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CANADIAN MACHINERY AND MANUFACTURING NEWS

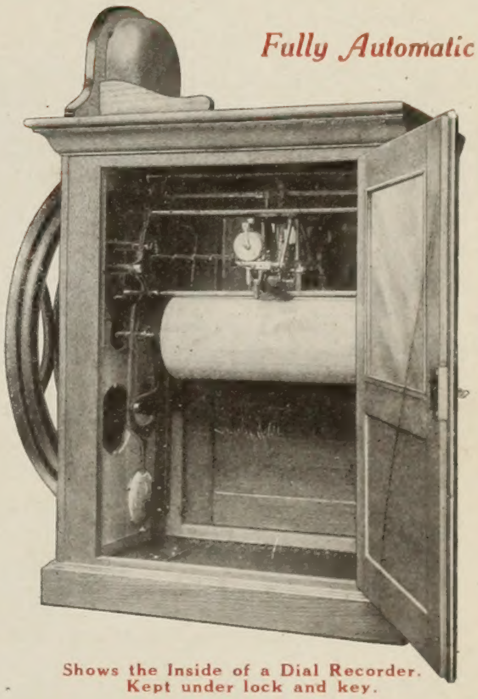
A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by the MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XVI—No. 1 Publication Office: Toronto, July 6, 1916 Subscription Price $3.00 per Year

This is how it works

The employee punches his number—
The Recorder does the rest.
That is—
It prints the exact minute he came to work.
It prints the exact minute he quit work.
At the end of the week you get, for your pay-roll, an exact statement of how much labor you got for the money paid.
The white drum in the cut shows the weekly sheet.
The printing mechanism moves automatically from the In column to the Out Column and vice versa, at the set hours. Also from one day to the next.
You simply wind the clock once a week.

Fully Automatic



Shows the Inside of a Dial Recorder. Kept under lock and key.

International Dial Time Recorder

Many of the most successful firms in the world use this system, some equipments comprising dozens of Internationals. The modern manufacturer would as soon think of doing without light as his Time Recorder. It checks his most important purchase—labor, and protects him from the commonest kind of dishonesty—the theft of time, and its consequence — an incorrect pay-roll.

We have a Time Recorder for YOUR business.

International Time Recording Company of Canada, Limited

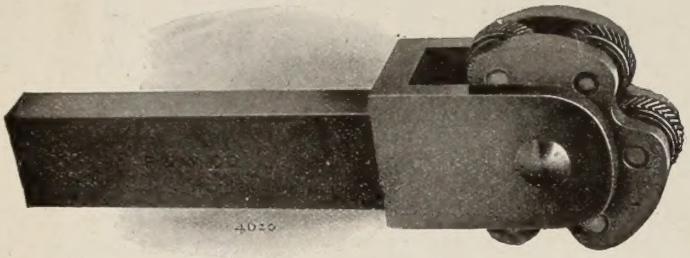
Factory:
Anderson St., Toronto
Phone Coll. 7393

F. E. MUTTON,
General Manager

W. A. WOOD, Jr., Sales Agent
Cartier Bldg., Montreal
McGill and Notre Dame Streets

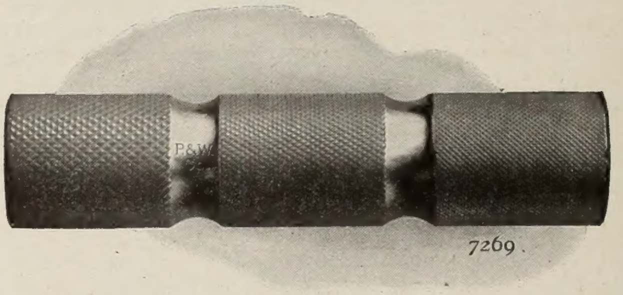
Don't Waste Time Changing Knurls

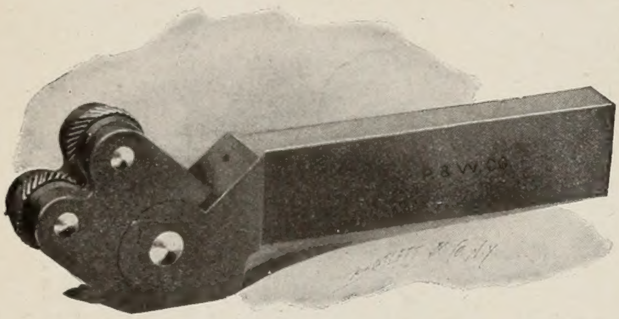
and don't be bothered with three holders when one will do.



Use the P. & W. "Three-in-One" Lathe Knurling Tool

Carries three pairs of knurls, making it three distinct knurling tools in one.





Coarse, Medium and Fine

The three pitches of knurls which we carry in stock are all combined in this one tool.

Uses same knurls as regular Lathe Knurling Tool shown opposite.

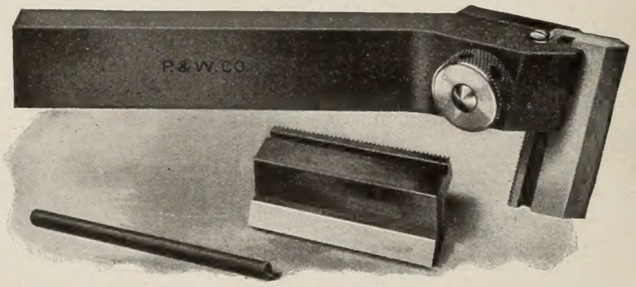
Same Holder for Chasers and Single Point Cutters

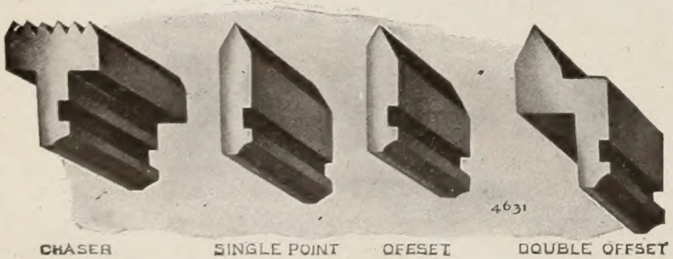
and the change can be made in a jiffy on the

P. & W. Threading Tool

A Few Of Its Advantages

1. Threads can be cut very close to a shoulder.
2. Tools are sharpened by simply grinding off top of cutter.





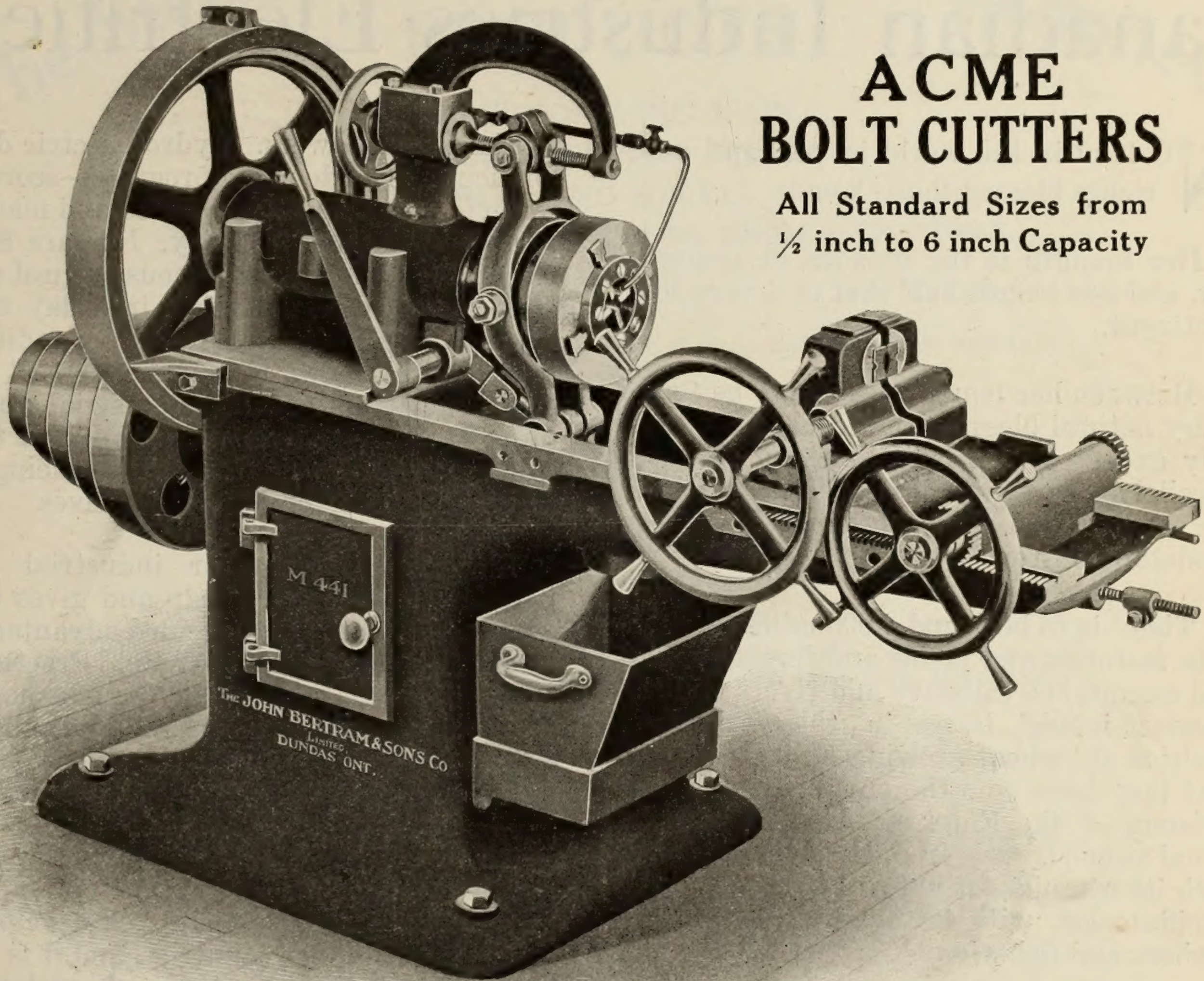
3. Combines economy with all features essential in a threading and forming tool.
4. Cutters have 15° clearance which experience has taught gives the longest wear in various metals.

Place a trial order with our nearest store.

Pratt & Whitney Co. of Canada, Limited

DUNDAS	MONTREAL	WINNIPEG	VANCOUVER
Ontario	723 Drummond Bldg.	1205 McArthur Building	B.C. Equipment Co.

BERTRAM MACHINE TOOLS



ACME BOLT CUTTERS

All Standard Sizes from ½ inch to 6 inch Capacity

Supplied with Leadscrew Attachment for Stay Bolts or other work requiring special Accuracy of pitch.

WRITE US FOR FULL DETAILS ON ANY MACHINE OR MACHINES IN WHICH YOU ARE INTERESTED.

The John Bertram & Sons Company Limited

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

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609 Bank of Ottawa Bldg.

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1205 McArthur Bldg.

The Publisher's Page

Canadian Industries Electrified!

NO land in the world is, perhaps, more richly blessed than Canada.

Her breadth is the breadth of a continent, and her length half that of a very long continent.

Between her boundaries are to be found every natural blessing that could be reasonably expected in a land touching the 45th parallel on the south and the Arctic circle on the north. And those blessings have been prodigally bestowed.

There is to be found 4,000 miles of alternate factories and farms and forests, mines and mountains, railways and rivers and the greatest inland lakes in the world, vast prairies of wheat-growing soil so prolific that they have won the envious title of the Granary of the Empire. All this is to be found as one travels from the Atlantic coast, with its magnificent natural harbors, to the Pacific coast, with its equally magnificent harbors and fisheries.

The mines of Canada are especially rich, producing gold, silver, iron, zinc, copper and coal in immense quantities, and as yet one might say that only the surface has been touched.

Of all Canada's great resources one of the greatest is perhaps her wonderfully potential water powers. Hydro-Electric development has made rapid progress—scores of waterfalls have been harnessed and made to turn the wheels of industry. Niagara Falls, one of the world's most famous natural wonders, have converted night into day for a hundred cities and towns within a radius of two hundred miles, to run their street cars and trolleys, to turn their industrial wheels, to cook their food, to wash and iron their clothes. And all this without sacrificing the scenic beauty of the Falls themselves.

Electrical energy for industrial purposes is surprisingly cheap and gives Canadian manufacturers a decided advantage in competing for export trade. Practically every industrial centre in Canada has its source of power close at hand and millions of horse-power remains undeveloped—to be harnessed and utilized as the country expands.

The abundance of cheap power will prove a very great factor in developing business with other countries, and it is only natural to assume that the characteristic progressiveness of Canadian manufacturers will be applied in other directions in the same aggressive manner as it has in taking advantage of one of the greatest of nature's gifts. And if it does the result will be as satisfactory to the buyers of Canadian-made goods at it will be gratifying to the manufacturers themselves.

Canadian Machinery & Manufacturing News
143-153 University Avenue, Toronto, Canada
Montreal Winnipeg London, England Boston New York Cleveland Chicago

Quality **Service**

The Steel Company of Canada, Limited

PRODUCTS

"HAMILTON" PIG IRON

BASIC, MALLEABLE AND FOUNDRY

IRON AND STEEL

BLOOMS, BILLETS, BARS, WIRE RODS, ANGLES, CHANNELS, PLOW BEAMS, ETC.

FORGINGS

Car Axles, Shape and Drop Forgings, Horse Shoes, Carriage and Automobile Hardware, Top Goods, Etc.

WIRE, ETC.

Steel, Brass, Copper and Bronze, Heavy and Fine, Bright Annealed, Coppered, Liquor Bright, Galvanized and Tinned. Stranded, Steel and Copper Cable, Clothes Line, Wire Nails, Staples, Barb Wire, Woven Wire Fencing, Fence Gates.

RAILWAY FASTENINGS

Angle Bars, Track Bolts, Tie Plates, Spikes, Tie Rods, Etc.

NAILS, SPIKES, RIVETS, ETC.

Wire, Cut, Boat and Horse Shoe Nails, Railway, Pressed and Drift Spikes. Tacks and Shoe Nails, Steel and Copper Rivets, and Burrs, Iron, Brass and Copper.

POLE LINE HARDWARE

Pole Steps, Cross Arm Braces, Guy Clamps and Guy Rods, Etc., Black and Galvanized.

BOLTS, NUTS AND WASHERS

Machine, Carriage, Elevator, Stove, Tire and Sleigh Shoe Bolts, Blank, Tapped Nuts, and Washers.

WROUGHT PIPE

Black and Galvanized Nipples and Couplings.

SCREWS

Wood and Machine Steel, Brass and Bronze.

LEAD PRODUCTS

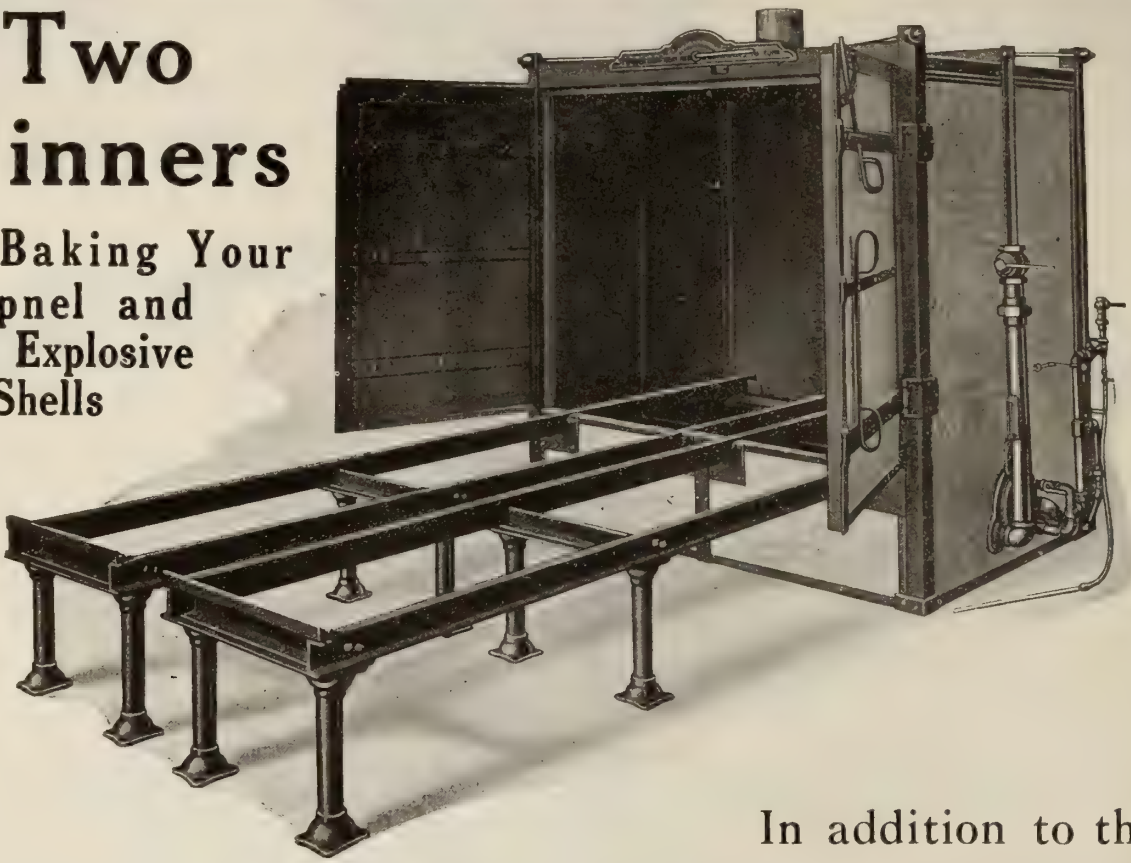
Lead Pipe, White Lead, Shot and Putty

The Steel Company of Canada, Limited

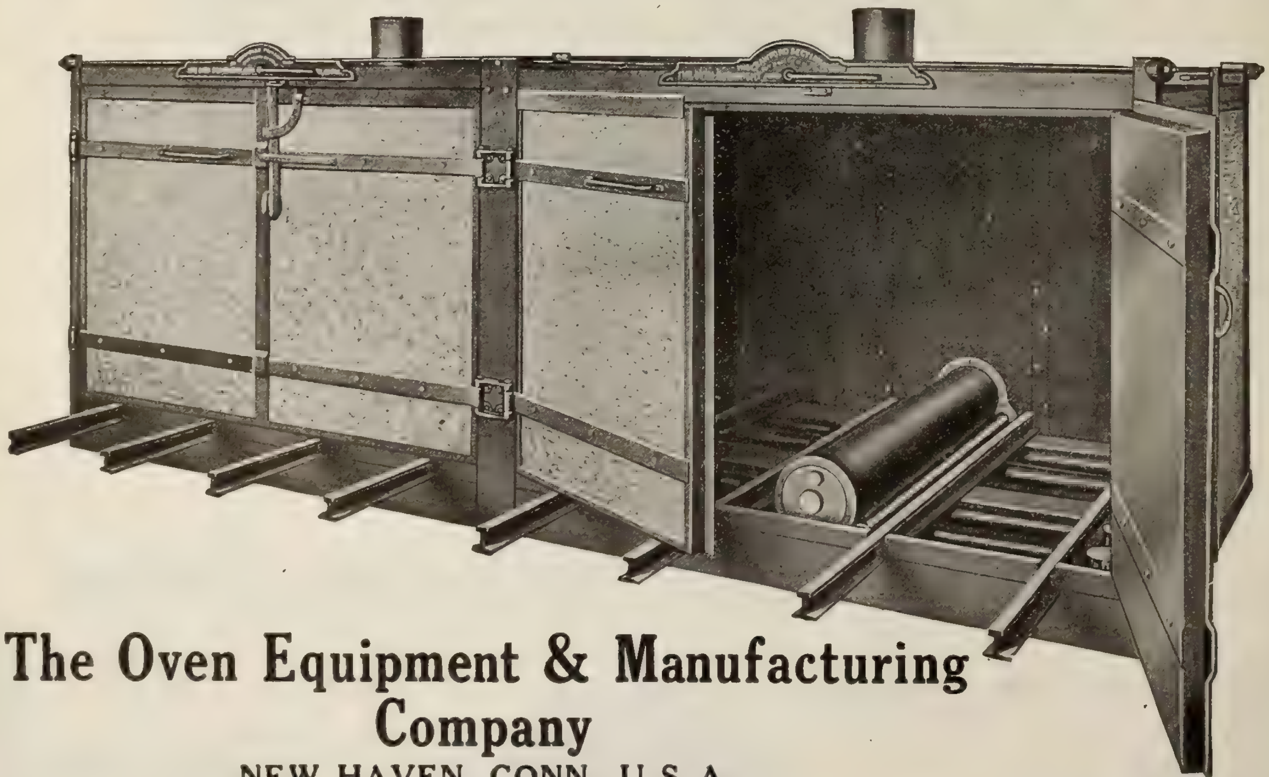
HAMILTON TORONTO MONTREAL WINNIPEG

Two Winners

for Baking Your Shrapnel and High Explosive Shells



In addition to the constructing of Special Oven Equipment, we design and build trucks suitable for handling any size of shell.



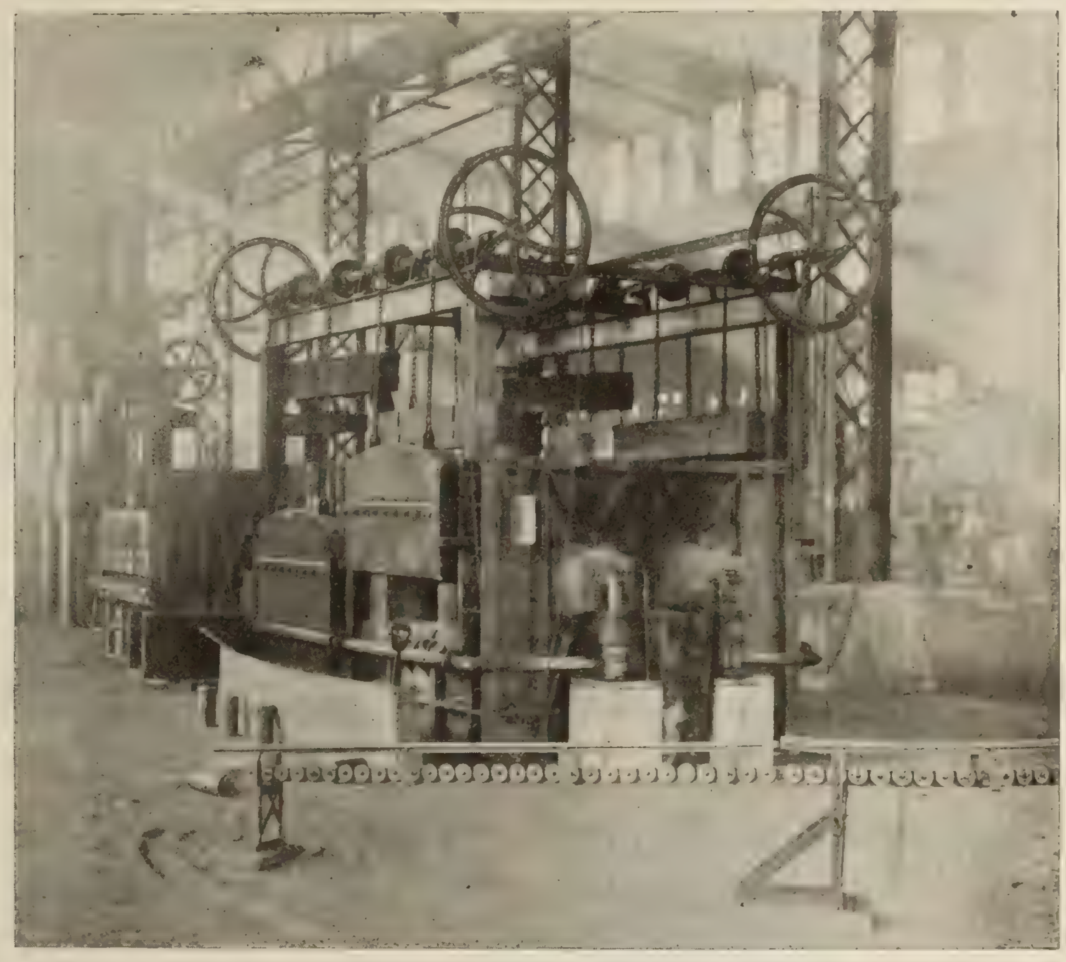
The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN., U. S. A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA

"MECOL" Furnaces

especially designed for Shell Work



To secure accurate SHELL FORGINGS you must have properly heated Billets.

Shell, Howitzer and Cartridge Cases

HEATED TO THE DESIRED TEMPERATURE

are only possible in well-designed Furnaces. The largest manufacturers are using MECOL FURNACES. Full particulars on request.

All Furnaces designed and built under personal supervision of F. DITCHFIELD, "THE FURNACE MAN."

Mechanical Engineering Company, Limited
55 COTE STREET, MONTREAL, QUE.
PHONE—MAIN 3585

A direct increase of capacity for every lathe in your plant

will result from the use of

STELLITE

HIGH SPEED TOOL METAL

MADE IN CANADA
STELLITE

—the alloy of metals without a particle of iron in it; the alloy so hard and so tough that the best tool steel seems soft and brittle beside it.

"Stellite" tools do not lose their temper. Sometimes the speed of the lathe becomes so great that the edge of the "Stellite" tool becomes visibly red, and remains so during an entire cut without the slightest injury.

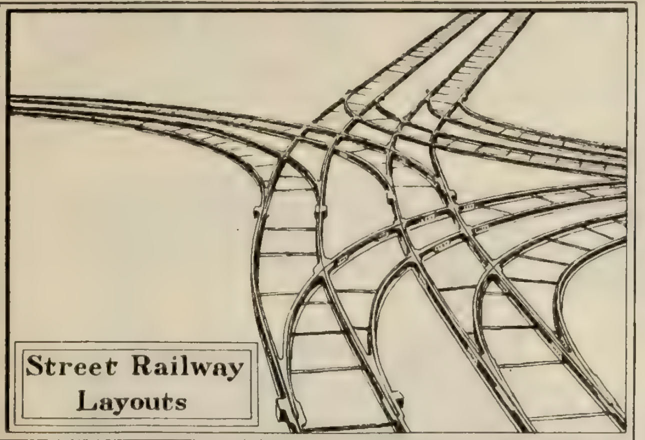
"STELLITE" TOOLS INCREASE PRODUCTION 20 TO 300 per cent., also greatly reduce labor cost and overhead per piece.

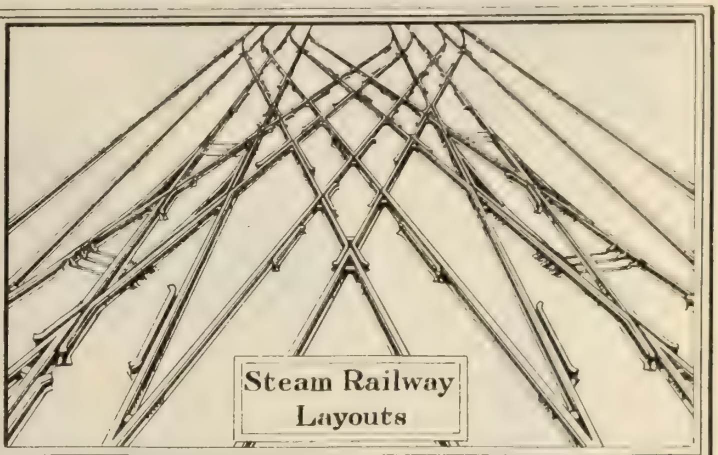
Send a trial order and get acquainted.

Made in Canada by
Deloro Mining & Reduction Company, Limited
Deloro, Ontario
C.P.R. Building, Toronto, Ont.

Sold Exclusively in Canada and Newfoundland by
The Canadian B. K. Morton Company, Limited
49 Common St., Montreal, P.Q.
86 Richmond St. E., Toronto, Ont.

Full particulars and price on request.


Street Railway
Layouts


Steam Railway
Layouts

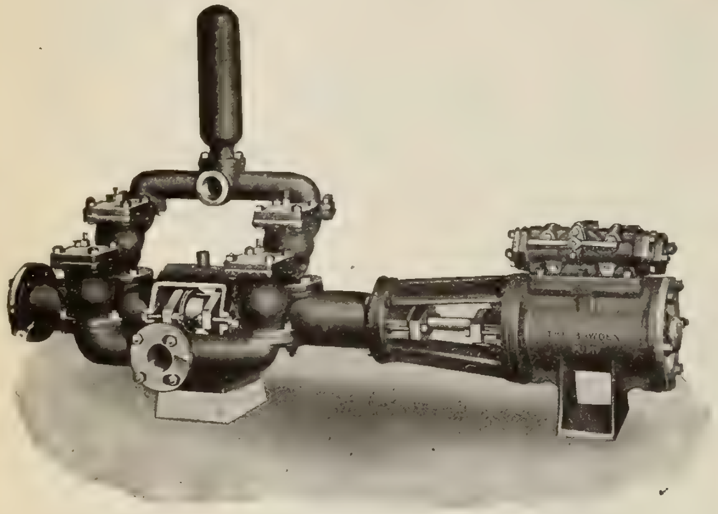
Switches, Frogs and Every Description of Trackwork.
Solid Manganese Steel Construction. Cast Iron and Cast Steel bound Construction with Manganese Steel Inserts.

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

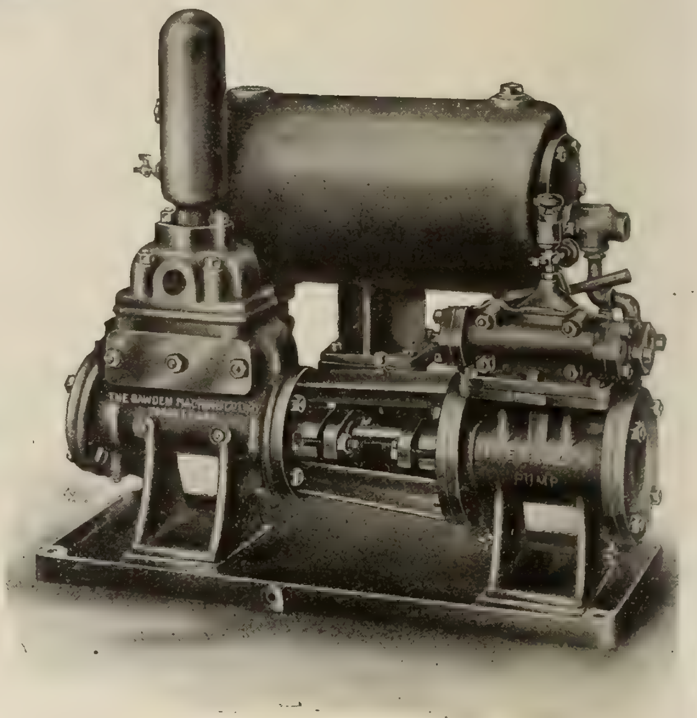
ARMSTRONG, WHITWORTH OF CANADA, LIMITED
22 VICTORIA SQ. MONTREAL P.Q.
"T.Y.R."
Highspeed Steel
(Made in Canada)
Works: LONGUEUIL, Que.
DOMINION BANK BLD'G TORONTO

Steam and Power Pumping Machinery

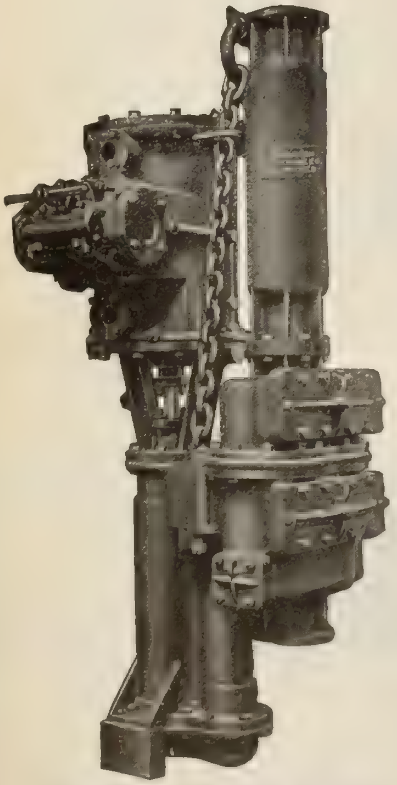
BAWDEN
NEVER SHORT STROKE
PUMPS



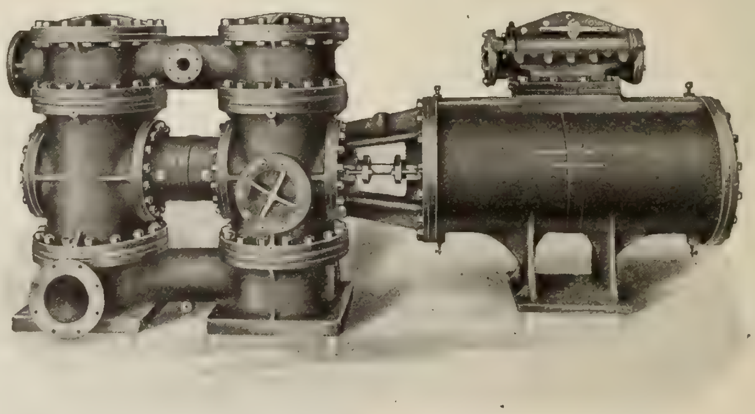
General Service Pump for High Pressures



Automatic Feed Pump and Receiver



Vertical Sinking Pump



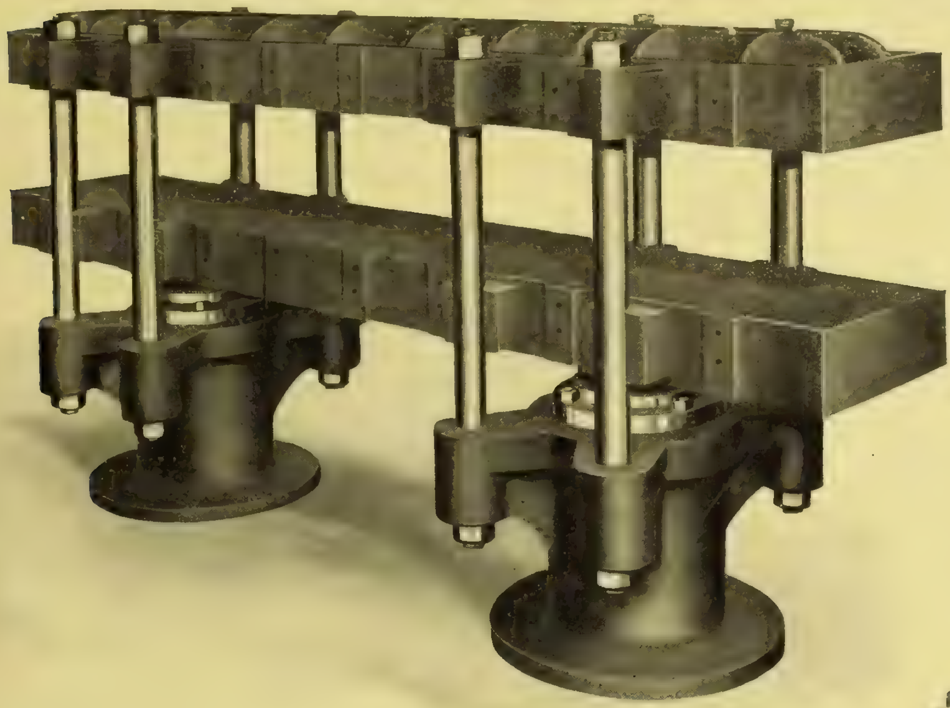
The Bawden Compound Pump

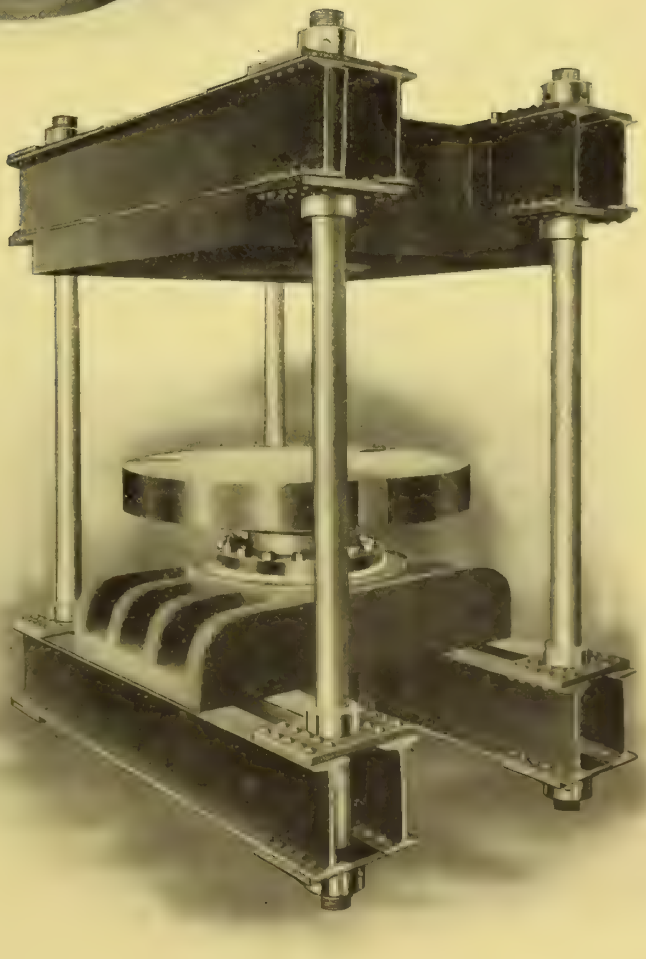
Bawden Machine Co., Limited
TORONTO, CANADA

The Bawden Machine Co., Limited

HYDRAULIC PRESSES

DESIGNED AND BUILT IN OUR WORKS





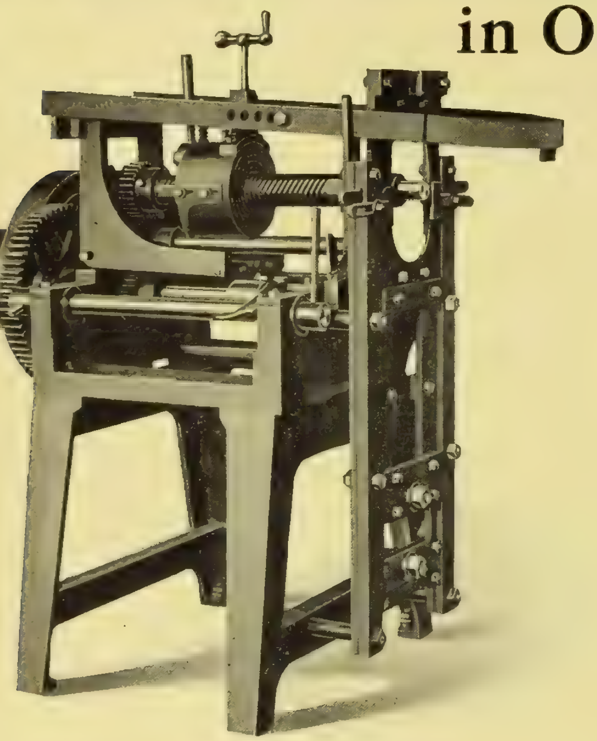
We build a standard line of Presses from 12" x 18" to 16' x 5', suitable for any pressure or tonnage.

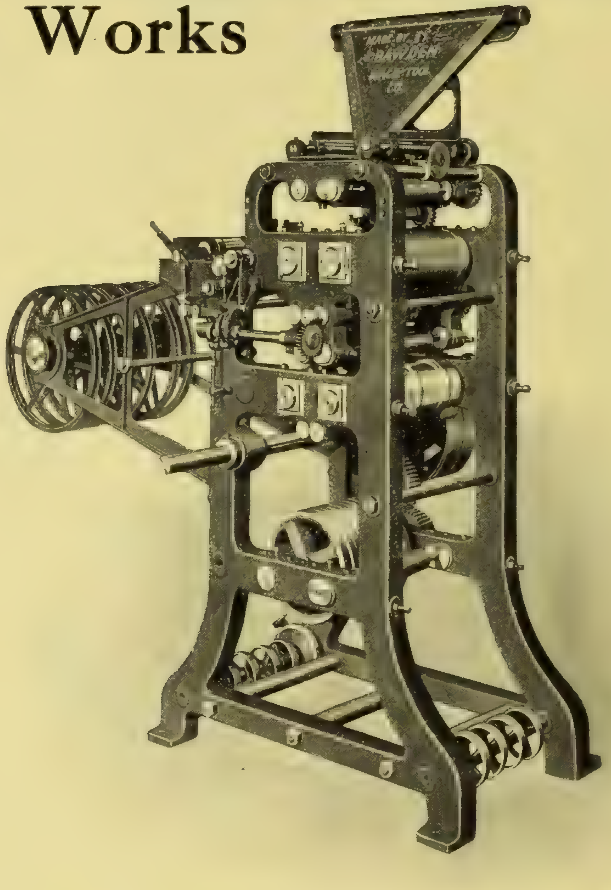
Write us regarding your requirements for standard or special hydraulic presses, and have our representative call.

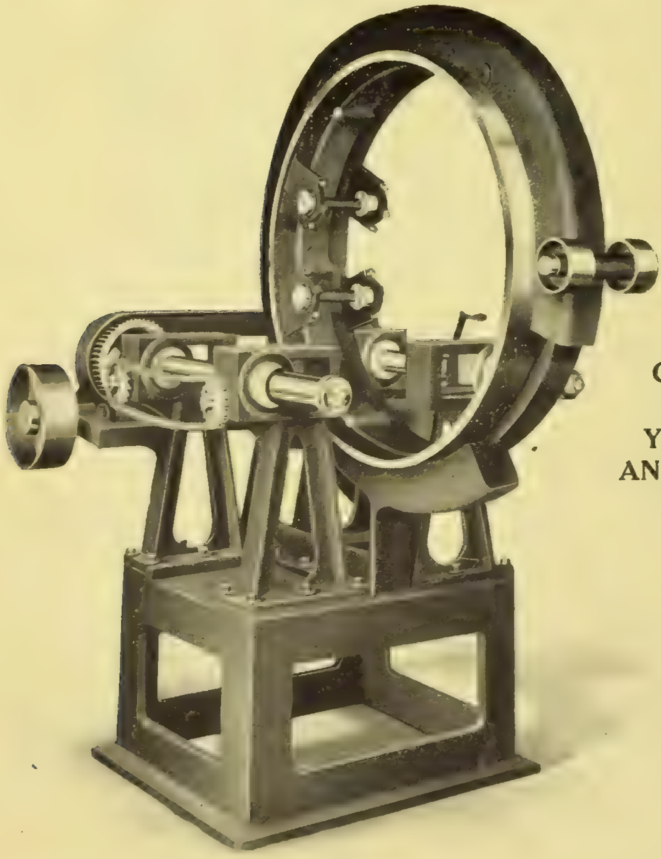
The Bawden Machine Co.
LIMITED
TORONTO CANADA

The Bawden Machine Co., Limited

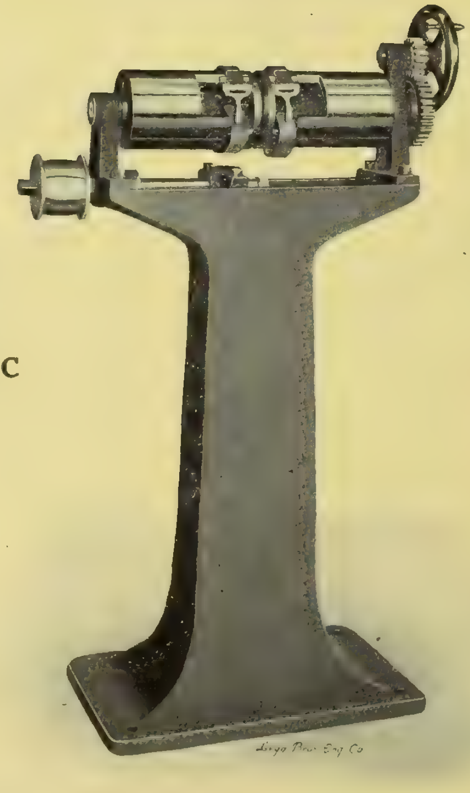
Automatic Machinery Designed and Built in Our Works




MADE BY THE
BAWDEN
MACH.TOOL
CO.



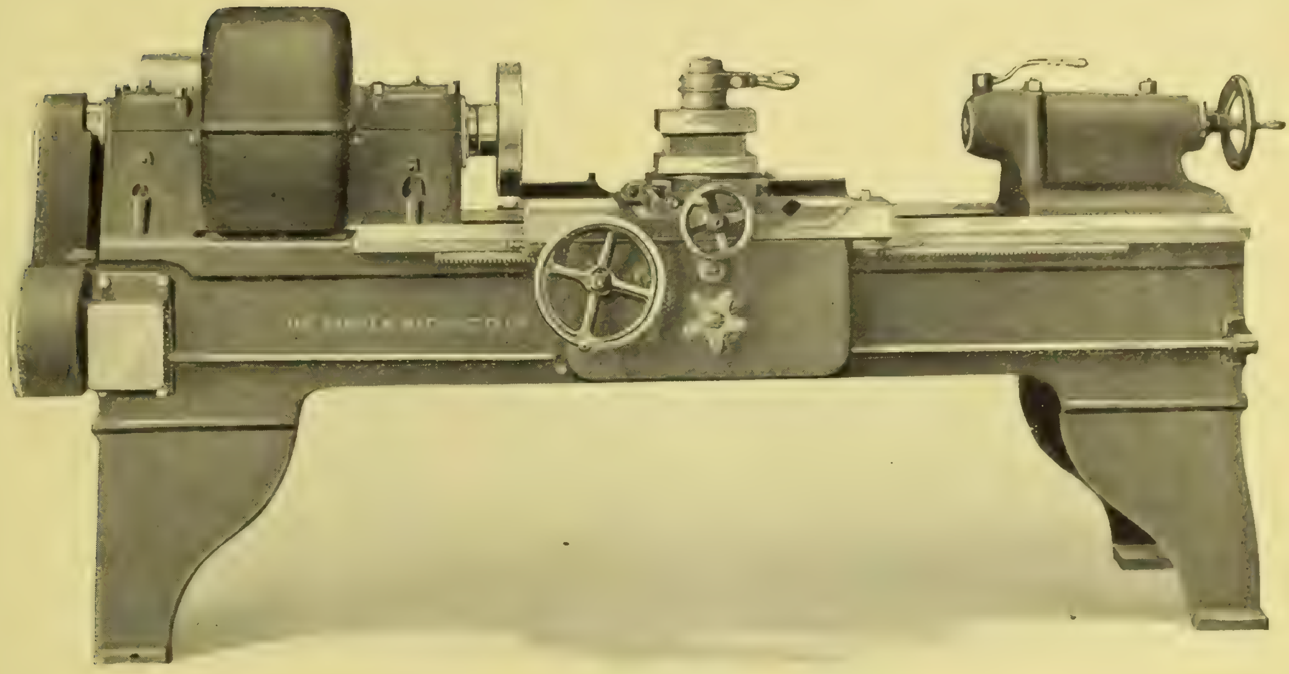
CONSULT US
REGARDING
YOUR SPECIAL
AND AUTOMATIC
MACHINERY



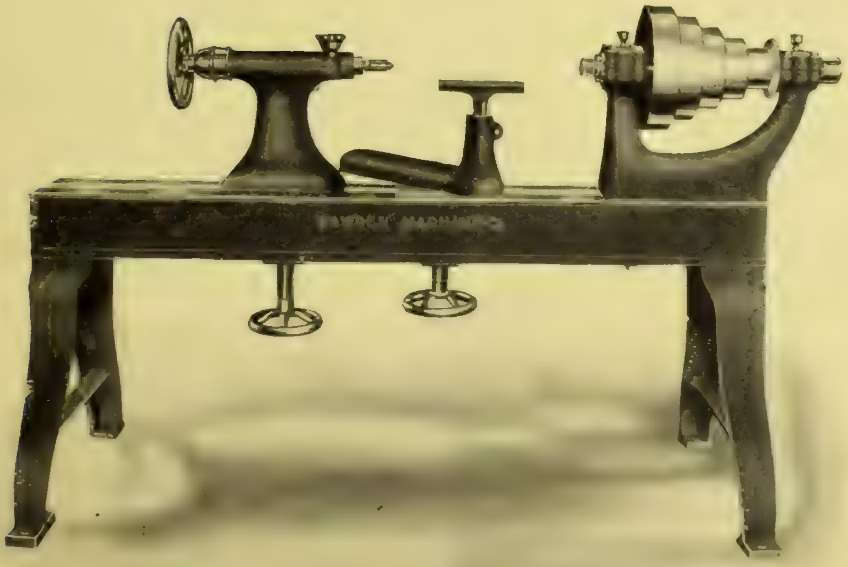
The Bawden Machine Co., Limited - Toronto, Canada

The Bawden Machine Co., Limited

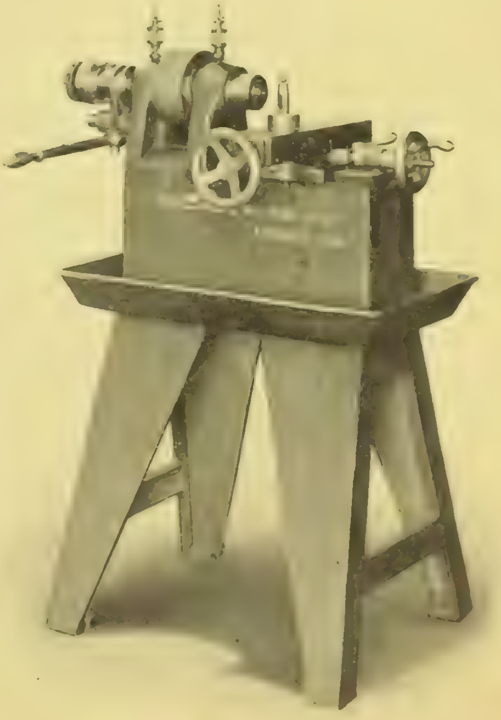
Lathes



Bawden New 24 in. Double Back Geared Shell Lathe. Gear ratio, 19½ to 1. Rough turn 6 in. H.E. Shell 6¼ minutes.



Bawden Spinning Lathe

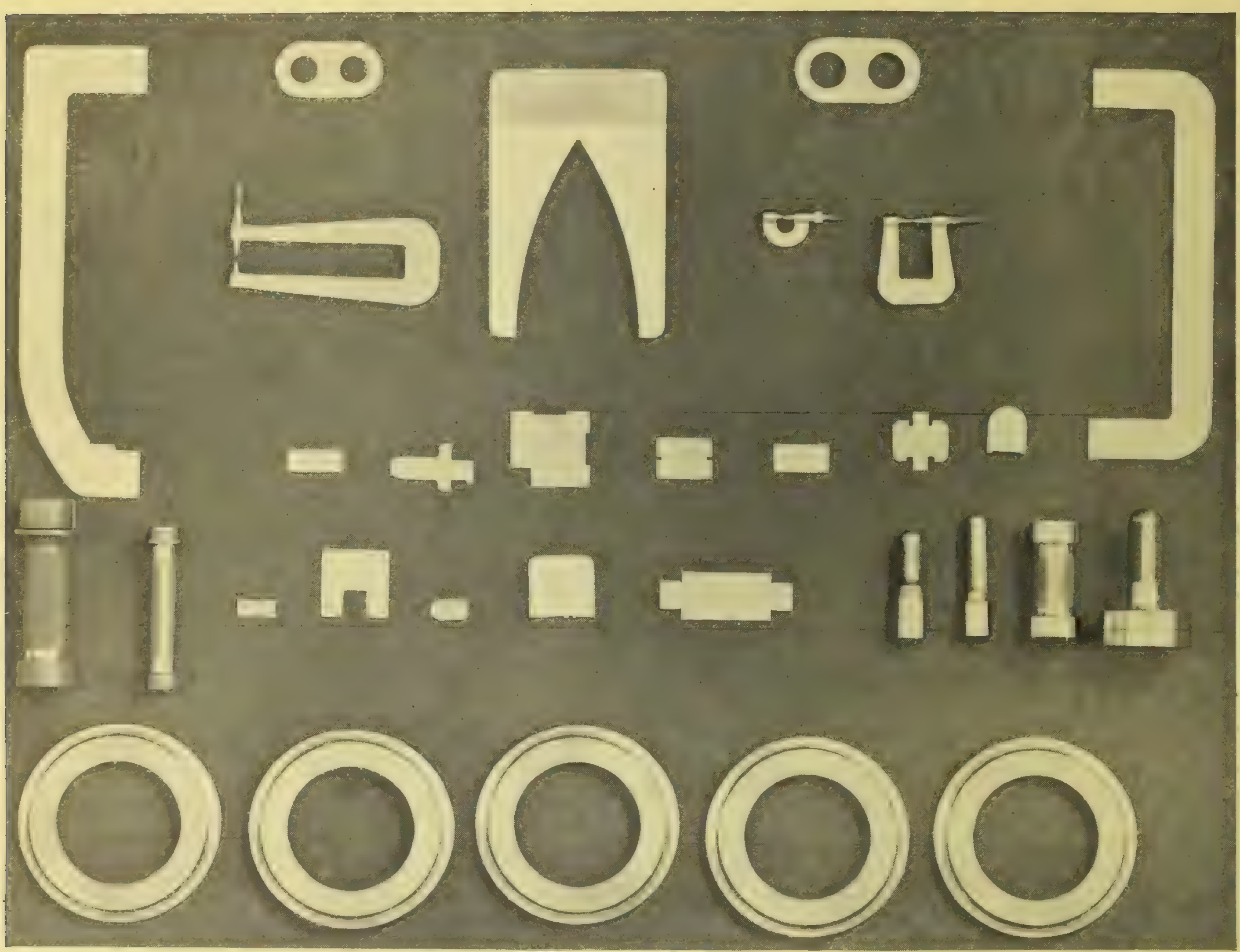


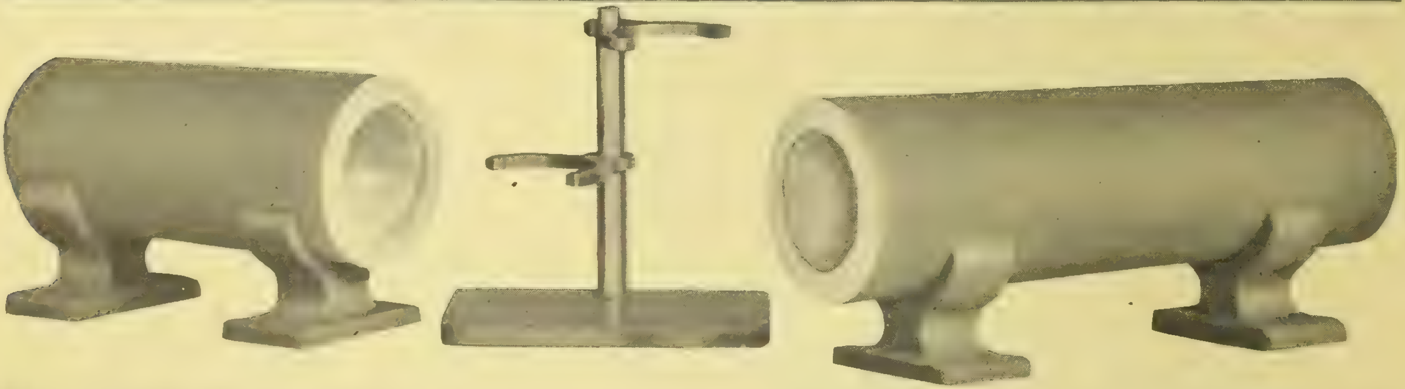
Bawden Plain Screw Machine

The Bawden Machine Co., Limited - Toronto, Canada

The Bawden Machine Co., Limited

MUNITION and SPECIAL GAUGES





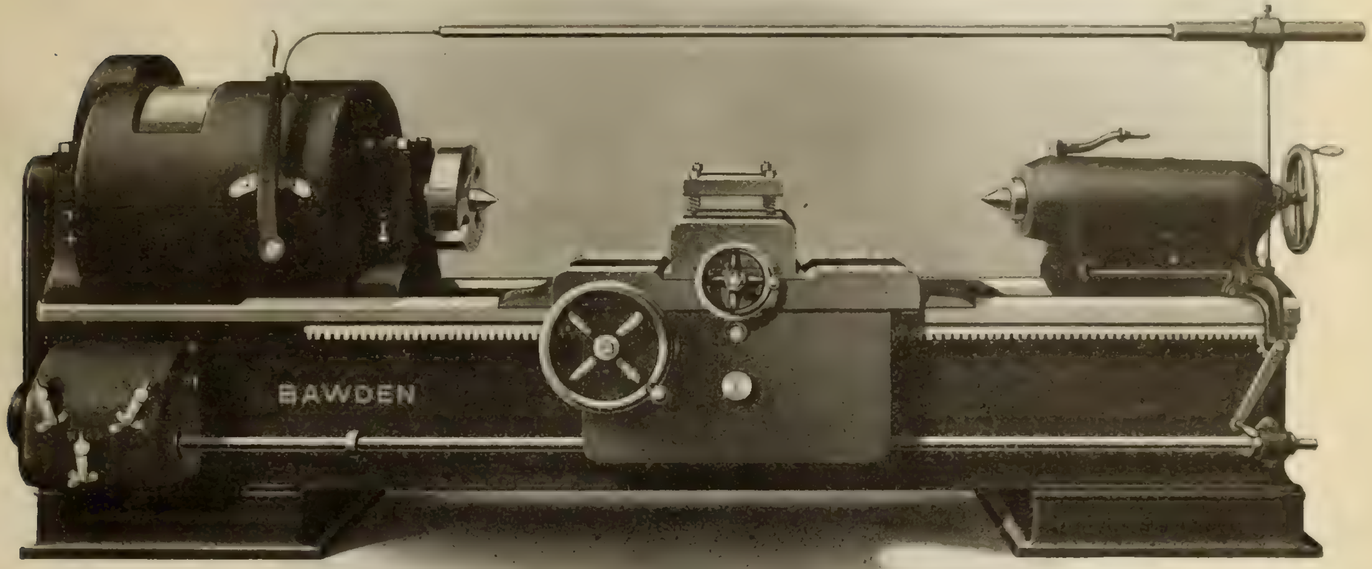
We manufacture a full line of gauges for all sizes of British, Russian and French shells and component parts.

The Bawden Machine Co., Limited - Toronto, Canada

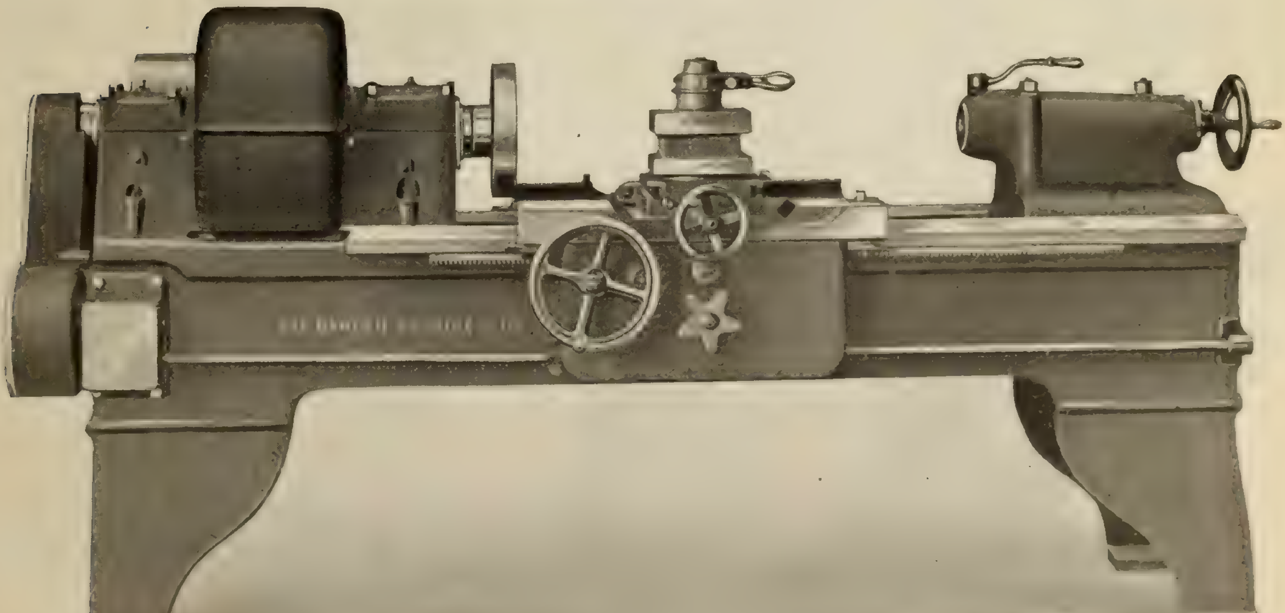
The Bawden Machine Co., Limited

Bawden Heavy Duty Shell Lathes

Every part made in our plant. Bronze bearings, steel spindles and gears. Best material and finish throughout.



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.



New Bawden 24 in. Double Back Geared Shell Lathe for Shells up to 6 in. Gear Ratio 19¼ to 1. Rough turn 6 in. H.E. Shell, in 6¼ mins.

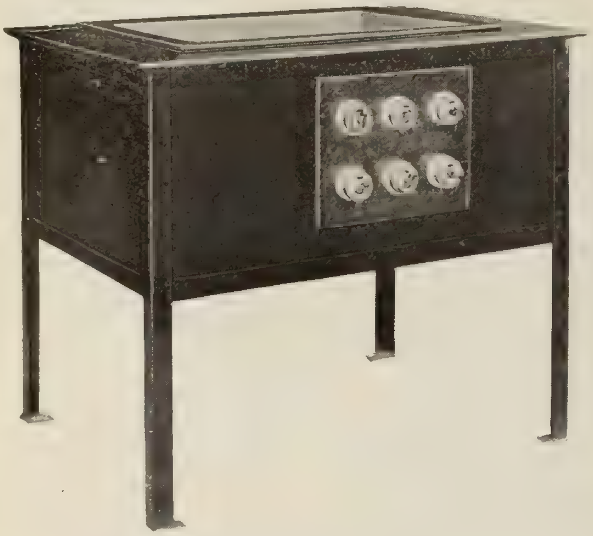
Write for particulars and learn what Bawden Lathes are doing. Lathes fitted with attachments for all operations.

The Bawden Machine Co., Limited, 125-137 Sterling Road, Toronto, Canada

HOSKINS

TRADE MARK REGISTERED

ELECTRIC OIL TEMPERING FURNACES REDUCE YOUR FIRE RISK



The HOSKINS Electric Oil tempering furnace was designed to reduce the dangers of fire so common with other types of oil tempering furnaces.

The electric unit is immersed in oil, thus insuring the use of the full heat generated. In this type of furnace it is possible to get an absolutely even heating of the oil, perfect control of the temperature of the oil and the elimination of excess radiated heat and destructive fumes. Owing to the efficient design of this furnace the operating cost is generally lower than either gas or oil. For full particulars, write our nearest Sales Office.

Canadian Hoskins Limited

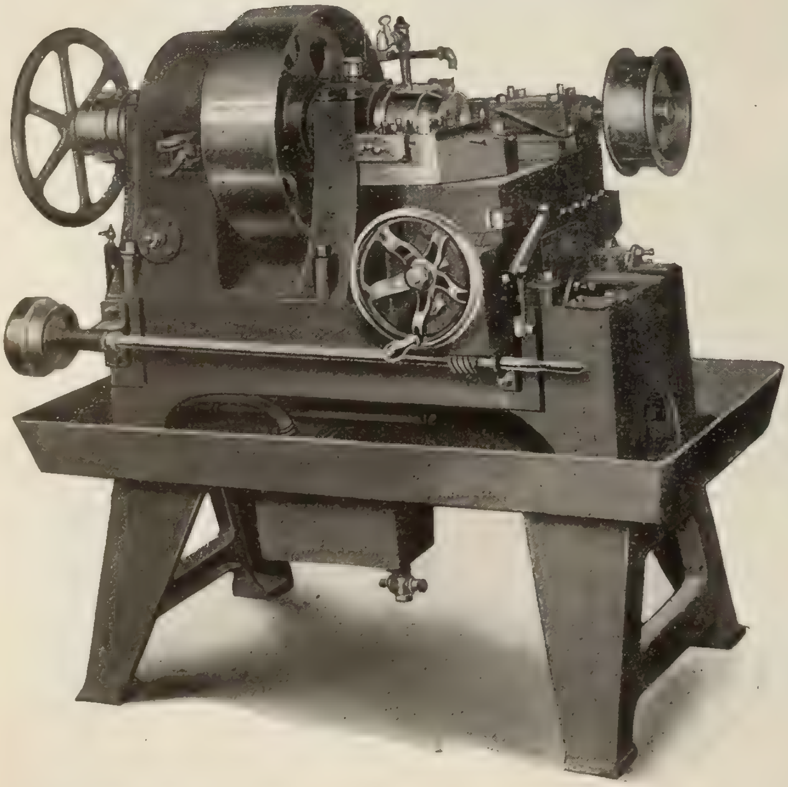
ELECTRIC, GAS AND OIL FURNACES AND PYROMETERS

General Office and Factory, WALKERVILLE, ONTARIO

Sales Offices

MONTREAL
224 St. James Street

TORONTO
Traders Bank Building



For Turning, Facing and Milling the Thread on Gas Check Plugs for 6-inch High-Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells. Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

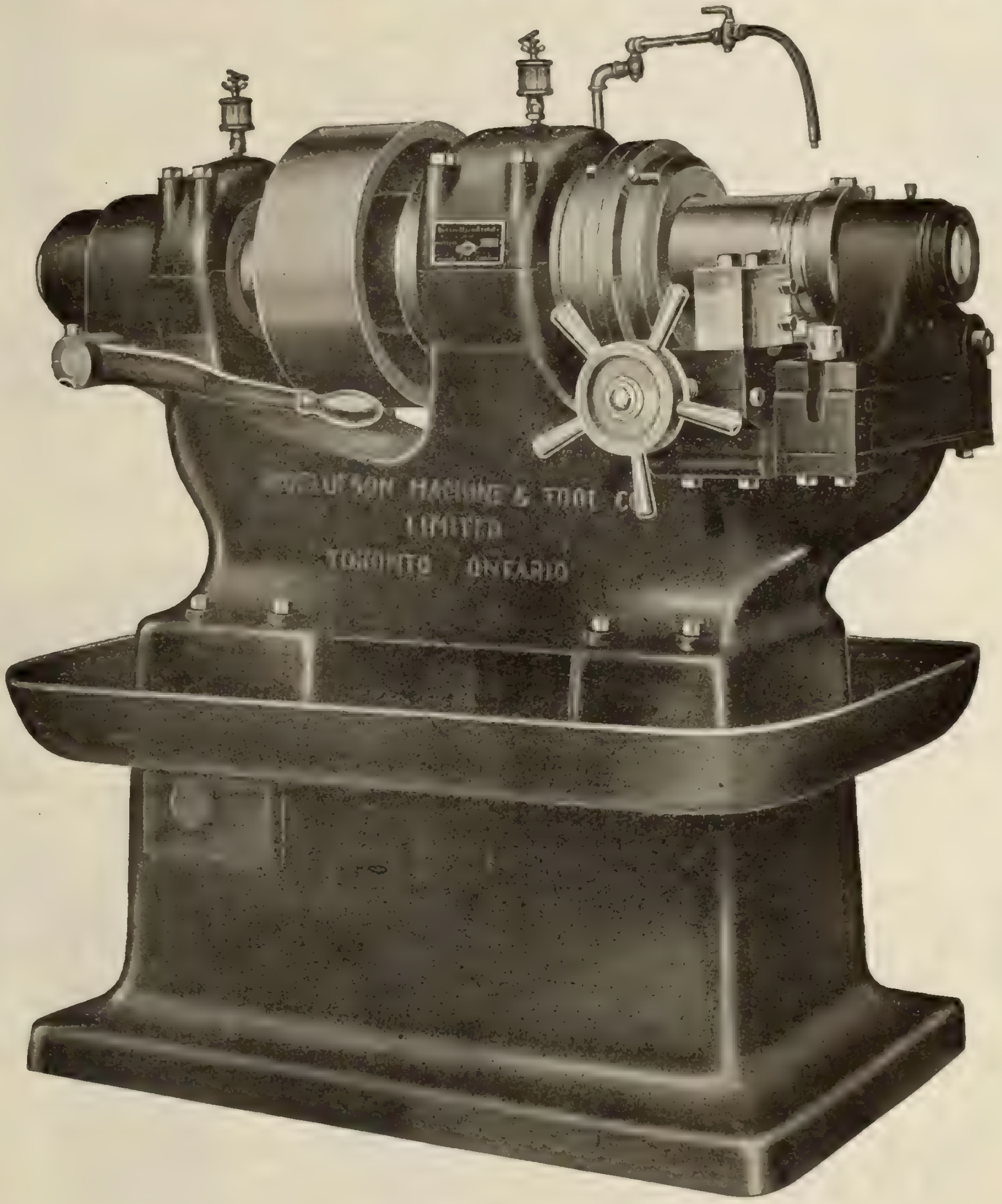
Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield

STAIR BUILDING, TORONTO, ONT.

BAND TURNING MACHINE



6-Inch Band Turning Machine.

Machines for 15, 18, 60-pdr. and 4.5 and 6-inch Shells.

The **experienced** shell maker will appreciate the design of this most efficient machine. The following features are worthy of special note.

Integral (en bloc) construction insures perfect **rigidity**, permanent **accuracy** and desirable **compactness**.

Self-centering cup rest with push collet chuck provides automatic location of work, accurately and rapidly.

Graduated feed dial, two cutting tools and ample belt power insure maximum output of accurate work in least possible time.

Many in use in Canadian Munition Plants giving absolute satisfaction.

WRITE FOR PRICES AND DELIVERIES.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

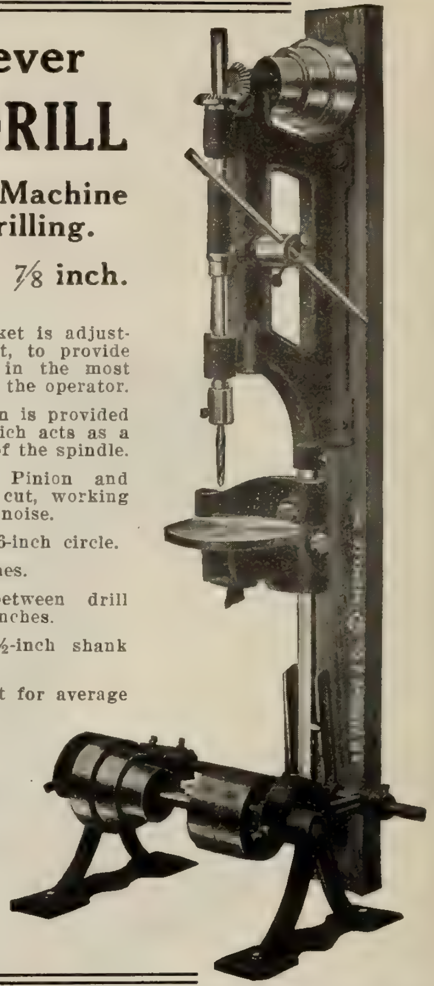
ACCURACY

The discriminating buyer is the one we like to meet—the one who insists on accurate product. He will eventually buy "GALT" Cap and Set Screws because they measure up to his standard.

Your rush orders for S. F. Hex. nuts taken prompt care of. Better finished nuts—try a sample.

THE
GALT MACHINE SCREW CO.,
LIMITED
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company, Limited, 49 Common St., Montreal, Que.



16 in. Lever
POST DRILL

A Giant Little Machine For Light Drilling.

Will drill up to 7/8 inch.

The Feed Lever Socket is adjustable on the feed shaft, to provide for setting the lever in the most convenient position for the operator.

An adjustable friction is provided for the feed shaft, which acts as a balance to the weight of the spindle.

Bevel Gears, Feed Pinion and Rack are all machine cut, working smoothly and without noise.

Drills to centre of 16-inch circle.

Run of feed 5¼ inches.

Greatest distance between drill spindle and table, 22 inches.

Spindle bored for ½-inch shank twist drills.

Speed of countershaft for average work, 300 per minute.

A. B. Jardine & Co.
Hespeler, Ontario

PIG IRON

"Victoria" Foundry and Malleable, made by The Canadian Furnace Co., Port Colborne, Ont., Canada

M·A HANNA &Co

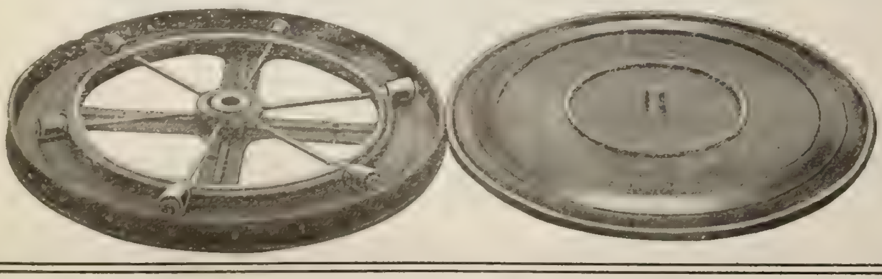
M.A.HANNA&Co. Sales Agents: CLEVELAND, O., U.S.A.

Whiting Turntables

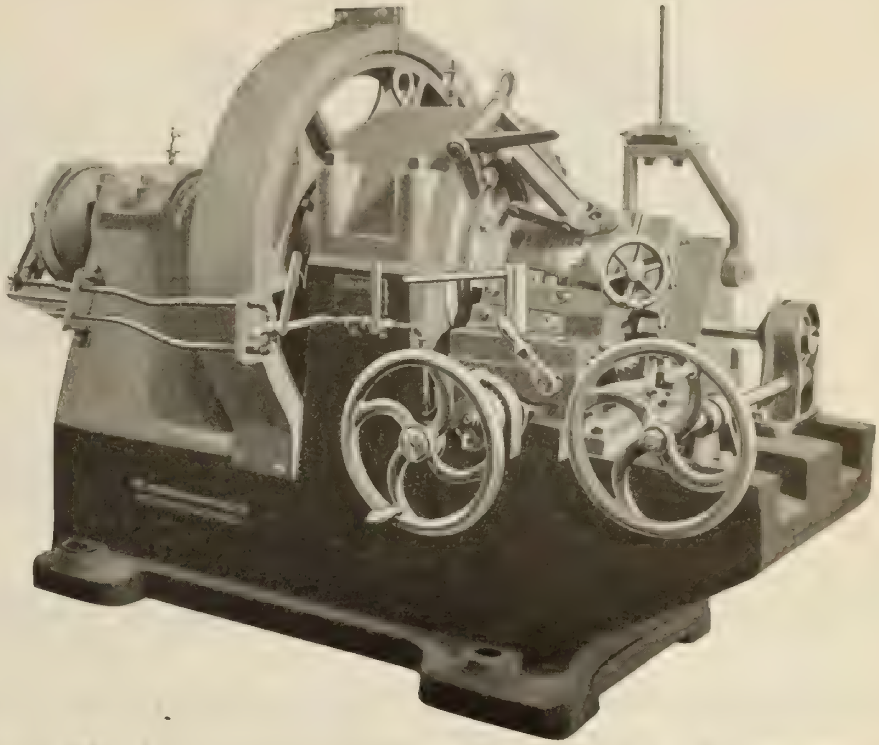
Rigid, self-contained construction. No tipping, no getting out of line, no journal friction. Load is carried on conical, chilled rollers, running on machined path, giving long life and smooth, easy operation. Tops furnished plain or with raised or grooved tracks. Smaller sizes with plain tops kept in stock, together with frogs. **Send for Catalog 78.**

Complete Foundry Plants
Cranes of all kinds

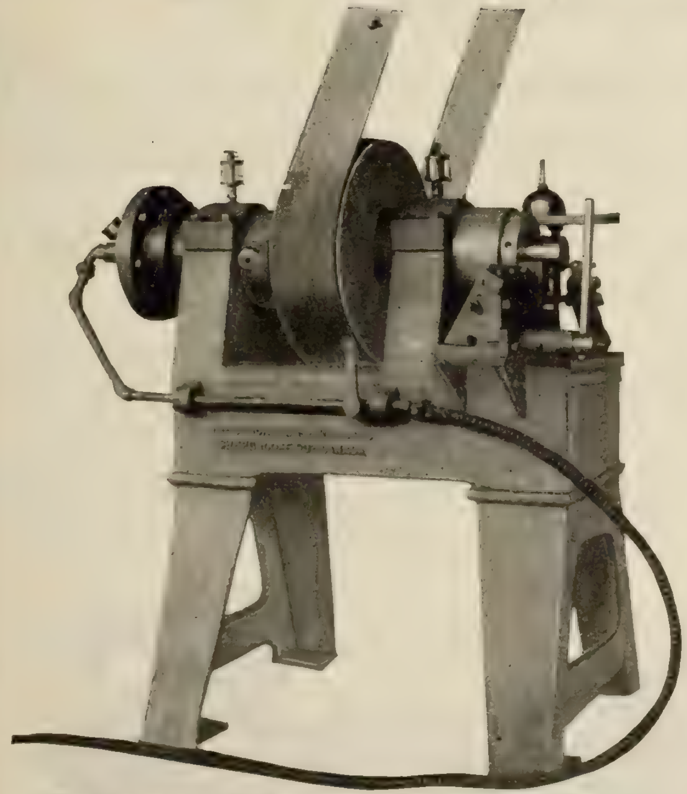
WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB.



Single Purpose Lathes for Shell Work



For turning the bands on 9.2" and 12" British shells



Single Purpose Lathe, air equipped for turning and finishing the driving band on Shrapnel and High Explosive Shells, British, French or Russian.

Machines that put a new speed to shell banding operations.

Jenckes Banding Lathes will give the best production of anything in shell banding tools yet designed.

You can clearly see by the liberal proportions of these machines that they are built for long, heavy service.

We manufacture banding machines for 18 pdr., 4.5", 5", 6", 8", and 9.2" shells.

These machines are also tooled when required for the mm. sizes corresponding to Russian and French ammunition.

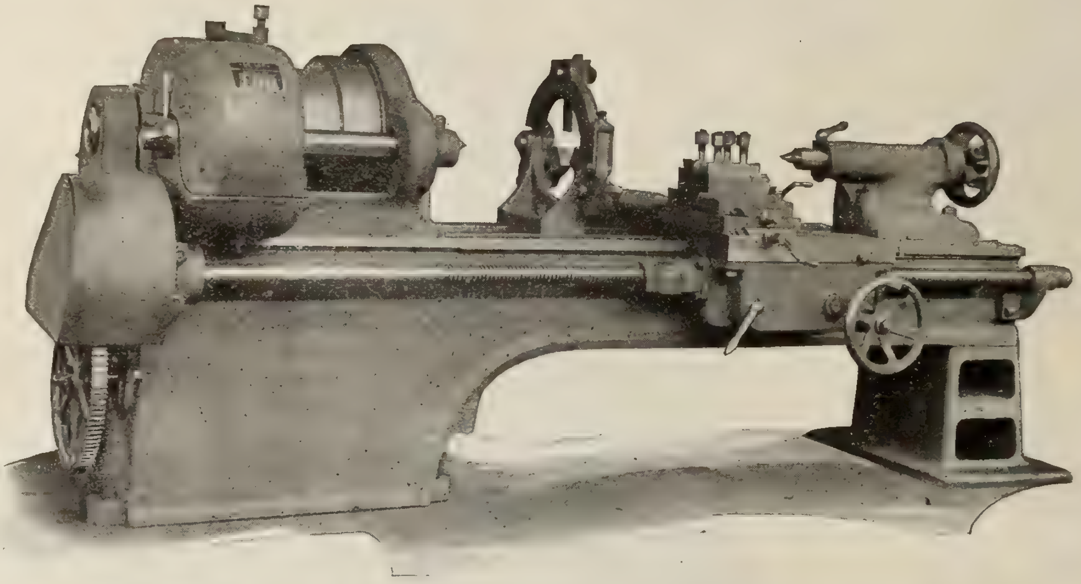
Single Purpose Lathe for turning copper band on 9.2" British Shell. Illustration shows spindle enlarged to adapt this machine for finishing the bands on the 12" British Shell. Air chuck and friction.

The JENCKES MACHINE CO., Limited

Works: SHERBROOKE, QUE.; ST. CATHARINES, ONT., CANADA

CANADIAN SALES OFFICES:

727 Traders Bank Bldg., Toronto; 908 E. T. Bank Bldg., Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Bldg., Vancouver; Nelson, B.C.



PB

LANG SINGLE PURPOSE LATHE

PB

Made in the United States under supervision of British Government. (Lang's Design.)

59 BEAVER HALL HILL **PEACOCK BROTHERS** MONTREAL, QUE.

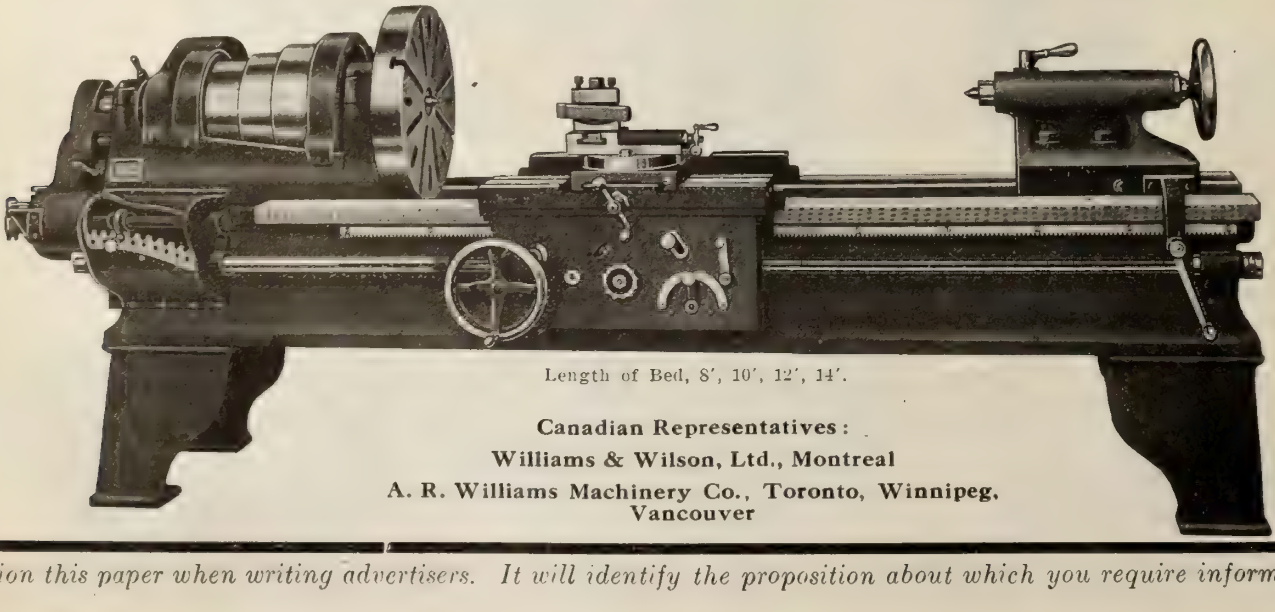
Davenport 22-Inch Lathe — For Extra Heavy Service

These lathes are built exceptionally rigid and heavy. No feature has been omitted, to secure great strength and power. The bed, the headstock, the tailstock, the carriage—every detail has been designed and constructed with a view to driving the heaviest cut that any tool will stand up against. At present we can make quick deliveries on this machine.

Built with ordinary change gears unless otherwise specified.

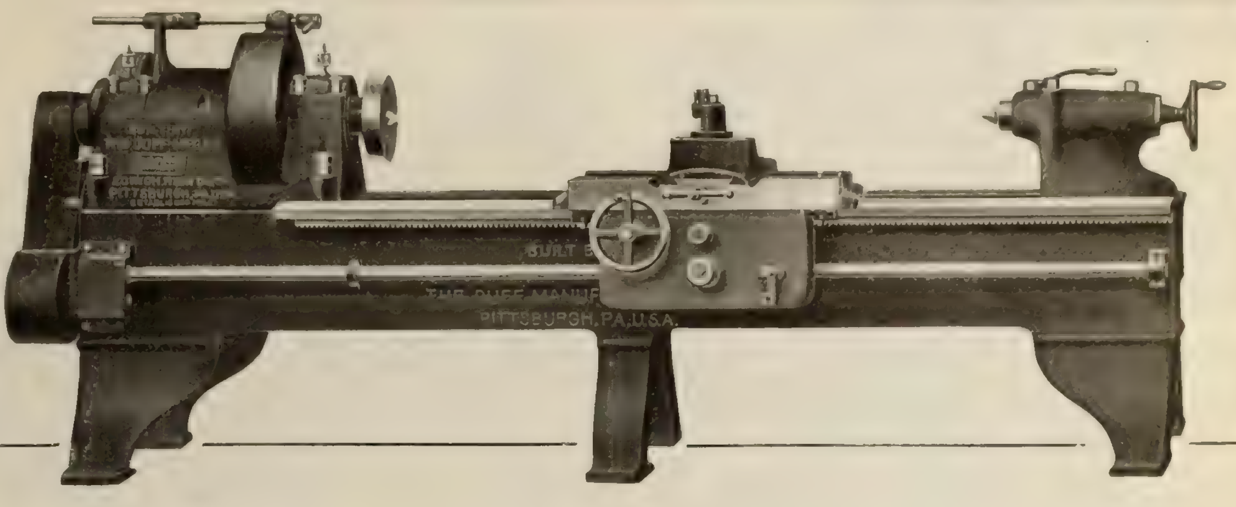
Write at once for Bulletin. It gives full details of construction.

DAVENPORT LOCOMOTIVE WORKS
DAVENPORT, IOWA



Length of Bed, 8′, 10′, 12′, 14′.

Canadian Representatives:
Williams & Wilson, Ltd., Montreal
A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver



The HINDMAN HIGH DUTY LATHE

has all the power for heavy turning

The compactness, the simple, rugged construction, make this machine a big producer in the duplication of heavy lathe work.

Of 20-inch swing, it has all the solid strength of the average 36-inch lathe. It delivers 15 h.p. at the cutting tool.

We can make IMMEDIATE DELIVERIES on this machine with 10 ft. bed. Write for details at once.

Detailed Specifications

Swing over Shears	20"
Swing over Carriage	12"
Distance between Centers, 10' Bed..	64"
Single Speed Drive, consisting of tight and loose pulley, loose pulley running on roller bearings. Speed of 690 revolutions per minute, diameter of pulley	10½"
Width of belt	4½"
Front Spindle Bearing diameter...	5"
Front Spindle Bearing Length	7⅝"
Spindle Nose Diameter	4 1/16"
Spindle size of hole, regular.. .... (up to 3½" extra)	1½"
Diameter Main Driving Gear (Steel) on Spindle..	18 x 3 11/16" Face
Spindle Speeds (Steel Gears, 3" Face) number regularly furnished	3
Feeds number, regularly furnished.	**5**
Feeds range	20 to 100
Tail Stock Spindle	3½" dia.
Tail Stock Spindle travel	6"
Width of Bridge	10"

Carriage arranged to take any form of multiple tool holder.

Bed arranged to take any design of taper attachment, and also for back facing arm

All Gears of Steel. High-Speed Gears carbonized and hardened. High-Speed Pinion on pulley shaft is Vanadium Steel, hardened and ground.

Weight, 10-ft. bed, approximate 6,000 lbs.

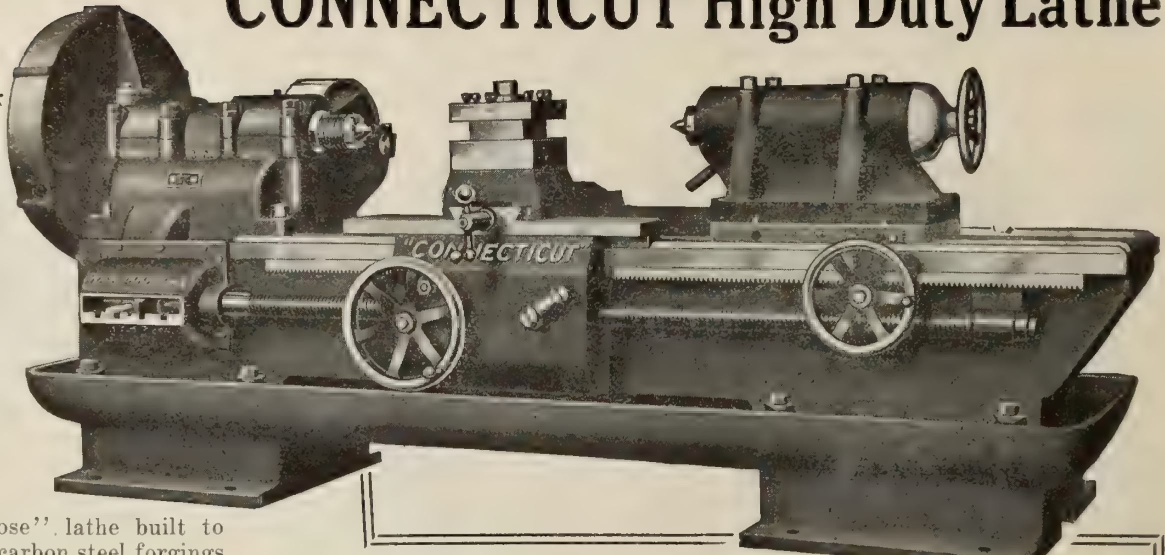
MANUFACTURED BY

The Duff Manufacturing Co., Pittsburgh, Pa., U.S.A.

Established 1883

NEW YORK CHICAGO

CONNECTICUT High Duty Lathe



Sets the pace on HEAVY WORK

A "Single Purpose" lathe built to turn or bore high carbon steel forgings at maximum speeds.

It is in all respects heavier and more rigid than standard 30-inch or even 36-inch lathes giving the same distance between centers.

The usual cutting speeds on shell work are 40 to 50 feet per minute on shells up to 8″ diameter, 30 feet per minute on larger sizes. Depth of cut from ¼″ to ⅝″, depending upon the eccentricity of the piece. Our lathes will stand more than this.

We admit the **Big Gear** is not particularly handsome, but it eliminates the train of small gears, and adds greatly to the strength and wearing qualities.

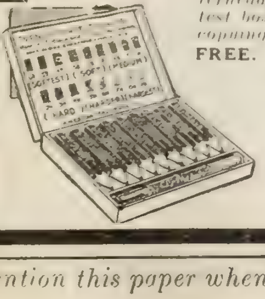
Write for bulletin giving full details.

W. & B. DOUGLAS, ***Middletown, Conn.***

VENUS 10¢ PENCIL

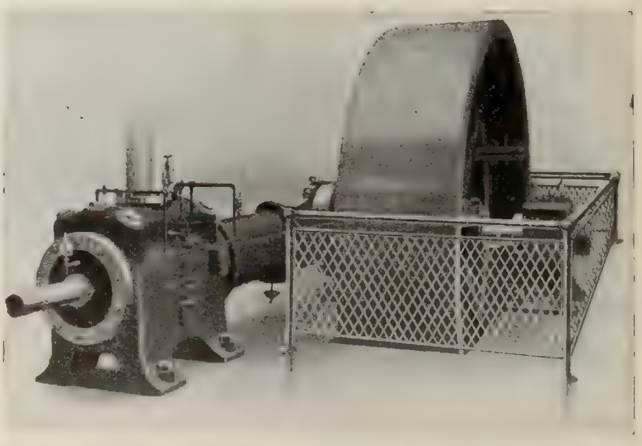
FAMOUS for superlative quality because the lead is always smooth-marking, strong and non-crumbling, the wood is of selected extra grade and the lasting properties are exceptional. Distinctive water-mark finish. Choose hard, medium or soft, of just that fraction of hardness or softness you desire, from the 17 degrees ranging from 6B to 9H. There are also two copying degrees, hard and medium, for billing and manifolding.

FREE *To the technical user writing on his business letterhead, we shall be pleased to send a test box of VENUS drawing and VENUS copying pencils and a VENUS Eraser* **FREE.**



Write for this **sample box to-day.**

American Lead Pencil Co.
238 Fifth Avenue, New York
and Clapton, London, England



DENNIS MACHINE GUARDS

Will Protect YOU!

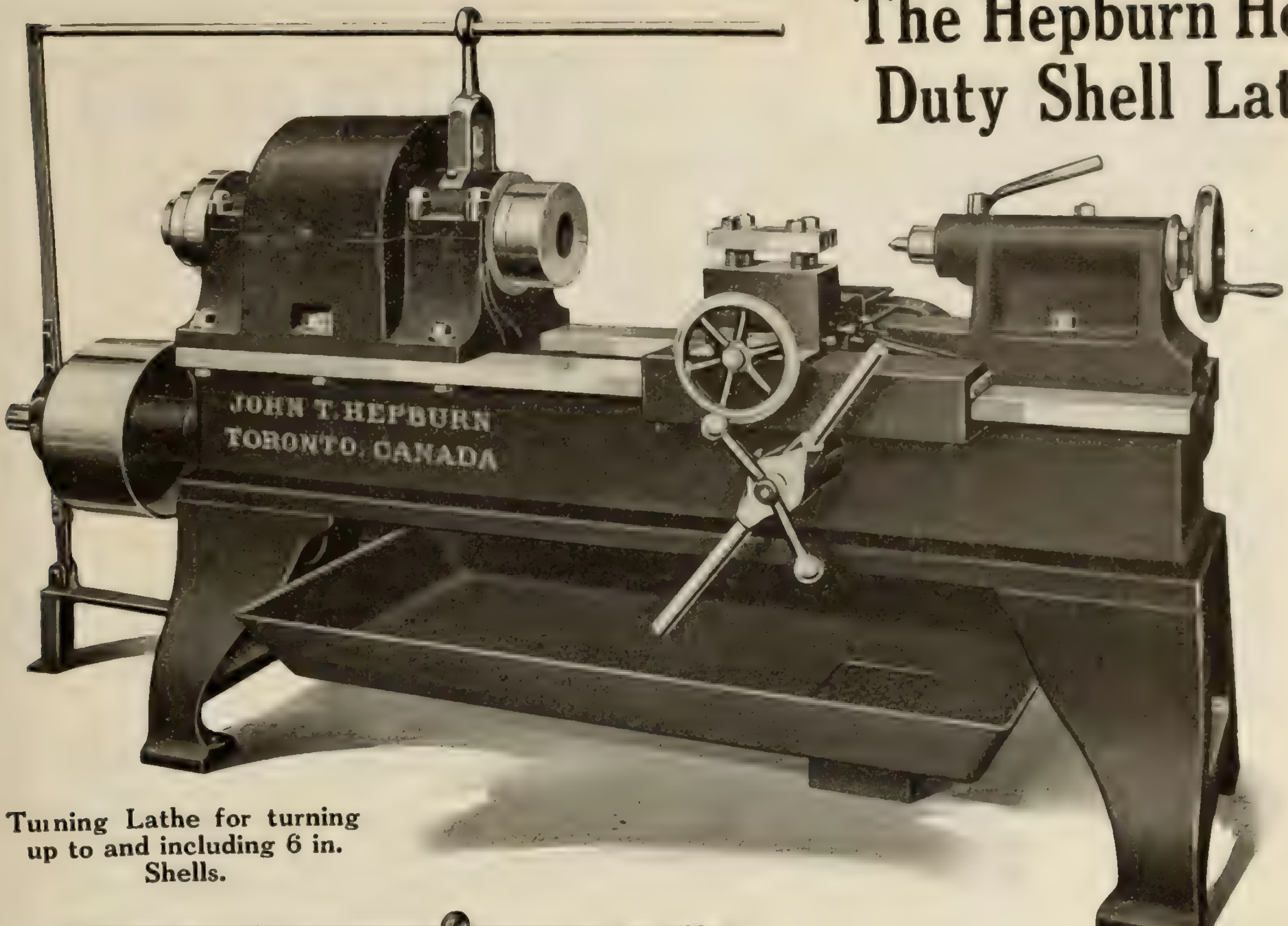
BESIDES safeguarding life and limb for your employes, Dennis Machine Guards protect your profits.

One serious accident may cost you more than a complete installation of these necessary, humane, protecting guards.

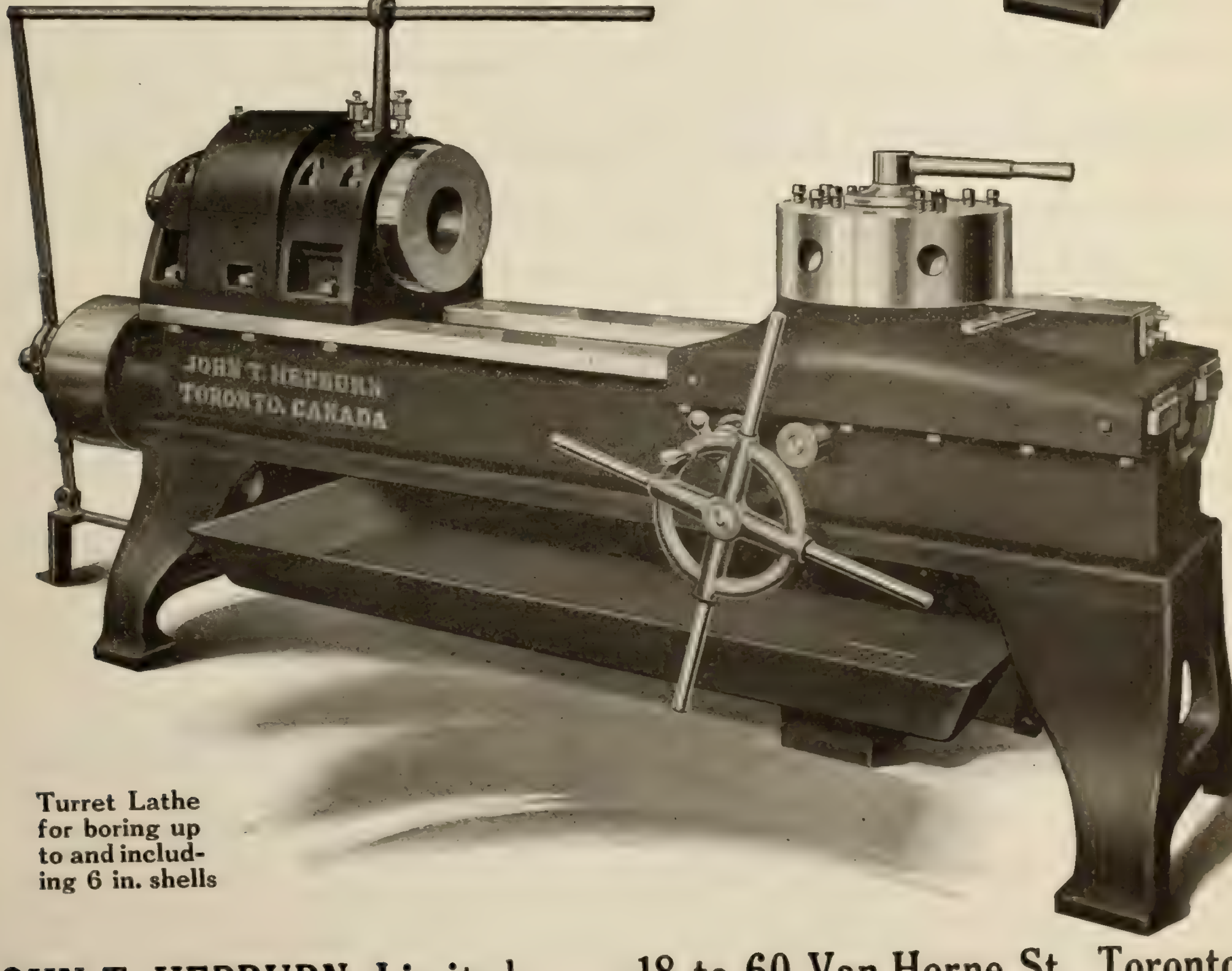
Let us tell you how to guard your danger points economically and right.

THE DENNIS WIRE AND IRON WORKS
COMPANY, LIMITED
LONDON
CANADA

The Hepburn Heavy Duty Shell Lathes

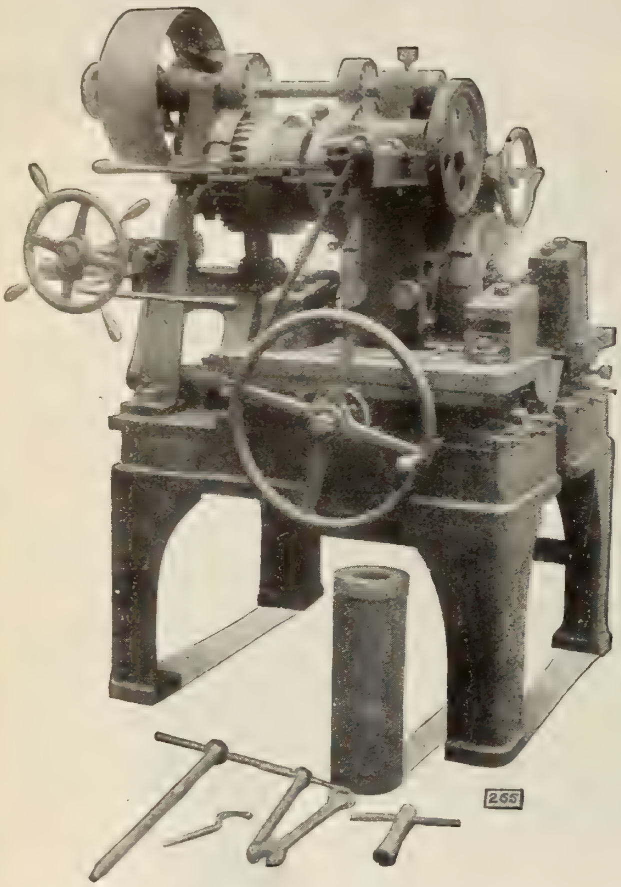

JOHN T. HEPBURN
TORONTO, CANADA

Turning Lathe for turning up to and including 6 in. Shells.


JOHN T. HEPBURN
TORONTO, CANADA

Turret Lathe for boring up to and including 6 in. shells

JOHN T. HEPBURN, Limited, **18 to 60 Van Horne St., Toronto, Can.**



CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal

---

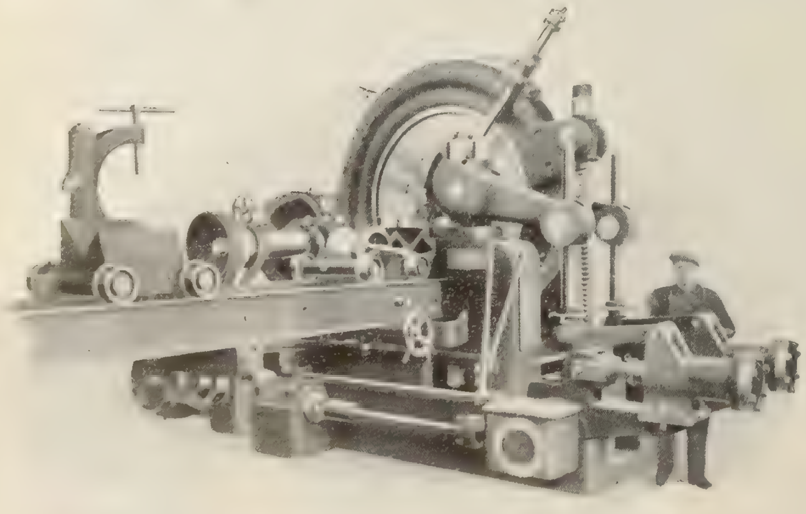
Gorton Heavy Duty Cutting-Off Machine

No. 2-E

The principle of construction of the Internal toothblade type of machine shown here admits of a cutting speed which cannot be approached by machines of the ordinary type.

Vibration is so completely eliminated that the output of this machine is controlled by the efficiency of the **Tool Steel.**

For instance, at present it is not practicable to maintain the maximum speeds of which this Cutting-Off Machine is capable with present Tool Steels.



FRONT VIEW GORTON NO. 2-E HEAVY DUTY CUTTING-OFF MACHINE—capacity 13 in. rounds and less. Photograph shows the Standard Machine, self-contained, motor driven, with power clamping front and rear, and stock rack No. 1551. Net weight without motor, 53,000 pounds.

The No. 2-E Gorton Heavy Duty is pre-eminently suitable for **constant, hard service, and capable of being operated continually month in and month out without the excessive repairs ordinarily placed on such machine.**

Especially suitable for Rolling Mills, Car and Locomotive Works, Engine Builders, Electrical concerns, and Machine builders generally.

Capacity 3 in. to 13 in. rounds; 3 in. to 9¼ in. squares; and for any other size or shape that can be contained within a 13 in. circle.

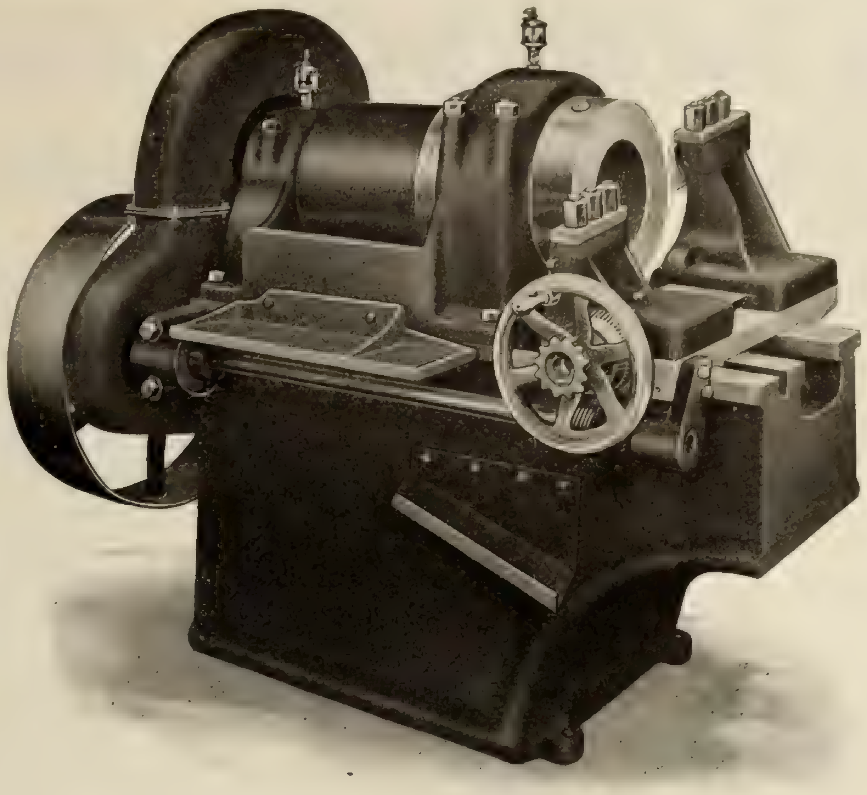
For catalog and full particulars write

George Gorton Machine Co.

Manufacturers of Engraving Machines and Heavy Duty Cutting-off Machines

RACINE, WIS., U. S. A.

Cable Address: "Gorton, Racine." Use A.B.C. Code (4th edition) or Western Union Code (Universal edition.)



"R. & V." Cutting-Off Lathe for 6", 8" and 9.2" Shells

WE have brought out a line of Special Single Purpose Lathes for the manufacture of High Explosive Shells, specializing on

Cutting-Off Lathes
Outside Roughing Lathes
Inside Boring Lathes (roughing and finishing).
Outside Finishing Lathes
Waving and Undercutting Lathes
Copper Band Turning Lathes
Facing Lathes
Turret Lathes—for counterboring, necking, truing for thread, and adjusting to weight.

They are all of exceptionally heavy construction and simple design to meet the severe service and special requirements of the Munition manufacturers.

These machines are making records equalled by few, and are already favorably known.

If you are a manufacturer of, or contemplate making shells, write us for estimates and deliveries.

The Root & Van Dervoort Engineering Company

EAST MOLINE, ILLINOIS, U.S.A.

Cisco Lathes by the Carload

One of our Eastern Representatives, who used to buy one or two machines a month, is now ordering by the carload, and spreading them all over a territory where many lathes are built.

He is educating his friends and customers to be CISCO users. He claims he can put CISCOS wherever any one wants a good lathe, and he's always calling for more.

Particular People

Eastern Lathe users, like **Canadians,** are **very careful** in selecting machines. It's not the frills they want, but they must have **Accuracy—Strength—Efficiency—Economy.**

That's why they buy

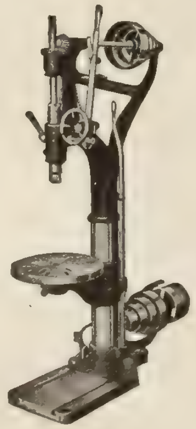
THE LATHE WITH THE PULL.

Sold by Williams. **Made by**

THE CINCINNATI IRON AND STEEL COMPANY
CINCINNATI, U. S. A.
14", 16", 18", 24" ENGINE LATHES

The

BARNES DRILLS

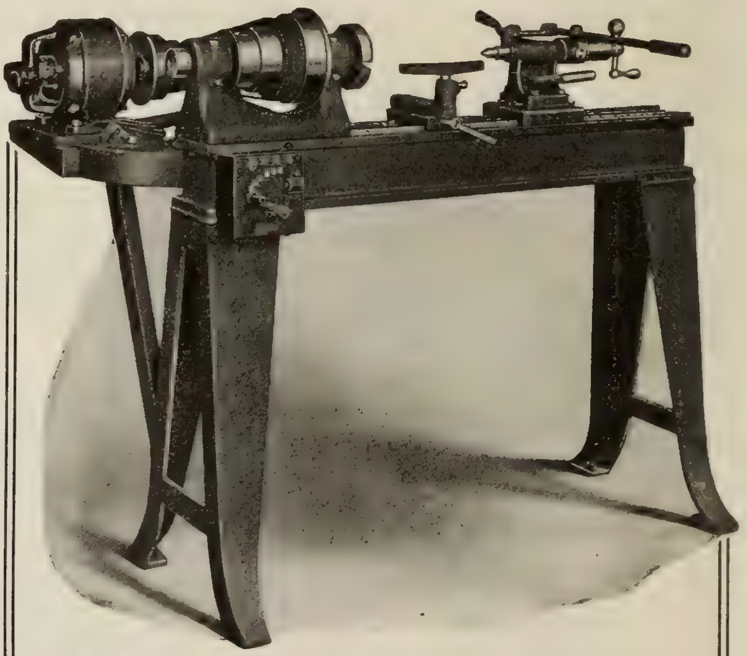


Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

W. F. & JOHN BARNES CO.
104 Ruby Street - ROCKFORD, ILL.
Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal



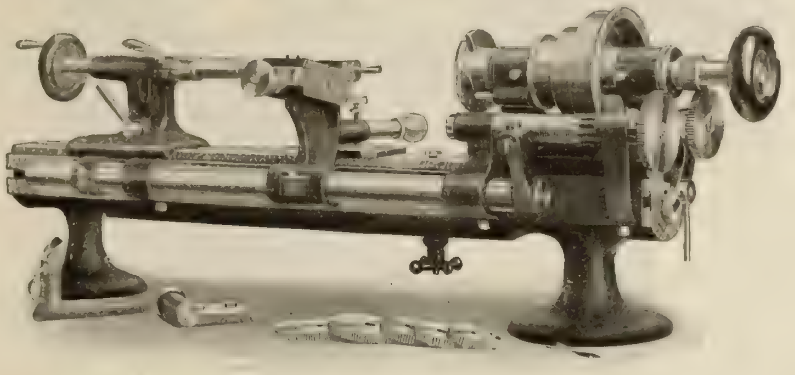
Motor Driven Speed Lathe

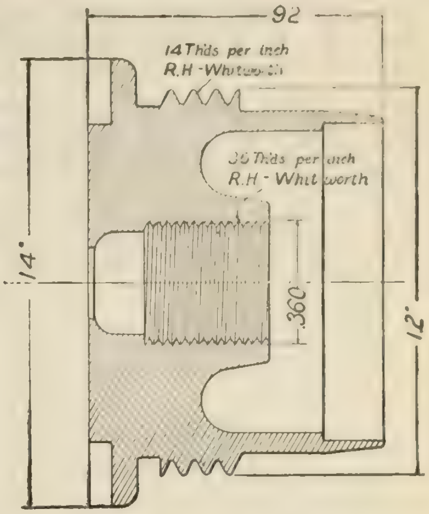
This style of motor drive employs a constant speed motor mounted on a plate having an extension arm to support a bearing for the outer end of the motor shaft. The motor plate is fitted to a slide on a shelf which is securely fastened to the back of the lathe bed. The motor plate is moved by means of a screw which tightens or loosens the belt. A four-step cone pulley on the motor shaft is belted to a four-step cone pulley on the spindle. This gives the same speed variation as when a countershaft is used, and by means of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is crossed-braced and all clamping levers are above the ways.

J. G. BLOUNT CO. - Everett, Mass., U.S.A.

THE CATARACT BENCH LATHE WITH CHASING ATTACHMENTS





We have sold many of our lathes to Canadian concerns who are eminently satisfied with results. Will you be next?

For work requiring greatest accuracy and rapidity, THE HARDINGE CATARACT BENCH LATHE will not disappoint you. Machine equipped with Automatic Chuck Closer for rapid operation of chuck, and with chasing bar arranged with multiple point, chasing tool is producing from ten to twelve hundred 14-pitch Whitworth threads on primers in TEN HOURS. Prompt deliveries. Catalogue No. 15 is ready to mail TO YOU. You are invited to write for it to-day.

HARDINGE BROTHERS, Inc., 1770 Bertau Ave., CHICAGO, U.S.A.

Two Cuts at One Time

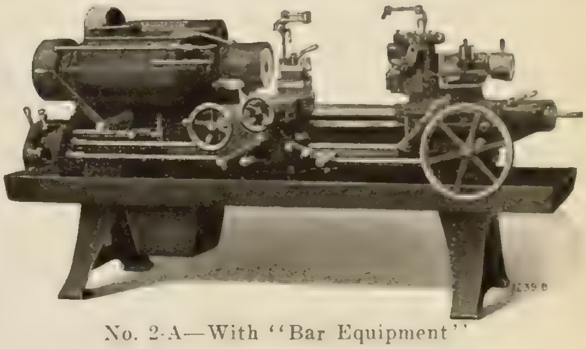
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

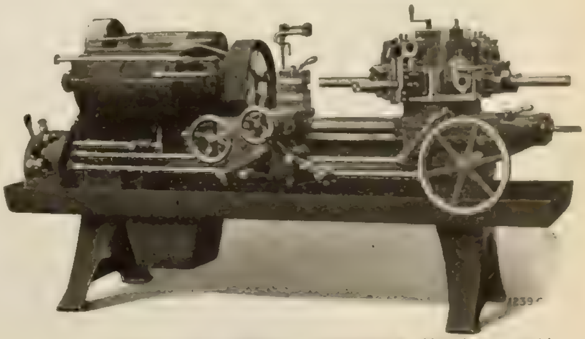
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



No. 2-A—With "Bar Equipment"



No. 2-A—With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

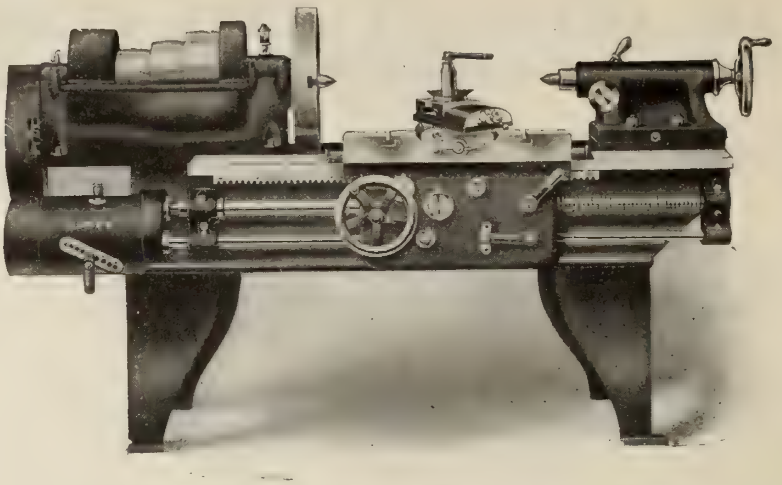
Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal

SIDNEY ENGINE LATHE

A "Heavy Turning" Tool of Wonderful Accuracy

Some of the important features

20 per cent. steel mixture in bed casting. Heavy carriage vee 2½ inches wide.



17-inch and 19-inch plain change engine lathe, all double back geared. Built 8, 10 and 12-foot lengths of bed.

High carbon rack pinned and bolted to bed.

50-point carbon steel head stock spindle offset 1 inch off centres for heavy duty work.

40-point carbon lead screw 17-16 inch diameter, 2 pitch thread.

Let us tell you of the many other interesting details. Write for full particulars.

THE SIDNEY TOOL COMPANY, Sidney, Ohio, U.S.A.

Canadian Agents: ONTARIO: The A. R. Williams Machinery Co., Toronto; QUEBEC: The Foss & Hill Machinery Co., Montreal

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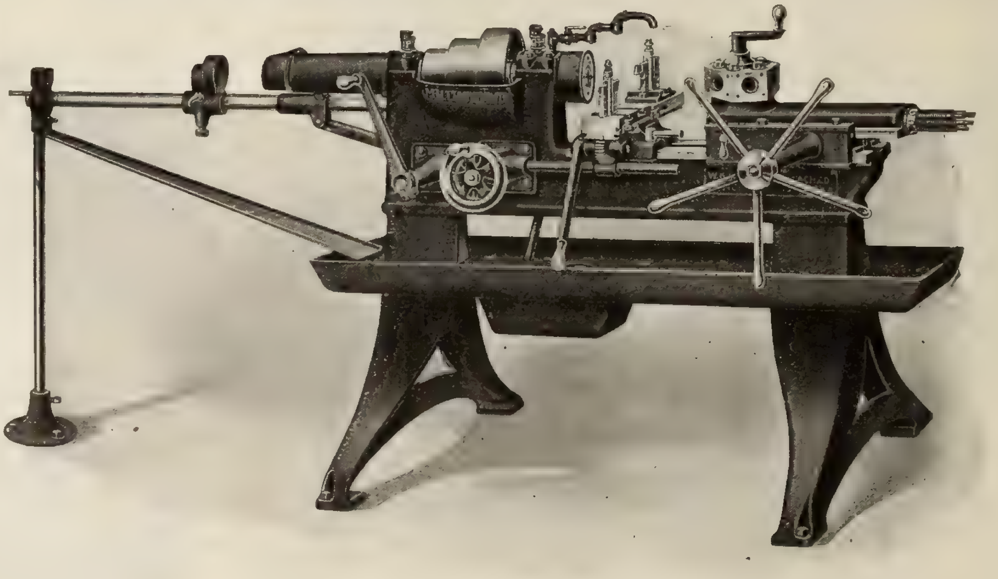
Every Feature to secure strength and stiffness on the heavy cuts is embodied in

Millholland 1"x7" Screw Machine



The Bed is of box construction well ribbed, and with the headstock cast solid.

The Headstock is made with plain head three-step cone. The steps of the cone pulley are of large diameter and wide face and are so proportioned as to transmit the maximum power with proper spindle speeds.

The Spindle, high-carbon steel with hardened and ground thrust washers.

The Cut-off Slide, with broad, flat, well-gibbed bearings.

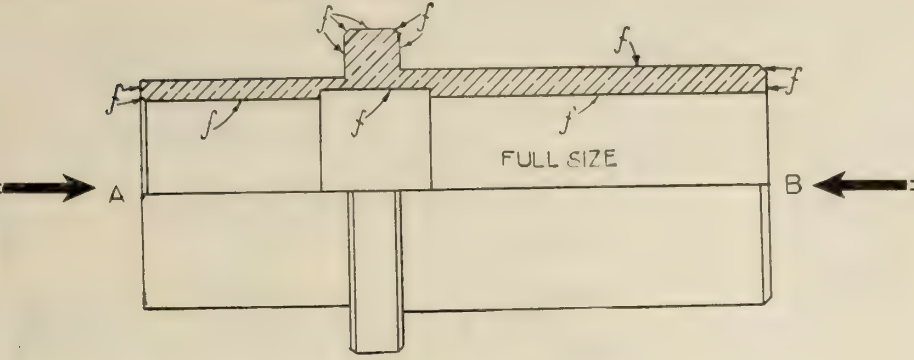
The Turret is of heavy construction and mounted on a large steel stud.

The Automatic Chuck and Bar Feed, operated by the long lever on the front of the bed, grips or releases the work instantly. The operator with one movement opens the chuck and feeds the bar without stopping the machine.

DROP A LINE FOR FULL DETAILS AND SPECIFICATIONS.

Manufactured by

W. K. Millholland Machine Company
INDIANAPOLIS, IND.



35 Per Hour, Machined All Over!

Less Than A Cent Apiece for Labor!

That's the way the Packard Motor Car Co. makes these Roller Holder Guides—and they're **hard bronze**, too.

OPERATIONS—END A

Rough and Finish Turned, Faced, Chamfered, Bored and Undercut.

OPERATIONS—END B

Rough and Semi-finish Turned, ready for Grinding, Faced, Chamfered, Bored and Reamed.

GO into PACKARD, OVERLAND, BUICK, FORD, STUDEBAKER, REO and other large automobile plants and you will find numerous parts being automatically handled by these machines.

"ACCURACY FIRST" is the slogan in all these factories and the fact that their equipment of these machines is constantly being enlarged is the most convincing evidence of the ability of the "New Britain" to produce work within the close limits of accuracy allowed.

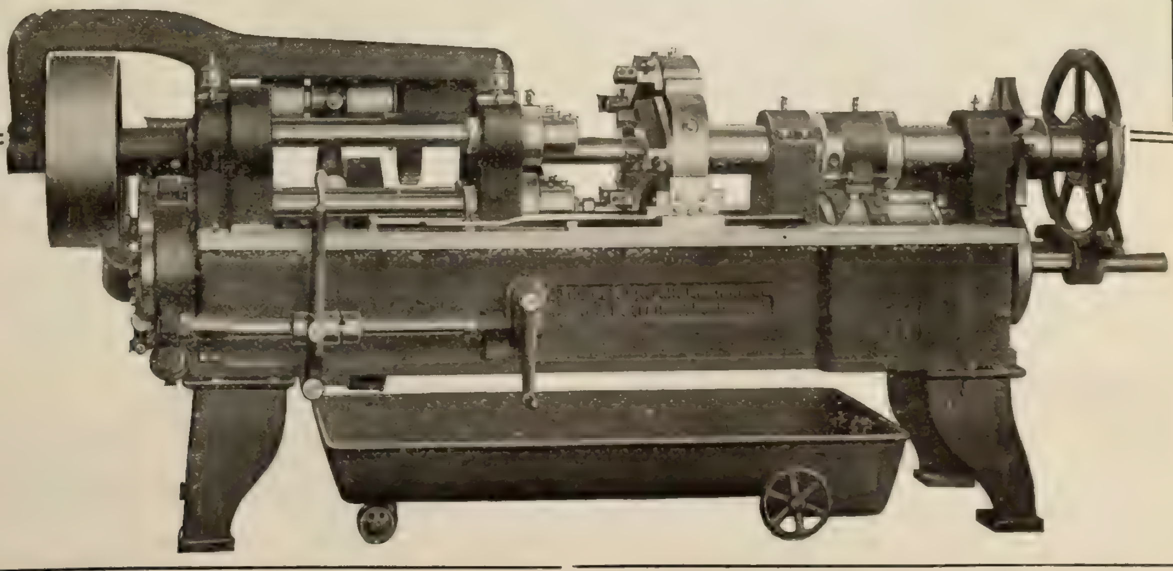
PRODUCTIVITY—**four to five times that of other machines**—is the outstanding feature of the "New Britain" Automatic Chucking Machine. Its increased use constitutes an important factor in the decreased cost of automobile manufacture and its consequent lower selling price.

Both Single and Double Head Machines—Send for complete catalog.

The New Britain Machine Co.

—Automatic Screw and Chucking Machines—

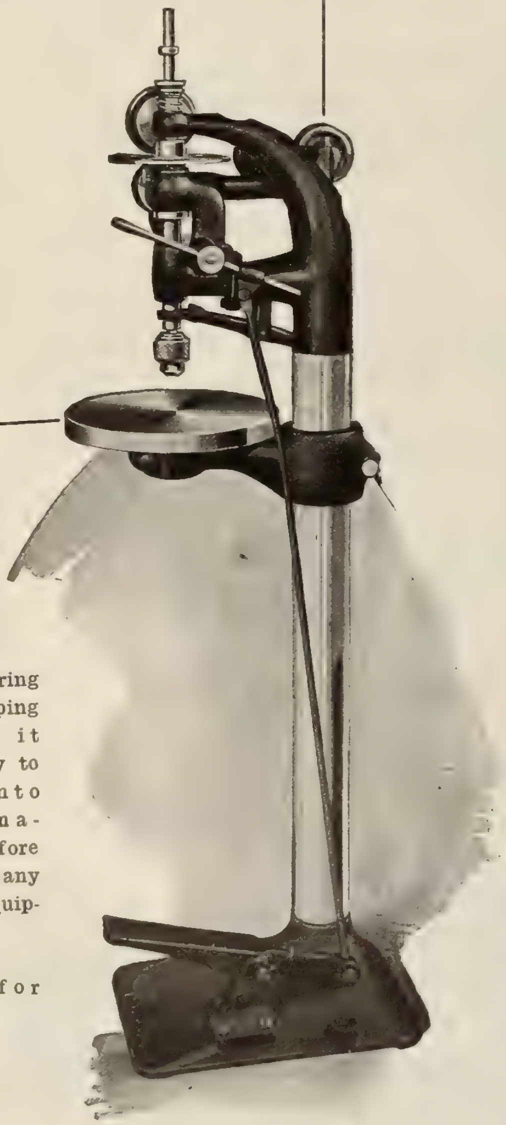
New Britain, Conn., U.S.A.



R. & S. Tapping Machines

put an extra measure of speed, accuracy and economy into the manufacture of fuse parts.

Fastest and most Sensitive Tappers built



If considering any tapping operation, it would pay to look into these machines before installing any other equipment.

Write for catalog.

Rickert-Shafer Company
Erie, Penna. U.S.A.

Agents for Great Britain—ALFRED H. HERBERT, Limited, Coventry, England.

HIGH SPEED HAMMERS

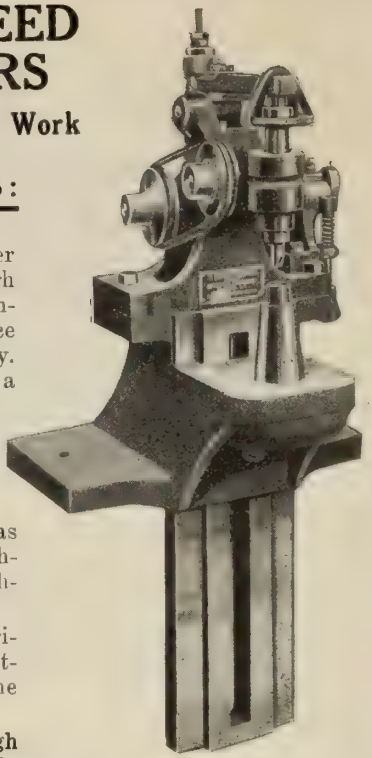
For High Speed Work

FEATURES:

Our Bench Hammer can be adjusted high or low, and spells another economy in space and handy utility. With it you have a guaranteed saving of from 15% to 20% on any class of work. The life of the machine is practically indefinite as phosphor bronze bushings are used throughout.

No riveting too intricate for us; no riveting which our machine cannot accomplish.

Send for our **High Speed Hammer Book.**



THE HIGH SPEED HAMMER CO.
Rochester, N.Y.

Sales Agents: The A. R. Williams Machinery Company, Limited, Toronto, Ontario.

Marking Base of SHELLS

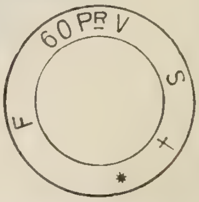
A PERFECT JOB in 15 Seconds

The "Grant" Shell Marker

is so arranged that the blow is brought to bear on each individual letter successively, while the blow can be adjusted to give a shallow or deep impression which is uniform for each letter or figure. The work is completed in one revolution of the shell, which is done by hand. **Made for 18 pdr., 4.5 in., and 60 pdr. high explosive shells.**

Drop a card for full particulars.

Cut on right shows marking on shell.



THE GRANT MFG. & MACHINE CO.
Holland Ave.
BRIDGEPORT, CONN.
U.S.A.

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO.
LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Heavy Machine Tools for
8-inch, 9.2-inch and 12-inch Shells

18" and 20" Engine Lathes for Tool Room Equipment.

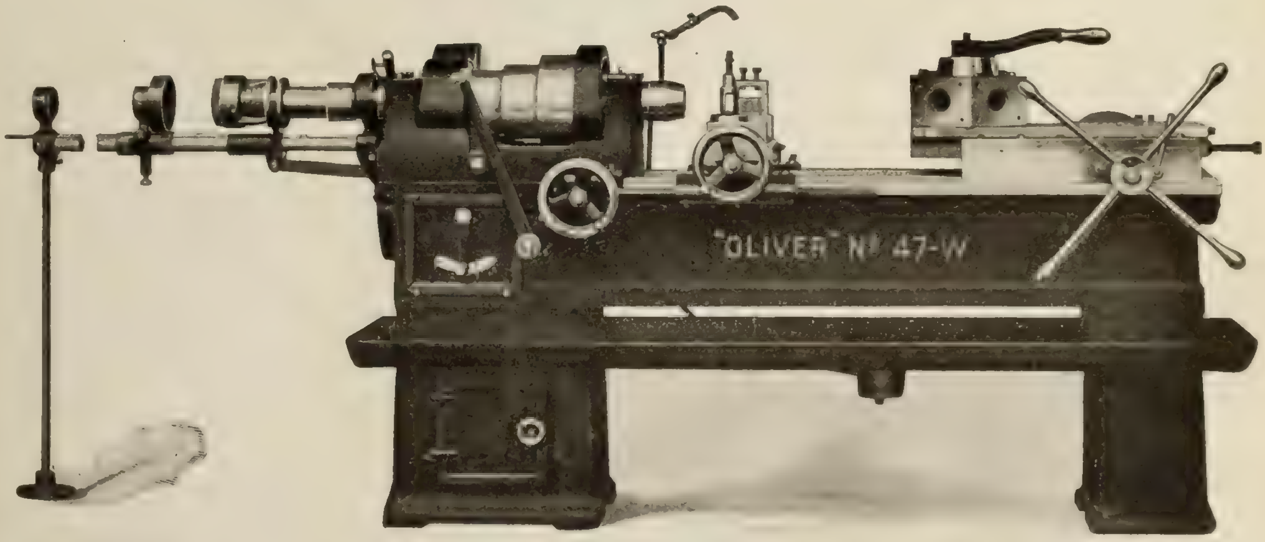
Single Purpose Turret and Turning Lathes for 6" Shells and under.

Write us for prices and deliveries on anything in the way of Iron or Wood Working Tools.

GARLOCK-WALKER MACHINERY CO., Limited, Telephone Main 5346 **32 Front St. West, TORONTO**

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds



"OLIVER" NO. 47-W HEAVY DUTY SCREW MACHINE 2¼"—SWING 16".

A HEAVY TOOL FOR HEAVY WORK—A MODERN MACHINE—OLIVER QUALITY—
PROMPT DELIVERIES.

WRITE FOR FULL INFORMATION.

OLIVER MACHINERY COMPANY, Grand Rapids, Mich.

If your product is good, if its service is likely to recommend it, mark it so that any one can easily tell who made it.

The cost will be comparatively nothing, the results almost incalculable.

We make any form of a steel lettering, die or stamp

that will mark your name, address, trade-mark, or any identification mark you desire to show on your products. Furthermore, the dies or stamps furnished by Matthews will give the maximum number of clear; clean, easily read markings during working use.

The nature of our organization, equipment and facilities, combined with an experience extending over 66 years, place Matthews in a position to render a **service in making devices that will please the most exacting.** Make us prove it on your next order.

We have the largest and best equipped factory of its kind in the United States.

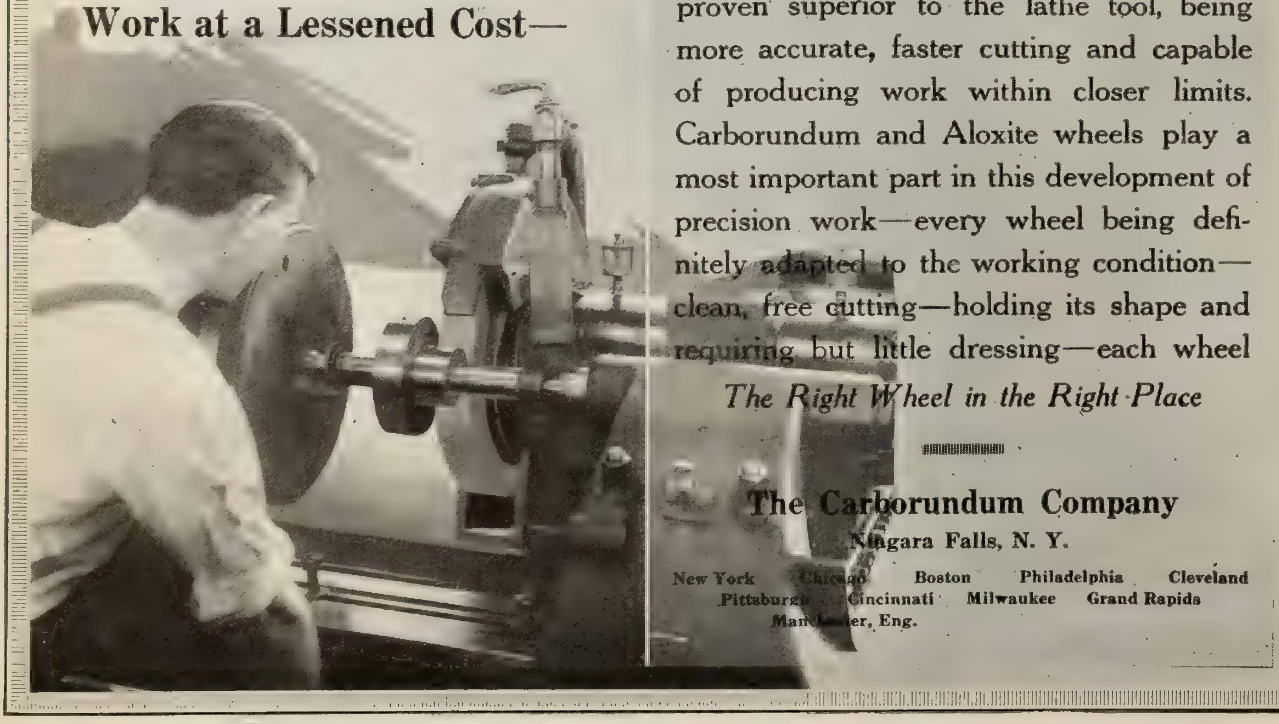
For the convenience of steel die and stamp users, we have prepared a splendidly illustrated catalog. It will be well worth your while to send for it now.

Pittsburgh Bevel Hand-made Steel Letters and Figures.

Jas. H. Matthews & Co., Inc. Established 1850 **Pittsburgh, Pa.**

The CANADIAN FAIRBANKS-MORSE CO., LIMITED, Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Saskatoon, Edmonton, Victoria
DISTRIBUTORS FOR CANADA

Carborundum and Aloxite Grinding Wheels—Factors in the Production of Precision Work at a Lessened Cost—



It is seldom now that a piece is turned to the extreme limits of accuracy.

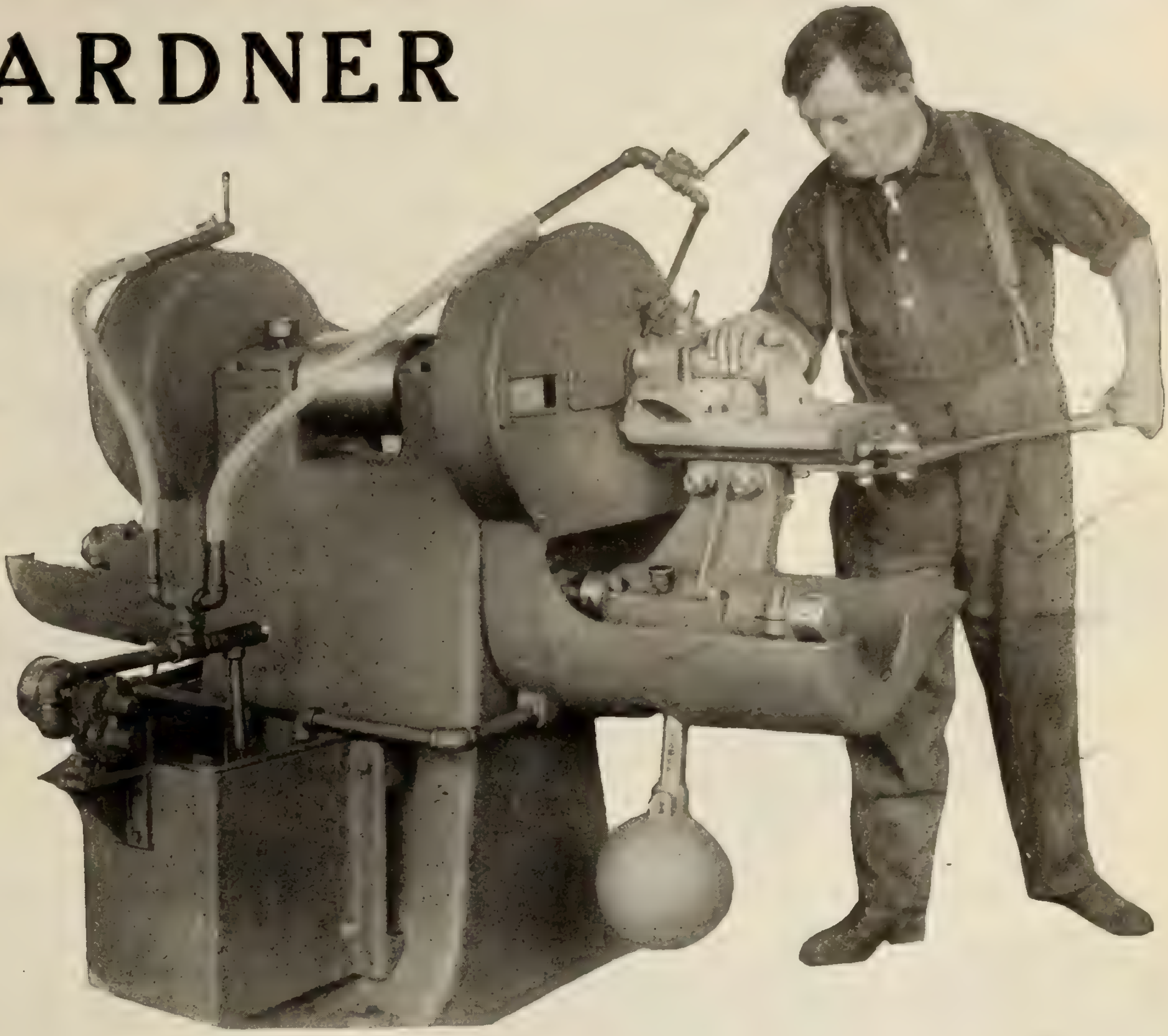
In precision work the grinding wheel has proven superior to the lathe tool, being more accurate, faster cutting and capable of producing work within closer limits. Carborundum and Aloxite wheels play a most important part in this development of precision work—every wheel being definitely adapted to the working condition—clean, free cutting—holding its shape and requiring but little dressing—each wheel

The Right Wheel in the Right Place

The Carborundum Company
Niagara Falls, N. Y.

New York Chicago Boston Philadelphia Cleveland
Pittsburgh Cincinnati Milwaukee Grand Rapids
Manchester, Eng.

GARDNER GRINDERS



For Grinding Ends of Shells

We have developed a Special Grinding Machine for removing the hub or centre projection from the ends of shells. This grinder is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates.
We build as well a much heavier and more Powerful Grinder to be used for these same operations on 6" Shells.

FEATURES

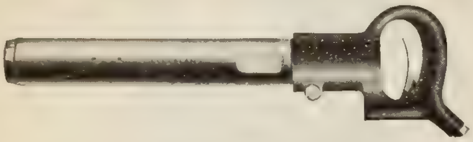
- High-Grade Babbitt Bearings and Lever Feed.
- Rapid clamping of Shell into "V" fixture.
- Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.
- Can be equipped and operated at both ends for double output.
- Output, according to size of projection to be removed, from 40 to 100 per hour.
- Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments.
- Weight, 4,500 lbs.

For further particulars write

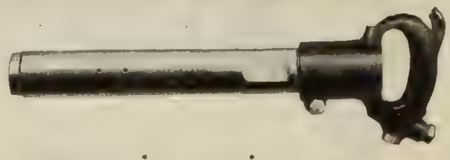
The Gardner Machine Company, Beloit, Wis., U.S.A.

CLEVELAND RIVETING, CHIPPING, CALKING AND BEADING HAMMERS

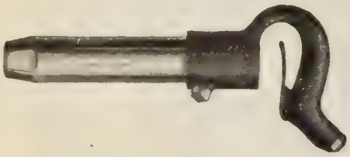
MOST POWERFUL AND EFFICIENT AIR TOOLS ON THE MARKET



Cleveland Riveters are made in 20 styles and sizes with driving capacities of ¼-in. to 1½-in. rivets in Boilers, Tanks, Stacks, etc.



They have a enviable record for durability and economy in service.

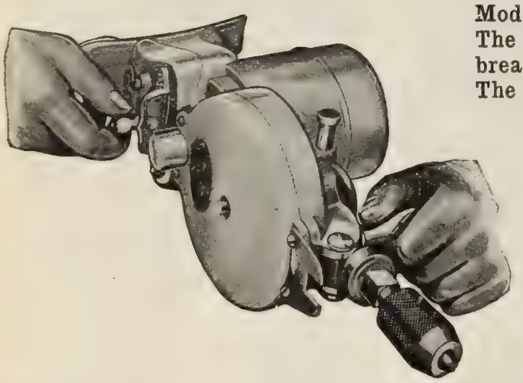


CLEVELAND CHIPPING HAMMERS

are made in 20 styles and sizes to suit all classes of work. They are ideal tools for foundries, as they have high speed, no recoil and are practically dust-proof.

In stock: Riveting and Chipping Hammers, Air Drills, Corner Drills, Sand Rammers, Portable Grinders, Bowes Couplings, Chisels, Rivet Sets, etc.

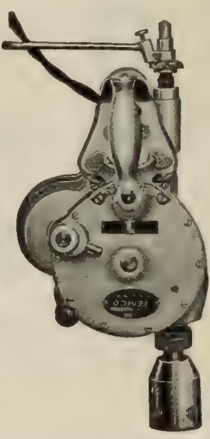
PORTABLE ELECTRIC DRILLS



Model "B" Drill illustrated, shows compactness of design. The Casing, Switch and Gear Covers are aluminum; the breast plate, motor-head and handle supports are of steel. The machine is light in weight, convenient in shape; has high speed; operates on either A.C. or D.C. currents and runs either forward or reverse as desired. Model "C" has two speeds and in construction is similar to Model B.

Bulletins mailed on request.

Cleveland Pneumatic Tool Co.
of Canada, Limited
80 Duchess Street, - Toronto, Ont.



WE BUILD THEM BY HUNDREDS

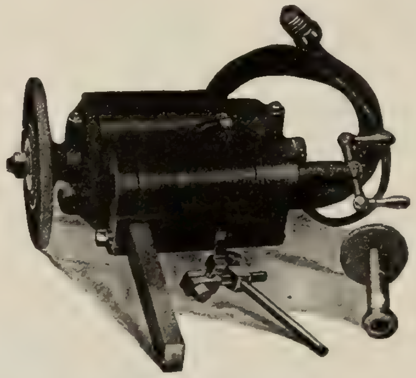
Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only
$60
Complete

The Blake & Johnson Co., Waterbury, Conn.

Stow Tool Post Grinder

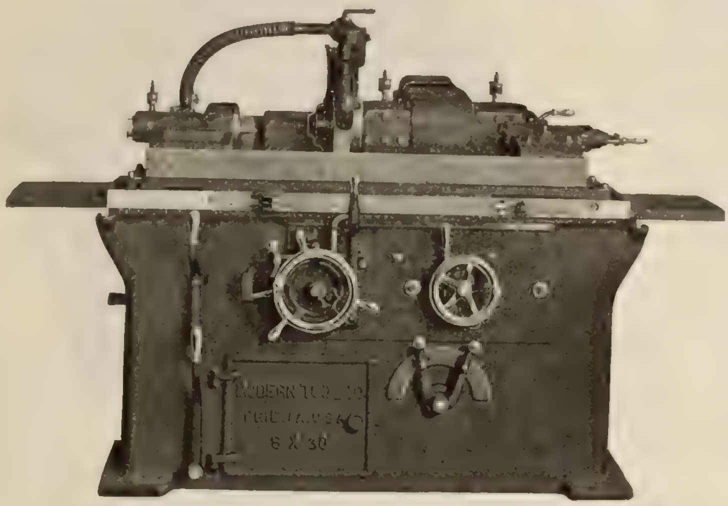
Does the most accurate of work—patent bearings, for Internal and Surface Grinding—A.C. or D.C. Immediate shipment from stock. Plain or with slide.



One of the many electric portable tools built by

Stow Manufacturing Co.
Binghamton, N.Y.
Oldest portable tool manufacturers in America.
London Stock, 85 Queen Victoria St.

Modern Self-Contained Plain Grinding Machines

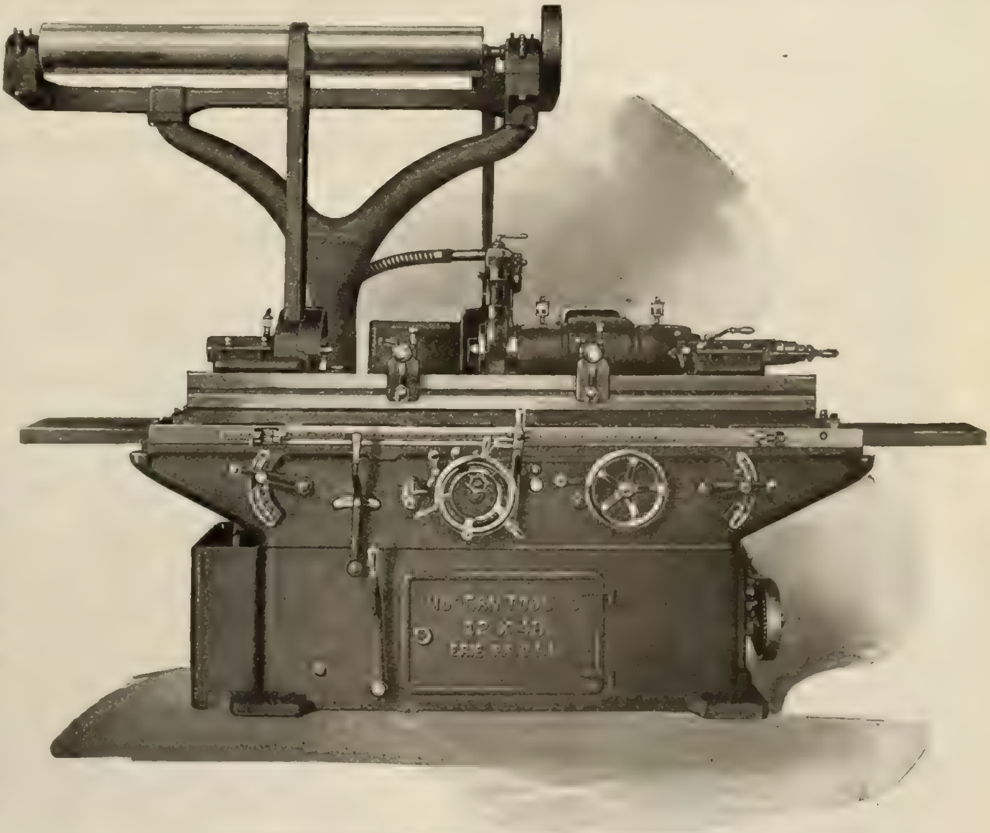


"MODERN" 8″ x 30″ Self-Contained Plain Grinding Machine.

The big problem to-day is output. If you desire big production you will promptly investigate the MODERN Line, and this is the best and most opportune time to seriously consider the economies resulting from the intelligent use of MODERN Machines. Many manufacturers are meeting the delivery problem by the use of MODERN Grinding Machines, and have materially profited by the installation of such Machines.

MODERN Grinding Machines mean that parts are finished accurately, production increased and with economy in operation. The smaller Plain Machines have 8″ swing, 18″ and 30″ centres. The larger Machines have 12″-16″ swing; 24″, 36″, 48″ and 60″ centres. The Crank Shaft Machines grind multiple throw cranks up to 6″; single throw cranks up to 8″, and up to 40″ and 52″ lengths.

Absolute central control—all levers and hand wheels concentrated on front of Machine — quickly and easily operated. Work speeds and table feeds entirely independent and cover every range within the capacity of the machine. Automatic feed at either or both ends of table reverse. Auxiliary feed for bringing the wheel into work without traversing table. Positive stop provided when feeding the wheel by hand. Head Stock entirely belt driven. Steady rests that are universal in all their movements and have positive stops for grinding duplicate work. Interchangeable wheel centres.



"MODERN" 12″ x 48″ Self-Contained Plain Grinding Machine.

MODERN TOOL COMPANY

Main Office and Works: STATE and PEACH STREETS, ERIE, PENNSYLVANIA, U. S. A.

Canadian Agents: Rudel-Belnap Machinery Co., Toronto and Montreal.

New York Office: 50 Church Street. **Chicago Office: 32 N. Clinton Street.**

Shell Painting, Nosing and Banding Machines

PAINTING MACHINE

4.5 and 60 POUNDER SHELL
BANDING and STAMPING MACHINE

SIMPLICITY: That is the beauty of these machines; they are so simple that a **woman or even a child can control them.** This is an important feature in reducing operating expenses.

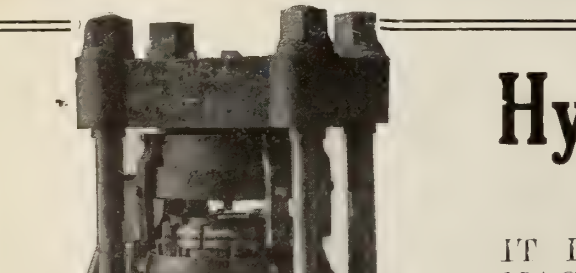
Banding Press is sold without stamping attachment if desired.

Painting Machine is operated with an ordinary air drill, and, if desired, a heating coil under table, enclosed in a sheet steel shell, can be supplied, as shown in cut.

Canadian Locomotive Company, Limited, Kingston, Ont.

SALES HANDLED EXCLUSIVELY BY

The John Bertram & Sons Company, Limited, Dundas, Ontario, our Agents for these machines



Hydraulic Banding Press

that enlarges shell output

IT IS A STRONG, SIMPLE AND RELIABLE MACHINE AT LOW COST. Power is obtained from continuous running belt-driven pump located near the press and is applied to the ram underneath the table. TABLE RISES AND FORCES STEEL TAPER WEDGES EIGHT IN NUMBER UP INTO THE HOLLOW STEEL FORGING AT THE TOP, THE WEDGES CONFORMING TO THE SHAPE OF THE COPPER BAND ARE THUS PRESSED IN EQUALLY AGAINST SAME. PRESSURE IS THEN RELEASED AND THE SHELL READILY TAKEN OUT.

Operates by lever shown on left-hand side.

Pressure gauge behind.

As this machine is a Standard Hydraulic Press it can be used in any other capacity.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt Driven Loading Vibrators, Bench Vises** and a universally endorsed, **Ball-Bearing Elevating Truck.**

We shall be pleased to submit prices and give any particulars required.

The Chapman Double Ball Bearing Co.

of Canada, Limited

339-351 Sorauren Avenue, Toronto, Canada

Transmission Ball Bearing Co., Inc., 1407 West Ave., Buffalo, N. Y.

"W. & B." Drop FORGINGS

¶ We make a specialty of the highest grade Drop Forgings. Our exceptional capacity and equipment insure accurate forgings and prompt delivery.

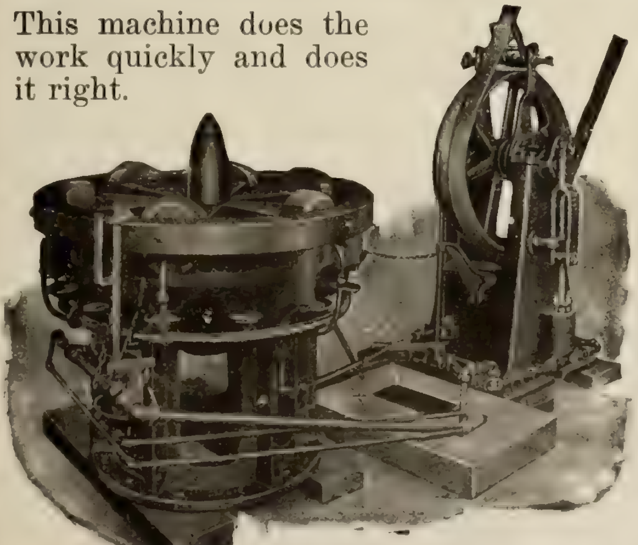
The
Whitman & Barnes
Manufacturing Co.
Established 1854
St. Catharines, Ontario

Send us Blue Prints on Special Forgings, three pounds and under in weight, and permit us to estimate on your requirements.

Hydraulic Banding Machine

For compressing bands on shrapnel shells and other projectiles

This machine does the work quickly and does it right.



In writing for information or quotation please advise width and thickness of bands and diameter of shells to be handled.

Machines for our Canadian Customers are built in Hamilton, Ont.

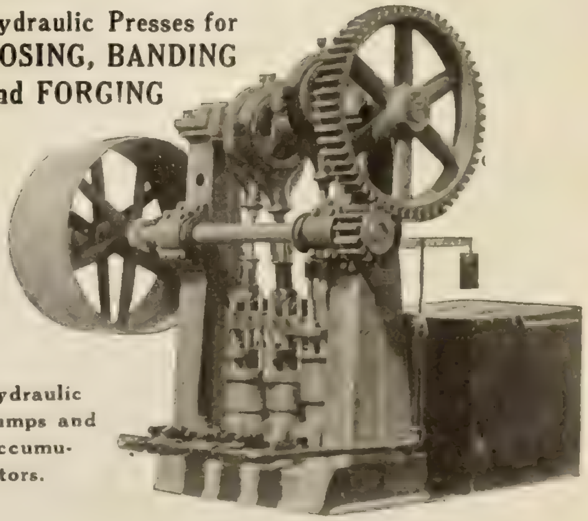
We also manufacture machines for setting wagon and carriage tires, cold.

Please address all communications to our Rochester Office

THE WEST TIRE SETTER COMPANY
ROCHESTER, NEW YORK, U.S.A.

PRESSES FOR SHELLS

Hydraulic Presses for
NOSING, BANDING
and FORGING



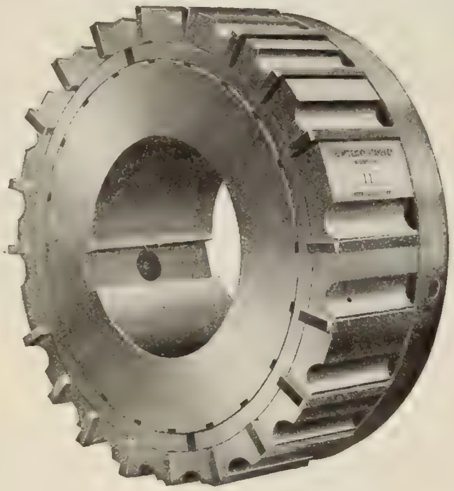
Hydraulic Pumps and Accumulators.

Hydraulic Presses for all purposes.

WRITE FOR FULL DETAILS NOW.

William R. Perrin, Limited
TORONTO, ONTARIO

A McCrosky 11" Cylinder Finishing Reamer



Why you should specify

McCROSKY

in buying Reamers

1. It has a large and accurate adjustment to provide for wear.
2. It is simple and strong. No internal mechanism to weaken it. No screws or small parts to get out of order. Practically a solid reamer when assembled.
3. Will bottom a blind hole.
4. Has ample chip clearance.
5. Cannot change its size in the hole or by careless usage.
6. Not easily adjusted outside of the tool room. Special wrenches required.
7. Made in all styles and sizes.
8. Blades easily renewed.
9. Prompt shipment—most sizes from stock.
10. **A reamer combining the advantages of both solid and adjustable reamers without the disadvantages of either.**
11. They have solved the reamer problem in the largest and best shops.
12. Thousands of holes can be reamed to an absolute standard of size and finish.

Write for catalog. It gives full particulars.

Manufactured only by

The McCrosky Reamer Co.

Meadville, Pennsylvania, U.S.A.

Export Agent:
BENJAMIN WHITTAKER, 21 State St., New York, N.Y.

Ever Shaved by a Blunt Razor?

Remember how long it took; how you scraped away and were finally disgusted with the shave?

Well, that is how a workman feels when using a file that has reached its "inefficient point."

He gets irritated — does not take the same pleasure in his work. The foreman thinks he is slow. There is no satisfaction anywhere.

But, give that man a new file and he puts new enthusiasm and new energy into the job.

This is a homely illustration, but it is true, for it is human nature.

The line of least resistance and greatest efficiency in shop practice to-day is to give men new files to work with when their files reach the "inefficient point."

Manufacturers, suggest to your superintendents,

Superintendents, instruct your foremen,

Foremen, tell your men

to turn in old files the moment they reach their "inefficient point." It costs less for a new file than it does to have a man slowed down and irritated by an old file.

Nicholson File Company
Port Hope Ontario
DEALERS EVERYWHERE

RACINE

High Speed Metal Cutting Machine

No. 9-c
Heavy Duty Machine
With Motor and Three-Speed Attachment.

MORE SPEED

LESS BLADES

RAPID-MASSIVE-STRONG-DURABLE

A Machine Tool, not a Hack Saw

This machine is equipped with our Special 3-speed Transmission, which gives the proper speeds for cutting any kind of material, practically giving you THREE MACHINES in ONE, and cuts Faster, Truer and More Economically than any other make of machine on the market. The material saved by this machine in the cut, as compared with a cold saw, will pay for the machine many times over.

Adapted for cutting Angles, Channels, I-Beams, Die Blocks, Pipe, Tubing and so forth.

Automatic Lifting Device—This is accomplished by using a Patented Return Stroke Automatic Lifting Device which lifts the blade clear of the work. No dragging back on the non-cutting stroke, THEREBY INCREASING BOTH THE OUTPUT AND ENDURANCE OF THE BLADE 500 PER CENT.

Combination Vise—A Powerful, Quick-Changeable Vise for regular work. This machine is also arranged for cutting any degree of angle. Stock held close to the blade, which enables operator to cut short pieces at any angle.

Cooling System—A geared circulating pump applies a cutting compound on the blade.

Blade Holders—The Blade Holders are made from a 1⅜-inch flat bar fitted into a milled slot which holds the blade square with the work, therefore it must cut straight, while the BLADE TIGHTENER enables the operator to give the blade sufficient tension without the use of a wrench.

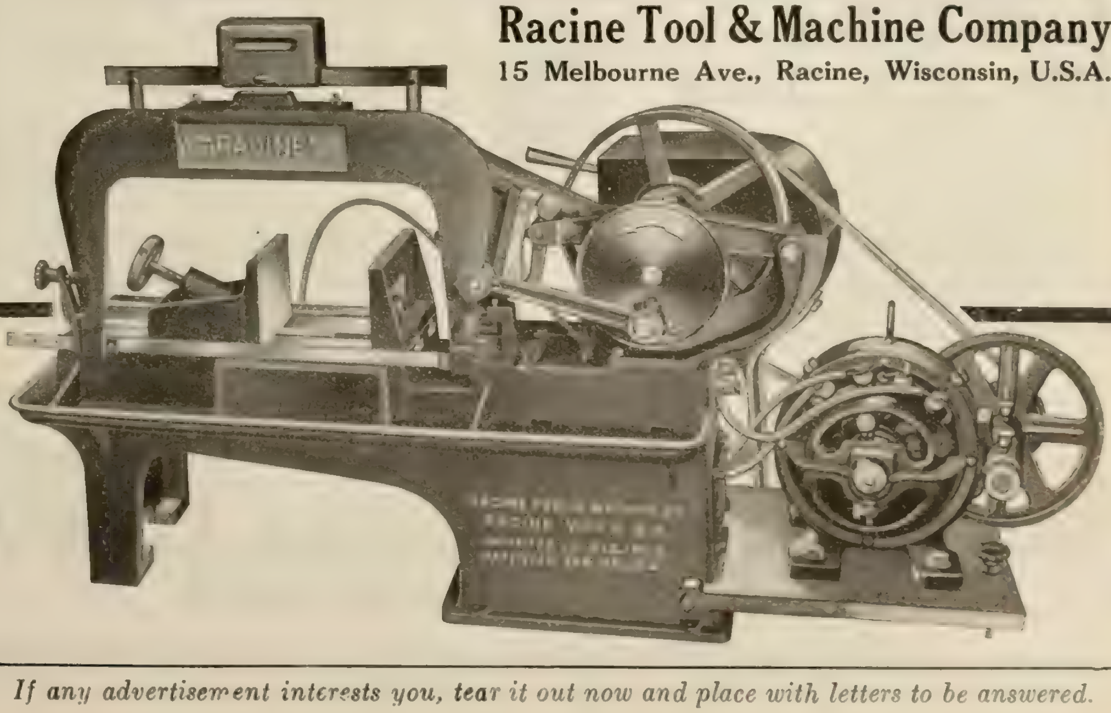
Saw Frame—The Saw Frame holds itself automatically at any height, which is very convenient when placing stock into the machine.

These machines are built for either Belt or Motor Drive, and will do anything that a Cold Saw will do, and many things that a cold saw cannot do.

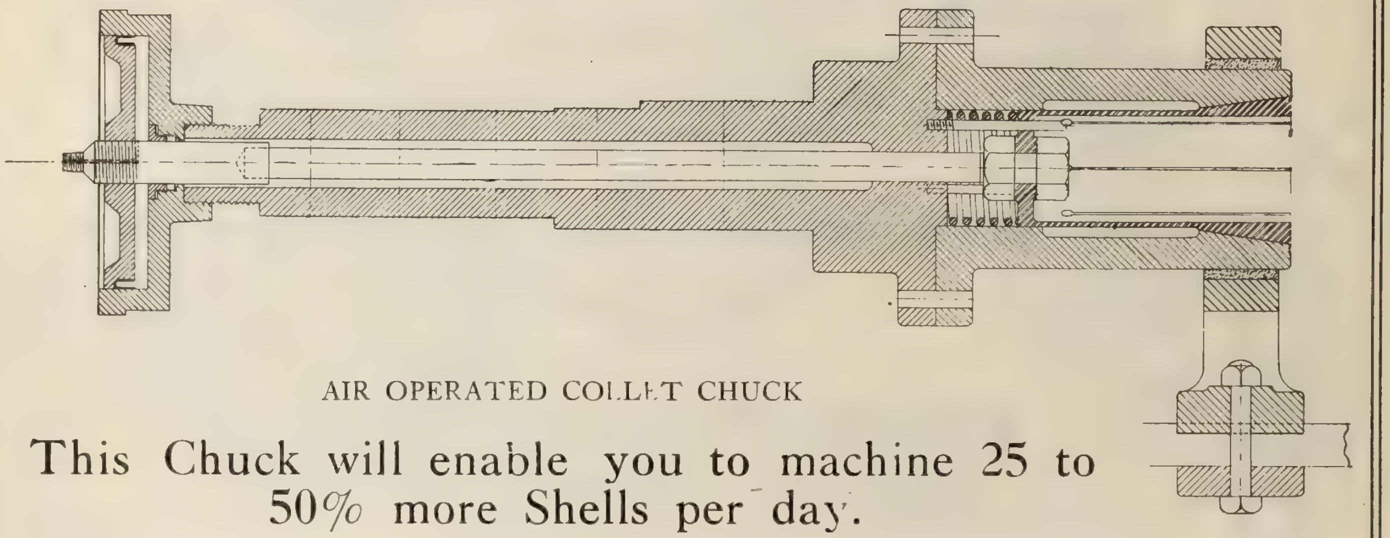
SPECIFICATIONS:

Capacity, 12 x 15 in. Pulley, 3 x 16 in. Blades, 17 to 24 in. Floor Space, 31 x 79 in. Height over all, 41 in. Weight (crated), 1,140 lbs. Height to top of table, 18 in. Net weight, 1,000 lbs.

Racine Tool & Machine Company
15 Melbourne Ave., Racine, Wisconsin, U.S.A.



INCREASE YOUR PRODUCTION



AIR OPERATED COLLET CHUCK

This Chuck will enable you to machine 25 to 50% more Shells per day.

MADE IN ALL SIZES. ADAPTABLE TO ANY HOLLOW SPINDLE LATHE.

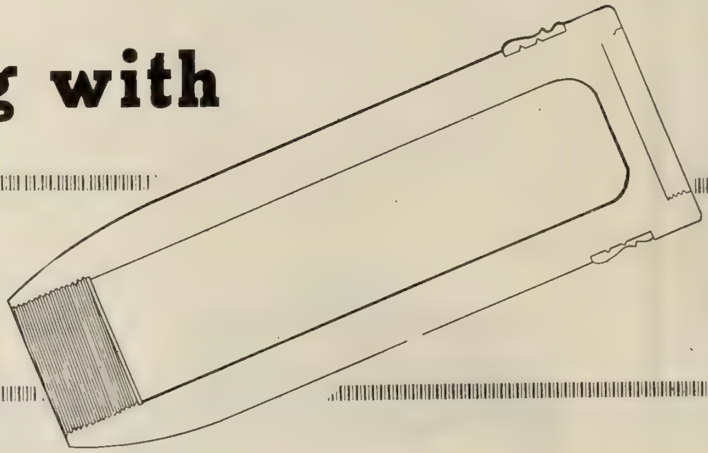
Particulars on Application. Prompt Delivery.

HYDE ENGINEERING WORKS

P.O. Box 1164 **27 William St., MONTREAL**

Time Threaing with

MURCHEY
TAPS AND DIES



18-pdr. Shrapnel - - 25 seconds
18-pdr. High Explosive - 60 seconds
4.5-in. High Explosive - 60 seconds
6-in High Explosive - 60 seconds

Also you save time of rechucking which is fully equal to this.

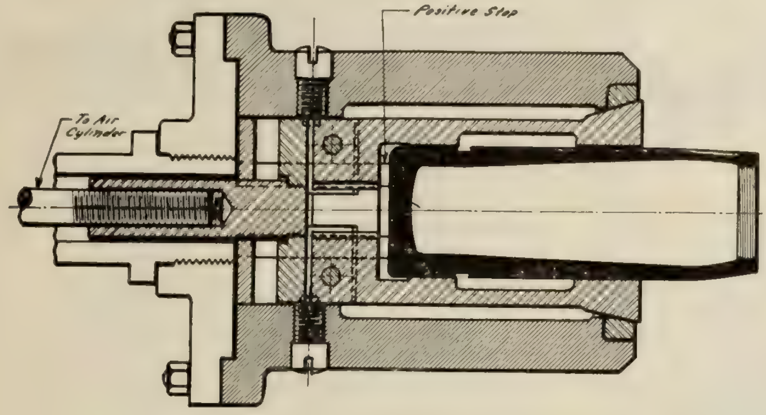
Threading is done on same machine nose is finished. No extra machine is required.

The largest American firms are doing all the threading on shells up to as large as 12" with **Murchey Collapsing Taps** and **Murchey Self-opening Dies,** and are getting most desirable results.

Send us Blue Prints of your requirements and we'll gladly quote you on the necessary tools.

MURCHEY MACHINE & TOOL COMPANY
75 Porter Street, Detroit, Mich.

You Can Produce More Shells Per Day



M. E. C. Air Operated Hinge Collet Chuck adapted for rough and finish boring operations.

If you are interested in Machining Fuse Plugs, Shells, Etc., the best Chuck and Taps are M. E. C.

These devices will increase your production from 25 to 40 per cent. over any other method now employed.

ONCE KNOWN—ALWAYS USED

It will pay you to investigate at once.

Manufacturers Equipment Company

175-179 North Jefferson St., CHICAGO, ILL.

FOREIGN AGENTS: C. W Burton Griffiths & Co., Ludgate Circus, Ludgate Hill, London, England.
Louis Besse, Bureaux & Caisse, 39 Rue de Lappe, Paris, France; Geo. A. Todd, 152 Bay St., Toronto, Canada

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At Last! A Magnetic Chuck That Won't Magnetize Your Machines

The ordinary type of magnetic chuck is constructed so that the body is part of the magnetic path. This means the body is magnetized and that there is almost sure to be a leakage of magnetism from the chuck to the machine on which it is used until the machine becomes highly magnetized. The

HEALD MAGNETIC CHUCK

is the only one so constructed that the bodies are NON-MAGNETIC—in fact the bodies are entirely insulated from the top plates and there can be no leakage of magnetism.

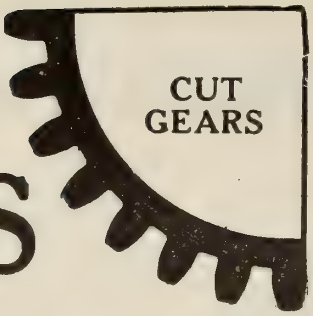
This is one of the many advantages which mark the superiority of Heald Chucks. Built both in flat and circular types. This is the real 20th Century Chuck. WRITE NOW FOR DETAILS.

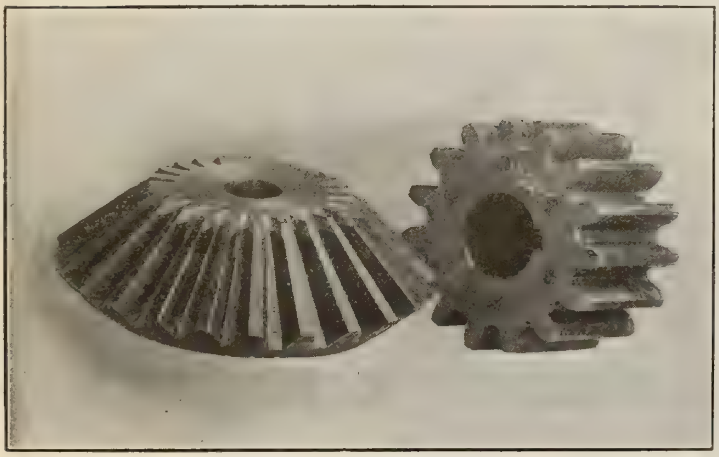
THE HEALD MACHINE COMPANY,

8 New Bond Street
Worcester, Mass.

BRANCHES: **Chicago** 24 So. Jefferson Street; **Cleveland**—710 Engineers Bldg.; **Cincinnati**—602 Provident Bank Bldg.; **Detroit** 303 Majestic Bldg.

CUT GEARS





Rawhide is suitable for Bevel as well as Spur Pinions

The only Gear Shop in Canada for Specialized Work in a large range of sizes.

Write for Quotations.

Hamilton Gear & Machine Co.

COR CONCORD
& VAN HORNE
TORONTO

The Roper Line of Lubricant Pumps

ranging from the simple one-way pump to the reversing pump with integral relief valve and by-pass, is undoubtedly the most up-to-date line offered by any manufacturer.

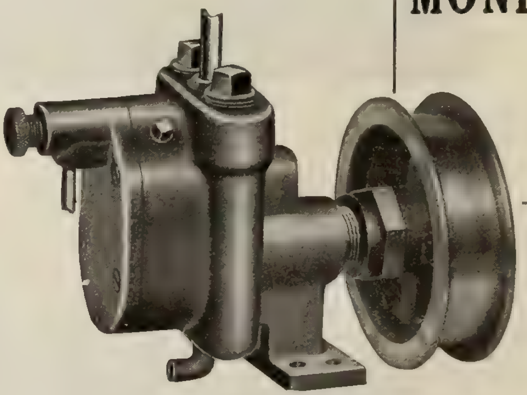
The "Roper" construction is extremely simple and makes for long, reliable service. The principal mechanism is a pair of accurately cut, hardened steel gears, running in a tight chamber.

Roper Pumps are made in all sizes, suitable for use on any machine.

Type 2. One-way

Our Type 2 one-way pump costs less to install because it eliminates the usual separate relief valve and piping.

WE CAN SAVE YOU MONEY



Type 1. Reversing

Our Reversing Pumps are simple, self-priming and low in cost. The Reversing feature is accomplished by simple ball valves which also form a double check valve in the pump, making unnecessary any check valve in the pump line.

Write for full information—we can save you money.

C. F. ROPER & CO.

Hopedale, Mass., U.S.A.

LEVIATHAN AND ANACONDA
ELEVATING
TRANSMITTING
CONVEYING
BELTING

ANACONDA BELTING

It is made of stitched canvas for the reason that this material, processed the ANACONDA way, makes belts more waterproof, with less slip, less stretch and of greater general serviceability than any other belts of any kind—leather, rubber, balata, or fabric, including canvas.

In other words, only in ANACONDA can you obtain those belt qualities which you know are needed in your plant, and an investigation at least cannot fail to be profitable.

Write us now about your particular belt troubles.

Main Belting Co. of Canada
Limited
10½ St. Peter St., Montreal

WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE

To the Shell Manufacturer:

Use

Economic Shell Washer

If you wish to wash your shells quickly and cheaply; it will remove all grease, oil, lead, etc., and makes the shells easy to lacquer.

Made in Canada by

Canadian Economic Lubricant Company, Limited, Montreal

Don't make patterns for your Gears

We make

Machine Moulded Gears

Any size up to 18 feet in diameter, in either steel, semi-steel or grey iron. No patterns required.

TRADE MARK
IF IT'S CASTINGS WRITE TO US
ADAMANTINE MANGANESE STEEL

Also manufacturers of all parts pertaining to Cement Mill Machinery, Crushing, Mining and Dredging Plants in "Adamantine," Chrome, Manganese and Nickel Steel.

Let us figure on your requirements. Write

HULL IRON & STEEL FOUNDRIES, Limited
HULL, P.Q., CANADA

MAIN PLANT OF MACKINNON, HOLMES & COMPANY, Limited, SHERBROOKE, QUE., CANADA

Engineers, Manufacturers and Erectors of Steel Structures

such as Bridges, Buildings, Towers, Tanks, Penstock, Stacks, Roof Trusses, Girders, Columns, Elevator Buckets, Bins.

Miscellaneous Steel Plate Work a Specialty

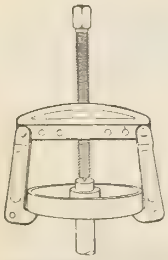
Steel Beams, Channels, Angles and Plates always on hand for prompt delivery.

We Also Make a Variety of Hydraulic Forgings

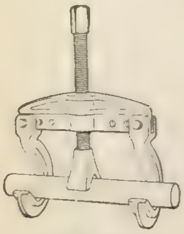
Your enquiries for any of the above will receive our immediate and careful attention.

MACKINNON, HOLMES & CO., LTD., Sherbrooke, Que.

Crane's New Model Patent Wheel Puller



Removing Work Near End of Shaft



Pipe Bending and Shaft Straightening Attachment

The screw has a flat end with inserted tempered tool steel point that will not spread cutters. Makes its own centre on work that has none. The strain is taken on the flat end of the screw. Grease to keep from cutting. The screws are made of high carbon steel and case-hardened all over.

The pipe-bending attachment consists of a pair of arms and forked end for the screw. Two sizes to fit the No. 2 and No. 3 Two-Arm Puller. **It is indispensable in a repair shop** for straightening propeller and jack shafts, banding exhaust pipes, and removing universal joint yokes, etc.

We absolutely guarantee the workmanship and material in our tools.

Write for full particulars.

The Crane Puller Co.
54 Lake Street
ARLINGTON, MASS., U. S. A.

Canadian Distributors: Canadian Fairbanks-Morse Co., Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary; John Millen & Son, Montreal, Toronto, Winnipeg, Vancouver.

—laces a 6-inch Belt in THREE minutes

Laces any width or thickness. You don't have to remove belt from shaft, as this small 19-lb. machine is carried to the belt and the work done on the floor.
Saves man-time, machine-time, and money, and you get a better joint.
Adapted to all makes of belting.
33.000 now in use all over the world.
Sent on 30 days' free trial.
Here's your opportunity to prove f yourself, on your own plant — that the "Clipper" is the **only** belt lacer you can afford to use.
FOR SALE BY ALL LEADING SUPPLY HOUSES IN CANADA.

CLIPPER BELT LACER

Clipper Belt Lacer Company
1 Front Ave., Grand Rapids, Mich.

Chisholm-Moore "Matchless"

Adjustable Malleable Frame Trolleys

Geared and Plain

"Matchless" Trolleys are made with flangeless track wheels and vertical guide rollers, enabling them to pass freely, without cramping, on curves as short as 18" radius.

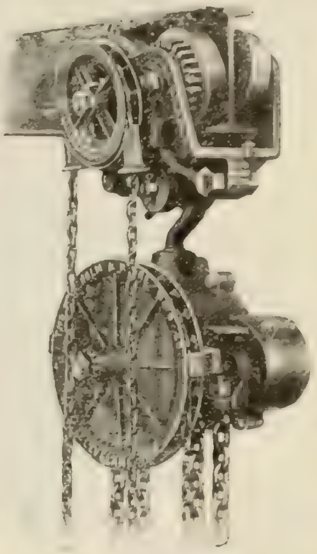
Track wheels have hardened steel roller bearings, and on Geared Trolleys all gears are cut. Each sized Trolley is adjustable to at least 3 sizes of standard I-beam.

"Matchless" Trolleys, with

Chisholm-Moore "Cyclone" Chain Hoists

and Hand Travelling Cranes, make up a complete line of hoisting equipment, adapted to any purpose, and ranging from ½ to 40 tons capacity.

Write for Catalogue, stating your special requirements, to



"Matchless" Geared Trolley with "Cyclone" Chain Hoist

Lyman Tube & Supply Co., Limited

Montreal
323 St. James St.

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"New Departure" Ball Bearings

For Autos, Motor Trucks and Machine Tools

"New Departure" Ball Bearings are produced in the largest ball bearing manufacturing plant in the world, and are used in over 75% of the motor cars made on this Continent.

The "New Departure" line is most complete, comprising the regular annular single row ball bearings, cup-and-cone or "take-up" bearings, and the

"New Departure" Double Row Ball Bearing

This is a distinctive "New Departure" design that in a single unit combines the greatest capacity for carrying all loads from any direction. It will take radial loads 1-3 to 1-2 greater than will a single row bearing of the same bore and diameter—a thrust, when no other load is present, of nearly twice its radial load capacity—or a combination load many times greater than that of a single row bearing.

This double function makes it the most efficient and economical anti-friction bearing for 75% of the places where ball bearings can be properly installed.

Write for Catalogue and full information to

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The Measure of Superiority

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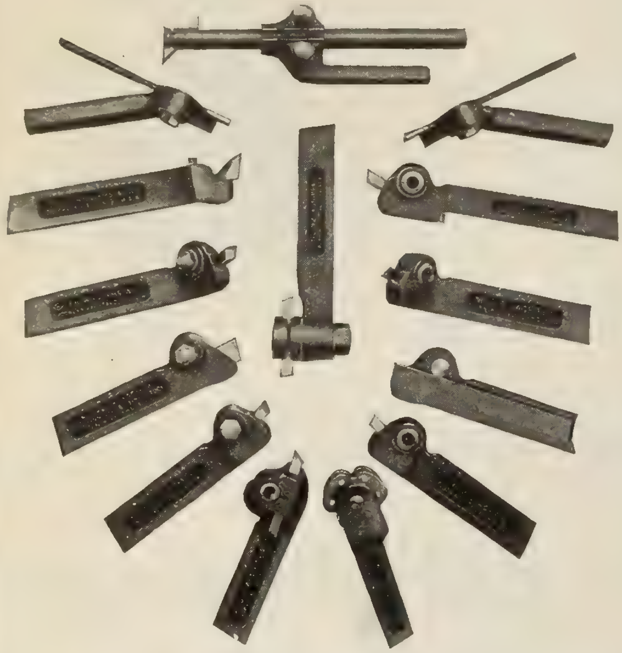
Williams' "AGRIPPA" Tool Holders

"THE HOLDERS THAT HOLD"



is the proportion in which they excel and endure.

You can verify our GUARANTEE of their maximum resistance, adjustment, interchangeability, usefulness, life and economy by exhaustively testing them on your own machines. When you have done so you will not care that their minimum age has not yet permitted maximum distribution. If they had been in existence a full quarter century you would probably doubt their having the most up-to-date improvements. *Quality,* not Quantity, establishes individual tool-holder value.

J. H. WILLIAMS & CO.

45 Richards Street BROOKLYN, N.Y. CITY

The Wrench People

Western Office and Warehouse:

40 So. Clinton Street, CHICAGO, ILL.

Thor SINGLE VALVE CHIPPING-HAMMERS

Equipped with a valve mechanism so perfectly balanced as to eliminate practically all vibration.

Made in five sizes, with piston diameter of 1 1/16" by strokes of from 1 to 5", designated as sizes A, B, C, D and E.

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Independent Pneumatic Tool Co.

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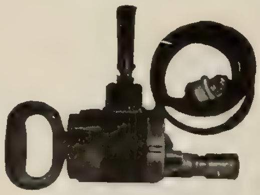
Save Time, Labor and Money

They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.



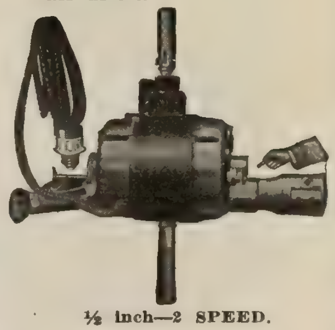
3 SIZES

3-16 inch, W.G.T. 6 lbs.
¼ inch, W.G.T. 9 lbs.
⅜ inch, W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



½ inch—2 SPEED.
Speed, 400-750 R.P.M.

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The Canadian Fairbanks-Morse Co., Limited

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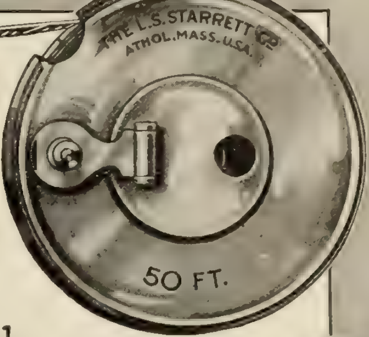
THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO

Starrett Tools

BY INVITATION MEMBER OF

NEW YORK U.S.A.



For Good Workmen

THE skilled mechanic uses the best tools because of pride in his work. He knows that his skill, aided by tools of utmost precision, makes him an accurate workman.

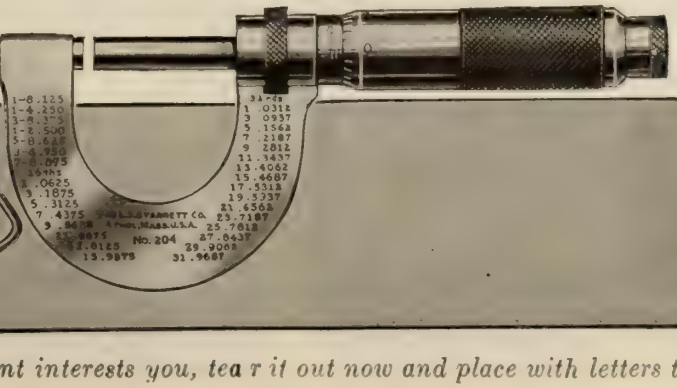
Starrett tools are the choice of skilled mechanics because they are satisfactory in every respect—in accuracy, in durability, in their convenience.

In looking through the Starrett catalog every mechanic or engineer will find described many tools and instruments that are exactly adapted to his work—that will make many a job easier and save time.

Write for the free Catalog No. 2 -

THE L. S. STARRETT COMPANY
Athol, Massachusetts
"The World's Greatest Tool Makers"
New York London Chicago

- Micrometers
- Vernier Calipers
- Combination Squares
- Steel Rules
- Protractors
- Levels
- Calipers
- Dividers
- Hack Saws
- Wrench Sets
- Speed Indicators



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Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas XX
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Chrome Vanadium Steel

Carbon Tool Steel
"Deward" Oil Tempering,
Non-Shrinking

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

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YOUNG, CORLEY AND DOLAN, Inc.

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EXTRA Die Steel

is produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

You get extra service from "EXTRA" DIE STEEL. A trial is convincing.

STEEL

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MONTREAL TORONTO NEW YORK

Manufactured By SANDERSON BROTHERS & NEWBOULD, Limited
SHEFFIELD, ENGLAND

Red Cut Superior High Speed Steel

Quality First

THE BEST FOR MACHINING
ALL HARD MATERIALS

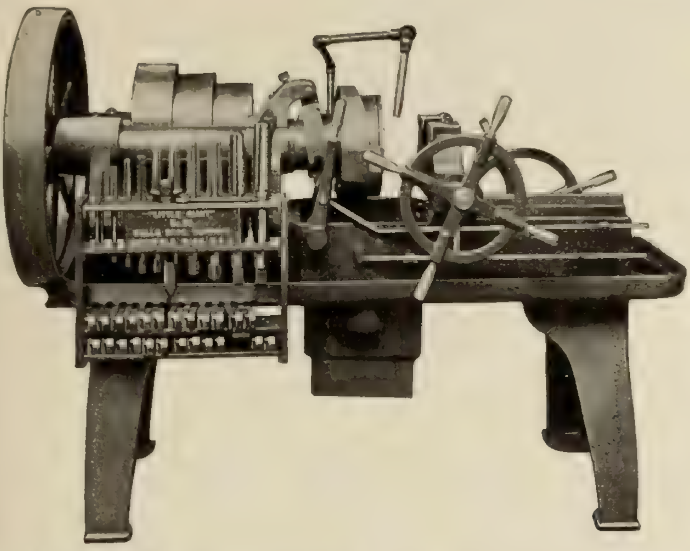
Are you tools made of Red Cut?

Send for folder

VANADIUM-ALLOYS STEEL COMPANY

PITTSBURGH, PA.
Works at Latrobe, Pa.

Threading Machines

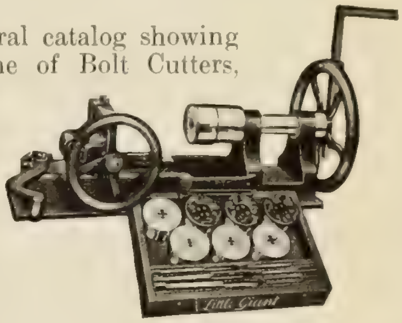


Little Giant

threading machines are free from time-consuming complications. Any shop employee can set them up in a few minutes. They are very easily operated. Any length of thread can be cut with the power machines, as they are fitted with hollow spindles.

The Little Giant line includes a complete range from the power machines with Automatic Opening Die Heads to the small bench machines with Solid Die Heads.

Send for general catalog showing our complete line of Bolt Cutters, Taps, Dies, Screw Plates, Gages, Reamers, etc.



Wells Brothers Co. of Canada, Limited
GALT, ∴ ONTARIO

Sales Agents; THE CANADIAN FAIRBANKS-MORSE COMPANY, LIMITED,
Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary.

Alundum Wheels are Used for

Grinding Automobile Steering Worm Mechanism

Here is an example of grinding superseding both roughing and finishing on the lathe, and doing the work with greater economy. It is everyday practice with the Gemmer Mfg. Company, of Detroit, Mich. The subject illustrated is part of an automobile steering worm mechanism shaft 5½ in. long, 1⅛ in. diameter. It carries a shoulder 2 in. diameter by ⅜ in. wide which must be at right angles to the shaft. The limit is very close. Production is 400 in ten hours.

NORTON COMPANY
WORCESTER, MASS. U.S.A.

Alundum and Crystolon Plants, Chippewa, Ontario

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THE CANADIAN FAIRBANKS-MORSE CO., LTD.
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822

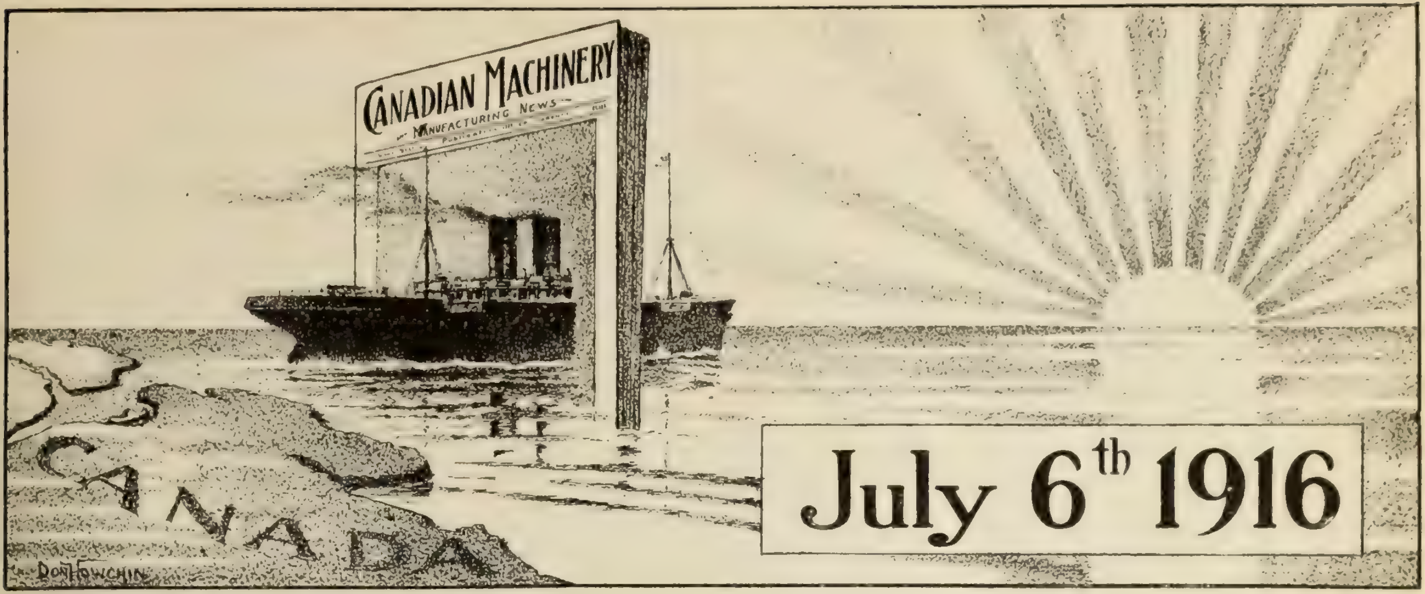
New and Used Machinery for Munition Manufacturers. Immediate Shipment

Quantity.	Description.	Selling Price.	In stock at	Remarks.
	LATHES			
4	24" x 10' New Haven Lathes each	$2,300.00	Toronto	New machines
1	18" x 8' Barnes Engine Lathe	800.00	Toronto	New machine
5	No. 60H "Star," 13" x 5' (swings 14⅛") Screw-cutting Engine Lathes, with pan bed, countershaft and regular equipment each	585.00	Toronto	Used machines
1	Von Wyck 15" x 8' Engine Lathe, compound rest, countershaft and complete equipment	700.00	Toronto	Good as new
1	10" x 5' Seneca Falls Screw Cutting Engine Lathe, for foot or power, complete with countershaft, change gears, etc.	250.00	Toronto	Used machine
1	Perkins Engine Lathe, 26" x 12'; setover tailstock, compound rest, 4-step cone, complete with countershaft and regular equipment	1,800.00	Toronto	New machine
1	Rand-Carpenter Screw Cutting Engine Lathe, 20" x 10', complete with face plates, countershaft and regular equipment	1,000.00	Toronto	Used but in excellent condition
6	"Hare" Shell Boring Lathes, for 4.5", 5" or 6" shells, 8" double belt, 20" turret—			
	Without power feed each	1,500.00	Toronto	New machines
	With power feed each	1,750.00	Toronto	New machines
19	Fairbanks Heavy Duty Single Purpose Manufacturing Lathes, 7' beds, equal to 26" standard engine lathe each	1,200.00	Niagara Falls	July shipment new : June and
7	Fairbanks Heavy Duty Single Purpose Manufacturing Lathes 9' 0" beds, equal to 26" standard engine lathe each	1,300.00	Shipment in July	July shipment New machines
20	Fairbanks Heavy Duty Single Purpose Manufacturing Lathes, 9' 0" beds, equal to a 30" standard engine lathe each	1,500.00	Shipment in July	New machines
1	American Tool Works Co.'s Lathe, 16" x 6' pan bed	1,600.00	Toronto	New machine
1	Prentice 16" x 8' Toolroom Lathe, 4-step cone, taper attachment, oil pan and pump, draw-in attachment and 7 collets from ⅛" to ½ x 1-16"	1,850.00	Toronto	New machine
1	Hendey Toolroom Lathe, 16" x 7', quick-change gears and oil pan	1,800.00	Toronto	New machine
1	Hendey Lathe, 20" x 8', quick change gears and regular equipment	1,100.00	Toronto	Used machine
	AUTOMATICS			
1	4-spindle National Acme Automatic	1,500.00	Toronto	Used but in excellent condition
	SCREW MACHINES AND TURRET LATHES			
2	No. 3 Foster Turret Lathes, plain head, with automatic chuck and wire feed, capacity 1 5-16", 14" swing, swing over cut-off slide 5½", hole in spindle 1 9-16" each	1,000.00	Toronto	New machine
5	Smurr & Kamen No. 4 Geared Friction Head Turret Lathe, 1⅞" hole in spindle, 16" swing, wire feed, capacity 1⅝", automatic chuck capacity 2¾" each	1,500.00	Toronto	New machines
	RADIAL DRILLS			
1	5' Bickford Full Universal Radial Drill, with speed box, single pulley drive	1,985.00	Toronto	Used but in excellent condition
	DRILLING MACHINES			
1	Henry & Wright No. 1, Class "L" High-Speed Ball-Bearing Sensitive Drill, single spindle with 12" overhang, spindle has a No. 2 Morse taper, and the capacity is from 0 to ¾", table is stationary, with cabinet base	225.00	Toronto	New machine
1	Hoefer Sensitive Drill, ¾" capacity, 16" swing	80.00	Toronto	New machine
2	McDougall 20" Drills, with automatic stop, power feed and back gears each	125.00	Shipment in July	New machines
1	No. 14 "Perfect" Column Sensitive Drill, capacity ½"	40.00	Toronto	New machine
1	24" All geared Sliding Head Barnes Drill, with oil tank and pump	450.00	Toronto	New machine
	MILLING MACHINES			
1	No. 3 Cincinnati Plain, Cone Type Milling Machine, with single back gears, power longitudinal feed to table, hand, cross and vertical feeds, overhang arm, standard countershaft	1,800.00	Toronto	Used, excellent condition
1	No. 3B Milwaukee Universal Milling Machine, with complete regular equipment, single pulley drive	2,850.00	Toronto	Used machine
	GRINDERS			
3	Bench Grinders, with countershaft each	10.00	Toronto	New machine
1	No. 8 "Perfect" Grinder, with countershaft	56.00	Toronto	New machine
1	Tool and Cutter Grinder, similar to Wells No. 164	175.00	Toronto	New machine
1	St. Louis No. 3 10" Double Head, Self-contained Countershaft, with guards, complete	42.00	Toronto	New machine
1	St. Louis No. 4 12" Double Head, Self-contained Countershaft, with guards	48.00	Toronto	New machine
1	Stevens Improved Universal Tool and Cutter Grinder	560.00	Toronto	New machine
1	Gisholt Tool Grinder	545.00	Toronto	New machine
	POWER HACK SAWS			
1	No. 3 "Perfect" Hack Saw, 6" x 6"	30.00	Toronto	New machine
1	No. 1 Racine Hack Saw, capacity 6" x 6"	131.00	Toronto	New machine
1	No. 7 Racine Hack Saw, capacity 12" x 12"	376.00	Toronto	New machine
	PUNCHES			
1	No. 2 Union hand power combination Punch and Shear	85.00	Toronto	New machine
	ARBOR PRESSES			
1	Greenerd Arbor Press No. 3½	50.00	Toronto	New machine
	PORTABLE ELECTRIC GRINDERS			
1	Type NA. Surface Grinder, direct current, 220 volts	98.00	Toronto	New machine
1	Type N.A. Grinder, 60 cycle, 110 volts, single phase	93.50	Toronto	New machine
	PIPE MACHINES			
2	No. 304A. Oster Pipe and Nipple Machines, capacity 1" to 4" each	325.00	Toronto	New machines
	RIVETING MACHINES			
1	Grant No. 60 Pedestal Type Riveter	165.00	Toronto	New machine

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

St. John Montreal Quebec Toronto Hamilton Winnipeg Saskatoon
Calgary Edmonton Vancouver Victoria

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS



The Dominion of Canada Celebrates Its Fiftieth Birthday

Contributed and Selected

On this and the immediately succeeding pages, it seems fitting that reference both specific and general be made to the development of Canada's natural resources and to the upbuilding of her industry and commerce. She has just celebrated her fiftieth birthday, and it goes without saying that at no previous or similar epoch has her prosperity been more marked, her enterprise been more demonstrative, and her Empire allegiance been more sincere.

DOMINION Day, July 1, 1916, found Canada in many respects more enterprising and progressive than at any time since Confederation. Various reasons may be assigned as being contributory or responsible for the initiation of her new and broadened outlook. The bumper crop of 1915, the meantime satisfactory condition of that of the present year, and the aptness with which our metal-working and manufacturing plants generally have negotiated munitions production, may, however, be reckoned as the chief factors.

A New Inspiration Evident

Not only has a new inspiration come to us, but coincident with it much of our latent individual and collective ability to observe and perform has been revealed. We have come to realize that not only are we big and strong enough to take care of a larger proportion of our own ever-increasing domestic needs and undertakings, but we can prepare to take a hand in the many business opportunities presently offering abroad; all of which will necessarily increase in number, extent and diversity, as the trade unification plans of our Empire and her Allies develop and mature.

Our record since Confederation is no mean one, as the accompanying data and statistics amply bear out. We have accomplished much in agriculture, mineral reclamation, manufacturing and transportation during the intervening period, and most gratifying of all, we have contrived to equip our national machine in its myriad intricacies so as to play a relatively important part in the world's future commerce and industry. We have taken cognizance of what other and older countries have found advantageous, and have appropriated their ideas; on the other hand, we have discriminated against many of the disabilities under which they labor. As a result, it requires no stretch of imagination to affirm that, with the lapse of a similar period ahead, our national progress and achievement will be in marked degree accelerated.

It has been during the last quarter century or even less that our greatest development has taken place; its trend and activity were, however, self-contained. In the coming time, and because of the latter, the scope of our activities will become enlarged so as to be world-embracing in their application. This, needless to say, is already abundantly evident in the expressed desire and effort being concentrated towards the distribution of the products of our fields, our mines and our factories in lands hitherto unfamiliar, and in many cases altogether ignorant of our trade and commerce capacity.

Territorial Area

Canada has one-third of the area of the British Empire, and a majority of the white population of the Empire outside of Great Britain.

Canada is bounded by three oceans; its 13,000 miles of coast line is nearly equal half the circumference of the earth.

Canada is 3,500 by 1,400 miles in area. The United States-Canada boundary line is 3,000 miles long; 1,600 by land, 1,400 through water.

Canada is as large as 30 United Kingdoms and 18 Germanys; twice the size of British India; almost as large as Europe; 18 times the size of France; 33 of Italy.

Canada is larger in area than the United States, including Alaska, by 111,992 square miles (Canada, 3,729,665; United States and Alaska, 3,617,673).

In 1868, area of the four provinces forming Confederation was 662,148 square miles; now Parliament exercises jurisdiction over 3,729,665 square miles in nine provinces.

Land of Opportunity

Our Prime Minister, Sir Robert L. Borden, says that Canada without any booming is going to be one of the greatest countries in the world, even if England neither sent a man nor a penny piece out there.

"The Canada of to-day is a land of peace and plenty, a place of sunshine and big crops, a country whose soil spells wheat, and out of whose farms thousands are growing rich.

"Canadians have reason to feel proud of the laws governing the country and the manner in which they are administered. There is an observance of established authority that is appreciated by all law-abiding citizens.

"In religious matters and politically Canada is the freest country in the world. There is no established religion, and each person is at liberty to worship as he pleases.

"Each province is in absolute control of its own system of education, and probably no country in the world enjoys a broader or more generous system.

"Do you realize how great a country Canada is? If you could pivot Canada upon its eastern seaboard, it would cover the northern part of the Atlantic Ocean, the British Islands, Norway, Sweden, Denmark, Holland, Belgium, the northern part of France, the entire German Empire, and a considerable part of European Russia, and a man who lives in Halifax is a thousand miles farther away from Victoria than he is from London."

Agriculture

Canada's harvest for 1915 was the most bountiful in her history, making new records for quantity, quality, and value.

Canada's total grain crop of 1915 was a record-breaker, totalling 10,194,609,250 bushels, worth $800,000,000, and this from less than 10 per cent. of the arable area. This was Canada's record-breaker both in field crops value and production.

Canada's total tilled area in 1915 was 37,263,000 acres; in 1914, 33,440,075.

Canada is increasingly becoming the great granary of the Empire.

Canada's wheat yield for 1915 was 376,303,600 bushels, worth $312,569,400, or 215,023,600 bushels more than in 1914. Average yield per acre, 28.98 bushels; 1914, 15.67.

Canada has 543 flour mills, with a daily capacity of 111,865 barrels.

Canada's exportable wheat and flour, from the 1915 harvest, is estimated at $200,000,000.

Oats were Canada's greatest crop; 520,103,000 bushels in 1915; worth $170,894,700. Yield in 1914, 313,087,000 bushels.

Other principal crops: Barley, 53,331,300 bushels, worth $26,704,700; rye, 2,394,100 bushels, worth $1,899,900; peas, 3,478,850 bushels, worth $5,730,700; root and fodder crops value, $229,623,000.

Canada's total dairy production totalled (census of 1910), $109,339,934. Dairy product exports, 1914-15, $22,952,560, mostly cheese.

Canada had in 1915, 14,212,662 head of live stock.

Canada's cattle value increase in ten years, 1901-1911, was $24,755,000, or 14 per cent.

Canada's horse value increase in ten years, 1901-1911, was $260,607,000, or 200 per cent.

Population

Canada's population:—1867, 3,371,594; 1911, 7,206,643, more than double. By the same ratio Canada would have, at the end of the next fifty years, viz., in 1967, or at the conclusion of a century of Confederation, fifteen millions. Canada's present population is estimated at 8,075,000. The last ten-year increase, 1901-1911, was 34 per cent., as against 24 per cent. in the United States for the same period.

Canada's population is about two per square mile; that of the United States about 30. If Canada had the square-mile population of the United States it would have 111,000,000.

Canada had, in 1871, 21 cities and towns of over 5,000 inhabitants; in 1911 there were 90.

"Long before the end of this century Canada will have 75,000,000 people."—Watson Griffin in "Canada the Country of the Twentieth Century."

Trade Growth

Canada's total foreign trade has jumped from $131,027,532 in 1867 to $1,120,253,771 in 1915. Average per head, 1867, $38.35; 1915, $137.69. Imports in 1867 were $73,459,644; in 1915, $629,444,984. Exports in 1867 were $57,567,888; in 1915, $490,808,877.

Canada's trade has expanded from dealing with a few countries to those now numbering seventy.

Canada's trade growth since Confederation has been remarkable.

Canada ranks third in the ratio of her trade per head.

Canada's trade has more than doubled in nine years, and trebled in fourteen; being nine times greater than what it was at Confederation.

Manufactures

Canada's industrial growth has been in keeping with her great development in other lines; it has been markedly so since 1900.

Canada has more than a billion dollars invested in her factories, which make over 300 different varieties of product.

It is estimated that over 300 United States firms have factories in Canada.

The value of goods made in Canadian factories is estimated at $1,400,000 a year, based on normal capacity.

Railroads

Canada's railway mileage, June 30, 1914, 30,795; increase of 1,491 in year. Doubled in 20 years. Mileage in 1836, 16; at Confederation, in 1867, 2,278.

Canada has, on basis of population, the highest ratio of railway mileage of any country in the world, viz., 3.75 miles per head.

Canada has more miles of railway in operation than Australia, New Zealand, Italy, and Spain combined; more than Sweden, Norway, Denmark, Belgium, Holland, Switzerland, and Roumania joined together.

Only four countries now exceed Canada in railway mileage—United States, Russia, Germany, India.

Canada added more than 10,000 miles to her operative railway mileage in the last decade. No other country in the world has equalled it.

Canada's railways have been given cash subsidies of $228,772,640, viz., $178,839,528 from Dominion, $37,023,275 from provinces, and $17,914,836 from municipalities. Dominion and Provincial Governments have also guaranteed railway bonds for many millions.

Canada's railways employ 159,142. Annual salaries and wages, $111,762,972.

Resources Development and Achievement

Canada's canal at Sault Ste. Marie is the greatest single lock in the world. This lock has a length of 1,350 feet, with a width of 50 feet, a height of 50 feet, and a lift of 20 feet. These dimensions surpass those of any other lock in the world, the length of the biggest lock in the Kiel Canal being but 1,082 feet.

Canada has built the largest irrigation dam in America at Bassano, Alta., 7,000 feet long.

Canada is about completing the largest railway tunnel in America, in the Rogers Pass.

Canada is building the largest single span bridge in the world, at Quebec.

Canada is building a new $60,000,000 Welland Canal.

Canada is spending many millions on great harbor works in Halifax and St. John, and in deepening the St. Lawrence ship-channel.

Canada is erecting the largest telescope in America, on Vancouver Island.

The Canadian Government has built five large grain elevators.

Canada has the largest grain mills in the British Empire.

Canada has the world's largest lift-lock, at Peterboro.

Canada has the largest buffalo herd left on the continent, between one and two thousand.

Canada has the largest and richest nickel mines in the world.

Canada will have the longest bridge span in the world, at Quebec.

Montreal harbor has the largest grain conveying system in the world.

Canada has the most prolific and extensive sea fisheries in the world.

Ontario's Hydro-Electric Power transmission line is the longest in the world.

Canada possesses the largest pulpwood resources of any country in the world.

Canada has the largest consecutive

wheat field in the world, 900 by 300 miles.

Canada has one of the highest tides in the world—59½ feet—in Noel Bay, Bay of Fundy.

The thickest known coal seam in the world—47 feet— is at Stellarton, Nova Scotia.

Canada has the largest elevator in the world at Port Arthur; capacity, nearly ten million bushels.

Toronto's Industrial Exhibition is the largest annual fair in the world.

Water Powers

One of Canada's richest assets is in her water powers, which have only been developed since Confederation. Canada's estimated water power is 16,600,000 h.p., equal to an annual production of 367,000,000 tons of coal. Only a little over 1,000,000 h.p. thus far developed. Canada possesses, it is claimed, a larger amount of potential water power than any other country.

Irrigation

Irrigation methods were practically non-existent in Canada at several large irrigation systems in Confederation. To-day there are Alberta and British Columbia. The C. P. R. project will irrigate part of a tract of 3,000,000 acres of land east of Calgary, involving 2,500 miles of canals and ditches.

Shipping and Shipbuilding

Canada's marine progress has been steady. Her net registered vessel tonnage, December 31, 1914, was valued at $27,972,660.

Canada now occupies the tenth place among maritime nations. Registered vessels, December 31, 1914, 8,772, measuring 932,422 net tons, employing 45,168 men and boys; 327 vessels valued at $1,950,570 added to list in 1914; 212 removed from register.

Tonnage of vessels built in Canada, 1914-15, 45,721; doubled in five years. Tonnage of vessels registered, 55,384.

Canada's sea-going, coasting, and inland shipping, inwards and outwards, fiscal year 1914-15, 259,192 (275,139 in 1913-14); aggregate tonnage, 126,704,135.

Finances

Canada's Government revenue, first year of Confederation, $13,687,928; 1915-16, $170,000,000.

National public debt, 1867-68, $96,846,666; March 31, 1916, $580,000,000.

Canadian people's savings on August 30, 1915, in the chartered banks, post offices, and other institutions authorized by the Government to accept deposits, amounted to $1,134,367,051, or $140 per head of 8,000,000 population.

"Round Table" estimate of Canada's capital wealth, $9,920,000,000.

The position of the chartered banks of Canada is stronger than in any other period since Confederation.

Western Canada

Western Canada's development has almost entirely come since Confederation.

Western Canada has nearly 3,000 elevators, with a capacity of nearly 100,000,000 bushels.

The three Prairie Provinces are three times the area of the German Empire.

Less than 10 per cent. of Western Canada's arable area is under cultivation at the present time.

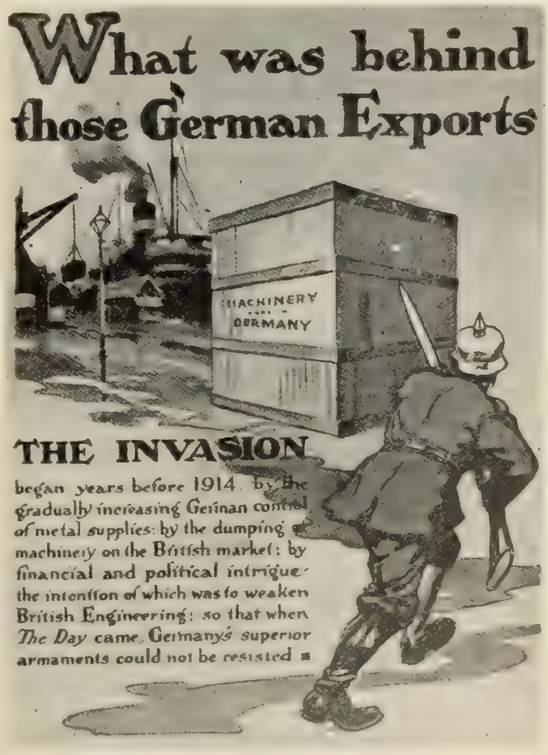

What was behind
those German Exports
MACHINERY
GERMANY
THE INVASION
began years before 1914. by the gradually increasing German control of metal supplies: by the dumping of machinery on the British market: by financial and political intrigue the intention of which was to weaken British Engineering: so that when *The Day* came, Germany's superior armaments could not be resisted

Illustration courtesy Engineering Review.

The three North-West Provinces' estimated yield of wheat in 1915 was 304,200,000 bushels, out of 336,258,000, or 90 per cent.; oats, 305,680,000 bushels, out of 481,035,000, or 63 per cent.

The Peace River country, the Last Great West to be opened up, has 45,000,000 acres of arable land—"a new kingdom of arable richness."

Practically all of the Western cities have come into existence since Confederation.

Banks

In no department has Canada's development since Confederation been more strikingly shown than in that of banking. Canada's paid-up bank capital in 1888 of $30,507,447 increased to $115,984,389 in 1915; bank deposits from $33,653,594 to $1,123,673,735; assets from $77,872,257 to $1,574,210,941, and post office deposits from $1,687,808 to $39,995,406.

Canada's Part in the War

Canada is fully determined to spare no effort and shrink from no sacrifice to make triumphant the cause of the Allies, says Sir Robert L. Borden.

Dominion Day, 1916, finds Canada in the world's greatest war, with a national and an Empire unity never before known.

Canada has pledged 500,000 men to Great Britain and the Allies. Of this number, 350,000 have enlisted, and additional enlistments are averaging a thousand a day.

Canada's war expenditure thus far (through the Federal Government and Parliament) totals $400,000,000, including Government war vote for current year of $250,000,000.

Over 400 industrial plants are making shells and other munitions.

Canada has given $10,000,000 for its Patriotic Fund, and as many millions for Red Cross and similar purposes.

The first Canadian contingent of nearly 33,000 men, 7,500 horses, and 70 pieces of artillery, was the largest military force that ever crossed the Atlantic.

Canada was supporting in the fall of 1915, 10,000 beds in France, England, etc., distributed between 16 hospitals, with staffs of over 2,000 doctors and over 500 nurses.

Immigration

Government encouraged and regulated immigration, practically unknown at Confederation, started in 1907. Total arrivals since then, 3,172,865 viz., 1,197,995 British, 1,090,457 United States, 882,423 foreign, representing 43 nationalities.

Japanese immigration, 1907-1915, 11,741; Chinese, 28,725.

Canada's foreign population was 6 per cent. in 1901; 11 per cent. in 1911.

Labor Unions

Labor unions were practically non-existent in Canada at Confederation. Now there are over 2,000 local trade union branches, with 166,163 members, according to returns at end of 1914.

Fisheries

Canada has the most extensive and best stocked commercial fishing waters in the world, including 5,000 miles of Atlantic and 7,000 miles of Pacific coast, and 220,000 square miles of fresh water. Canada's fishery exports have increased from $3,357,510 in 1867 to $19,687,086 in 1914-15.

Mineral Wealth

Canada possesses practically every known mineral.

Canada's total mineral production since Confederation, $1,645,608,421.

Production value, 1886, $10,221,255; 1914, $128,475,499. It has doubled in the last ten years.

Canada's mineral exports were only $1,267,129 in 1867; $53,781,102 in 1914.

Canada produces 80 per cent. of the world's nickel output. Production in 1914, 45,517,937 pounds, worth $13,655,381.

Cobalt silver production since 1909, $113,751,261.

Canals

Canada has a remarkable canal system in comparison with its vast area and relatively small population, viz., 100 miles (linking together 1,594 miles of waterways), at a cost of over $100,000,000. The traffic through the Canadian canals on Canadian vessels jumped from a tonnage of 2,681,639 in 1885 to 12,050,856 in 1914, and on United States vessels from a tonnage of 547,438 in 1900 to 15,636,414. Freight carried, 1885, 3,673,641 tons; 1914, 37,023,237 tons.

Customs Revenue

Canada's chief source of revenue. Customs duties, has increased from $8,801,446 in 1867 to $104,691,238 in 1915, and excise from $3,002,588 to $21,452,037.

Telephones and Wireless

The telephone has come into existence since Confederation, and to-day Canada is one of the world's greatest telephone users, there being one for every 15 of population.

Canada had, in 1914, over half a million telephones and 1,136 telephone organizations.

Canada is the home of the telephone, being first used in Brantford, "the Telephone City."

Wireless is also new since Confederation. Canada has a chain of wireless stations, making one of the best marine telegraph services in the world.

Mails and Parcels

The post offices of a country are a measure of its growth. Canada's expansion in this regard has been striking, from 3,638 at Confederation to 13,348 on March 31, 1915.

Letters mailed in 1868 amounted to only 18 millions; in 1914-15 they were 684,000,000.

Parcel post and rural mail deliveries are new features.—Toronto Star abstract.

PACKING OF MACHINERY, HARDWARE, ETC.

TO facilitate easy handling and minimize chances of breakage, cases containing machines should be as small as possible, and all parts should be snugly tight in the case or crate, as the least bit of movement may result in serious damage. Pieces of irregular form should be braced at every curve and angle, the box itself being reinforced inside and out to prevent its going to pieces if suddenly dropped. A very important precaution is the covering of the machinery itself in such a way that if the cases are exposed to rain the contents will not get wet, and it is advisable to cover all metal parts with vaseline or similar substances to prevent rust.

Because of its weight, hardware should be packed in as small compass as practicable, and in cases that will stand rough and frequent handling. Protection against damp should be supplied and close attention paid to the requests and suggestions of buyers, which, it is claimed, are frequently overlooked in these lines. Nails should be packed in strong kegs bound with four or five steel hoops, and have reinforced ends; otherwise there is generally considerable breakage in every shipment, the loss ensuing from pilfering and other causes falling upon the foreign importer or the native dealer who buys from him.

If the shipper wishes the consignee to receive his cargo in satisfactory condition he must pack to protect against dampness, and have the cases stout and iron banded to prevent breaking and to give greater immunity from depredations in warehouses, etc.

HINTS FOR TRADE EXTENSION ABROAD

AT this time when Canada is making wide preparations for an extension of its foreign trade, the following hints from The Board of Trade Journal may be of interest to such of our manufacturers as may be considering the question of entering a new market:—

When it is remembered that success or failure depends at least as much on the organization of a business campaign as on the intrinsic value of the goods offered when compared with those of competitors, the manufacturer contemplating extending his business in a new market will realize the desirability of himself making a preliminary visit to the district. He will thus be in a position to judge for himself the extent of the business to be done and to prepare an organization which will diminish as far as possible the disadvantage due to his inevitable absence.

The most deliberate care and attention should be given to the choice of a representative. Such a man, besides having a complete knowledge of the language and customs of the locality in which he works, should be a thorough expert in his trade and be able to adapt his knowledge to local requirements. He should not be treated as a mere employee, and above all he should not be paid a fixed salary only, but his remuneration should be arranged on a commission basis with an adequately generous allowance for expenses. Shipping agents who are British subjects should be chosen wherever possible.

Emphasis is laid on the desirability of commercial travellers being provided with sufficient samples, price lists, catalogues, etc., in the language of the country; on the economy to be obtained by groups of non-competitive manufacturers combining to send one representative; the need to conform to local tastes as to the manner of presentation of the article, packing and labelling, etc.; the need of certain markets for giving long credits; and for quoting inclusive prices —factory to customer's warehouse or shop—for goods.

C.P.R. RESOURCES EXPERT ON PRELIMINARY INVESTIGATION

GEORGE BURY, vice-president of the C.P.R. left Montreal on June 22, for the West on his regular trip of inspection, accompanied by A. D. Little, whose firm is, under arrangement with Lord Shaughnessy, to examine into Canada's mineral and other unutilized wealth, with a view to making the same productive as respects the general industries of the country as a whole.

Mr. Little will make a general examination of a preliminary nature, at points which offer evidence of metalliferous wealth, but the work of systematizing and classification will follow later on. The firm of Little & Company, are located on McGill, St., Montreal, which will be headquarters for the organization, now getting under way. It will be the business of the firm to analyze values and possibilities, and report same to an Advisory Committee, which will, in turn, report to Lord Shaughnessy.

The effect of the examinations and appraisements are, it is understood, to give to the untouched and unknown (in great part) riches of the country a chance of utilization in connection with native industries and exploitation, so that the country, through the wealth it bears in its bosom, may become self-contained to a greatly increased degree. In a word, Mr. Little will try to reveal, through his investigations, the enormous wealth of the country and it will then be for capitalists to utilize it in the various processes of manufacture, instead of being dependent upon outside aid in the fabrication of such things as we require in our commercial and industrial life. The mineral wealth of the Dominion has it is believed been little more than "scratched," so to speak, and it will take Mr. Little and the staff he has assisting him, a considerable time to make the necessary investigations.

Plant and Product of the Bawden Machine Co., Ltd., Toronto

Staff Article

War-time demands have in many cases been the cause of very complete changes in the output of our factories, and to few firms indeed has the great strife occasioned less complete reversals of activity than the plant described. On the contrary, its services to the country have involved rather an intensification of its previous efforts, which by reason of the personnel, plant and product, have been rendered of increasing value to the country in the present crisis.

WHILE much of the success attendant on Canadian munitions manufacture has been due to the whole-heartedness with which so many firms entered on the work, the fact remains that without the necessary equipment many factories would not today be shipping shells. Despite the immensity of the machine tool production in the States, the demands from other countries greatly restricted the supply of tools from that quarter, and the business acumen of several of our home firms in taking up the manufacture of machine tools, not only minimized the handicap from which shell production suffered, but afforded an opportunity for Canadian machines to firmly establish themselves on the market as a permanent product possessing all the features of advanced design, with the reliability and capacity arising from proper material and thorough workmanship.

A Machine Building Organization

With an established reputation of eight years' standing, the outbreak of hostilities found the Bawden Machine Co. of Toronto busily engaged in all of the activities connected with general and special machine shop work. As builders of the Bawden pump, the company was thoroughly au fait with manufacturing methods; at the same time, the accumulated experience of many years on special machine building also had a considerable influence on the decision of the company's officials to confine their war efforts to supplying machines rather than shells, and their measure of success can be readily noted by any observing visitor to our leading munition plants.

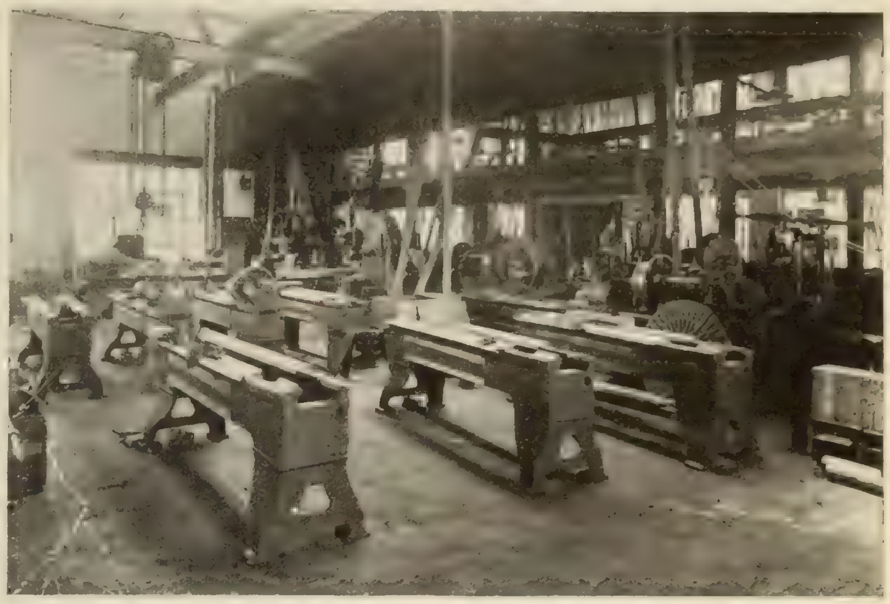


FIG. 2. VIEW IN ASSEMBLY DEPARTMENT WITH MAIN BAY IN BACKGROUND.

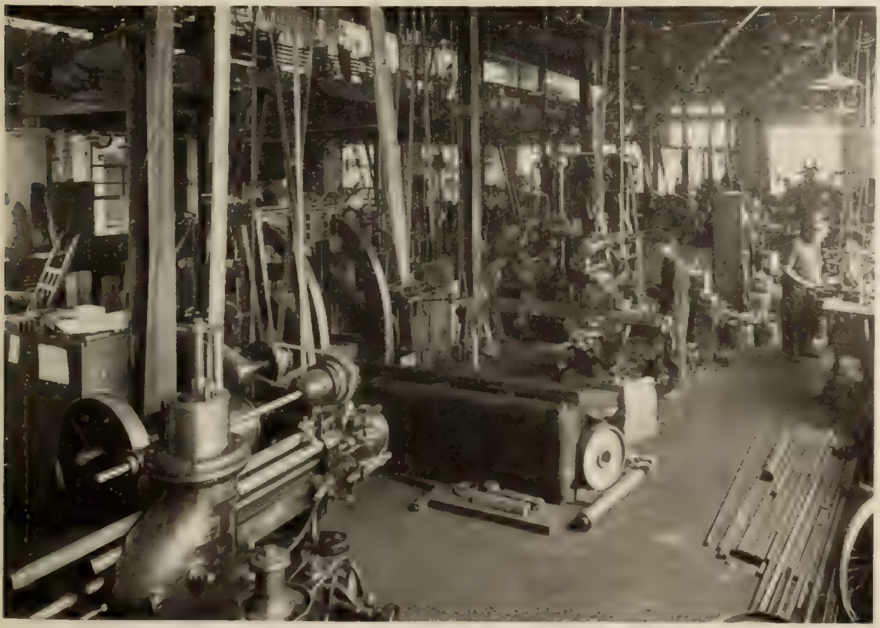


FIG. 1—INTERIOR OF MAIN BAY LOOKING EAST.

Increased output has demanded considerable additions to present plant, the acquisition of which three years ago was rendered necessary by the increasing extent of the company's business. The quantity production of lathes has necessitated additional floor space, while the regular supply of castings is insured by the Worr Foundry Co., which operates a modern foundry plant in conjunction. A completely equipped pattern shop and smith shop are operated, while the tool room has done excellent work in producing testing and gauging devices in endless variety for the use of shell makers.

Main Shop Equipment

The brick office building is 50 ft. long, extending across the western end of the main bay, which is 50 ft. wide by 108 ft. long. A view of the main bay looking east is shown in Fig. 1, the machines in the immediate foreground being a Fellows gear shaper and a 12 ft. by 30 in. by 30 in. Whitcomb-Blaisdell planer. A No. 3 Cincinnati plain miller and a 48 in. Colburn boring mill are located beyond the planer. A Universal boring machine is largely occupied on boring and facing pump cylinders and hydraulic press castings.

At the eastern end of the main bay is a cross bay, which includes assembly department, tool room and smiths' shop. Part of the assembly floor is shown in Fig. 2, the large lathes in the background being part of the main bay. Prominent

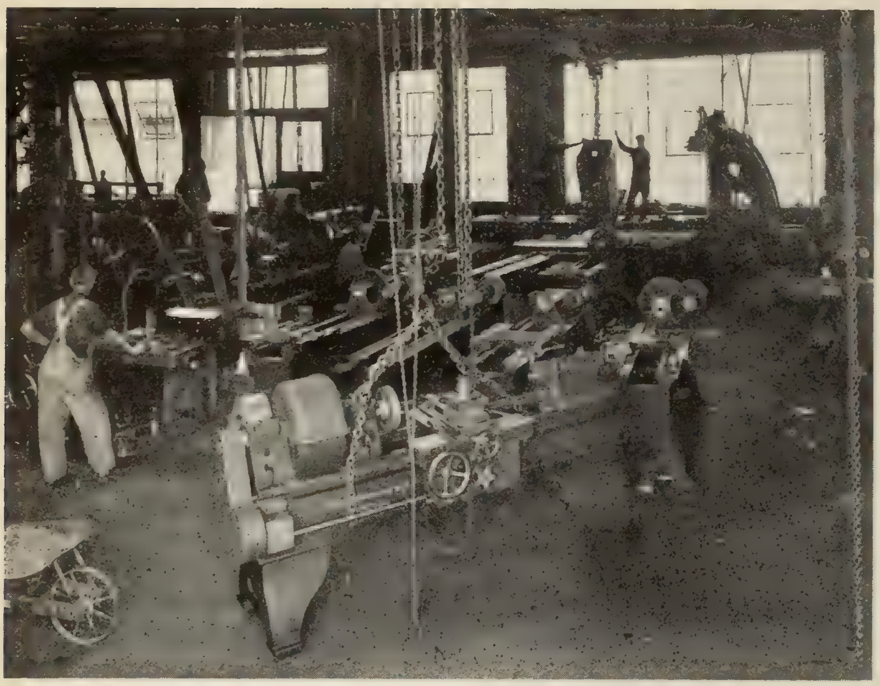


FIG. 3—A 16-IN. LATHE READY FOR SHIPMENT.

among the lathes are a 42 in. Bradford, triple geared, a 48 in. New Haven, a 30 in. Bertram, and a 48 in. triple geared facing lathe, with two tool rests on cross slide.

Other representative tools are a No. 4 Cincinnati vertical miller, a 36 in. Gisholt vertical turret lathe, and a No. 3 Becker universal miller; while the drill department includes two 36 in. Fosdick radials, one 36 in. Cincinnati-Bickford radial, and one 12 in. Rockford vertical drill press. The portion of the assembly floor shown in Fig. 2 is served by a 5-ton Herbert Morris travelling chain hoist, hand operated.

The process of assembling when completed in this part of the works finds the lathe in close proximity to the shipping door, Fig. 3 being taken from the door and showing a completed lathe suspended from the crane.

Special Purpose Machines A Feature of the Shop Product

The manufacture of machinery for special purposes has always been a feature of this firm. Cloth dryers, gasoline engines, hydraulic presses and automatic machinery for numerous purposes indicate the wide field of application to which the firm's activities have been directed, some of the more specialized apparatus consisting of machines for making corrugated bottle caps, stereotype machines, and automatic machinery for producing twist drills.

Reference has already been made to the tool room. In the case of repetition work, the importance of tool room facilities as a factor in successful production is thoroughly recognized, but in special machinery building the necessity of a tool room is not always so evident, especially when a high grade of work is constantly in progress and the standard of excellence is uniformly high throughout the plant. In the case of this plant, the tool room might well be termed the light machine shop, as owing to the nature of its equipment it is capable of turning out a large variety of work in addition to performing the regular work of tool upkeep, etc.

Tool Room Equipment

Two views of this department are shown in Figs. 4 and 5, while some of its more recent products are shown in Fig. 6. Here, as throughout the remainder of the plant, careful discrimination has been shown in selecting the equipment.

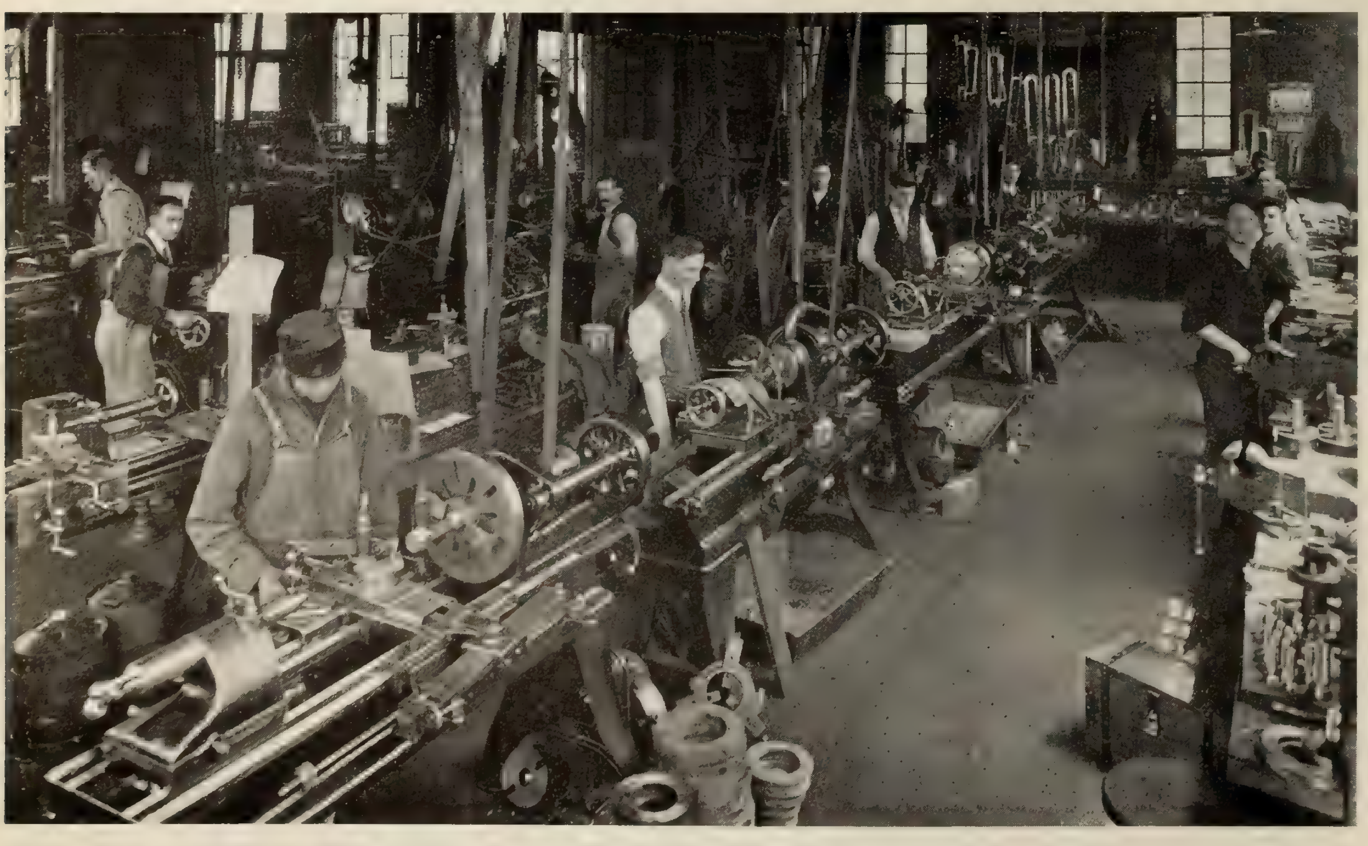


FIG 4—GENERAL VIEW OF TOOL ROOM.

The lathes include two 18 in. Reed; one 18 in. Lodge & Shipley; and one 18 in. Hendey, all of the tool room type, with full equipment. In Fig. 6 can be observed a No. 3 Modern grinder, and beyond this is a 36 in. Le Blond heavy duty turret lathe. A No. 4 Landis grinder and one Stevens tool grinder complete the machines of this type; while the milling machines include one No. 3 Becker vertical mill and a No. 2 Cincinnati. Minor, but none the less useful items, are a Thomson metal band saw and a Hartford bench filing machine.

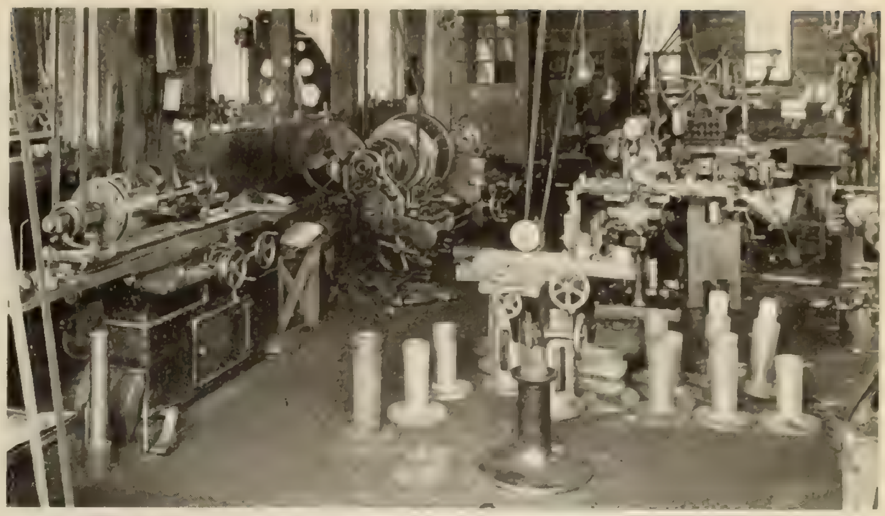


FIG. 5. BIEW IN TOOL ROOM SHOWING GRINDING.

Interesting Gauge Work

For many months the tool room has been almost entirely devoted to the making of gauges and testing machines for use by the officials of various Governments and private munitions makers. With the gradual increase in size of projectiles produced in this country the types of gauges have undergone slight alteration. The samples shown in Fig. 6 are but a small variety of the work done in this respect. To the right of the picture is a partly finished cylindrical gauge for 8 in. shells. Lying on the floor beside it is a plug gauge for 18-pdr. fixed ammunition, and toward the left of that is a replica of a gun chamber for gauging finished cartridge cases. The gauge in the centre is for testing the cylindricity of shell bodies, the vertical arm carrying an indicator which shows variations in thousandths of an inch from a true circle. The gauges hanging up behind include one ring and one snap gauge, and four special caliper gauges for testing the wall and base thickness of large shells.

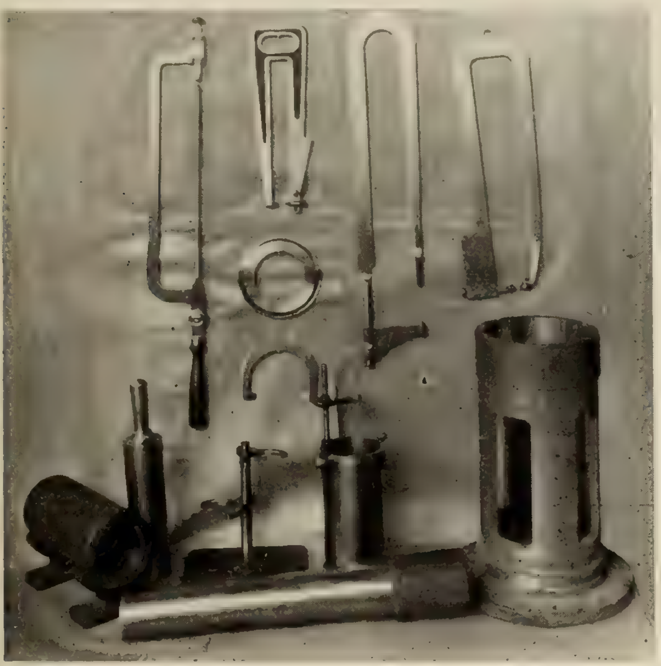


FIG. 6. GROUP OF GAGES FOR VARIOUS SIZES OF SHELLS.

Smith Shop and Hardening Department

Adjacent to the tool room is the smith shop, which is equipped with three hearths, three gas-fired hardening furnaces, one brazing hearth, and one 8$\frac{1}{2}$ lb. Dupont power hammer, built by the Plessisville Foundry Co. All products of combustion from the hardening furnaces are taken care of by a special ventilating system, and every precaution has been taken to insure the safety and comfort of the workers in this department.

A view of the pattern shop is reproduced in Fig. 8, from which an idea of the equipment may be gained. Included are one Crescent band saw; one C. M. C. disc and wheel sander; one American saw bench, surfacer, and planer, and the usual lathes and smaller equipment, all being operated by a 25 horse-power Canadian Westinghouse motor.

The provision of this department has been rendered doubly necessary by reason of present industrial conditions and the extent of the firm's activities, which make quick delivery and perfect accuracy of patterns a desideratum in work of the nature usually undertaken by the company. In accordance with modern practice, the pattern shop is located within convenient access of the drafting room, and is adjacent to and on the same level as a gallery which extends along one side of the main bay, forming accommodation for brassfinishing and special manufacturing, experimental work, etc. This gallery is twenty feet wide, and has a liberal equipment of lathes, drill presses, millers, etc.

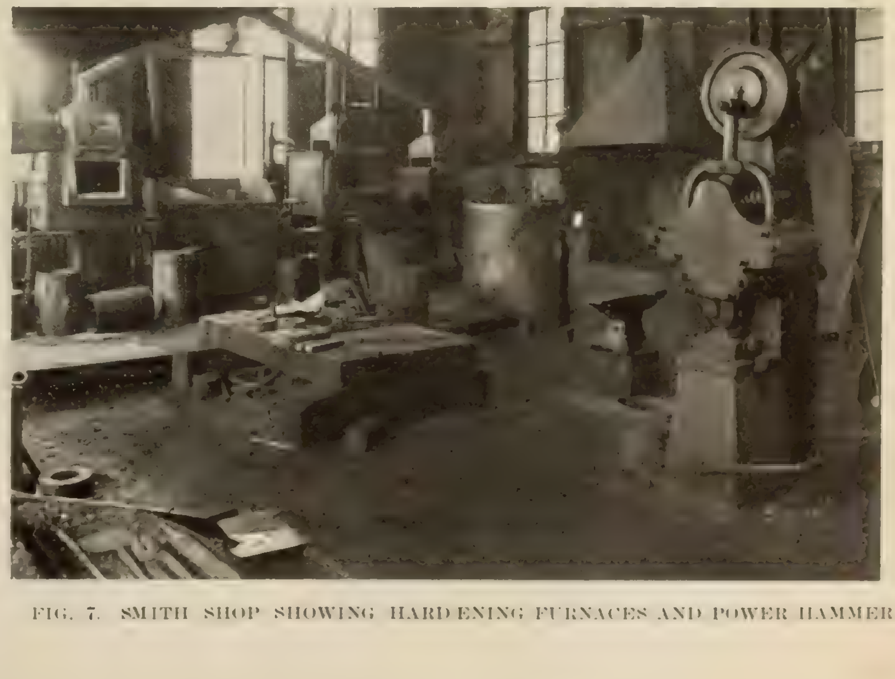


FIG. 7. SMITH SHOP SHOWING HARDENING FURNACES AND POWER HAMMER.

Foundry

The foundry, which as already mentioned is operated as a separate concern, makes a special feature of gray iron castings up to seven tons in weight, the capacity at present being approximately ninety tons per week. Machine parts of all descriptions, tire moulds, piping, rolls and couplings and general castings for many kinds of work, in addition to material furnished to the machine shop, make up the great bulk of its output. A general view of the moulding shop is shown in Fig. 9, the cupola and core ovens being situated at the far end, while two revolving jib cranes serve the part of the floor where heavy work is moulded. All of the equipment used in the foundry is of Canadian make, the cupola being a Sheldons, of ten tons capacity, the cranes and minor equipment being all built locally.

Every facility has been provided to insure a continued high grade of product. Tungsten lamps are liberally used throughout offices, factory and foundry. Excellent wash room accommodation is installed for the men, and ample heating plant maintains the factory in a desirable condition of comfort under the most rigorous of climatic conditions. Convenience and reliability of shop operation is secured through the use of Hydro-Electric power, while receiving and shipping facilities are provided by a spur from the G. T. R. tracks, which form one boundary of the company's property. Considerable space is still available for further extensions, and a continuance of the country's prosperity may well necessitate considerations of such a nature in view of the ultimate development of world trade, which is expected in so many quarters.

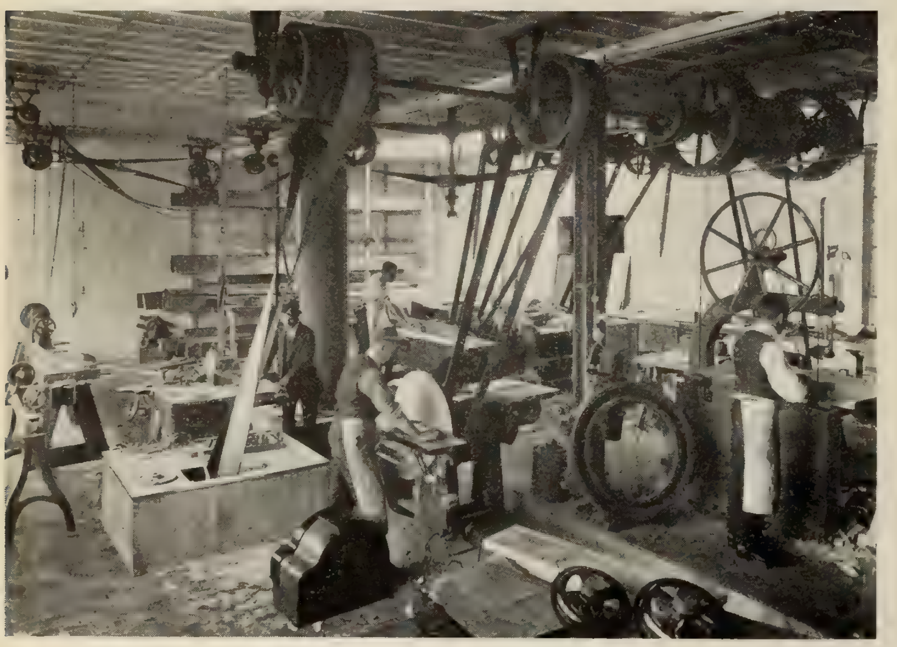


FIG. 8—VIEW IN PATTERN SHOP.

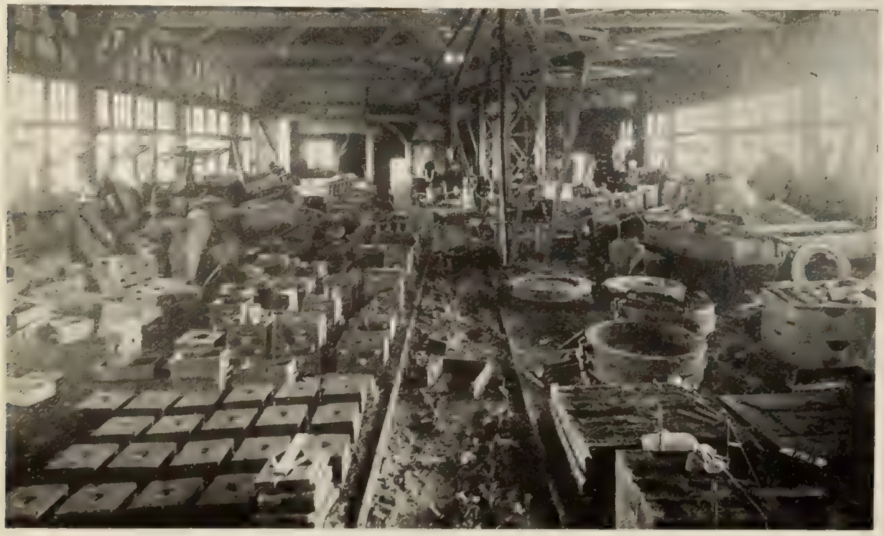


Fig. 9—MAIN BAY OF FOUNDRY LOOKING TOWARDS CUPOLA.

SHIP'S OPTION—WEIGHT OR MEASUREMENT

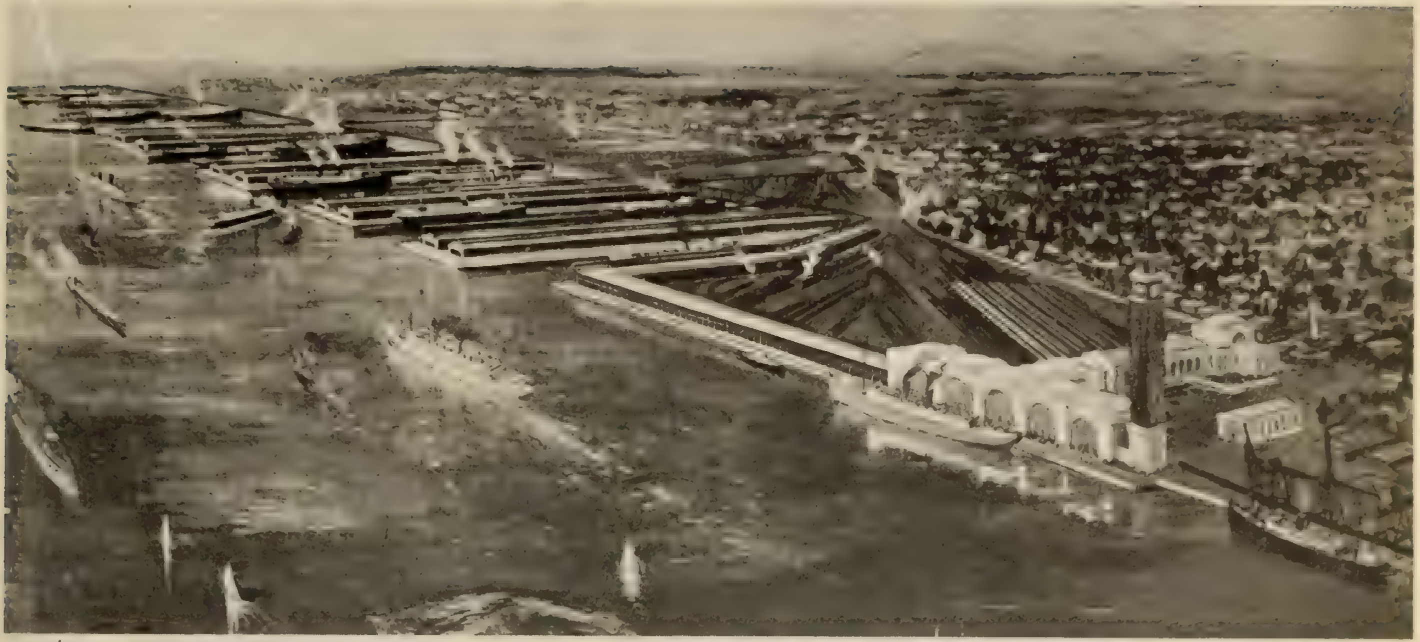
WHEN a steamship company makes a freight quotation "per ton, weight or measurement, ship's option," it is understood that the charge will be made on a weight basis if the weight of the shipment exceeds the cubic measurement of same, or on a measurement basis should the cubic measurement exceed the weight, while practically all the foreign steamship lines quote freight rates on the basis of 2,240 pounds or 40 cubic feet measurement to the ton.

Disputes are frequent between shippers and steamship companies in regard to the cubic measurements of packages. Sometimes these are the result of careless measurement on the part of the shipper, but usually the dispute arises because of the fact that steamship companies, as a rule, measure all packages in a rectangular way, so that all those irregularly shaped are estimated as though rectangular and are figured by their greatest dimensions. The reason for this is that irregular packages are not easily stowed, as it may be difficult to find smaller packages to fill in the vacant spaces, in which case "dunnage" or ship's lumber has to be used to keep the cargo from shifting.

Although a steamship company may have been charging on a certain kind of goods according to a weight basis, they may at any time change to a measurement basis, and this occurs for many reasons. For instance, a steamship company may find that competing lines, either from this country or from Europe, are charging on this class of goods on a measurement basis, and in order to equalize rates the change is made to a measurement basis.

There is no doubt of the steamship company's right to charge on either basis, whichever will give them the most revenue, and the steamship companies do not hold themselves to maintain their rates for any length of time, unless by freight contract arranged between them and the shipper for a stated time. This latter is the only way that a shipper can protect himself against change of rates. During 1915, steamship companies in almost every trade increased their rates, owing to the demand for space and the higher rates they had to pay for the use of steamers which they charter. This made it almost impossible to arrange freight contracts for any length of time.

There is no dividing line as to weight or measurement, above or below which a steamship line will charge on one basis or the other. It is simply a matter of figuring out on which basis they will make the most money, and unless a contract has been arranged, quotations are supposed to apply only on the steamer loading at that time, or the next steamer to be placed on the berth.



THE NEW TERMINALS AT HALIFAX, N.S., AS THEY WILL APPEAR ON COMPLETION.

Ocean Terminal and Port Development at Halifax, N.S.

By A. J. Campbell

The effort now being put forth to supplement the natural advantages which Halifax as an ocean port possesses is, although somewhat tardy, visible and tangible evidence that we have now become fully awake to the trade and commerce possibilities in Europe and elsewhere that its all-the-year-round value and facilities not only render available, but that as a matter of fact place all other Atlantic ports on this Continent under a handicap in many respects.

THE port of Halifax has long been regarded by naval and military experts as the key to the strategic situation in the north Atlantic. In commercial circles a similar opinion is now gaining ground. In suitability of alignment, in width and in depth, the harbor is unrivalled by any competing port on the Atlantic coast of North America. The entrance to the harbor is broad and for fully one-half mile of its width is over sixty feet in depth at L.W.O.S.T. The harbor requires no maintenance, is visible and almost straight throughout a length of seven miles from the entrance light.

A Natural Harbor

The natural protection and the average low range of tide of five feet, render open piers and tidal basins satisfactory. No such appliances as gates or locks are needed. Ships may enter and leave at any time of day or night with equal facility. The harbor is so easy to navigate—so free from bends and currents—that the largest vessels can enter and leave under their own steam. Recently some of the largest liners afloat, entered, docked and left the port under their own steam and with no assistance from tugs.

The advantageous geographical position of Halifax is evident to anyone who has studied the map. The harbor while contiguous to the North Atlantic route to Europe is sufficiently removed from the open shores of the ocean for ample protection. At the same time it is open all the year and is 250 miles nearer to Europe than any other port on the mainland of America. All vessels plying between Europe and such important ports as New York, Boston, Philadelphia, Portland and St. John pass close to Halifax, particularly in winter, and it is therefore most favorably situated as a port of call on the North Atlantic. When the proposed All-Red-Route was being actively discussed, Halifax was regarded on all sides as the best situated terminal point on the Atlantic. Different writers have pointed to its convenient situation on the probable main route from Europe to the Panama Canal. Halifax is the nearest Canadian port and is also nearer than Boston, New York or Philadelphia to seaports on the East Coast of South America, Mediterranean ports and seaports on the West coast of Africa.

Important Trade Route Terminal

By far the most important trade route in which Canada and the United States are interested is that between Europe and North America via the North Atlantic Ocean. Most of the exports of the natural products and manufacturers of North America and Europe as well as a fair proportion of these originating in Asia and Africa are carried over this route. The ships employed thereon have long been the largest, fastest and best equipped in the world, and they have steadily increased in numbers and size with the development of the world's trade. Twenty years ago a 10,000 ton liner was considered very large. Now ships of 60,000 tons are in service and plans for larger ones are in progress.

Ship Sizes and Harbor Accommodation

It is well known that a more rapid increase in the dimensions of ships has been prevented only by the great expenditure and the length of time necessary for the preparation of harbor and dock works of correspondingly increased dimensions. Indeed all the largest ships of to-day are much shallower than they should be for economical construction and operation. Most of the great ports of the world are situated several miles up a tidal river or estuary and the deepening and widening of the harbors and the dredging of their approach chanels are slow and costly operations. The port of Halifax is certainly an outstanding exception. This natural harbor is free from littoral drift at the entrance and, as it has no large river entering, it is exempt from silting or bar formation.

VIEW OF THE HARBOR—CELLULAR CONCRETE BLOCKS IN FOREGROUND.

Almost from the founding of Halifax in 1749, the matter of wharfage and terminal facilities has been one of constantly recurring urgency. In recent years the principal wharfage facilities have been provided by a number of timber piers constructed at the Northern portion of the water-front known as the "Deep Water Terminals." In addition a reinforced concrete pier has been erected there, a description of which has already appeared in these columns. Even with this addition, it was felt that sufficient provision was not made for the existing and prospective needs of the port. In the last decade there has been not only a marked increase in the dimensions and speed, but also in the class of ships employed between Canadian and European ports, and there is every prospect that this improvement will keep pace with the phenomenal development of Canada which is looked for after the war.

Initiation of Development Scheme

Plans for a comprehensive scheme of terminals were begun by the Dominion Government in the summer of 1912. After an exhaustive survey of the situation, four alternative plans each with its own advantages and disadvantages were presented by the engineers employed. These gentlemen were F. W. Cowie, B. Sc., M. Inst., C.E., of the Montreal Harbor Commission as consulting engineer, and James McGregor, A M. Inst, C.E., A.M. Can. Soc. C.E. as president and superintending engineer Mr. McGregor had previously been with the Canadian Pacific Railway on construction work in Western Canada and also had considerable experience in the building of terminals in some of the largest ports of the world.

After consideration and comparison of the plans submitted, it was finally decided to adopt a site on the western shore of the harbor and nearer to the ocean than any of the old piers. The site extends southward along the water front for a distance of one and a quarter miles. This location was considered to be the most desirable with regard to the city population and industries ,and sufficient ground was taken for the extensions of the future. The adopted scheme of piers, basins and railway terminal facilities was prepared with a view to a progressive development extending over a period of years so that the future traffic requirements of the port may be fully met for a long time to come.

Tenders were publicly invited for the construction of the first and most important unit of section of the dock works on September 2, 1913. The contract included the dredging of the harbor and basins, filling of reclaimed areas for quays, the construction of one and a quarter miles of concrete and granite masonry quay walls, concrete substructures for the transit sheds and buildings, sewers and other incidental works. The tender of the well-known firm of Foley Bros., Welch Stewart and Fauquier amounting to $5,250,000 was accepted.

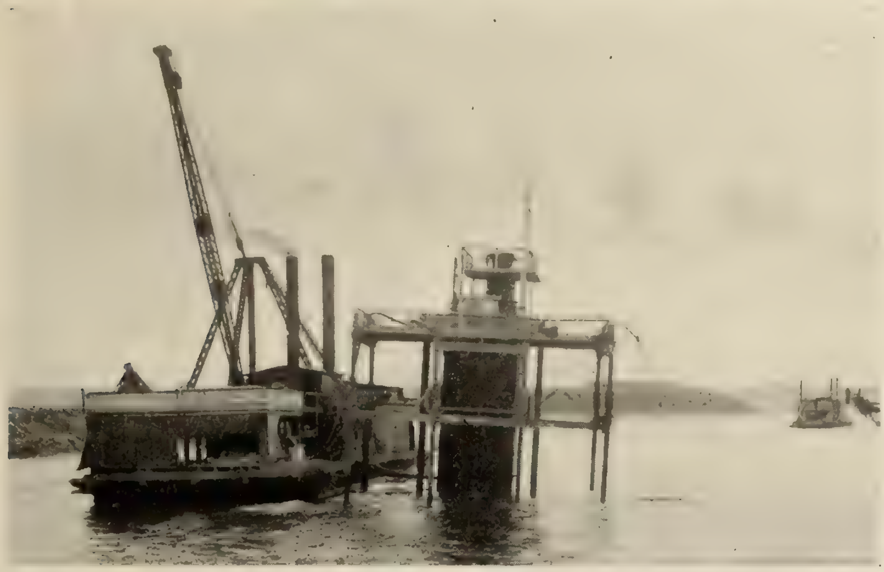
Construction Work Begun

The contractors began work in March of 1914 and operations have continued since that time. The great depth of water and the somewhat unusual nature of the work required the use of a large amount of specially designed plant. Eighty-five acres of the shore land were expropriated, which with 115 acres reclaimed from the harbor makes a total area of 200 acres available for the terminal yards, quays, piers, etc. The area of water to be occupied by shipping inside the new pierhead line will be sixty-two acres. The distance between the pierhead lines and the opposite shore of the harbor is one mile and the depth of water seventy feet at L.W.O.S.T. In front of the terminal site there is therefore provided by nature free of cost a magnificent canting station one mile square and at least seventy feet deep perfectly protected from the ocean and remarkable free from winds and currants and an ideal situation for the turning and manoeuvring of ships of any pres-

CLOSE VIEW OF THE CELLULAR REINFORCED CONCRETE BLOCKS.

ent or proposed length, breadth, draught, or displacement.

The quays and piers were planned to provide twenty-seven berths for ships varying in length from 500 to 750 feet each, but ships up to 1200 feet in length can be accomodated with equal facility. Provision is also made for the berthing of coasting vessels and other smaller craft. The basins are suitably arranged for ships to pass in and out, and for the use of coal and other barges alongside.


THE MOBILE PNEUMATIC CAISSON EMPLOYED.

Meantime Scope of Undertaking

The first unit of the docks now under construction will include the Bulkhead Passenger Landing Quay, North Quay of Basin No. 1, and the Bulkhead Quay of Basin No. 2, and will provide berthage with sheds etc., for nine ships of the Alsatian type. All these structures together with the breakwater have been carefully laid out along orthogonal lines to simplify construction and so as to concentrate within a comparatively small area a maximum of quay space and berthage with ample transit sheds and buildings, and with convenient and adequate truckage and paved driveways to each berth. The piers and basins are laid out at right angles to the shore line, and also to the direction of maximum fetch and exposure.

The breakwater at the extreme south protects all the piers and basins to the north of it from the south and southeast which are the only directions from which seas of any weight can enter the harbor. With the exception of Basin No. 1, all the piers and basins will be of the same dimensions and area. The basins are widened out towards the harbor and the piers toward the land, thus effecting a saving in cost of construction and affording extra, width where most required. It is expected that three berths in Basin No. 1 will be ready for use next winter and that two temporary wooden sheds will be ready for use on the north quay of same. The excavation of the railway yards at the dock is well advanced, and sufficient trackage will be provided there next winter to deal with the traffic to and from the three berths at Basin No. 1.

Bulkhead Passenger Landing Quay

The Bulkhead Passenger Landing Quay will be 2006 feet long, sufficient to accomodate three ships 650 feet long or two ships 1000 feet long. It is situated at the north end of the works nearest to the centre of the city and adjoining and directly connected with the Union Passenger Station to be constructed. Each of the five piers and six basins will be 1250 feet long and will taper from 320 to 360 feet in width. The piers are designed for four 600 feet ships, two on each side, or for two ships each up to 1200 feet long, one on each side and with no part of either ship projecting beyond the pierhead line. The basins will have a minimum depth of forty-five feet at L.W.O.S.T. This is five feet deeper than that provided at New York or Southampton and ten feet deeper than at Boston. The rubble mound breakwater at the seaward end has a quay wall on the inner side 1205 feet long and an open rip-rapped slope on the outer or seaward side protected with heavy blocks of rubble.

Quay Wall Features

Quay walls of concrete and granite will be constructed along the lines of the bulkhead landing quay, basins and piers, while the areas between the respective walls, and between the walls and the shore, will be filled in with materials from the railway excavations, dredged materials from the basins, and materials secured by dredging from the eastern side of the harbor. About one-third of the total length of quay wall is constructed and about sixty per cent. of the foundation work for the remaineder completed. The dredging of the basins and for the quay walls is ninety per cent. completed. This dredging was done by means of a dipper dredge with a seven cubic yard bucket to a depth of forty-five feet below low water. As greater depth the dredging was done by a very heavy orange peel bucket of five and one-half cubic yards capacity. The rock in the basins and under the quay walls was drilled by Keystone well

CELLULAR CONCRETE BLOCK BEING PLACED IN POSITION.

drills, blasted with dynamite, and afterwards dredged. The method employed in constructing the quay wall is described by Mr. McGregor as follows:—

The quay wall, is for the most part, founded on solid rock but where the depth of rock exceeds 55 feet below L.W.O.S.T. a broad rubble mound foundation is used, the top of which will be at 45 feet below L.W.O.S.T. The walls are constructed of cellular reinforced concrete blocks each about 31 ft. by 22 ft. by 4 ft.1½ inches, with outside walls and partitions 8 inches thick, each block weighing about 62 tons. All the cells in the bottom blocks and the front and centre cells only of all the other blocks are filled with concrete. The remaining cells are filled with rock, sand and gravel from the excavations. The cellular blocks at the front reach to a height of 1 foot below extreme L.W.L., and at 4 ft. 8 in. back from the face they are continued with narrower blocks up to 1 foot above H.W.L.

VIEW OF CUTTING SHOWING TEMPORARY BRIDGE FOR STREET.

Above this the construction is of rubble concrete faced with cut granite masonary begining with a heavy corbel course and finishing with a granite coping 3 ft. wide and 16 inches deep, with the exposed arrises rounded to 2½in. radius. The joints are secured with secret steel dowels. The back of the wall has been vertical to simplify the blocks carrying the front columns of the transit sheds, and to provide width on top to carry the permanent railway track as well as the temporary construction tracks for the block setting machines which will lay the blocks by the "Over End" system. These travel outward upon the blocks as they are placed, and so eliminate the use of temporary staging of floating plant. The front of the walls is made vertical and the toe projection reduced to a minimum to suit the almost rectangular midship section of modern large vessel.

The walls will be built in lengths of 22 feet, each length consisting of a vertical stack of 13 cellular blocks. In this way the block setting is very simple, and allowance is made for settlement and expansion and contraction. The vertical joints between the stacks are made with vertical reinforced concrete key posts 14 ins. by 14 ins. in section, which also act as guides in adjusting and setting the blocks. The bottom was cleaned and made ready for the mass concrete by means of a self-submerging raising and floating steel and timber diving bell specially designed for this work. This diving bell or mobile pneumatic caisson has a working chamber 38 ft. by 26 ft. by 8 ft.; has separate man and material shafts and air locks, and can work safely with compressed air to a depth of 55 feet of water. It is lighted with electricity and provided with high pressure air and water systems for drilling and cleaning the foundations.

Transit Sheds

The transit sheds on the quays and piers will be built of steel and concrete. Each will be 100 feet wide and will be fully equipped with the best mechanica appliances, water supply and fire protection, offices, coaling facilities, grain conveyors, railway tracks, paved roads and teamways etc. Cargo sheds will be provided at the passenger landing quay where also special appliances and facilities will be installed for the expeditious landing of passengers, baggage, mails and express freight from the ships to the trains, and vice-versa. A large terminal grain elevator with ample trackage and fully equipped with belt conveyors and spouts will be erected .

Railroad Connections

To obtain the necessary railway connection for the new terminals, an extension of the Intercolonial Railway is necessary. After the comparison of several alternative lines in tunnel and in the open, and at various elevations, it was decided to extend the railway in the open from Fairview, via the east side of the North West Arm. The contract for construction was awarded on July 2, 1913, to the Cook Construction Co., and Wheaton Bros. The tender amounted to $1,500,000. Work was at once begun at both ends of the line and has since proceeded slowly but surely through the heavy rock cuttings. The contractors have a well-organized force and an efficient plant in use, including five complete steamshovel outfits. The contract included the filling in with materials from the railway cuttings and the formation of a new terminal freight yard at Bedford Basin, grading of a portion of the ocean terminals, and the formation of the rubble mound breakwater also with rock excavated from the cuttings and yard areas. This breakwater will be completed during the present summer .

The new railway line which is about five and a half miles long will be double-tracked throughout and sufficient right-of-way has been acquired for four tracks should more become necessary. The construction of the culverts and bridges of a permanent character is being proceeded with. Grade crossings have been entirely eliminated. In the location of the railway along the beautiful Arm and through one of the finest residential districts of Halifax, care has been taken to perserve as far as possible the natural scenery. The cut is now practically ready for the rails and it is expected that track laying and ballasting will be begun this summer, so that the railway connections will be ready for use in connection with the three berths next winter. The work of trimming off the sides of the cutting is at present in progress. Over two million cubic yards of material have been excavated and transported to be used as fillings elsewhere. An eighty-five pound rail will be laid .

Freight and Passenger Arrangements

All freight trains to and from Halifax will be cared for at a new Freight Receiving, Classifying and Departure Yard. This yard is being constructed on an area that has been reclaimed from Bedford Basin, by filling in and has a length of one and a quarter miles. The filling in is nearly completed and the track laying and ballasting of the whole yard will be ready in time for next winter's traffic. All freight cars will be moved between this new freight yard, the Ocean Terminals, the city freight yards and sheds, by switching and transfer engines.

The general scheme for the Passenger Terminals consists of a large passenger station building shaped like the letter

T—the foot of the T being at the shore end and the head on the landing quay. The shore end will provide accommodation for the local Halifax traffic, and will contain the ticket offices, baggage and parcel checking rooms, restraurant and lunch rooms, retiring rooms with toilets, and, on the upper floors, office space for the railway and steamship lines. The shore end of the building will face on a plaza 400 feet in depth. Upon the northern end of the landing quay the top portion of the T-shaped building will be placed. Passengers disembarking from the steamships will enter the building at the second story level and will be distributed in the usual way for Customs examination. The baggage will be transferred, after examination. The baggage will be transferred, after examination, by means of chutes or elevators to a distributing baggage room below, from which it will be routed to cars according to destination.

Mails will be conveyed directly from the steamships to the lower level where they will be loaded on cars. Passengers pass conveniently into an apartment between the steamship station and the Halifax City station, forming the stem of the letter T. This is a booking hall containing ticket offices for the various railway, and steamship lines where passengers may quickly and easily obtain railway tickets and baggage checks. They can then either step into the train concourse or into a waiting room.

Train Concourse

The train concourse is designed for the common use of the Halifax City traffic and the steamship passenger traffic. The floor of this room is placed level with the second story of the steamship passenger level and is also at the same level as the ticket lobby floor of the Halifax city station. The passenger platforms of the train shed are placed at a level midway between the train concourse and the baggage room beneath. Passengers will reach the passenger platforms from the train concourse level by means of easy inclines instead of stairways. Separate inclines and separate trucking platforms for baggage trucks are provided. A portion of the building will be reserved for the Immigration service. These rooms are not directly connected with the other portions of the station building.

Miscellaneous

The other general arrangements include a separate power house for the furnishing of heat, light, and power for all the buildings. A large passenger coach-yard fitted with buildings for cleaning coaches and equipping dining and sleeping cars will be provided immediately adjoining the passenger station. A broad subway for vehicular traffic will be constructed to pass under the freight and passenger tracks connecting with a broad-paved roadway leading to all the steamship berths and the main city thoroughfare. The grading for the site of this building is now in progress, and construction will be begun at an early date .

PROSPECTS FOR TRADE IN RUSSIA

WITH further reference to articles that have appeared in our columns on trade with Russia, the following extracts taken from the Board of Trade Journal and the United States Commerce Reports may be of interest to Canadian manufacturers anticipating an export business in that country:

A Few Facts

It should be borne in mind that the great bulk of the local dealers in the Caucasus are people with little or no capital. A condition, therefore, which is essential for the successful expansion of trade is that it has to be carried on with the support of banks which advance money on goods. This is more especially the case as regards the export trade in raw materials. Dealers have, of course, to pay a fairly high price for this pecuniary aid, but the arrangement enables them to handle a great volume of merchandise, and it pays in the long run. In the import trade, German manufacturers frequently gave financial assistance, more especially to small dealers, by a system of credit which met with the latters' approval and was extensively resorted to by them.

Meeting German Competition

The question of successful competition with German firms after the war is of great importance, and the present time is a favorable one for activity by Canadian manufacturers. They should enter the field now, if only for the purpose of making arrangements preliminary to actual business after the war. Manufacturers should send out travellers speaking Russian, with price lists in Russian, prices being worked out in roubles at the current rate of exchange. The travellers should carry samples of all the goods which it is desired to sell, and get into touch with dealers. Manufacturers of other countries are quite alive to the necessity of action of this kind and are very alert just now in the Russian markets. It is intimated that in the long run these suggestions, if acted upon, will prove remunerative. Dealers in the Caucasus repeatedly say that they have neither the time, the means, nor the desire to enter into lengthy explanations by correspondence. They have been accustomed to the visits of commercial travellers who show them samples of the goods they have to sell and are prepared to book orders on the spot. The great bulk of the traders consider that catalogues should be brought to them and explained. As the information contained in catalogues would be of use if they were judiciously distributed, it is suggested that copies should at least be put into the hands of the dealers.

Electrical Appliances and Materials

The electrical trade is a branch of Canadian industry that might very profitably be developed in the Caucasus. Until the outbreak of war, and for some time after, the electrical engineering appliances and materials required locally came principally from Germany. If the intention to capture German trade under this head is to be realized, Canadian manufacturers should take advantage of the present opportunity to prepare for the competition that will exist after the war. The needs of the Caucasus in all manner of electrical appliances from the smallest to the largest are indeed very great, and when normal conditions are resumed there is no reason whatsoever why Canadian and British sources of supply should not be preferred to those of Germany. The quality of the articles produced there is admitted in the Caucasus to be superior to that of German-made goods, but the question of price will have to be studied closely, together with that of the terms of payment. At present most supplies are almost exhausted.

Agricultural and Other Machinery

The possibilities in these branches of trade in the Caucasus are also great. Necessarily, in view of prevalent conditions, no imports under these two heads took place in 1915, but directly after the war the demand for every kind of machinery will be brisk, and this remark is particularly commended to the attention of Canadian manufacturers of machinery.

Cutlery, Hardware, etc.

All stores in the Caucasus are almost depleted of their stocks of hardware. The need for goods of this description is very great, and a large business will be done directly after the war. Our manufacturers should be on the alert as American firms are watching their opportunity for getting a strong footing in the Russian hardware markets. As it is, trade in this class of goods with the United States is already extensive.

THE SHIPPING OUTLOOK

AT the recent meeting in London of the Royal Mail Steam Packet Co., Sir Owen Philipps, the chairman, among other things, said:

"Many smaller shipping companies owning tramp steamers have recently been paying very large dividends, as a result of the high rates of freight obtainable in the open market, but the steamship companies with which we are allied carry on regular ocean services at relatively low rates of freight compared with tramps. They are all well-managed concerns, with their vessels properly written down in their books, and I believe that when times of stress again arrive for the shipping trade, as they are certain to do, these allied companies will be found in such a sound financial position as will enable them to continue paying steady dividends through times of depression."

Canadian-West Indies Service

Reference was made to improving trade conditions in Argentina and Brazil, which promised greater business for steamship services. He spoke afterwards of the Canadian-West Indies service as follows:—

"The fortnightly passenger and cargo service which was started two years ago between Canada and the British West Indies, under a contract with the Dominion Government of Canada, has, I am pleased to say, been conducted without interruption throughout the war. Since the termination of the mail services between the United Kingdom and the West Indies, and between the West Indian Islands, this Canada-West Indies service has not only served as an inter-colonial link between the Islands, through arrangements with the Canadian Government for additional calls, but has also provided a regular connection between Great Britain and the West Indian Colonies, via Canada. The service has done much to develop commerce between Canada and the British West Indies, and has secured a considerable volume of West Indian trade for Canada which would otherwise have been secured by the United States.

"If I may be allowed to do so, I would like to remark here that the success which has followed the establishment of this service has more than justified the most sanguine expectations of the Canadian Minister of Trade and Commerce, the Hon. Sir George Foster, to whom its initiation was largely due, and who has always taken a great personal interest in the development of trade relations between the great Dominion and the British West Indies, by which he has rendered Imperial service of no small importance.

Shipping Generally

On the subject of shipping generally, Sir Owen said: "The value of British vessels lost from August, 1914, to the end of April, 1916, namely, 21 months, has been less than 8½ per cent., which is less than 5 per cent. per annum. What is much more important, however, is the practical cessation for so long a period of nearly all mercantile shipbuilding, for, although there are a large number of mercantile steamers building, they are as a matter of fact, making very slow progress. It is recognized on all hands that the position in regard to our depleted mercantile tonnage calls for urgent remedy.

The assistance rendered to our Allies in the carriage of necessaries and the large requirements of the British Government for our own needs have led to a very serious restriction of tonnage available for our own commercial requirements, and this shortage has been further accentuated by the depredations of enemy submarines. The sequel is a lack of ships to carry our necessary commerce, and this has bred a scarcity of supplies in Britain, with an inevitable advance in prices, which seriously menaces the activities necessary in prosecuting the war.

Call for Ships

"The remedy for this condition of things is ships, and more and more ships, earmarked for our commercial needs. While we recognize that the first call on all the available material and skilled labor of the country must be for munitions and the naval and military requirements of ourselves and our Allies, the building of commercial tonnage must be considered as only secondary in vital importance to these needs.

The Government will, no doubt, use every effort to speed up facilities for the building of commercial ships consistently with our more pressing needs. At the same time, every encouragement should be given to capital to acquire foreign tonnage, wherever possible, to add to the British registry, and to get ships for commercial use constructed in foreign yards, during this time of abnormal stress. This cannot be done without immense capital outlay, owing to the present very high price of tonnage; hence capital will need such special facilities or encouragement from the Government in the shape of modified taxation, or otherwise, as will encourage it to embark upon expensive remedies of this nature, for the amelioration of the national position. I hope, now that we are beginning to organize our national resources more fully and completely, steps will soon be taken to expedite the completion of tonnage building, and that arrangements will be made to repair the wastage of war. This matter is pressing, and ought to be dealt with immediately."

GOOD PACKING ESSENTIAL

IN spite of many admonitions to shippers there are still a few who seem not to comprehend the seriousness of insufficient packing. An importer of Palermo, Sicily, requested the American Consul there to accompany him to the custom house to attend the opening of ten cases of leather, inasmuch as the insurance and steamship companies refused to accept any responsibility for the goods, because the bill of lading was marked "old cases." In the interest of the American firm concerned the consul went to the custom house and found that five of the ten cases had been broken and repaired. They were about 5 by 3 by 3 ft. in size, and contained about 1,000 pounds of tanned hides wrapped in bundles of six skins each. Around each end was a small iron band, but across the end there were no cleats and no bands, nor were they reinforced in the centre. From each of the several boxes that were damaged there were missing one or more bundles of skins, a total loss amounting to $345. The ends of the boxes being broken, it was an easy matter for the thieves to pull out one or more bundles unobserved. Had there been cleats nailed across the ends with iron bands passing over lengthwise it would have been difficult to extract goods. A shipment from the same firm about a month previous was also damaged, and there were also goods missing from these cases. Such occurrences cause difficulties in extending American trade, as they frequently not only result in loss of the customer for the manufacturer concerned but also deter the importer from buying from other American firms. —U.S. Consular Report.

CANADIAN CAR AND FOUNDRY MUNITIONS SHIPMENTS

IT is learned that the Canadian Car & Foundry Co., by the end of June, had shipped nearly a million and a half of the original five million shrapnel shells ordered by the Russian Government. The shells are inspected in the United States, and a receipt for delivery to the transportation company means that so far as the local company is concerned, the business has been completed. The value of the shells which have been shipped up to the end of June was placed by the official at nearly $12,000,000. All the component parts are now coming forward rapidly, and it is anticipated that by the first of November the entire $85,000,000 contract will have been completed.

Apart from the Russian business, the Car Company has $13,000,000 in orders on its books. Two-thirds of this business is made up of domestic orders, which include contracts for shell parts from the British Government. The balance is for railroad equipment, 70 per cent. of which calls for cars for shipment to Europe. The Canadian demand for equipment continues very light, and it is believed that roads in this country will withhold orders as long as possible, to avoid paying the increased prices now prevailing for all raw material.

United Shoe Machinery and United Last Co. Plants

Staff Article

Shoes, no less than shells, are necessary to the successful execution of military operations, and considerable interest attaches to the plants forming this article through the fact that the ability of shoe manufacturers in this country to execute contracts of magnitude is due to the fact that they are largely equipped with machines and accessories made by these firms.

UNITED SHOE MACHINERY CO.

COMFORTABLE footwear is one of the blessings of humanity, yet how many of us realize, or even imagine, the vast amount of skill and ingenuity expended in the designing and manufacture of the machines necessary to furnish us with this indispensable piece of wearing apparel. To study the making of a modern shoe, as it passes from one machine to another, and observe the action of the complicated mechanism, the intricate masses of cams and levers, as they perform their irregular but accurate work, is to be impressed with the wonderful perfection which has been attained, in the development of mechanical appliances for the benefit and comfort of mankind.

A Marvellous Mechanical System

Other industries have their marvellous machines; the modern loom, the linotype, the monotype, and various automatic machines now in use excite our wonder and admiration, but here we have an entire system of machines, many of them as intricate and as finely adjusted as a watch, performing with marvellous accuracy, operations which, but a short time ago, were considered impossible through any other medium than the human hand. Each fills exactly its place in the general scheme, constantly preparing for operations that are to follow, for in the making of a high grade shoe there are no really minor operations. Some of them may seem to be less important than others, but, the accurate working of each succeeding machine in sequence is so absolutely essential, that the inaccurate work of a single machine, like the iniquities of a sinful generation, if not discovered, is visited upon each of the machines that follow, until the finished product emerges, a pariah among its fellows and scornfully known in trade as a "bat" a "crab" or a "cripple". Fortunately, this now seldom occurs, for there is no system of machines in the world so finely adjusted to each other's requirements and which receive such constant and expert attention. No other aggregation of machines meets and successfully copes with so many and such variable conditions; different sizes, shapes, qualities, and a never ending procession of styles, are made on one set of machines.

Early Growth of the Industry

Like many other lines of activity however, the early days of the modern method of shoe manufacture were beset with many obstacles. Owing to the prejudice of many people against the introduction of machinery in the making of boots and shoes, the growth of this industry was greatly restricted, and it has only been during recent years that any marked advance has been accomplished. Even when shoe manufacturers recognized, and acknowledged the efficiency of mchinery in the making of boots and shoes, it still continued to be very difficult to place these machines in their factories, as very few were in a position to pay even the moderate price that the makers asked. It is related that Gordon MacKay—one of the earliest builders of shoe machinery—after innumerable attempts to induce manufacturers to purchase his machines, finally tried to dispose of his entire business. When this failed, he evolved the scheme of placing them out on royalty, when they were eagerly accepted. This system of lease, which originated over fifty years ago, has been the general practice ever since, and it has often given the impression to the uninformed, that the control of these machines was in the hands of a monopoly. This however, is not the case, and although the majority of shoe machinery may be operating under the lease system, much of the necessary equipment can be purchased outright.

During the early period of machine-made footwear, much trouble was experienced, owing to the various types and makes of the machines then in use; parts would wear out, adjustments go out of order, causing long and vexatious delays, and frequently causing plants to shut down until the machine could be repaired and placed in proper running order. Most of the machines then being used were made in or near Boston, and in addition to the terms imposed by the maker, custom charges, and all expenses relative to operating instruction made it almost impossible for boot and shoe manufacturers in Canada to compete with other makers abroad. Under these conditions, it is not surprising that this industry, in Canada advanced but slowly. Many manufacturers preferred to cling to such primitive means as the awl, waxed ends and hammer—shoemaking tools as old as the Egyptian temples—operating only such machines that required little adjustment or mechanical attention, rather than submit to existing conditions.

GENERAL VIEW OF MACHINE SHOP FROM WORKS OFFICE.

Canadian Development

Such was the state of affairs when in 1899, the United Shoe Machinery Co., of Canada was formed, an event which undoubtedly transcends all others in the history of an industry which, in its evolution from the purely hand process and implements of only half a century ago, has passed through many revolutions, many of them almost spectacular in character. The United Shoe Machinery Co. of Canada established its factory in Montreal, secured a number of the best machines then in use, improved them, designed and constructed others to fill in the gaps for which there were no machines. It harmonized their action, adjusting them to each other's requirements, until it had a system of machinery for attaching the soles to shoes (universally known as the "Goodyear Welt") which, in comparison to the product of former years, is truly marvellous. All of this was accomplished only at the expenditure of much money and untold effort. To maintain the best possible relationship between themselves and their customers, this firm not only supplied the desired equipment, but made provision for keeping it constantly in good working condition. It established branch offices in Quebec, Toronto and Berlin, where a complete supply of machine parts were always available for immediate use, thus insuring to the utmost against any possiblity of delay in operation of a factory in the various territories. When it is realized that this company, in the regular routine of its business, makes over 83,000 different kinds of machine parts, varying from a machine base, weighing over a ton, to the most minute screw, the magnitude of this undertaking can be readily comprehended.

The company maintains in each of its branch offices, a corps of men who, in addition to being skilled mechanics, are expert shoemakers as well; competent to repair the machines and give reliable instruction in their operation. The company is impartial to all of its customers, each one knowing that he is not only entitled to, but actually receives the same service as his competitor. It has been a cardinal principle in the building of the company's business to play no favorites, and the sincerity of the company's efforts is apparently never questioned by its customers.

Success of the Undertaking

The United Shoe Machinery Co., of Canada, has apparently been successful in performing the things it set out to accomplish, for the boot and shoe industry has prospered as at no other time in its history. The company has been constant and diligent in anticipating the requirements of the industry it has served so well. From the small space it occupied, on the top floor of an old building, during the first year of its existence, the rapid growth and expansion of the business has culminated in the erection of what is considered one of the best equipped and arranged factories in Canada. Located in the Maisonneuve district of Montreal, it was designed to meet not only the immense requirements of the company's business —due to the large number of different machines of an extremely intricate nature it manufactures—but to provide for future needs. It is the basis of the highly organized and efficient service, which is distributed through its various branches, and is ever at the disposal of its many customers throughout Canada.

GENERAL VIEW OF ASSEMBLY ROOM.

New and Modern Building

The main building, four stories high, is 280 feet long and 60 feet wide, with a wing leading to a one-storey building in the rear. The ground floor of the main building contains the parts department and shipping department; the second floor, the assembling department and general offices; the entire third floor is used for the machine shop and works office, with the woodworking and draughting departments on the fourth floor. The one storey section in the rear is used for the tack factory, the die factory, the blacksmith shop and boiler room.

VIEW OF TACK AND NAIL DEPARTMENT.

As one passes into the main entrance, he is immediately impressed with the regular and convenient arrangement of the various offices, and also the extensive and efficiently arranged general office. The furniture is modern in every respect, and of the latest design. All office stationery, both for the head office and the several branches, is under the supervision of one person, and is kept in such a manner that a constant record is maintained of the stock on hand. Each form or requisition blank pad, when printed, receives its particular stock number, as well as the date of printing, so that a record can be kept and when a further supply is required, the date will indicate whether the previous lot was sufficient or not enough. Provision is made for a six months supply, as it is deemed inadvisable, owing to possible changes, to carry a heavier stock. Under the present system a saving has been shown of thousands of dollars a year.

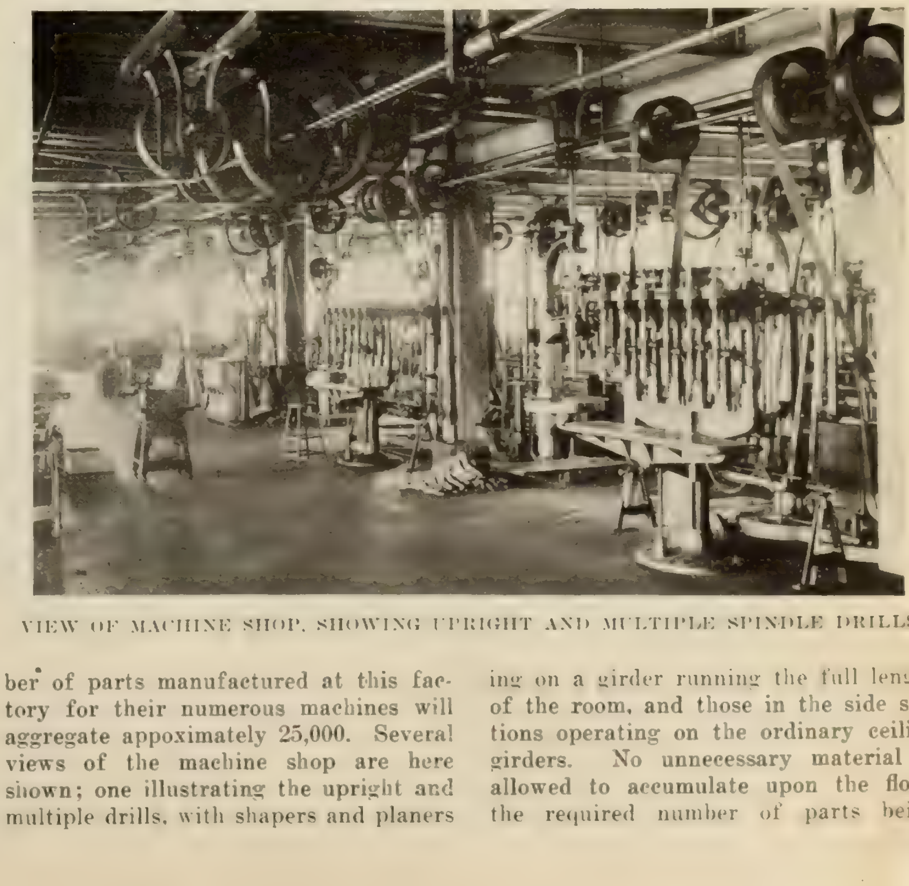
All letters are filed away in a special room reserved for this purpose, with a girl in charge whose duty it is to keep tab of all correspondence received. The only entrance to this room is through that of the manager, and it is almost impossible for anyone to secure a filed letter without the knowledge of the girl in charge.

Adjacent to the main office is a rest room, with piano, which the company provides for the comfort and convenience of the office employees; there is also another small room adjoining this where light cooking can be done should any of the girls desire it, all necessary utensils and equipment being furnished by the company.

Machine Shop and Works Office

The machine shop which, with the works office, occupies the entire third floor contains in all, 131 machines, consisting of milling machines, lathes, drills, screw machines, boring machines, boring mills, shapers, planers, grinders, cam cutting machines, profiling machines, etc.

In this plant, 125 different types of shoe machinery are manufactured, and some idea of the extent of this industry can be gathered from the fact that some of these machines are using as many as 750 different parts, and the total number of parts manufactured at this factory for their numerous machines will aggregate appoximately 25,000. Several views of the machine shop are here shown; one illustrating the upright and multiple drills, with shapers and planers in the background; another view shows the section containing the various grinders with the lathes in the background, the machine in the immediate foreground being a product of the shop, an automatic heel compressing machine.


VIEW OF MACHINE SHOP, SHOWING UPRIGHT AND MULTIPLE SPINDLE DRILLS.

In the centre of the two sections, is located the works office which keeps a record of all the work, detail and assembly, as it passes through the shop. This is a very important feature in connection with the operation of this plant, and much of the success of this company is due to the thorough manner in which even the smallest detail receives attention, reducing to a minimum any possibility of loss or error. Particular attention is drawn to the general appearance of all sections of the shop; complete absence of waste material; order and cleanliness of the general equipment; sanitary conditions, etc. The room is entirely free from any objectionable dust, and even amidst the every-day grind of machine shop operations, this works office retains it appearance of order and cleanliness, to such an extent that it would be a credit to many a main office in other manufacturing plants.

Machine Assembly Room

The general assembly room, a view of which is here shown reflects in some measure the numerous machines being manufactured and the marvellous quantity of different parts required in the complete assembly of the final product. This room is supplied with a number of one-ton chain blocks for facilitating the erection and handling of the heavier portions of the machines under construction: the one in the centre aisle traveling on a girder running the full length of the room, and those in the side sections operating on the ordinary ceiling girders. No unnecessary material is allowed to accumulate upon the floor, the required number of parts being secured from the parts department for the assembling of each machine. A complete supply of about 40,000 different parts is constantly kept in stock, to avoid all possible delay in maintaining the high standard of efficiency in the company's service department.

Tack and Nail Department

The tack and nail department which is continually turning out hundreds of thousands of tacks and nails every hour is here shown, giving some idea of the general layout of the equipment; the nail machines being on one side and the tack machines on the other. Driving motors are supported on special platforms, hung from the ceiling. Neatly arranged racks and bins to hold the stock are located in convenient positions, and special trays are provided of each machine.

The Blacksmith Shop

The blacksmith shop, to the rear of the tack and nail department is fully equipped for making all the dies and tools required for the production of the various styles, shapes and sizes of the different shoes. Oil burning furnaces are used for heating the pieces, and cooling and tempering baths are arranged so as to insure the best results in the handling of material. Tempering tanks are provided with water coils to regulate the temperature of the bath.

General

Machinery and shafting throughout the plant is driven by 12 induction motors, capacity ranging from 2½ h.p. to 35 h.p.; Renolds silent chain being the transmission medium from the motors to the line shafting.

GENERAL VIEW OF MACHINING DEPARTMENT.

Individual wash basins in the dressing rooms and clothes racks are provided for the workmen. A restaurant with seating capacity for one hundred is also furnished, meals being served at a very moderate cost and the best of service constantly maintained.

The number of men employed in the various departments of the factory is approximately three hundred, and while their interests outside of their work vary, they appreciate the value of exercise and recreation, their efforts in this direction finding ample scope in the works Athletic Association which holds its meetings in extensive grounds supplied by the company and maintained in a state of perfection matching that of the works themselves.

ANOTHER VIEW OF MACHINING DEPARTMENT. NOTE HEATING COILS UNDER SKYLIGHT.

◆

UNITED LAST COMPANY PLANT

TO meet the requirements of their rapidly increasing business, and at the same time prepare for future needs, the United Last Co. have recently completed the erection of a new factory of the most modern type in the City of Montreal, adjacent to the extensive plant lately constructed by the United Shoe Machinery Co. These two concerns, while operating under separate management, are still indirectly connected, both being directed by the same parent company.

The main building is of mill construction, 140 ft. by 140 ft., one storey high, with basement. The main floor contains the machining department, office and sample room; while the basement contains the supply of rough-shaped blocks, a vault for the storage of standard models, lockers and washrooms, etc.

Rough Stock Department

The stock bins are very extensive, 400,000 rough-turned blocks being constantly kept on hand. These blocks are received from cars at the rear of the building, and are placed in the various bins according to their size and style. These blocks are generally made of kiln dried maple, with a supply of ash blocks to be used for making up travellers' samples. These when finished are exact duplicates of the standard lasts, but for obvious reasons are made of a light wood and hollowed out for convenience of handling. Owing to the nature of the work, this room—in fact, the entire building—is kept at an even temperature of about 68° F., being regulated slightly to conform to the general humidity.

Machining Department

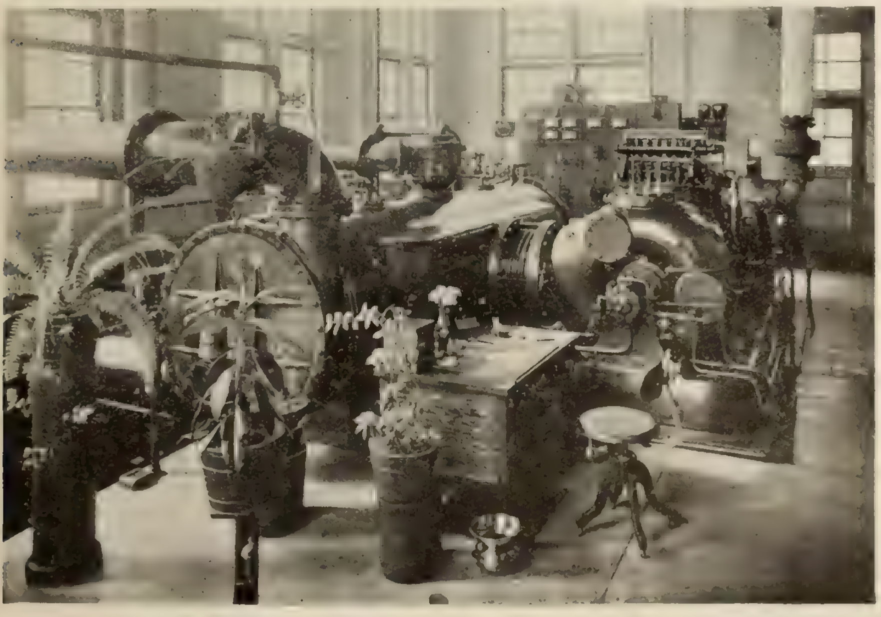
On this page are shown two views of the machining departments, where the rough blocks are rapidly converted into finished and faultless lasts. The equipment consists of 22 turning lathes, with all the additional machinery necessary for an output of 1,000 pairs per day. By means of a standard style model, invariably of the right foot, the lathes will turn out either right or left foot lasts, and of any desired size or width, simply by the adjustment of various cams and levers. After the lasts have been rough turned, the heels and toes are dressed off in specially designed machines, which can be so adjusted by cams, etc., to automatically shape the parts to the desired size and style. Holes for the hinge joints are drilled and counterbored, lasts are sawn in two, face of joint tongued and grooved to insure proper alignment, spring hole drilled, etc., continuing on until the final buffing and polishing operations complete the lasts. Each succeeding operation is gauged from the first drilled hole, so that each last is an exact duplicate of its fellow.

Model Making Department

Of recent years the efficiency of last making has not only increased, but it has been necessary to meet the requirements of the trade in the wide range of shapes and styles that are continually being adopted. When a new style has been decided on, the design is taken to the model making department, where an accurate sample is made by hand. If approved by a customer, an exact duplicate is made and deposited in a fireproof vault in the basement, where all the models, of every last made, are kept with the various master patterns of that particular make of shoe.

Upper Patterns

In addition to the machining of the wooden lasts, two high-speed Reed grading machines are used for cutting out the patterns of the various upper parts. The action of these machines is similar to the last turning lathes, inasmuch as the grading of the different sizes of the same style of upper part is derived from the same master metal pattern, secured to the machine, so that by moving a gauging finger around its edge, the cutter, revolving at a speed exceeding 30,000 revolutions per minute, cuts the pattern from the mill board sheet. These two machines have a capacity of about 1,000 pairs per day. The patterns are afterwards edged with a tin or brass facing to protect them from the cutting knife.



400 K.W. TURBO-GENERATOR AND CONDENSING PLANT.

Dust Removing System

The title cut shows an exterior view of the plant with the power house on the left. Above the main building and passing over to the boiler room is seen the system of pipes and receivers that carry the dust and shavings from the various machines and benches to the boiler room, where the waste material is consumed in the boiler furnaces. It will be noticed that another smaller system is arranged at a lower level and leading to a separate receiver. This leads from the buffing and polishing machines, where there is the possibility of a live spark setting fire to the waste material. By using a separate system to convey the dust from these machines the danger of fire is materially reduced.

DIE DEPARTMENT WITH SMITH SHOP IN REAR.

Power Plant

The power house is located at the rear of the main building. An outstanding feature in connection with this plant is the compact yet efficient manner in which the power house equipment is arranged. The boiler house equipment consists of two 250 horse-power water tube boilers, each fitted with Foster superheaters, and two 3-in. Consolidated pop safety valves. The boilers are hand-fired, grates being No. 3 McClare Brooks, 7 ft. by 7 ft. 6 in., ⅜ in. mesh, fitted with twin lever. Thompson damper regulators are also fitted to both boilers. Two 7½ in. by 4½ in. by 10 in. duplex piston pattern, feed water pumps, bronze fitted, of Worthington make, supply water to a Blake Knowles steam stack, cut out, water heater. Steel piping, with C. G. E. E. fittings and Lunkenheimer valves are used; steam traps are Anderson low pressure type.

The engine room contains a four-stage condensing Curtis turbine, direct connected to a 600-kilowatt generator, running at a speed of 3,600 revs. per min. This unit is operated in conjunction with an Alberger surface condenser, having a cooling surface of 2,400 sq. ft., equipped with an 8-in. regular volute centrifugal circulating jump, driven by 5 in. x 6 in. vertical Sturtevant engine. There are also one 6 by 14 by 10 in. Alberger horizontal air pump, and one 2 in. Alberger hot well pump. The circulating water is cooled in a large cooling pond, equipped with spraying apparatus installed by the Spray Engineering Co.

The building is equipped with sprinkler system throughout, and in addition, a highly efficient fire-fighting squad has been formed among the workmen. The comfort of the employees is well looked after, individual lockers being supplied, as well as wash basins, shower baths, etc.

◆

THE CEMENT INDUSTRY

ABOUT three-fifths of the cement imported into Ecuador used to come from Germany. The demand for cement is increasing chiefly on account of the sanitation work now in progress in Guayaquil, and also on account of the erection of the new municipal buildings, for the law requires the foundations of all new buildings to be constructed of concrete. It is worthy of notice that the superior quality of the barrels used by the United Kingdom exporters greatly reduced the percentage of loss of material in transit.

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WORLD-WIDE PROGRESS FOLLOWING THE WAR

OPTIMISTS continue to lay stress on the ultimate expansion of the world's trade and to emphasize the necessity of seizing every opportunity to lay a present foundation for future operations. Some of these critics have referred to the records of historical commentators as authority for the statement that many of the world's advances in arts and industry took place during former periods of strife, the progress of England as a manufacturing nation during the Napoleonic war being one of the outstanding instances of such economic phenomena.

While it is no doubt pleasant to draw comforting analogies between the present and past wars, the wish may be father to the thought to such an extent that accuracy may be overlooked. In many ways the present world condition is entirely unparalleled by any former occurrence. In the instance referred to, England had been enabled, as a result of the unsettled state of affairs in Europe, to obtain a considerable lead in many industries, this being rendered further valuable by her overseas commerce which was then attaining considerable dimensions.

Viewed in the light of the present tumult, however, conditions then were much more favorable to making an advance over industrial competitors than now, one reason being that outside of England there were few aspirants to overseas trade, whereas at the present moment every neutral nation is straining to secure and retain much of what was formerly British business. The strides being made by Scandinavia and Holland in the motor ship industry are one example alone which causes more than passing concern, yet to those who endeavor to see further and deeper than the present trend of events, the possibility of British trade being permanently or even seriously menaced by such developments seems remote.

Latest advices from the scene of hostilities indicate that the industrial resources of the Allies have been utilized to an extent well nigh incredible. While the output of war material in Britain is vast beyond comprehension, the significance of such efforts as omens of future activity should not be lost sight of by those concerned with future happenings in the industrial world, and students of history are not altogether lacking in data wherewith to demonstrate the repetition of the past. The past eighteen months have witnessed developments in every branch of physical science which in ordinary times would have excited the wonder of the world, but at the moment receive only passing comment. Trans-Atlantic telephony, high-speed steel without the use of rare metals, the commercialization of many processes hitherto only possible for the manufacture of products of formerly limited demand, advances in the design, material, and methods of manufacture of airships and submarines, etc., stainless steel, non-ferrous alloys—these, to mention a few only, are some of the more obvious developments whose ultimate influence on industrial conditions will only begin to be felt when ploughshares and pruning hooks resume their natural and inevitable positions of importance in the structure of civilization. In former wars Britain only, advanced, in this war Britain and the world advances.

* * *

FACTORS IN OUR MUNITIONS PRODUCTION

FROM observation covering many of our munitions manufacturing plants we have been impressed with the grim earnestness and methodical application which marks each operator's activities. There seems to prevail a keen sense of the necessity for absolute fitness of the product, whether the realization have its inception because of a piecework or bonus system of remuneration in vogue; the strictness of the individual piece inspection; or the desire transcending both of these, that the product may in no respect fail of its great and ultimate purpose. Whatever be the reason, and all three suggestions are likely to be more or less contributory, it would appear that employer and employee are less widely apart in their aims and ideas than pre-war times seemed to indicate.

If there is one thing more than another that munitions production has demonstrated — we speak from what we have seen and experienced in Canadian plants, it is the absolute necessity of having departmental oversight, and that again, of course, in the hands of men, tactful, resourceful and resolute. Such men are rather less plentiful than recruits for our overseas battalions—in any case their sphere does not meantime belong there.

The success of many of our munitions manufacturing plants and the spirit actuating their humblest operator is altogether attributable to headquarters and departmental administration of the nature indicated. Although the language is admittedly figurative, we know of cases where the salary limit of departmental supervisors was given as the "sky," provided the men could be got; and in the particular instances, as is nearly always the case when the position seeks the man, success crowned the enterprise.

The smooth-running, intensified and accelerated munitions output which to-day characterizes our metal-working plants constitute perhaps the most noteworthy achievement that industrial Canada has meantime on record. Of greater importance, however, is the indication that she is out for further achievement both at home and abroad, and means to realize it.

* * *

The decision to enter some department of overseas trade should be reached only after due deliberation involving a full accounting of the cost, and with a stolid determination to surmount not only the initiation difficulties, but those incidental to subsequent procedure.

INDUSTRIAL NOTABILITIES

THOMAS JOSEPH DILLON, director, Canada Foundries and Forgings Ltd., Brockville, Ont.; president, Canada Forge Co. and general manager, Canadian Billings & Spencer Ltd., of Welland, Ont., was born at Indianapolis, Ind., July 12, 1882, the son of John T. and Katherine (Hanley) Dillon. He was educated in the public and high schools, and started his business career as apprentice with the Titusville Forge Co., Titusville, Pa., in 1896. He passed through the various departments, emerging as a forging specialist in 1905.

THOMAS JOSEPH DILLON

Mr. Dillon came to Canada in the latter year, and organized the Canada Forge Co., becoming its president, and being more than anything else responsible for the plant growth and product achievement as we find it to-day. In 1912, when the merger of the James Smart Co., the Canadian Billings & Spencer Co., and the Canada Forge Co. took place, Mr. Dillon became a director of the combination.

He married Edith Maude Burgess, daughter of Charles Burgess, proprietor of the Cyclops Steel Co., Titusville, Pa., on November 23, 1904, there being two sons and two daughters of the union.

Mr. Dillon's recreations are golf and motoring, his Clubs the St. Catharines, Welland; and his Societies, the Knights of Columbus. In religion he is a Roman Catholic, and his residence is 122 Hellems Avenue, Welland, Ont.

—Photo, Courtesy International Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$18 70
Lake Superior, charcoal, Chicago	19 75
Michigan Charcoal iron.	28 00
Ferro nickel pig iron (Soo)	25 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain ..	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base, Toronto	3.25
Steel bars, 2 in. and larger, base..	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base ..	3.30
Bessemer rails, heavy, at mill....	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh....	...
Steel hoops, Pittsburgh	...

F.O.B., Toronto Warehouse.	Cents
Steel bars, base	3.25
Small shapes	3.75

F.O.B. Chicago Warehouse	Cents
Steel bars	3.10
Bars, 2 in. and up	4.00
Structural shapes	3.10
Plates	3.50

FREIGHT RATES

Pittsburgh to Following Points

Per 100 lbs.

	C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload ..	$31 00	$30 00
Electrolytic copper	31 00	30 00
Castings, copper	30 50	29 50
Tin.	47 00	46 00
Spelter	15 00	15 00
Lead	9 00	9 00
Antimony	28 00	28 00
Aluminum	65 00	67 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4.25	$4 25
Heads	4 50	4 50
Tank plates, 3-16 in.	4 75	4 75

WROUGHT IRON PIPE

Prices in effect April 26, 1916

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 06	5 31
½ in.	3 91	6 08
¾ in.	4 72	7 65
1 in.	6 97	11 31
1¼ in.	9 43	15 30
1½ in.	11 28	18 29
2 in.	15 17	24 61
2½ in.	23 99	38 90
3 in.	31 37	50 87
3½ in.	37 72	61 18
4 in.	44 69	72 49

Lapweld

2 in.	$17 02	$26 46
2½ in.	25 16	40 07
3 in.	32 90	52 40
3½ in.	39 56	63 02
4 in.	46 87	74 67
4½ in.	57 15	90 81
5 in.	66 60	105 82
6 in.	86 40	137 28
7 in.	116 62	179 70
8 in. x 25 lbs. per ft. ..	122 50	188 75
8 in. x 25 lbs. per ft. ..	141 12	217 44
9 in.	169 05	260 48
10 in. x 32 lbs. per ft.	156 80	241 60
10 in. x 40 lbs. per ft.	201 88	311 06

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$16 00	$16 50
Copper, crucible	19 25	19 50
Copper, heavy	19 50	19 75
Copper wire	19 75	20 00
No. 1 machine compos'n	15 00	15 00
No. 1 compos'n turnings	13 00	13 00
New brass clippings ..	14 50	14 50
No. 1 brass turnings ..	11 50	11 50
Heavy melting steel ..	9 00	9 50
Boiler plate	11 75	10 50
Axles, steel	13.00	15.00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	13 50
Shafting	16 50	16 00
Malleable scrap	10.00	12.00
Pipe, wrought iron	11 00	10 00
Stove plate	11 00	10 50
No. 1 machin'y cast iron	14 75	14 50
Heavy lead	5 50	5 50
Tea lead	5 50	5 50
Scrap zinc	11 00	11 00
Aluminum	37 00	36 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	50
Stove bolts	62½
Plate washers	25
Machine bolts, ⅜ and less	40
Machine bolts, 7-16 and over ..	30
Blank bolts	30
Bolt ends	30
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron....	25
Machine screws, fil. head, brass..	5
Nuts, hex., up to 1 in. $3.75 per lb. off	
Nuts hex., over 1 in. $2.00 per lb. off	
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$4.85
Structural rivets, as above	4.75
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent.
Sq. & Hex Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	.65
Coupling bolts	net
Planer head bolts, without fillet	.15
Planer head bolts, with fillet	net
Planer head bolt nuts up to 1 in. ..	.60
Planer head bolt nuts, over 1 in. ..	.55
Planer bolt washers	list plus 10
Hollow set screws	list plus .20
Collar screws	list plus.20
Thumb screws	.20
Thumb nuts	.75

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh ...	$45 00
Open-hearth billets, Pittsburgh .	42 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3 75	$3 70
Cut nails	3 40	3 40
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs.		$3 90

MISCELLANEOUS

Solder, guaranteed	0.29½
Solder, strictly	0.27½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	13.95
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.32
Benzine, single bbls., per gal.	0.31½
Pure turpentine, single bbls., gal.	0.63
Linseed oil, raw, single bbls.	0.70
Linseed oil, boiled single bbls.,	0.73
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.13
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHING DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	45
Standard drills over 1½ in.	5
3-fluted drills to 1½ in.	15
3-fluted drills over 1½ in.	net
Bit stock	55
Ratchet drills	net
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	25
Electricians	20
Sockets	30
Sleeves	50
Taper pin and taper reamers	25
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 5
Bridge reamers	55
Centre reamers	net
Chucking reamers	net
Hand reamers	5

High-speed drills up to 1½ in. and over 1½ in. Double list plus 20 per cent.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	4 60	4 50
Canada plates, dull, 52 sheets	4 50	4 50
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	7 00	7 00
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28, U.S.	7 00	7 00
Premier, 10¾ oz.	7 30	7 30

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch.	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$19 55	.....
1¼ in.	19 55	.....
1½ in.	19 55	14 00
1¾ in.	25 00	15 00
2 in.	25 00	15 50
2¼ in.	28 50	18 50
2½ in.	32 00	21 00
3 in.	40 00	24 00
3½ in.	45 00	28 00
4 in.	50 00	34 00

Prices per 100 feet. Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

Ist Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜ in.	$ 8.35
Galvanized, 24 wires, 1 in.	24.05
Black, 19 wires, ⅜ in.	6.90
Black, 19 wires, 1 in.	21.30

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	
Axle	Prices on
Anvil	application
Anchor	
WASHED WIPERS	
Select White	
Mixed colored	Prices on
Dark Colored	application

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.37 to .39
Tin	.58 to .60
Zinc	.26 to .28

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	$47 50	$47 50
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	46 00	46 00
Copper sheet, tinned, 14 x 60, 14 oz.	55 00	55 00
Copper sheet, planished, 14 x 60 base	58 00	58 00
Braziers' in sheets, 6 x 4 base	47 50	47 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	1.75 to 1.90
Polishing wheels, bullneck.	.90
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 50	$13 00
Sheets, 3½ lbs. sq. ft.	12 50	13 00
Sheets, 4 to 6 lbs. sq. ft.	12 25	12 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.15-24
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents

Montreal, Que., July 3, 1916.—Satisfactory conditions continue to prevail throughout the industrial situation, continued optimism is apparent in many directions while domestic trade continues to resume its normal position. The general steel situation has now apparently attained the high water mark and the next move is expected to be to lower levels.

Pig Iron

There is little to report in the pig iron situation. Steel making pig is very steady but foundry prices are easing up as shown by a general decline of 50 cents a ton on many of the current quotations.

Steel

While production is not any less, the buying tendency is practically at a standstill although foreign interests are showing a little anxiety over the situation in the States. The general feeling is that the top of the upward movement has been reached, and the question now appears to be, the length of time that the market will rest before a downward movement begins. No price changes are reported during the week. Owing to labor shortage it is reported that some cancellations have been made on bars, consumers being unable to use the quantity previously ordered. The market in sheets is quiet, but mills are very busy on special sheets. The wire rod demand is not brisk, but in event of a break with Mexico, the stoppage of export from the States would result in increased production here. In all other lines, the productive end is very active but the market is very quiet.

Metals

The situation in metals shows very little change, and the general market is quiet. Copper is fairly steady but inclined to weaken. Tin is at present firm but is expected to weaken in view of heavy supply. Spelter is still falling off, and lead prices may be subjected to re-adjustment in the near future. Antimony is very weak and aluminum is a little easier.

Copper.—The market is not very active, and under the conditions prices are almost stationary. Producers at present show no inclination to reduce prices, awaiting the trend of present developments. The turn of affairs recently shown in reports from the other side, foreshadows, some changes in the metal situation. London reports a little strength during the past week, advances of £5 and £4 being shown in standard spot and futures; quotations being £103 for spot and £100 for futures. Eastern price c.i.f. London of £3 15s. over last week. With the exception of lake, which shows an advance of ⅛ cent, New York prices are firm; this weeks quotations being 27 cents for lake, 26⅞ cents for electrolytic and 24¼ for castings. Local conditions are unchanged and dealers report a quiet market at last week's prices, 31 cents for lake and electro and 30½ for castings.

Tin.—The situation in tin continues to be very quiet and little activity is shown. Recent arrivals of tin have placed considerable metal on hand, and in view of the fact that large consumers are well covered for immediate and early requirements, buyers are showing very little interest at any deliveries. London prices are easier while New York prices show a decline of ⅝ of a cent the nominal quotation for Straits tin being 39⅝ cents for pound. Unchanged conditions prevail in the local market and dealers are still quoting 47 cents per pound.

Spelter. — The market is quiet and prices are still declining, the production of spelter being far in excess of the present demand. The New York market has declined ⅞ of a cent during the week, the nominal price now being 11 1-3 cents per pound. Local dealers report a dull market on declining prices, present quotations of 15 cents being a decline on the week of one cent per pound.

Lead.—The situation in lead maintains a steady position and prices are holding firm. Outside interests are still slightly below the Trust prices and are therefor receiving the bulk of the business that is going. New York quotes 7 cents on Trust price and 6⅞ cents for outside interests. Conditions here are unchanged, and prices are firm at 9 cents per pound.

Antimony.—Buyers are showing little interest in the situation and the market continues to weaken. New York prices are now 17½ cents, and a decline of 2 cents on the local market places the current quotation at 28 cents per pound.

Aluminum.—The demand for aluminum has decreased and prices are easier. New York prices have declined two cents and local dealers are asking 65 cents which is a decline of one cent over that of last week.

Machine Tools and Supplies

The situation in the machine tool industry is much the same, with the pressure on the manufacturers gradually being removed, and the possibilities of delivery becoming more normal. With the exception of the heavier equipment, and such small orders as, are required for the maintainence of standard machines, the situation is gradually resuming a normal condition. The demand and inquiry for domestic tools is still good and the outlook is encouraging. Owing to the continued activity in munition plants the demand for supplies is still very great and accessories are still required in large numbers, with little relief in the way of prices, but much better deliveries on necessary supplies.

Scrap

Consumers are apparently still well supplied and the market is comparatively unchanged. Business is light in heavy melting steel and New York prices are a little weaker; quotations on old steel rails and R. R. wrought iron are also easier, but buying is light. Brass scrap is slightly stronger and also aluminum, but old lead and zinc have declined. While local dealers are fairly busy they are holding firm on price quotations.

Toronto, Ont., July 4.—The continuance of further orders for munitions to be made in Canada has been assured by the establishing of additional credits for the Imperial Government. The total amount of the new credit will probably be over $50,000,000., the exact amount however, will be determined shortly by the Minister of Finance and a Committee of the Canadian Banker's Association. Previous credits have enabled the Imperial Munitions Board to distribute large orders for shells in Canada, with the result that over 300 plants are now busy producing munitions. This activity has been of the greatest benefit to the engineering industry as well as to the country generally. It is estimated that the Imperial Munitions Board is expending from twenty-five to thirty million dollars every month. This has only been made possible by establishing these credits which not only benefit Canada industrially, but are also of the greatest assistance to the British Government in the control of the sterling exchange situation.

A statement recently issued by the Department of Trade and Commerce covering the returns for May, shows a heavy increase in exports of manufactured goods. These exports in May amounted to $27,734,477 as compared with $16,121,149 in the corresponding month last year. The imports also show a substantial increase. From an industrial standpoint, Canada is experiencing a wave of prosperity which will no doubt continue while the war lasts. During the period of re-adjustment after the war there will be reaction, but the effect of this can be offset to a great extent if manufacturers prepare for the change by developing their export business and also make determined effort to manufacture articles which hitherto have been imported, principally from enemy countries. Such a procedure would be of lasting benefit to the country generally.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

Steel

The situation in the steel market is unchanged and prices have been maintained at last week's levels. The export business continues heavy but domestic demand is easier. An advance in lapwelded boiler tubes is expected in the near future, but prices are unchanged meantime. On locomotive and merchant tubes most makers have their output sold for practically the remainder of the year. The wrought iron pipe market is easier, the new demand being lighter. Many mills are filled up for four or five months on lapwelded sizes, but can make fairly prompt delivery on butt-weld pipe. The skelp situation is unchanged, the mills having their output sold up over the next three or four months. Prices of wire rods are a shade easier but smooth steel wire has advanced 15c and is now quoted at $4.05 per 100 pounds. Cold-rolled shafting is easier but unchanged and deliveries are extending into three or four months.

The sheet market is strong but quiet, and quotations are unchanged. Blue annealed sheets are in good demand and prices have an upward tendency. Advancing costs of sheet bars and labor are expected to have a stiffening influence on all grades of sheets. The continued decline in spelter has improved the situation in the galvanizing trade but prices of galvanized sheets are unchanged locally although the market is easier in the States.

In the United States market there is evidence that the export business is sustaining prices as the domestic demand has decreased. New enquiries from Europe for Bessemer pig iron, steel billets and shell steel are in large volume while the export demand for steel bars is also heavy. The grave situation between the United States and Mexico is affecting the steel trade because of the possibility of early Government buying of steel products and munitions. Prices of some products are easier although the market generally is firm. Plates have declined to 3.25c Pittsburgh, but steel bars are unchanged at 2.50c and shapes at 2.50c Pittsburgh. Wire rods have declined $5 and are now being quoted at $50 per ton Pittsburgh.

Scrap

The market for old materials continues weak and dull. Quotations however are unchanged although declines are looked for in lead, zinc and brass scrap.

Machine Tools

Further orders for munitions are assured following the further credit which is to be arranged for by the Minister of Finance and the committee of the Canadian Banker's Association. Probably $50,000,000 will be placed at the disposal of the Imperial Munitions Board for expending on shells which will keep the munitions plants busy for a long period, and machine tools will be required. The machine tool business continues brisk, and further orders for lathes have been placed while others are pending. Deliveries are improving from makers in the States and indications point that the pressure on machine tool builders there is fast subsiding.

Supplies

Prices continue to advance on some machine shop supplies but the principal difficulty that dealers have to contend with is the scarcity of some lines, drop forgings and steel pulleys being particularly hard to obtain. Some of the advances which have gone into effect recently are as follows:—Canadian made chucks are now 5 per cent off list; American "Independent" chucks are list plus 30 per cent., and geared scroll chucks list plus 40 per cent.; Cushman 3-jaw chucks style 21-28, list plus 30 per cent.; Cushman "Hartford" drill chucks list plus 10 p.c. with shanks for same and parts list plus 10 per cent. Malleable lathe dogs are now 45 p.c. off list. A new price list on "Stevens" drill vises and bench vises has been issued. A number of lines of saws are now quoted at 25 p.c. off list and include solid tooth and inserted tooth circular saws, shingle and heading saws, mitre and novelty saws, circular milling saws, narrow band saws and gang saws. Concave and grooving saws are 5 p.c., wide band saws 35 p.c., special milling saws net list and metal splitting saws 50 p.c. Skinner drill chucks, geared pattern, are now list plus 15 p.c. and standard pattern list plus 5 p.c. A new price list has been issued on adjustable wrenches which carries a discount of 20 p.c. J. H. Williams products, have advanced and include drop forged wrenches 25 p.c., "Vulcan" and "Agrippa" chain pipe wrenches 25 p.c.; "Vulcan" chain pipe vises 15 p.c.; clamps list plus 25 p.c.; and drop forged lathe dogs list plus 15 p.c. Makers of high-speed steel cutters have shaded their prices while high-speed tool steel has also a weaker tendency. Owing to the decline in pig lead, prices of lead sheets are lower.

Metals

The downward tendency in prices of practically all metals except aluminum is the principal feature of the week, while the demand for most metals continues light there is evidence that prices are gradually working down to a more normal level. Production and consumption are now more evenly balanced and a falling off in demand will thus tend to lower prices. The position of copper is rather different from the other metals owing to the enormous war consumption and it is hardly likely that prices will decline in the same proportion as lead, spelter or antimony. After the war the industrial demand for copper will be so heavy that the possibility of any pronounced decline in prices for many months seems remote.

Copper.—The market is firmer in London but weak and dull in New York. Further price concessions have been made by second hands to attract buyers, but producers continue to hold firm. The visible supply of copper continues to decrease and it is quite possible that the Allies will be in the market for good sized tonnages in the near future. In view of the fact that producers are sold up for three or four months ahead, there appears to be little possibility of any marked decline in prices. Local Quotations are lower and nominal at 30c per pound.

Tin.—The market is weaker and unsettled due to lack of interest on the part of consumers and a big increase in stocks. It is believed in some quarters that tin is cheap when compared with other metals and that the market will recover in due course. Local quotations are lower and nominal at 46c per pound.

Spelter.—Quotations continue to decline and the whole spelter situation is unsatisfactory. Producers are lowering quotations in an effort to interest consumers but little buying has developed. Spelter has declined 1c locally and is now quoted at 15c per pound.

Lead.—The market is steady and unchanged with the "Trust" quoting 7c New York. The situation in the New York market is uncertain and indications point to a decline in prices unless the export demand is renewed. Lead is unchanged locally at 9c per pound.

Antimony.—Sellers are slowly reducing prices to get what little business is offering with the result that the market is weaker with prices lower. The local market is dull and easier at 28c per pound, quotations being entirely nominal.

ALLIES PURCHASING AGENTS

The Trade and Commerce Department, Ottawa, has published the following list of purchasing agents for military purposes for the allied Governments:

International Purchasing Commission, India House, Kingsway, London, Eng.

French.—Hudson Bay Co., 56 McGill Street, Montreal; Captain Lafoulloux, Hotel Brevort, New York; Direction de l'Intendence Ministere de la Guerre, Bordeaux, France; M. De la Chaume, 28 Broadway, Westminster, London.

Russian.—Col. N. Golejewski, Military Attaché, Room 904 Flat Iron Building, New York City.

Aluminum.—The situation is unchanged but the market is stronger and quotations higher at 67c per pound.

SHIPPING FACILITIE FOR EXPORT TRADE

IN regard to the new service on the Pacific, there is no doubt that American trade has suffered much from want of transportation facilities since the withdrawal of the ships of the old line. It is quite clear that countries which possess ships of their own are in a better position to engage in trade with foreign countries than those who have to depend upon foreign bottoms to convey their overseas commerce. That the Pacific Coast trade of Canada with foreign ports has suffered for want of shipping facilities, not only since the war began but for years before, has been freely stated. Observations made upon Canada's small trade with China would seem to bear out the truth of this statement. The rate of progress which the Japanese are making in the construction of ships, unless other countries soon make a start to do likewise, must ultimately place the Pacific carrying trade practically all in the hands of the Eastern nation.

It is of interest also to observe the class of vessels which Japan is constructing for this service. Fairly large steamers of 6,000 to 8,000 tons, not of great speed, but essentially freighters, and designed to handle rough and heavy cargo, such as timber, flour and machinery. The passenger accommodations on many of these ships are confined to intermediate and Asiatic travellers, and being comfortable and clean, if not luxurious, are well adapted to all the requirements of this service. It would seem that a line of intermediate ships of this class might find ample business in the Canadian trade with the Far East.

AGRICULTURAL MACHINERY NEEDED IN INDIA

THE agricultural machinery opening in India is the subject of the following article, in the Implement and Machinery Review. It will appeal more especially to the Canadian manufacturers of farm implements who are on the lookout for a channel of foreign export.

The enterprising implement and machinery manufacturer, who is on the qui vive for new avenues of trade, might with considerable advantage turn his attention to the East, and closely study the needs of our vast Indian Empire. Rich in historical associations, but lacking the material wealth which only industrial development can produce, this country offers almost a virgin field to engineers and machinery makers. India has so far only experienced a passing acquaintance with modern mechanical power for industrial pursuits, but she is awakening to the possibilities afforded, and step by step machinery will be introduced until, with the great increase in the wealth of the country, the demand for machinery will grow enormously. Already on a limited scale India is sharing in the general output of munitions, and this has prompted the thought that if she can successfully apply herself to this class of manufacturing, other trade is open to her.

The Provincial Department of Industries is being called upon to encourage the use of machinery, for it is regarded in responsible quarters that India's industrial progress will always be slow so long as the country is backward in mechanical engineering. Take the case of agriculture, India's principal source of wealth. Owing to the primitive method of cultivation, a ryot performs one-twelfth of the work of an average English farm labourer, and the yield per acre is much smaller than on the average English farm, but in England mechanical plant is utilized to a degree undreamt of in our mighty Eastern Empire. In the year 1908, 34,450 engines with a horse-power of 213,525 were employed in Great Britain in the cultivation of 2,000,000 acres. It is contended that Indian agriculture offers even infinitely greater scope for machinery than does English agriculture, and as the area under cultivation is ten times larger than that of Great Britain, the machinery manufacturers who seek to cater for India's requirements must be impressed by the probable tremendous demand.

They must not lose sight of that fact, however, that competition in various types of engines and machines is restricted in India, owing to the lack of engineering resources in the country for repair work, and also in view of the question of importing spare parts. One thing is abundantly clear, and that is that the popularity of agricultural machinery will increase when a sufficient number of millwrights' shops are established to perform repair work, and so remove the present worry and trouble. Beginnings have been made in this direction and also in securing competent mechanics. A concrete case of the saving qualities of machinery is given by the irrigation problem. Fully 33.3 per cent. of the land irrigated is watered from wells, and the labour of at least six million cattle is employed. Mechanical power would do all that is necessary in much less time, and at smaller expense. Only for the war, British manufacturers would have had on the market the small combined pump and motor combination the country requires, and a direct result of its installation would have been to increase the area cultivated. A good deal of missionary work is required to familiarize the Hindu cultivators with mechanical plant. The obstacle of the small holdings will have to be overcome by co-operative ownership, whilst it will have to be made clear that only by the full use of machinery can its utmost benefit be derived. The Hindu seems to be content to employ machinery on a restricted scale, but fails to appreciate the gains to be derived from organized running.

* * *

Can. Merchant Marine.—The Dominion Government is investigating the possibilities of a Canadian merchant marine. It is thought that a resort will be made to bond guarantees, and subsidies may be granted to equalize the difference between the cost of construction between Great Britain and Canada. However, no definite policy has been arrived at. No doubt the first move will be to extend the Government freight carrying service between Halifax and Liverpool in conjunction with the Government-owned land service by the Intercolonial and National Transcontinental Railways.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign potr.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross. 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia .
C. F. Just, c/o British Consul, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address. Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsythe Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canadian Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgrow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Strete, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Austraasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.
R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegad No. 4, Christiana, Norway. Cable address, Sontums.

SOUTH AFRICA

D. M. McKibbin, Room 34, Permanent Buildings, Harrison Street, Johannesburg.

E. J. Wilkinson, Durban, P.O. Box 673, Durban, Natal.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Walland, Ont.—The Welland Motor & Machine Co. will build a factory at a cost of $3,500.

Sunderland, Ont.—T. Welsh is in the market for two 15-h.p., three-phase, 220-volt, 60-cycle squirrel-cage motors.

Montreal, Que.—The Canadian Tube & Iron Co. has commenced the erection of a building to cost $3,000.

Renfrew, Ont.—The Renfrew Electric Mfg. Co. has commenced the erection of an addition to its factory to cost $5,000.

Toronto, Ont.—The Bawden Machine Co., 163 Sterling road, will erect frame and galvanized iron storage bins, at a cost of $2,000.

Peace River, Alta.—The Department of Public Works, Ottawa, contemplate the installation of an electric generating plant.

Hamilton, Ont.—The Oliver Chilled Plow Works will build an addition to its plant on Burlington Street at a cost of $2,000.

Toronto, Ont.—The Flint Varnish & Color Works, Perth avenue, will erect four steel and concrete storage tanks at a cost of $2,000.

St. Catharines, Ont.—The Packard Electric Co. are building an addition to their factory, 50 ft. x 145 ft., of steel and concrete construction.

Stellarton, N.S.—The Acadia Coal Co. contemplate installing an additional unit in their power plant. This will consist of a 3,000 k.w. steam turbine.

Lindsay, Ont. — The Westinghouse, Church & Kerr Co., New York, have the contract for the Government's new ammunition plant to be constructed here.

Hull, Que.—The Hull Iron & Steel Foundries is building an addition to its plant, 90 x 150 ft., at a cost of $30,000. It will be used as a small castings department.

Sarnia, Ont.—A site has been selected at Point Edward for the stone cutting plant which will be established by George Oakley, of Toronto. The new company is capitalized at $100,000, and will cut all the stone required for the Union Station at Toronto.

The Ontario Steel Products Co. is making extensions to its plants at Chatham and Gananoque, Ont., to take care of increasing business. The company has been working at full capacity for a considerable time on its regular spring, axle and shovel business, and has recently closed contracts for springs, etc., with several automobile manufacturers.

General Industrial

Guelph, Ont.—The Dominion Linens will build an extension to their factory here.

Berlin, Ont.—Fire did $500 damage to Kreiner & Co.'s furniture factory on Sunday.

Peterboro, Ont.—A by-law to aid the Bonner-Worth Co., in the erection of a new factory was passed on June 27, by a majority of over 400. The capacity of the present plant has been trebled within the past three years.

Canadian Plant Projected.—The International Paper Co., has plans made for a 200 ton newsprint mill to be erected in Canada. It is officially stated that this mill will produce newsprint, round wood pulp and a surplus production of sulphite pulp, and that construction will be begun as soon as a building material can be contracted for to advantage.

Municipal

Guelph, Ont.—The City Council are in the market for a 750 h.p. transformer.

Montreal, Que.—The Town Council of Pointe aux Trembles, near here, contemplate installing a waterworks system.

Birchcliff, Ont.—The ratepayers of this district have endorsed a scheme for installing a hydro-electric system here.

Kingsville, Ont.—The Town Council will submit a by-law on July 5 to authorize the expenditure of $16,000 on waterworks improvements.

Saskatoon, Sask.—A by-law will be voted on by the ratepayers on July 26 for $90,000, to provide for an incinerator and to purchase a site. The cost of the incinerator alone is estimated at $30,000.

Windsor, Ont.—An important session of the Essex Border Public Utilities Commission was held at the City Hall here on June 28, and at its conclusion it was announced that the commission had ratified the appointment of a Board of Engineers to prepare comprehensive plans for a joint sewage and water system for the six Canadian border municipalities. When the plans are perfected the ratepayers of Windsor, Walkerville, Sandwich East, Sandwich West, Ford and Ojibway, the municipalities affected, will be asked to vote on the project. The approximate cost of a new sewerage system for the border towns is estimated at between $1,500,000 and $2,000,000.

Tenders

Saskatoon, Sask.—Tenders are being called until July 26 for a high pressure water main system.

Victoria, B.C.—W. Galt, city purchasing agent, is receiving bids for a quantity of supplies which are for sale, including brass goods, hose nipples, lead and iron unions, cocks, lead pipe, and valves, etc.

Halifax, N.S. — Tenders will be received until Wednesday, July, 19, 1916, for furnishing 2,800 ⅝ in. meters and 300, ¾ in., meters in accordance with the specification made by the City Engineer. Further particulars may be obtained from H. W. Johnston city engineer.

Prince George, B.C. — Tenders for power plant equipment for the City of Prince George, B.C., will be received at the office of the city clerk, up to July 8, 1916. Specifications and instructions may be obtained at the office of the city clerk, or at the office of the consulting engineers. DuCane, Dutcher & Co., Rogers Blg., Vancouver, B.C.

Welland, Ont.—Tenders for repairs to the southerly end of elevator mooring dock at Port Colborne, Welland Canal, will be received until July 14. Specification and form of contract to be entered into can be seen at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the superintending engineer, St. Catharines, Ont.

Toronto, Ont.—Tenders for Examining Warehouse will be received until July 17. Plans, specification and form of contract can be seen and forms of tender obtained at the offices of Thos. A. Hastings. Clerk of Works, Postal

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Ottawa, Ont.—Tenders will be received until July 10 for 163,500 lbs. of galvanized iron telegraph wire, delivered at Montreal, Que., or 128,500 lbs. of same delivered at Kamloops, B.C., and 35,000 lbs. delivered at Vancouver, B.C.; early dates of delivery desired. Specification and forms of tender can be obtained on application to the office of the General Superintendent of the Government Telegraph Service at the Department of Public Works, Ottawa; also at the office of J. T. Phelan, superintendent of Government Telegraphs at Vancouver, B.C.

Steam Turbo Alternator, Etc.—The corporation of Invercargill, New Zealand, is calling tenders for a steam turbo alternator, condensing plant and switchgear. The contract to be let is for the manufacture, supply, delivery and erection, duty, railage, and all other charges paid, including all labor in buildings and upon foundations constructed by the corporation of all plant and material required for a steam turbo alternator complete with necessary condenser, fittings, auxiliaries and all apparatus, whether specified or not particularly mentioned necessary for proper and efficient operation of the plant. Tenderers must state in what time they will guarantee to complete the whole of the contract, including all tests. Time to date from acceptance of tender. Such acceptance may be by letter, telegram or cable. Specifications and plans may be obtained by writing to the Commercial Intelligence Branch, Department of Trade and Commerce, Ottawa, referring to File A-1939.

Contracts Awarded

Port Arthur, Ont.—The contract for the new 300,000 bushel elevator has been let to Barnet & McQueen.

Fredericton, N.B. — The Dominion Bridge Co., has been awarded the contract for the superstructure of the Aroostock Mouth bridge at $33,318. They will erect the Jemsey bridge for $33,094.

Personal

Captain Archibald Reid, for many years Lloyd's surveyor at Montreal, has resigned.

Charles L. Marble has been appointed manager of the Wayne Oil Tank & Pump Co., of Woodstock, Ont.

W. J. Alderson, has been appointed Lloyd's engine and ship surveyor for the ports of Montreal and Quebec.

E. R. Gray, assistant city engineer of Hamilton, Ont., has been recommended by the Board of Control for the position of chief engineer, to succeed A. F. Macallum.

Walter S. Barrows, foreman of the plating department, the Canada Cycle Co., Toronto, and Supreme President of the American Electro-platers Society, is again back to business, following a long and trying sickness.

Watson Griffin has been appointed superintendent of the Commercial Intelligence Branch of the Department of Trade and Commerce. Mr. Griffin was until recently special trade agent for Canada to the British West Indies.

J. C. Gwillim, professor of mining engineering at Queen's University, Kingston, Ont., has been appointed an officer in the Canadian Engineers and will leave shortly for Valcartier, where he will assume his duties.

J. McGregor, superintending engineer of the Halifax Ocean Terminals, has obtained leave of absence from the railway department to go to the front. Mr. McGregor will be chief engineer of the railway construction battalion commanded by Col. J. W. Stewart, with the rank of Major.

Captain Wm. Mathews, master of the schooner, "General Laurie," of Lockeport, N.S. is to receive a silver souvenir from the King of Norway, in recognition of the services rendered the master and the crew of the Norwegian barque "Forth," of Sandefjord, lost on the 27th September, 1915.

Robert Maitland Roy, C.E., manager and director the Hamilton Bridge Works, Hamilton, Ont., died on June 27, following an illness of about six months duration. Deceased was born at Stirling, Ont., on November 28, 1869, and had been manager of the Hamilton Bridge Works since 1908, and a director since 1913.

Capt. Archibald Reid, for many years Lloyd's surveyor at Montreal, has resigned. His place will be taken by **W. J. Anderson,** a shipping and engineering surveyor of Lloyd's, who will watch Montreal and Quebec ports. Captain Reid has combined the work of port warden and surveyor for years; now the work has become too heavy for one man to perform it, so the post has been divided.

Captain Blanchard Henry, commanding the transport Ionian, has been especially mentioned by the Admiralty for work in the evacuation of the sick and wounded from the Gallipoli Peninsula. Captain Henry carried out responsible duties, say the Lords of the Admiralty, "with devotion, zeal, readiness, resource, and dispatch, never known to have been equalled." Captain Henry's home is Montreal, and he has seen thirty years service with the Allan line. He commanded a transport carrying some of the original Canadian contingent to England. He holds a medal for transporting troops during the South African War.

Building Notes

Toronto, Ont.—The Northop & Lyman Co., will build a warehouse to cost about $75,000.

Toronto, Ont. — The Separate School Board will erect two-storey brick school, on Broadway avenue, at a cost of $24,000. They will also erect a two-storey brick school on 783 Bathurst street, at a cost of $9,000.

Woodworking

Berlin, Ont.—It is announced that the National Furniture Co. of this city, has been taken over by E. O. Weber, of the Waterloo Furniture Co.

Windsor, Ont.—Fire totally destroyed the lumber and planing mills of C. F. Smith at Harrow, near here, on June 24. The damage is placed at $8,000.

Trade Gossip

Halifax, N.S.—The head office of the Camaguay Electric Co. has been removed from here to Montreal.

The Storey Pump & Equipment Co., Toronto, have been awarded a contract for pumps and filtration plant for Niagara-on-the-Lake, Ont.

Campbell & Deyell have closed their office in Schumacher, and in future will have all work attended to at the Cobalt works.

The Roelofson Elevator Works, of Galt, Ont., have been awarded a contract for an electric elevator by the Hample Paper Box Co., Brantford, Ont.

The Zenith Coal & Steel Products, of which G. D. Drummond, is president, and C. D. E. Wilson, secy.-treasurer, will deal in coal, coke and steel products. The capital stock is $35,000 and the head office, Montreal.

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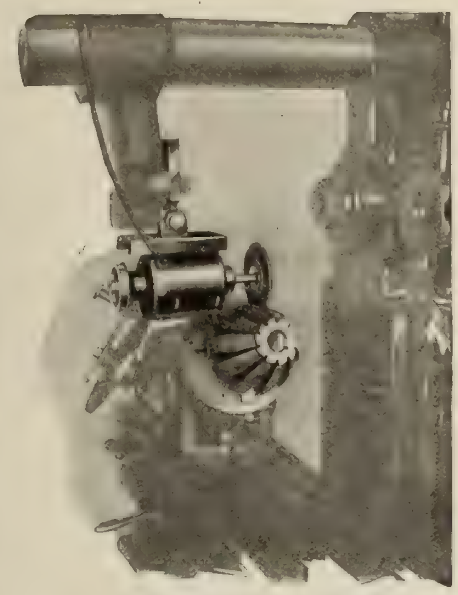

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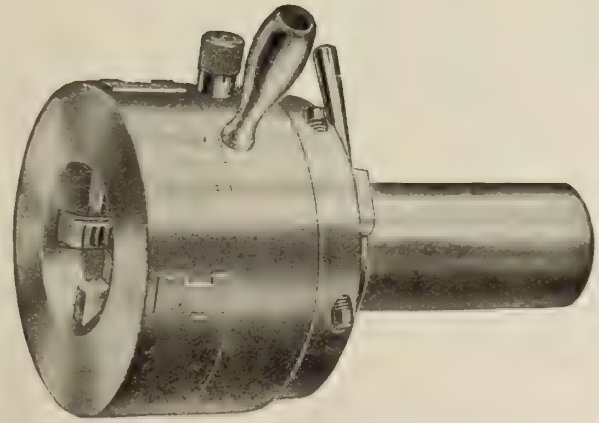

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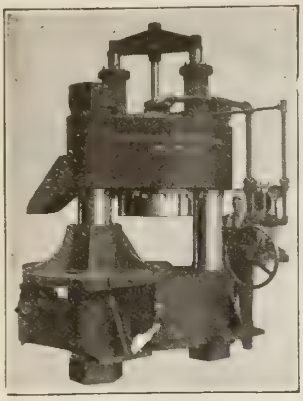

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Canadian Machinery
Classified Advertising Section

Montreal Metallurgical Association.—The summer meetings of the Montreal Metallurgical Association are taking the form of evening visits, once a month, to the various plants about the city. The June visit was to the plant of the Canadian Steel Foundries at Point St. Charles and the July outing will take place on the evening of July 5 to the plant of the Dominion Glass Co.

French Car Shipment.—The first shipment of cars for the French Government, from the Eastern Car Co., plant, New Glasgow, has been made, we are informed. These cars are smaller than those made for the Russian Government. They are open gondola type, and each car is equipped with a small caboose on the end, which protects the trainmen from the weather.

The Roelofson Machine & Tool Co. has been organized at Galt., Ont., with E. C. Roelofson, formerly of Galt, who has been in Toronto for some years as president and general manager, and his brother, A. C. Roelofson, works manager. E. B. Roelofson, Galt, is vice-president. Work has been started on a factory 185 feet by 105 feet on Beverley street, and it is expected that the building will be completed by August.

Consignment to South Africa.—Official advice has been received from Mr. Egan, Canadian Trade Commissioner in South Africa, that consignments to order or through forwarding agents for Delagoa Bay will not be allowed to go through. Certain consignments for Delagoa Bay on the last steamers from Canada were landed at Durban. All consignments for Portuguese East Africa must name consignees or as it is sometimes called in South Africa destinatories on bill of lading.

New Mining Area.—The largest mining district in Canada is to be made of the northern part of Manitoba, according to the announcement made here recently by Hon. Dr. Roche, Minister of the Interior. From the head of Lake Winnipeg to the Arctic seas, and from Hudson Bay to the boundary line beween Manitoba and Saskatchewan, is the area decided upon. It approximates 200,000 square miles of territory, the headquarters of which will be located at The Pas, Man.

Italy Purchases Old Steel Rails.—Three thousand tons of worn-out steel rails recently constituted the cargo of a homeward-bound Italian steamer when it left its berth in the Delaware River. The old rails were no longer fit for service, and had been scrapped by one of the eastern transportation companies. Owing to the shortage of iron and steel abroad, they were purchased by agents representing the Italian Government and will be melted down for use in the manufacture of munitions of war. To facilitate loading, the rails were cut in two on the dock with the aid of oxy-acetylene torches.

Trade With Russia.—In keeping with the policy outlined by Sir Thomas White to the Canadian Bankers recently advocating steps for developing trade with Russia, the Trade and Commerce Department in the past year has been making investigations and generally looking over the ground. C. F. Just, one of the Trade Commissioners, has interviewed Russian importers and has forwarded to the department numerous communications dealing with trade prospects. It has been decided to make Mr. Just trade representative in Russia permanently, while W. Wilgress, after several months' service in the department, has been assigned to a trade mission in Siberia. His headquarters will be at Omsk.

The Canadian Electrical Association held their annual meeting this year on board the Canada Steamship Lines steamer "Toronto." A large number of members took advantage of the opportunity of seeing the Thousand Islands, thus combining business and pleasure. The party left Toronto on the afternoon of June 21, going as far as Prescott, where the Montreal delegation joined the Ontario members. On the return trip the business of the association was transacted, a very successful outing terminating with the arrival of the steamer at Toronto early on Friday morning. The weather, although cool, was bright, and the trip was much enjoyed by all present. Much of the success of the meeting was due to Alan Sullivan, the secretary of the association, who was responsible for the arrangements of the trip.

New Incorporations

Toronto Opticians has been incorporated at Toronto, with a capital of $40,000, to carry on the business of manufacturing all kinds of optical goods. Incorporators: W. A. Lamport, H. M. Fergusson, and W. J. McCallum, all of Toronto.

The Colonial Chemical Co., has been incorporated at Toronto with a capital of $40,000 to manufacture nitrate of ammonia and all by-products thereof. Head office at Toronto. Incorporators are F. Regan, J. Callahan and W. Menton all of Toronto.

The Atlantic Chemicals has been incorporated at Toronto, with a capital of $40,000, to manufacture nitrate of ammonia and chemicals of all kinds. Head office to be situated at Toronto. Incorporators: F. Regan, J. Callahan, and W. Menton, all of Toronto.

The Bras d'Or Coal Co. has been incorporated at Ottawa, with a capital of $45,000, to mine and deal in coal, coke, ironstone and other minerals. Head office to be situated at Montreal. Incorporators: H. A. Lovette, G. W. Cole, and B. F. Bowler, all of Montreal.

Baldry, Yerburgh & Hutchinson has been incorporated at Toronto, with a capital of $561,000, to carry on the business of engineers, contractors (dock, railroad and canal). Head office to be at St. Catharines, Ont. George Peterson, of St. Catharines, is the attorney.

The Chapman Engine Mfg. Co. has been incorporated at Ottawa, with a capital of $250,000, to manufacture engines to be run by gasoline, kerosene and steam power, also electrical motors, machinery, tools, etc., at Dundas, Ont. Incorporators: G. W. Williams, F. E. Lennard, and J. D. Pennington, all of Dundas, Ont.

The American Natural Gas & Gasoline Co., has been incorporated at Toronto with a capital of $2,000,000 to refine and deal in natural and artificial gas, gasoline and peat for lighting and heating purposes. Head office at Toronto and the incorporators are E. R. Reynolds, a Van Dusen and John Mortimer all of Toronto.

The Canadian Collapsible Tube Co. has been incorporated at Ottawa, with a capital of $100,000, to manufacture and deal in collapsible tubes of every type, shape and material, also in tin, lead and aluminum goods. Head office to be situated at Toronto. Incorporators: R. W. Hart, K. D. McKenzie, and W. W. Perry, all of Toronto.

Marine

Halifax, N.S.—Work is being pushed hard on these terminals in order that three berths at least may be complete for shipping this autumn.

St. Catherines, Ont. — The steamer India owned by the Montreal Transportation Co., carried away the head gates of lock 12 in the Welland Canal on June 29.

Ottawa, Ont.—The Toronto Harbor Commission have deposited with the Public Works Department, for approval, plans of the bastion seawall to be built at the mouth of the Humber River.

Sarnia, Ont.—The wrecker "Favorite" of the Great Lakes Wrecking Co., along with the tug "Michigan", has succeeded in raising the overturned steamer "Chas. Price" sufficiently to enable them to bring her three miles closer to the mouth of the St. Clair River .

Hull of Majestic Raised.—The Reid Wrecking Co. has raised the hull of the steamer Majestic, of the Northern Navigation Co., which burned to the water's edge and then sank in shallow water in Sarnia Bay last Fall. An examination will be made of the hull, and if possible it may be rebuilt.

Vessel in Halves Through Canal.—On June 18, the fore part of the steamship "Harvey H. Brown" passed through the Lachine Canal, and was berthed in the Vickers Drydock to await the arrival of its aft complement, so that they might once more be united for a further life of usefulness at sea.

International Mercantile Marine.—The British Government has approved Harold A. Sanderson, E. C. Grenfell, of Grenfell, Morgan & Co., and Lord Pirrie, of Harland & Wolff, Belfast, as British nominees to the directorate of the reorganized International Mercantile Marine Co. Two British directors who will not appear on the new board are Charles F. Torray and J. Bruce Ismay. J. P. Morgan & Co., announce

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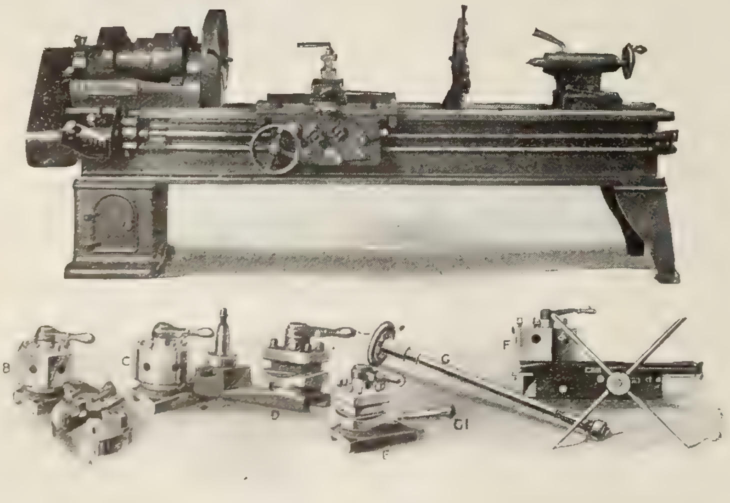

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types which are most frequently used in power house and storage pocket design. Numerous cuts are included showing the application of these valves, and selected with the idea of assisting where there is any question as to the type best suited to requirements. The catalogue, 6 in. x 9 in., contains 28 pages, and copies may be obtained on application by those sufficiently interested.

Recording Instruments.—Instruments for recording carbon dioxide in flue gases are described in Bulletin 91, of the Bureau of Mines, Department of the Interior, J. F. Barkley and S. B. Flagg, authors. In explaining why the Bureau of Mines has issued a report of this character, the authors say: "In the past few years an awakened activity in power plant economies has resulted in a marked improvement in the equipment for generating and utilizing steam. Although the improvement in design and construction of steam-driven prime movers has been greater than that of the steam-generating equipment the economies obtained with the more efficient engines and turbines have stimulated interest and activity in eliminating innecessary boiler and furnace losses. Much attention has been given to the boiler room in efforts to obtain proper combustion of the coal, because of the importance of the coal item in costs of power production. As evidence of this increasing interest may be cited the record of the development within the past few years of new apparatus for the analysis of flue gases. Many new forms of apparatus have appeared, including those for the determination of carbon dioxide, oxygen, and carbon monoxide, and others for indicating and for recording the content of carbon dioxide only, as carbon dioxide content is usually a good indicator for the control of furnace operation. Because of the large number of steam-power plants operated by the Federal Government and the number of carbon dioxide recorders used therein the Bureau of Mines undertook to collect information regarding the practical application of such recorders. Articles published from time to time concerning carbon dioxide recorders have been mostly descriptive, giving little reliable information as to the results that could be expected from the various types of instruments in ordinary practice, and most of the tests made have been of a laboratory nature. Tests of several different types of recorders were made under service and laboratory conditions in order to obtain needed information. The purpose of the Bureau of Mines in publishing the results is to show the factors which may affect the accuracy of a carbon dioxide recorder and the manner in which a recorder should be tested. Copies of this bulletin may be obtained free of charge by addressing the director of the Bureau of Mines, Washington, D.C.

Book Review

Modern Starting, Lighting and Ignition Systems, by Victor W. Page, nearly 400 pages, $5\frac{1}{2}$ in. by 8 in., and over 250 illustrations with folding plates. Published by the Norman W. Henley Publishing Co., New York. Price $1.50. This volume explains all forms of electrical ignition systems used on internal combustion engines of various types, and deals with the equipments of cars built in previous years as well as those in use this year. It also includes comprehensive instructions pertaining to the starting and lighting systems of automobiles. The book is essentially practical. While of considerable value to the mechanic, it has been written with special reference to the requirements of the non-technical reader, who may desire easily understood explanatory matter relating to all types of automobile ignition, starting and lighting systems. The aim of the author has been to present a book that can be understood even by those whose knowledge of electrical matters is limited. In order to help the reader who is deficient in this respect, elementary electrical principles are dealt with at length in chapter one, the succeeding chapters dealing with the various systems covering construction and operation. Chapter two describes different battery and coil ignition methods, while the following chapter deals with magneto ignition systems. Elementary electric starter principles are discussed fully in chapter four, and in chapter five typical starting and lighting systems are described in detail. Chapter six deals with starting system faults and their systematic location, while chapter seven is devoted to a description of miscellaneous electrical devices. The illustrations, which are very explanatory, are from specially-prepared engravings; in addition, there are some interesting folding plates. The book is bound in attractive and substantial cloth covers, and the reading matter is printed in clear type.

* * *

THE Petrograd International Commercial Bank and the Russo-Asiatic Bank have formed a financial syndicate to promote a company, with a capital of 25,000,000 roubles (£2,756,250), for the metallurgical development of the Altai district of Siberia. The Russian Government, it is said, will take up one-half of the shares. The application for the concession sets forth that the South Russian and Ural metallurgical works have reached the limit of their productive capacity, and that it is necessary to erect new factories.

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FOR SALE

FOR SALE—ELECTRIC PLANT—1 CORLISS engine, 16 x 30; boiler 72" x 14'; 1 dynamo, 1,100 V., 60 K.W. alternating current; 1 dynamo, 500 V., 30 K.W., direct current; transformer, watt meters, shafting, pulleys, belts. All in first-class condition. Sold complete or in part. C. Zufle, Exeter, Ont. (26)

FOR SALE — THREE HOLDEN-MORGAN threading millers; one arranged for nose threading; two for base threading. One base threader can be changed to 4.5, as it was reduced from this size. Also two Bertram wavers and groovers, and one Martin, all used for 3.3 shells. Canadian Linderman Co., Ltd., Woodstock, Ont. (27)

FOR SALE 5 CARLOADS MACHINERY steel, consisting of rounds from ¼" to 5", squares, flats, angles and channels. Also tire sections. Slightly rusted through being outside. Will move this entire stock at great sacrifice in price to someone who can take delivery of entire quantity at once. This is an exceptional offer. Box 210, Canadian Machinery. (1)

FOR SALE—NEW HAVEN, 60-INCH SWING Standard Engine Lathe—triple geared. 15 ft. bed, hollow spindle, cuts threads 1 to 12. Compound rest, countershaft, steady rest, wrenches, etc. This tool is in excellent shape and owner offers special bargain. Particulars from Winnipeg Machinery Exchange, Sutherland and Gladstone Streets, Winnipeg, Man. (24)

FOR SALE—McDOUGALL ENGINE LATHE 20" swing, 10' bed, complete with 20" 4-jaw chuck, countershaft, steady rest, face plate, gears, etc. This tool, we understand, has never been used; has been lying crated for about 5 years. We are having it cleaned and offer a decided bargain for quick sale. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg. (3)

SITUATIONS WANTED

MECHANICAL ENGINEER OPEN FOR position as shop engineer or superintendent; Technical graduate; broad experience in design, construction and production; have practical experience in forging and finishing large and small shells; have highest recommendation for ability to handle men efficiently. Box 205, Canadian Machinery. (25)

MECHANICAL AND ELECTRICAL ENgineer, 16 years' experience, plant layout and maintenance; expert draftsman; wishes change. Box 207, Canadian Machinery. (26)

POSITION WANTED AS SALESMAN, agent, or traveler, for mechanical goods, or machinery, by Chief Engineer, (Marine), thoroughly reliable, of good education and appearance. Box 209, Canadian Machinery. (3)

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 40, 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN LAMP FACTORY
ST. CATHARINES, ONTARIO

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

WANTED

WANTED—ELECTRIC TRAVELLING GANtry crane, span about 57 ft., clearance 50 ft., overhanging at one end; load 15 tons. State full particulars and price. Thor Iron Works, Limited, Toronto, Ont. (27)

WANTED BERTRAM WAVING ATTACHment for 4.5 Shells, with or without Lathe. Also 18" or 20" turret lathe. Give full particulars and price. Bowes, Jamieson Limited. (R.T.F.)

WANTED — BERTRAM WAVING ATTACHment for 4.5 shells, with or without lathe. Also 18" or 20" turret lathe. Give full particulars and price. Bowes, Jamieson, Limited, Hamilton, Ont. (rtf)

For Sale Cheap

1—Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.

1—12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 3 tons capacity; complete, less the Hoist.

1—10" Single "I" Beam Overhead Hand Power Crane, 23' 0" span, 2 tons capacity; complete, less the Hoist.

1—Brantford (Gas) Bake Oven and 4 Racks.

1—No. 5 High-Speed Hammer.

1—30" Hercules Drill, made by Cincinnati Bickford Tool Co.

2—Baker Type Vises.

1—Linderman 2-Spindle Boring Machine.

1—24" Drill, Bertram Company.

1—26" Drill, London Machine Tool Company.

1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

M. BEATTY & SONS,
Limited
Welland, Ont.

Machinery for Sale

Four 16" Power-feed Turret Lathes; two Bardons & Oliver; one Brown & Sharp, and one Pratt & Whitney. Also a quantity of slightly used leather belting, better than new. Write J. A. Harvey, No. 2 Gould St., Toronto, or 'Phone Junction 1494.

(3)

Wanted to buy or sell Scrap Iron, Metals, etc.

At the present time we are paying the following prices:

No. 1 Scrap Wrought Iron, $13.75 gross ton.
Heavy Scrap Copper, $20.00 per cwt.
Mixed Heavy Scrap Brass, $13.00 per cwt.
Heavy Scrap Lead, $5.75 per cwt.
Scrap Aluminum, $32.00 per cwt.
Scrap Babbitt, $8.00 per cwt.

Our Motto: Honest dealings and prompt settlements. Make us a trial shipment.

L. S. TARSHIS & SON
88-98 Wellington Street, Montreal

FOR SALE

Two 96-horse-power Gas Engines.

Complete with producers.

Made by the largest English manufacturers.

WILL SELL CHEAP

Empire Mfg. Co., Ltd.
London, Ontario.

For Sale

1—150-ton Hydraulic Press with Accumulator and Die complete for nosing 4.5" Brit. H.E. Shells.

1—Electric Varnish Bake Oven for H.E. Shells.

Box 202, Canadian Machinery. (r.t.f.)

QUALITY FIRST
DOMINION MACHINERY CO.
TORONTO

IMMEDIATE DELIVERY

5—24 x 10 New Engine Lathes, double back gear, similar to LeBlond.
6—18 x 8 New Engine Lathes, double back gear, similar to LeBlond.
1—18 x 8 Reed Lathe, not used six months, with 14" four-jaw chuck.
1—18 x 8 American Tool Works Engine Lathe, quick-change gear.
1—15 x 6 Bertram Engine Lathe, compound rest, hollow spindle.
1—20 x 10 Rhan-Carpenter Engine Lathe, double back gear.
1—16 x 8 Cleveland Engine Lathe; new.
1—20" Davis Back-geared Drill Press.
1—14" Henry & Wright Sensitive Drill.
1—14" Avery Drill.
1—14" two-spindle Reed.
1—14" three-spindle Barr.

All the above machines may be returned at our expense if not as represented.

Dominion Machinery Co., Toronto, Canada
Office: 110 Church Street **Factory: 14 Darling Avenue**

Kindly Mention This Paper When Writing Advertisers

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3½" Gridley Automatic
40" x 16' Conradson, heavy duty
40" x 12' New Haven
24" x 8' Lodge & Shipley
21" x 8' Gisholt
20" x 10' American
17" x 6' Garvin
16" x 6' Pratt & Whitney
16" x 5½' Warner & Swasey
16" x 5' Windsor, wire feed
15" x 5½' Fox, American
2" x 24" Jones & Lamson flat turret
No. 2½ Garvin, wire feed
Garvin Double Turret Screw Machine
8" x 51" Brown & Sharpe

Engine Lathes

36" x 15' Putnam
32" x 22' London D.B.G
30" x 16½' Pond
26" x 11' Hamilton, D.B.G. (3)
26" x 14' Gleason D.B.G. (2)
22" x 16' Lodge & Shipley, patent head
20" x 12' Lodge & Shipley, patent head (2)
20" x 16' Bertram
20" x 8' Lodge & Shipley, patent head
20" x 8' Hercules, heavy duty
20" x 8' Bullard
20" x 8' Ames
18" x 8' New Haven
18" x 8' Lodge & Davis
18" x 6" New Haven
17" x 8' Blaisdell
16" x 6' Porter
16" x 24" x 10' South Bend Gap

Upright Drills

D4 Colburn, heavy duty
D2 Colburn Heavy Duty (2)
32" Rockford Back geared, sliding head
30" Bertram, back geared
28" Rockford Back geared, sliding head
24" Rockford, heavy duty
No. 1 Avey high speed, sensitive
24" Bickford, shaft driven (2)
24" Foote Burt
24" London
20" Canedy-Otto, back-geared (2)
20" Canedy Otto, lever feed
20" Bertram, power feed
15" Avey, 2 spindle sensitive
14" Excelsior
14" Garvin, 4 spindle
14" Barnes, friction (2)
6' Bertram Semi universal Radial
48" Gang, plain radial
3' New Century, plain radial
32" Fosdick Plain Radial

Planers and Shapers

36" x 36" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
24" x 24" x 6' American
24" x 24" x 6' Bertram
20" x 20" x 5' Bertram
20" Smith & Mills

Milling Machines

No. 5 Becker-Brainard, plain
No. 25 Becker, plain
No. 12 Brown & Sharpe plain (2)
No. 1½ Brown & Sharpe Universal
Ennicking & Trautman Universal
24" Bertram, plain

Presses

No. 12 Geared Rhodes, roller feed
No. 4½ Bliss
No. 5 Waterbury
No. 19 Banfield

Miscellaneous

4½" Davis Cutting-off Machine
No. 7 Racine Hack Saw
No. 1 Racine Hack Saws (4)
Lo-Swing Lathes (2)
No. 1 Davis Keyseater
No. 14 Besly Grinder
32" x 9' Special Facing and Tapping Machine
No. 1 Dwight-Slate Gear Cutter
40" Binsse Horizontal Boring Mill
No. 00 Heald Cylinder Grinder
No. 2 Garvin Automatic Tapping Machine
No. 2 Lapointe Broaching Machine
¼" Shuster Riveters (3)
17" Rock River Punch and Shear
6' Brown Boggs Power Shear
9½' Bertram Bending Rolls

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.
Front St. W., - - Toronto, Ont.

Immediate Shipment

ALL IN STOCK IN JERSEY CITY

No. 3 Landis Universal Grinder
No. 4 Landis Universal Grinder
Four No. 1½ Landis Internal Grinders
No. 1 Brown & Sharpe Internal Grinder
No. 11 and No. 12 Brown & Sharpe Plain Grinders
Diamond Surface Grinder, 12" x 24"
No. 2 Brown & Sharpe Surface Grinder
Norton Universal Tool Grinder, 6" x 32"
No. 5 Bath Duplex Internal Grinders
6 ft. Pond Machine Tool Co. Radial.
5 ft. Bickford Semi-Universal Radial.
5 ft. Niles Semi-Universal Radial.
Ingersoll Slab Miller, 3 ft. x 12 ft., three heads
Ingersoll Slab Miller, 12" x 48"
Newton Heavy Duty Vertical Miller, 48" circular table
Brainard Vertical Miller
No. 1-B Milwaukee Plain Miller
No. 1 Cincinnati Plain Miller
No. 9 Kempsmith Plain Miller
No. 12 Brown & Sharpe Manufacturing Miller
Garvin 2 spindle Profilers.
62" Baush Vertical Mill, two heads
60" Bement-Miles Vertical Mill, two heads
5 Bement Vertical Mill, one head
54" Colburn Vertical Mill, two heads
Two 36" Bridgeport Vertical Mills, two heads
30" Baush Vertical Mill, turret head
Binsse Horizontal Mill, 3" bar
Beaman & Smith 2 spindle Horizontal Mill.
36" Sellers Horizontal Mill, 3" bar.
2" x 24" Jones & Lamson Flat Turret Lathes
No. 5A Pottern & Johnston Automatic Turret Lathes
7 ft. Bliss Spur and Bevel Gear Cutter
36" Fellows Gear Shaper
125-lb. Scranton Power Hammer
80-lb. Hackney Power Hammer
1,000-lb. Morgan Steam Hammer
600-lb. Bement Steam Hammer
60-lb. Bradley Helve Hammer
No. 4 Mitts & Merrill Keyseater
No. 2 Mitts & Merrill Keyseater
No. 2 Davis Keyseater
Baker Bros. Keyseater, 20" stroke
No. 3 Baker Bros.' Keyseater
8" Saunders Pipe Machine
Springfield Boring Lathe, 7" spindle capacity.
Three 2" Cleveland Full Automatic Screw Machines
1½" Hartford Full Automatic Screw Machine
Six 1⅛" Cleveland Full Automatic Screw Machines
Two ⅞" Cleveland Full Automatic Screw Machines
⅝" Cleveland Full Automatic Screw Machine
⅝" Pratt & Whitney Hand Screw Machine
Two Brown & Sharpe Full Automatic Screw Machines, 7/16" capacity
Five No. 2½ Garvin Hand Screw Machines
Bement-Miles Double End Cutting-off Machine, 10" capacity
Manville Knuckle Joint Geared Press
No. 4 Bliss geared Double Crank Press.
No 2 Bliss Double Crank Press.
Sellers Hydraulic Wheel Press.
26" Kelley Crank Shaper
24" Smith & Mills Crank Shaper
21" Juengst Crank Shaper
20" Steptoe Crank Shaper
16" Ohio Crank Shapers
16" Gould & Eberhardt Crank Shaper
44" x 44" x 16' Niles Planer, one head
40" x 40" x 8' Pond Machine Tool Co. Planer
30" x 30" x 16' Harrington Planer, one head
24" x 24" x 5' Flather Planer
17" Miles Slotter
14" Putnam Slotter
12" Sellers Slotter
8" Lowell Slotter
Newton Rotary Saw No. 3
16" Baker Tapping Machine
Toledo Spot Welder.
Worcester 2-spindle High-Speed Drill
10 ft. Plate Bending Rolls

AMONG OTHER LATHES, WE HAVE THE FOLLOWING

38" x 16' Fifield, face plate drive
36" x 14' Bement
34" x 16' Perkins
32" x 16' Pond
32" x 16' Niles
30" x 21' Fifield
28" x 18' Gray

New York Machinery Exchange

50 Church St., NEW YORK CITY

HIGH-GRADE

MACHINE TOOLS

The list below is a small portion of our present stock. Write for complete lists.

12—26"-48" x 14' New Style McCabe Double Spindle, Heavy Pattern New Lathes.
2—26"-48" x 18' New Style McCabe Double Spindle, Heavy Pattern New Lathes.
26" x 12' Pittsburgh, D.B.G., Q.C.G.
20" x 8' Prentice Lathe, T. A.
3—19" x 8' New Sidney Lathes, Swing 21".
4—17" x 8' New Sidney Lathes, Swing 19".
2—18" x 10' Rahn Mayer Lathes
18" x 10' Cincinnati Lathe
15—17" x 8' New National Q.C.G. Lathes.
15" x 6' Davis Lathe.
14" x 10' Prentice Lathe, T.A.
13" x 5' 6" LeBlonde Quick-Change
2—13" x 7½' New Carroll Jamieson.
3¾" H.S. 40" Swing Conradson Semi-automatic Turret.
⅜" Pratt & Whitney Screw Machine.
36" Baker Drill, Adjustable Head and Table.
36" Currie & Snyder Sliding Head Drill.
32" Hamilton Sliding Head Drill.
10" Pratt & Whitney Shaper.
18" Bement Traveling Head Shaper.
24" Smith & Mills B.G. Shaper.
24" American B.G. Shaper.
30" Cincinnati Triple-Geared Shaper.
Pratt & Whitney 2⅝" H.S. Cutting-off Machine.
58" x 48" x 8' 6" Sellers Planer, two heads.
30" x 30" x 9' 9" Bretell Planer, two heads.
18" x 18" x 5' Pond Planer.

FRANK TOOMEY, INC.

127-131 North Third St., PHILADELPHIA, PA., U.S.A.

High-Grade Used Machinery

ENGINE LATHES

1—16" x 8' Greaves & Klusman Quick-Change Gear Lathe, single back geared.
1—18" x 10' Lodge & Shipley Quick-Change Gear Engine Lathe, single pulley drive, variable speed countershaft, plain block rest.
1—18" x 8' Rahn-Carpenter, plain screw cutting; rebuilt.
1—18" x 10' Bradford, plain screw cutting.
1—24" x 12' American Quick-change, double back-geared; nearly new.
10—22" x 10' Milwaukee, double back-geared, plain screw cutting, comp. rest; new machines. Write or wire for circular and prices.
1—30" x 14" James, raised to swing 38", plain screw cutting.

SCREW MACHINES

5—1½" Milwaukee Screw Machines, complete. Write for circular.
1—1½" Dreses Geared Friction Head Screw Machine, complete.
1—1½" x 9" Acme Turret Screw Machine, friction geared head, complete; excellent shape.
1—No. 2 Brown & Sharpe Semi-Automatic Wire Feed Screw Machine; rebuilt.
2—⅝" Cleveland Automatics.
1—1" Cleveland Automatic.
1—2" x 24" Jones & Lamson Flat Turret Lathe, cone drive, rebuilt; excellent condition.

MILLING MACHINES.

1—No. 0 Owen Plain Milling Machine; rebuilt.
1—No. 3-H Becker-Brainard Profiler; rebuilt; first-class shape.
1—LeBlond Heavy Design Worm Cutting Attachment for use on No. 2 LeBlond Miller.

GRINDERS

1—No. 60 Heald Cylinder Grinder; rebuilt; 20" table.
1—4" x 30" Pratt & Whitney Automatic Sizing Grinder; rebuilt.
1—12" x 42" Landis Universal Tool Room Grinder; rebuilt.

SHAPERS.

1—24" Lutter & Gies "Milwaukee" Back-geared Crank Shaper; fine shape.
1—20" x 50" Walker Traveling Head Open Side Planer or Shaper.

MISCELLANEOUS.

1—30" Mueller Radial Drill.
1—No. 1 26" Diamond Automatic Face Grinder.
1—2" Bignall & Keeler P.D.Q.C. Pipe Machine.
1—No. ½ Schuchardt & Schutte Gear Hobber.
1—32" x 32" x 6' Pond Heavy Pattern Planer, one head.
1—48" x 48" x 14' Pond Planer, one head.
1 48" x 48" x 16' Pond Planer, one head.
1—No. 3½-A Bliss Toggle Drawing Press; nearly new.
1—60" Stevens Pulley Lathe.
1—48" Brainard Automatic Gear Cutter.
1—17-G New Doty Single End Punch or Shear, 12" throat, capacity 2" in 1".

The E. L. Essley Machinery Co.

551-557 Washington Blvd., Chicago

Guaranteed Machinery for Immediate Delivery

TURRET LATHES

12" Windsor, plain head.
16" Lodge & Shipley, plain head.
No. 2 Warner & Swasey, hollow hex.
24" Niles, friction head.
16" Foster, ring turret.
24" Garvin Turret Boring Lathe, back-geared.
28" Gisholt, with taper attachment.

ENGINE LATHES.

14" x 6' Davis, q.c.g.
14" x 6' Fairbanks, c.r. and taper.
14" x 6' Prentice, c.r.
16" x 6' Robbins, c.r
16" x 6' Sebastian, p.r.
16" x 8' Lodge & Shipley, pat. head.
16" x 10' Greaves & Klusman, c.r.
18" x 6' Bradford, c.r.
18" x 8' Lodge & Shipley, pat. head.
18" x 10' Bradford, c.r. and taper.
18" x 12' Barker, c.r.
18" x 12' American, q.c.g.
18" x 12' Greaves & Klusman, c.r.
20" x 10' Flather, c.r.
21" x 12' Bradford, c.r.
21" x 12' New Haven, c.r.
24"-40" x 12' McCabe, two-spindle.
24" x 16' Schumacher & Boye, c.r.
32" x 12' Pond, c.r.
30" x 14' Reed, c.r.
36" x 12' Hamilton, c.r.
34" x 16' Blaisdell, c.r.
36" x 28' American, c.r.
42" x 24' Fifield, c.r.

SCREW MACHINES.

Pratt & Whitney No. 1 friction gear.
1 3/16" Hartford Automatic.
2" Cleveland Automatic.
2¾" Cleveland Automatic.

BORING MILLS.

52" Niles, car wheel.
48" Colburn, two heads.
60" Colburn, vertical, two heads.
51" Bullard, two swivel heads with motor drive and motor.

PLANERS

Morton Portable.
17" x 17" x 12' Whitcomb, crank.
22" x 22" x 6' Gray, one head.
24" x 24" x 4' New Haven, one head.
24" x 24" x 6' Pond, one head.
24" x 24" x 6' Gray, one head.
30" x 30" x 8' Woodward & Powell, one head.
36" x 36" x 10' Powell, one head.
36" x 36" x 12' Powell, two heads.
36" x 26" x 16' Sellers, one head.
39" x 39" x 12' New Haven, one head.
40" 40" x 12' New Haven, one head, one side head.
54" x 54" x 14' Pond, two heads, arranged for motor drive.

MILLING MACHINES.

No. 12 B. & S., plain.
No. 2 Cincinnati, plain.
No. 2 P. & W., Lincoln Type.
No. 23 Fox Miller.
No. 13 P. & W., Lincoln Type.
Garvin No. 1½ Universal.
No. 3 LeBlond, plain.

GEAR CUTTERS.

24" x 7" Gould & Eberhardt, for spur gears.
24" x 9" Gould & Eberhardt, for spur, bevel and face gears.
36" Walcott.

SHAPERS.

15" Hendey, friction.
16" Niles, back-geared.
18" Barker & Chard, back-geared.

HAMMERS.

100-lb. American, steam post.
100-lb. Pittsburg, single frame, steam.
200-lb. Bliss, drop.
300-lb. Bliss, drop.
800-lb. Morgan, single frame, steam.

PRESSES.

No. 77A Toledo, o.b., straight side.
No. 3 Delivouk & George, o.b., inclinable.
No. 3 Toledo, o.b.
No. 430 McDonald, double crank.
No. 133 Ferracute, double action.
No. 95 Bliss, double crank.
No. 77A Toledo, o.b.

DRILLS.

5' Dreses Full Universal Radial.
3' Economic Plain Radial.
2½' Dreses Radial.
No. 30-C Baush, 12-spindle.

Advise us what you contemplate purchasing and we will keep you posted on our stock.

The H. A. Stocker Machinery Company, 566-572 W. Randolph St., CHICAGO, ILL.

The Co-operative Used Machinery Company

HORIZONTAL BORING MACHINES

Beaman & Smith Combination Boring, Milling and Drilling Machine (sliding column), bores to center of 10' 6", traverse along column of 5', feed to bar 30", bed supporting spindle column is 36" wide, 10' 2" long, 36' wide	$5,000
Beaman & Smith, spindle 5" dia., bores to center of 10', 30" travel of bar	3,500
Bement & Dougherty Knee Type, double screw, bar 3¾", travel to bar 24"	1,250
No. 0 Bement Boring, Drilling and Milling Machine, 2½" bar, 24" travel of bar, cross table 28" wide, 38" long, No. 5 Morse taper	950

VERTICAL BORING MACHINES

51" Bullard, 2 swivel heads, table 50", motor driven by 15 H.P. Cracker Wheeler Motor, 230 volts, D.C.	1,750
32" Rogers Boring Machine	750

PLANERS

48" x 48" x 20' Putnam, 2 heads; in very good condition	3,000
36" x 8' Sellers, 4 heads, Sellers spiral drive	1,200
36" x 13' Detrick & Harvey, open side	2,000
32" x 10' Gleason, single head, exceptionally good condition	700
30" x 8' Pond Planer, single head; first class condition	650
24" x 6' New Haven, single head; excellent condition..	450

MILLING MACHINES

No. 5-C Becker (Vertical), table 14" x 53", complete with circular table; condition A1	1,850
No. 3 Kempsmith Plain Miller, back-geared, table 7" x 24" with 3 T slots	650
No. 15 Garvin Plain, back-geared, table 12 x 36	750
Three (3) No. 25 Becker Brainerd Plain, **New Brainerd** Planer Type, 26" between housings, 24" under cross rail, bed 7', table 22" wide, each	$1,000
No 4 Lodge & Davis Universal Milling Machine	1,000
No. 24 Brown & Sharpe Mfg. Type, table 10" x 50", overhanging arm, 4" dia., worm drive in head	1,000

SHAPERS

24" Potter & Johnson, power down feed, single geared; excellent condition	500
Two (2) 24" Gould & Eberhardt, back-geared, each......	450
24" Hendey Shaper, power down feed	450

GRINDERS

Landis Universal 12" x 42", internal and all attachments, pan and pump; excellent condition	2,000
Landis, plain, 8 x 38	1,400
Two (2) No. 5 Rivett, each	550

LATHES

60" x 28' Fifield Raising Blocks to 75", double back geared, face plate drive, dia. face plate 56" x 8" face, weighs 75,000 lbs.; positively good as new	5,000
50" x 20' Fifield Massive Pattern, 48" 4 jaw chuck, etc..	2,750
52" x 16' Gleason, heavy triple geared, face plate drive, etc.	2,500
24" x 18" Lodge & Shipley quick-change gear, taper, motor driven, carriage control	2,000

Also all other Standard Sizes and Makes, also Brass Monitor Lathes!!

WE STOCK **EVERY** MAKE, DESCRIPTION and SIZE of **MACHINE TOOLS** and **METAL WORKING MACHINERY** ! ! ! ! !

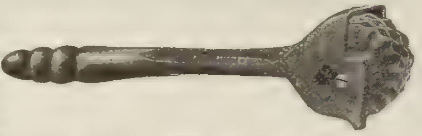
The above are but samples write for our list.

WE BUY AND SELL ! ! !

THE CO-OPERATIVE USED MACHINERY COMPANY

50 Church St., Suite 482, Telephone Cortlandt 665, New York **Warehouse, 408 Claremont Ave., Jersey City, N.J.**

"Keep Wheels Dressed" is just as important as "Keep Tools Sharp"



Diamo - Carbo Grinding Wheel Dressers are the economical substitute for the Black Diamond Dressers. They are so low-priced that each grinding stand may be provided with its own Dresser. Sherman-Huntington For use on large and coarse wheels upon which the Diamond cannot be used, the Sherman-Huntington is the most satisfactory Dresser ever designed. Made in three sizes with either Corrugated or Toothed cutters. The No. 2 with Cutters 2⅜" in diameter is a wizard for use on the hardest wheels. Provided with hood to protect user from flying particles.

We also manufacture Diamond Dressers

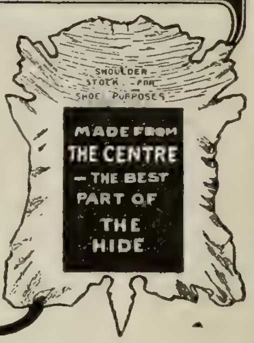
Sent on approval

THE DESMOND-STEPHAN MFG. CO.
URBANA, OHIO, U.S.A.
Alfred Herbert, Ltd., Coventry, Agent for Great Britain.

J.C.McLAREN BELTING

THE J.C. McLAREN BELTING CO. OAK EXTRA TANNED EST 1856

Will Save You Money In Every Day of Service


SHOULDER - STOCK - FOR SHOE PURPOSES
MADE FROM THE CENTRE - THE BEST PART OF THE HIDE

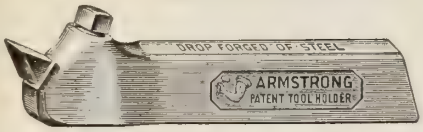
Modern plant and thorough knowledge of requirements of belting guarantees perfect satisfaction to all buyers. Our belts are the result of using best leather, and our 57 year's experience.

Ask for Quotations.

J. C. McLAREN BELTING CO.
Limited
Montreal Toronto Winnipeg

You want Tool Holders that have made good

ARMSTRONG TOOL HOLDERS
Won The
GRAND PRIZE
THE HIGHEST POSSIBLE AWARD AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.



THEY ALWAYS MAKE GOOD

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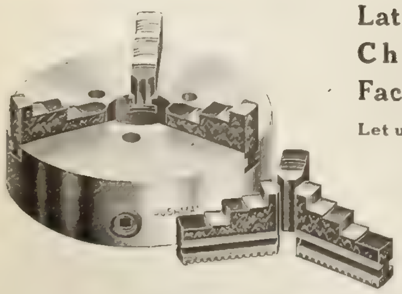

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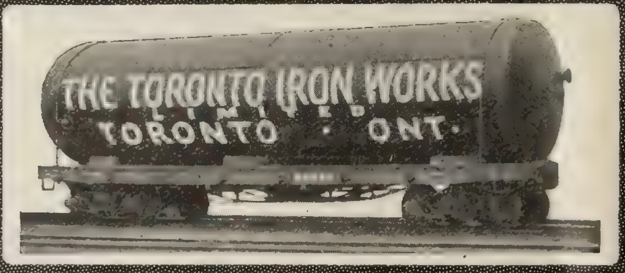

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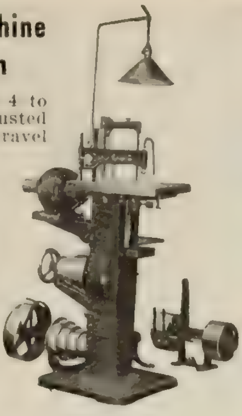

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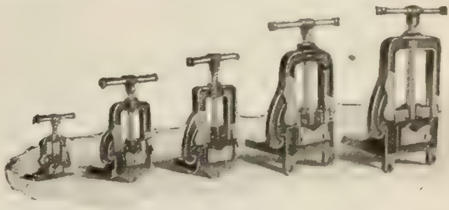

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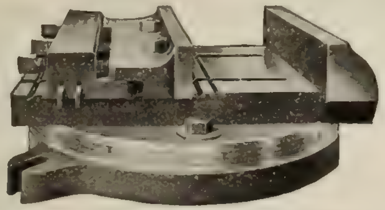

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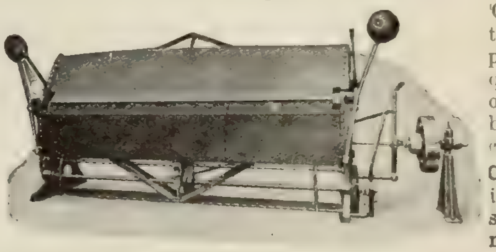
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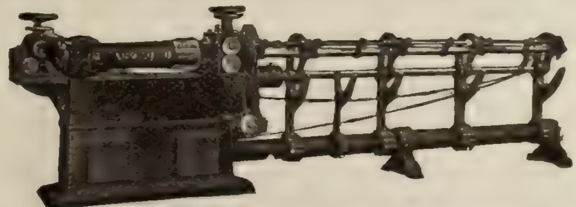

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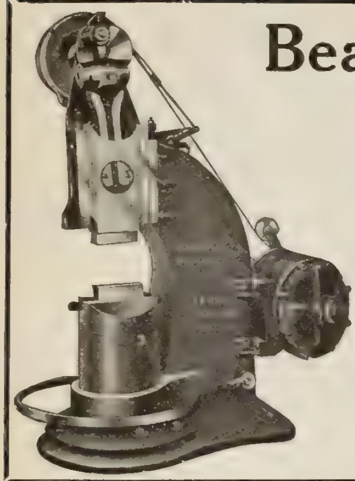

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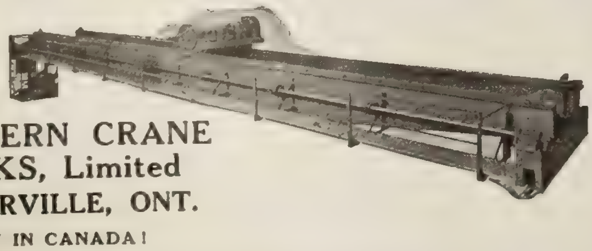

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Can. Matthews Gravity Carrier Co., Toronto, Ont.
H. W. Petrie, Toronto.
The Smart-Turner Machine Co., Hamilton.

COPING MACHINES.
Can. Blower & Forge Co., Berlin, Canada.
John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

CORNICE BRAKES.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Steel Bending Brake Works, Chatham.

COUNTERBORES AND COUNTERSINKS.
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.

COUNTERSHAFTS.
Baird Machine Co., Bridgeport, Conn.
Wells Brothers Co. of Canada, Galt, Ont.

COUPLINGS.
Gardner, Robt., & Son, Montreal.

COUPLINGS, AIR HOSE.
Cleveland Pneuatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.

CRANE PULLERS.
Crane Puller Co., Hopedale, Mass.

CRANES, LOCOMOTIVE.
Davenport Locomotive Works, Davenport, Iowa.
Northern Crane Works, Walkerville.

CRANES, GANTRY.
Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, GOLIATH AND PNEUMATIC
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, PORTABLE.
Aikenhead Hardware Co., Toronto, Ont.
Davenport Locomotive Works, Davenport, Iowa.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.
Peacock Bros., Montreal, Que.
Whiting Foundry Equipment Co., Harvey, Ill.
Zin-Ho Mfg. Co., Chicago.

CRANES, ALL KINDS.
Davenport Locomotive Works, Davenport, Iowa.
Hepburn, John T., Ltd., Toronto, Ont.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.
Zin-Ho Mfg. Co., Chicago.

CRIMPS, LEATHER.
Graton & Knight Mfg. Co., Montreal.

CUPOLAS.
Can. Blower & Forge Co., Berlin, Canada.
Northern Crane Works, Walkerville.
H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CUPOLA BLAST GAUGES & BLOWERS.
Sheldon's, Ltd., Galt, Ont.

CUTTER GRINDERS AND ATTACHMENTS.
Cincinnati Milling Machine Co., Cincinnati.
Garvin Machine Co., New York.

CUTTERS, ANGLE, TEE IRON AND BAR.
Can. Blower & Forge Co., Berlin, Canada.

CUTTERS, FLUE.
Cleveland Pneuatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machinery Co., Montreal.
Garvin Machine Co., New York.
Morse Twist Drill and Machine Co., New Bedford
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.

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Prest-O-Lite Co., Inc., Indianapolis, Ind.

CUTTING COMPOUND AND CUTTING OIL.
Can. Economic Lubricant Co., Montreal.
Cataract Refining Co., Buffalo, N.Y.
Racine Tool & Machine Co., Racine, Wis.

CUTTING-OFF MACHINES.
Armstrong Bros. Tool Co., Chicago.
John Bertram & Sons Co., Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Foss & Hill Machy. Co., Montreal.
Garlock-Machinery, Toronto.
Garvin Machine Co., New York.
Geo. Gorton Machine Co., Racine, Wis.
Hurlbut, Rogers Machinery Co., South Sudbury, Mass.
John H. Hall & Sons, Brantford, Ont.
Wm. Kennedy & Sons, Owen Sound, Ont.
Peerless Machine Co., Racine, Wis.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Racine Tool & Machine Co., Racine, Wis.
Root & Van Dervoort Engineering Co., East Moline, Ill.
L. S. Starrett Co., Athol, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

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Darling Bros., Ltd., Montreal, Que.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co., Montreal.

DESIGNERS, SPECIAL MACHINERY
Baird Machine Co., Bridgeport, Conn.

DIAMONDS, BLACK AND ROUGH
Geo. A. Joyce Co., Ltd., New York.

DIAMOND TOOLS
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Matthews, Jas. H. & Co., Pittsburgh, Pa.

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Aikenhead Hardware Co., Toronto, Ont.
Armstrong Mfg. Co., Bridgeport, Conn.
Banfield, W. H., & Son, Toronto.
Butterfield & Co., Rock Island, Que.
Brown, Boggs & Co., Hamilton, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DIES FOR BIT BRACE USE
Wells Brothers Co., Greenfield, Mass.

DIE SINKERS
Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.

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Aikenhead Hardware Co., Toronto, Ont.
Wells Brothers Co., Greenfield, Mass.

DIE SINKING PRESSES, HYDRAULIC
Charles F. Elmes Eng. Works, Chicago.

DIES, SELF-OPENING
Geometric Tool Co.. New Haven.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Wells Brothers Co. of Canada, Galt, Ont.

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Wells Brothers Co. of Canada, Galt, Ont.

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Acton Tool & Stamping Co., Toronto, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
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Coleman Fare Box Co., Toronto, Ont.
Fisher, A.D., Mfg. Co., Toronto, Ont.
Worth Engineering Co., Toronto, Ont.

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Landis Machine Co., Waynesboro, Pa.
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Murchey Machine & Tool Co., Detroit.
Wells Brothers Co. of Canada, Galt, Ont.

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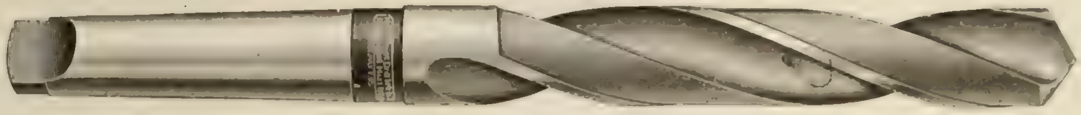

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"MORSE" DRILLS

ARE UNSURPASSED.

MORSE TWIST DRILL & MACHINE COMPANY

NEW BEDFORD **MASS., U.S.A.**

Don't Keep It--Sell It!

If you have a lathe
- a drill
- a milling machine
- a planer
- a chain block
- a chuck
- a motor
- a crane
- a stock of belting
- an engine
- a compressor

or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Are You Behind on Cutting Your Steel?

then read these two paragraphs from a customer's letter. Could anyone expect to hear so favorably from a customer after waiting eight weeks **for delivery on machine? It was real production and satisfaction that prompted them to write this letter.**

"On arrival of this machine we were so far behind on cutting that we thought sure one or two more machines would be required for our works, but owing to the high speed and the rapid cutting of this machine it has **caught up with our work in a short time. We are now more than pleased** that we had the patience and waited delivery on this tool, even if we were put to considerable inconvenience, as a lot of our work had to be sent out to be cut.

"We must say that this tool is certainly a great time-saver in actual time saved in operating the machine. We figure the operator's time saved alone will soon pay for this **tool."**

Several other interesting facts in this letter. Would you like a copy, together with **other descriptive matter?**

PEERLESS
PEERLESS

This machine cuts off 2¼" round Manganese bronze in 12 seconds. **Compare this** with your **cutting time.**

Note its rigid construction, it means increase in production.

PEERLESS MACHINE COMPANY

1607 Racine Street **RACINE, WISCONSIN**

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A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Limited, Galt, Ont.

DRIFT BOLT CUTTERS
Cleveland Pneumatic Tool Co. of Canada, Toronto.

DRILL HOLDERS
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Wells Brothers Co., Greenfield, Mass.

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W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Berlin, Can.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
A. R. Williams Machinery Co., Toronto.

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Modern Tool Co., Erie, Pa.

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Canada Machinery Corporation, Galt, Ont.

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John Bertram & Sons Co., Dundas.
Can. Blower & Forge Co., Berlin, Canada.
Canada Machinery Corporation, Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.

DRILLING MACHINES, RADIAL AND TURRET
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Dominion Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Turner Machine Co., Danbury, Conn.

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Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
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Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Can. Blower & Forge Co., Berlin, Ont.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

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Keystone Mfg. Co., Buffalo, N.Y.

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Pratt & Whitney Co., Dundas, Ont.
United States Electrical Tool Co., Cincinnati.

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Foss & Hill Machy. Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
L. S. Starrett Co., Athol, Mass.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.

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Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Berlin, Canada.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Lachapelle, J. D., & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.
A. R. Williams Machy. Co., Toronto.

DRILLS, HIGH SPEED
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Can. Fairbanks-Morse Co., Cleveland.
H. A. Drury Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Morse Twist Drill & Machine Co., New Bedford.
W. F. & John Barnes Co., Rockford, Ill.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, MULTIPLE SPINDLE
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.

DRILLS, PNEUMATIC
John F. Allen Co., New York.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
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Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

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Armstrong Bros. Tool Co., Chicago.
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, ROCK
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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy Co., Montreal.
Peacock Bros., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

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Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy Co., Montreal.
Morse Twist Drill and Machine Co., New Bedford.

DRILLS, TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong. Whitworth of Canada, Ltd., Montreal.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill and Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

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Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

DRYING APPLIANCES
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Sheldons, Ltd., Galt, Ont.

DRYING OUT BARRELS
Baird Machine Co., Bridgeport, Conn.

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Sheldons, Ltd., Galt, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
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Lancashire Dynamo and Motor Co., Ltd., Toronto.
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Canada Wire & Iron Goods Co., Hamilton, Ont.
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Curtis Pneumatic Machy. Co., St. Louis, Mo.
Whiting Foundry Equipment Co., Harvey, Ill.

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Can. Matthews Gravity Carrier Co., Toronto, Ont.

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Stow Mfg. Co., Binghamton, N.Y.

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Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
H. W. Petrie, Toronto.

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Gardner, Robt., & Son, Montreal.
Norton Co., Worcester, Mass.
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Jenckes Mach. Co., Sherbrooke, Que.
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Sheldons, Ltd., Galt, Ont.
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Mechanical Engineering Co., Montreal.
Whiting Foundry Equipment Co., Harvey, Ill.

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ENGRAVERS
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Parmenter & Bulloch Co., Gananoque.

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Sheldons, Ltd., Galt, Ont.

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Brown Engineering Corp., Toronto.

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Can. Blower & Forge Co., Berlin, Canada.
Peacock Bros., Montreal, Que.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.

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Toronto Iron Works, Ltd., Toronto.

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Smart-Turner Mach. Co., Hamilton.

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Sheldons, Limited, Galt, Ont.

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Dominion Forge & Stamping Co., Walkerville, Ont.
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Whitman & Barnes Mfg. Co., St. Catharines, Ont.
J. H. Williams Co., Brooklyn, N.Y.

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Williams Co., J. H., Brooklyn, N.Y.

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Erie Foundry Co., Erie, Pa.

FORGING MACHINERY
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Erie Foundry Co., Erie, Pa.
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H. W. Petrie, Toronto.

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Baird Machine Co., Bridgeport, Conn.
H. W. Petrie, Toronto.
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Lachapelle, J. D., & Co., Montreal, Que.
Mechanical Engineering Co., 55 Cote Street, Montreal, Que.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

FURNACES, BLAST
Toronto Iron Works, Ltd., Toronto.

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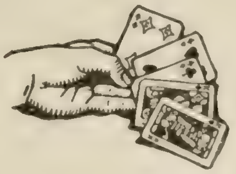
Can. Hoskins, Ltd., Walkerville, Ont.
Mechanical Engineering Co., 55 Cote Street, Montreal, Que.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.



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Under such circumstances it is manifestly impossible to completely satisfy all—second choice must be to create a plan of distribution that will be sound, equitable and impartial—one that will never serve a favored few at the expense of the many.

To keep the drill presses of all "Cleveland" customers running at capacity and to so distribute "Cleveland" drills that no man shall enjoy a surplus supply to the detriment of any other man is the aim of our distributing plan.

It does not always work to perfection—sometimes we err as to what constitutes a surplus or an insufficient supply—that's because we are drill manufacturers and not professional judges.

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NEW YORK CLEVELAND CHICAGO

MALLEABLE GREY IRON ALUMINUM & BRASS

CASTINGS

The selection of metals and the necessary treatments are governed by the purpose for which each casting is required

The quality is always of the highest standard.

Our castings "stand up" to service where others fall down.

Try them and you'll be convinced.

The Galt Malleable Iron Co., Limited
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The Asa S. Cook Company

HARTFORD, CONN.

Rivet Machines

WITH

Absolutely Accurate Automatic Feed

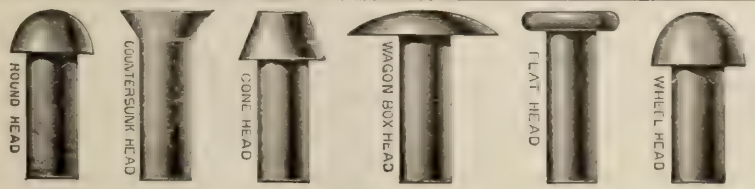
In sizes to work blanks up to 6 inches long, 7/16 in. diameter stock. Capacity from 80 to 200 rivets per minute, according to size.

WRITE FOR COMPLETE PARTICULARS.

BRASS AND BRONZE CASTINGS

We keep our own chemist, enabling us to give any analysis.

EMPIRE MFG. CO., LIMITED, LONDON, CANADA



WE MANUFACTURE RIVETS of every description, ½ inch. dia. and smaller.

PARMENTER & BULLOCH CO., LTD.
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Whiting Foundry Equipment Co., Harvey, Ill.

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Oven Equipment & Mfg. Co., New Haven, Conn.

FURNACE LINING
Mechanical Engineering Co., Montreal.

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Dominion Forge & Stamping Co., Walkerville Ont.

FUSE CAP MACHINERY
Noble & Westbrook Mfg. Co., Hartford, Conn.

GALVANIZING MACHINERY
Erie Foundry Co., Erie, Pa.

GANG PLANER TOOLS
Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

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Can. Blower & Forge Co., Berlin, Canada.
Sheldons, Limited, Galt.

GAS MACHINES
Brown, Boggs & Co., Hamilton, Can.

GAS PRODUCER PLANTS
Can. Fairbanks-Morse Co., Montreal

GAUGES, HYDRAULIC PRESSURE
Charles F. Elmes Eng. Works, Chicago.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
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"Hae ye heard whit ma auld mither's postit tae me?
It fair makes me hamesick," says Private McPhee.
"And whit did she send ye?" says Private McPhun,
As he cockit his rifle and bleezed at a Hun.
"A haggis! A HAGGIS!" says Private McPhee,
"The brawest big haggis I ever did see
And think! It's the morn when fond memory turns
Tae haggis and whuskey,—the Birthday o' Burns
We maun find a dram; then we'll ca' in the rest
O' the lads and we'll hae a Burns' Nicht wi' the best."

IN the July issue of MacLean's Magazine appears a poem by Robert W. Service, "The Haggis of Private McPhee," which bids fair to prove the most popular piece of verse that the war has produced. Forceful, humorous, written in the swinging measure that distinguishes all of Service's work, this story of the efforts of two braw Scotch soldiers to hold a Burns festival in the trenches will give you a thrill as well as a smile.

Robert W. Service and Rudyard Kipling are the most successful poets, from a commercial standpoint, that the age has produced. Their poems sell the world over. Kipling's "Gunga Din," and Service's "The Shooting of Dan McGrew" are recited everywhere. This is a notable distinction for a young Canadian. Despite the fact that he is just on the threshold of his career, Robert W. Service, with his "Songs of a Sourdough," has made for himself a place in the esteem of the public that no other poet, with the exception of Kipling, has ever enjoyed.

And, when it is said that "The Haggis of Private McPhee" is one of the finest pieces of verse that he has produced, it will be recognized that this is something you cannot afford to miss.

The July issue is distinguished also by contributions from the following famous Canadian writers:

Arthur Stringer, Agnes C. Laut, Nellie McClung, Arthur E. McFarlane, Anna Chapin Ray and others.

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Magazine

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The Briggs Miller handles work no other machine of its size can touch. It is a manufacturing machine. On account of its rigid construction it will produce accurate work when running at a high rate of speed and feed.

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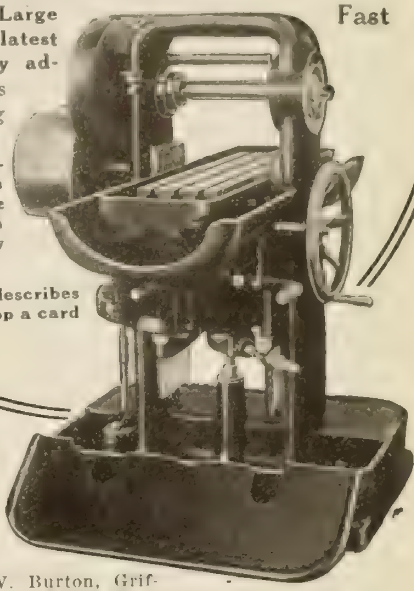

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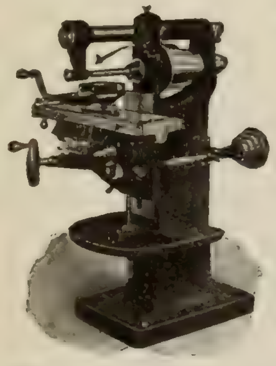
Foreign Agents: Allied Machinery Company of America, France, Belgium, Italy, Switzerland, Russia, Scandinavia, C. W. Burton, Griffiths & Co., London, Manchester and Glasgow, Barandiaran, Metivier, Gazeau & Cia, San Sebastian, Spain.



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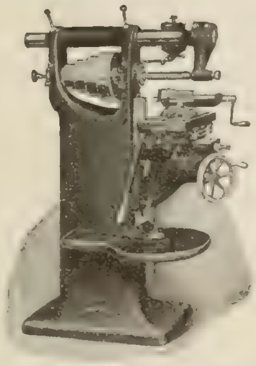
Large Millers for large work —STEPTOE MILLERS for small work



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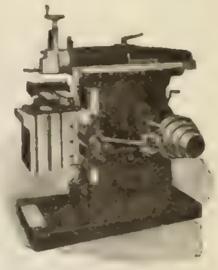

Will result in increased production; less money invested in machinery, and increased profits.

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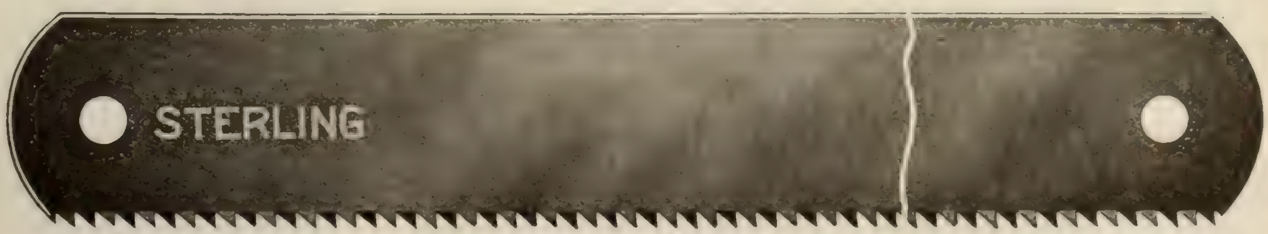

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Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
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Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
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Garvin Machine Co., New York.
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H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

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Sheldons, Ltd., Galt, Ont.

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Canadian Billings & Spencer, Ltd., Welland.

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Atlas Press Co., Kalamazoo, Mich.

PRESSES, BANDING
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Perrin, Wm. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

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Atlas Press Co., Kalamazoo, Mich.

PRESSES, BROACHING
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Toledo Machine & Tool Co., Toledo.

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Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo, O.

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Can. Locomotive Co., Kingston, Ont.
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Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

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W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can Boomer & Boschert Press Co., Montreal.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Toledo Machine & Tool Co., Toledo.

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Charles F. Elmes Eng. Works, Chicago, Ill.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
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H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

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Can. Boomer & Boschert Press Co., Montreal.
John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

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Can. Boomer & Boschert Press Co., Montreal.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
Geo. Gorton Machine Co., Racine.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

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Can. Boomer & Boschert Press Co., Montreal.
William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

PRESSES, SCREW
Can. Boomer & Boschert Press Co., Montreal.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Erie Foundry Co., Erie, Pa.

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Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Dodge Mfg. Co., Toronto, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Ltd., Toronto.
The Smart-Turner Mach. Co., Hamilton.
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Niles-Bement-Pond Co., New York.

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Bawden Machine Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
Jenckes Mach. Co., Sherbrooke, Que.
Peacock Bros., Montreal, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL
Can. Blower & Forge Co., Berlin, Canada.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Darling Bros., Ltd., Montreal, Que.
D'Olier Centrifugal Pump & Machine Co., Philadelphia, Pa.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

PUMPS, HIGH PRESSURE
Charles F. Elmes Eng. Works, Chicago.
Darling Bros., Ltd., Montreal, Que.
Peacock Bros., Montreal, Que.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

PUMPS, ALL KINDS
Bawden Machine Co., Toronto, Ont.
Can. Blower & Forge Co., Berlin, Canada.
Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PUMPS, HYDRAULIC
Can. Boomer & Boschert Press Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
Darling Brothers, Montreal.
Peacock Bros., Montreal, Que.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto.

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Roper, C. F., Co., Hopedale, Mass.

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Graton & Knight Mfg. Co., Montreal.

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E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Coleman Fare Box Co., Toronto, Ont.
Scott Bros., Halifax, Eng.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

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John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

PUNCHES, PNEUMATIC
Jno. F. Allen Co., New York.

PUNCHING MACHINES, HORIZONTAL
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John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Peacock Bros., Montreal, Que.
Niles-Bement-Pond Co., New York.

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Peacock Bros., Montreal, Que.
Shore Instrument & Mfg. Co., New York City.
Thwing Instrument Co., Philadelphia, Pa.

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Niles-Bement-Pond Co., New York.

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Keystone Mfg. Co., Buffalo, N.Y.

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Garvin Machine Co., New York.

REAMERS, ADJUSTABLE
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McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
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Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McKenna Bros. Brass Co., Pittsburgh.

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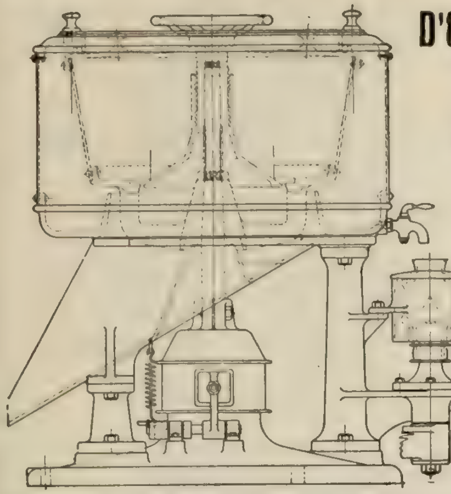
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.



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For recovering and filtering oil from automatic machined parts, metal chips, turnings, scrap, etc.

A large capacity, extremely efficient machine, especially designed and built to care for the "rush" character of work and the increasing volume of shop output now prevailing.

SPECIAL FEATURES

Weston type, self-balancing basket, 30 in. diameter, motor driven.

Bottom chute discharge and conical unloading valve.

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A "Labor-hour"

Sent on approval for one week

is made up of both productive and non productive effort.

As you eliminate the latter your profits increase — lifting out the non productive effort is a study of minutes, — hundredths of a minute.

And because the nonproductive intervals are scattered throughout the minute or hour, this is only possible with an instrument which will measure the work as it is "worked" and "loaf" during the waste effort.

The "Decimal" time and motion study watch automatically measures either *work* or *rest*; it separates one from the other; shows at a single reading the net output or production per hour.

It is the one "stop-watch" by which these calculations may be made without additional computation.

A superintendent using the "Decimal" time and motion study watch is able to eliminate the greater part of productive effort from the total "labor hours."

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That you may prove for yourself its value as an aid to increased production and greater profits,

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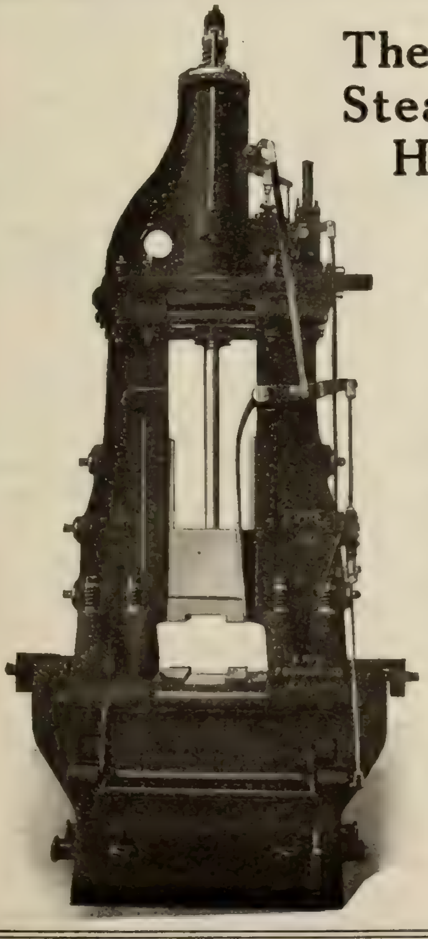

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Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

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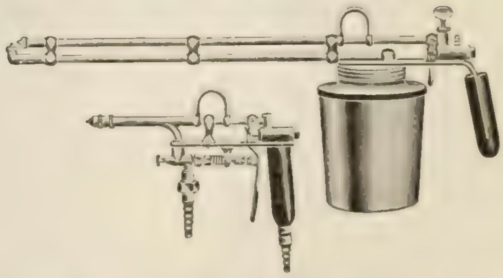

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THE ONLY PRACTICAL SPRAYER

E. W. BLISS COMPANY.
Borough of Brooklyn, New York,
August 23, 1915.

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62 Ninth Avenue, New York City.

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In regard to the number of shells being sprayed, would state that each operator sprays on the average 450 3" shells per hour.

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Yours very truly, E. W. BLISS COMPANY.
(Signed) H. E. Norwood.

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Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont
Wilt Twist Drill Co., of Canada, Ltd., Walkerville, Ont.

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Peacock Bros., Montreal, Que.

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National Machinery Co., Tiffin, O.

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Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Niles-Bement-Pond Co., New York.
H. W. Petrie. Toronto.

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Toledo Machine & Tool Co., Toledo.

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Bertrams, Ltd., Edinburgh, Scotland.

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James Chesterman & Co., Ltd., Sheffield, Eng.
L. S. Starrett Co., Athol, Mass

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Gray Mfg. & Machy. Co., Toronto, Ont.

SAND BLAST SYSTEMS
Whiting Foundry Equipment Co., Harvey Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

SAW BLADES
Aikenhead Hardware Co., Toronto, Ont.
Diamond Saw & Stamping Works, Buffalo, N.Y.

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Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner. Robt. & Son, Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

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Hunter Saw & Machine Co., Pittsburg, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)

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Lovitz, Louis, Toronto, Ont.
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Can. Fairbanks-Morse Co., Montreal.
Garvin Machine Co., New York.
A. B Jardine & Co., Hespeler.
Milholland, W. K., Co., Indianapolis, Ind.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

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New Britain Machine Co., New Britain, Conn.
Windsor Machine Co., Windsor, Vt.

SCREWS
Galt Machine Screw Co., Galt, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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Butterfield & Co., Rock Island, Que.
Can. Tap & Die Co., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
Wells Bros. Co. of Canada, Galt, Ont.

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Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

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Dominion Machinery Co., Toronto.
Essley Machinery Co., Chicago, Ill.
Gardner, Robt. & Son, Montreal.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt. & Son, Montreal.
New York Machinery Co., New York.
Niles-Bement-Pond Co., New York
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Plessisville Foundry Co., Plessisville, Que.
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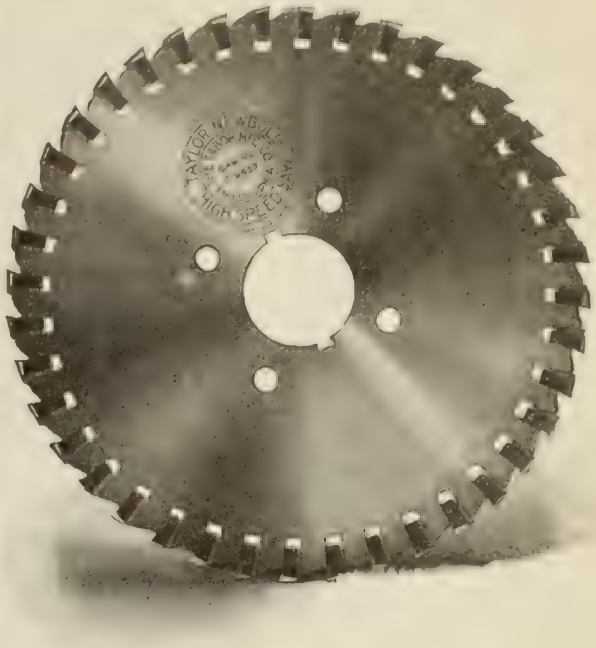

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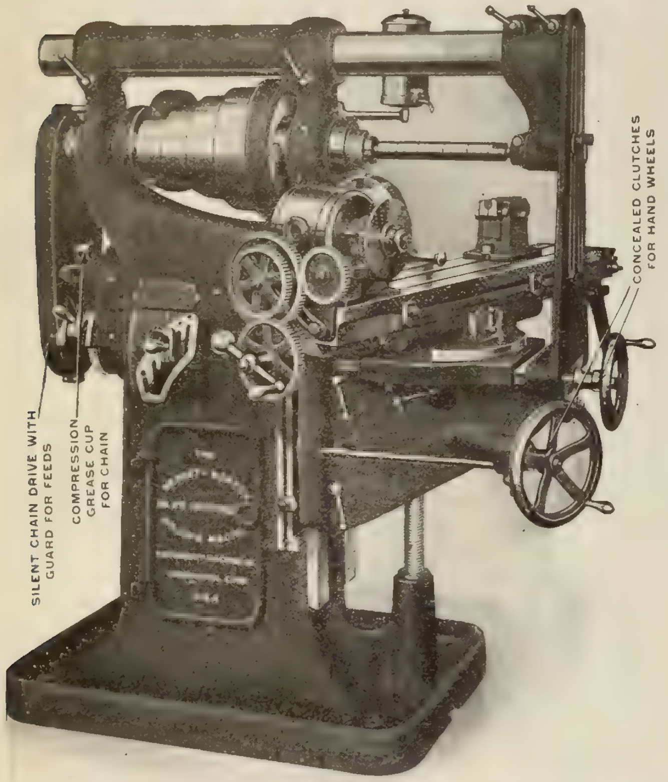
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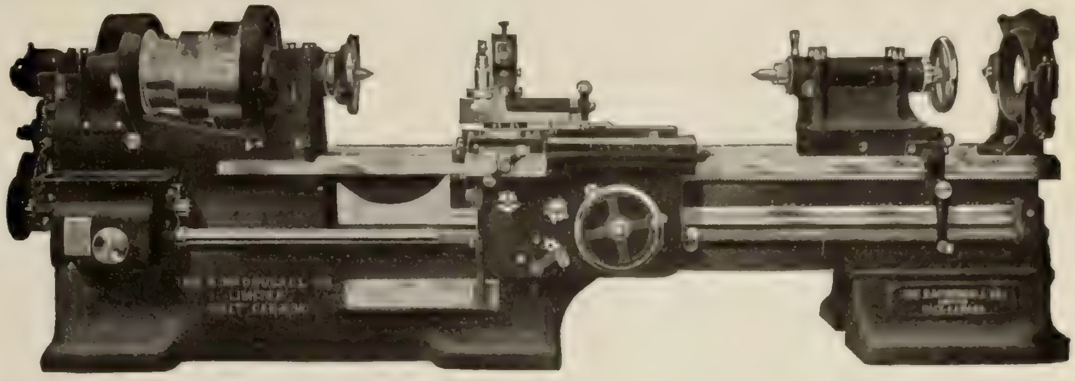
McDougall Gap Lathes

—

Strength
Accuracy
Quality



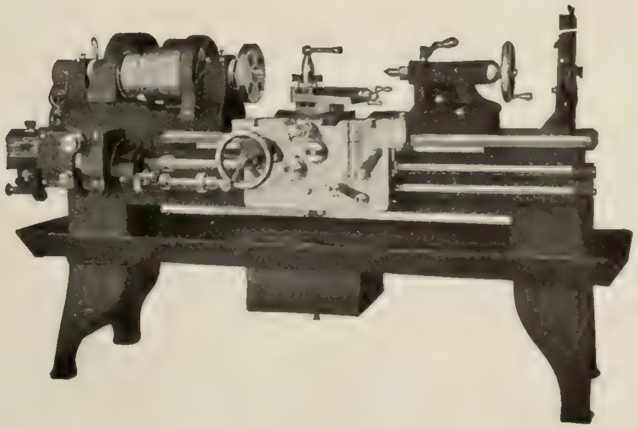
Take a look at the next money you intend to invest in a Lathe.
Then, take a look at the money's worth we offer you in our machine.
Your money will soon come back to you in increased production and we will have the pleasure of having a satisfied user. Our machines are just as good as they look and they look good too.
We invite the closest inspection.

ARE-MAC-DEE IS A GUARANTEE

Particulars on request.

The R. McDougall Company Limited
Manufacturers
GALT, Ont., Canada
The Canadian Fairbanks-Morse Co., Limited, Sales Agents.

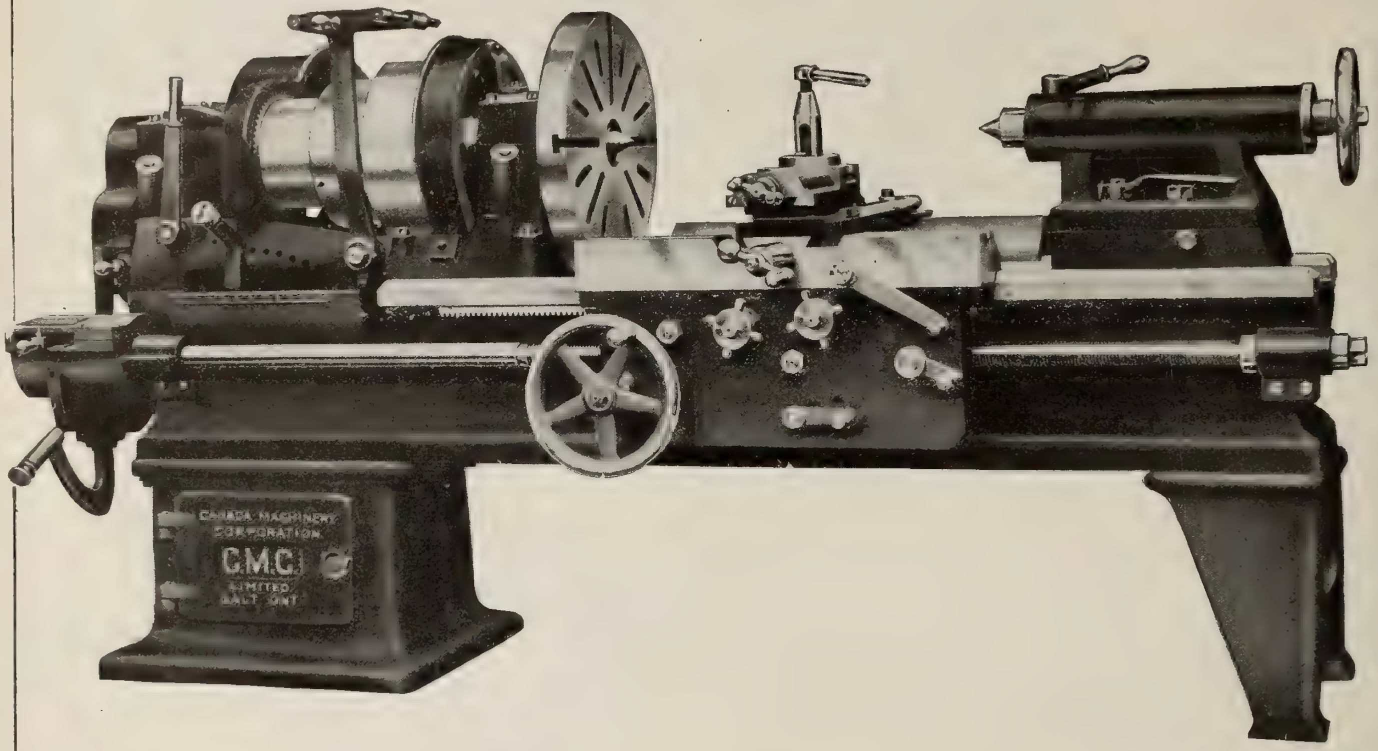
In Stock for Immediate Delivery



5 21 x 8' 6" Roulstel Engine Lathes
5 21 x 8' 6" Roulstel Turret Lathes
3 6" Hurlbut & Rodgers Cutting-off Machine
1 [illegible]" Conradson Turret Lathe
1 18 x 10 American Quick Change Gear Lathe
1 18 x 8 Flather Tool Room Lathe, with drawn-in attachment
1 16 x 6 Flather Tool Room Lathe, with drawn-in attachment and taper attachment
2 14 x 6 Rockford Quick Change Gear Lathes
1 1" [illegible] Turret Lathe
3 18 x 8 Cincinnati Quick Change Gear Lathes
2 16 x 8 South Bend Lathes
1 8" Rivett Precision Lathe, milling attachment, etc.
1 18 x 10 Lodge & Shipley Quick Change Gear Lathe
1 12 x 5 Champion Lathe
[illegible] No. 2 Oesterlein [illegible] Milling Machine
No. 2 [illegible] Spindle Milling Machines
1 No. 1 Diamond Surface Grinder
1 No. 1 Oesterlein Universal Grinder
2 8 x 9 Rockford Plain Milling Machine
2 [illegible]" Ohio Heavy Shaper
1 16" [illegible] Shaper
1 [illegible]" Hendey Friction Geared Shaper
2 24" Hendey Friction Geared Shaper
1 24 x 24 x 6 Cincinnati Planer
2 24 x 24 x 6 [illegible] Machined Tool Co.'s Planer
1 20 x [illegible] x 5 [illegible] Planer
2 20" Sibley Drill Presses
1 14" Woodward & Rodgers Three-spindle Drill Press
1 14" Woodward & Rodgers Four-spindle Drill Press

THE FOSS & HILL MACHINERY CO.
305 ST. JAMES STREET - - - - MONTREAL, QUE.

MACHINE **C.M.C.** TOOLS



Engine Lathe with Quick-Change Gears

Sizes 20 in. and 24 in.

The ease and convenience of operation of machine tools is a time-saving feature of importance

Our Lathes are Built to Ensure Rapid Manipulation

Quick-Change Gears. Safety Belt Shifter. Interlocked Apron.
Convenient Back Gear Shifting Levers.
All within easy reach of the operator.

ILLUSTRATIONS AND DESCRIPTIONS SENT ON REQUEST.

CANADA MACHINERY CORPORATION
LIMITED
GALT, ONTARIO

Builders of Machine Tools and Woodworking Machinery

For convenience of the Trade, we have opened Showrooms in Toronto, at Brock Avenue Subway, where a Full Line of our Machinery can be inspected.

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CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by the MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XVI—No. 2 Publication Office: Toronto, July 13, 1916 Subscription Price $3.00 per Year

"Red Cut Superior"

HIGH SPEED STEEL

YOU have thought of many qualities you would like to have in High Speed Steel Tools—such as cutting edges with long life, freedom from brittleness, great reserve strength and toughness to resist shocks and strains, tools that would not require special heat treatment, tools that would take deep roughing cuts or fine smooth finishing cuts, and in addition, could be worked at higher speeds than you ever dreamed of. All these virtues and many more are contained in "Red Cut Superior", a First Quality High Speed Steel. Furnished in Annealed Bar Stock, Discs, and Treated Tool Holder Bits.

Send for folder Are your tools made of **Red Cut** ?

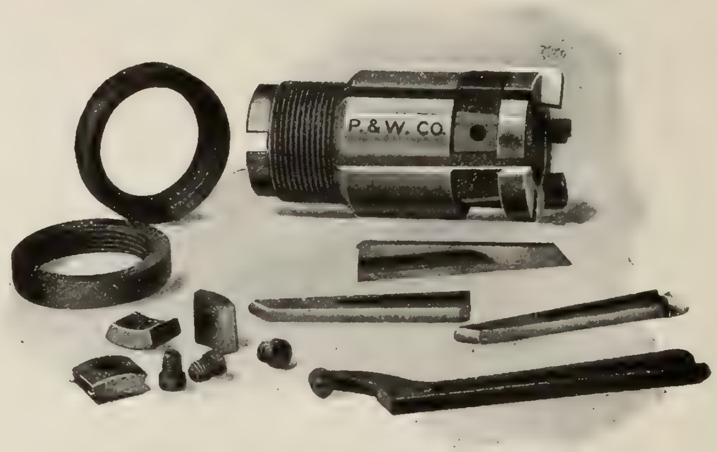
VANADIUM-ALLOYS STEEL CO.

Pittsburgh, Penna. Works at Latrobe, Pa.

REAMERS
ALWAYS UP TO SIZE

Make sure that all your reamed holes are smooth and accurate

STANDARD
1½
5/8



Parts of P. & W. Solid Adjustable Blade Reamers

USE P. & W. SOLID ADJUSTABLE BLADE REAMERS

Unexcelled for Design, Simplicity and Ease of Adjustment

1. The eccentrically relieved blades are stronger than others, do not chatter and produce a smoother hole.

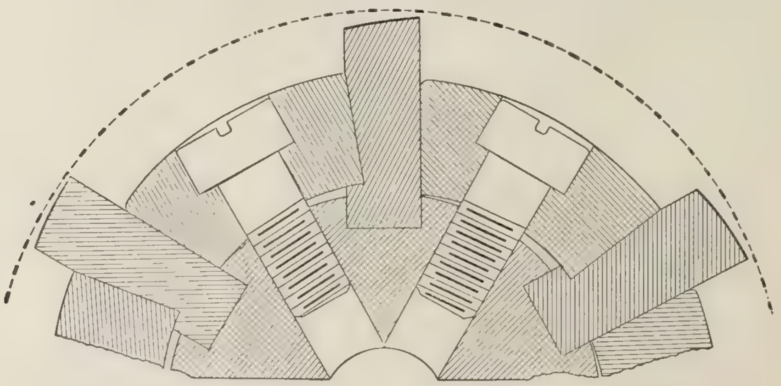
2. The hand, shell and fluted chucking reamers have interchangeable nuts, screws and wrenches.

3. The bottom of a hole can readily be faced.

4 By a simple adjustment of the blades the reamer can easily be set to size without regrinding.

REDUCE YOU REAMING COSTS

Write for catalog, "Small Tools," showing our complete line.



Section showing construction of P. & W. Adjustable Blade Reamers

Place a trial order with our nearest store.

Pratt & Whitney Company of Canada, Limited

DUNDAS	MONTREAL	WINNIPEG	VANCOUVER
Ontario	723 Drummond Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

Bertram
MACHINE
TOOLS

Locomotive and
Car Shop Equipment

Structural and
Bridge
Shop Machinery

Repair Shop
Machinery

General Machine
Shop Equipment

We'll be pleased to submit photographs and full details on any line or lines in which you are interested.

30-inch Vertical Drilling Machine

Photographs and full particulars gladly mailed upon request.

WRITE US NOW

The John Bertram & Sons Company
Limited
Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

The Shortage of Labor

WE have just received from one of our circulation representatives a report on conditions as he found them in a large foundry in Western Ontario.

"This foundry," the report runs, "is extremely busy on a very large order for stoves. Like many other shops and foundries it has lost many men through enlistments, over fifty of their employees having joined the colors.

"In this foundry as in other places, I noticed a good deal of new equipment which was evidently installed to compensate in a measure for the shortage of manual labor. In this particular plant over $10,000 worth of equipment has been purchased and the superintendent intimated that they were not all through by any means."

This report differs only in detail from other reports we have received from time to time. They all tend to show that there exists a well developed tendency to purchase and install the most efficient labor-saving machinery. The most urgent necessity may have proved an irresistible incentive while the presence of financial prosperity made inclination the more easily followed.

With the establishment of new industries in Canada, with new plants springing up, with export trade developing and other changes taking place, the labor situation will very likely remain acute for a long time to come. Canadian manufacturers now have both the opportunity and the necessity for equipping their plants in the most up-to-date manner, both as a solution of present problems and as an insurance for the future.

CANADIAN MACHINERY
143-153 UNIVERSITY AVE., TORONTO, CANADA

Montreal Winnipeg London, England Boston New York Cleveland Chicago

Quality Service

The Steel Company of Canada, Limited

PRODUCTS

"HAMILTON" PIG IRON

BASIC, MALLEABLE AND FOUNDRY

IRON AND STEEL

BLOOMS, BILLETS, BARS, WIRE RODS, ANGLES, CHANNELS, PLOW BEAMS, ETC.

FORGINGS

Car Axles, Shape and Drop Forgings, Horse Shoes, Carriage and Automobile Hardware, Top Goods, Etc.

WIRE, ETC.

Steel, Brass, Copper and Bronze, Heavy and Fine, Bright Annealed, Coppered Liquor Bright, Galvanized and Tinned. Stranded, Steel and Copper Cable, Clothes Line, Wire Nails, Staples, Barb Wire, Woven Wire Fencing, Fence Gates.

RAILWAY FASTENINGS

Angle Bars, Track Bolts, Tie Plates, Spikes, Tie Rods, Etc.

NAILS, SPIKES, RIVETS, ETC.

Wire, Cut, Boat and Horse Shoe Nails, Railway, Pressed and Drift Spikes. Tacks and Shoe Nails, Steel and Copper Rivets, and Burrs, Iron, Brass and Copper.

POLE LINE HARDWARE

Pole Steps, Cross Arm Braces, Guy Clamps and Guy Rods, Etc., Black and Galvanized.

BOLTS, NUTS AND WASHERS

Machine, Carriage, Elevator, Stove, Tire and Sleigh Shoe Bolts, Blank, Tapped Nuts, and Washers.

WROUGHT PIPE

Black and Galvanized Nipples and Couplings.

SCREWS

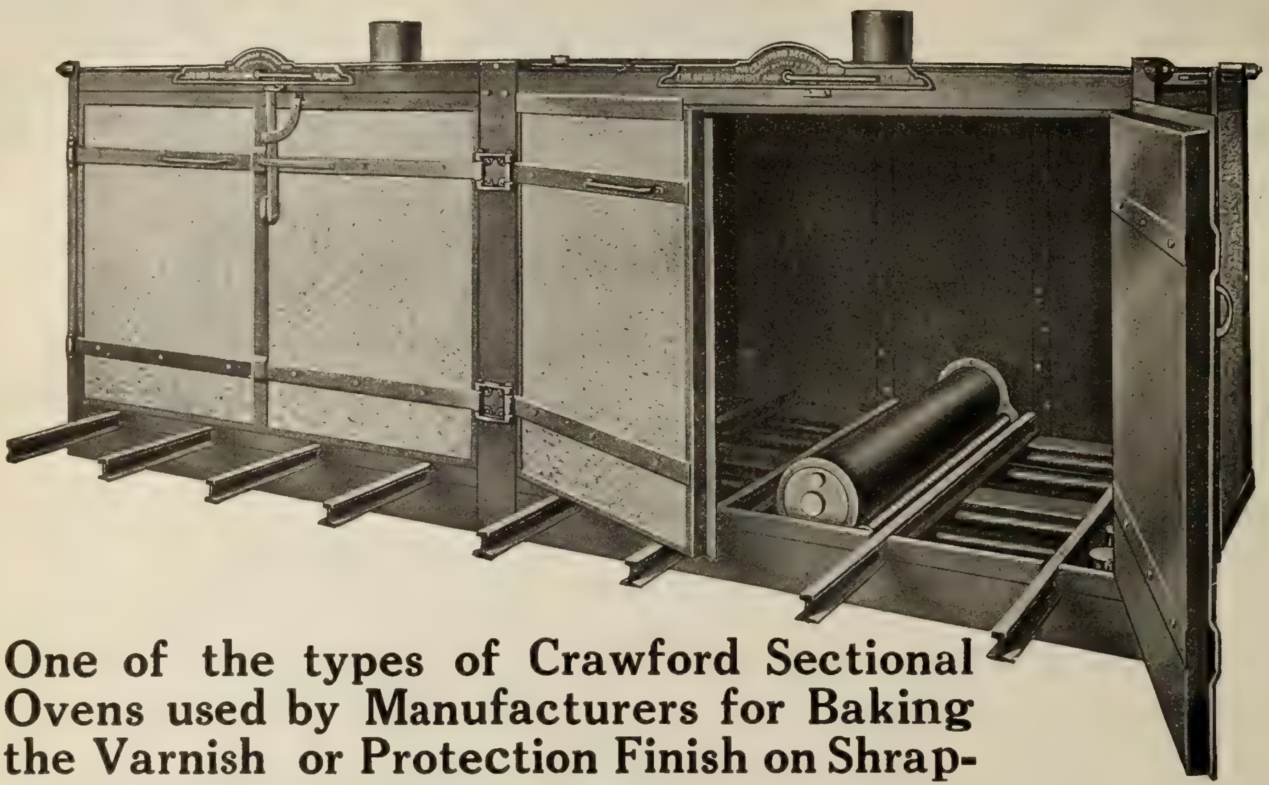
Wood and Machine Steel, Brass and Bronze.

LEAD PRODUCTS

Lead Pipe, White Lead, Shot and Putty.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG



One of the types of Crawford Sectional Ovens used by Manufacturers for Baking the Varnish or Protection Finish on Shrapnel and High Explosive Shells.

These ovens are equipped with the only gas burner that gives a combined radiated heat and circulation of preheated air in the oven.

The gas and air are mixed and combustion in the large cylinder supported by air from a positive pressure blower which gives the highest efficiency and economy known for burning either city, natural, gasoline or producer gas, and there is no exposed flame in the oven.

The truck shown holds (120) twenty-eight-pound shells and is planned to stand the shells on end, resting on angles. Other designs have been built for shells ranging in weight from fifteen to eight hundred pounds, the last mentioned shell being forty-eight inches high by twelve inches in diameter.

The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN., U.S.A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA

Nova Scotia Steel & Coal Company
Limited

New Glasgow, Nova Scotia, Canada

RUDDER FOR SS. "LUX." WEIGHT 9 TONS, LENGTH 42 FEET.

Ship Forgings of all Shapes, Sizes and Weights up to 75 Tons

We manufacture, of Fluid Compressed Steel, forgings entering into the construction and equipment of steel vessels up to and including the largest building or afloat, and embracing Rudder Frames—sectional or one piece, also Rudders complete; Stern Posts and Stern Brackets for Single, Twin and Triple Screw Ships, Rudder Heads, Boat Davits, Derricks, etc.

A direct increase of capacity for every lathe in your plant

will result from the use of

STELLITE

HIGH SPEED MADE IN CANADA STELLITE TOOL METAL

—the alloy of metals without a particle of iron in it; the alloy so hard and so tough that the best tool steel seems soft and brittle beside it.

"Stellite" tools do not lose their temper. Sometimes the speed of the lathe becomes so great that the edge of the "Stellite" tool becomes visibly red, and remains so during an entire cut without the slightest injury.

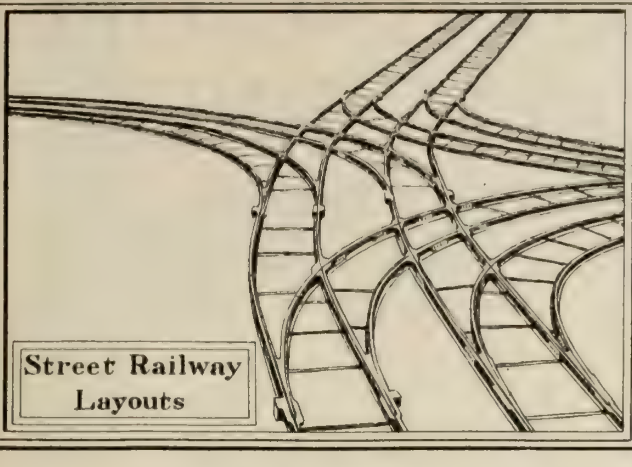
"STELLITE" TOOLS INCREASE PRODUCTION 20 TO 300 per cent., also greatly reduce labor cost and overhead per piece.

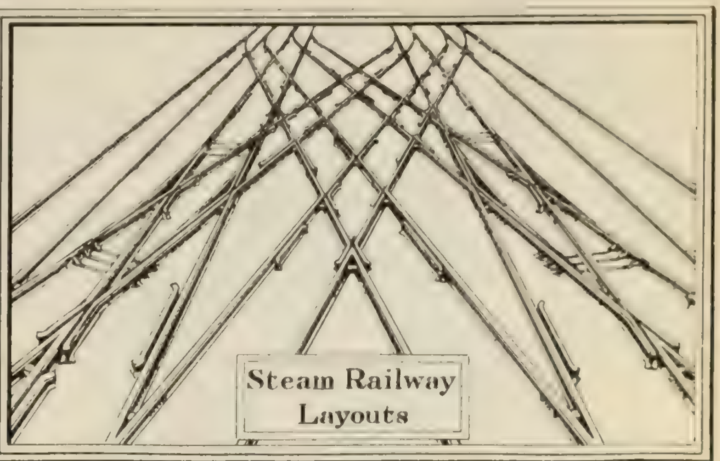
Send a trial order and get acquainted.

Made in Canada by
Deloro Mining & Reduction Company, Limited
Deloro, Ontario
C.P.R. Building, Toronto, Ont.

Sold Exclusively in Canada and Newfoundland by
The Canadian B. K. Morton Company, Limited
49 Common St., Montreal, P.Q.
86 Richmond St. E., Toronto, Ont.

Full particulars and price on request.





Switches, Frogs and Every Description of Trackwork.
Solid Manganese Steel Construction. Cast Iron and Cast Steel bound Construction with Manganese Steel Inserts.

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

Atlas Crucible Steel Company
DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas XX
High Speed Steel, Atlas X
Chrome Vanadium Steel

Carbon Tool Steel
"Deward" Oil Tempering, Non-Shrinking

"When ordering steel, it is important to state purpose for which steel is to be used."

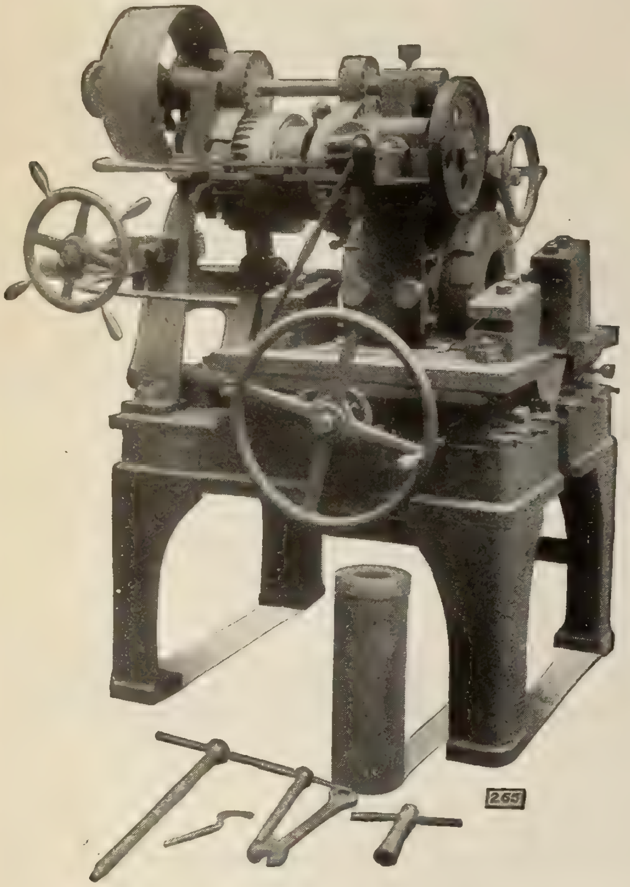
"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

YOUNG, CORLEY AND DOLAN, Inc.
149 BROADWAY, NEW YORK CITY, U.S.A.



CUTTING-OFF MACHINES

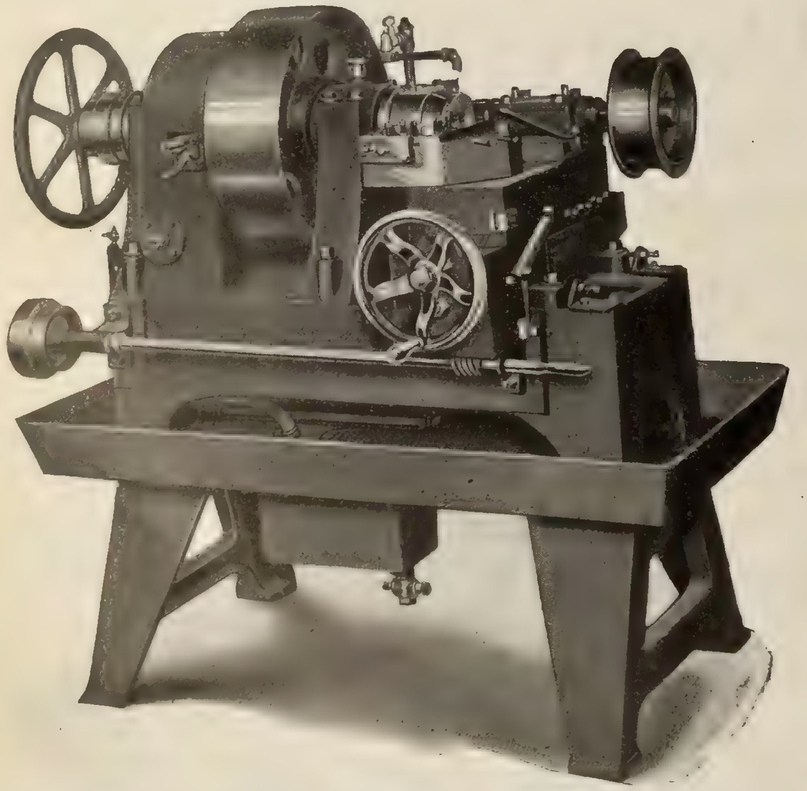
Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal



For Turning, Facing and Milling the Thread on Gas Check Plugs for 6-inch High-Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft (**all drives direct from main line shaft**). Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells. Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield
STAIR BUILDING, TORONTO, ONT.

The Hepburn Heavy-Duty Shell Lathes

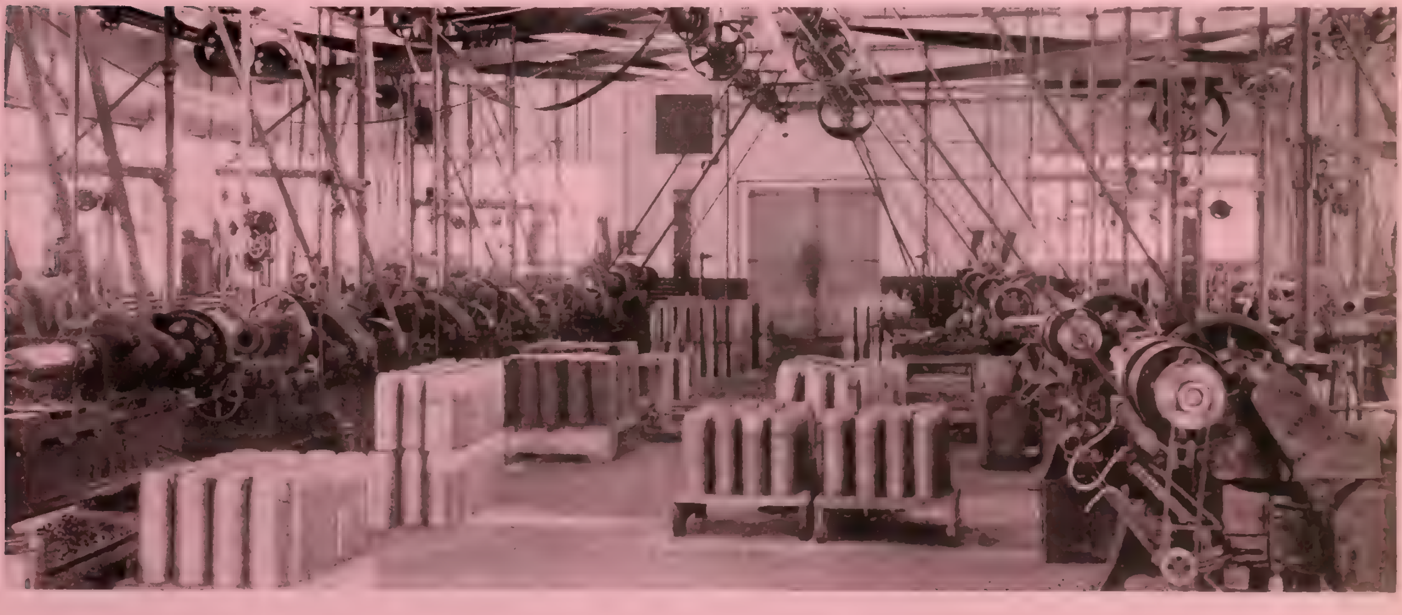
SPEED
ACCURACY
POWER
STRENGTH
SIMPLICITY

Performance:

This is the Supreme Test.

The fact that we are regularly receiving repeat orders is the best testimonial we can give you as to the accuracy, volume and ease of production secured with the Hepburn Lathes. Our new models are ready and we are in position to make prompt deliveries. Your enquiries will have our immediate attention.

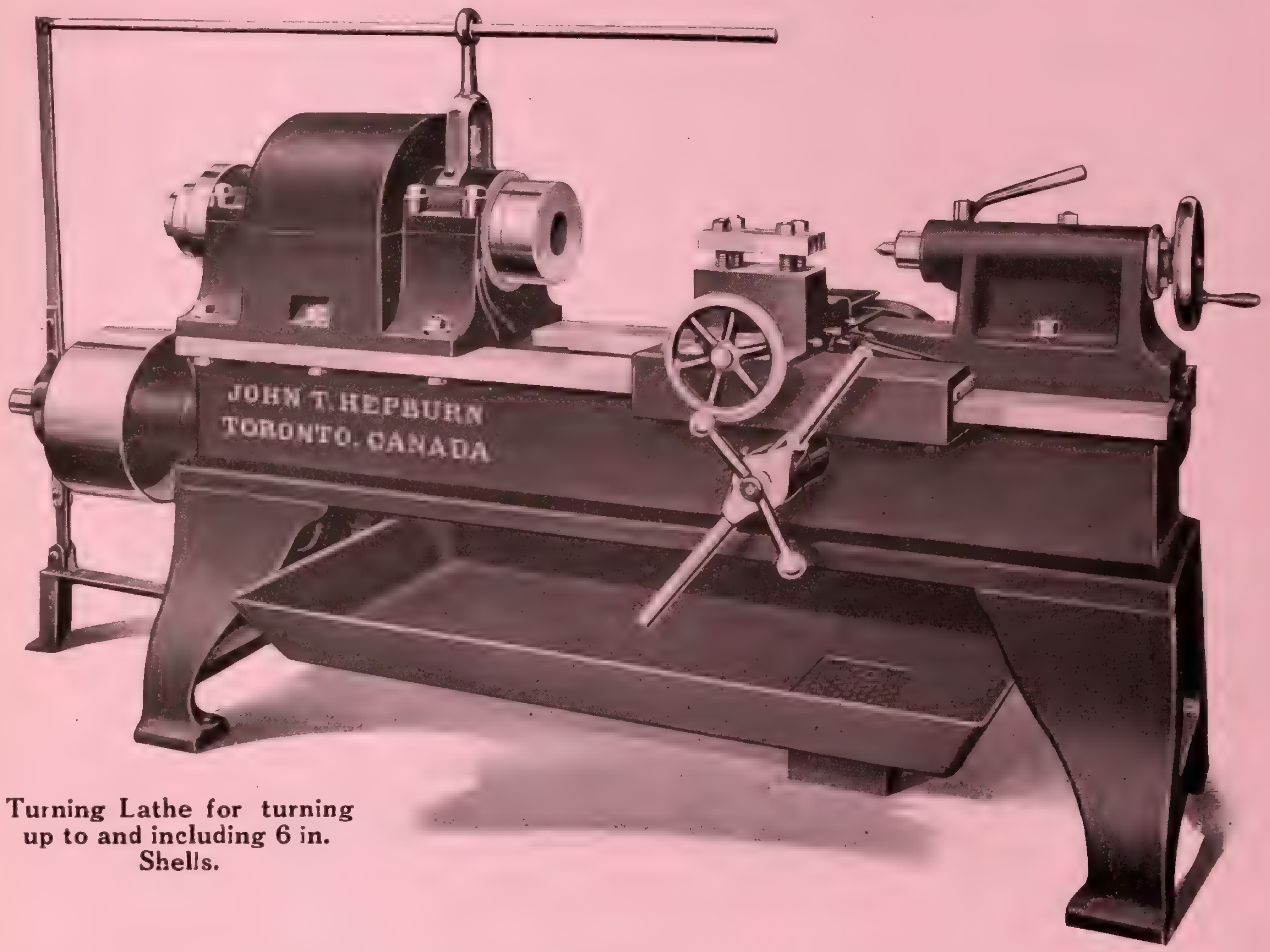
This Cut Shows Hepburn Lathes on 6-inch Shells.



John T. Hepburn, Limited,

18 to 60 Van Horne Street,
TORONTO, CANADA

The Hepburn Heavy-Duty Shell Lathes



Turning Lathe for turning up to and including 6 in. Shells.

SPEED
ACCURACY
POWER
STRENGTH
SIMPLICITY

Note Those Five Words in the Panel to the left—

Speed Accuracy Power
Strength Simplicity

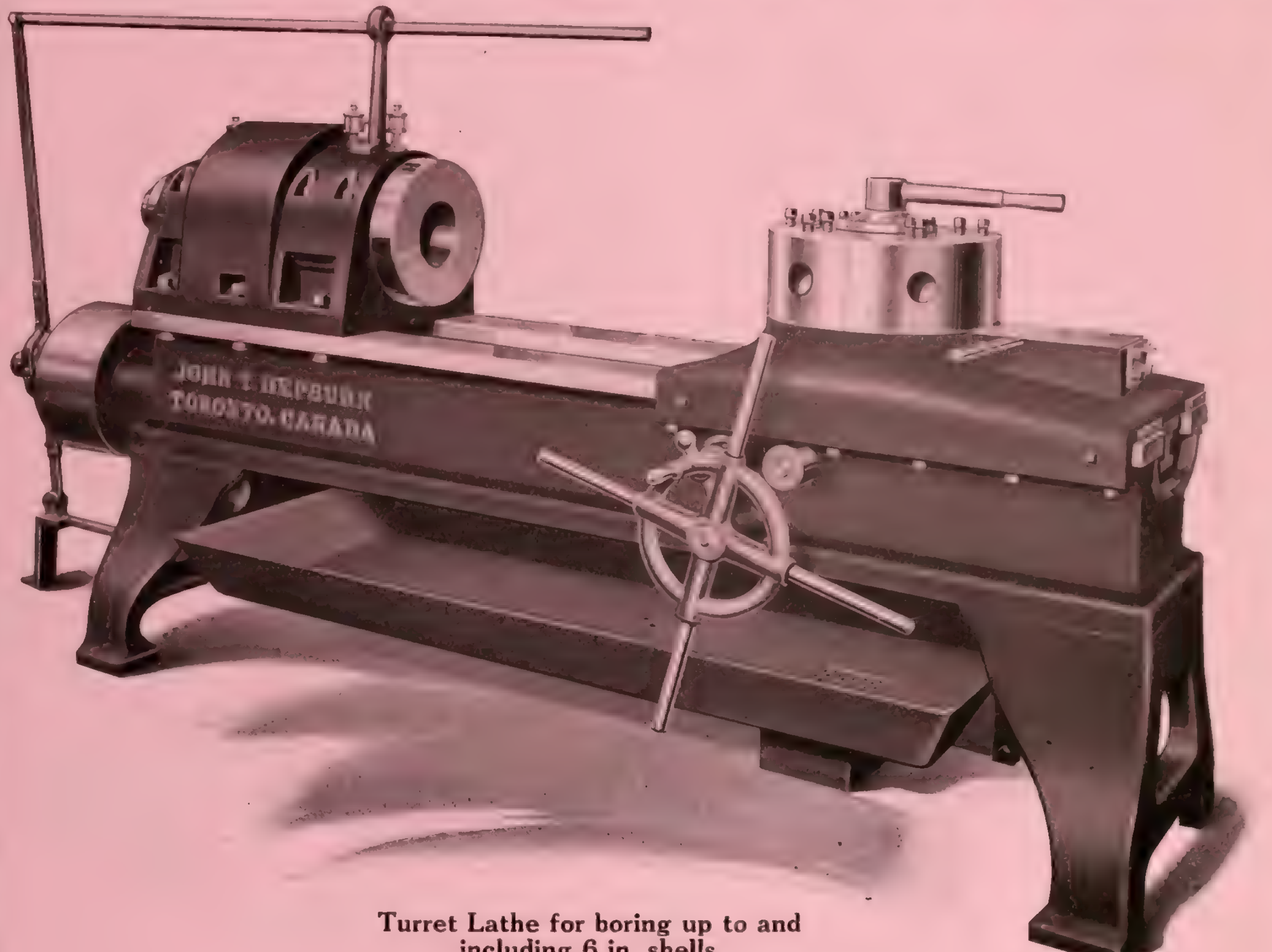
They are not carelessly chosen words. They mean exactly what they say. They are a sort of "Straight Edge" by which to test any and every lathe you may have, or may instal. Rarely do you find any lathe measure 100% efficient in regard to **all** these essentials; most of them "fall down," or sag away at some point. We know only one lathe that Stands the Test—our own make—The Hepburn.

Study the model illustrated in this page—for the manufacture of shells up to 6 in.

SEND FOR SPECIFICATIONS.

John T. Hepburn, Limited, 18 to 60 Van Horne Street
TORONTO, CANADA

The Hepburn Heavy-Duty Shell Lathes



Turret Lathe for boring up to and including 6 in. shells.

Here is another heavy-duty lathe for boring. We'd like to give you the specifications of this and the other lathes right here; but these are all fully set forth on Special Sheets, all ready for mailing to you, and given in greater detail, in more easily read type than would be possible in this advertisement with its space limitations.

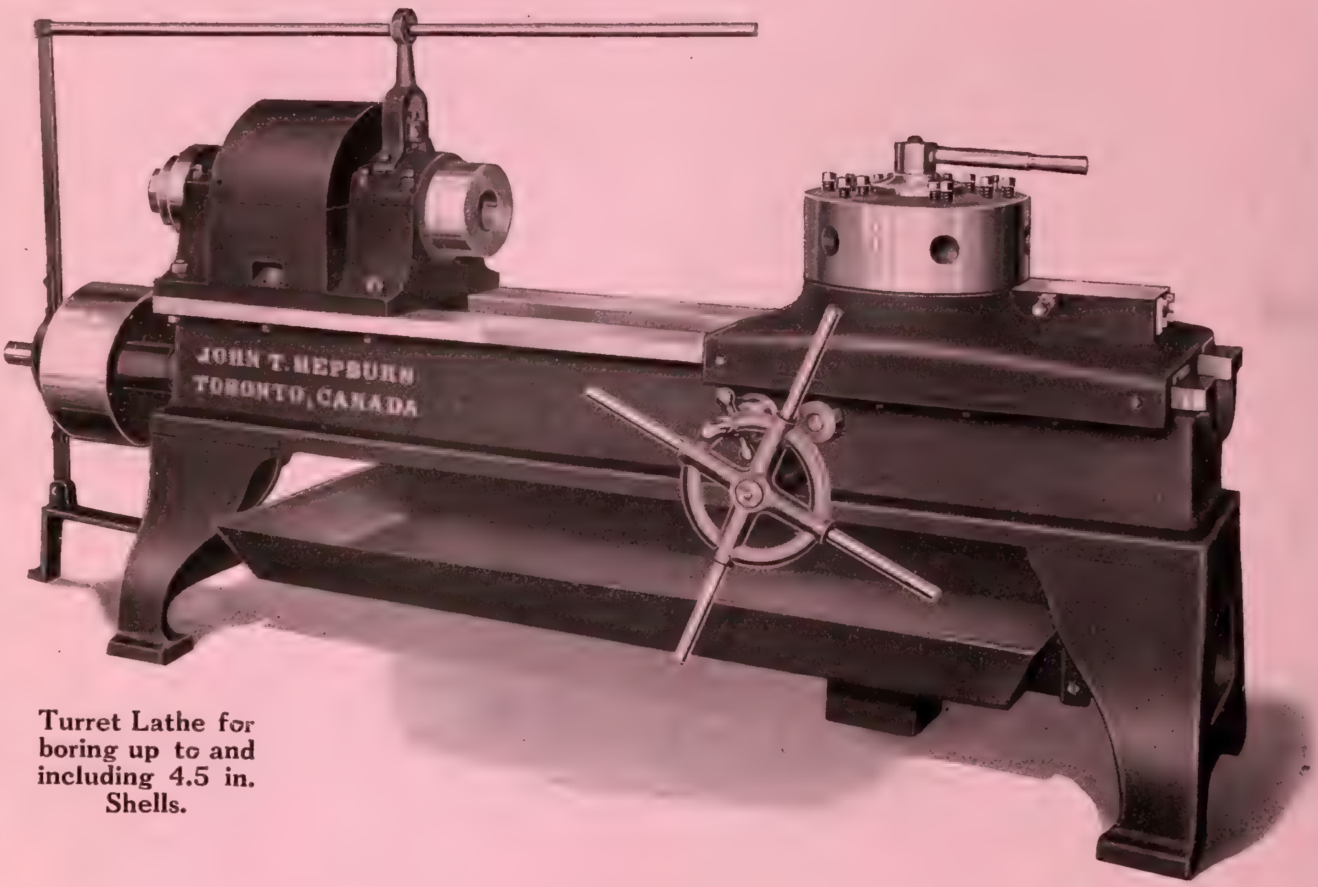
If you are at all interested in the business of Shell-making, we are relying on your astuteness to investigate the Hepburn lathes. *They are doing the work* in many munitions factories and we're ready to give you the names of these, that you may get the testimony of *users*.

This is an "acid test"—but we are ready to submit to it.

SPEED
ACCURACY
POWER
STRENGTH
SIMPLICITY

John T. Hepburn, Limited, 18 to 60 Van Horne Street,
TORONTO, CANADA

The Hepburn Heavy-Duty Shell Lathes



Turret Lathe for boring up to and including 4.5 in. Shells.

SPEED
ACCURACY
POWER
STRENGTH
SIMPLICITY

This is a point for you to consider; these lathes of our making have been an evolution. We frankly confess to having been able to greatly improve our first models. Our models now seem to be the last word in Efficiency and Economy. They are so good in the opinion of users that other lathes have been replaced with the **Hepburn,** just because it has been **good business** to do so. Maximum Speed, Maximum Accuracy, Maximum Power, Maximum Strength, Maximum Simplicity. There is big money in having one of these features—features found in Maximum amount only in the

HEPBURN

We can ship quickly—no long and costly weeks and months of waiting.

In the meantime, write us, and let us get into personal touch with each other.

John T. Hepburn, Limited, 18 to 60 Van Horne Street,
TORONTO, CANADA

"A. M. C. Machines will take any cut at any speed and feed that the tools will stand"

Some Salient Points about the Construction of

Amalgamated Ammunition Machinery

The Amalgamated machines are as strong and rigid as any machines on the market for shell turning.

All the steel for spindles and ways is OPEN HEARTH, HIGH CARBON, turned and ground to extreme limits of accuracy.

We pay an extra price for the turning and grinding on account of the extra high carbon and a further extra price for unusually rigid inspection.

All sliding bearings are cast iron on steel. Rotating bearings are of the best heavy pressure babbitt poured into the cast iron boxes from the original melting of the babbitt and machined and fitted in accordance with the best practice.

We get an alignment in our machines secured by no other manufacturers. We have an excess of strength and power throughout the machines.

Send for the catalog and study the strength of their construction. A copy is yours for the asking.

Amalgamated Machinery Corporation

CANADIAN REPRESENTATIVES

Amalgamated Ammunition Machinery Company, Limited
708 C.P.R. Building, Toronto · Tel. Adelaide 3148

Machines that put a New Speed to Shell Banding Operations

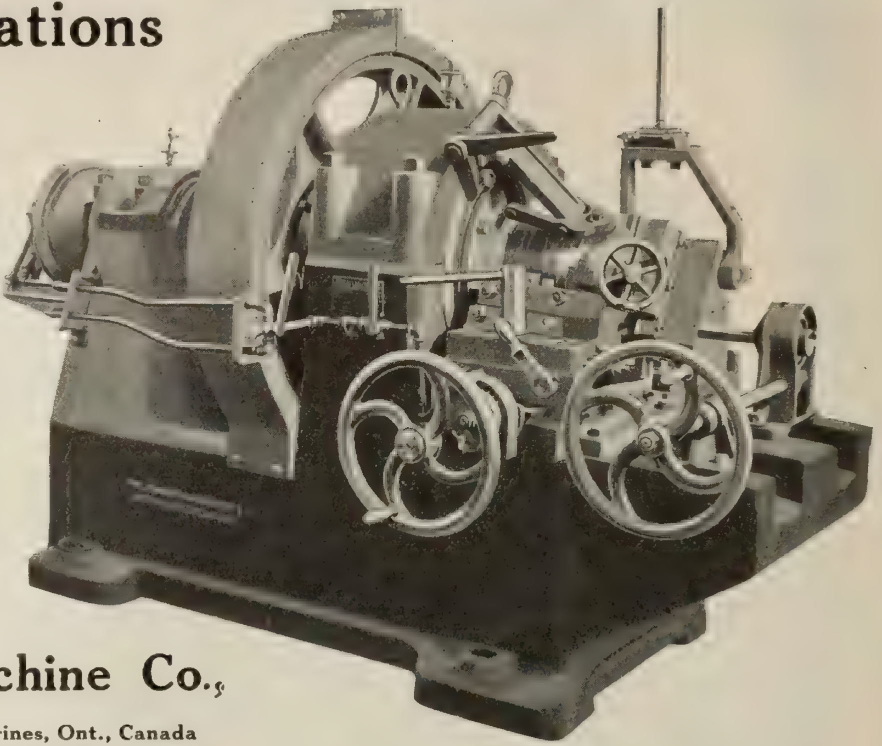
Jenckes Banding Lathes will give the best production of anything in shell banding tools yet designed.

You can clearly see by the liberal proportions of these machines that they are built for long, heavy service.

We manufacture banding machines for 18 pdr., 4.5", 5", 6", 8", and 9.2" shells.

These machines are also tooled when required for the mm. sizes corresponding to Russian and French ammunition.

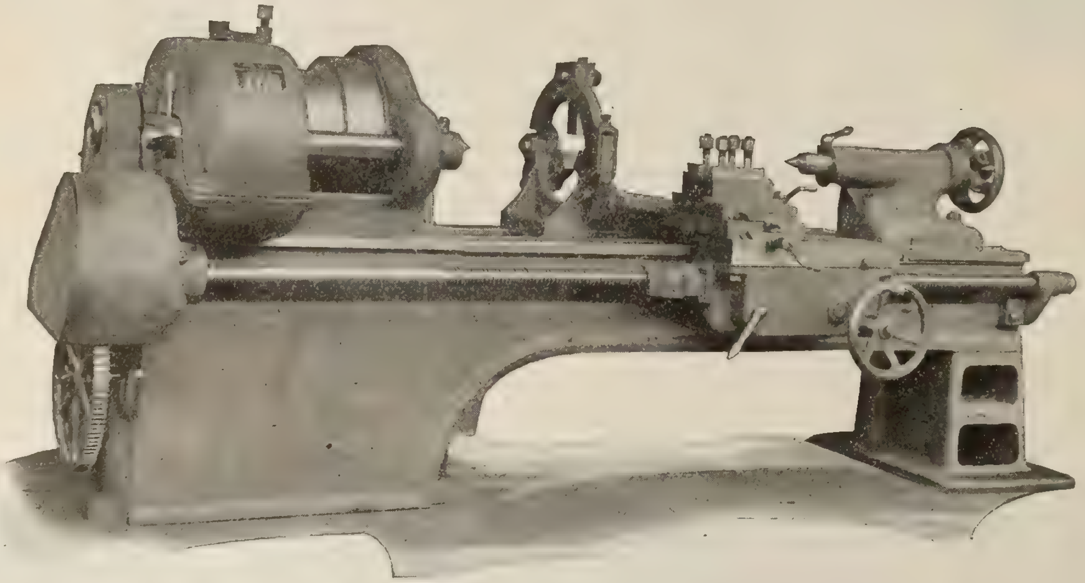
Single Purpose Lathe for turning copper band on 9.2" British Shell. Illustration shows spindle enlarged to adapt this machine for finishing the bands on the 12" British Shell. Air chuck and friction.



For turning the bands on 9.2" and 12" British shells

The Jenckes Machine Co.,
LIMITED
Works: Sherbrooke, Que.; St. Catharines, Ont., Canada
CANADIAN SALES OFFICES: 727 Traders Bank Bldg., Toronto; 908 E. T. Bank Bldg., Montreal; West Chester Ave., St. Catharines; Cobalt, Ont.; Exchange Bldg., Vancouver; Nelson, B.C.

PB

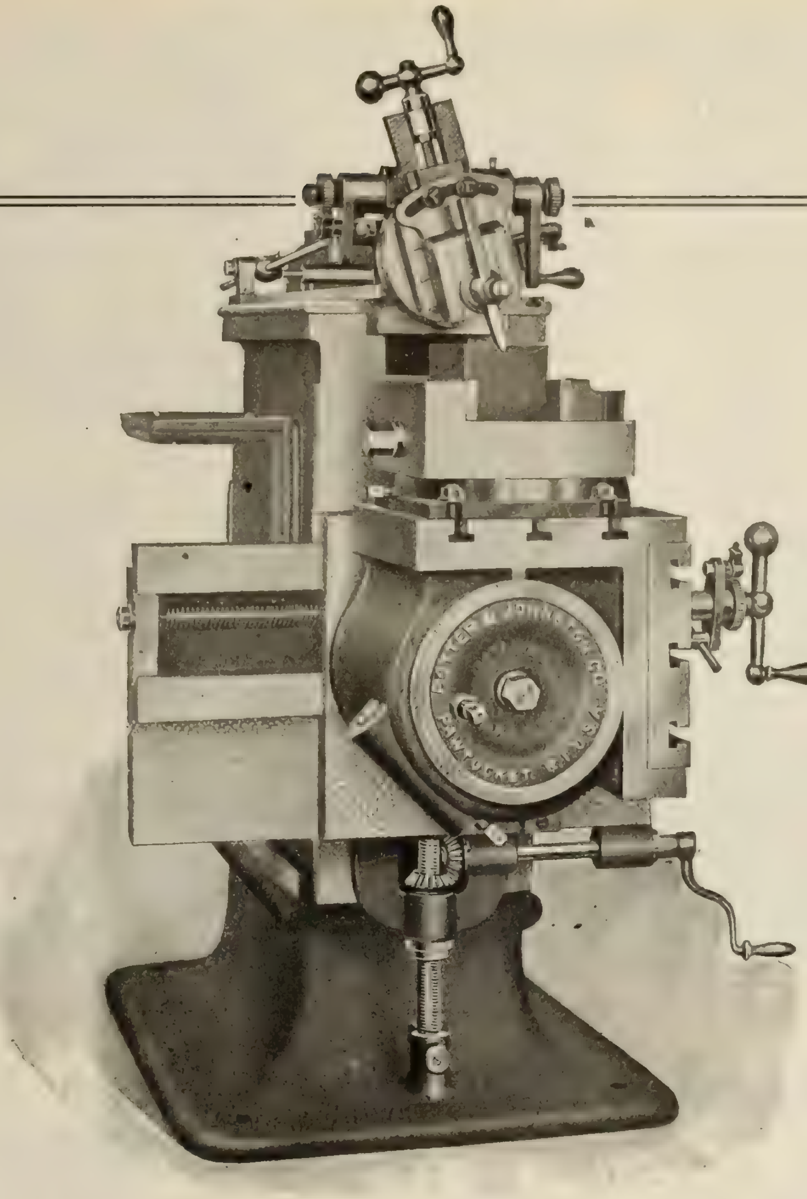


PB

LANG SINGLE PURPOSE LATHE

Made in the United States under supervision of British Government. (Lang's Design.)

59 BEAVER HALL HILL
PEACOCK BROTHERS
MONTREAL, QUE.



Potter & Johnston 15-inch Universal Shaping Machine

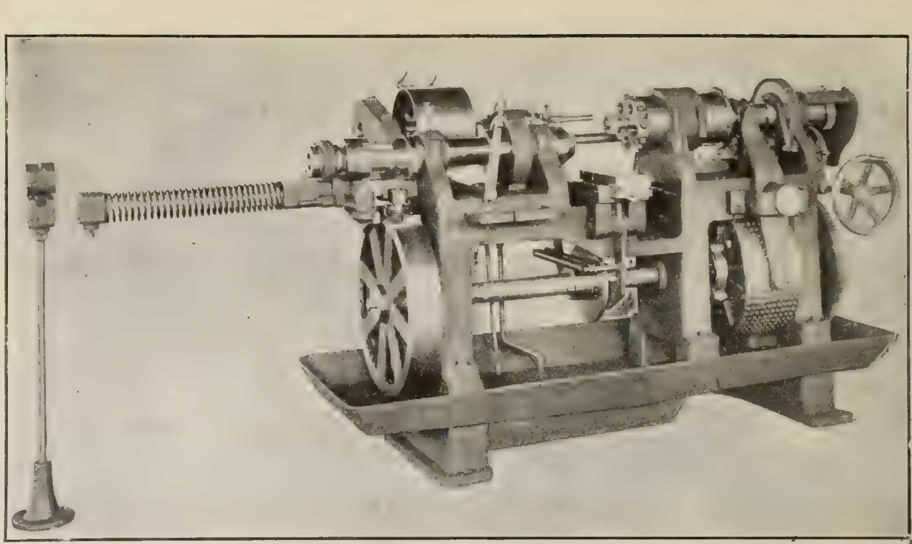
Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA



The Chicago Automatic Screw Machine

MANUFACTURES RAPIDLY AND ACCURATELY WITHOUT THE USE OF A COMPLICATED MECHANISM OR A SYSTEM OF CAMS THAT ARE DIFFICULT TO DETERMINE AND ARRANGE ON THE MACHINE. The rigidity of the machine has not been sacrificed for the flexible features which are embodied in the Chicago Automatic. Alignment is correct and there are no parts where excessive wear takes place—therefore accurate production is assured during the long life of the machine.

No countershaft is required—the machine is quipped with a fast and loose pulley on the spindle head, this being the only belt drive on the machine.

Spindle speeds suitable to different sizes and kinds of stock within the capacity of the machine are obtained by changing two gears on the spindle head.

IN LESS THAN SIX WEEKS AFTER YOUR ORDER REACHES US WE CAN PLACE CHICAGOS IN YOUR PLANT READY FOR PRODUCTION.

Chicago Automatic Screw Machines are not an experiment—ten years of intensive manufacture of one product—Automatics—stands behind every machine.

Full particulars on request.

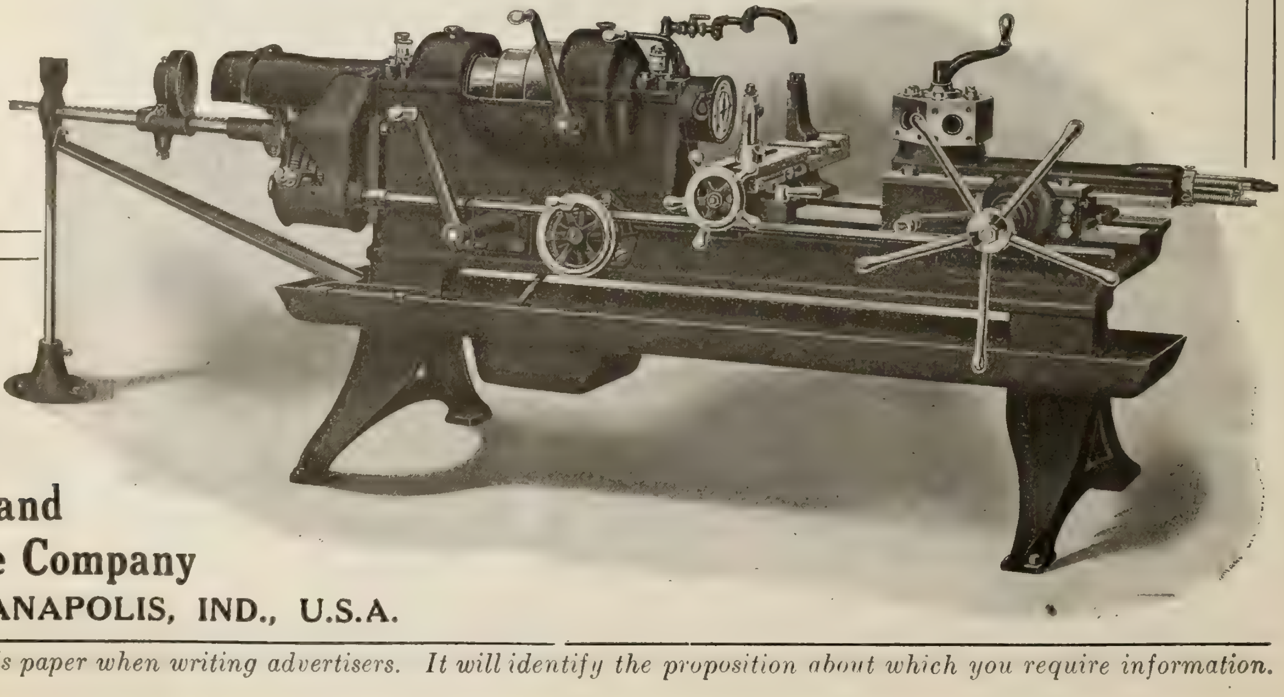
THE JOHN McNAB MACHINERY COMPANY
NEW YORK CITY, U.S.A.
European Representatives : John McNab, Hyde, England.

Millholland 1⅝ x 10 Turret Screw Machine

The combined result of two generations of engineering and mechanical experience. While, as a whole, it is no radical departure from established lines of the turret lathe, it has many original features, and with these features are combined well-known devices.

Safety, rigidity, convenience, production and durability are the ideas behind every step in their construction.

Your request will get you full details and specifications by early mail. Make it.

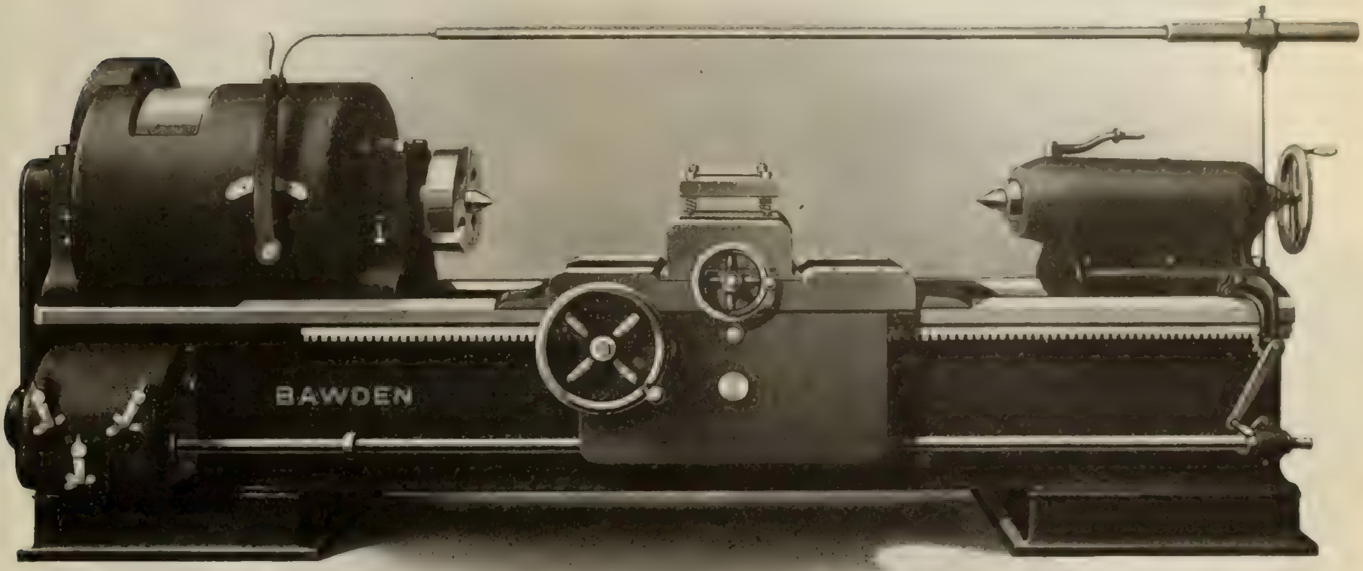


W. K.
Millholland
Machine Company
INDIANAPOLIS, IND., U.S.A.

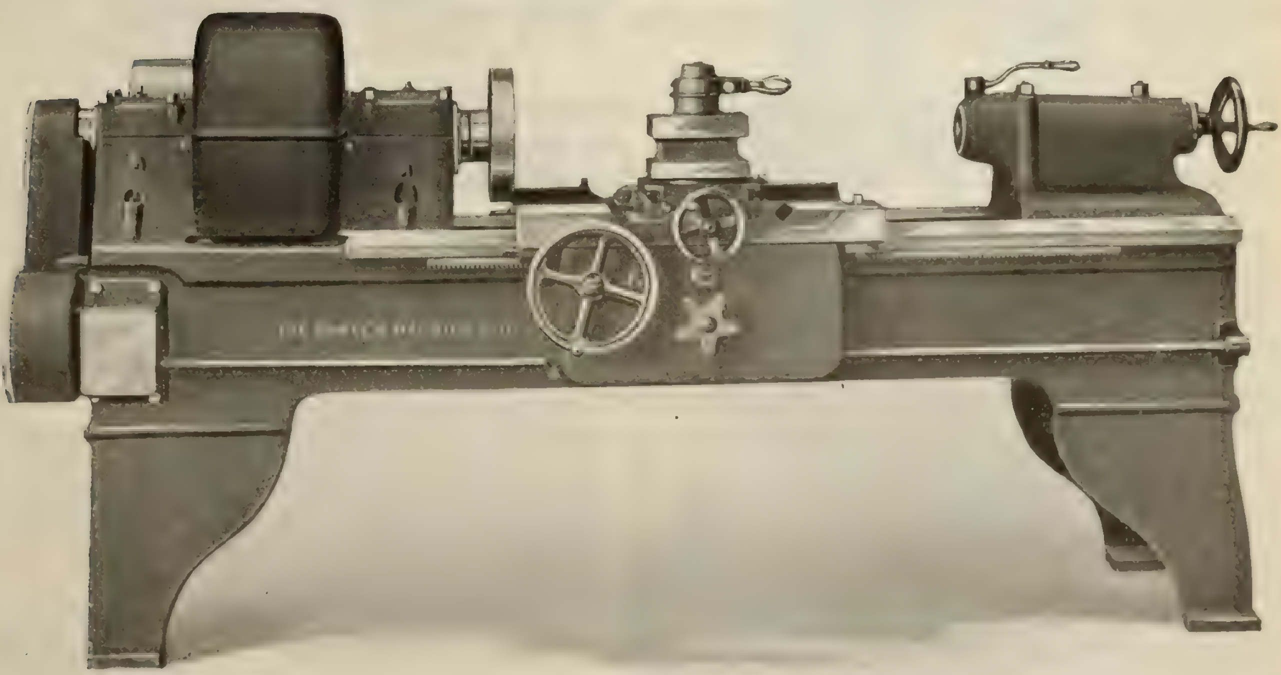
The Bawden Machine Co., Limited

Bawden Heavy Duty Shell Lathes

Every part made in our plant. Bronze bearings, steel spindles and gears. Best material and finish throughout.



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.

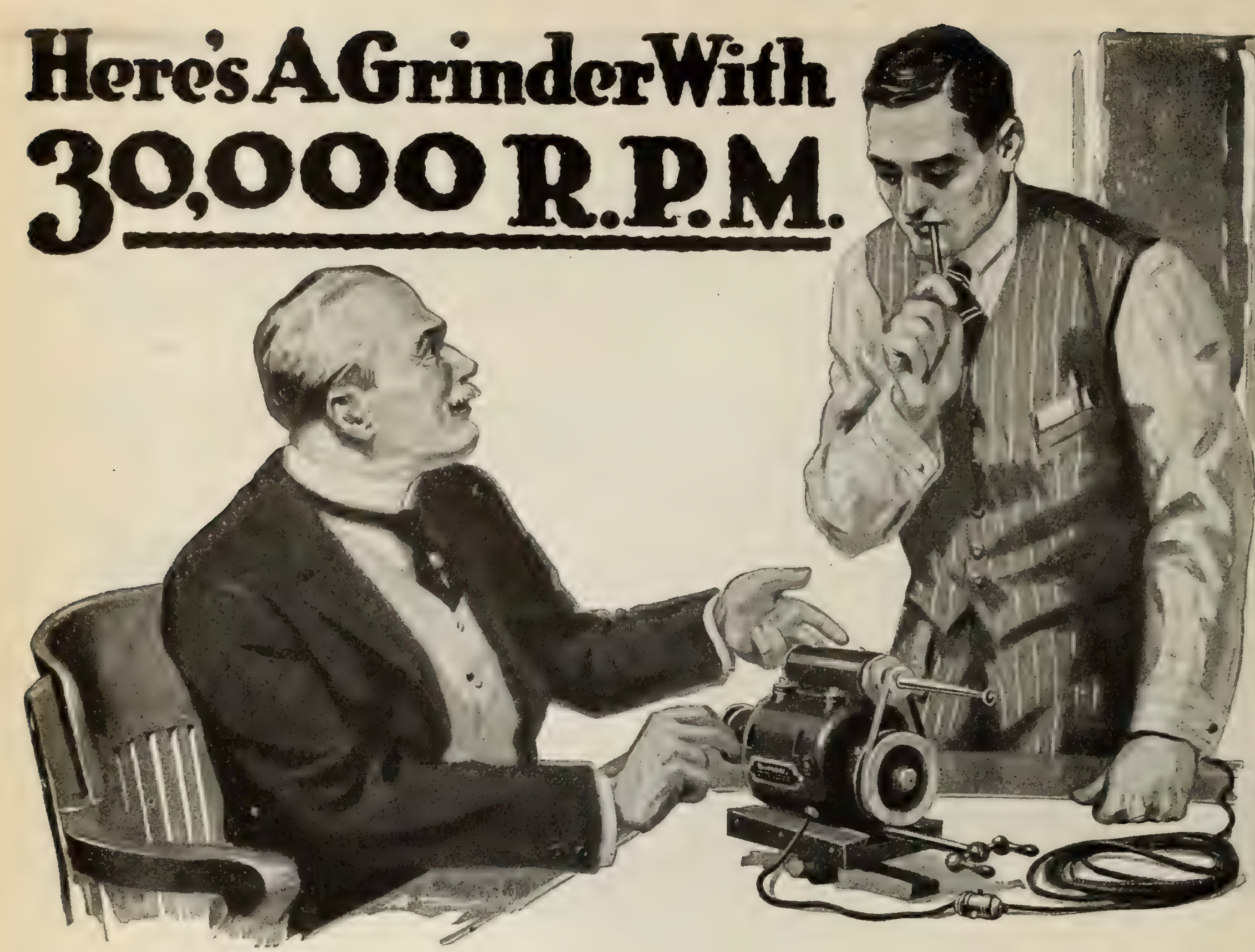


New Bawden 24 in. Double Back Geared Shell Lathe for Shells up to 6 in. Gear Ratio 19½ to 1. Rough turn 6 in. H.E. Shell, in 6¼ mins.

Write for particulars and learn what Bawden Lathes are doing. Lathes fitted with attachments for all operations.

The Bawden Machine Co., Limited, 125-137 Sterling Road, **Toronto, Canada**

Here's A Grinder With 30,000 R.P.M.



"Just the tool we have been looking for. We want you to equip our various departments with these wonderful

DUMORE PORTABLE ELECTRIC GRINDERS

as soon as possible. I know what I am talking about because they have been proven to me to be the best by actual test."

This conversation took place in a large eastern manufacturing plant. It was no easy matter to convince the general manager of the DUMORE Grinder's merits—but when he realized that it actually developed 30,000 R.P.M., he was sold then and there.

30,000 R.P.M. is possible with the DUMORE Grinder because it is dynamically balanced and equipped throughout (both motor and internal spindle), with S.K.F. Ball Bearings. You will find a dozen uses for the DUMORE about the plant. It weighs only 17 lbs. Can be easily carried from one job to another, and set up in a moment on any lathe, shaper or milling machine.

The DUMORE is just the tool you have been looking for to do those accurate grinding jobs that are now giving you so much trouble. It is indispensable for making gauges, dies, reamers, special cutters, etc. The DUMORE Grinder is universal, operating on direct and alternating current. Sold on merit. Absolutely guaranteed. Write for complete information.

Wisconsin Electric Co., 1703 Dumore Bldg., **Racine, Wis., U.S.A.**

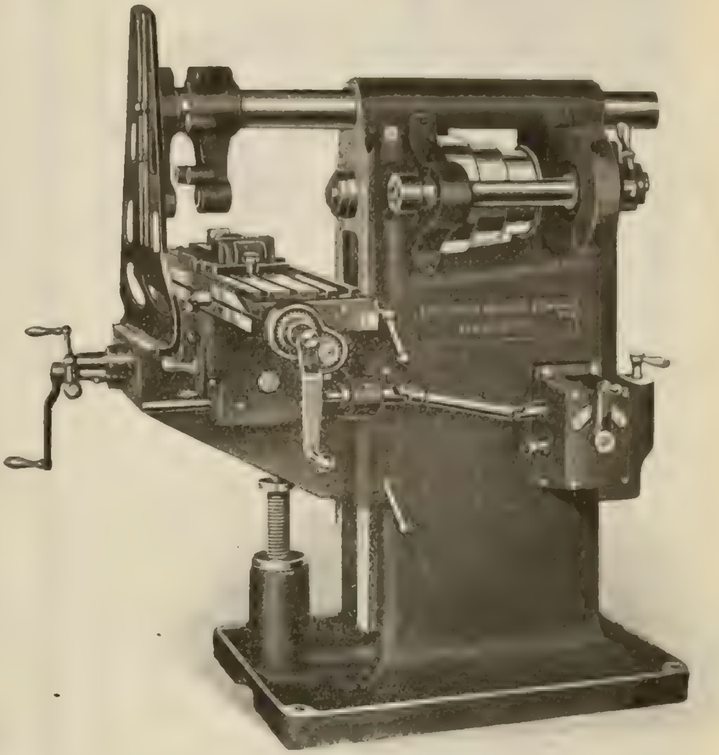
Toronto Office: R. E. T. PRINGLE, LIMITED, 95 King St. East, Toronto.
Complete stock carried by Aikenhead Hardware Company, 17 Temperance Street, Toronto

The Ford-Smith Machine Company

Ford-Smith
27" x 19" x 7½"
Milling Machines

We can make interesting deliveries on these machines, either through our regular dealers or direct from our plant.

FORD-SMITH MACHINE CO.
Limited
Hamilton Canada



KEMPSMITH
UNIVERSAL MILLING MACHINES

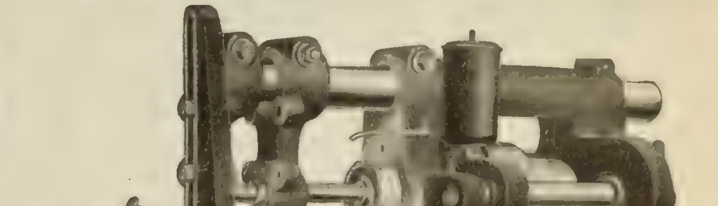
When installing a Universal Milling Machine for tool room work, one of the prime considerations is simplicity of machine and convenience of operation.

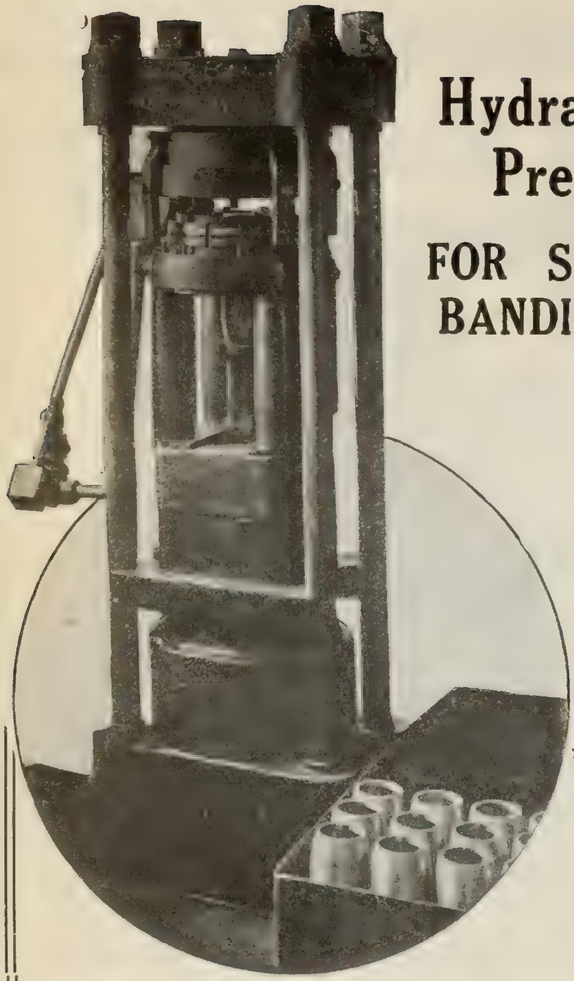
Kempsmith Milling Machines are notable leaders in these two requirements. Note especially that all feeds are reversed by one lever at the front of the knee. Likewise all power feeds are tripped and engaged by one compound lever, also located at the extreme front of the knee. The swiveling table is clamped rigidly at any angle by a quarter-turn of a single bolt.

Our catalogue illustrates and describes more fully the features mentioned. A copy will be gladly sent on request.

Kempsmith Manufacturing Co.
MILWAUKEE, U. S. A.

Agents:—Foss & Hill Machinery Co., Montreal
General Supply Company, Toronto and Ottawa
Western Supply and Equipment Co., Calgary





Hydraulic Press

FOR SHELL BANDING

Simple, Strong, Reliable, Low Cost

Power is obtained from continuous running belt-driven pump located near the press and is applied to the ram underneath the table.

Table Rises and Forces Steel Taper Wedges, eight in number, up into the Hollow Steel Forging at the top, the wedges conforming to the shape of the shell and are thus pressed in equally against the copper band; pressure is then released, the shell is readily taken out.

Operates by lever shown on the left-hand side. Pressure gauge behind.

As this machine is a standard Hydraulic Press, it can be used in any other capacity.

SEE OUR BIG TIME AND LABOR-SAVING ELEVATING TRUCK in next week's ad. It is proving indispensable everywhere.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises.**

We shall be pleased to submit prices and give any particulars required.

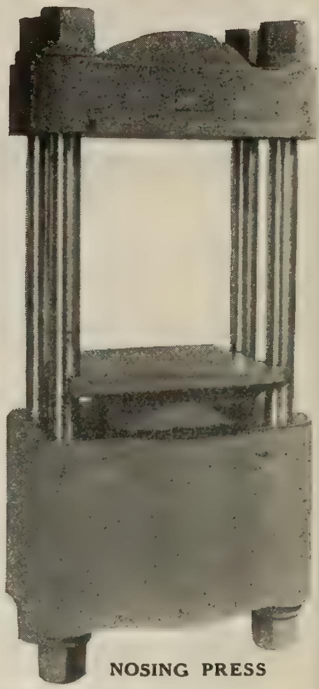
THE CHAPMAN DOUBLE BALL BEARING CO. OF CANADA
LIMITED
330-351 Sorauren Avenue, TORONTO, CANADA
TRANSMISSION BALL BEARING CO. Inc.
1407 West Avenue, Buffalo, N.Y.

PRESSES

Pumps and Accumulators

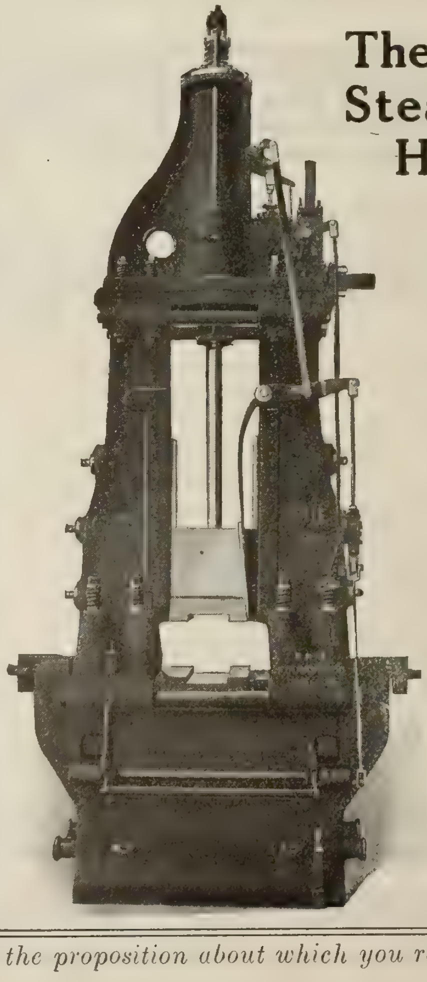
FOR ALL PURPOSES

Made in Canada



NOSING PRESS

WILLIAM R. PERRIN, Limited
TORONTO



The "ERIE" Steam Drop Hammer

is the last word in Hammer construction. Ask any user.

A list will be supplied upon request.

We also build Trimming Presses.

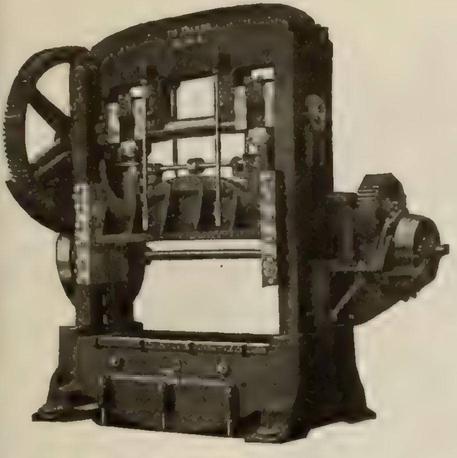
Single- and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

Erie Foundry Co.
ERIE, PA.

From everywhere comes indisputable evidence of the merit of

"TOLEDO"

Double Crank Presses



No. 95E with long stroke and high die space for forming, etc., on auto hoods, engine pans, bodies and seats, steel range and similar work.

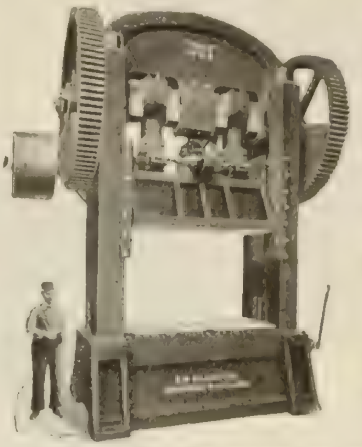
This prestige rests on no single record, but on half a century of tried and proven success.

Space prohibits detailing the special features and advantages—we however earnestly solicit investigation and comparison.

Built in over 150 sizes and adapted to every requirement of sheet metal and drop forging work.

The Toledo Machine & Tool Company
TOLEDO, OHIO, U.S.A.

POWER AND CONVENIENCE



Here is an unusual combination of powerful construction and every convenience for quick and accurate adjustments.

BLISS
Double Crank
PRESSES

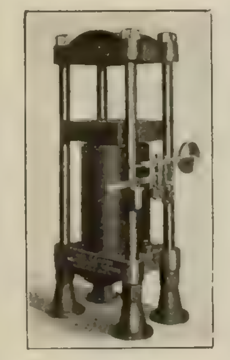
Adapted for the economical manufacture of vapor stoves, wrought iron ranges, agricultural implements, automobile stampings, steel car parts, ceilings, sidings, metal doors, window frames and sashes, metal furniture, and all similar classes of goods.

Built in over 150 sizes, there is one adapted to your special requirements.

Write us to-day for descriptive matter.

Talk to us about Presses for any and every purpose.

E. W. Bliss Co., No. 20 Adams Street
Brooklyn, N.Y.
Chicago Office: 622 West Washington Boulevard
Detroit Office: Dime Bank Building



Elmes Hydraulic Press No. 676 With ¾-in. Automatic Lever Operating Valve No. 677-A

This press is of steel and semi-steel construction, and the stands which support the press are threaded at the ends to receive the steel columns and have holes for fastening to the floor. The platen is guided by the columns.

The operating valve is attached to the cylinder, and is designed with a weight to be set for the pressure desired, and releases automatically. To start the ram up, the lever is pushed down; upon the ram reaching the desired pressure, the lever automatically releases (acting as a safety valve as well), causing the ram to descend. Valve body is made of bronze, and other parts are made of tool steel and machine steel. If desired, a hydraulic gauge can be attached to show the various pressures, although with this valve it is not necessary.

Write for our Hydraulic Machinery Catalogue.

Charles F. Elmes Engineering Works 217 N. Morgan St.
Chicago, U.S.A.

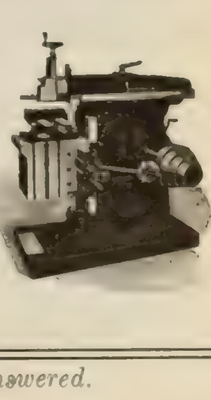
Over 50 years' experience building hydraulic machinery.

Don't Crowd Your Large Machines

You cannot manufacture small parts economically on a large machine. Steptoe Small Power Feed Millers and Hand Millers are especially adapted for that kind of work, a stiff heavy tool that can be quickly handled and crowded to the limit. That is the machine to buy for small parts.

If your Planers are crowded take the small jobs and put them on a Steptoe Shaper and you will do them quicker and you will have less money invested in equipment.

STEPTOE SHAPERS "Just a Little Better." CIRCULAR ON REQUEST.



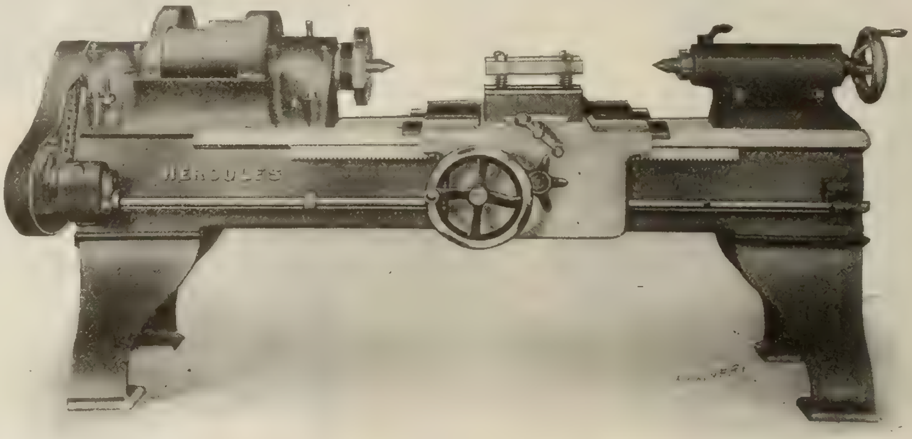
John Steptoe Co., CUMMINSVILLE,
CINCINNATI, OHIO, U.S.A.

How Lathe Simplicity Solves Labor Problems

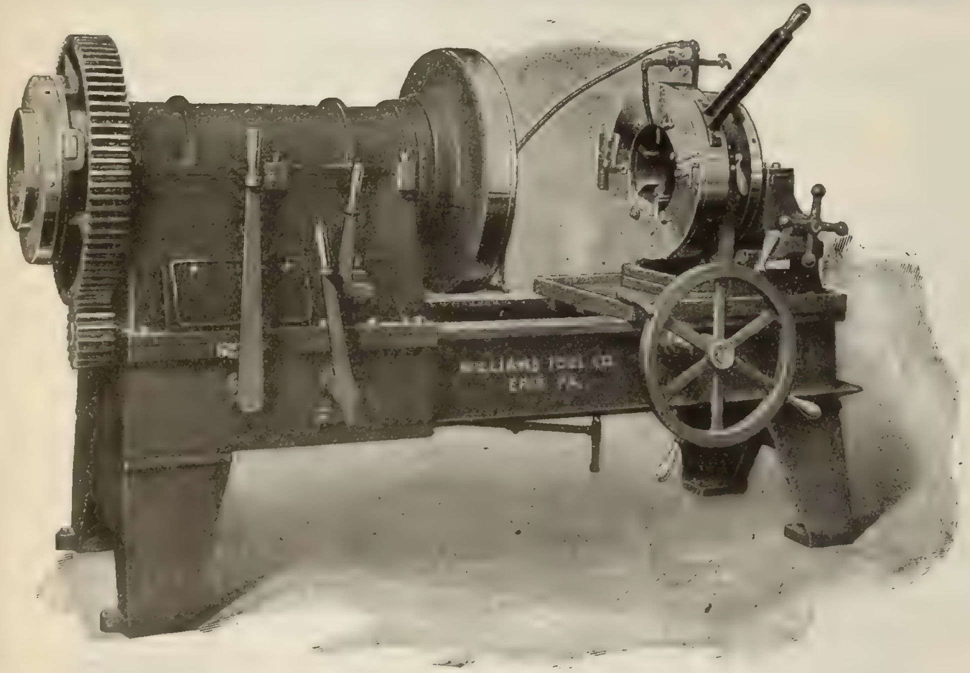
The great simplicity, the compact, convenient design, make the Hercules Lathe an ideal single-purpose machine. To train an unskilled laborer to perform accurately one or two operations on this machine requires but a short time. The rugged, powerful construction then enables that laborer to turn out precise work continuously at the maximum speed.

Where skilled mechanics are not always available — the Hercules Single-Purpose Lathe is the logical machine tool.

At the present time, we can still make early deliveries. Write — at once—for full details.



HIMOFF MACHINE COMPANY, INC.
128 MOTT STREET, NEW YORK CITY



The gas light was a big improvement over the tallow dip, but it had to give way to the electric light; and the Tungsten has superseded the little glimmer that once delighted us.

If you are still employing pipe-cutting methods as antiquated as the tallow dip, you need a Williams Pipe Machine, which occupies the same position in the pipe-cutting field as the Tungsten does in the lighting world, to bring you up-to-date.

Let us quote you prices and terms: any machine to cut 10 sizes of pipe between 1-4 inch and 18 inch, with any kind of power.

Anyone making, selling or buying a pipe machine, claimed to be a Canadian-made Williams Pipe Machine, does so without right or authority from us, and is liable to prosecution for damages.

Williams Tool Co., Erie, Pa., U.S.A.

AGENTS:

A. R. WILLIAMS MACHINERY COMPANY

ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER

PEERLESS
PEERLESS MACHINE CO. RACINE WIS. U.S.A.

Are You Behind on Cutting Your Steel?

then read these two paragraphs from a customer's letter. Could anyone expect to hear so favorably from a customer after waiting eight weeks for delivery on machine? It was real production and satisfaction that prompted them to write this letter.

"On arrival of this machine we were so far behind on cutting that we thought some one or two more machines would be required for our works, but owing to the high speed and the rapid cutting of this machine it has caught up with our work in a short time. We are now more than pleased that we had the patience and waited delivery on this tool, even if we were put to considerable inconvenience, as a lot of our work had to be sent out to be cut.

"We must say that this tool is certainly a great time-saver in actual time saved in operating the machine. We figure the operator's time saved alone will soon pay for this tool."

Several other interesting facts in this letter. Would you like a copy, together with other descriptive matter?

This machine cuts off 2¼" round Manganese bronze in 12 seconds. Compare this with your cutting time.

Note its rigid construction, it means increase in production.

PEERLESS MACHINE COMPANY
1607 Racine Street RACINE, WISCONSIN

SPEED SPEED

This pile of 1-inch square steel bars was cut in nine hours with a

Racine Metal Cutter

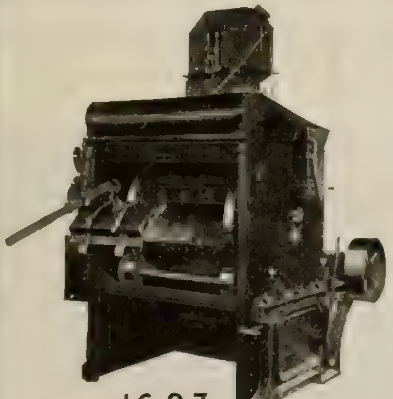
with ONE BLADE at a blade expense of six cents.

You will profit by learning all about the Racine features that make records like this possible.

Used extensively in Canadian plants. One Canadian Steel Company is using 120.

We'll gladly put you in touch with users and send full details.

RACINE TOOL & MACHINE COMPANY
15 Melbourne Ave., Racine, Wisconsin, U.S.A.



1697

Sand Blast Equipment

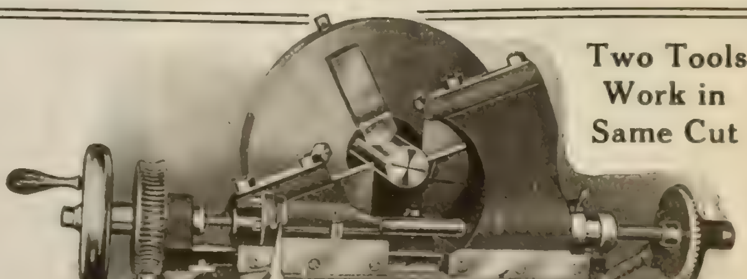
The improved design of barrel shown needs no foundation and can be moved to any place in the shop. Absolutely dustless. Automatic action. Direct connected to air line. Castings dump into truck after cleaning.

Write for particulars.

Complete Foundry Equipments

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB.

Cranes of all Types



Double-Quick Cutting-Off

Two Tools Work in Same Cut

THE HURLBUT-ROGERS CUTTING-OFF AND CENTERING MACHINE has the advantage of two cutting tools.

Each tool is rigidly supported in a stationary block at an angle which permits a strong shearing cut.

WITH THIS MACHINE PRODUCTION CAN BE NEARLY DOUBLED, and the utmost accuracy maintained under the hardest of work.

Read full details. Write for catalogue.

Hurlbut-Rogers Machinery Company
South Sudbury, Mass., U. S. A.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow, Newcastle-on-Tyne. H. W. Petrie, Toronto, Canada.

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO.
LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Heavy Machine Tools for
8-inch, 9.2-inch and 12-inch Shells

18" and 20" Engine Lathes for Tool Room Equipment.

Single Purpose Turret and Turning Lathes for 6" Shells and under.

Write us for prices and deliveries on anything in the way of Iron or Wood Working Tools.

GARLOCK-WALKER MACHINERY CO., Limited, Telephone Main 5346 **32 Front St. West, TORONTO**

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds

"CLAUDE" OXYGEN MADE FROM LIQUID AIR

The Most Efficient — Absolutely Safe — in Purest Form—Full Measure—at Low Price— —Delivered the day your order arrives—

OXY-ACETYLENE
Welding and Cutting Plants
—(Made in Canada)—
as well as
Pure Dissolved Acetylene
supplied by
L'AIR LIQUIDE SOCIETY
—Three Canadian Distributing Stations—

26 Boler St. WEST TORONTO
Maisonneuve MONTREAL
325 William Ave. WINNIPEG

—Branches the World Over—

L'Air Liquide Society, Maisonneuve,
MONTREAL, P.Q.

Gentlemen,—Will you please send, without obligation to me, postpaid, your New Booklet?

Name ....

Address ....

Province .... Date ....

Business .... C.M.

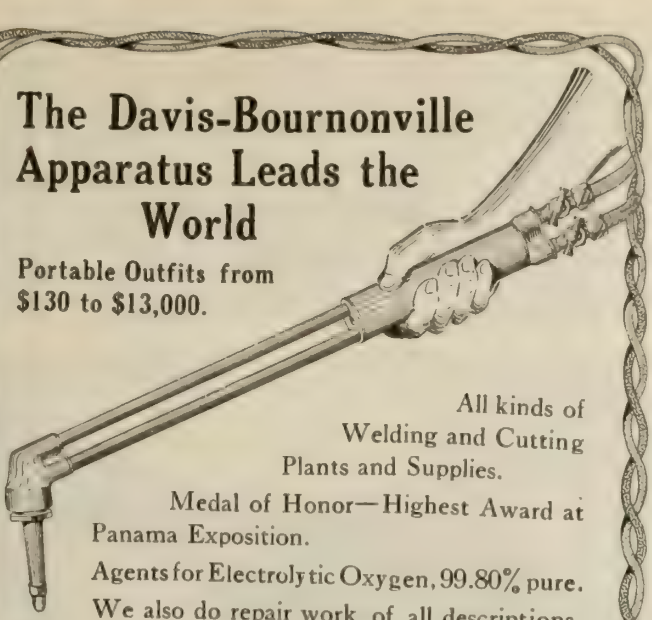
Steel Tank—10 ft. x 8 ft.—ALL WELDED—Made in Canada

BOILER and TANK MAKERS:— WRITE US for MORE DETAILS.

← **THIS COUPON will bring you much information. Do not postpone. Send Coupon NOW.**

The Davis-Bournonville Apparatus Leads the World

Portable Outfits from $130 to $13,000.



All kinds of Welding and Cutting Plants and Supplies.

Medal of Honor—Highest Award at Panama Exposition.

Agents for Electrolytic Oxygen, 99.80% pure.

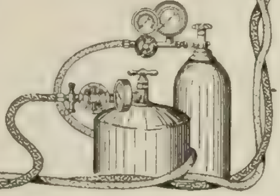
We also do repair work of all descriptions.

Write us for price list.

Carter Welding Company

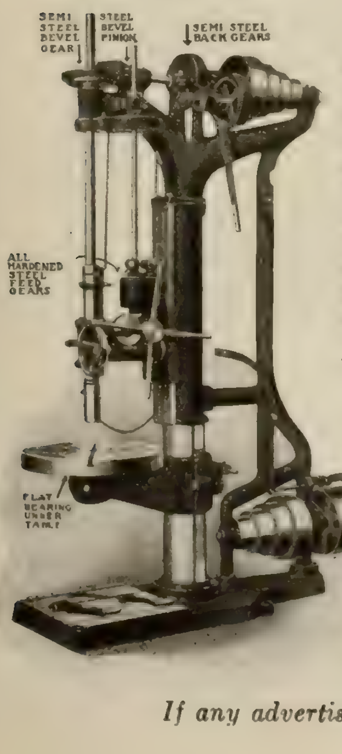
561 King Street West, Toronto
Tel. Ade. 893

Canadian Agents for
The Davis-Bournonville
Apparatus



"AURORA"

Drilling Machines



COVER AN EXCEPTIONALLY WIDE RANGE OF WORK, and every provision is made for handling this work within closest time limits and at lowest labor costs. They will save you money on any work in your shop that's suitable for machine tools of this kind because of their unusual speed, accuracy, convenience, strength and durability.

Ask for Details.

Stationary Head,
sizes 20"-21"

Sliding Head,
sizes 22"-44"

The Aurora Tool Works
AURORA - IND.

Oxy-Acetylene Welding and Cutting

Manufacturing metal furniture, using the Prest-O-Lite Process

Makes Greater Savings in Metal Manufacturing

Oxy-acetylene welding is a simple, low cost, easily learned method of metal joining that makes possible marked economies in production costs, and increased quality in the finished article. Welded joints are rapidly displacing riveted and threaded joints of many kinds.

It will pay you to investigate. From the manufacture of heavy machinery to the making of fine surgical instruments, oxy-acetylene welding is more than paying its way. Work heretofore considered too expensive or too intricate **has now become simple every-day routine. Welded joints** can be made as strong as any other part of the finished article. Metal is left in ideal condition for subsequent machining.

For the same reasons that oxy-acetylene welding is so valuable in metal manufacturing, it is highly profitable in all kinds of metal repairing. Just one important welding repair could easily repay you for all needed apparatus by preventing serious tie-ups in production, to say nothing of the savings on old parts reclaimed and the troublesome **dismantling avoided.**

Secure the greatest convenience, the widest range of usefulness, and the highest efficiency by adopting the

Prest-O-Lite
PROCESS

Employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene (ready-made carbide gas) is backed by Prest-O-Lite Service, which provides dry, purified gas, insuring better welds, quicker work and lower cost, and also avoids the large initial outlay and heavy depreciation incurred in making crude acetylene in a carbide generator.

The necessary equipment is not expensive. We furnish high-grade welding apparatus for $75; acetylene service at additional cost. Adaptable for oxy-acetylene cutting by the purchase of special cutting blowpipe. Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene—any average workman who understands metals can learn the process quickly and easily.

Put your production problems up to our oxy-acetylene experts. Send for thoroughly illustrated literature that shows specific instances of the savings made and how easy it is to apply these economies in your shops.

The Prest-O-Lite Company, Inc.
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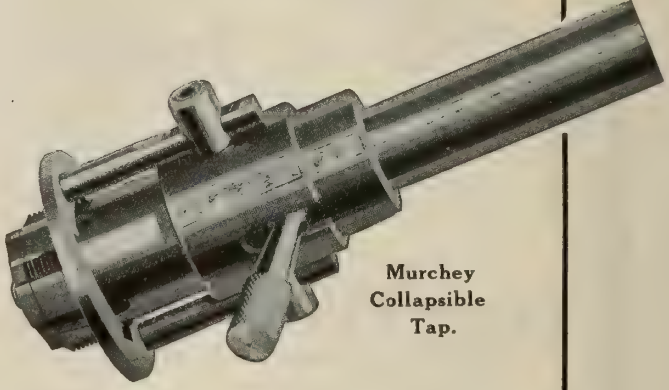
The World's Largest Makers of Dissolved Acetylene.
Canadian Main Office and Factory
MERRITTON, ONTARIO
Factory Branch: Winnipeg, Man.
53 Branches and Charging Plants
Keep Canadian Factories Going. Insist on Buying Goods MADE IN CANADA.

MURCHEY
TAPS AND DIES

—very extensively used on 6-in., 8-in. and 9.2-in. shells.

The great advantage of using MURCHEY COLLAPSING TAPS and DIES on large shells—



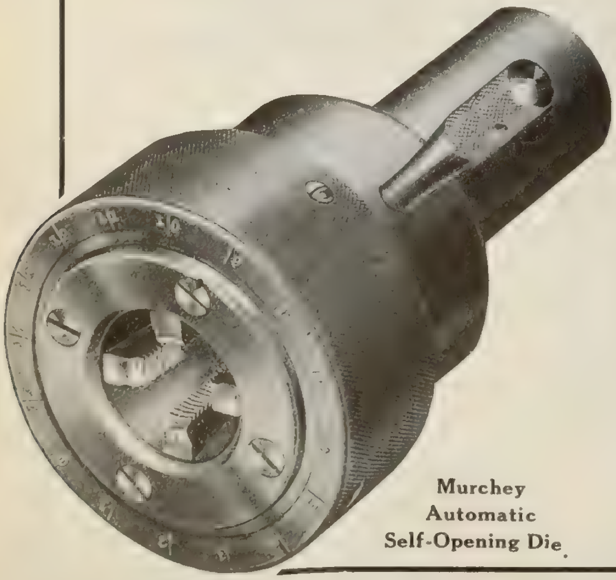
Murchey Collapsible Tap.

THEY save the time of rechucking and rehandling, the possibility of the shell getting out of center, and by using a roughing and finishing tap they are able to tap the base and nose of these shells in about one-fifth of the time it requires on a thread miller and produce accurate work.

MURCHEY Taps and Dies save the buying of extra machines, and the time alone required to thread one of the large shells, together with rehandling, will more than pay for the tap in a very short time.

THE largest American firms are doing all the threading on shells with Murchey Collapsing Taps and Murchey Self-opening Dies, and are getting most desirable results.

Send us Blue Prints of your requirements and we'll gladly quote you on the necessary tools.

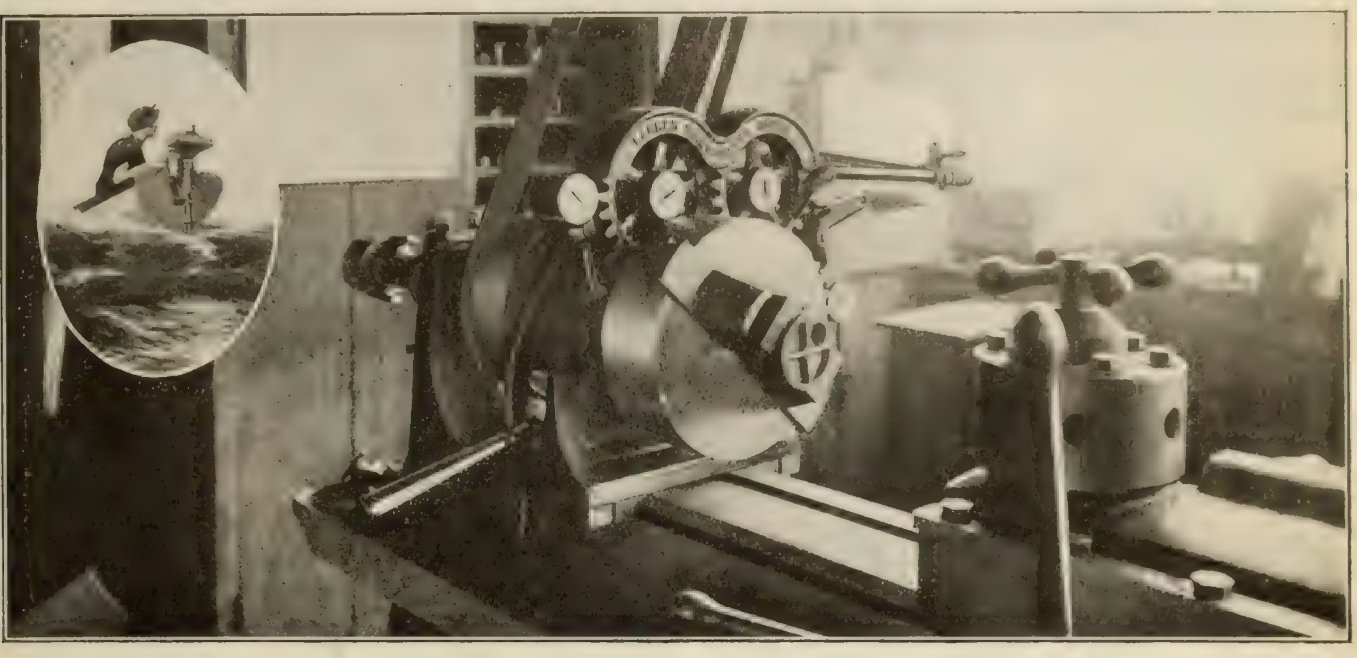


Murchey Automatic Self-Opening Die

Murchey Machine & Tool Company

75 Porter St., Detroit, Mich.

On and Off Any Lathe Like A Face Plate



A Barker Wrenchless Chuck

In daily operation in the Machine Shop of the Evinrude Motor Co., Milwaukee, Wisconsin. Supt. E. P. Gleason in enthusiastically speaking of the chuck, summed up its fine points as follows:

FIRST—It can be mounted upon any lathe. It is as easily put on or removed as the face plate.

SECOND—It does away with cumbersome heavy cylinders mounted on end of spindle to be started and stopped each time lathe is reversed.

THIRD—There is nothing to happen to one unit that will in any way effect operation of the rest. A broken air line might put out of commission several units.

FOURTH—Chuck and spindle are same diameter, thus permitting bar work.

FIFTH—You really can feel it work—you can consequently close the jaws tight enough to hold without danger of crushing.

SIXTH—It lessens the overhang because all levers, cams, arms, etc., revolve auxiliary with the spindle.

"Yes, I am well pleased with its work and cheerfully recommend it," concluded Mr. Gleason.

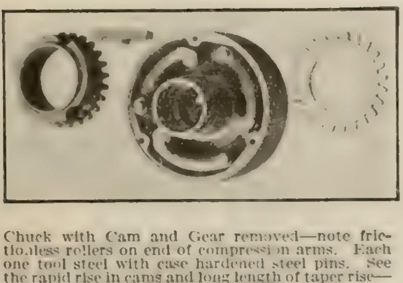
Isn't it reasonable to suppose what it is doing for the Evinrude Motor Co. and many others it will do for you?

As far as we can find out it costs not less than 15 cents per day for each air operated chuck besides installation work —what's the answer?

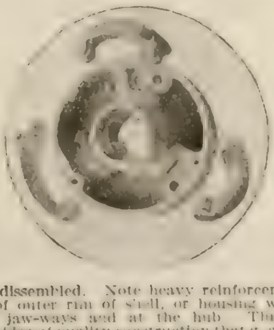
Let us tell you more about this money saving Barker Wrenchless Chuck—write us for details—it will not obligate you to buy—and it will be a saving in "first cost" and "up-keep" that is most interesting.

Thomas Elevator Company,

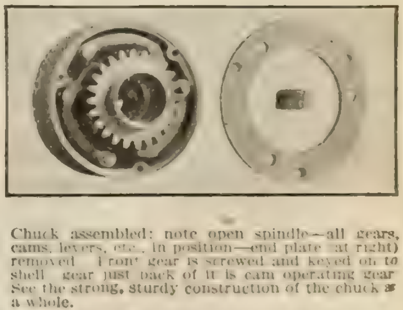
22 South Hoyne Avenue
Chicago - Illinois



Chuck with Cam and Gear removed—note frictionless rollers on end of compression arms. Each one tool steel with case hardened steel pins. See the rapid rise in cams and long length of taper rise—this feature permits great compression. An automatic stop prevents rollers from getting into pockets.

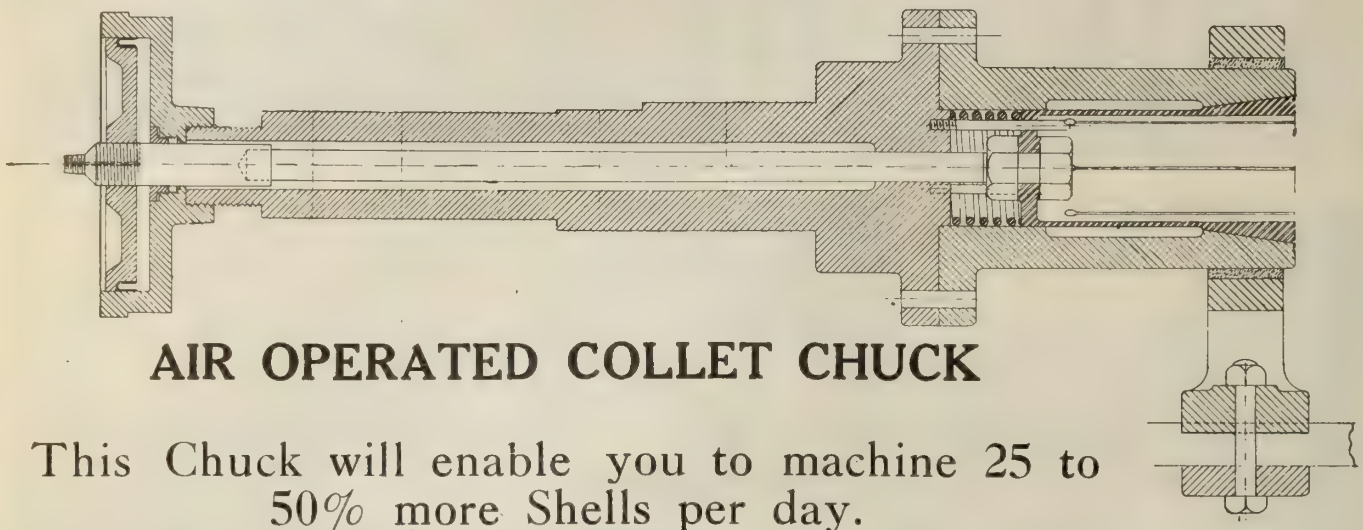


Chuck dissembled. Note heavy reinforcement of metal of outer rim of shell, or housing where it crosses jaw-ways and at the hub. This gives graphic idea of quality construction that guarantees durability.



Chuck assembled: note open spindle—all gears, cams, levers, etc., in position—end plate (at right) removed. Front gear is screwed and keyed on to shell, gear just back of it is cam operating gear. See the strong, sturdy construction of the chuck as a whole.

INCREASE YOUR PRODUCTION



AIR OPERATED COLLET CHUCK

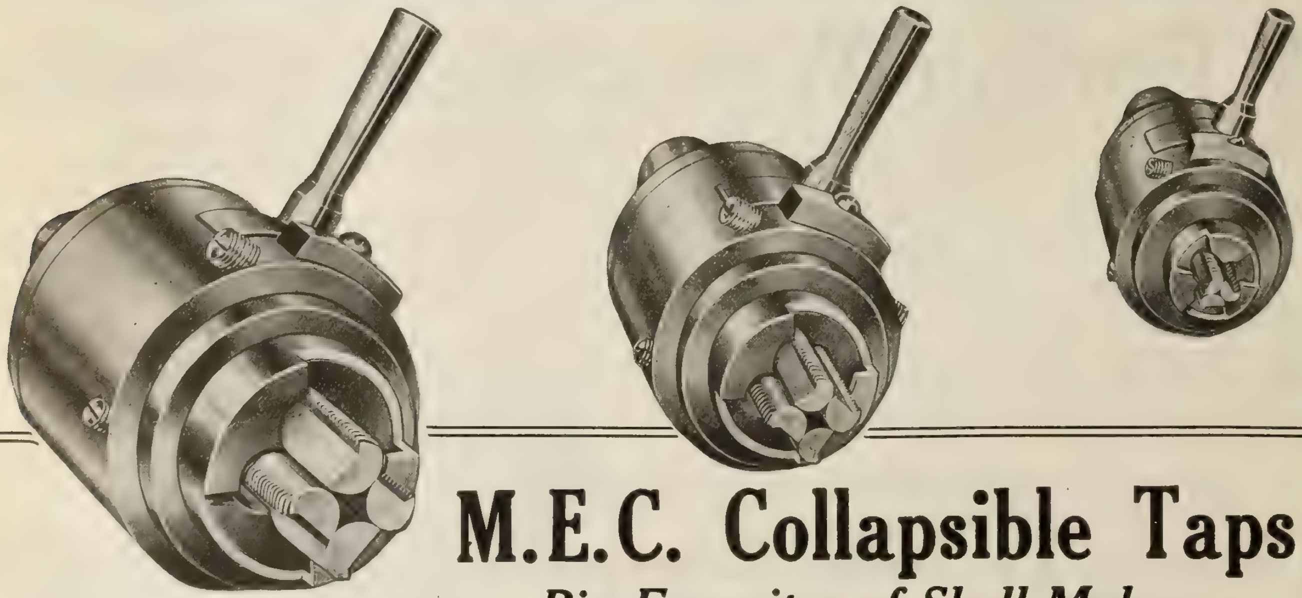
This Chuck will enable you to machine 25 to 50% more Shells per day.

MADE IN ALL SIZES. ADAPTABLE TO ANY HOLLOW SPINDLE LATHE.

Particulars on Application. ***Prompt Delivery.***

HYDE ENGINEERING WORKS

P.O. Box 1164 **27 William St., MONTREAL**



M.E.C. Collapsible Taps

Big Favorites of Shell Makers

Manufacturers of shrapnel shell parts find them invaluable because of their convenience, rigidity and accuracy. Many of Canada's largest manufacturers of munitions have adopted them as a **practical way of reducing cost and increasing output,** after putting them to a severe test.

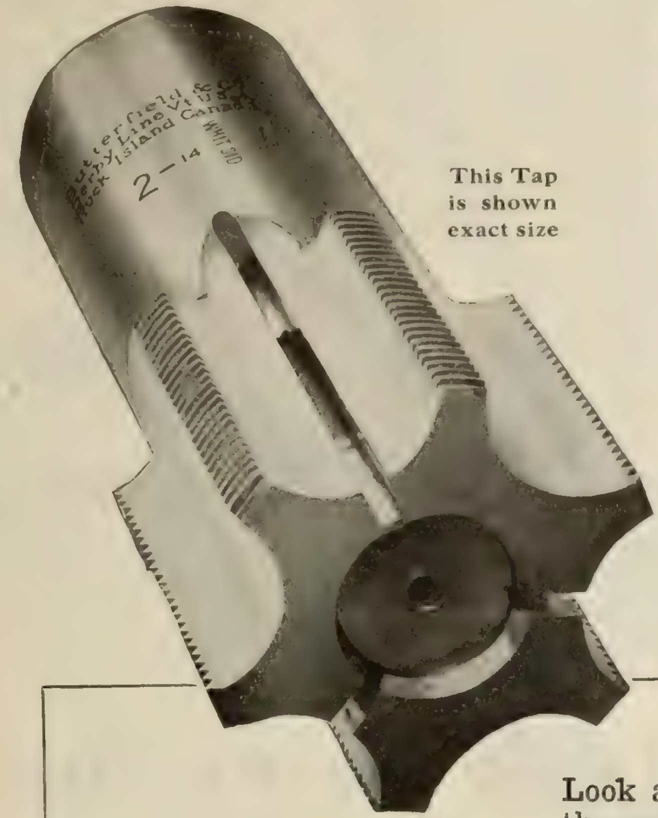
Would you like to hear what users have to say? We'll be glad to put you in touch with our Canadian customers.

Drop us a line now for our proposition—it's a liberal one that's sure to appeal to you.

MANUFACTURERS EQUIPMENT COMPANY

175-179 North Jefferson Street, CHICAGO

FOREIGN AGENTS: C. W. Burton Griffiths & Co., Ludgate Circus, Ludgate Hill, London, England. Bureaux & Caisse, 39 Rue de Lappe, Paris, France. Geo. A. Todd, 152 Bay St., Toronto.



This Tap
is shown
exact size

For—

FASTER FEEDS
FASTER SPEEDS
LONGER SERVICE

Look at that solid strength through the shank of this tap — it means power that will stand up under the heavy strain of exceptional production.

BUTTERFIELD
TOOLS

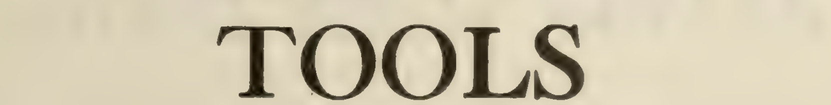
are the highest development of over 35 years' experience.

Try them and you'll have a new idea of tap service, economy and efficiency.

Our new catalog illustrates and describes all the Butterfield Products. May we send you a copy?

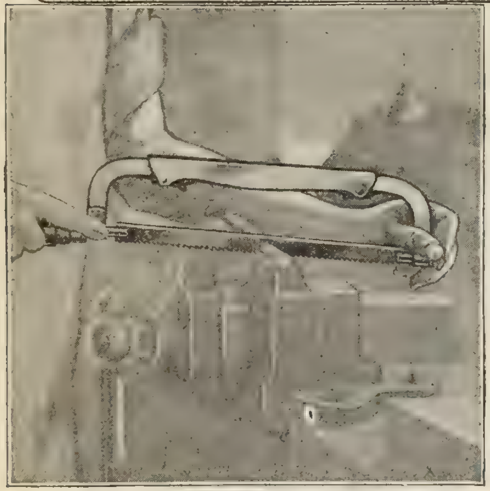
Butterfield & Company, Inc.
ROCK ISLAND, QUEBEC

Taps, Dies



Reamers, Etc.

Starrett
STARRETT
HACK SAWS
CUT QUICKER
LAST LONGER



Hack Saws for Clean-Cut Work

YOU cannot expect a hack saw that is intended for work on cast-iron pipe to make a clean cut in sheet steel. For this reason the good workman who wants blades that are right for every job buys

TRADE MARK
Starrett Hack Saws
REG. U.S. PAT. OFF.

There is a Starrett blade of just the proper steel composition, number and set of teeth, shape, size and thickness for every kind and shape of metal. Starrett Hack Saws properly selected will do better work and last longer than any general-purpose hack saw. For most satisfactory results with hand frames order by this table:

No. 103 Saws in hand frames, to cut cast steel, cast iron, tool steel and all solid metals.

No. 103B Saws in hand frames, to cut cold-rolled stock and soft metals.

No. 102 Saws in hand frames, to cut sheet metal and tubing 16 to 18 gage.

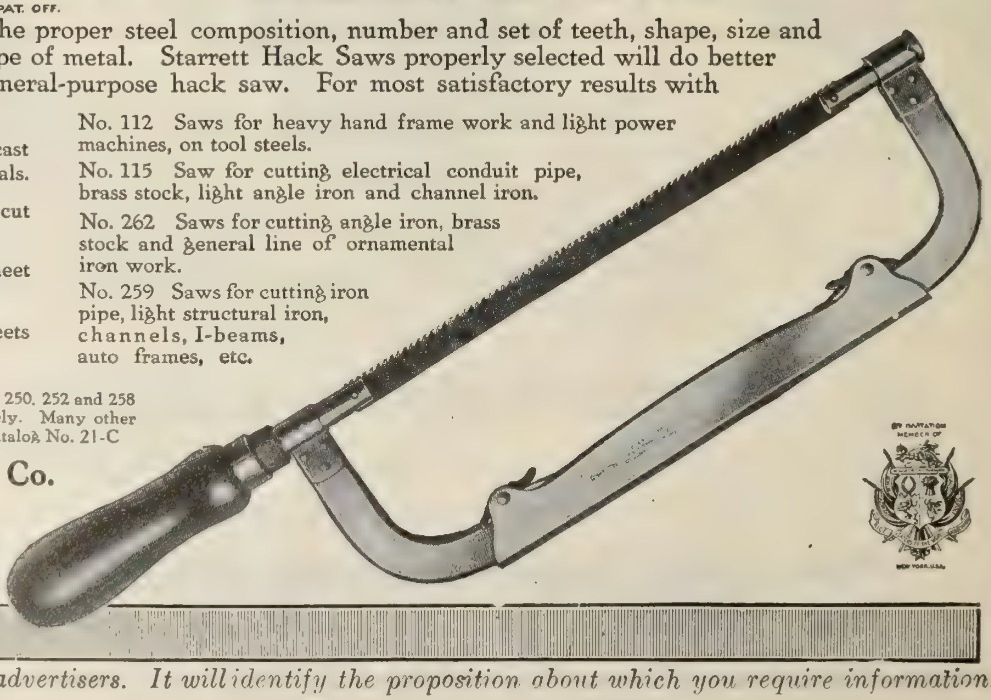
No. 253 Saws in hand frames, to cut sheets and tubing thinner than 18 gage.

No. 112 Saws for heavy hand frame work and light power machines, on tool steels.

No. 115 Saw for cutting electrical conduit pipe, brass stock, light angle iron and channel iron.

No. 262 Saws for cutting angle iron, brass stock and general line of ornamental iron work.

No. 259 Saws for cutting iron pipe, light structural iron, channels, I-beams, auto frames, etc.



If flexible back saws are preferred, use Nos. 250, 252 and 258 instead of Nos. 103, 102 and 253 respectively. Many other styles for machine cutting. Write for free catalog No. 21-C

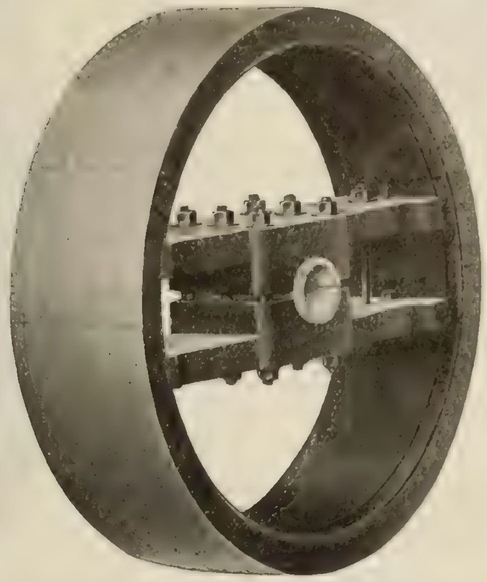
The L. S. Starrett Co.
Athol, Mass.
"The World's Greatest Tool Makers"
New York London
Chicago

PULLEYS

No Keys

No Set Screws

In Perfect Balance



Lighter

Stronger

Better Belt Surface

The Dodge Standard Wood Split Pulley

The Wood Split Pulley is better than either cast iron split pulleys or steel split pulleys for the following reasons—

The wood pulley is lighter, stronger, better balanced, and provides a very much better belt surface. It costs 33 1-3% less money and provides 50% more returns in horse-power value. It may be run at very much higher speeds with no danger of bursting—also it may be had quicker and in a greater range of sizes.

It costs less to get—less to put on—and less to keep.

We make approximately 300 Dodge pulleys every day—everybody uses them.

There are more Dodge pulleys making ammunition than any other kind—you can get them quick.

Every pulley is thoroughly nailed. Every pulley is guaranteed for Double Belts.

We are Canada's greatest pulley makers.

If you have not our Books, write us.

DODGE MANUFACTURING COMPANY

Toronto - - Montreal

Save the Power Lost in Air-Fanning

The powerful strokes of eagles' wings are nothing more or less than *air fanning.* And a big eagle can lift considerable weight and get away with it.

The average steel or wood pulley has anywhere up to eight "wings," which *fan* the air when they revolve rapidly around the shaft.

The *power loss* is obvious — and when you compare with AMERICAN STEEL SPLIT PULLEYS, whose arms cut the air instead of fanning it, it becomes clear *why* coal or current consumption goes *down*—much!

We have valuable data, showing exactly how much power this *one* advantage of AMERICANS saves—and other of their characteristics result in proportionately great additional savings.

Without obligation, we will mail you this data on request.

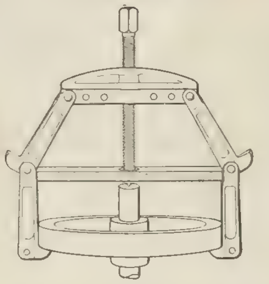
Over 60,000 pulleys—3 inches to 120 inches in diameter—stocked at centres named below, and additional thousands stocked by over 200 dealers insure prompt deliveries. Write for quotations and delivery dates.

American Pulley Co.
4206-60 Wissahickon Ave.
Philadelphia, U. S. A.

New York, 33-35 Greene St.
Boston, 165 Pearl St.
Chicago, 124 S. Clinton St.
Seattle, 536 First Ave., S.
WILLIAMS & WILSON, LTD. Montreal. The The A. R. Williams Machinery Co., Ltd., St. John, N.B.; Toronto, Winnipeg, Vancouver.

AMERICAN Steel Split PULLEYS

CRANE'S New Model Patent Wheel Puller



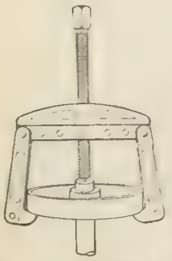
Work of Large Diameter (a piece of wood being used as a spreader)

For Removing Transmission and Cam Shaft Gears, Auto Wheels, Fly-Wheels, Sprockets, Collars, Couplings, Propellers, Universal Joints—For Straightening Shaft, Bending Pipe, Etc.

The screw has a flat end with inserted tempered tool steel point, that will not spread cutters. Makes its own centre on work that has none. The strain is taken on the flat end of the screw. Grease to keep from cutting. The screws are made of high carbon steel and case-hardened all over. All pullers are furnished with two sets of the new combination hook extension arms.

The Pipe Bending Attachment consists of a pair of arms and forked end for the screw.

Write for full particulars.



Removing Work Near End of Shaft

The Crane Puller Co.

54 Lake Street
ARLINGTON, MASS., U. S. A.

Canadian Distributors: Canadian Fairbanks-Morse Co., Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary; John Millen & Son, Montreal, Toronto, Winnipeg, Vancouver.

LEVIATHAN AND ANACONDA
ELEVATING
TRANSMITTING
CONVEYING
BELTING

"THE REAL REASON" for buying a

Leviathan or Anaconda Belt

means more dollars saved to you than you can ever pay us.

Your inquiry insures our proving this.

Quick deliveries.

Let us help you solve your belting troubles.

MAIN BELTING COMPANY OF CANADA LIMITED
10½ St. Peter St., Montreal

WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE.

"FULFLO"
MACHINE TOOL
Lubricant
PUMP

You can drive your machines faster

but your cutting tools won't stand it — the speed burns them up.

A cutting tool will stand up to higher speed and heavier feeds, providing it is kept cool.

The "FULFLO" Machine Tool Lubricant Pump supplies a good "HEAVY" stream of compound sufficient to carry away all the heat.

No gears or other close-fitting parts to be affected by the grit, dirt or small chips that are always present in the coolant. No clogging.

The only working part is the impellor. Since no check valve, reverse valve or any other kind of valve is present in the pump or pipe, other than the stop cock, the usual valve troubles are eliminated.

Easily attached to any machine. **Insist that the new machines you buy be equipped with the "FULFLO."**

The Cincinnati Lubricant Pump Co.
2270 Spring Grove Avenue - Cincinnati, U.S.A.

ECONOMIC WATER OIL

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the **COST** of your **CUTTING MIXTURE** BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with **30 to 50** gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be **satisfactory**, but will produce very **ECONOMIC RESULTS.**

One TRIAL ORDER will **prove** our STATEMENT.

Made in Canada

Canadian Economic Lubricant Co.
LIMITED
1040-1042 Durocher St. MONTREAL

Ask Your Dealer or Send to Us for New Catalog

FORGES	HAND AND POWER BLOWERS
DRILLS	PUNCHES AND SHEARS
PUMPS	COMBINATION WOODWORKERS

Fan System Apparatus of all kinds

CANADIAN BLOWER AND FORGE COMPANY, Ltd.
Factory and Main Office, BERLIN, ONT.
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The Measure of Superiority

of

Williams' "AGRIPPA" Tool Holders

"THE HOLDERS THAT HOLD"

is the proportion in which they excel and endure.

You can verify our GUARANTEE of their maximum resistance, adjustment, interchangeability, usefulness, life and economy by exhaustively testing them on your own machines. When you have done so you will not care that their minimum age has not yet permitted maximum distribution. If they had been in existence a full quarter century you would probably doubt their having the most up-to-date improvements.

Quality, not Quantity, establishes individual tool-holder value.

J. H. WILLIAMS & CO.

45 Richards Street BROOKLYN, N. Y. CITY

The Wrench People

Western Office and Warehouse:

40 So. Clinton Street, CHICAGO, ILL.

Cut Filing Costs in Half

Filing is like drilling. The moment the file wears smooth, it takes twice, or three times the energy to accomplish the desired result. Engineers have got it down to a scientific basis in drilling. The moment a drill reaches its "inefficient point," it is discarded and this "efficient point" is determined by the amount of power used to drill a certain dimension.

Workmen are not machinery; consequently you have to depend upon the personal element and educate your men up to the point where they will know at once when their files have reached the "inefficient point." If you can educate your men to do this you will get double the results at the bench, compared by results when men have been working with files that are inefficient.

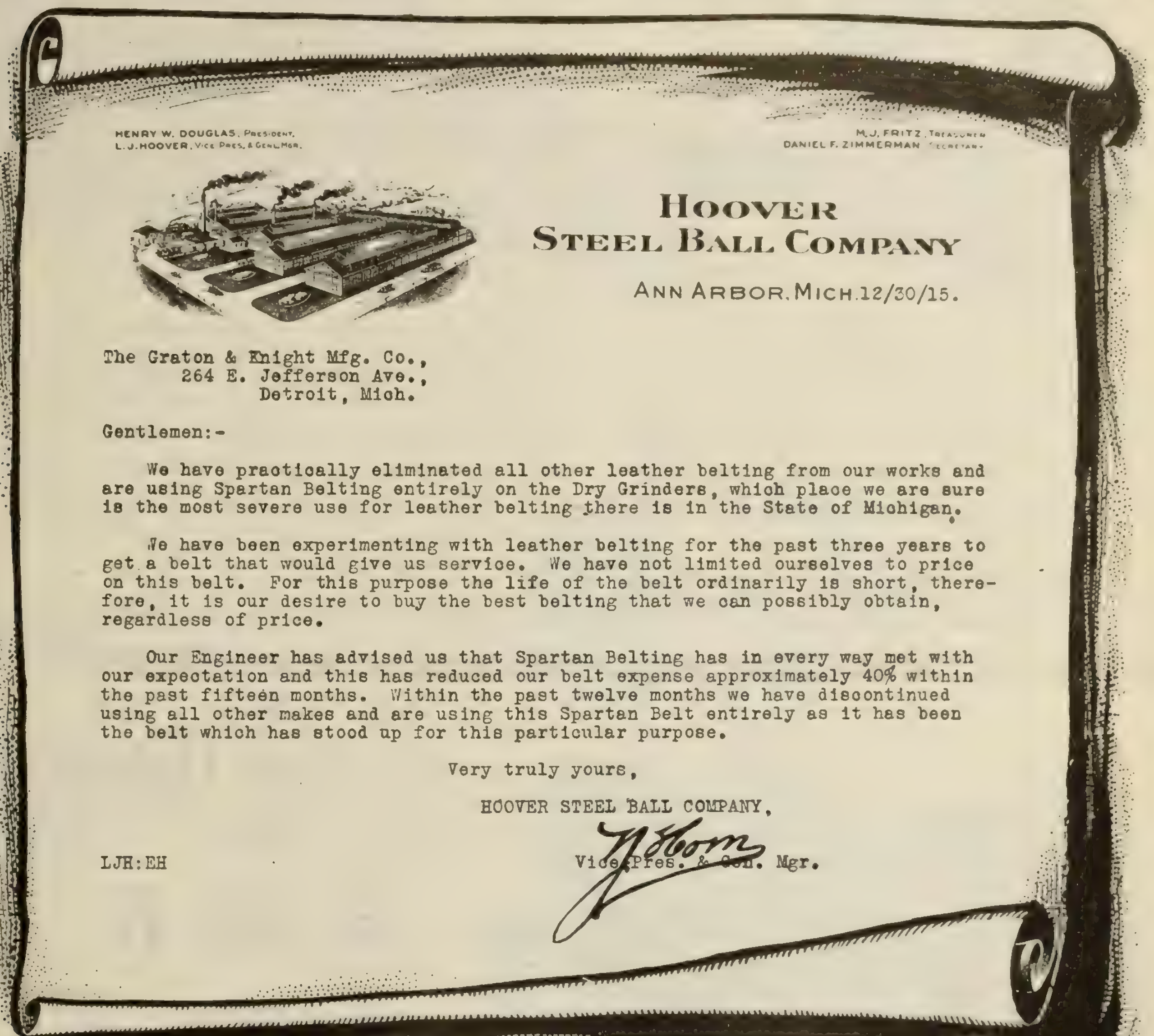
KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE
(Made in Canada)

Write for our booklet "File Filosophy." It is well worth reading by any manufacturer, shop superintendent, shop foreman or workman who is concerned with the use of files.

Nicholson File Company

Port Hope *(Jobbers Everywhere)* **Ontario**

BELTING EXPENSE REDUCED 40%



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L. J. HOOVER, VICE PRES. & GEN. MGR.

M. J. FRITZ, TREASURER
DANIEL F. ZIMMERMAN, SECRETARY.

HOOVER STEEL BALL COMPANY

ANN ARBOR, MICH. 12/30/15.

The Graton & Knight Mfg. Co.,
264 E. Jefferson Ave.,
Detroit, Mich.

Gentlemen:-

We have practically eliminated all other leather belting from our works and are using Spartan Belting entirely on the Dry Grinders, which place we are sure is the most severe use for leather belting there is in the State of Michigan.

We have been experimenting with leather belting for the past three years to get a belt that would give us service. We have not limited ourselves to price on this belt. For this purpose the life of the belt ordinarily is short, therefore, it is our desire to buy the best belting that we can possibly obtain, regardless of price.

Our Engineer has advised us that Spartan Belting has in every way met with our expectation and this has reduced our belt expense approximately 40% within the past fifteen months. Within the past twelve months we have discontinued using all other makes and are using this Spartan Belt entirely as it has been the belt which has stood up for this particular purpose.

Very truly yours,

HOOVER STEEL BALL COMPANY,

Vice Pres. & Gen. Mgr.

LJH:EH

Spartan Belting is daily proving its efficiency in plants of every description—proving it so conclusively that Spartan is fast becoming the universal equipment for all drives where the physical conditions are quickly ruinous to ordinary belting.

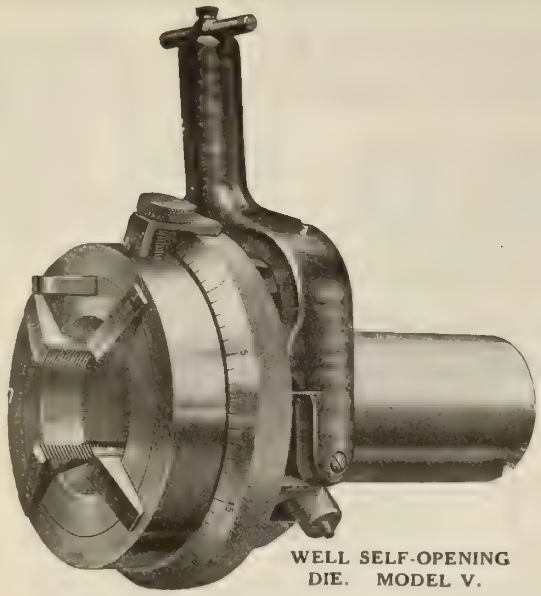
The use of Spartan Belting in your mill will mean the solution of your Hard-drive problems—it will mean greater, more efficient and more economical service. Why not select one or more of the difficult drives in your mill and put Spartan to the test?

G & K
SPARTAN

THE GRATON & KNIGHT MANUFACTURING CO.

Oak Leather Tanners and Belt Makers
WORCESTER, MASS., U.S.A.

Representatives in Canada:—The Canadian Fairbanks-Morse Company, Limited, St. John, Toronto, Quebec, Hamilton, Montreal, Ottawa, Vancouver, Victoria



WELL SELF-OPENING
DIE. MODEL V.

A large Stock of these Dies in stock for Immediate Shipment

Our line includes taps, dies, screw plates, gauges, reamers, threading machines, etc.

Send for our general catalog—contains tables, of valuable information for producers of screw threads.

Wells Bros. Co. of Canada, Ltd.

GALT, ONTARIO

Sales Agents; The Canadian Fairbanks-Morse Company, Limited,
Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary.

In Theory

a screw-cutting die reproduces its own thread.

In Practice

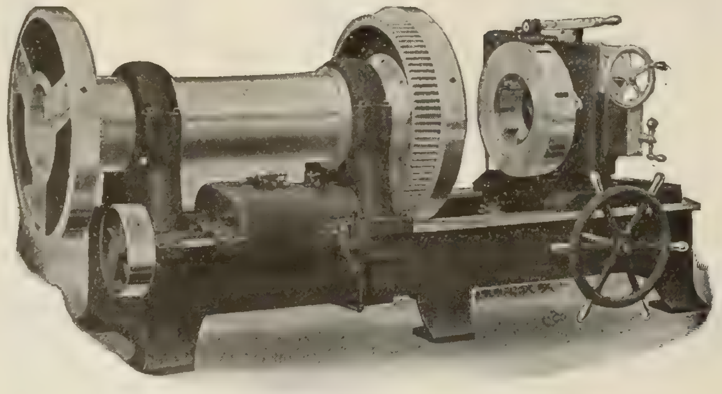
conditions incident to the application of power rise up to hinder; but the

Well Self-Opening Die

has mastered hindering conditions and produces the accuracy of lathe-cut threads at twice the speed of ordinary dies.

Do you want to cut the production cost of your screw thread work right in two in the middle? Then let us demonstrate in a small way at our expense that it can be done and you will be glad to do the rest.

Complete finely illustrated book sent free on request.



Cut Your Threads on a B & K and remove the frown

Frowns have no place around a Bignall & Keeler Pipe Machine. When a machine satisfies both the owner and the user, frowns are unknown. "Satisfies" is a big word when applied to pipe threading. There is the owner of the machine; the man who operates the machine, and the man who makes up the threaded joints. B&K machines satisfy all along the line.

What size are you interested in?

Bignall & Keeler Machine Works, Edwardsville, Ill.

CFM

The Canadian Fairbanks-Morse Co., Limited, Sales Agents for Canada

Montreal St. John Toronto Winnipeg Calgary Saskatoon Vancouver

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

Grinding Tapered Bodies of Connecting Rods

One of the largest gas engine and pump manufacturers in the middle west grinds tapered bodies of connecting rods to get good finish on these parts. It is putting in extra work not necessary for accuracy, therefore big production is required.

The photograph shows the machine grinding one of these rods, the tapered body of which is 30 inches long. The shaft is a drop forging, the finished small diameter is $1\frac{3}{8}$ in., and the large diameter $1\frac{7}{8}$ in. From 0.020 in. to 0.030 in. is removed—enough to clean up all lathe tool marks—the rod coming to the grinding machine after a roughing lathe cut only has been taken.

The wheel used is a Norton Alundum, 24 x 2 x 5 in., grain 24, grade M, running at a periphery velocity of 6,000 ft. per minute.

Canadian Agents
THE CANADIAN FAIRBANKS-MORSE CO., LTD.
Montreal, Toronto, Quebec, Ottawa, St. John, N.B.,
Winnipeg, Calgary, Saskatoon, Vancouver, Victoria.
F. H. ANDREWS & SON,
Quebec, P.Q.

NORTON

NORTON COMPANY
WORCESTER, MASS.
New York Chicago
Electric Furnace Plants:
Niagara Falls, N.Y. Chippawa, Ont.

820

Thor

SINGLE VALVE CHIPPING-HAMMERS

Equipped with a valve mechanism so perfectly balanced as to eliminate practically all vibration.

Made in five sizes, with piston diameter of 1 1/16" by strokes of from 1 to 5", designated as sizes A, B, C, D and E.

Shipped on Trial at Our Expense

Independent Pneumatic Tool Co.

CANADIAN OFFICE:
334 St. James St., MONTREAL, QUE.
General Offices: Thor Building, Chicago, U.S.A.
Branches: New York, Pittsburgh, Detroit,
San Francisco, Birmingham

For riveting base plugs in shells of high explosive type of 4.5", 5" or 6" size.

The
Grant Riveter

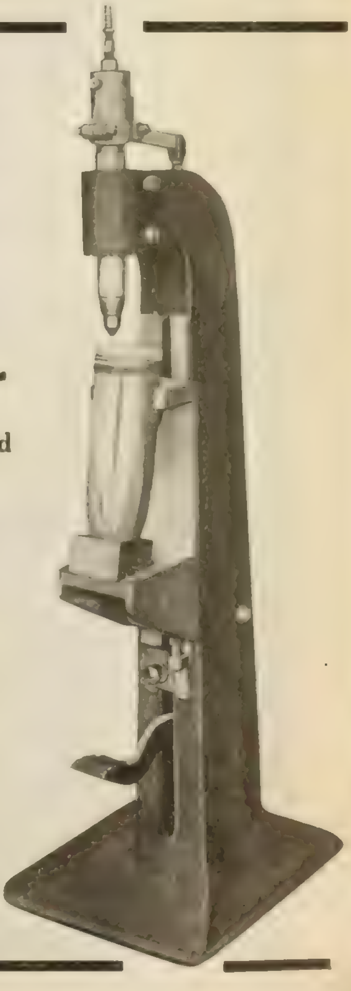
Does its work with speed and thoroughness.

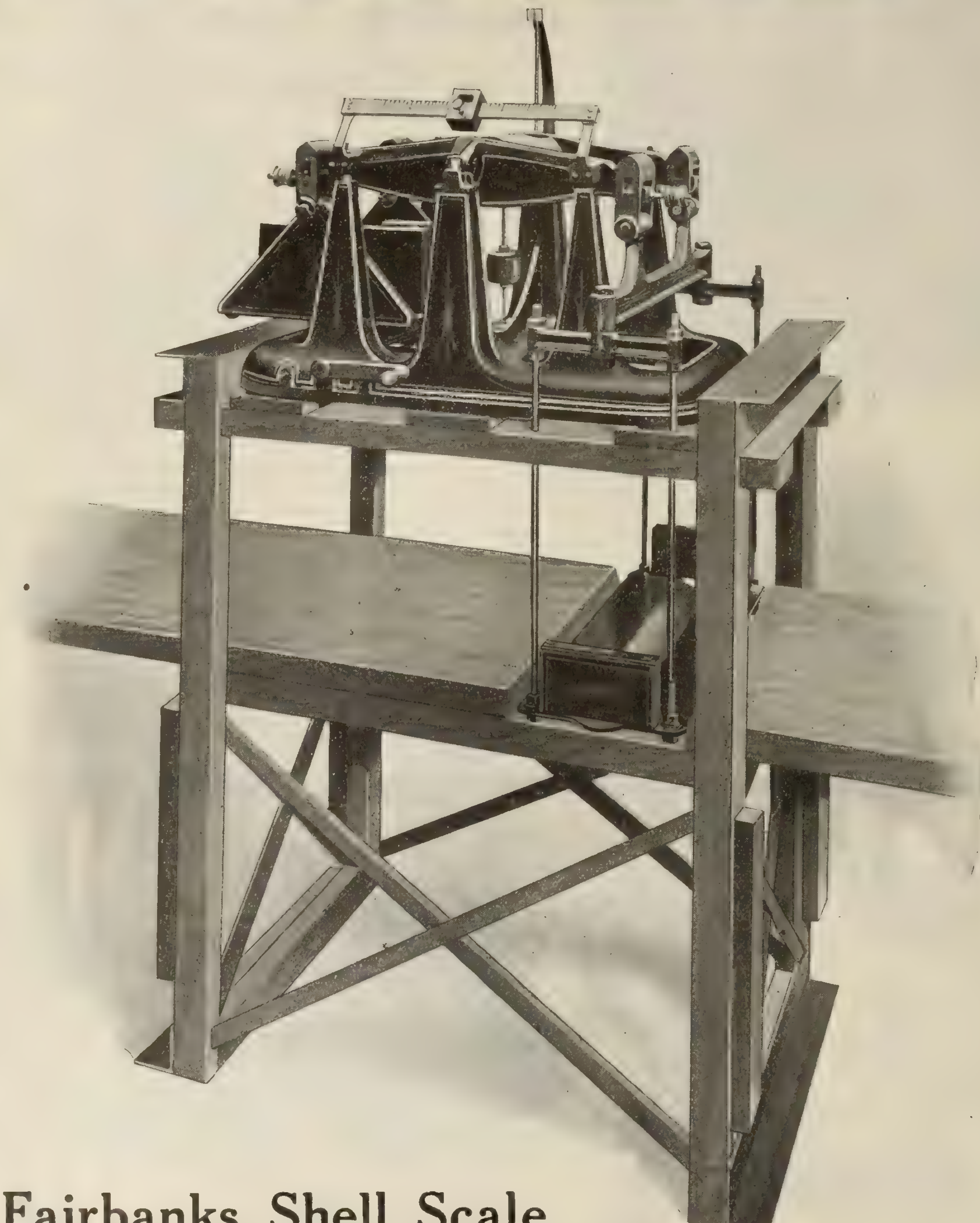
The riveting device is actuated by compressed air, and is fitted with a foot treadle which brings the hammer into action, leaving the operator with both hands free to handle the work.

The hammer strikes about 1,000 blows per minute, which enables the plug to be **riveted perfectly tight** in one complete revolution, occupying about **20 seconds.**

Drop a card for full details.

THE GRANT MFG. & MACHINE CO.
Holland Ave.
Bridgeport, Conn., U.S.A.





Fairbanks Shell Scale

EVEN-BALANCE TYPE

The simplest and most accurate scale made. Equipped with relieving device. Can be furnished as shown or with platform to hold shells standing on end. A plus or minus beam gives the variation of the shell from standard weight. Made for shells from 6″ to 12″ in diam.

Guaranteed to weigh within ⅛ of an oz.

CFM

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

St. John Montreal Quebec Toronto Hamilton Winnipeg Saskatoon
Calgary Edmonton Vancouver Victoria

CANADA'S
DEPARTMENTAL
HOUSE FOR
MECHANICAL
GOODS

Machining and Finishing the 8-inch High Explosive Shell-II

Staff Article

Although the manufacture of the large size high explosive shell by Canadian metal-working plants is now well established, it may be said that its initiation and development progress have occasioned little more than passing interest, the more noticeable of course because of the excitement and enthusiasm aroused when the manufacture of shrapnel shell was instituted. Experience in that direction has made possible the new achievement. The machine tool equipment, methods and devices, described, cover a plant which is easily a front-rank producer.

THE performing of operation 7—finish turn outside—completes the major operations on the forging, which has now assumed its final form so far as general external appearance is concerned. The remaining work to be done consists of minor operations which, although of more or less simple nature, call for continued accuracy and thorough workmanship.

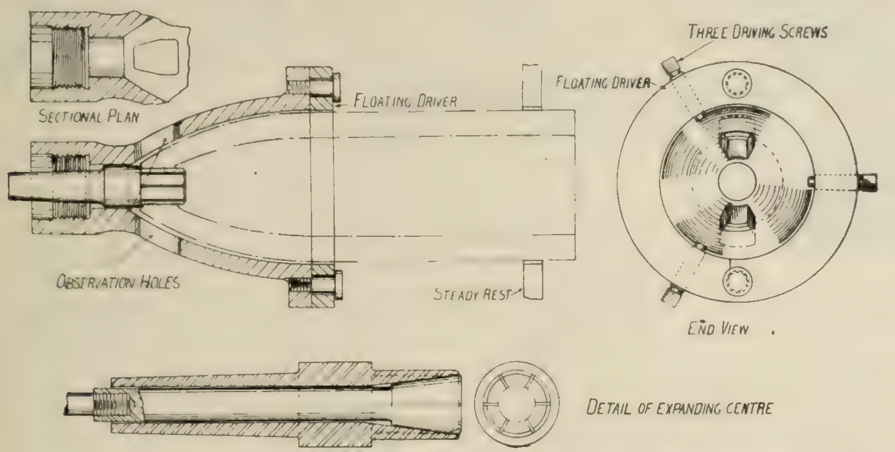


FIG. 14. DRAWING SLEEVE AND EXPANDING CENTRE USED ON LATHES PERFORMING OPERATIONS 8 AND 11.

Counterbore and Recess

Operation 8 is conveniently performed on Bawden 16 in. lathes, in which the nose of the shell is supported on a small expanding centre, while the base end revolves in the steady rest, the shell being driven by a floating ring carried on the outer end of a conoidal sleeve, the small end of which is threaded to fit the spindle nose (see Fig. 14). The expanding centre is of simple design. The shell nose being bored out closely to gauge, the amount of expansion required is small. In placing the shell in this fixture, it is desirable to observe the nose as it passes on to the centre, and see that it comes into proper contact with the shoulder so that the base end of each succeeding shell will be in the same position in relation to the cutting tools, and allow the use of stops for regulating lengths of cuts, etc. Two apertures or sight holes on opposite sides are provided for this purpose, as shown in Fig. 14.

The weight of the shell at this stage is now observed, and any reduction necessary is obtained by facing off the open end. This fact emphasizes the importance of having the nose in contact with the shoulder on the expanding centre as mentioned, both the bottom of the recess and the depth of thread counterbore being made in relation to this point. As the length of the shell has been maintained at the high limit right along, it is now permissible to remove part of this excess length for weight adjustment.

As subsequent final adjustment is necessary after the adapter has been screwed into place, no attempt at extreme accuracy in weight is made at this time, the limits being sufficiently wide to avoid unnecessary loss of time.

Grooving and Waving

This operation, No. 9, is done in a number of 16-in. Bawden lathes of the single purpose manufacturing type, with special tooling for this work. As arranged in this plant, the shell is driven by the open end, which is carried on an expanding arbor similar to that shown in Fig. 13. The nose end is supported by a pipe centre in the tailstock. This method avoids the use of a steady rest, which is not so convenient, and allows the shell to be driven from a point close to where the cut is being taken.

The grooving and undercutting tools are carried in the regular square tool turret, while the waving tool is carried on a slide lying parallel with the shell and reciprocated by a pin engaging in the groove of a cam mounted on the body of the driving arbor. The came is of the double-acting type, which moves the tool positively in each direction dispensing with the use of weights, springs, or other devices which are required when the cam acts positively in one direction only.

Thread Milling

Considerable interest attaches to the thread milling operations, the use of this method of producing threads having first come into pro-

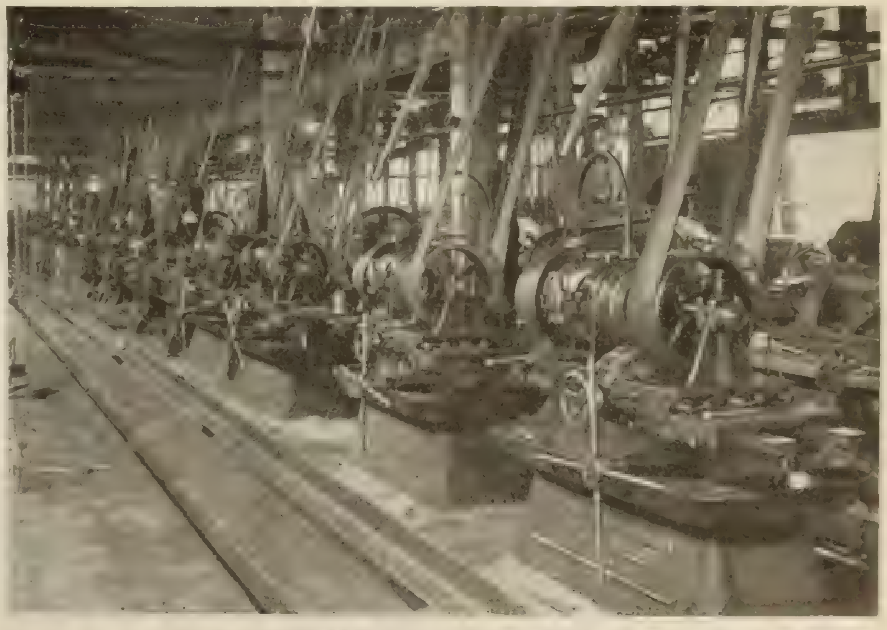


FIG. 15. BATTERY OF THREAD MILLING MACHINES FORMING THREAD IN BASE OF SHELLS.

minence in the smaller sizes of shells.

The thread milling machines used in this plant are of the Holden-Morgan type, a portion of the installation being shown in Fig. 15, while Fig. 16 shows a single machine from a different angle of view. The shell is carried in the interior of a large hollow spindle or mandrel mounted in the headstock, which is securely fastened to the bed. Back of the headstock is a belt pulley which transmits motion through a double worm reduction gear to the mandrel, causing it to revolve at a suitable speed. The milling hob is carried on the end of a belt-driven spindle mounted on a carriage gibbed to ways on the top of the bed. A cross slide enables the hob to be adjusted laterally as well as longitudinally, positive stops and locking devices insuring accurate duplication of the work on each succeeding shell.

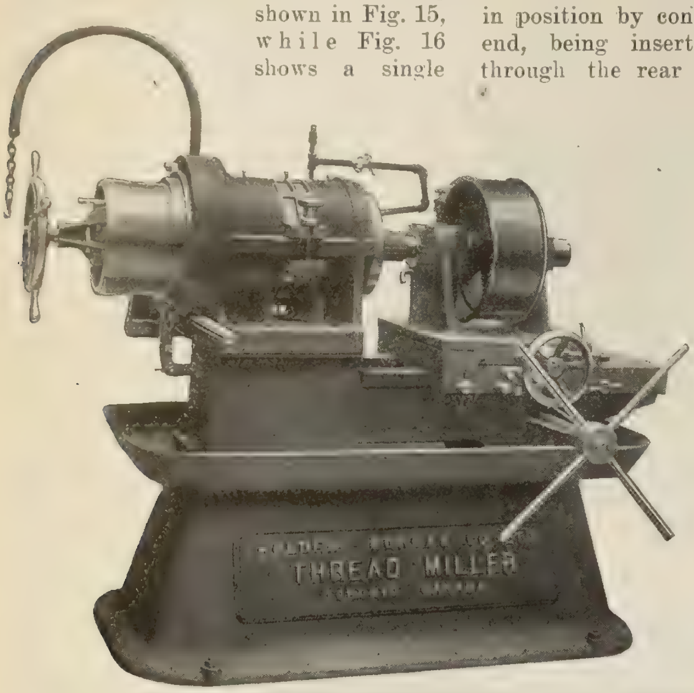


FIG. 16. VIEW OF THREAD MILLER SHOWING CRANE FOR REMOVING BREECH BLOCK FROM BACK END OF SPINDLE.

The shell itself is accurately located in position by conical surfaces at each end, being inserted in the mandrel through the rear end, which is then closed by a species of breech block provided with a tightening device which forces the rear cone against the shell and wedges it up against the front cone, thus insuring a concentric thread being cut by the hob. The hob is inclined slightly, so that it is perpendicular to the angle of the thread, the advance of the work to suit the lead of the thread being had by means of a clamping nut which engages with an external thread on the central portion of the mandrel. A small swivelling crane is provided, from which the clamping gear is suspended when it is withdrawn from the mandrel, keeping it free from dirt and damage, and avoiding fatigue on the part of the operator.

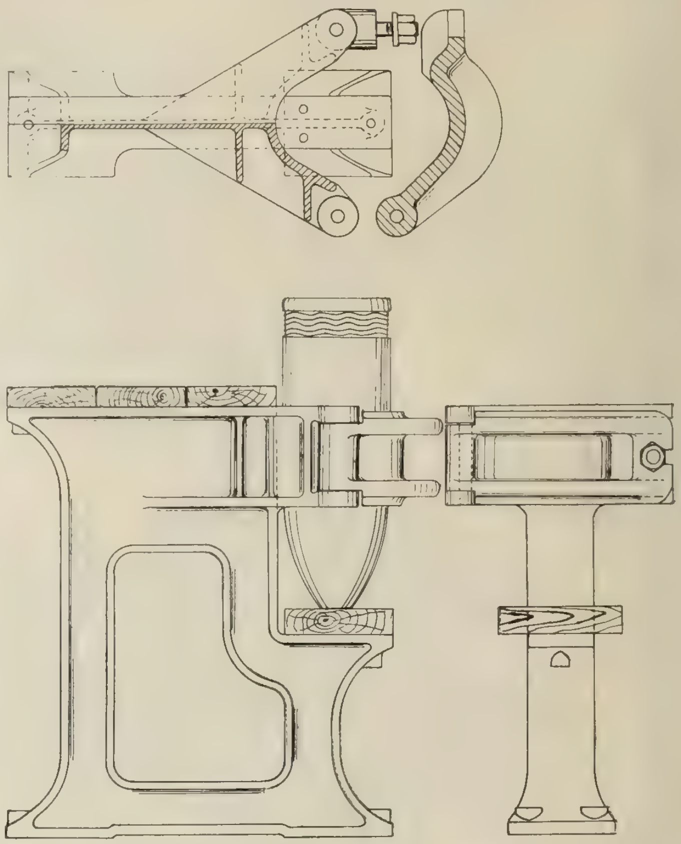


FIG. 18. VISE FOR HOLDING SHELLS WHILE INSERTING ADAPTERS.

The entire operation of milling is completed in one revolution, the hob being first of all fed into the proper depth, and then the shell revolved by lifting up the handle below the end of the mandrel which brings a worm into mesh with the gear, an automatic knockout stopping the feeds, while a stop is provided for resetting the mandrel when starting a fresh cut.

The nose thread is milled in a similar machine with a smaller hob, and with a higher speed of revolution for the shell because of the smaller diameter of the hole being threaded.

Cleaning and Inspecting

Before having the adapter inserted the shell is thoroughly cleaned for preliminary inspection. It is most important that this cleaning be properly performed, as after the adapter is inserted, access to the interior can only be had through the nose, and the varnishing of the interior is liable to be defective if the surface be not absolutely free from grit, dirt, and grease. The expense of using pure gasoline for the cleansing operation has been greatly reduced by

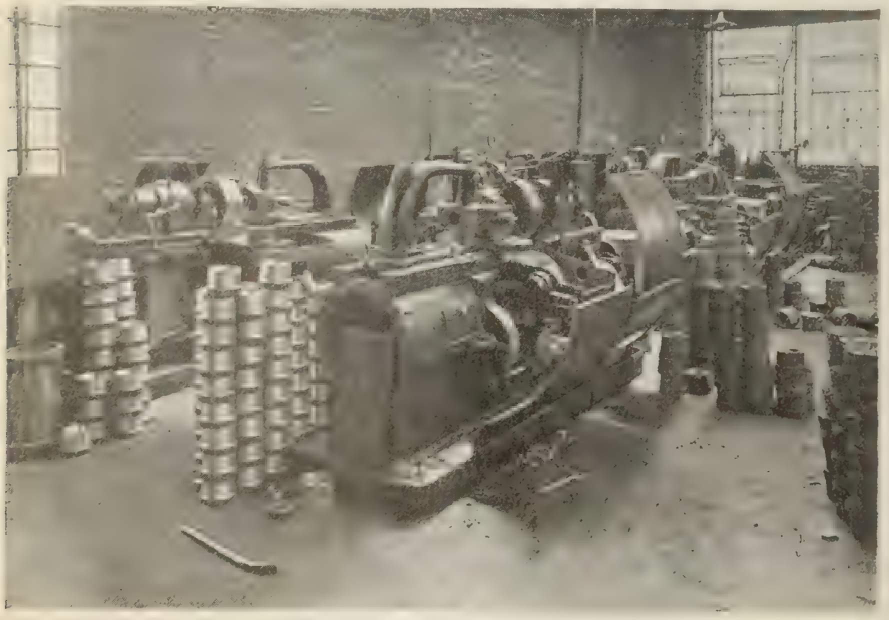


FIG. 17. BATTERY OF AUTOMATIC MACHINES PERFORMING ROUGHING OPERATIONS ON ADAPTERS.

washing the shells in a bath of Mystic compound, followed after draining by a rinsing in gasoline.

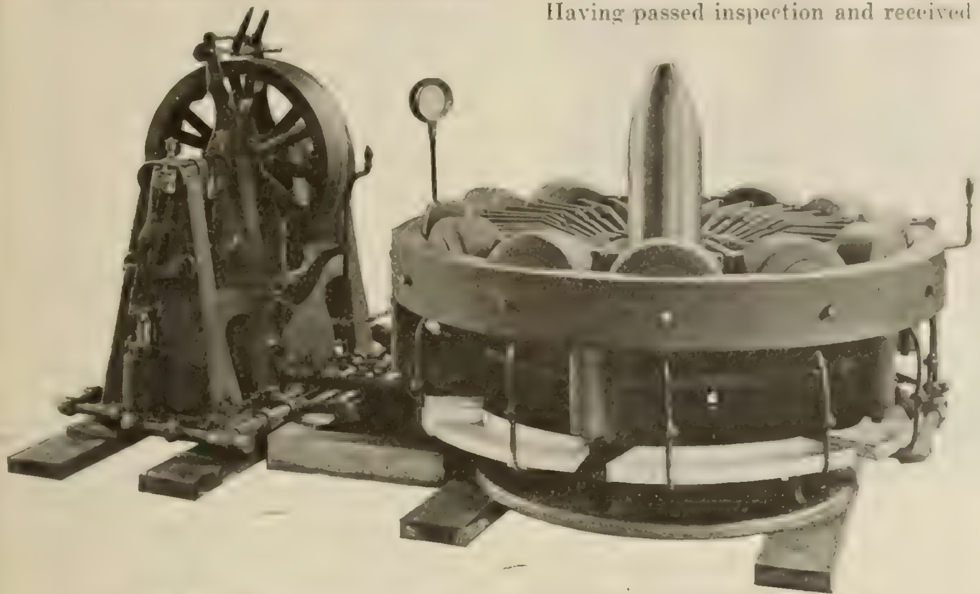


FIG. 19. HYDRAULIC BANDING PRESS OF THE TIRE SETTING TYPE.

The preliminary inspection consists of gauging all diameters, lengths, depths, threads, and bevels, and is done by the plant inspectors, and also by the Government officials. The two inspections take place immediately after each other, and as the Government inspection must be done in the official enclosure, the shop bench is built on the outside of the room and the shells arranged to roll along, receiving a progressive inspection of the various features, at the end of which they pull up in front of a trapdoor in the partition, through which they can be rolled as required by the officials.

The trap door is provided with locks, as required by regulations, but when swung down in use it forms a continuation of the bench, and dispenses with two handlings of the shells and the necessary trucking in and out.

Adapter Machining

Having passed inspection and received certain marks, the shells are ready to receive the adapters. These are machined to size within required limits, which permit of a slight amount of selection, so that each adapter may be inserted with a reasonable certainty of going home to its seating in the recess without binding unduly on the threads.

The machining of the adapters is done in Potter & Johnstone automatic machines, which hollow out the cupped face and rough turn the threaded diameter, subsequent operations including finish turning in suitable lathe fixtures, and drilling and tapping the driving holes, which latterly have the thread drilled out to size, as shown in drawing of shell on page 607 issue of June 29.

Considerable thought has been given to the question of whether or not the adapters could be driven home by machinery. Naturally the preliminary work has been done by hand, and the experience so obtained has been of considerable value in reaching a decision in the matter, and so far it has not been considered advisable to adopt any power method of adapter driving. The principal difficulty arises from the high degree of accuracy demanded in the various dimensions. Despite the accurate nature of the threading machines and hobs, the tough nature of the shell forging and the occasional occurrence of hard spots render the production of a perfect thread commercially impossible. Slight variations in pitch or diameter and the great length of thread, i.e., 3 in., combine to make it extremely difficult to produce shells and adapters which will be interchangeable. Consequently both shells and adapters are threaded within close limits and matched as nearly as possible from stock, a careful operator being able to judge from experience if a shell wants easing on the thread to insure a safe drive home. The necessity for care in this respect will be appreciated when it is remembered that if forced too hard the adapter will very probably seize in the shell and damage the thread, so that even though the adapter be removed by cutting out, the shell thread will be defective, and the scrapping of 8-in. shells cannot be done with the same impunity as was once the case with shrapnel.

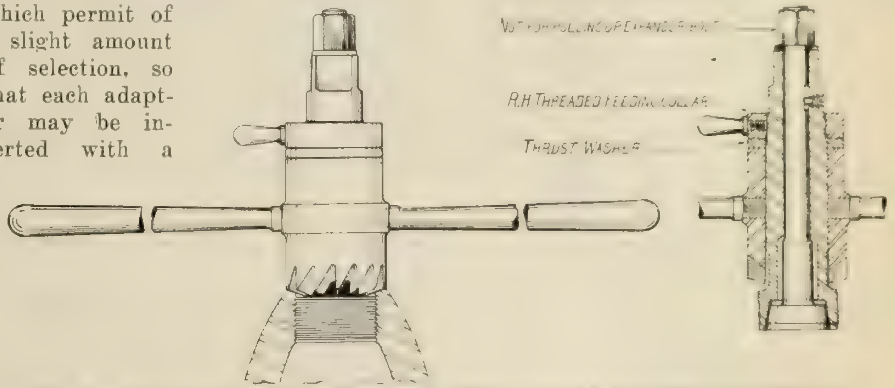


FIG. 21. HAND TOOL FOR REFACING BEVEL SEATS ON NOSE OF SHELLS.

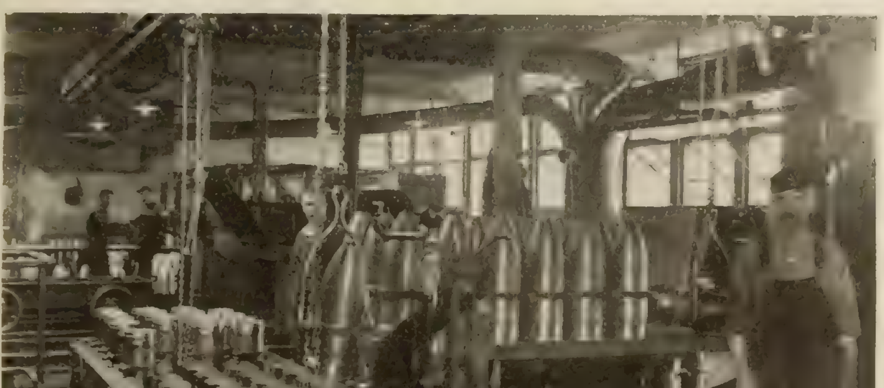


FIG. 20. VARNISHING TANK AND DRAINING RACKS, SHOWING METHOD OF SLINGING SHELLS.

Adapter Assembling

In driving the adapter, the shell is inverted and clamped in a special vise.

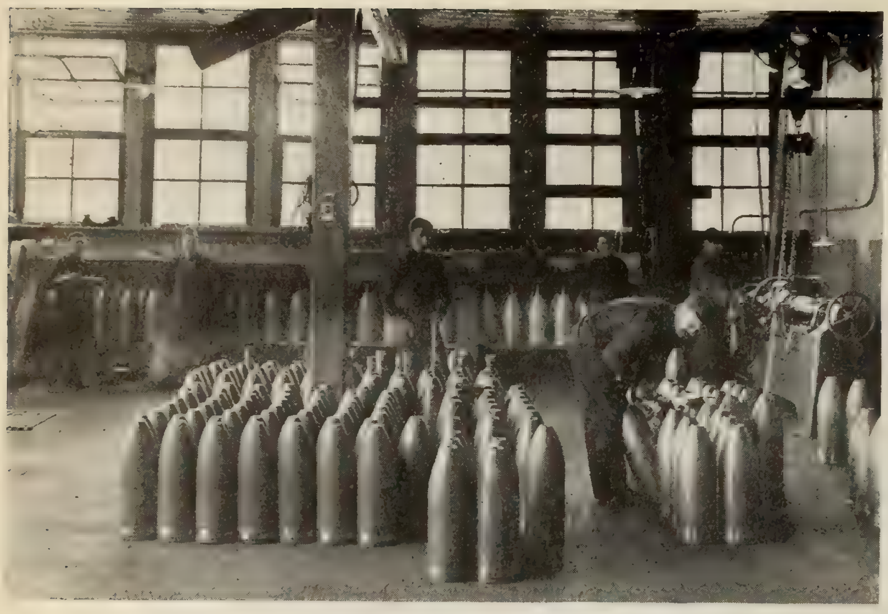


FIG. 22. MARKING AND PAINTING DEPARTMENT.

as illustrated in Fig. 18. This is similar to an ordinary bench leg, but not so high.

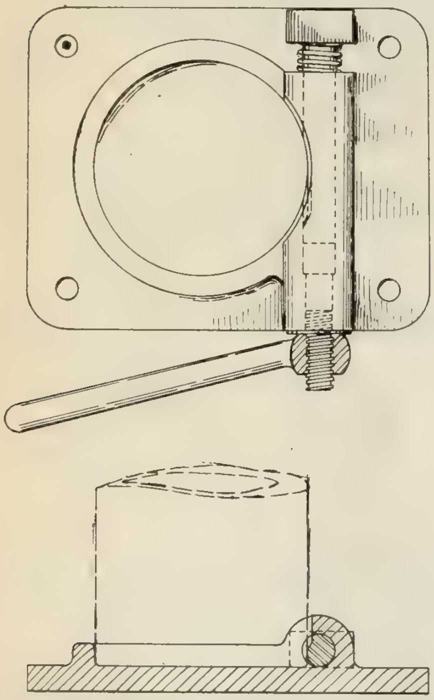


FIG. 23. BENCH VISE FOR HOLDING SHELL WHILE REFACING BEVEL SEATS.

It has a step in front on which the shell rests, and a hinged clamp for tightening in place.

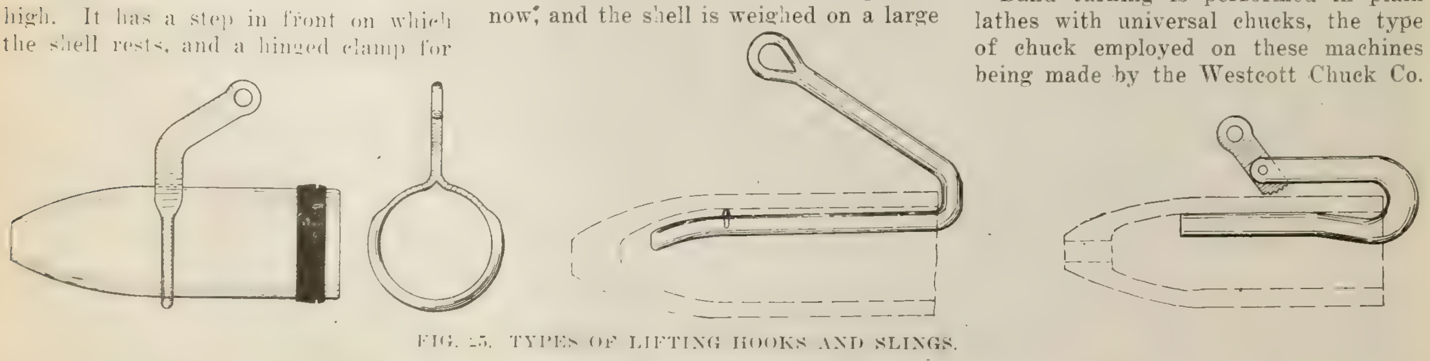


FIG. 25. TYPES OF LIFTING HOOKS AND SLINGS.

A long double end pin wrench with tube extension handles allows two men to pull on each end. Pettman's cement, as called for by specification, is used for making the joint, which is riveted up by hand. Riveting is another point where the superiority of machine over hand methods has been open to question. The thickness of metal to be spread out is approximately 1 in., and rapid blows from a comparatively light power hammer are not effective to a sufficient depth to insure the adapter flange being filled out metal to metal to the bottom of the recess. The use of heavy hand hammers, of about 10-lb. weight, has been found satisfactory, and these are applied with the shell still held in the vise. The low height of this allows a man to walk around the work while hammering so as to produce regular results.

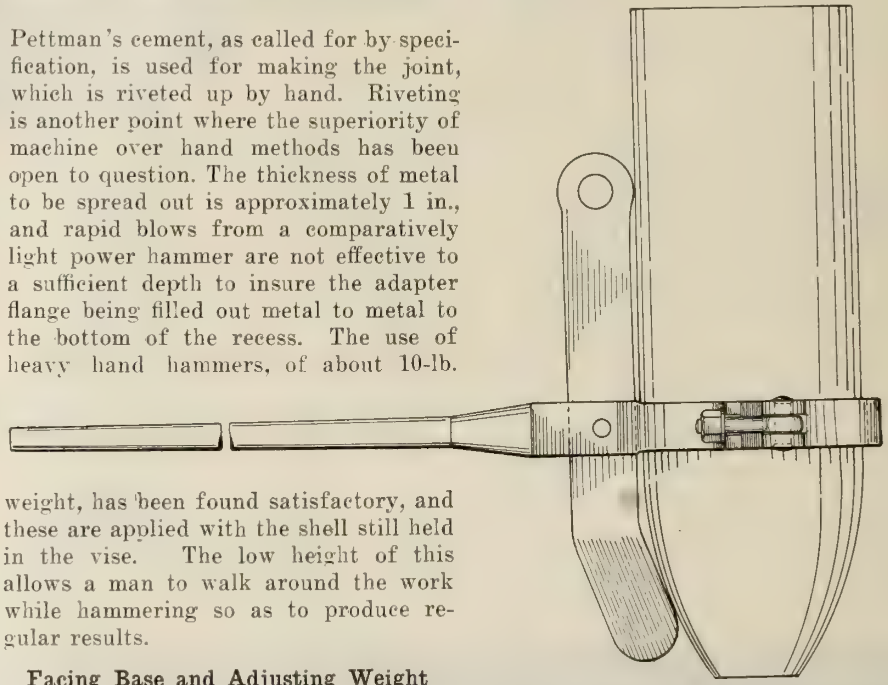


FIG. 24. CLAMP WITH HAND LEVER FOR LIFTING SHELL IN PRELIMINARY OPERATIONS.

Facing Base and Adjusting Weight

The shell is now returned to the machines, where the base is faced off to the high limit, this work being done in lathes fitted with driving sleeves and expanding centres, as shown in Fig. 14. The radius on corner of base is also put on now, and the shell is weighed on a large dial Toledo indicating scale, which is built into the floor, so that the shells may be rolled on and off, reducing the possibility of damage through shells being dropped too suddenly on the platform. Four lathes are engaged on this work—two Fairbanks, one McGregor Gourlay, and one Milwaukee. They are arranged two on each side of the aisle, with the scales in the centre so as to be equally accessible from each machine.

After being adjusted to weight, the shells pass to the banding press, which is operated by an independent belt-driven pump. The press is of the horizontal concentric type with radial cylinders, and is illustrated in Fig. 19, being built by the West Tire Setter Co. The copper driving weighs 4 lbs. when finished, and in the rough state is approximately 8 in. bore by 2 in. long and 5-16 thick.

In order to insure easy assembly and machining, the band is put on hot, being heated up to a dull red, which expands the band considerably, allowing it to slip over easily and at the same time anneals it, the latter action being assisted by the rapid cooling when the dies come in contact with the hot copper.

Band turning is performed in plain lathes with universal chucks, the type of chuck employed on these machines being made by the Westcott Chuck Co. Square revolving tool rests are used carrying one roughing tool and three profilers. The shell is gripped by the base, so that the side thrust of the tool is taken by the front bearing of the spindle. The nose of the shell is conveniently supported by a pipe centre with very slight taper, which maintains the shell accurately in position without doing any damage to the thread.

Varnishing

The equipment for varnishing is of a simple nature, and with the use of unskilled labor has given satisfactory service. The shells are clamped around the body with a trunnion ring (see photo. Fig. 20) and hoisted by high speed chain blocks, which hold them under the swivelling discharge pipe of the Bowser measuring tank shown in the foreground, which measures accurately the amount of varnish or lacquer necessary to fill the shell. Immediately after filling, the shell is turned upside down and the varnish poured back into the tank. After a few seconds' draining, it is deposited in the rack behind, where it awaits the time when it will be put in a steel truck and run into gas-fired drying ovens.

The threads in the nose, which have been protected by bushings during the varnishing, are now thoroughly cleaned, and the bevel seating on the point of the nose is refaced by a hand-operated cutter, which removes any marks or damage, incidentally received during manufacture. A sketch of this tool is given in Fig. 21. A quill or hollow arbor is threaded at its lower end to fit the nose of shell. This threaded part is provided with expansion slots, so that after being screwed into the nose, it can be expanded tightly in place by an expander bolt, which is pulled up by a nut at the top end of the arbor (see sketch), the lower end or head of the bolt being tapered to fit the inside of the slotted part. This fixes the arbor firmly in position and true with the thread, forming a suitable support for the facing cutter which is formed of a sleeve with cutting teeth on its lower end, shaped to the correct angle of bevel. In operation, the cutter is pulled around by the two handles shown, and is fed by a collar which fits on a threaded portion of the arbor, a thrust washer being placed between the cutter and the collar. The device is simple and efficient, and provides a welcome means of rapidly removing disfigurements, which can hardly be avoided in handling, but which prevent the shell being accepted in spite of their seemingly slight nature.

Marking and Painting

The shell now receives final inspection before being marked and painted, both of which operations are done in the painting department, Fig. 22. To the right of the picture can be seen a heavy type Brown Boggs marking machine, which has proven very efficient on this work, uniformity of results, speed of operation, and freedom from die breakage being features of its service.

The painting machine occupies one side of the room, being situated under the windows in Fig. 22. The machine consists of a strong timber framework, with two shafts running along the top, the driving pulleys being next the marking machine. A series of bevel wheels drives a number of vertical spindles from which the shells are suspended, threaded couplings fitting in the nose. In placing the shells in position, they are put on an elevating truck platform and run under the spindles, being lifted up by the elevating mechanism, so that a coupling pin can be slipped through, leaving the shell hanging. With the shells revolving, the application of the paint is a simple matter, the drying being assisted by the motion of the shells in the air, after which the shells are ready for shipping in individual boxes.

Handling Devices

Much of the success of work of this nature is due to the efficiency of the handling tackle. Where possible the shells are handled by Yale high-speed chain blocks suspended from trolleys on light I beams. In some of the illustrations there can be seen a runway or bench which occupies the centre of the aisles and allows the shells to be rolled from one group of machines to the next group, avoiding the use of trucks with their loading and unloading, and maintaining a continuous stream of work progressing forward. Fig. 23 shows a bench vise for holding the shell while being reseated, the action being obvious from the sketch. Fig. 24 shows a special handled clamp for use with chain blocks in placing the shell nose down in operation 3; and Fig. 25 shows different methods of holding the shell at various stages, the centre being for cutting off machine, the right for inside boring and profiling, and the left for placing the shell with band on, in the marking machine.

DRILL WASTAGE

A REFORM which undoubtedly calls for prompt enforcement at the present moment is that relating to wastage in drilling, says Page's Weekly. In many engineering shops, especially those engaged on war work, the speeding up of drills has frequently led to a speeding down of output, simply because under the pressure of new conditions the well-established principles of working are frequently exceeded. Sometimes the result is disasterous in keeping back a host of allied operations which could have gone forward to completion at a reasonable speed; again, at all times the result is inconvenience and delay.

Drill Grinding

Added to this trouble is the supplying of drills wrongly or badly ground. Complaints have been made regarding the cutting edges of twist drills. As the two cutting edges cannot meet at the centre, a non-cutting portion occurs, which ought to be thinned down more effectively than it is in some of the samples which have come under our notice. Unless this thinning down is accomplished according to a proper scale, and not according to some loose notions, the drill is not likely to prove entirely efficient, and it may break at the first onset. The scrap heap furnishes an eloquent proof of wasted drill power, and there is the further waste of power in the great addition of pressure needed to feed a drill which is not correctly thinned.

Durability Feature

Some other important considerations arise. Dealing with the subject of drills generally there are advocates of a greater clearance angle than that usually given by a drill maker, the reasons assigned being that the greater clearance causes the metal to cut freer, and materially adds to the depth which can be drilled between the grindings. In this connection practical men have noted that the depth of the hole drilled has a very marked effect on the durability of the tool. The deeper the hole the oftener must the drill be ground because the lubricant cannot reach the drill point as freely as it should and also because hot chips lie against the tool, the body of which is thereby prevented from carrying away the heat generated at the point.

Simplified Data Required

All the reforms needed in the use of drills or other machine tools can be accomplished without an ostentatious parade of algebraic formulae. If we had less of the latter and more of plain English, the average engineer would be able to test in practice the information which is now frequently hidden from him in a mass of symbols. The ultimate test of every formula is the capacity for working it on a commercial basis as a part of a workman's routine. Nothing else appeals to a man who has to conduct his business for the purpose of gain. Much needless difference of opinion exists among machine tool owners and workers regarding workshop practice, chiefly because the results of experience have not been compiled in readily available form or because it has not been stated in a form understandable by plain man. Other branches of engineering appear to be more fortunate in that respect, for they enjoy fully correlated information. Hence occurs a great deal of the scrapping and wastage in machine tool shops, and the passing on of the trouble from one manufacturer to another until we are again confronted by all the old questions of standardisation.

ZINC DEPOSITS NEAR OTTAWA

NEW and valuable deposits of Gatineau zinc have it is reported been discovered by a mining engineer, J. D. McFarlane, and a prospector, Dennis Callahan, formerly of Haileybury, in the vicinity of Burbidge station, which is about 72 miles from Ottawa. The discovery is of special interest in connection with the use of zinc in munitions manufacture.

Callahan made a discovery last fall which attracted much attention, and McFarlane was called to investigate. The deposits looked good and men have been working in the vicinity since. This spring, however, they have made what is claimed to be much more valuable discoveries north of the limestone area in which they were first prospecting. They have trenched across the ore vein at intervals of 1,400 feet, showing ore in places from six to fifteen feet. Mr. McFarlane, states that the deposits are rich, and that the mineral is much better than that found previously.

* * *

THIRTY YEARS C.P.R. PROGRESS

THE C.P.R. held no celebration of its 30th anniversary on the 28th of June, but it published some very interesting facts and figures under the title "Thirty Years of Progress."

In 1886, the mileage of the company was 4,651 miles; now it is about 18,000—if all the companies which it controls, be considered. The gross earnings of the company in the initial year were $10,081,000, but at present $100,000,000 has been greatly exceeded. In 1886 the company possessed no steamships, except three on the Great Lakes. Now it has an aggregation under another name which is one of the strongest fleets in the world; and in addition the company operates fleets of speedy and luxurious vessels on the Bay of Fundy, the Great Lakes, the Kootenay, Arrow and Okanagan Lakes and on the British Columbia coast.

A comparison of the equipment possessed by the Canadian Pacific Railway at the close of 1886 and at the end of the last fiscal year (June 30, 1915), is interesting, and is as follows:

	1886	1915
Locomotives	372	2,255
First and second class passenger cars, baggage cars and colonist sleeping cars	304	2,182
First class sleeping and dining cars	47	502
Parlor cars, official and paymaster cars	27	97
Freight and cattle cars (all kinds)	8,253	87,504
Conductors' vans	178	1,424
Board, tool and auxiliary cars and steam shovels	71	6,467

The C.P.R. opened up the West, making the towns and cities possible. Thirty years ago the prairies were a vast wilderness. To-day they are largely occupied with a prosperous and contented people. The company performs not only a national, but an Imperial service by linking up the various component parts of the Empire.

Such is what the company, not immodestly, says of itself, but it might have gone much farther, for there is scarcity an activity in the West to-day that the C.P.R. has not been instrumental in setting agoing. Its penetration of the West gave the latter the first value it possessed, while its encouragement, all the way, of the settlers, to engage in other forms of activity and enterprise, in addition to wheat growing, made possible the manifold Western energies as we see those expressed to-day alike in agriculture and manufactures.

* * *

BRITISH INDIA LEGISLATES AGAINST ENEMY TRADERS

A SPECIAL despatch from Simla says: that the Government of India have promulgated an ordinance dealing with the liquidation of hostile firms and the property of hostile persons; this brings the legislation of India into closer accord with the present state of the English law. The British Trading with the Enemy Act of 1916 enables action to be taken in the case of firms whose business, by reason of enemy nationally or association, is carried on wholly and with certainty for the benefit of enemy subjects. It also gives power to the Board of Trade to abrogate contracts or transfer power, which, it is believed, has for obvious reasons been very sparingly exercised. It also enables a company containing enemy elements to purge itself thereof with assistance of a custodian, who may permit British shareholders to put out enemy shareholders, depositing the price so paid with the custodian.

The ordinance follows closely the English Act with such modifications as local circumstances require. It will enable the Government to wind up hostile business much on the lines of the Indian Companies and Insolvency Acts, the distribution of assets so realized being subject to special rules. The liquidator will have power to give good title to purchasers of the good-will of hostile businesses and to immovable property held by them.

The new procedure represents a considerable advance from that hitherto adopted, in that the initative for liquidation will come from the liquidator and will not be left nominally with the firm itself. It will also enable hostile businesses to be dealt with and to be completely extinguished, thereby preventing any chance of their recovering from the state of suspended animation and resuming business after the conclusion of peace.

* * *

NEW BRITISH TRADE ORGANIZATION

AN important movement for the organization of British industry is represented by the United British Industries Association now in course of formation. The membership already includes fifty of the leading industrial concerns of the United Kingdom with an aggregate capital of $250,000,000. An additional fifty members will be necessary before the Association deems itself formed. The entrance fee is $5,000, so that the association will start its propaganda with a fund of $500,000. The objects of the association were stated at a preliminary meeting to include:—

1.—Among other things, the war has shown us that foreign control of raw materials is as serious a danger to British industry as foreign attempts to capture our markets at home and abroad. After the war, the political world will be occupied with such questions as our Dominions' trade, the trade with the Allies, protection against German trade, the relations between capital and labour, new methods of taxation, and the solution of any unemployment problem that may arise; hence the necessity of some central and representative organization to deal appropriately with both political and commercial questions, so far as they may affect industry and trade.

2.—To command the attention of the Government when framing industrial legislation. At present, the trade unions are consulted, but there is no organization representing the business man to which any serious attention is paid.

3.—To deal with labour on comprehensive lines. The trade unions have adopted the principle of collective bargaining, and the employers of the country must have an organization big enough to make terms with labour—terms by which we may successd in bringing about understanding and cooperation.

4.—To bring about organized efforts for the furtherance of British trade interests in foreign and colonial markets.

* * *

Austrian locomotive manufacturers are reported as unable to execute promptly the orders received from the government, because of lack of labor. A recent government order for 150 locomotives to be delivered in 1915 has been only partially filled, so that an additional order for 129 for delivery before July 1, 1916, is not to be negotiated unless the other order is filled at once.

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

VALUE OF BELT TIGHTENERS

By N. G. Near

WITH reference to the extracts from the report by Professor W. W. Bird and Francis Roys, (page 619, Canadian Machinery), it might be well to point out the fact that these tests were made on belts that had not been waterproofed. Humidity does not affect a waterproofed belt to any appreciable extent, if at all.

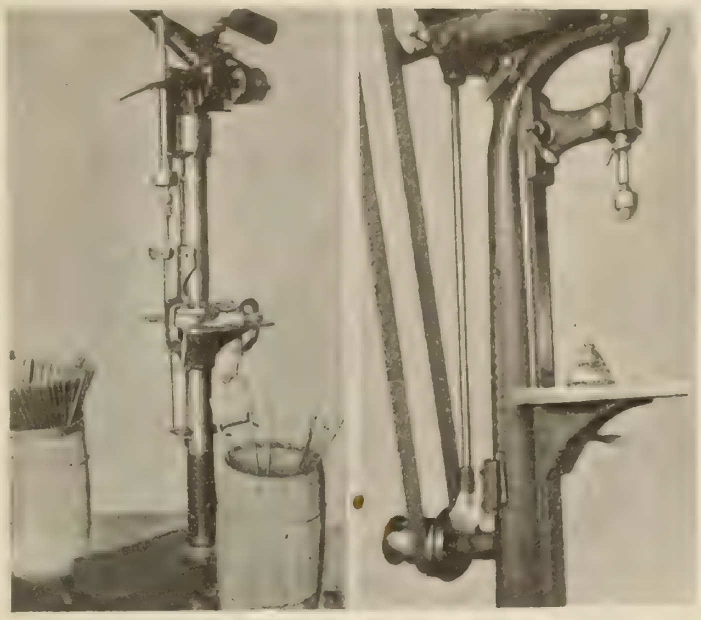
I do not find any reference to the ommission of this important point in the report of the above gentlemen, and therefore think it should be added, otherwise erroneous conclusions might be drawn. Readers are liable to think that leather belts are subject to change with humidity, but such is not the case as has been proved time and again with waterproofed belts. With a properly waterproofed belt, slipping does not occur when humidity increases. Of course, should humidity increase to such an extent that the pulley would become wet, the water on the pulley might serve as a lubricant and slipping would occur, but that would be a very extreme case and is seldom experienced in practice with belts used indoors.

Another point missed in the above report is the advantage of pliability with waterproofing which permits the belts to be run slack. High initial tensions become unnecessary. In that case, then, there is seldom any need for belt tighteners except on vertical or overpull belts. In fact, I wouldn't call them belt tighteners at all. I would prefer to call them "idlers" because the function of an idler should be principally to increase the arc of belt contact to a maximum rather than to "tighten" the belt. Arc of contact, with a good reliable belt, is more important than tension as can easily be proved by taking a "hitch" around a pulley with a pliable belt, and then with a stiff, dry belt. The pliable belt will hold, but the stiff dry belt will slip.

TAPPER AND RECONSTRUCTED DRILL

By D. A. H.

IN the manufacture of some rifle attachments, large numbers of rods and brass and steel tubes were to be threaded and large numbers of $\frac{1}{8}$ in. holes were to be tapped in $\frac{1}{8}$ in. steel plates. This work had been done on a sensitive drill fitted with an Errington tapping attachment, and would still be so done but for the pressure of other work necessitating the use of the drills.



TAPPER AND RECONSTRUCTED DRILL.

It was decided to buy or make over some odd machine and jig parts that were available. We found on hand a casting suitable for a base, a 54 in. length of $3\frac{1}{2}$ in. pipe with one flange, a pair of pulleys, and a finished bracket of exactly the right shape for the table, faced on top and bored and split through the hub. It took but little consideration to see that the flange could be bolted to the base, the pipe turned off and the table applied. Then, with the Errington tapper, to give the reverse movement and the friction drive to the tap, there was little else to produce other than a "head" containing the bearings for two shafts at right angles, a hand feed, and to get the bevel gears.

How the machine looked when finished is shown by the photo. It will be seen that the vertical spindle sets close to the column — as close as the tapper itself will permit. This was done on account of the nature of the work primarily, but it also made for rigidity and compactness. The end of the spindle is threaded and set directly into the body of the tapper. Since put up, the machine has cut upwards of a hundred thousand threads ranging from a $\frac{3}{8}$ in. buttress thread in cast iron to a No. 5 tap blind hole in steel. It is shown cutting a thread on the outside of 11-32 in. brass tubing. For outside work, a die holder is substituted for the chuck and arranged so that a length of 3 in. can be threaded.

The same pressure of work located the weak spot in a light drill press of the familiar type shown in the second photo. The drive was by belt from the cone pulley shaft up and over two idler pulleys at the rear top, and around the pulley on the spindle, and was as weak as many such drives are when forced a bit.

A change was made to gear and change drive by making a couple of bearing brackets and using a pair of bevel gears at the lower end, using a $\frac{3}{4}$-in. vertical shaft with sprocket on top, and putting a sprocket in place of the pulley on the spindle. A diamond roller chain formed the final drive. While this drive was a little noisier than the belt, it hasn't slipped yet, and has required no taking up—but what is more to the point, the machine will now do double its former production.

FOOLING THE ELEVATOR

By J. H. R.

HOW many of us have escaped the experience of that qualmish sensation at the sudden starting or stopping of a high-speed electric elevator? Very few; yet it is quite possible to take a trip on one of these perpendicular tramcars without being effected by this disagreeable feeling. The cause of the annoyance is the inability of the various organs of the body to attain the momentum of the elevator in the same period of time. Owing to the delicate construction of the human system, and the elastic manner in which many of the internal organs are supported, it is very difficult for some of them, more especially the stomach, to respond to any rapid or abrupt movement of the outward or more rigid portions of the body. When a person is traveling on a street car, any sudden action of the car will have the tendency to throw the body in the opposite direction, unless by instinct or intention the body is set for the coming movement. However, in the case of the elevator, it would appear that the vertical movement of the body in unison with that of the car offers no opportunity of freeing one from this objectionable sensation; yet it is not only possible to overcome this feeling, but much easier to "fool the elevator" than the tram car.

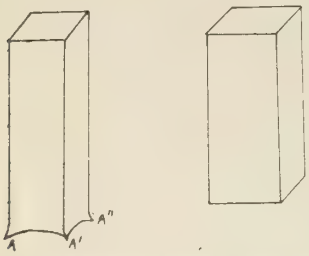
If when stepping upon an elevator, and just previous to the starting or stopping, the entire body is lifted slightly, by raising the heels from the floor, or the knees are bent a little forward, (weak-kneed) sufficient spring is provided to allow for the sudden movement in either direction. By this procedure the internal members of the body will more readily adjust themselves to any abrupt action of the moving elevator.

TO REMOVE A BROKEN STUD

By James E. Noble

SOME men drill a hole in a broken stud and proceed to drive a square drift, or piece of steel, into the hole and with a wrench endeavor to twist out the stud, more often than not they fail as such a proceeding will invariably press the bolt threads in tighter than ever.

One successful method to remove a broken stud is to drill a hole in the stud, then take a square piece of machine steel which will fit the drilled hole snugly, heat one end and hammer out the corners about 1-16 inch full, as at A A^1 A", Fig. 1. Sharpen these corners with a smooth file and then temper the piece and draw it to a blue all over, now drive this tool into the hole in the stud, and the ends A, etc., will cut four groves the depth of the hole. Next take a piece of tempered square steel 5-34 inch greater in diameter than the first piece, force it into the groves and turn out the stud. It will be a stubborn bolt indeed which this will not remove.



AID TO BROKEN STUD REMOVAL

Using a left hand tap to remove a right hand bolt has been suggested, also using a left hand drill has been recommended but neither method is in the same class for effectiveness as the foregoing.

AN INTERESTING SHIPBUILDING TEST

By A. J. Campbell.

THE Nova Scotia Steel & Coal Co. are making a test of the cost of building steel ships on the Atlantic seaboard. On a site by the East River, at New Glasgow, immediately to the rear of the Eastern Car Works—a subsidiary concern of "Scotia"—the keel is being laid of a ship of 2,000 tons deadweight capacity. The craft will be 220 feet long, with beam 35 feet and a moulded depth of 20 feet. The boat will be built to Lloyd's classification, and with all the scantlings 10 per cent. in excess of requirements.

A 1,000 shaft horse-power DeLaval steam turbine is being specially constructed for this vessel, it being geared to the propeller shaft through two sets of gearing. This will be the first boat built in Canada to be equipped with a geared turbine. The equipment will also be unique in regard to the auxiliaries. A rotary air pump and a centrifugal circulating pump will be driven by a single engine. The stem, stern post and rudder forgings, propeller shafting, propeller and all fittings will be made by the company's New Glasgow plant. Frames, floor plates, and the bulk of the other construction material will also be furnished by the latter.

Permanence of the Enterprise

When this ship is completed, it will be fairly well determined what Government assistance, if any, will be necessary in order to make the industry a permanent one. It is hoped, however, that the experiment will prove the amount of this assistance to be not beyond the ability of the Government to grant. It must be remembered that the Nova Scotia Steel & Coal Co. have not definitely settled on a policy of shipbuilding. They have decided to build one ship and they hope to build many; but they are not going to say positively what will be done until they find out what this first ship will cost. It would seem probable that the cost will be higher than the normal cost of construction in England, owing to the higher price of labor. It may be, however, that the discrepancy between the cost of construction in this country and the cost in the Old Country is perhaps more apparent than real. Some well-informed observers declare that this difference is not nearly so great as the Canadian public have been led to believe. It is pointed out that while labor costs are less in the Old Country, labor results are also less. Thus, it may be found that what was supposed to be a 25 per cent. difference in favor of the British yards will be reduced to possibly 10 per cent. Better service largely counter-balances cheaper work. The New Glasgow test will prove what this argument is worth.

Certainly the location selected for this test possesses many advantages. It has been said more than once that if shipbuilding cannot be carried on profitably at New Glasgow it cannot be done anywhere in Canada. The reason given is that there are few places where so many economies in carrying on the undertaking can be effected. The site owned by the company is practically free. A portion of "Scotia" staff will carry on the business organization. Much of the necessary machinery which a new company would have to buy is already installed either in the steel works or the car works; indeed numbers of machines, useful for ship-building purposes are installed there which the ordinary yard could not well afford to purchase. Moreover there is a marked disposition on the part of workmen at New Glasgow to co-operate. The obstinacy of the unions in England is one of the handicaps of the British shipbuilder. The Nova Scotia Steel & Coal Company are large owners and charterers of tonnage; they operate a considerable fleet at the present time, and when this ship is finished, if there be no customer in sight, they can use her as a collier themselves.

Factors Towards Success

Colonel Cantley was asked the other day what he considered was necessary to make this ship-building project a success. He replied:

(1)—Government assistance; perhaps not very much, but some.

(2)—The hearty co-operation of the workmen; it must be assured against onerous labor legislation.

(3)—Good shipping laws. Some of the laws enacted by the United States have handicapped the operation of American shipping very seriously. For example, on an American ship of a certain size, the navigation laws call for a crew of 32, whereas on an English ship of the same size only 27 men are required. Such legislation as this, in addition to the higher scale of wages, makes it difficult for the American ship to compete in the open market in normal times.

(4)—Lower insurance rates, and also the inspection and registration of Canadian ships made easier for their owners. With regard to insurance, it is a fact that the Norwegians are insuring their fleet at about half the price our vessels are paying at the present time.

It will be admitted that there is logic in a plea for assistance for steel ship building. At the very least an amount equal to the duty imposed on the material that would enter into Canadian built ships should be returned to the builder, and since we give direct aid to the developing of our land transportation, why not do likewise to encourage the development of our own ocean transportation? It is expected that the launching of this test craft will take place late this autumn.

EXAMPLE OF WOMEN WORKERS

I AM acquainted with certain women who are working in munition factories and who only after a short experience of a technical school are turning out from lathes 2 per cent. more work of precisely the same character than skilled men are doing working on the same lathes one hour longer, says a London Times correspondent.

Such cases are not at all rare, and something ought to be done to induce the British workman to do the right thing by his country and by himself. It seems to me that the poison of limiting production so largely preached has entered very deeply into the constitution of the men, and in spite of its being war time they seem unable to free themselves these fetters.

The Coming Industrial War

After the war victory in the industrial race will be to the country that can produce the most and the best from machinery, and if only British working men could be taught a more sound political economy so that they could understand that it was not only to the disadvantage of their country, but to the disadvantage of themselves and every one concerned to limit the natural output of a lathe or any other kind of machine, it would help very largely to hold our own in the future.

The trouble is that the great majority of men do not realize the necessity of giving value for the wages that they receive. This is not only dishonest; it is stupid, and steps ought to be taken to show how dishonest and how stupid it is. There are amongst the workmen a fair number who are perfectly willing to do a fair day's work and to get a fair amount out of the machines that they control.

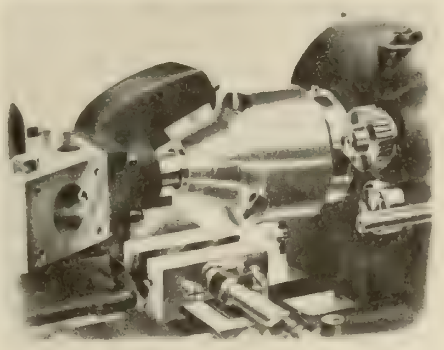
Physically Powerful Leaders an Asset

I know a case of an engineer who had retired previous to the war, who came back on its outbreak and started working in a large factory as an ordinary skilled mechanic. He did not strain himself, but simply kept steadily at work. Every kind of pressure was brought to bear upon him to bring his output down, as it was about 40 per cent. in excess of the average produced in his shop. He was a strong man mentally and physically, and in spite of being assaulted—when he laid out two men with a spanner—he continued his course. The good men in the shop eventually followed his example, and in the end that factory produced on an average 30 per cent. more per day than they did previous to this man's example. He was then asked to go on the night shift, which he readily did, and in course of time produced the same result there.

This goes to show that the better class and the more willing amongst the men only require a leader, but the fact is the lazy and the incompetent are as a rule the loudest and the most turbulent, and they gain their ends over the better ones by means which can easily be understood. I am certain if the men would work honestly that an eight hour day would be infinitely more productive than a nine or a ten hour day under the restrictive action of the unions. The men could earn as much money and perhaps more, and the employer himself be better off. Surely it should be possible to so preach the doctrine of honesty and sound political economy that men should see the error of their ways and amend them. The example of women workers must be productive of great help in this direction.

FORMING STEEL HEADS OF H.E. SHELLS

IN machining steel heads of high explosive shells from 4.5 in. to 6 in. inclusive, material in the form of blanks or forgings is used, the work being done on a Herbert, Coventry, England, No. 4, Capstan lathe with two operations.



FORMING STEEL HEADS OF HIGH EXPLOSIVE SHELLS.

The forming of the external radius is done at the second operation, the work being held by the threaded part in a special chuck. This radius has to be finished subsequently on another machine when the head and body are assembled, so that the curve may be continuous. On the No. 4 Capstan lathe, the forming is usually done with a broad form tool carried in a suitable tool post on the back of the cross slide. When blanks are used, a considerable amount of metal has to be removed, which makes the forming rather a laborious operation, especially as hand feed must necessarily be used.

The accompanying illustration shows a new design of form tool holder which takes advantage of the automatic feed provided on the Capstan slide. The action of the tool is a combined turning and shaving cut, as it is fed to the work in a direction at right angles to that in which a cross slide form tool would be fed. The holder itself consists of a cast-iron bracket bolted to the capstan and provided with a central hole in which is clamped a revolving steady peg to suit the hole in the work. The form tool is a dovetail blade of high speed steel fitting in a slot in the holder and clamped by a pad bolt. It is backed up by two grub screws, which also serve to adjust the position of the cutting edge up to centre The cutting edge is vertically over the work, and this position allows a liberal stream of cutting compound to be directed on it. It will be seen that there is no strain on the capstan locking bolt, as the revolving steady peg ties up the holder to the work, and the stresses are therefore self-contained.

The form tool has 12 degrees top rake and 3 degrees clearance, while, in addition, the axis of the slot is inclined at 6 degrees to the normal in order to give it side clearance. This side clearance is essential as the blank must necessarily be slightly over size, and the edge of the tool, which first comes in contact with it, acts exactly like a turning tool. The amount of high speed steel used in the form tool is very small in comparision to the length of life, and it can be used up till only a short piece remains. Grinding is also a simple matter, and the tool can be replaced in the correct position without difficulty.

This tool holder is, we understand, giving excellent results, and it is interesting to note that no difficulty is experienced in forming with the automatic feed such a wide cut as the curve on the steel head of the 6 in. Mark IV. shell, which is 3 7-16 in. wide on the formed part.

OUR 1916 FIRE RECORD

IN war time, and while many interests are urging thrift and economy, the Canadian people are burning up their created resources at a much greater rate this year than last, is the statement which appears in a bulletin issued by the Conservation Commission on July 7.

During the first five months of 1916 the fire loss in Canada has exceeded that of January to May, 1915, by approximately $3,000,000, or $600,000 per month, acording to the bulletin. At this rate of increase our. fire loss will exceed that of 1915 by $7,200,000.

Canada has need of all her financial resources. She is borrowing money to carry on the war, and is paying 5 per cent. interest thereon. The additional fire loss of 1916 would, therefore, pay the interest charge on the recent war loan of $100,000,000 and would pay $2,200,000 of the principal. Canada's average annual fire loss, of over $23,000,000 would pay 5 per cent. interest on approximately half a billion dollars. Our fire loss is, however, something for which we are receiving no value, either financially or patriotic; it is simply a tax, due in great part to carelessness, which Canadians appear willing to pay, and which they, as a whole, are doing little to avert.

MARKET FOR MANUFACTURED GOODS IN RUSSIA

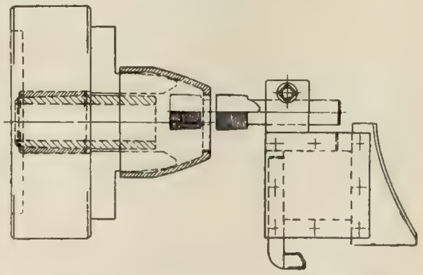
CONSIDERING the great population in Russia, somewhere in the neighborhood of 170,000,000, and the tremendous area of the country, about one-seventh of the earth's surface, it is not to be wondered at that an examination of the imports of the country shows a wonderful market for manufactured goods of every description, says Kelly's Monthly Trade Review. Manufacturers will find in the following list goods for which there is a good Russian market: Agricultural machinery, building materials, carriages, cast iron, chemicals, coal, coke, cotton, textiles, cotton yarn, electric dynamos and electric motors of all kinds, fertilizers, iron and steel, machinery, knitted and braided goods, leather goods, manufactured copper, motor-cars and cycles, musical instruments, paints and dyes, paper and stationery, machinery parts and apparatus, physical appliances, pig-iron, silk manufactures, tallow and animal oils, tanning materials, timber, woollen manufactures, shoes and boots, hats, ties, scarfs, haberdashery, etc. The match-making industry will probably develop considerably in Russia and there should be a market immediately after the war for match-making machinery.

There is a tremendous demand for beeswax in Russia. In spite of the fact that the total home production averages some 245,000 poods (equal to 8,847,638 pounds), valued at some £600,500 per annum, imports of beeswax amount to some 8,000,000 pounds annually, more than half of which was hitherto imported from Germany. Owing to the number of churches there is a great demand for candles, which has increased during the war, and it is estimated that there will be a shortage of some 7,500,000 pounds in the coming year. There is a movement on foot to develop the home production of beeswax, and it is proposed to include the study of apiculture in the schools.

CHASING 60 PDR. SHRAPNEL HEADS ON A NO. 4 CAPSTAN LATHE

THE steel stampings from which the heads of the 60 pdr. shrapnel shell are made are bored and threaded at one end to receive the fuse socket, which is soldered in position. This thread is very short, and, if tapped, the operation must be carried out carefully, otherwise there is a danger of the tap acting as a boring tool and stripping the thread. In addition, taps of this size are both costly and difficult to manufacture to the required degree of accuracy.

An excellent way of threading this work is shown in the line drawing, from which it will be seen that the threads are chased with Herbert standard type circular internal chasers held in the square turret, which also carries a facing tool and former for the profiling slide. The threaded portion of the chaser is very much longer than standard, as it has a chamfer or lead $\frac{7}{8}$ in. wide, which distributes the cut over a number of teeth.



CHASING 60-PDR. SHRAPNEL HEADS.

When the thread diameter has been bored, the lathe spindle is reversed and the chaser moved into the position shown by the dotted lines, being set to the correct diameter by means of the cross slide micrometer dial. On engaging the nut with the leader, the chaser travels away from the chuck to the position shown by the full lines, completing the threading at one cut. The advantages of threading by this method are:

(1)—The chaser is cheaper to manufacture than a tap, as its diameter need not be accurate; it also employs much less steel than a tap.

(2)—The life of a chaser is much longer than that of a tap.

(3)—The chasing, being done at one cut, is a quicker operation than tapping, which necessitates reversing the spindle to get the tap out of the work.

(4)—The diameter of the hole is under the control of the operator, and the wear of the chaser can be allowed for by adjusting the micrometer dial. A tap which has worn below size at once becomes useless.

(5)—The chaser, having clearance, cuts a much cleaner thread than a tap.

(6)—The holder for the chaser is much less costly than a self-releasing tap-holder.—Herbert's Monthly.

RUSSIA WILL NEED MUCH MACHINERY

THE Special Foreign Trade Bulletin issued by the Foreign Trade Department of the National Association of Manufacturers of the U.S. is devoted to Russia's requirements. The pamphlet outlines plans for great development of railways, waterways, and other national utilites, calling for immense supplies of machinery and equipment. The publication is intended to keep members advised of developments affecting the export and import trade arising out of the European war as they affect Russia and American manufacturers and exporters desiring to avail themselves of opportunities for extending trade.

"Those who know Russia well," says the Bulletin, "and whose judgment is not affected by the prospect of personal material advantage, are of the opinion that a conservative estimate of the high grade and costly machinery for the completion of public improvements puts the value at over $200,000,000 for the first year for Government needs alone, and $100,000,000 for private needs. Furthermore, something like the same ratio of needs and disbursements will continue for at least ten years longer, although in gradually decreasing sums of actual money outlay."

PROHIBIT ALL TRADE WITH ENEMY COUNTRIES

THE Dominion Government is promulgating through its official publication the full text of the resolutions adopted at the economic conference of the allies in Paris last month, when measures temporary and permanent were instituted to safeguard their mutual economic interests.

They provide for absolute prohibition of all trade with enemy countries. The cancellation of any contracts entered into, the sequestration or control in allied countries of enemy enterprises, further restriction of supplies to the enemy by unifying lists of contraband, etc., making exports to neutral countries conditional on the existence of control organizations or special guarantees, and during and after the war a policy of mutual collaboration and assistance in trade development to offset and counteract the similar policy in contemplation by the Central powers.

* * *

The Thor Ironworks, Toronto, have been awarded a contract for the construction of a steel boat 261 feet long for the Great Lakes Transportation Co.

Foundrymen's Convention and Exhibition at Cleveland, Ohio

Contributed

It will be noted from what follows that not only are the executive plans well developed for the 1916 *Foundrymen's Convention and Exhibition, but the mass of detail arrangement necessary to making the double function a huge success from either or all of the educative, business and social viewpoints, may be said to be more or less finally worked out and completed*

THE exhibition of foundry equipment and accessories, machine tools, etc., to be held at Cleveland, Ohio, during the week of September 11, concurrent with the annual meetings of the American Foundrymen's Association and the American Institute of Metals, will, it is expected, surpass in magnitude any similar undertaking. This is indicated by the large number of manufacturers who already have made reservations for space. Fully 90% of the exhibition area of the Coliseum has been disposed of, and since 10,000 additional square feet will be required to meet the needs of prospective exhibitors, it has been decided to erect a temporary building on a lot directly across the street from the Exhibition Hall. At a meeting of the exhibition committee of the American Foundrymen's Association, held at the Hotel Statler, Cleveland, on Saturday, June 24, the erection of this annex was authorized.

The two buildings will be connected by a runway, making it necessary for the visitors to descend to the street when passing from one to the other. In the temporary structure it is planned to place all of the large operating machines requiring heavy foundations, and it is probable that several different types of melting furnaces will be shown in operation. The annex will be converted into a temporary foundry, where molds will be made and poured. Since the Coliseum was erected, many shows have been held there. The structure affords 60,000 square feet of floor space, but this industrial exhibition will be the first to overflow its generous dimensions, making necessary the erection of a temporary annex to provide space for all of the manufacturers who contemplate making exhibits. This industrial exhibit will, it is believed, be the biggest and most complete show of its kind ever held in Cleveland, and the local interest now manifested points to an unusually large representation of Cleveland products.

Reservations Made

Although more than two months still intervene before the opening of the exhibition, 95 manufacturers already have made reservations, and the indications are that this total will be swelled to 150 when the doors of the Coliseum and the annex are thrown open on Monday, Sept. 11. At Atlantic City last year there were 102 exhibitors, and never before in the history of the exhibition movement has as much space been reserved so far in advance of the opening of the show as this year. The complete list of manufacturers who have made application for space follows:

American Gum Products Co., New York.
Arcade Mfg. Co., Freeport, Ill.
Armstrong Cork Co., Pittsburgh.
Atkins, E. C., & Co., Indianapolis.
Ayer & Lord Tie Co., Chicago.
B. & B. Mfg. Co., Indianapolis.
Berkshire Mfg. Co., Cleveland.
Besly, Chas. H., & Co., Chicago.
Birkenstein, S., & Sons, Chicago.
Blystone Mfg. Co., Cambridge Springs, Pa.
Brass World Publishing Co., New York.
Brown Specialty Machinery Co., Chicago.
Carborundum Co., Niagara Falls, N.Y.
Cataract Refining & Mfg. Co., Buffalo.
Chicago Pneumatic Tool Co., Chicago.
Cleveland Blow Pipe & Mfg. Co., Cleveland.
Cleveland Pneumatic Tool Co., Cleveland.
Coale, Thomas E., Lumber Co., Philadelphia.
Curtis Pneumatic Machinery Co., St. Louis.
Davis-Bourneville Co., Jersey City, N.J.
Dixon, Joseph, Crucible Co., Jersey City, N.J.
Excelsior Tool & Machine Co., East St. Louis, Ill.
Federal Foundry Supply Co., Cleveland.
Felt & Tarrant Mfg. Co., Chicago.
Gardner Machine Co., Beloit, Wis.
General Electric Co., Schenectady, N.Y.
Gibb Instrument Co., Pittsburgh, Pa.
Gisholt Machine Co., Madison, Wis.
Goldschmidt Thermit Co., New York.
Graceton Coke Co., Graceton, Pa.
Great Western Mfg. Co., Leavenworth, Kans.
Hardy, F. A., & Co., Chicago.
Harriss, Benjamin, & Co., Chicago.
Herman Pneumatic Machine Co., Pittsburgh.
Herold Bros. Co., Cleveland.
Hill-Brunner Foundry Supply Co., Cincinnati.
Hoevel Mfg. Corporation, New York.
Ingersoll-Rand Co., New York.
Iron Age, New York.
Jennison-Wright Co., Toledo.
King, Julius, Optical Co., New York.
Lehigh Coke Co., South Bethlehem, Pa.
Lincoln Electric Co., Cleveland.
Lupton's, David, Sons Co., Philadelphia.
McCormick, J. S., Co., Pittsburgh.
MacLean Publishing Co., Toronto, Ont.
Macleod Co., Cincinnati.
Mahr Mfg. Co., Minneapolis.
Malleable Iron Fittings Co., Branford, Conn.
Manitowoc Electric Implement Co., Manitowoc, Wis.
Metal Industry, New York.
Midland Machine Co., Detroit.
Moldar Co. (Richey, Brown & Donald), Maspeth, N.Y.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Engineering & Mfg. Co., Baltimore.
Motch & Merryweather Machinery Co., Cleveland.
Mott Sand Blast Mfg. Co., Chicago.
Mumford, E. H., Co., Elizabeth, N.J.
National Engineering Co., Chicago.
New Haven Sand Blast Co., New Haven, Conn.
Norma Co. of America, New York.
Norton Co., Worcester, Mass.
Obermayer, S., Co., Chicago.
Oliver Machinery Co., Grand Rapids Mich.
Osborn Mfg. Co., Cleveland.
Oxweld Acetylene Co., Chicago.
Pangborn Corporation, Hagerstown, Md.
Penton Publishing Co., Cleveland.
Pickands, Brown & Co., Chicago.
Portage Silica Co., Youngstown, O.
Pridmore, Henry E., Chicago.
Pyrotectite Co., Chicago.
Robeson Process Co., New York.
Rogers, Brown & Co., Cincinnati.
Sand Mixing Machine Co., New York.
Sly, W. W., Mfg. Co., Cleveland.
Smith Facing & Supply Co., Cleveland.
Smith, R. P., & Sons Co., Chicago.
Smith, Werner G., Co., Cleveland.
Snyder Electric Furnace Co., Chicago.
Standard Sand & Machine Co., Cleveland.
Sterling Wheelbarrow Co., West Allis, Wis.
Stevens, Frederic B., Detroit.
Strong, Kennard & Nutt Co., Cleveland.
Sullivan Machinery Co., Chicago.
Superior Band Co., Chicago.
Thomas Elevator Co., Chicago.

Titanium Alloy Mfg. Co., Niagara Falls, N.Y.

Union Steam Pump Co., Battle Creek, Mich.

U. S. Graphite Co., Saginaw, Mich.

U. S. Molding Machine Co., Cleveland.

Wallace, J. D., Chicago.

Warner & Swasey Co., Cleveland.

White & Bro., Philadelphia.

Whiting Foundry Equipment Co., Harvey, Ill.

Woodison, E. J., Co., Detroit.

Papers and Reports

The papers and committee reports to be presented at the annual meeting of the American Foundrymen's Association promise an unusually valuable and interesting programme. Separate sessions will be held for the discussion of topics relating to the manufacture of gray and malleable iron and steel castings. The opening meeting will be held at the Hotel Statler, Monday afternoon, September 11, and will be followed by morning sessions only, the convention closing Friday, September 15. This arrangement will afford the foundrymen more opportunity to inspect the exhibition than has been the case in former years with two sessions daily, although the length of the programme will necessitate several simultaneous meetings. Three symposiums will feature the programme, the subjects of which follow:

“Results of Closer Co-operation between the Engineer and the Foundry as relating to Gray and Malleable Iron, Steel and Non-ferrous Metals.”

“The Influence of Gating on Castings, including Gray and Malleable Iron, Steel and Non-ferrous Metals.”

“Electric Furnace Practice as Relating to the Production of Steel Castings.”

Four authors will present papers for each of the symposiums, and every phase of these respective subjects will be discussed. Several interesting papers on sand reclamation also will be presented, covering investigations made among all of the members of the American Foundrymen's Association and by the United States Bureau of Standards. A partial list of papers promised follows:

Miscellaneous

“Sand Reclamation,” by H. B. Swan, Cadillac Motor Car Co., Detroit.

“Progress Report on Sand Reclamation,” by C. P. Karr, associate physicist, U.S. Bureau of Standards, Washington.

Symposium on “The Results of Closer Co-operation between the Engineer and the Foundry,” as relating to

“Gray Iron,” by D. W. Sowers, Sowers Mfg. Co., Buffalo.

“Steel,” by John Howe Hall, Taylor-Wharton Iron & Steel Co., High Bridge, N.J.

“Malleable Iron” (author not yet determined).

“Non-Ferrous Metals,” by C. E. Chase, Modjeski & Angier, Chicago.

Symposium on “The Influence of Gating on Castings,” including

“Gray Iron,” by B. D. Fuller, Westinghouse Electric & Mfg. Co., Cleveland.

“Steel,” by William Gilmore, Hubbard Steel Foundry Co., East Chicago, Ill.

“Malleable Iron,” by A. M. Fulton, Fort Pitt Malleable Iron Co., Pittsburgh.

“Non-Ferrous Metals,” by R. R. Clarke, Pennsylvania Railroad Co., Pittsburgh.

“The Significance of the Fire Waste,” by Franklin H. Wentworth, secretary National Fire Protective Association, Boston.

“Profit Sharing in the Jobbing Foundry,” by C. E. Knoeppel, New York.

“What the Pratt Institute Has Done, Is Doing, and Hopes to Do, in the Training of Men for the Foundry Industry,” by Samuel S. Edmands, Pratt Institute, Brooklyn.

“The Installation of Uniform Cost Systems by Members of Technical Societies,” by Clinton H. Scovell, Clinton H. Scovell & Co., Boston.

“Report of the Committee on Foundry Costs,” by B. D. Fuller, chairman Westinghouse Electric & Mfg. Co., Cleveland.

“Report of the Committee Advisory to the U. S. Bureau of Standards,” by Richard Moldenke, chairman, Watchung, N.J.

“Report of the Committee on Safety and Sanitation,” by Victor T. Noonan, chairman, Industrial Commission of Ohio, Columbus.

“Report of Representatives on the Conference Board on Training of Apprentices,” by B. D. Fuller, chairman, Westinghouse Electric & Mfg. Co., Cleveland.

Gray Iron

“The Effect of Different Mixtures on the Strength of Chilled Car Wheels,” by G. S. Evans, Lenoir Car Works, Lenoir City, Tenn.

“The Manufacture of Semi-Steel Castings,” by David McLain, McLain's System, Milwaukee.

“The Use of By-Product Coke in Foundry Operations,” by George Long, Pickands-Brown & Co., Chicago.

“How Certain Cleaning Room Problems Have Been Solved,” by H. Cole Estep, The Foundry, Cleveland.

“The Use of Borings in Cupola Operations,” by James A. Murphy, Hooven, Owens & Rentschler Co., Hamilton, O.

“One-third of a Century in a Gray Iron Foundry,” by A. O. Backert, Penton Publishing Co., Cleveland.

“The Experimental Foundry,” by H. K. Hathaway, Tabor Mfg. Co., Philadelphia.

“Report of Committee on Standard Methods for Coke Analysis,” by H. E. Diller, chairman, General Electric Co., Erie, Pa.

“Report of Committee on Standard Specifications for Foundry Scrap,” by G. E. Jones, chairman, Whiting Foundry Equipment Co., Harvey, Ill.

“Report of Committee on General Specifications for Gray Iron Castings,” by W. P. Putnam, chairman, Detroit Testing Laboratories, Detroit.

Steel

Symposium on “Electric Furnace Practice for the Manufacture of Steel Castings,” by F. T. Snyder, Snyder Electric Furnace Co., Chicago; A. B. Clarke, Buchanan Electric Steel Co., Buchanan, Mich.; John A. Crowley, John A. Crowley Co., New York.

“Making Electric Steel in the Rennerfelt Flaming Arc Furnace for Foundry Purposes,” by C. H. Vom Baur, Hamilton & Hansell, New York.

“Crucible and Electric Steel Compared,” by T. S. Quinn, Lebanon Steel Foundry, Lebanon, Pa.

“Converter and Electric Steel for Casting Purposes Compared,” by Peter Blackwood, Monarch Steel Casting Co., Detroit.

“Manganese Steel Castings,” by W. S. McKee, American Manganese Steel Co., Chicago, Ill.

“Titanium in Steel Castings,” by W. A. Janssen, Bettendorf Co., Davenport, Iowa.

“Report of Committee on Steel Foundry Standards,” by Dudley Shoemaker, chairman, Atlantic Steel Casting Co., Chester, Pa.

“Report of Committee on Specifications for Steel Castings,” by John Howe Hall, chairman, Taylor-Wharton Iron & Steel Co., High Bridge, N.J.

“The Small Open-Hearth as a Flexible Unit for Either Large Steel Foundries or General Jobbing Shops,” by Frank Carter, Milwaukee.

“The Presence of Alumina in Steel,” by G. F. Comstock, Titanium Alloy Mfg. Co., Niagara Falls, N.Y.

“The Particular Application of Green Sand Molding in the Steel Foundry,” by A. F. S. Blackwood, Monarch Steel Casting Co., Detroit.

“Theory and Practice of Heading and Gating Steel Castings,” by Ralph H. West, West Steel Casting Co., Cleveland.

“Acid versus Basic Steel for Making Castings,” by E. F. Cone, The Iron Age, New York.

“Alloy Steel Castings,” by David Evans, Chicago Steel Foundry Co., Chicago.

Malleable Iron

“The Application of Malleable Iron Castings in Car Construction,” by Frank J. Lanahan, Fort Pitt Malleable Iron Co., Pittsburgh.

“Commercial Side of the Malleable Iron Industry,” by W. G. Kranz., National Malleable Castings Co., Cleveland.

“Report of Committee on Specifications for Malleable Iron Castings,” by

Enrique Touceda, chairman, Albany, N.Y.

Papers will be presented on various subjects relating to malleable iron practice, by the following authors:

Edwin F. Leigh, Marion Malleable Iron Works, Marion, Ind.

S. H. Standish, North-Western Malleable Iron Co., Milwaukee.

G. Meehan, Ross-Meehan Foundry Co., Chattanooga, Tenn.

Enrique Touceda, Albany, N.Y.

W. A. Forbes, Rockford Malleable Iron Works, Rockford, Ill.

Entertainment and Plant Visitation

To provide for the entertainment of the visiting foundrymen and to direct them in plant visitation, local committees have been organized, the chairmen of which held their first meeting at the Hotel Statler, Cleveland, on Saturday, June 24.

F. B. Whitlock, Interstate Foundry Co., has been appointed chairman of the general directing committee, which consists of the chairmen of the other committees, as follows:

Plant Visitation—J. S. Smith, Smith Facing and Supply Co.

Entertainment — Sterling Hubbard, Rogers, Brown & Co.

Reception—Herbert Boggis, Taylor & Boggis Foundry Co.

Golf—W. B. Greene, Palmer & De Mooy Foundry Co.

Finance—J. C. Brainerd, Johnston & Jennings Co.

Ladies' Entertainment—Mrs. W. C. Sly, 13474 Lake Avenue.

An unusually complete entertainment programme is being developed, which includes the annual banquet of the American Foundrymen's Association and the American Institute of Metals, at the Hotel Statler, Thursday evening, Sept. 14. Every opportunity also will be afforded for plant visitation. Cleveland is one of the leading foundry centres of the United States, and practically all of the castings manufacturers will permit the inspection of their plants during convention week.

In view of the great activity prevailing in the foundry industry, making necessary the almost continuous service of every available employee, many foundry operators are planning the vacations of their plant executives for convention week. That the attendance will eclipse all previous records is indicated by the interest already manifested, and large delegations of foundrymen will travel in a body from Detroit, Pittsburgh, Chicago, Milwaukee, Buffalo and Philadelphia.

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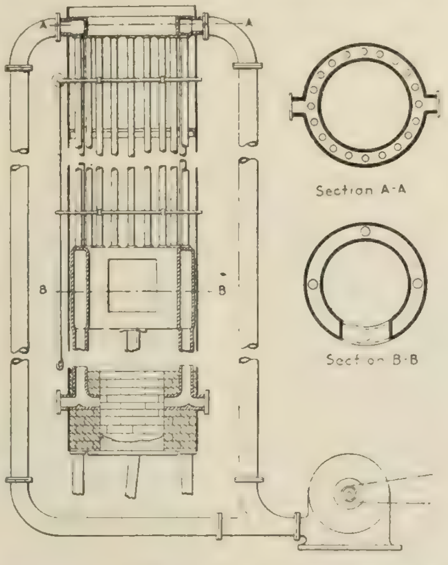
BLAST PREHEATING CUPOLA

A NEW type of cupola, in which the blast is preheated before coming in contact with the fuel, is described by J. A. Parsons in a recent issue of the Journal of the South African Institute of Engineers. The air passes through a series of tubes in the chimney of the cupola, after which it is blown through the tuyeres to the fuel. When the blast is first started, the air reaches the fuel bed only slightly warm. Within a few minutes it reaches the temperature of melting lead, and at the end of about 20 minutes it attains a temperature about one-third of that to be imparted to the iron.

Economy in the use of coke is obtained by means of the preheater, due to the fact that only about one-half of the coke is burned to CO_2 in the neighborhood of the tuyeres, the other half being burned to CO which later burns to CO_2 in the chimney. The burning of the coke to CO generates 4320 B.t.u., and the burning of CO to CO_2 generates an additional 10,220 B.t.u. Inasmuch as this additional heat is generated after the CO has passed the iron in the cupola, its heating effect is lost. The preheater located in the chimney recovers a large portion of this heat and returns it to the cupola in the blast. The economy in coke claimed for the preheater, as the result of several months' operation, is 30 to 39 per cent., according to the duration of the cast.



ARRANGEMENT OF BLAST PREHEATING CUPOLA.

It is also claimed that the quality of the metal is improved, and that the tuyeres do not clog up. The furnace can be temporarily held up, by diminishing the blast, yet the remainder of the blast comes in so hot that the melting can be reduced in proportion and without cooling the furnace unduly. This latter feature permits of great flexibility of operation. Furthermore, the capacity of the cupola is much increased. A 24-in. cupola can handle up to 2 tons of iron per hour with a 6-oz. blast. After some seven months' operation no deterioration of the preheater is noticeable. This results in a low first cost and small repair charges.

TRAINING MUNITION OPERATORS IN BRITAIN

IN order to train workers for employment in the numerous factories throughout Great Britain, the Ministry of Munitions some months ago decided to establish a number of training schools. It was not anticipated, at the outset, that anything further would be achieved than that certain numbers of unskilled workers could be taught to perform correctly one single operation. As a fact, a good deal more than this has been done in some cases, but, broadly speaking, what is actually being effected is that each student is taught how to do one thing and to do it well enough to ensure that the work produced is satisfactory and to gauge.

Instruction Schedule

These training centres are intended, if not to supplant, at any rate to supplement the teaching which is being carried out at the factories themselves, and it can be said of them that they have been exceedingly successful. For the carrying out of its idea the Ministry of Munitions quickly turned its attention to the various technical schools owned by local authorities throughout the country, and from them it, apparently, met with a ready response. At the present time there are over sixty training centres under the control of the Ministry in which instruction is being given to persons desirous of entering munition works.

The training is free in all the sixty-four centres, and in the Metropolitan area they are under the control of the London County Council. Each student must undertake to enter a munition factory at the close of the course of training. In London the normal course is six weeks, the students working for four hours a day for six days a week. The total duration of the training is, therefore, 144 hours. The day is divided into three periods of four hours each, these being from 9 a.m. to 1 p.m., from 2 p.m. to 6 p.m., and from 6.30 p.m. to 10.20 p.m. respectively. Hence the school is open for 72 hours per week, and three sets of students can be in training at one time. The teaching staff is so arranged that each individual is on duty for half of the day—that is to say, each works 36 hours per week. Two definite classes of students are trained—(a) ordinary operators at the vise and machine tools and (b) tool setters on lathes, milling and allied machines. In July of last year, when the control was taken over by the Ministry of Munitions, the particular work shop under review contained the following equipment: Thirty lathes, 11 drilling machines, 3 power hack saws, 2 shaping machines, 1 punching machine, 1 shearing machine, and 45 vises. Since that time the following machines have been added: Six capstan lathes, 12 milling machines, including profiling machines, 3 lathes for 18-pdr. cartridge cases, 2 turret lathes for 18-pdr. shells, 2 tool grinders, 2 universal cutter grinders, 1 slotting machine. Further machines are about to be installed. The motive power is obtained from four electric motors, which drive on to three main lines of shafting, each about 100 ft. long.

Organization

The organization of the school has been arranged to follow as nearly as possible that of a munition factory, there being offices, stores, refreshment rooms, machine, fitting and blacksmiths' shops. Ordinarily speaking, set schemes are worked to, but in special cases where requisition is made by individual firms for workpeople trained to meet particular needs, special training—sometimes with tools actually lent by the firms in question—is given.

Students are trained in a large number of operations, such as the use of files; operating capstan and turret lathes; or taking charge of milling, drilling, slotting and grinding machines. In some cases the work produced—such as baseplates for shells, is for actual use. Other students again learn how to forge, form and sharpen tools, etc. Naturally, as is to be expected, the character of the work being turned out varies, for there are students in different stages of training. There are to be seen, for example, tools and gauges of various forms which would do credit to any workshop. The training is eminently practical and calculated to produce the desired result, namely, the making of each student as proficient as possible in one particular operation in the shortest time. Women students are of all ages. Some are quite young, while others have reached middle life. They all appear to enter wholeheartedly into the work.

In London there are five centres conducted by the London County Council. Two of these are exclusively devoted to the teaching of gauge making, the working hours being 44 per week. Up to the present time over 3,000 students have received certificates, and of these over 2,700 are known to have entered munition factories or his Majesty's forces. Students have been supplied to 338 individual firms, one of which has taken no less than 344, while 18 have taken more than twenty each.

PRODUCING THIN METAL PANS

ACCORDING to the International Moulder's Journal, the extremely thin metal pans made by the Chinese for cooking rice with a minimum amount of fuel are cast in moulds—which are made in two parts—of well-kneaded clay by means of a potter's wheel. When dried the moulds are again placed on the wheel and coated with a very thin layer of moulder's sand, and, after being redried, the two halves are fitted together with the greatest care, since even the slightest relative displacement would spoil the casting. The next step is to bake the moulds, until they are as hard as brick, at red heat in a furnace filled with charcoal and topped by a banded fire-clay cover.

Meanwhile the iron for pouring is melted in a small crucible-like cupola furnace, so that the metal will have attained the requisite fluidity by the time the mould is at a bright red heat, whereupon the cover of the baking furnace is taken off, the metal poured into the mould, and the cover replaced for the casting and mould to cool down together, which takes about two days. The mould is then carefully taken apart, the pan detached, and the casting gate removed with a fine saw. The pan is fitted with wire handles, inserted through drilled holes, and is ready for sale. The moulds can be used for several pourings, being recoated with fine sand every time.

WOMEN MAKING GOOD ON MUNITIONS

THE other day I met a friend who is a highly placed official at one of the largest works in Sheffield, England, says an engineer correspondent. We discussed the labor outlook. The great difficulty, he said, is in getting a full supply of really skilled men—men who are fitters as well as turners. For ordinary shell turning any man of intelligence, and with the slightest taste for that kind of thing, can be sufficiently trained in a day or so to commence work—the rest comes with experience. I asked how the experiment of women munition workers was progressing, and was assured that it had quite passed the experimental stage. "We do not know," he added, "what we should do without them now. They are proving far better than our highest anticipation.

Women Save the Situation

In fact, women in the munition factories are going to save the situation. They are in real earnest, and show great adaptability. They are willing to be taught, and quickly learn." I have received similar testimony in other directions, and it is rare for one of them to come before the tribunals for any offence. Many of the women have temporarily abandoned good social positions. Clad in khaki overalls, and a very becoming head-dress, they sink all such distinctions and work for the common good.

One very remarkable case in their favor has been related to me. It occurred in this district. A new shell shop was fitted up with lathes for turning 18-pounder shells — a nice light job for youths. The shop was filled with lads who had received preliminary instruction in their duties. After a certain period of grace, during which they were expected to pick up sufficient experience, it was estimated that the output should have been, say X thousand shells weekly. What was the actual fact? The output never rose above a tenth of that amount, and within six months there was not a lathe in the place that had not been broken in some way or other.

Employment Provision Amplified

These youths were all cleared out, the pick being transferred to other shops, and the remainder dismissed. The place was reorganized and filled with women. Within six weeks they were working so well that the weekly output had risen to 500 beyond the original estimate—and all the machines were intact. Of course, the great difficulty of a more rapid extension of the employment of women is that the works were built for male labor, so that the sanitary and other arrangements of the places have had to be reorganized. In some cases this has been done upon a very elaborate scale, and one or two large works, I believe, are on the eve of huge extensions of female labor.

It is now being recognized that women can do almost anything. Men employed as laborers for the rough work of sweeping and cleaning, if they become awkward or unsatisfactory, as they have a knack of doing at times, are being quietly dropped in favor of women suitable for such work, and of a class well able to take care of themselves in rough surroundings. They work side by side with men, in some cases, but always under their own forewoman, and are answering the purpose well. It is quite anticipated that women will shortly be employed in the turning, etc., of a very much heavier type of shell. Already in some factories they are engaged in such work as operating steam cranes, working in khaki trousers and overalls, and at one factory—I have no need to be more definite—there are already 4,000 women hard at work on munitions, whilst preparations are well advanced to receive as many more. These are great times for patriotic women, and they earn good wages, too.

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It is reported by H. M. trade commissioner for Australia that the New South Wales Minister of Agriculture has recently entered into an agreement with a firm of engineers for the supply of plans and specifications for elevators for the bulk handling of grain in the State. It is anticipated that the first building to be erected, namely, the Sydney Terminal Elevator, will be undertaken during next month. New South Wales will, it is stated, be the first State in the Commonwealth to handle grain in bulk by elevators.

PROGRESS IN NEW EQUIPMENT

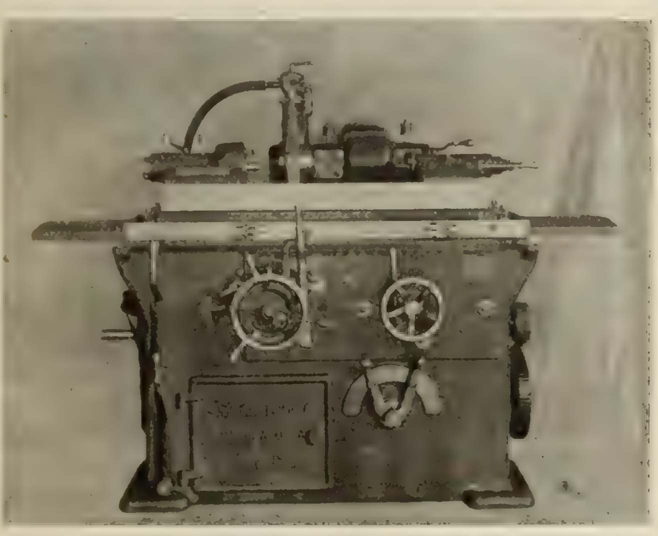
A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

SELF-CONTAINED GRINDING MACHINES

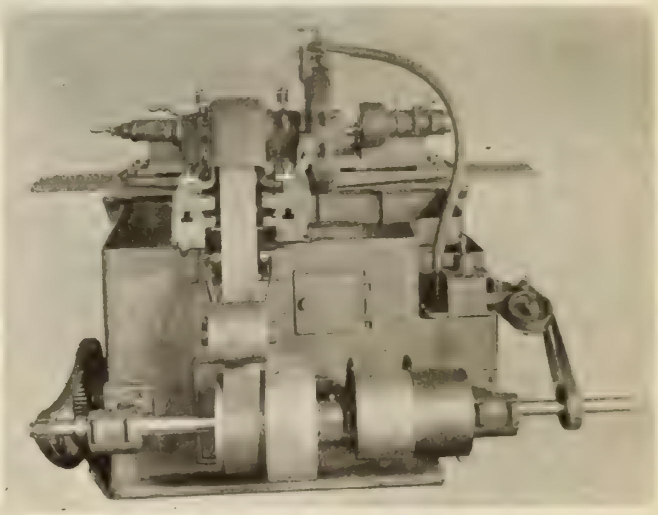
TWO additional sizes—8 in. x 18 in. and 8 in. x 30 in.—have been added to the line of self-contained grinding machines built by the Modern Tool Co., Erie, Pa.

Economy of floor space, compactness, ease of operation, and comparative simplicity of mechanism are distinguishing features of these machines, all operating levers being concentrated on the front of the machine, and no parts extending above the wheel stand. These machines are essentially manufacturing grinders for straight or taper cylindrical work in quantities, the accessibility allowing parts to be properly cared for without undue expenditure of time.

The bed is a one-piece casting, rigidly braced to insure stability, while the base rests upon three points.



FRONT VIEW 8 IN. X 18 IN. MACHINE.



REAR VIEW 8 IN. X 18 IN. MACHINE.

The standard wheel spindle is 2¼ in. diameter running in phosphor bronze bearings 6¼ in. long, driven by a belt 4 in. wide. For exceptionally heavy duty work, however, they can be furnished with a wheel spindle 3¼ in. in diameter running in phosphor bronze bearings 8¼ in. long driven by a belt 5 in. wide, with a corresponding increase in the wheel stand pile, the bearings in each instance being provided with sight-feed oilers.

The wheel stand pile is bolted to the bed of the machine. The wheel stand slides on V and flat ways, and is held in place by gravity, but is provided with a safety gib to guard against lifting under abnormal conditions. The wheel centre is of large diameter, has a long bearing on the spindle, and will take any of the recognized standard grinding wheels. Wheels used on the standard machines are 16 in. diameter up to 3 in. face. Wheels used on the heavy drive are 18 in. up to 4 in. face.

The table drive is of a very simplified type, eliminating what was formerly known as the table transmission.. This table drive consists of a single unit contained in the bed of the machine which is a combination of table drive and transmission. All steel spur gears are used for the reversing mechanism. The power table traverse is controlled by a lever immediately left of the table hand wheel, which provides for starting or stopping the table at any point in its stroke. When the table is under power the hand wheel is automatically disengaged and when the power is removed the hand wheel is automatically engaged for traversing the table by hand. There are four table feeds, derived from a single unit gear box, and controlled by a lever at right immediately below the table hand wheel.

The automatic cross feed is positive in its action and can be set for a reduction of any amount from .0005 in. to .005 in. at either or both ends of the table reverse. This latter feature is especially advantageous when grinding against a shoulder. The feed is automatically thrown out when work is ground to size and a positive stop is provided for use when feeding by hand.

The cross feed hand wheel is graduated to .0005 in. in plain view of the operator. Adjustment of the cross feed is made by the movement of a lever to the amount of feed desired, as indicated on a graduated dial plate, and may be instantly changed to any feed while the machine is still in operation.

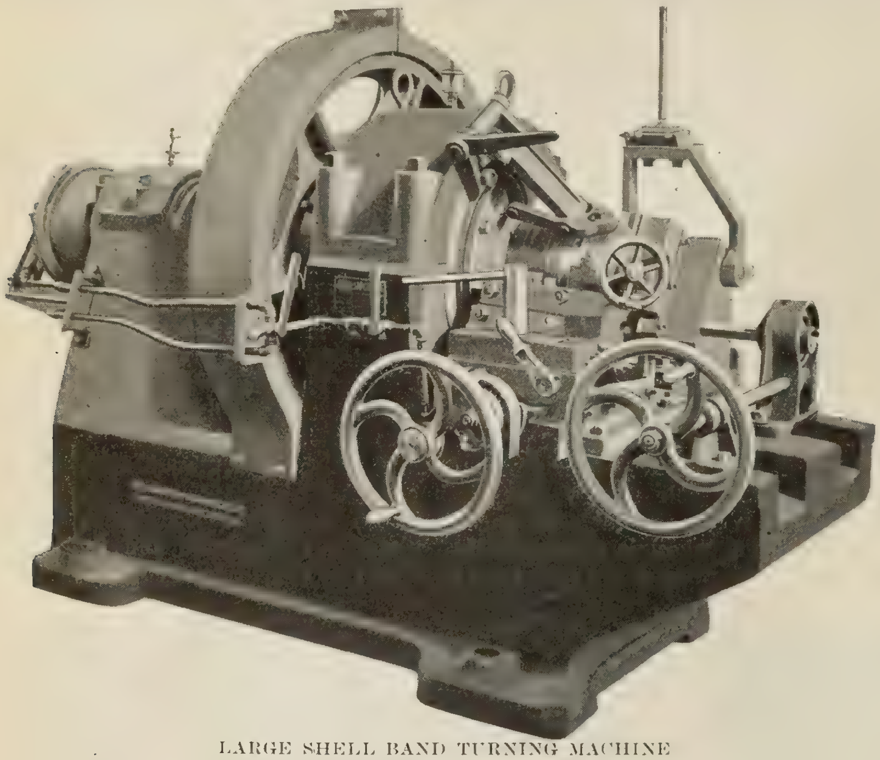
The headstock is of entirely new design being driven from a shaft under the sliding table. This shaft is driven by a pulley which is carried in a bracket on the bed, on which power is taken from the gear box.

A feature of the headstock is the combination of live and dead centres. The spindle is carried in bearings in the headstock base in which it revolves for live centre work. The face plate is clamped to the spindle and the spindle revolves in the headstock bearing for live centre work. To change for dead centre work it is only necessary to loosen a screw which clamps the face plate to the spindle and tightens the clamp on the headstock which holds the spindle firmly in the headstock base The dead centre pulley is then free to revolve upon its bearing for regular dead centre work.

The foot stock is fitted to the swivel table and preserves its alignment in the same manner as the headstock. The foot stock spindle is held in any position by a spring, or may be set positive against the work and locked. The work centres on the head and foot stock, are directly over and between the guides of the table, a construction which eliminates the weight and strain necessarily present where the work centres are outside.

These two machines have eight work speeds from 26 to 390 r.p.m., and four table feeds from 22 in. to 104 in. per minute. The feeds and speeds are entirely independent of each other, and are suitable for the various classes of work which come within the range of these machines.

All work speeds and table feeds are controlled by levers on the front of the machines and are derived from a separate unit gear box. The gears are made of specially treated steel and are in mesh at all times.


LARGE SHELL BAND TURNING MACHINE

The main drive is in the rear of the machines and runs at constant speed, power being applied either from a line shaft by a single belt or by motor connection. Wheel truer, steady rests, and pump are supplied with the regular equipment.

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LARGE SHELL BAND TURNING MACHINE

THE type of single purpose band turning machine originated by the Jenckes Machine Co., Sherbrooke, Que., has been extended to include shells of the larger sizes, and the accompanying photo shows the 9.2 in. size for machining the driving bands on shells of that size.

The bed is deep and wide, of heavy box section with box cross girts. The bearings are cast integral with the bed, the front bearing being 9¾ in. dia. by 7 in. long, and the rear 6 in. dia. by 7 in. long. The bearing caps are machine fitted and secured by four heavy studs. The forward cap is interlocked with the bearing to take the end thrust without end shift. Both bearings are lined with best babbitt peened in, bored and finally scraped to the spindle. Shims are provided, so that wear can be taken up in an effective manner.

Tailstock.—The exact position of the tailstock spindle is determined by a swinging stop, and a limited adjustment is provided for, by a set screw and lock nut in the stop, so that the enlarged end of the spindle actually bears against end of shell, to locate the band the proper distance from end of shell. A heavy center working in a hardened bushing centers the shell on the spindle. This center retreats slightly against the pressure of a heavy spring inside the spindle, and permits some variation in depth of center in adapter plug.

The hollow driving spindle is of steel. The chuck is built into the extension of the spindle and is of the collet type, the jaws being opened and closed positively by compressed air. It is operated by an air cylinder at the rear. In closing the jaws, the shell is pushed forward until stopped by the tail spindle. Jaw movement continues until the full pressure of the cylinder is exerted. The drive is through a single clutch pulley, 22 in. diam., 10½ in. face. The pulley is bronze bushed and runs loose on the spindle. The clutch is the full diameter of the inside of the pulley and is of the taper cork insert type. It is operated by a separate valve, and the release is by springs. The thrust of the spindle is taken at the forward end bearing, a take-up collar being provided at the rear of the particular bearing.

The tool base is bolted firmly to the bed and carries both roughing and finishing heads. On the 9.2 in. the roughing is split into two operations. Each tool is fully adjustable but when once set they can be removed and replaced with precision. The feed of both tools is by a single screw to positive stops. The undercutting tool is on a separate block mounted on the front slide at the correct angle and is fully adjustable. The feed is through lever and cam. The rear or finishing tool is so mounted that the tool slides past the band and shears it to exact size and shape. The feed is by rack and pinion with handle in a convenient position for the operator.

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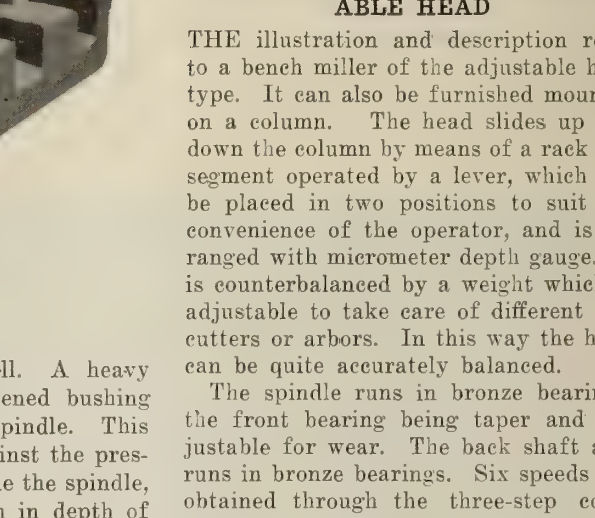
BENCH MILLER WITH ADJUSTABLE HEAD

THE illustration and description refer to a bench miller of the adjustable head type. It can also be furnished mounted on a column. The head slides up and down the column by means of a rack and segment operated by a lever, which can be placed in two positions to suit the convenience of the operator, and is arranged with micrometer depth gauge. It is counterbalanced by a weight which is adjustable to take care of different size cutters or arbors. In this way the head can be quite accurately balanced.

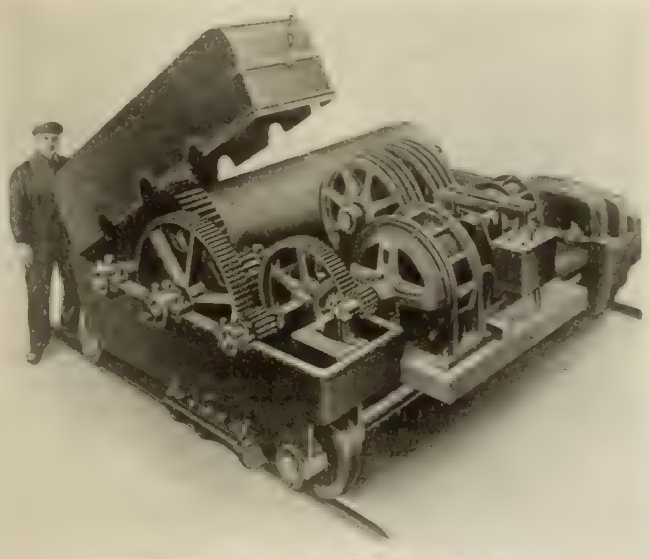
The spindle runs in bronze bearings, the front bearing being taper and adjustable for wear. The back shaft also runs in bronze bearings. Six speeds are obtained through the three-step cone, and by reversing the pulleys on the end of spindle and end of back shaft. The table traverse is operated by lever through rack and pinion. The saddle is fed in and out by means of a square thread screw, which has a micrometer attachment. The specifications are as follows:—Size of table, 4 in. x 15 in.; table feed, 6 in.; vertical travel of head, 5 in.; taper in spindle, No. 7 B. & S.;


BENCH MILLER WITH ADJUSTABLE HEAD

spindle speeds with three-step cone, 120, 180, 270, 480, 720, and 1,080 r.p.m.; counter shaft speed, 360 r.p.m. The Morris Machine Tool Co., Court and Harriet Streets, Cincinnati, Ohio, are the manufacturers of this bench miller.

TWIN TROLLEY FOR 160-TON A.C. CRANE

ONE of the largest alternating current cranes yet installed for handling locomotives has been furnished recently by Whiting Foundry Equipment Co., Harvey, Ill., to the Seaboard Air Line Railway for their new shops at Portsmouth, Va. The crane is 160 tons capacity, with two 80-ton trolleys, one of which is equipped with a 10-ton auxiliary hoist. The trolleys are of the construction shown in cut, and embody many valuable features.



TWIN TROLLEY FOR 160-TON A.C. CRANE

Among these are the fact that the entire train of gears is enclosed and runs in oil bath. The motor pinion has outboard bearing as shown. The idler sheaves are mounted on separator in place of being hung on, thereby allowing the operator to inspect rope and oil sheaves while standing on top of the trolley, and also increasing lift of crane by about 30 inches. With the exception of drum shaft, no other shafts extend across the trolley.

All shafts in gear train are on the same line, and are of cast steel, machine cut. Pinions are forged, as is the drum gear. Trolley sides and separator are of cast steel, the housing being of structural steel, provided with proper hand holes to allow for inspection and easy removal for making repairs.

OPENING FOR MACHINERY IN TRINIDAD

EDGAR TRIPP, Canadian Commercial Agent in Trinidad, B.W.I., writes as follows concerning the importation into that island of general machinery:—

Official statistics give no details regarding the different kinds of machinery imported. The whole is lumped together, except a small portion admitted at the preferential rate of duty. The trade is fairly important, and is likely to become more so if the fiscal arrangements for which all the colonies are striving take effect after the war. In that case a great impulse would be given to sugar cultivation, an industry which if assured of the same measure of preference in the United Kingdom as is accorded in Canada, would no doubt develop enormously. At present, want of confidence in the future, generated by painful experience in the past, prevents any one interested in a sugar factory or plantation doing more than is actually necessary to keep things from year to year. Even so, the importation of sugar machinery is extensive. It is by far the largest item, the importation of which is from the United Kingdom, although water tube boilers from the United States are found among big concerns. Large renewals and repairs are, of course, of annual necessity, but for the present there is no prospect of new sets of works being erected. Most of the sugar estates are owned or controlled in the United Kingdom, and the local representatives have no say in deciding where orders shall be placed.

For the two years ending December 31, 1915, the total value of machinery imported was about £150,000 each year. Much of this was required for the new oil fields, and in this case the United States came in for a full share, amounting to nearly £100,000 in 1914, and £88,000 in 1915. Almost all this class of machinery was on the free list until December 10, 1915, when a 2½ per cent. duty was imposed, with other imposts necessary during the war . Canada only figured for £42 in 1914, and £26 in 1915, in the latter case not even claiming the preferential of 2 per cent.

Most of the machinery required for agricultural and commercial purposes is imported direct by the owners of the factories or works in which it is to be used and, being not for sale, is among the items formerly free ,but now paying 2½ per cent. Motor and other engines, electrical machinery, etc., imported for sale, are subject to a general tariff of 10 per cent., and a perferential tariff of 8 per cent. Apart from sugar factories, oil refining, and asphalt works, there are a certain number of foundries, rice mills, cocoanut oil factories, chocolate and match works, and one brewery, but all or nearly all obtained their plant direct, and not through dealers. Large numbers of sewing machines, and a certain quantity of printing press machinery are also imported.

A good active man from Canada, representing various classes of machinery has an opportunity now, such as has not occurred before of securing business, seeing that it is impossible to get orders executed in England or Scotland within anything like a reasonable time, and if the Dominion does not take advantage of this, some other country will.

MACHINE TOOLS ON BOARD SHIP

THE amount of damage to both fleets engaged in the recent sea battle draws attention incidentally, to the use of power driven tools on warships for effecting a multitude of repairs or alterations. Although it is not permissible to mention how far the British navy is equipped in that respect, one is at liberty to state that the ships of the world fleets as a rule are inadequately supplied with power-driven tools.

No doubt this applies more particularly to the mercantile marine, but facts give it force in relation to the warships of a number of Powers and it may not be an exaggeration to affirm, that the majority of modern steamships are deficient in tools of a character suitable for a long and economical range of work.

In many instances a nondescript lathe constitutes the "plant," and a current paragraph reports that the captain and crew of a broken down steamer had nothing more effective than chisels with which to plane or otherwise treat a new steel mast. One writer considers that a lathe, drilling machine, and high-speed grinder (capable of separate use) should be part of a ship's equipment, and he mentions several incidental items as very useful additions. So much damage has been done to the world's shipping by the war that the value of machine tools on a ship is now beyond question. There ought to be no difficulty in arranging that some of the men on board are capable of using such tools.

* * *

U. S. Steel Unfilled Tonnage.—The unfilled orders of the United States Steel Corporation on June 30 stood at 9,640,458 tons, a decrease of 297,340 tons compared with those on May 31, according to the monthly statement of July 10.

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STIMULATING OVERSEAS SERVICE RECRUITING

THERE is every indication that good progress is being made with the scheme of introducing more and more female labor into our factories, workshops and offices. An interesting feature is, of course, the entrance of women into spheres of activity to which in Canada at least they have not so far aspired or have been admitted. By this we mean particularly their employment in the production of munitions of a variety type. In Great Britain many thousand women are employed in shell plants, their work being as diversified as the shells themselves and their component parts, and just as many thousands are engaged in other forms of war-created commodity production and necessity, the opportunity afforded being the result of male enlistment and making possible the latter to become still more fully available.

In numerous cities and towns throughout Ontario at least, many women have registered so as to enable eligible men to join one or other of the overseas battalions now completing, or yet to be organized, and the movement is rapidly gathering impetus. It has, as a matter of fact, began already to make itself felt beneficially in the output of our metal-working plants, all of whom have been more or less handicapped of late, due to absorption of male help for overseas service.

The venture is a laudable one, the double purpose served being effective and valuable; besides, what Britain can do, Canada can do equally well. We look to see considerable development take place within the next few weeks in the matter of female employment in our munitions plants, the at least maintenance of output and the increased male enlistments being the desirable outcome.

Supplementary to the movement to increase the numbers and activity scope of women munition workers in our metal-working and kindred plants, and indicative of a proposition that may easily produce highly satisfactory returns, is the action taken a few days ago by the Committee on Recruiting of the Montreal Board of Trade. The aim is to have returned soldiers and men who have been rejected fill the places of those operators in our munitions plants who can measure up to the standard of service fitness. Although munitions plants are meantime more directly involved in the scheme of things, it is expected in the end to include the whole wide range of manufacturing enterprise. The idea is, of course, not Government conscription, but a somewhat severe form of compulsion on the part of employers, in order to ensure that men who should be at the front are at least not retained on work that can be done by those who have been in the trenches, or who have shown their desire to serve, and have been rejected.

In addition to Huntley Drummond, of the Board of Trade Committee on Recruiting, representatives from the following companies were present at the meeting called to formulate ways and means:—Northern Electric Co.; Montreal Locomotive Works; Darling Bros., Ltd.; Steel Co. of Canada, Ltd.; St. Lawrence Machinery Co.; B. W. Coghlin Co.; Canada Tube & Iron Co.; Dominion Bridge Co.; Canadian Car & Foundry Co.; John McDougall Caledonian Iron Works. After considerable discussion it was suggested by the chairman that Lieut.-Col. Clarence F. Smith, president of the St. Lawrence Machinery Co., form a committee representative of the leading munition manufacturers of Montreal and district, which would go into the whole subject of recruiting and its relation to manufacturing output.

To those familiar with the commercial and industrial activities of the City of Montreal, the detail of representative attendance is impressive and lends color to the idea that action along the lines indicated will not only have strong support, but will receive early exemplification in practice.

◆

THE LURE OF EXPORT TRADE

AS might be expected, the lure of export trade is not all-embracing in its appeal. This is not to be wondered at, in view of the many considerations and variety circumstances attendant on its successful or even worth-while prosecution. To begin with, many manufacturing concerns—large as well as small, have a domestic clientele which whether in war or peace times monopolizes approximately their production capacity. The net revenue from such sources has been proven not only ample, but without exception, reasonably free from curtailment by losses more or less incidental to all business enterprise. In view of this, they not unnaturally conclude that others less favorably situated or whose product more readily approaches the export requirement, should have all the scope possible.

To participate in export trade calls for abundant financial resources, also equal, if not more close attention to its claims than that deemed necessary for domestic requirement; and, last, but not least, a keen appreciation of the fact that many of the ideas and methods employed in catering to a domestic trade are not only capable of, but require a radical readjustment. In a word, a properly constituted export department is a sine qua non, with every manufacturer who would begin to lay himself out for the successful prosecution of trade beyond the confines of the territory which to him spells "domestic." It is so easy to allow the demands and requirements of the latter to unfavorably influence the former, as to bring about the inevitable result—failure, disgust and regret.

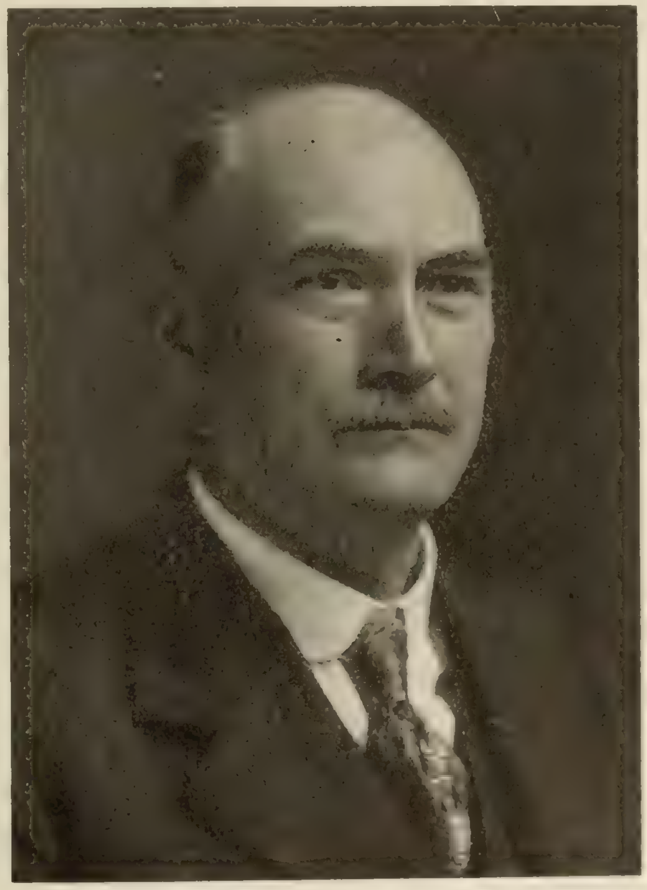
◆

THE FOUNDRYMEN'S CONVENTION AND EXHIBITION

THE American Foundrymen's Convention and Exhibition at Cleveland, Ohio, is now less than two months away, an interesting reminder of the fact being had from the comprehensive detail covering the double function which appears in another section of this issue. The indications are such that no progressive Canadian foundry enterprise can without very good reason fail to have representative attendance, and we think a careful perusal of the detail of good things being provided will bear out our contention.

INDUSTRIAL NOTABILITIES

HENRY BERTRAM, secretary-treasurer and director, The John Bertram & Sons Co.; secretary-treasurer, Pratt & Whitney Co. of Canada, Ltd., Dundas, Ont.; director, Niles Bement Pond Co., New Jersey; director, Canada Foundries & Forgings Co., Welland and Brockville, Ont.; director, Chapman Engine & Mfg. Co., Dundas, Ont.; was born at Dundas, January, 19, 1856, the son of John and Elizabeth (Bennett) Bertram.



HENRY BERTRAM

He was educated in Dundas, and entered his father's engineering business in 1871, becoming a partner in 1886, the firm name being then changed to that of the John Bertram & Sons Co. In 1901 the Company was incorporated, Henry Bertram becoming secretary-treasurer.

He married in 1881, Jennie Graham, daughter of Andrew Graham, of Dundas, the family consisting of four sons and two daughters.

Clubs and societies in which Mr. Bertram is more or less interested include the Welland, Dundas; Hamilton, Hamilton; Engineers, and Ontario, Toronto; Engineers, Montreal; Laurentian, Ottawa; and the A.F. & A.M., respectively. His residence is "Glenholme," Dundas, Ont.

—Photo. Courtesy International Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$18 70
Lake Superior, charcoal, Chicago	19 75
Michigan Charcoal iron.	28 00
Ferro nickel pig iron (Soo)	25 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base, Toronto	3.25
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.25
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.10
Bars, 2 in. and up	4.00
Structural shapes	3.10
Plates	3.50

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs.	
	C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 50	$29 50
Electrolytic copper	31 50	29 50
Castings, copper	31 00	29 00
Tin	45 00	45 00
Spelter	15 00	14 50
Lead	9 00	8 75
Antimony	23 00	26 00
Aluminum	65 00	67 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4.25	$4 25
Heads	4 50	4 50
Tank plates, 3-16 in.	4 75	4 75

WROUGHT IRON PIPE

Prices in effect April 26, 1916

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 06	5 31
½ in.	3 91	6 08
¾ in.	4 72	7 65
1 in.	6 97	11 31
1¼ in.	9 43	15 30
1½ in.	11 28	18 29
2 in.	15 17	24 61
2½ in.	23 99	38 90
3 in.	31 37	50 87
3½ in.	37 72	61 18
4 in.	44 69	72 49

Lapweld

2 in.	$17 02	$26 46
2½ in.	25 16	40 07
3 in.	32 90	52 40
3½ in.	39 56	63 02
4 in.	46 87	74 67
4½ in.	57 15	90 81
5 in.	66 60	105 82
6 in.	86 40	137 28
7 in.	116 62	179 70
8 in. x 25 lbs. per ft.	122 50	188 75
8 in. x 25 lbs. per ft.	141 12	217 44
9 in.	169 05	260 48
10 in. x 32 lbs. per ft.	156 80	241 60
10 in. x 40 lbs. per ft.	201 88	311 06

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$15 00	$16 00
Copper, crucible	18 00	18 50
Copper, heavy	18 00	18 00
Copper wire	18 00	18 00
No. 1 machine compos'n	14 00	14 50
No. 1 compos'n turnings	12 00	12 50
New brass clippings	13 50	14 00
No. 1 brass turnings	11 50	11 50
Heavy melting steel	9 00	9 50
Boiler plate	11 75	9 50
Axles, steel	13.00	15.00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	12 50
Shafting	16 50	16 00
Malleable scrap	10 00	11 00
Pipe, wrought iron	10 00	9 00
Stove plate	10 00	10 50
Heavy lead	5 00	5 00
Tea lead	5 00	5 00
Scrap zinc	7 00	9 00
Aluminum	33 00	35 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	50
Stove bolts	62½
Plate washers	25
Machine bolts, ⅜ and less	40
Machine bolts, 7-16 and over	30
Blank bolts	30
Bolt ends	30
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$4.85
Structural rivets, as above	4.75
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent.
Sq. & Hex Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	.65
Coupling bolts	net
Planer head bolts, without fillet	.15
Planer head bolts, with fillet	net
Planer head bolt nuts up to 1 in.	.60
Planer head bolt nuts, over 1 in.	.55
Planer bolt washers	list plus 10
Hollow set screws	list plus .20
Collar screws	list plus .20
Thumb screws	.20
Thumb nuts	.75

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$45 00
Open-hearth billets, Pittsburgh	42 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3 75	$3 70
Cut nails	3 40	3 40
Miscellaneous wire nails	65%	
Pressed spikes, ⅝ diam., 100 lbs.	$3 90	

MISCELLANEOUS

Solder, guaranteed	0.28½
Solder, strictly	0.26½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	13.95
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.32
Benzine, single bbls., per gal.	0.31½
Pure turpentine, single bbls., gal.	0.63
Linseed oil, raw, single bbls.	0.70
Linseed oil, boiled single bbls.,	0.73
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.13
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHING DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	45
Standard drills over 1½ in.	5
3-fluted drills to 1½ in.	15
3-fluted drills over 1½ in.	net
Bit stock	55
Ratchet drills	net
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	25
Electricians	20
Sockets	30
Sleeves	50
Taper pin and taper reamers	25
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 5
Bridge reamers	55
Centre reamers	net
Chucking reamers	net
Hand reamers	5

High-speed drills up to 1½ in. and over 1½ in. Double list plus 20 per cent.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	4 60	4 50
Canada plates, dull, 52 sheets	4 50	4 50
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	7 00	7 00
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28, U.S.	7 00	7 00
Premier, 10¾ oz.	7 30	7 30

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch.	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$19 55	.....
1¼ in.	19 55	.....
1½ in.	19 55	14 00
1¾ in.	25 00	16 50
2 in.	25 00	16 10
2¼ in.	28 50	18 50
2½ in.	32 00	21 00
3 in.	40 00	25 00
3¼ in.	.....	27 00
3½ in.	45 00	29 00
4 in.	50 00	37 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜ in.	$ 8.35
Galvanized, 24 wires, 1 in.	24.05
Black, 19 wires, ⅜ in.	6.90
Black, 19 wires, 1 in.	21.30

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	Prices on application
Axle	
Anvil	
Anchor	
WASHED WIPERS	
Select White	Prices on application
Mixed colored	
Dark Colored	

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.35 to .37
Tin	.55 to .58
Zinc	.20 to 23

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	$47 50	$47 50
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	46 00	46 00
Copper sheet, tinned, 14 x 60, 14 oz.	55 00	55 00
Copper sheet, planished, 14 x 60 base	58 00	58 00
Braziers' in sheets, 6 x 4 base	47 50	47 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	1.75 to 1.90
Polishing wheels, bullneck.	.90
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 50	$12 50
Sheets, 3½ lbs. sq. ft.	12 50	12 50
Sheets, 4 to 6 lbs. sq. ft.	12 25	12 00

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14.18
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents

Montreal, Que., July 10, 1916.—Throughout all branches of industrial activity the situation continues to be highly satisfactory. The manufacture of munitions is still the centre around which all other lines revolve, and from which they get inspiration. The outlook for a heavy grain crop is quite encouraging, so much so that it reflects favorably upon trade in general. One of the great problems, however, will be the securing of sufficient labor to successfully harvest what now promises to be a bumper crop. Bank returns continue to show the prosperous condition of the country, and latest figures show that the business failures for the past six months were much fewer than the corresponding period of last year. Activity in the steel trade is as great as ever, a slightly easier undertone, however, being more or less evident.

Pig Iron

Very little change is noted in the pig iron situation. The demand is still heavy for steel-making pig; the market, notwithstanding, is a little easier. Pittsburg quotations show a decline of 50c a ton for Bessemer and 25c for basic, present prices being $22.45 and $18.95 respectively. Foundry iron is quiet and quotations have declined from 25c to 50c a ton.

Steel

The middle of the year has been reached with no apparent relief in the productive end of the steel situation. Recent purchases have shown that buyers are only contracting for their most urgent requirements; the mills, however, are showing no uneasiness, as orders now on the books are sufficient to keep them operating at capacity for many months. For several weeks no change has taken place in price quotations, and it is almost conceded that the next movement will be downward, although the present situation appears to justify the maintenance of present prices for some time yet. Great activity is still shown in billets and sheet bars, the heavy export demand more than compensating for the slight falling off of domestic trade. The demand for all kinds of plates is very heavy, the requirements for shipbuilding being far greater than the mills can supply. Sheet mills are still unable to satisfy the demand, as many of them are booked for the remainder of the year. Owing to the constant drop in the price of spelter, it is expected that galvanized sheets will soon weaken. In some cases mills are insisting that buyers, who have no cancellation contract, must accept delivery of material at contract prices. The expected advance of wire and wire products has not materialized, and with the dull season coming on and a relatively light demand, further advance at the present time is now unlikely. Business in wrought iron pipe and boiler tubes continues very good.

Metals

The general market is quiet and inactive. With the exception of aluminum, which continues firm, the metals are inclined to weaken. Copper is firm but quiet. Tin is very quiet with the dull season approaching. Spelter continues to decline, with consumers showing little interest. Lead has become easier, and antimony is fast becoming normal. A comparison of present prices with those of a year ago and just before the war is here given.

	July, 1916	July, 1915	July, 1914
Copper	$31.50	$21.25	$15.50
Tin	45.00	45.00	34.50
Spelter	15.00	26.00	5.25
Lead	8.50	7.50	4.85
Antimony	23.00	40.00	8.25
Aluminum	65.00	35.00	20.00

Copper.—Very little activity is being shown in copper at present, as the majority of consumers are apparently well covered for immediate requirements. Foreign demand is very light, and it is not likely that further heavy buying will take place for some time. Under these conditions it is expected that the surplus supplies from refineries will be sold to domestic users. As the producers' books are well filled with future orders, they will not require to urge the buyers to purchase excess metal, and it is not thought that any great change will be noted in price quotations until general conditions change considerably.

The situation in London is having a disturbing effect upon the market here, as the sharp declines recently noted are not taken as the correct tone under existing circumstances. However, the standard market is being carefully watched, as developments in the next few weeks may have great bearing on the metal situation. The week has shown a decline of £12 on standard spot; £11 on futures, and £3 on spot electrolytic; present quotations being £91 for standard spot; £89 for futures, and £129 for electro spot. New York quotations have become slightly easier, a decline of ½c on lake, ⅝c on electrolytic, and ¼c on casting, making the latest quotations 26½c, 26¼c, and 24c per pound respectively. Local dealers are quoting a ½c advance on a fair market, prices this week being 31½c for lake and electrolytic, and 31c for casting.

Tin.—The relative quiet spell now prevailing is expected to be followed by further dullness as the summer advances. The constant weakening of the other metals is causing the buyers of tin to keep out of the market in the way of heavy purchases, and they are apparently only covering themselves for their most urgent requirements. The feeling appears to be prevalent that the time is approaching when a readjustment of quotations will be necessary. Cable reports show a further decline in the London market, a drop of 15 shillings being noted on standard spot and £1 on futures and Straits spot. Latest quotations are: £173 for standard spot; £173 10s. for futures; and £174 for Straits. New York continues to weaken, the current price of 39½c showing a decline on the week of ⅜c per pound. Local dealers report a very quiet market, with prices easier; a drop of 2c placing the present quotation at 45c per pound.

Spelter.—Following another break on the London market, spelter continues to show a demoralized condition. This panicky trend does not indicate the true tone of the present situation, however, and there appears little reason why the market should take such a slump at this time, for while weakness is no doubt evident, there is nothing to justify the heavy declines recently quoted. In face of existing conditions, and with the hope of steadying the market, several producers have withdrawn, and are refusing to quote prices until the situation has cleared. While prices are constantly declining, it is very doubtful if much metal could be obtained at quotations given. Recent advices from London show a drop of £17 on spot, and £12 on futures since last week, the latest price quotations being £44 and £41 respectively. Following the break in the London situation, New York has declined 2c on prompt Western shipment, the nominal figure being about 9¼c per pound. Local dealers report a quiet market, with prices steady at 15c per pound, but showing an undertone of weakness.

Lead.—Following the recent strength of the market in face of irregular conditions, lead is now beginning to weaken, the present market being reported dull and easier, with quotations again on the decline. Production is very heavy, but no apparent accumulation of stock is shown by any producers. Concessions have been general of late, and these are likely to continue for some time. Weakness is shown in London, a decline of 15 shillings on spot, and £1 on future, placing the latest quotations at £28 and £27 respectively. Both the Trust and outside interest quotations have declined ½c, with the independents slightly below the Trust prices; the former quoting 6.45c and the later 6.5c per pound. The situation here is quiet and unchanged, with prices easier at 8½c, a decline of ½c per pound.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

Antimony.—The weakness which has prevailed in antimony for the past month or so continues. The absence of further shrapnel shell orders and the possibility of only a further limited demand has gradually brought the market down to more normal condition. Present indications are that this metal will remain comparatively weak for some time. New York reports a further decline of 1½c, current prices being 16c per pound. The local situation is very dull, and dealers are quoting 23c, a decline of 5c on the week.

Aluminum.—The market is firm, with prices steady at 65c per pound.

Machine Tools and Supplies

Conditions are gradually becoming normal, the demand for shell-making equipment being more or less quiet. Orders for heavy shell machinery are still being filled, but delivery is much more reliable than it has been for many months. Domestic demand is light, but steady, inquiries promising some good business. The limitation of shrapnel shell orders has had the effect of placing on the market a number of small tools for re-sale by previous makers of shrapnel. No appreciable decrease is noted in the demand for machine shop supplies, and all makers of auxiliary equipment are very busy.

Scrap

In the large steel consuming districts the situation is beginning to show signs of returning strength. Large purchases for heavy melting steel scrap have recently been made, and prices have advanced about $5 per ton. Many of the large users, in addition to being well supplied with scrap, have large quantities of rejected steel and discarded shells on hand. Other grades of steel and iron scrap are also taking on activity, but scrap metals are a little weak. Local dealers report a quiet market, with prices easier. Old copper has declined from 1c to 1¾c, present prices ranging from 15c for light copper to 18c for wire. Machine composition and turnings have declined 1c, being quoted at 14c and 12c respectively. Brass clippings are 1c lower at 13c per pound. Wrought iron pipe and stove plate are quoted at 10c, a decline of 1c. Heavy lead is ½c weaker at 5c, while tea lead at 4½c is 1c lower. Following the slump in spelter, scrap zinc is quoted at 7c, a drop of 4c per pound. Aluminum is easier at 33c, a decline of 4c per pound.

Toronto, Ont., July 11.—Industrial conditions continue favorable as regards the volume of business but there is no improvement in the situation as regards the shortage of labor and raw materials. Manufacturers are being handicapped on this account and in addition have to pay higher wages which altogether will increase the cost of manufactured goods. The export business continues to steadily increase; more cargo space is now available at lower rates which will benefit trade considerably.

Steel

The steel market continues steady with a tendency to dullness, more or less seasonable. The export business continues heavy and the situation has been improved by the decline in ocean freight rates. Although the mills are sold up into the first quarter of 1917, there are indications that deliveries are improving. Prices are firm and unchanged with the exception of lapwelded boiler tubes which have advanced, as was expected. The situation in the tube market is unchanged and the prevailing prices will probably remain in effect for some considerable time, no further advance being expected. Wrought iron pipe is unchanged and steady. Many of the mills are well sold up for the remainder of the year on lapweld pipe, but on butt-weld sizes they can make delivery in two or three weeks. The skelp situation is unchanged and prices are very firm. On wire rods, domestic mills are in a sold up condition while in the States the new demand is quiet as consumers are covered over the remainder of the year. The sheet market is quiet but prices are very firm with the possibility of an advance owing to the increase in cost of labor and sheet bars. It is expected that the output of sheets will be restricted during the hot weather, and this will have a tendency to stiffen the market, particularly as stocks generally are low. Prices of galvanized sheets are unchanged locally but are weaker in the United States owing to the decline in spelter. Consumers who have stock are waiting in the hope that spelter may decline still further.

In the United States the export buying of steel products has been large recently, making up in large degree for a smaller domestic demand, and also helping to sustain prices. The export business consists principally of Bessemer pig iron, open-hearth and Bessemer billets, steel bars for shells, tin plate, and other finished products. The unfilled orders of the United States Steel Corporation on June 30, stood at 9,640,453 tons, a decrease of 297,340 tons compared with those on May 31. This is the first decrease in unfilled orders shown by Steel Corporation since August 1915. Steel bars are quoted at 2.75c; plates, 3.25c; and shapes 2.50c, Pittsburgh.

Pig Iron

The situation in the pig iron market is unchanged although prices recently have exhibited a weaker tendency. The consumption of steel making grades continues heavy and foundry irons are in fair demand. Current prices which are unchanged are given in the selected market quotations.

Scrap

The market for old materials is quiet and quotations continue to have a weaker tendency, with declines in copper, boiler plate, rails, malleable scrap, wrought-iron pipe, and scrap zinc. Light copper has declined ½c, crucible copper 1c, heavy copper 1½c, and copper wire 2c per pound. Boiler plates, rails and malleable scrap are each down $1.00 per ton, while wrought iron pipe scrap has declined $2.00 per ton. Scrap zinc is 2c, and lead ½c per pound lower. Prevailing prices are given in the selected market quotations .

Machine Tools

The situation in the machine tool market is unchanged. The active demand for tools for munitions plants continues and a number of good sized orders are pending for large-swing lathes, drilling machines, etc. Deliveries are improving owing to better facilities for increasing production and a falling off in demand. Reports from the States indicate that machine tools are being quite extensively offered for resale by munition manufacturers which will throw a considerable amount of second-hand equipment on the market. The machinery offered however, has been used principally for shrapnel and small sized high explosive shells which are not in demand now to any great extent.

Supplies

Dealers report brisk business in machine shop supplies. Prices continue very firm and higher quotations on a number of lines are expected shortly. The supplies affected are composed principally of iron, steel or brass. A sharp advance was made in shellac recently owing to the scarcity and increase in price of gums which are imported from India. The British Government placed an embargo on gums which has tended to restrict the available supplies; the high ocean freight rates have also helped to raise prices. Linseed oil and turpentine are steady and unchanged, while resins continue high in price and in good demand, particularly for the cheaper grades used in shrapnel shells. Lower prices in white lead are looked for in some quarters.

Metals

The metal markets continue weak, and lower levels have been registered for practically all. A sharp decline of copper in London has affected prices locally and quotations are lower. The copper market is in a waiting condition with producers sold up and consumers fully supplied for some months in advance. The tin market is unsettled with consumers holding off in anticipation of lower prices. Spelter has declined following a break in London and the market is unsettled with little business being transacted. The "Trust" have lowered their price on lead and the independents are offering concessions which is further weakening the market. The antimony situation shows no improvement and quotations have again declined. The aluminum market is steady at unchanged quotations.

Copper.—Inquiry for copper for prompt and last quarter delivery continues small but steady. The market is weak in London, and has declined here also. Most of the large producers are still sold up so far ahead that they cannot accept orders for even small lots for early delivery, and the result is that small consumers who want copper are endeavouring to come into the resale markets. The prospect for a peaceful solution of the American and Mexican difficulties has improved the outlook, but shows no reflection in the market. Quotations are ½c lower and are nominal at 29½c per pound.

Tin.—The market has been comparatively inactive and prices continue to decline. The tin situation is affected by the decline in other metals, the tendency being to depress the market. Stocks of tin have increased but the demand continues light. Local quotations are lower and nominal at 45c per pound.

Spelter.—A decline in London has been followed by lower prices in New York where the market is weak and more unsettled than ever. Although the market is declining, consumers are not showing any interest; some producers are shading prices, while others have retired from the market. Quotations are lower and nominal at 14½c per pound.

Lead.—The "Trust" has reduced the price of lead to 6.50c New York but this is not being adhered to by some of the independents who are quoting as low as 6.35c to 6.45c for spot metal, and 6.25c to 6.35c for August shipments. The production of lead is stated to be heavy but there is said to be no accumulation of stocks in the hands of any of the producers. Lead is dull and lower locally, being quoted at 8¾c per pound.

Antimony.—The dullness and weakness which have characterized this metal in the past few weeks are as acute as ever, but the market shows some sign of a reaction. Quotations are lower and nominal at 26c per pound.

Aluminum. — Supplies of this metal are rather more plentiful but the market is dull and quotations unchanged at 67c per pound.

Solders.—Prices of solders are lower following the decline in lead and tin. Guaranteed is now quoted at 28½c, and strictly at 26½c per pound.

BUILD SHIPS AT PRINCE RUPERT

M. P. COTTON, contractor, of Vancouver, and H. H. Hansard, solicitor for the G. T. P., have been to Prince Rupert, where they inspected the dry dock and shipbuilding plant. Mr. Cotton represents a shipbuilding syndicate, which, if satisfactory arrangements can be made, will lease the G. T. P. plant at Prince Rupert for the purpose of building freighters to be operated by the company. It is proposed to build the ships of steel, and it is understood that application has been made under the Government's legislation to aid shipbuilding, for assistance in the building of four of these ships, which will be about 5,000 tons each.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Hamilton, Ont.—The Oliver Chilled Plow Co. will build an extension to their plant here.

Hamilton, Ont. — The Victor Law Works will erect a factory here to cost approximately $6,000.

Toronto, Ont.—Toronto Electric Light Co. will build a one-storey brick garage, in Scott street, to cost $2,500.

Toronto, Ont. — The William Davies Co., will install a cold storage and ice plant at their packing house in this city.

Transcona, Man.—Construction on the elevator to be erected here by the Canadian Government Railways will begin shortly.

Beauceville, Que.—The foundry owned by Marcoux & Poirer was destroyed by fire recently, the loss being estimated at $12,000.

Copper Cliff, Ont.—The Canadian Copper Co., will construct a sewage pumping station. Tenders will be received by the chief engineer of the company until July 15.

Redcliff, Alta.—The Redcliff Rolling Mills are installing a new furnace which will double the capacity of the plant, Machinery for making bolts and nuts will also be installed.

Lindsay, Ont.—The Canadian Government new small arms ammunition factory will be located here. The contract for the buildings has been let to Westinghouse, Church & Kerr Co., of New York.

Toronto, Ont.—The city architect has issued to the Hospital for Sick Children a permit for the erection on Laplante avenue, near College, of a one-storey brick and concrete power house to cost $9,000.

Trail, B.C.—The new sulphuric acid plant, the first of its kind to be erected in B.C., has been completed and will go into operation shortly. The plant which has been constructed by the Consolidated & Mining Co., will manufacture acid as a by-product from the fumes of the smelter.

Quebec, Que.—Price Bros. & Co., propose making important extensions to their plant. A new unit will be added to the newsprint mill, also additions to other plants which will increase the company's production of sulphite and ground wood pulp to 25,000 tons and 55,000 tons per year respectively.

Weston, Ont.—Construction work has been commenced on the new Russell Motor Car factory on Eagle avenue. Footings for the new building are being put in and cars and other material are arriving daily. A long siding has been constructed into the property by the C. P. R. Company. It is expected that the building will be completed by October. It will be a two-storey brick structure, 300 feet square. The site comprises about 28 acres.

TENDERS INVITED—AUSTRALIA

The following foreign trade opportunities are published for the information of Canadian manufacturers:—

Tender forms, specifications, indents and drawings have been forwarded by D. H. Ross, Canadian Trade Commissioner, Melbourne, for equipment required by the Victorian Railways, Melbourne; the New South Wales Railways, Sydney, and the Postmaster-General's Department, Melbourne. (These tender forms are open to the inspection of Canadian manufacturers at the Department of Trade and Commerce, Ottawa.) (Refer File No. A-1919.) Tenders close at Melbourne on September 6, and particulars of the requirements are as follows:—

3 Phase crane motors and controllers, and one phase workshop motor and starter (as per drawings).

3 Dry grinding machines.

2 Beading and coping rolling machines.

2 Tube swaging machines.

St. John N.B.—The Booth Fish Co., which has large interests on both the Atlantic and Pacific coasts, have taken over the plant of the New Brunswick Canners at Chamcook, St. Andrews, and will operate it this year in a general fishpacking business. This plant was originally constructed by the Canadian Sardine Co., and cost over half a million dollars. Last year the works were occupied by the Lane & Libby Packing Co., who have transferred their interests to the Booth concern. The present holders are a wealthy corporation.

Electrical

Watford, Ont.—A by-law will be submitted to the ratepayers shortly to raise $10,000 to cover the cost of a hydro-electric installation.

Woodbridge, Ont. — Woodbridge Hydro-Electric Commission has decided to make an extension of its power lines to Maple, a distance of about five miles.

New Toronto, Ont.—It is announced that the Goodyear Tire & Rubber Co., will very soon commence building operations on the new plant to be erected here.

West Lorne, Ont.—The Village Council held a special meeting recently when a motion was passed authorizing the Hydro Commission to buy the necessary equipment for the plant here.

Municipal

Sault Ste. Marie, Ont.—An extensive waterworks system is contemplated by the town council, which will cost over $250,000.

Lethbridge, Alta.—The city council are considering the installation of a mechanical filter with a capacity of three million gallons per day. A by-law will be submitted to the ratepayers to authorize an expenditure of $100,000 on the plant.

Stratford, Ont.—The city council, in a special session on July 6, passed the by-law for $30,000 debentures to take care of extensions and improvements to the local Hydro-electric distribution system recently made. The money is to be procured from the Ontario Railway and Municipal Board.

Woodbridge, Ont. — E. A. James, county good roads engineer, has been engaged by the council to prepare plans of a system of water supply for the village. It is not likely that the people will vote on this question before January. The proposed system will cost about $40,000, and will include mains, pumping station, filtration beds and standpipe.

General Industrial

Leamington, Ont.—The Heintz Mfg. Co., propose building an addition to their factory here.

Quebec, Que.—The St. Lawrence Paper Bag Co., will build an extension to their factory at a cost of $20,000.

Winnipeg, Man. — Charles Blair, of Stockport, England, manufacturer of surgical dressings, may establish a factory here.

Guelph, Ont.—Negotiations have been concluded whereby the Malt Products Co. of Canada, take possession of that portion of the Sleeman Brewery on Waterloo avenue. They will occupy practically one-half of the building.

Toronto, Ont.—Excavation work has been started on a reinforced concrete four-storey factory building which will be constructed for the T. Eaton Co. at the southwest corner of Bloor and Dufferin streets. The building is to be 65 by 100 feet, and will cost approximately $45,000.

Fort William, Ont.—At a cost of over $700,000, the Grain Growers' Co., of Winnipeg, awarded a contract to S. J. McQueen, of this city for its new elevator to be constructed on the Port Arthur waterfront near the site of the Saskatchewan Elevator Co., now under erection. The building will be modern.

Tenders

Saskatoon, Sask.—Tenders are being called until July 26 for a high pressure water main system.

Halifax, N.S.—Tenders will be received until Wednesday, July 19, 1916, for furnishing 2,800 5/8 in. meters and 300, 3/4 in., meters in accordance with the specification made by the city engineer. Further particulars may be ontained from H. W. Johnston city engineer.

Toronto, Ont.—Tenders will be received by the chairman Board of Control, City Hall, until July 18, for the supply and delivery of one overhead hand-operated traveling crane. Specifications and forms of tender may be obtained at the Works Department, Room 12, City Hall. T. L. Church, Mayor.

Toronto, Ont.—Tenders will be received by chairman Board of Control, City Hall, Toronto, up to Aug. 1, for the supply and delivery of air brake equipment, step and door operating mechanisms, gears and pinions. Specifications and forms of tender may be obtained at the Works Department, Room 12, City Hall.

Toronto, Ont.—Tenders for Examining Warehouse will be received until July 17. Plans, specification and form on contract can be seen and forms of tender obtained at the offices of Thos. A. Hastings, clerk of works, Postal Station "F," Yonge street, Toronto, Ont., R. L. Deschamps, Central Post Office, Montreal, P.O., and at the Dept. of Public Works, Ottawa.

Toronto, Ont.—Tenders for the erection of a court house at Sault Ste. Marie (separate tenders are required for the heating and ventilating and plumbing and electric wiring) will be received up to July 21. Plans and specifications can be seen at the office of the sheriff, Sault Ste. Marie, and at the Departments of Public Works, Ontario Parliament Buildings, Toronto.

Toronto, Ont.—Tenders addressed to the secretary-treasurer of the Board of Education, will be received until July 13, for iron fence, folding gates, metal ceilings, local telephones, steam fitting, plumbing, electric wiring, etc., in connection with midsummer repairs, sundry schools. Specifications may be seen and all information obtained at the office of the superintendent of buildings, City Hall, Toronto.

ALLIES PURCHASING AGENTS

The Trade and Commerce Department, Ottawa, has published the following list of purchasing agents for military purposes for the allied Governments:

International Purchasing Commission, India House, Kingsway, London, Eng.

French.—Hudson Bay Co., 56 McGill Street, Montreal; Captain Lafoulloux, Hotel Brevort, New York; Direction de l'Intendence Ministere de la Guerre, Bordeaux, France; M. De la Chaume, 28 Broadway, Westminster, London.

Russian. — Col. N. Golejewski, Military Attachè, Room 904 Flat Iron Building, New York City.

Ottawa, Ont.—Tenders will be received until July 21, for the construction of an extension of 200 feet to the existing wharf at Chandler, county of Gaspe, Province of Quebec. Plans and forms of contract can be seen and specification and forms of tender obtained at this Department of Public Works, Ottawa, and at the offices of the District Engineers at Shaughnessy Building, Montreal, Post Office Building, Quebec, and on application to the Postmaster, at Chandler, Que.

Building Notes

Toronto, Ont.—The city architect has issued a building permit to the Campbell Milling Co., for a five storey warehouse to cost $17,000.

Montreal, Que.—F. W. Stair, of Toronto, is credited with the intention of erecting here a $700,000 theatre in the near future. The house, which will be for vaudeville, will be erected in St. Catharine street, near Bleury street, and work, it is said, will begin with a month or six weeks.

Toronto, Ont.—Bowles Lunch, Ltd., have purchased the north-east corner of Shuter and Mutual street, on which they propose to erect a large bakery, laundry and refrigerator plant. The site is 110 ft. by 35 ft. The new building will be two storeys and basement, brick, concrete and steel structure.

Personal

W. K. Jeffrey, formerly manager of the Ottawa Car Mfg. Co. has joined the Lyman Tube & Supply Co., as sales manager, with headquarters in Montreal.

Charles Hodgson Osler, civil engineer of the Montreal Light, Heat & Power Co., Montreal died on July 8, aged 56. The deceased was born in Sheffield, England and came to Canada in 1872. He was well known as a locating engineer and in this capacity was with the C.P.R. and C.N.R. for some years.

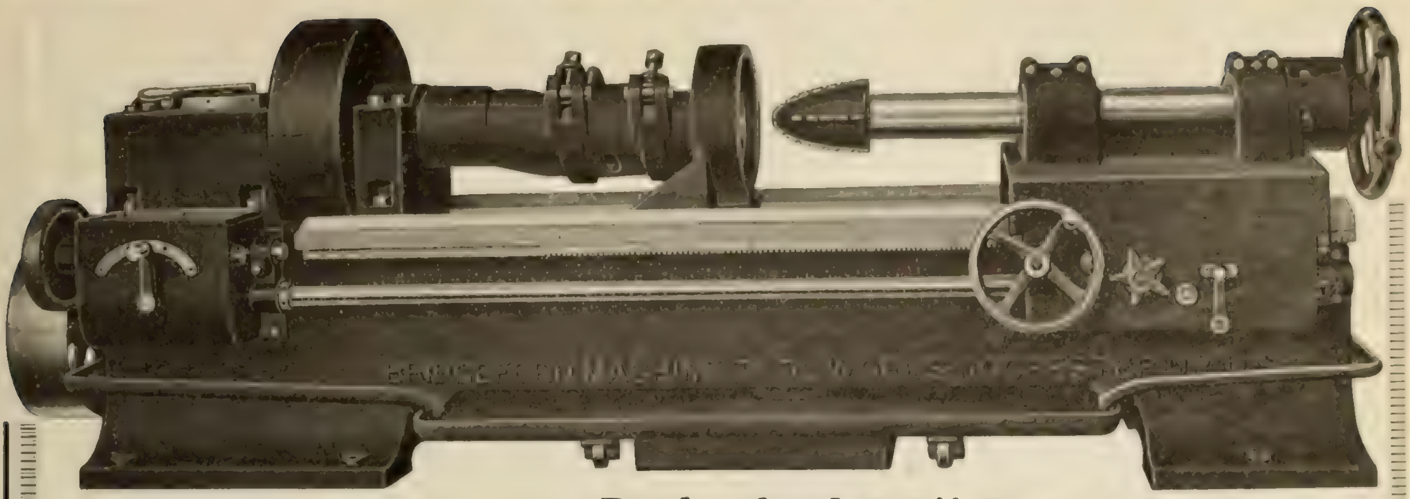
John Yttrup representing L. A. Jacobsen of Copenhagen, Denmark, machinery importer, is in Canada on a business trip. Mr. Yttrup in the course of an interview in **Canadian Machinery** office stated that arrangements had been made for representing a number of machinery manufacturers in connection with their Russian business.

Trade Gossip

The Chapman Valve Co., Toronto, will supply a number of valves to the Metagami Pulp & Paper Co., for their new paper mill at Smooth Rock Falls, Ont.

The Canadian Gasoline Corporation have acquired the Canadian rights for the "Greenstreet" process for making gasoline, H. T. Bush, president of the Standard Ideal Co. of Port Hope, Ont., is a member of the syndicate.

Windsor, Ont.—As a reflection of Windsor's business growth, customs re-



Bridgeford 9.2'' Boring Lathe

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A MACHINE of ideal proportionate strength. Stresses have been accurately calculated .on this machine and all parts have been reinforced and strengthened and a liberal allowance made for a safety factor, superior material is used and you have the result—a smooth-running, perfectly balanced unit that ensures efficiency, economy, speed and results.

Illustrated above is a heavy duty, low swing Boring Lathe having a specially designed carriage with auxiliary hand feel for internal profile. Carries a 6" steel bar with male taper. allowing for light design of cutter heads; 3 automobile style speed changes, all hardened and running in oil bath. A chip tray is attached and used in conjunction with stationary lubricant tank.

Regular equipment comprises everything except chuck, steady rest and cutter.

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turns for June show an increase of more than seventy-three per cent. over the same month last year, with the figures $454,498, as compared with $261,662.

Sarnia, Ont.—Customs returns for June of this year are the largest in the history of the port. The total receipts show an increase of $61,803.48 over May, and are three times as large as for the corresponding month of last year. The leading article on which duty was paid was coal.

The British Board of Trade has appointed a committee headed by Baron Farringdon, chairman of the Great Central Railway, to inquire into the best means to meet needs of British firms after the war, and to prepare a detailed plan for financing such firms, especially with regard to overseas contracts.

Merritt, B.C.—Mining men are showing considerable interest in a molybdenite property located on Texas creek, in the Lillooet district. The property is owned by J. B. Perkins and A. Hautier of Lytton, B.C., who have recently given a bond on it to American capitalists for $300,000.

List of Contraband Extended. — An additional list of articles of contraband is published in the Canada Gazette .They are asphalt, bitumen, pitch and tar, sensitized photographic plates and papers, felspar, talc, bamboo and electrical appliances adapted for use in war, and their component parts.

The Foundation Company, Montreal, has received two contracts from the Algoma Steel Corporation, Sault Ste. Marie, Ont. One is for the revision of the yard, including the engineering and constructing of three plate-girder bridges, and the other is for the construction of the foundations of two open-hearth furnaces and a gas producer.

Council of Commerce. — F. C. Armstrong, of the Canadian Exporters' Association has sailed for Canada on the Missanabie and will make a report on his recent tour of France and Italy. It is said that one outcome of the commercial congress to be held at Ottawa in October, arranged by Sir George Foster, will be the formation of a permanent Council of Commerce to act in an advisory capacity to the Department of Trade.

Winnipeg, Man.—In accordance with the Steam Boiler Act, an Order-in-Council was passed recently dividing Manitoba into 18 boiler inspection districts. A map has been prepared showing the districts, the boundaries of which are given below. A number of the inspectors have been appointed, but in other cases the selected men have not passed the examination as yet. The inspectors will be paid according to the work done. The reason for the greater number is to obtain efficiency.

Halifax, N.S.—Before Justice Chisholm at Supreme Court Chambers on July 4, tenders for the Nova Scotia car works were received from F. B. McCurdy & Co., for $153,000, and Nova Scotia Steel & Coal Company for $152,500. J R. Douglas and other shareholders in an affidavit stated that if possible that he would buy the property for the shareholders and would give more than the tenders offered. It was ultimately decided by all concerned to sell the property at auction July 26, the reserve price to be $154,000.

Will Build More Ships. — Both the American and British interests which will be represented on the new board of direction of the International Mercantile Marine Co. favor a plan to build new ships out of earnings. Tentative plans under way call for the construction of a large number of ships out of the cash reserves of the company. Such a plan, it is contended, will mean more in ultimate gain for both the preferred and common stock than a hasty payment of back dividends on the preferred. No contracts have been let but it is proposed to build the new ships in England.

Railway Directors Selected. — Although there is as yet no official announcement, the following Government directors on the Board of the Grand Trunk Pacific and Canadian Northern Railways have, it is understood, been selected. On the C. N. R. board the directors will be Messrs. W. K. George, of Toronto; H. A. Richardson, of Kingston, and W. J. Christie, of Winnipeg; and on the G. T. P. board, Messrs. J. B. Fraser, of Ottawa; Jules Hone, of Montreal, and Peter McAra, of Winnipeg. There will be no announcement as to the personnel of the commission to be appointed to investigate railway conditions in Canada for some days yet.

Russian Munitions Inspection.—Munitions makers who have worked on contracts for Great Britain and Russia say that it is easier to make ten shells for England than one for Russia. The Russian inspectors are exceedingly hard to please, and reject shells, rifles, or other munitions for faults that seem often imaginary, or which, in any event, do not affect the usefulness of the article. For instance, one concern which is making rifles for Russia has had trouble because the stain failed to take quite evenly on some of the wooden gun stocks. A munitions expert attributes the difference between the demands of the inspectors of the two countries by suggesting that the British representatives are more highly trained men, and are, therefore, allowed more leeway in using their judgment when there is any question of failure to meet specifications.

The International Paper Co., who propose erecting a 200-ton newsprint mill in Canada, was formed as a result of the consolidation of nineteen paper producing companies. The concern was incorporated in New York in January, 1898, and six other companies were taken in at a subsequent time. The various plants are located in Maine, New Hampshire, Vermount and New York States, eight being in Maine, and nine in New York State. They produce 1,200 tons of ground wood pulp per day, 400 tons of sulphide pulp per day and 1,700 tons of paper per day. In addition to its holdings of spruce woodlands in the United States, the concern has a considerable amount of land in Canada, and it has the license of the Canadian Government to cut timber on 3,000,000 acres of wood land in the provinces of Quebec and New Brunswick. The outstanding capital stock of the company is $40,000,000.

Liquid Air Research.—Arthur L. Clark, professor of physics in Queen's University, who went to Holland at the initation of Prof. H. Kamerlingh-Onnes, the famous director of the marvelous Physics Laboratory at the University of Leiden, to go further into the question of liquefying air, and who has just returned home, states that his mission was successful. The object of Prof. Clark's going to Leiden was to determine more accurately the temperatures at which air liquefies and freezes. At the Leiden University he liquefied and froze air. The results of the joint experiments of Prof. Clark and Prof. Onnes are to be published in the proceedings of the Royal Academy of Amsterdam and also in the report of the International Commission of Cold, of which Prof. Clark is a member. Prof. Clark states that Prof. Onnes is of the opinion that there will be a great commercial future for liquid air, and predicts that in a few years it will be extensively used in connection with the mechanical arts. Prof. Clark intends to install a liquid air machine at Queen's for the purpose of continuing his experiments.

Marine

New Toronto, Ont.—The Village Council has decided to purchase a new pump for the waterworks system. It

Mechanical Engineering Books

If you are desirous of improving yourself in your trade and so putting yourself in the position of making more money, these Mechanical Engineering Books will be found helpful.

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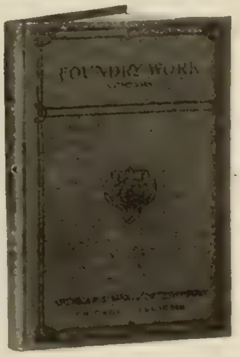

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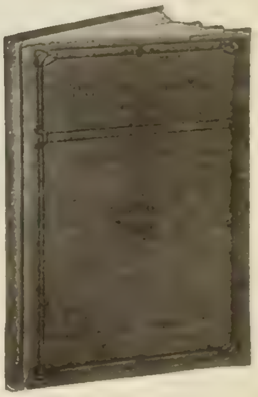

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MACHINE DESIGN. By Charles L. Griffin, S.B., Assistant Engineer, the Solvay-Process Co., American Society of Mechanical Engineers. 208 pp., 82 designs. Cloth binding. Explains in detail how to make the entire design of all kinds of machinery, how to lay out gears, etc., with complete specimen designs of numerous machines. Price **$1.50**

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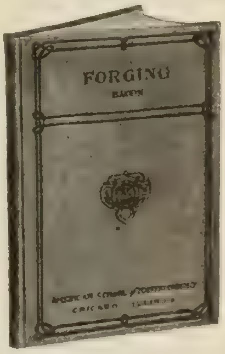

TOOL MAKING. By Edward R. Markham, Consulting Mechanical Engineer, formerly Superintendent of the Waltham Watch Tool Co., American Society of Mechanical Engineers, Author of "The American Steel Worker." 224 pp., 325 illus. Cloth binding. Takes up the methods of treating tool steels annealing, tempering, spring tempering, hardening, case-hardening, etc.: how to make drills and reamers of all kinds; the making of arbors and mandrels, taps, hobs, reamer and tap-holders, jigs, gauges, dies and die-holders of all kinds, counterbores, facing tools, milling cutters, hollow mills, and forming tools. Gives all necessary information for tool making in all its branches. Price ...**$1.50**

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OFFICE AND WORKS: MUSKEGON HEIGHTS U.S.A.

We are qualified Tool, Die, Jig, Gauge and Fixture Makers.
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Windsor Machine & Tool Works.
WINDSOR, ONT.

"HAWK'D" CHROME VANADIUM STEEL
Will Give You Exceptional
Shell Forging
Production
WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.
Comes to you heat-treated and ready for use.
It does not stick to the work.
There are many cases where each punch has turned out over 2,000 shells.
It means more shells, per machine per day.
STEEL OF EVERY DESCRIPTION.
Hawkridge Brothers Company
303 Congress St., BOSTON, MASS.
U.S.A.

will have a capacity of 600 gallons per minute.

Bowmanville, Ont.—A by-law has been registered to authorize an expenditure of $9,000 for the purpose of completing the waterworks and sewerage systems now under construction.

Smiths Falls, Ont.—The Town Council is starting an aggressive movement for cheaper power in Eastern Ontario, and an effort will be made to have the hydro-electric system installed here.

Port Dover, Ont.—Plans have been prepared by the Department of Public Works for harbor improvements here estimated to cost $250,000. It is proposed to establish a car ferry service.

Toronto, Ont.—The steamers Wahcondah and Fordonian, lake freighters of the Canada Steamship Lines, have been requisitioned for the transatlantic trade. Both steamers, which are Welland Canal size, were constructed in Great Britain within the past ten years. Since their arrival in Canada they have mostly been engaged in the Upper Lake service.

Toronto, Ont.—The Board of Control have recommended, at the request of General Manager E. L. Cousins, on behalf of the Harbor Board, and subject to the sanction of Finance Commissioner Bradshaw, the authorization of general debentures to the amount of $1,500,000 to raise money to carry on the harbor improvements. This is the balance of the amount guaranteed by the city, the amount already raised being $3,500,000.

Woodworking

Deseronto, Ont.—The large plant of the Dominion Hardwood Ltd., manufacturers of woodenware, was totally destroyed by fire last Sunday morning. It was a new industry, and had just commenced running at capacity. The loss is placed at $100,000, partially covered by insurance. The company expects to rebuild immediately.

Catalogues

Armstrong, Whitworth, of Canada, Longueuil, Quebec, have issued an attractive brochure as a means of announcing to the trade that they have installed an electric furnace for making high speed, carbon and alloy steels, etc. Views are included showing the furnace and also an exterior elevation of the company's works.

The "S-C" Regulator Co., Fostoria, Ill., have issued bulletin No. 24, contain-

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PATENTS-TRADE MARK-DESIGNS
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Patent Solicitors. Head Office, Royal Bank Bldg., Toronto. Ottawa Office, 5 Elgin St. Send for our Plain Practical Pointers. Copy of National Progress, in which our patents are advertised, mailed free.

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We are manufacturers of stamped parts for other manufacturers.
We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.
We can finish steel stamping in Nickel, Brass or Copper.
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372 Pape Avenue, Toronto, Can.

GENERAL MACHINE WORK

Contract machine work in large or small quantities.

We have show room and will rebuild and sell your machine at a reasonable price.

LET US FIGURE ON YOUR NEEDS.

Prompt Service. Reasonable Prices.

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We have the plant and equipment for turning out stampings of the highest quality in brass, copper, aluminum, tin and steel, and are prepared to undertake the manufacture of metal specialties of any description.

PUNCHES, DIES, TOOLS.

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70 Pond St., Toronto

ACTON TOOL AND STAMPING WORKS

Manufacturers of

Blanking, Forming, and Combination Dies for Sheet Metals

Special Machinery to order.
Metal Stampings.
Metal Novelties and Specialties.

195 Teraulay Street, Toronto, Can.

ing a description and specifications covering the "S-C" feed water regulator also the generator and regulating valve. The illustrations show typical installations and sectional views of the generator and valve, half actual size.

"Vim" Leather Packings are described at length in a bulletin issued by the E. F. Houghton & Co., Philadelphia, Pa. The principal features covering the material and process of manufacture are dealt with fully together with sectional views for use when ordering these packings. Price lists are included for the various styles of "Vim" packings, check valves and plunger leathers.

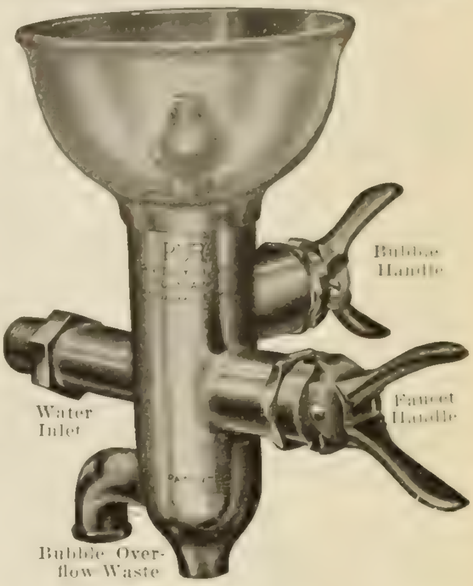
Spray Cooling System.—The Spray Engineering Co., Boston, Mass., have issued bulletin No. 101, entitled "Sprays for Cooling Condensing Water." A general description is given of the "Spray" cooling ponds, including particulars regarding their economy, power requirement, cooling capacity and design of the spray nozzle, while results of tests are also included. The cuts show a number of installations at various industrial plants.

The New York and New Jersey Lubricant Co., New York, have issued a series of bulletins dealing with "Non-fluid Oil" and its various applications, more particularly for textile, saw mill, and wood-working machinery and ring oiling bearings. The benefits obtained by the use of this oil are set forth and the class of work for which each grade is best suited is stated. Copies of these bulletins may be obtained on application to Fred Smith, 24 King street, west, Toronto.

PURO

(MADE IN CANADA)

Don't Pay Good Money for Impractical, Unmechanical and often Worthless Fountains



Actual Size 7" High.

Here is a practical Fountain, which combines the Faucet and Bubble Features takes care of the overflow waste, and insures

Safety and Service

This is an age of sanitary plumbing and the Sanitary Drinking Fountain is one of it's important subdivisions.

SAFETY FIRST PURO SERVICE ALWAYS

Is made of heavy brass with extra heavy nickel plate. Bubbler easily controlled by separate "squeeze" handle. No spurts to choking. Inside regulation prevents "showerbath." Faucet is controlled by another squeeze handle. Faucet gives full water pressure. Has thread for hose if wanted.

Write us the number of your employees and water pressure and we'll present an interesting proposition to you promptly.

Puro Sanitary Drinking Fountain Company
147 University Ave., TORONTO, CAN.

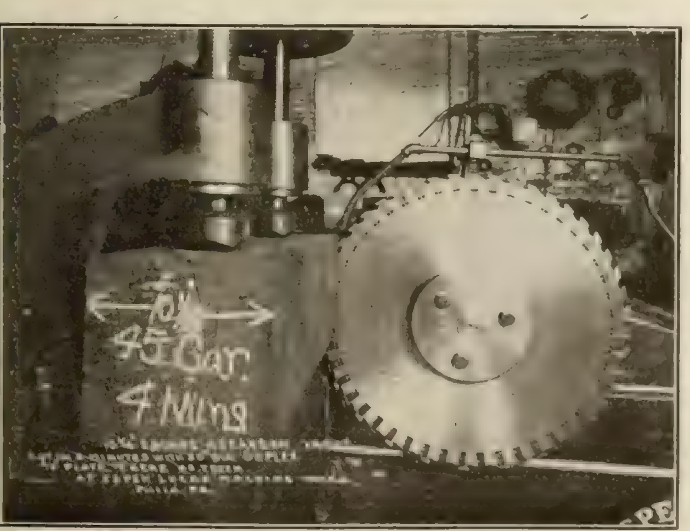
"Barnes-made" SPRINGS

are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

Write for booklet No. 7-T.

Established 1857.
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U.S.A.

Man'f'rs of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire



Circular Metal Cutting Saw Blades for Any Type of Machine

Let us demonstrate what a saving can be made by installing a

HUNTER "DUPLEX" Inserted Tooth Blade

Write for information

HUNTER SAW & MACHINE CO., Pittsburgh, Pa., U.S.A.

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Five cents each insertion when box number is required. Each figure counts as one word. Display rates on application.

FOR SALE

FOR SALE OR RENT — MACHINE SHOP with railroad siding. Box 208, Canadian Machinery. (4)

TEN TYPE "F" COOPER-HEWITT ELECTRIC lamps for sale—110 volts, 60 cycles, alternating current. Will sell at bargain price. Canadian Ingersoll Rand Co., Limited, Sherbrooke, Que. (2)

LATHE FOR SALE—ONE 39 x 17-FOOT Pond engine lathe, suitable for heavy shells; in good condition; $1,500.00. A. B. Ormsby Company, Limited, Toronto. (2)

A BARGAIN FOR QUICK SALE 30 H.P. 10 x 14 engine; guaranteed in first-class working condition; drive belt included. Hamilton Whip Co., Hamilton.

FOR SALE—SCREW-CUTTING LATHE, 14 FT. bed, 16-inch Imperial chuck, 24-inch Swing Countershaft. Apply Thos. H. Ruth, 314 Pearl Ave., Peterboro. (1)

FOR SALE—ONE DAVIS 4½" CUTTING-OFF machine; practically new; been used less than three months; very reasonable. Canadian Linderman Co., Ltd., Woodstock, Ont. (tf)

12-INCH HEAVY DUTY (CANADIAN CORPORATION) moulder; just used six months; also band saw, shaper, buzz planer, used two years. Apply W. A. Rumney, 36 Fuller Ave., Toronto. (28)

20,000 LBS. ⅝ GALVANIZED STEEL GUY wire. We can offer this wire at very attractive prices. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (25)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

WE HAVE FOR IMMEDIATE DELIVERY ten No. 9 Bardons & Oliver turret lathes; code word "Cedar"; 2½" capacity; exceptional value; price moderate. J. R. Stone Tool & Supply Company, 24 Goebel Building, Detroit, Mich. (24)

FOR SALE—EXCELLENT PLANT FOR THE manufacture of electric passenger and freight elevators, patterns, drawings, blueprints, special and ordinary machinery and parts. We are instructed to offer this entire plant at a fraction of the cost. If you are looking for a splendid manufacturing proposition, write for particulars of this one. Winnipeg Machinery Exchange, Sutherland and Gladstone Streets, Winnipeg, Man. (24)

FOR SALE—ELECTRIC PLANT—1 CORLISS engine, 16 x 30; boiler 72" x 14'; 1 dynamo, 1,100 V., 60 K.W. alternating current; 1 dynamo, 500 V., 30 K.W., direct current; transformer, watt meters, shafting, pulleys, belts. All in first-class condition. Sold complete or in part. C. Zufle, Exeter, Ont. (26)

FOR SALE

Fox Monitor Lathe, 18" x 5' 6", 9-hole turret, cross feed, hollow spindle, 5-step cone; good as new. Plating dynamo, 6 volts, 250 amp.; used only a short time.

PENDRITH MACHINERY COMPANY
970 Queen St. West, Toronto

FOR SALE

FOR SALE — THREE HOLDEN-MORGAN threading millers; one arranged for nose threading; two for base threading. One base threader can be changed to 4.5, as it was reduced from this size. Also two Bertram wavers and groovers, and one Martin, all used for 3.3 shells. Canadian Linderman Co., Ltd., Woodstock, Ont. (27)

FOR SALE 5 CARLOADS MACHINERY steel, consisting of rounds from ¼" to 5", squares, flats, angles and channels. Also tire sections. Slightly rusted through being outside. Will move this entire stock at great sacrifice in price to someone who can take delivery of entire quantity at once. This is an exceptional offer. Box 210, Canadian Machinery. (1)

FOR SALE—NEW HAVEN, 60-INCH SWING Standard Engine Lathe—triple geared. 15 ft. bed, hollow spindle, cuts threads 1 to 12. Compound rest, countershaft, steady rest, wrenches, etc. This tool is in excellent shape and owner offers special bargain. Particulars from Winnipeg Machinery Exchange, Sutherland and Gladstone Streets, Winnipeg, Man. (24)

FOR SALE—McDOUGALL ENGINE LATHE 20" swing, 10' bed, complete with 20" 4-jaw chuck, countershaft, steady rest, face plate, gears, etc. This tool, we understand, has never been used; has been lying crated for about 5 years. We are having it cleaned and offer a decided bargain for quick sale. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg. (3)

SITUATIONS WANTED

MECHANICAL ENGINEER OPEN FOR position as shop engineer or superintendent; Technical graduate; broad experience in design, construction and production; have practical experience in forging and finishing large and small shells; have highest recommendation for ability to handle men efficiently. Box 205, Canadian Machinery. (25)

MECHANICAL AND ELECTRICAL ENGINEER, 16 years' experience, plant layout and maintenance; expert draftsman; wishes change. Box 207, Canadian Machinery. (26)

POSITION WANTED AS SALESMAN, agent, or traveler, for mechanical goods, or machinery, by Chief Engineer, (Marine), thoroughly reliable, of good education and appearance. Box 209, Canadian Machinery. (3)

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ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 40, 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN LAMP FACTORY
ST. CATHARINES, ONTARIO

WANTED

WANTED—ELECTRIC TRAVELLING GANTRY crane, span about 57 ft., clearance 50 ft., overhanging at one end; load 15 tons. State full particulars and price. Thor Iron Works, Limited, Toronto, Ont. (27)

WANTED — BERTRAM WAVING ATTACHMENT for 4.5 shells, with or without lathe. Also 18" or 20" turret lathe. Give full particulars and price. Bowes, Jamieson, Limited, Hamilton, Ont. (rtf)

When writing advertiser kindly mention that you saw his ad. in this paper.

For Sale Cheap

1 Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.

1—12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 3 tons capacity; complete, less the Hoist.

1—10" Single "I" Beam Overhead Hand Power Crane, 23' 0" span, 2 tons capacity; complete, less the Hoist.

1—Brantford (Gas) Bake Oven and 4 Racks.

1—No. 5 High-Speed Hammer.

1—30" Hercules Drill, made by Cincinnati Bickford Tool Co.

2—Baker Type Vises.

1—Linderman 2-Spindle Boring Machine.

1—24" Drill, Bertram Company.

1—26" Drill, London Machine Tool Company.

1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

M. BEATTY & SONS,
Limited
Welland, Ont.

Machinery for Sale

Four 16" Power-feed Turret Lathes; two Bardons & Oliver; one Brown & Sharp, and one Pratt & Whitney. Also a quantity of slightly used leather belting, better than new. Write J. A. Harvey, No. 2 Gould St., Toronto, or 'Phone Junction 1494. (3)

Kindly mention this paper when writing advertiser

FOR SALE

Two 96-horse-power Gas Engines.

Complete with producers.

Made by the largest English manufacturers.

WILL SELL CHEAP

Empire Mfg. Co., Ltd.
London, Ontario.

For Sale

1—150-ton Hydraulic Press with Accumulator and Die complete for nosing 4.5" Brit. H.E. Shells.

1—Electric Varnish Bake Oven for H.E. Shells.

Box 202, Canadian Machinery. (r.t.f.)

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Every week new propositions are offered to you here. Look them all over. You may find at least one to interest you.

CANADIAN MACHINERY
Classified Advertising Section
143 University Ave., Toronto, Canada

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

[illegible]" Gridley Automatic
16" x 9' Conradson, heavy duty
16" x [illegible]' New Haven
24" x 8' Lodge & Shipley
21" x 8' Gisholt
20" x 10' American
27" x [illegible]' Garvin
16" x 6' Pratt & Whitney
16" x 5½' Warner & Swasey
[illegible]" x 5' Windsor, wire feed
15" x 5½' hex. American
2" x 24" Jones & Lamson flat turret
No. 2½ Garvin, wire feed
Garvin Double Turret Screw Machine
8" x 31" Brown & Sharpe

Engine Lathes

[illegible]" x 1[illegible]' Putnam
32" x 22' London D.B.G
[illegible]" x 16½' Pond
26" x 14' Hamilton, D.B.G. (5)
30" x 11' Gleason D.B.G. (2)
26" x 12' Canada Mach. Corporation D.B.G.
22" x 16' Lodge & Shipley, patent head
[illegible]" x 8' Bertram, D.B.G.
26" x 12' Lodge & Shipley, patent head (2)
20" x 16' Bertram
20" x 8' Lodge & Shipley patent head
21" x 8' Hercules, heavy duty
20" x 8' Bullard
20" x 8' Ames
18" x 8' New Haven
18" x 8' Lodge & Davis
18" x 6" New Haven
17" x 8' Blaisdell
16" x 6' Porter
16" x 24" x 10' South Bend Gap

Upright Drills

D4 Colburn, heavy duty
D2 Colburn Heavy Duty (2)
32" Rockford Back geared, sliding head
28" Rockford Back geared, sliding head
24" Rockford, heavy duty
No. 1 Avey high speed sensitive
24" Rockford, shaft driven (2)
24" Foote-Burt
24" London
20" Canedy-Otto, back-geared (2)
20" Canedy Otto, lever feed
20" Bertram, power feed
15" Avey, 2 spindle sensitive
14" Excelsior
14" Garvin, 4 spindle
[illegible]" Barnes friction (2)
5' Bertram Semi-universal Radial
48" Gang plain radial
[illegible]" New Century plain radial
[illegible]" Fosdick Plain Radial

Planers and Shapers

[illegible]" x [illegible]" x [illegible]' Wheeler
25" x [illegible]" x 12' Lodge & Davis
24" x 24" x 6½' [illegible]
24" x 24" x 6' American
24" x 24" x 6' Bertram
[illegible]" x [illegible]" x 5' Bertram
[illegible]" Smith & Mills

Milling Machines

No. 3 Becker-Brainard, plain
No. 25 Becker, plain
No. 12 Brown & Sharpe plain (2)
No. 2A Owen Universal
No. 1½ Brown & Sharpe Universal
[illegible] & Trautman Universal
24" Bertram plain

Presses

No. 12 Geared Rhodes roller feed
No. 3½ Bliss
No. 7 Waterbury

Miscellaneous

4½" Davis Cutting-off Machine
No. 7 Racine Hack Saw
No. 1 Racine Hack Saws (4)
[illegible] Swing Lathes (2)
No. 1 Davis Keyseater
No. 24 Besly Grinder
32" x 6' Special Facing and Tapping Machine
48" [illegible] Horizontal Boring Mill
No. 6 Heald Cylinder Grinder
No. 2 Garvin Automatic Tapping Machine
No. 2 Lapointe Broaching Machine
¾" Shuster Riveters (3)
¾" Rock River Punch and Shear
6' Brown Boggs Power Shear
6½' Bertram Bending Rolls

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.
Front St. W., - - Toronto, Ont.

IMMEDIATE SHIPMENT

Boring Mills

62″ Vertical, Baush, two heads
60″ Vertical, Bement-Miles, two heads
60″ Vertical, Miles, one head
54″ Vertical, Colburn, two heads
36″ Bullard, two heads
30″ Baush, one head
Binsse Horizontal, 3″ bar
Sellers Horizontal, 3″ bar

Presses

No. 4 Bliss, Straight Sided, Double Crank, Geared
No. 2 Bliss, Straight Sided, Double Crank
Ferracute P.G. No. 6
Ferracute D.G. No. 56
Manville Knuckle Joint Press, 100-ton capacity
No. 4 Farrell Punch Press
No. 24 Zeh & Hahneman Power Press
No. 1 Bliss, Straight Sided, 8″ stroke
Bliss Pillar Press, 1½″ stroke
No. 3 Manville Stamping Press, 1″ stroke

Cold Saws

Newton No. 3, 32″ blade, rotary base
Newton No. 1 Foundry, 40″ blade
Newton, 18″ blade
Newton, 24″ blade
Q. & C., 18″ blade
Pedrick & Ayer, 20″ blade
Espen-Lucas, 20″ blade

Slotters

8″ Lowell
12″ Sellers
14″ Putnam
17″ Miles

Electric Traveling Crane

10-ton Niles, 42′ 4″ span, 3 motors, 230 volt, D.C. Extra fine condition

New York Machinery Exchange
50 Church St., NEW YORK CITY

High-Grade Used Machinery

ENGINE LATHES

1—16″ x 8′ Greaves & Klusman Quick-Change Gear Lathe, single back geared.
1—18″ x 10′ Lodge & Shipley Quick-Change Gear Engine Lathe, single pulley drive, variable speed countershaft, plain block rest.
1—18″ x 8′ Rahn-Carpenter, plain screw cutting; rebuilt.
1—18″ x 10′ Bradford, plain screw cutting.
1—24″ x 12′ American Quick-change, double back-geared; nearly new.
10—22″ x 10′ Milwaukee, double back-geared, plain screw cutting, comp. rest; new machines. Write or wire for circular and prices.
1—30″ x 14″ James, raised to swing 38″, plain screw cutting.

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5—1½″ Milwaukee Screw Machines, complete. Write for circular.
1—1½″ Dreses Geared Friction Head Screw Machine, complete.
1—1½″ x 9″ Acme Turret Screw Machine, friction geared head, complete; excellent shape.
1—No. 2 Brown & Sharpe Semi-Automatic Wire Feed Screw Machine; rebuilt.
2—⅝″ Cleveland Automatics.
1—1″ Cleveland Automatic.
1—2″ x 24″ Jones & Lamson Flat Turret Lathe, cone drive, rebuilt; excellent condition.

MILLING MACHINES.

1—No. 0 Owen Plain Milling Machine; rebuilt.
1—No. 3-H Becker-Brainard Profiler; rebuilt; first-class shape.
1—LeBlond Heavy Design Worm Cutting Attachment for use on No. 2 LeBlond Miller.

GRINDERS

1—No. 60 Heald Cylinder Grinder; rebuilt; 20″ table.
1—4″ x 30″ Pratt & Whitney Automatic Sizing Grinder; rebuilt.
1—12″ x 42″ Landis Universal Tool Room Grinder; rebuilt.

SHAPERS.

1—24″ Lutter & Gies "Milwaukee" Back-geared Crank Shaper; fine shape.
1—20″ x 50″ Walker Traveling Head Open Side Planer or Shaper.

MISCELLANEOUS.

1—30″ Mueller Radial Drill.
1—No. 1 28″ Diamond Automatic Face Grinder.
1—2″ Bignall & Keeler P.D.Q.C. Pipe Machine.
1—No. ½ Schuchardt & Schutte Gear Hobber.
1—32″ x 32″ x 6′ Pond Heavy Pattern Planer, one head.
1—48″ x 48″ x 14′ Pond Planer, one head.
1—48″ x 48″ x 16′ Pond Planer, one head.
1—No. 3½-A Bliss Toggle Drawing Press; nearly new.
1—60″ Stevens Pulley Lathe.
1—48″ Brainard Automatic Gear Cutter.
1—17-G New Doty Single End Punch or Shear, 12″ throat, capacity 2″ in 1″.

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12" Windsor, plain head.
16" Lodge & Shipley, plain head.
No. 2 Warner & Swasey, hollow hex.
24" Niles, friction head.
16" Foster, ring turret.
24" Garvin Turret Boring Lathe, back-geared.
28" Gisholt, with taper attachment.

ENGINE LATHES.

14" x 6' Davis, q.c.g.
14" x 6' Fairbanks, c.r. and taper.
14" x 6' Prentice, c.r.
16" x 6' Robbins, c.r
16" x 6' Sebastian, p.r.
16" x 8' Lodge & Shipley, pat. head.
16" x 10' Greaves & Klusman, c.r.
18" x 6' Bradford, c.r.
18" x 8' Lodge & Shipley, pat. head.
18" x 10' Bradford, c.r. and taper.
18" x 12' Barker, c.r.
18" x 12' American, q.c.g.
18" x 12' Greaves & Klusman, c.r.
20" x 10' Flather, c.r.
21" x 12' Bradford, c.r.
21" x 12' New Haven, c.r.
24"-40" x 12' McCabe, two-spindle.
24" x 16' Schumacher & Boye, c.r.
32" x 12' Pond, c.r.
30" x 14' Reed, c.r.
36" x 12' Hamilton, c.r.
34" x 16' Blaisdell, c.r.
36" x 28' American, c.r.
42" x 24' Fifield, c.r.

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Pratt & Whitney No. 1 friction gear.
1 3 16" Hartford Automatic.
2" Cleveland Automatic.
2¾" Cleveland Automatic.

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52" Niles, car wheel.
48" Colburn, two heads.
60" Colburn, vertical, two heads.
51" Bullard, two swivel heads with motor drive and motor.

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Morton Portable.
17" x 17" x 12' Whitcomb, crank.
22" x 22" x 6' Gray, one head.
24" x 24" x 4' New Haven, one head.
24" x 24" x 6' Pond, one head.
24" x 24" x 6' Gray, one head.
30" x 30" x 8' Woodward & Powell, one head.
36" x 36" x 10' Powell, one head.
36" x 36" x 12' Powell, two heads.
36" x 36" x 16' Sellers, one head.
39" x 39" x 12' New Haven, one head.
40" 40" x 12' New Haven, one head, one side head.
54" x 54" x 14' Pond, two heads, arranged for motor drive.

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No. 12 B. & S., plain.
No. 2 Cincinnati, plain.
No. 2 P. & W., Lincoln Type.
No. 23 Fox Miller.
No. 13 P. & W., Lincoln Type.
Garvin No. 1½ Universal.
No. 3 LeBlond, plain

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24" x 7" Gould & Eberhardt, for spur gears.
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36" Walcott.

SHAPERS.

15" Hendey, friction.
16" Niles, back geared.
18" Barker & Chard, back-geared.

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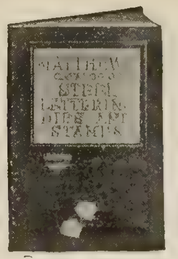

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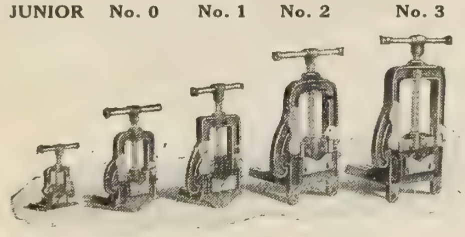

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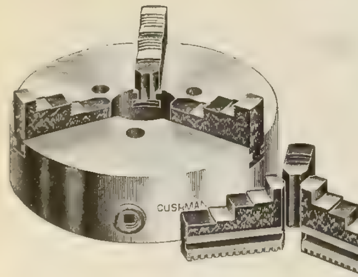

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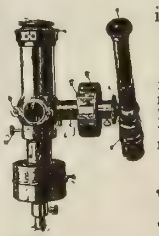
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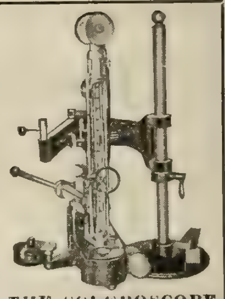
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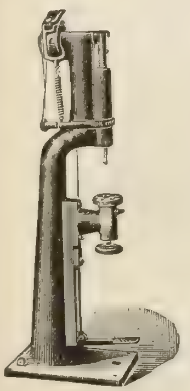

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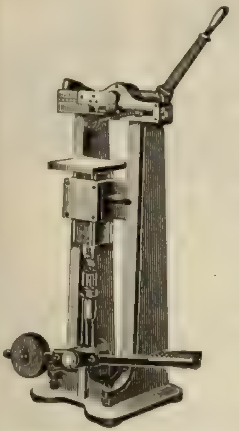

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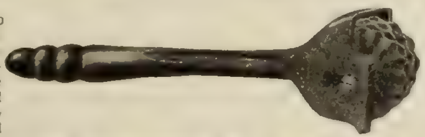

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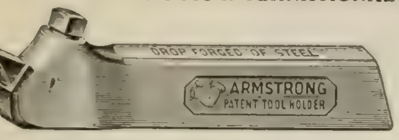

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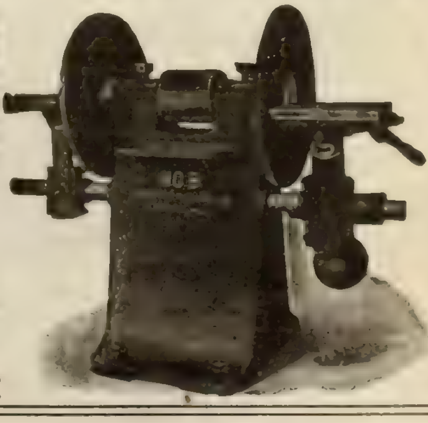

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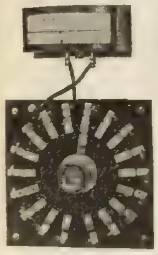

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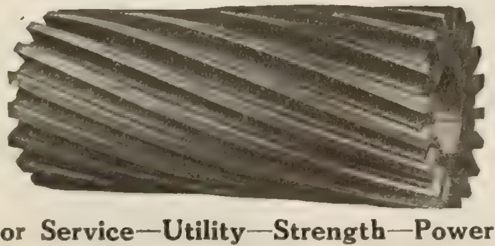

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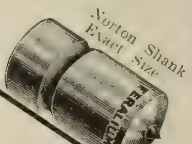

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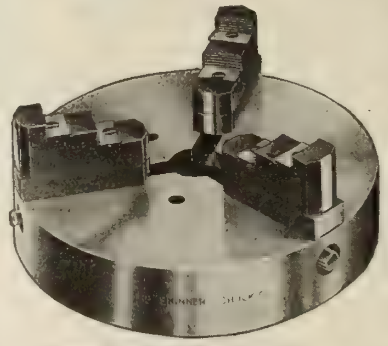

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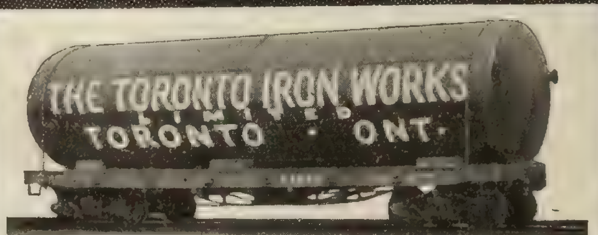

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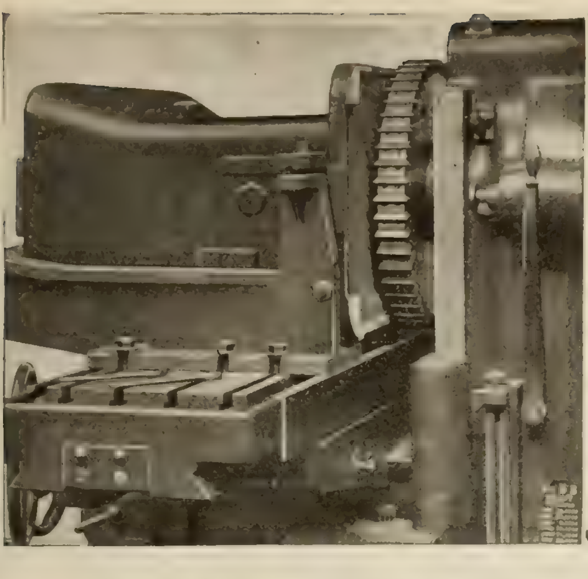

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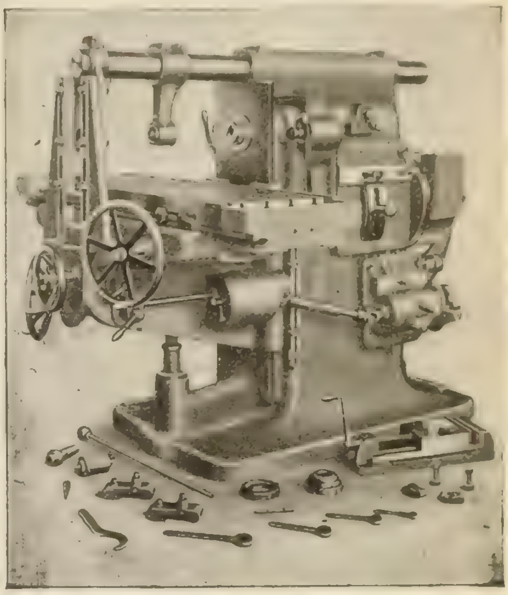

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"Hae ye heard whit ma auld mither's postit tae me?
It fair makes me hamesick," says Private McPhee.
"And whit did she send ye?" says Private McPhun,
As he cockit his rifle and bleezed at a Hun.
"A haggis! A HAGGIS!" says Private McPhee,
"The brawest big haggis I ever did see
And think! It's the morn when fond memory turns
Tae haggis and whuskey,—the Birthday o' Burns
We maun find a dram; then we'll ca' in the rest
O' the lads and we'll hae a Burns' Nicht wi' the best."

IN the July issue of MacLean's Magazine appears a poem by Robert W. Service, "The Haggis of Private McPhee," which bids fair to prove the most popular piece of verse that the war has produced. Forceful, humorous, written in the swinging measure that distinguishes all of Service's work, this story of the efforts of two braw Scotch soldiers to hold a Burns festival in the trenches will give you a thrill as well as a smile.

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And, when it is said that "The Haggis of Private McPhee" is one of the finest pieces of verse that he has produced, it will be recognized that this is something you cannot afford to miss.

The July issue is distinguished also by contributions from the following famous Canadian writers:

Arthur Stringer, Agnes C. Laut, Nellie McClung, Arthur E. McFarlane, Anna Chapin Ray and others.

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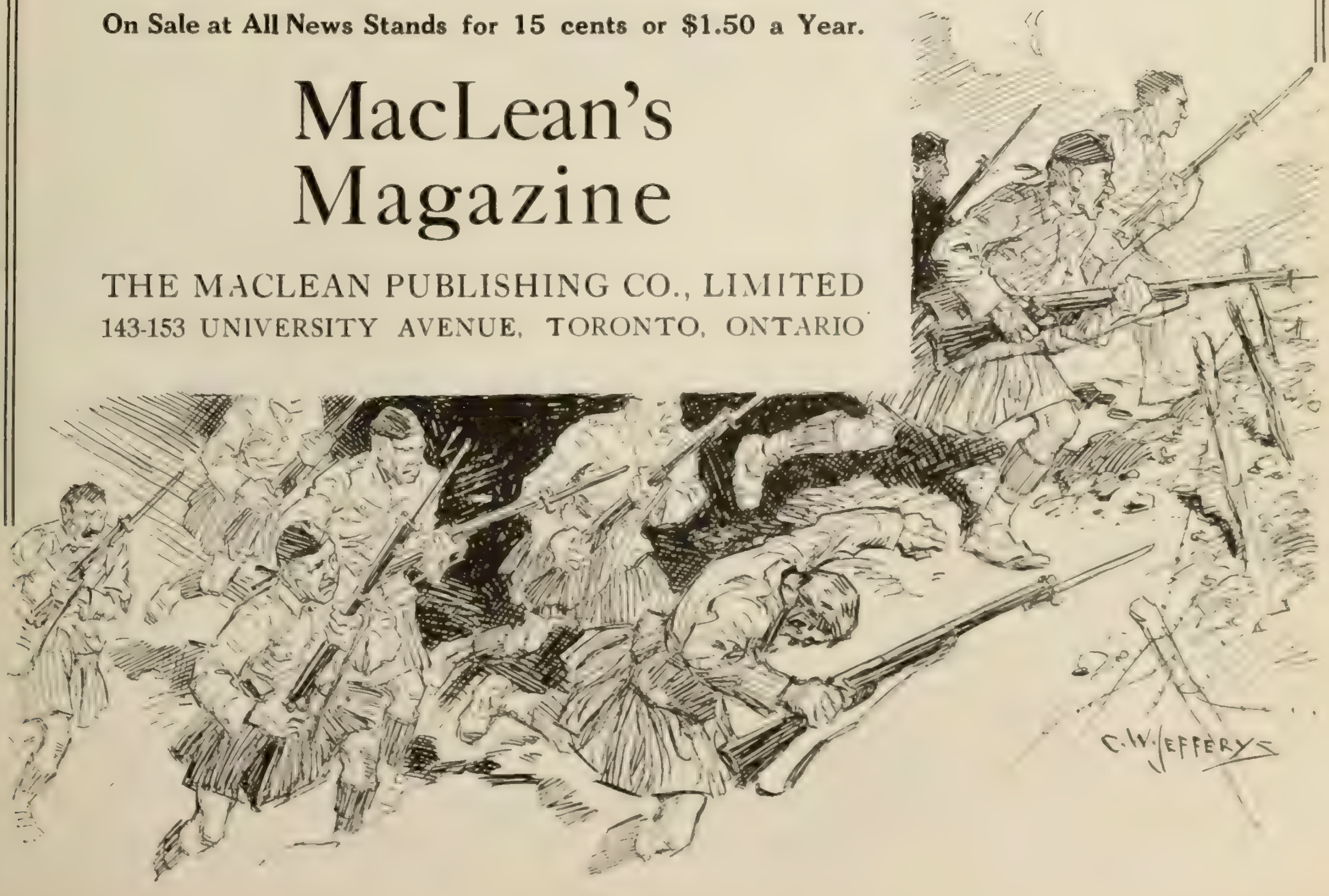

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W. F. & John Barnes Co., Rochford, Ill.
John Bertram & Sons Co., Dundas.
Bawden Machine Co., Toronto, Ont.
Edgar Bloxham, Inc., New York, N.Y.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Cincinnati Iron & Steel Co., Cincinnati, O.
Davenport Locomotive Works, Davenport, Iowa.
Dominion Machinery Co., Toronto.
Douglas, W. & B., Middletown, Conn.
Duff Mfg. Co., Pittsburgh, Pa.
Foss & Hill Machy Co., Montreal.
Fisher, A.D., Mfg. Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Hendey Machine Co., Torrington, Conn.
Hepburn, John T., Ltd., Toronto, Ont.
Himoff Machine Co., New York.
Hyde Engineering Works, Montreal, Que.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

LATHES, PATTERNMAKERS'
J. G. Blount Co., Everett, Mass.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Jenckes Mach. Co., Sherbrooke, Que.
H. W. Petrie, Toronto.

LATHES, SINGLE PURPOSE
Bertram, John, & Sons Co., Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal, Que.
Fisher, A.D., Mfg. Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Himoff Machine Co., Inc., New York, N.Y.
Roelofson Mach. & Tool Co., Toronto, Can.
Root & Van Dervoort Engineering Co., East Moline, Ill.

LATHES, SCREW CUTTING
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Cincinnati Iron & Steel Co., Cincinnati, O.
Davenport Locomotive Works, Davenport, Iowa.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
Niles-Bement Bond Co., New York.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

LATHES, SPINNING
Bawden Mach. Co., Toronto, Ont.
Bliss, E. W., Co., Brookln, N.Y.
Toledo Mach. & Tool Co., Toledo.

LATHES, TURRET AND SPEED
John Bertram & Sons Co., Dundas.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Cincinnati Iron & Steel Co., Cincinnati, O.
Fisher, A.D., Mfg. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Hepburn, John T., Ltd., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

LEATHER STRAPPING
Graton & Knight Mfg. Co., Worcester, Mass.

LIFTS, PNEUMATIC
Whiting Foundry Equipment Co., Harvey, Ill.

LINK BELTING
Can. Fairbanks-Morse Co., Montreal.
Graton & Knight Mfg. Co., Montreal.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LIQUID AIR
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.
Lyman Tube & Supply Co., Montreal, Que.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works Co., Ltd., London, Canada.

LOCOMOTIVE EQUIPMENT
Can. Locomotive Co., Kingston, Ont.
Davenport Locomotive Works, Davenport, Iowa.

LOCOMOTIVES
Can. Locomotive Co., Kingston, Ont.
Davenport Locomotive Works, Davenport, Iowa.

LUBRICANTS
Can. Economic Lubricant Co., Montreal.
Cataract Refineries Co., Toronto.

LUBRICATORS.
Bowser & Co., Inc., S. F., Toronto.
Cincinnati Lubricant Pump Co., Cincinnati.
Roper, C. F., & Co., Hopedale, Mass.

MACHINERY DEALERS
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Dominion Machy. Co., Toronto, Ont.
Essley Machinery Co., Chicago, Ill.
Garlock-Machinery, Toronto.
Foss & Hill Machy. Co., Montreal.
New York Machinery Exchange, New York.
H. W. Petrie, Toronto.
Stocker, H. A., Machinery Co., Chicago, Ill.
A. R. Williams Machy. Co., Toronto.

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MACHINERY REPAIRS
Cunningham & Sons, St. Catharines, Ont.
Coleman Fare Box Co., Toronto, Ont.
Sumbling Mach. Co., W. H., Toronto, Ont.

MACHINISTS' SCALES, SMALL TOOLS AND SUPPLIES
Can. Fairbanks-Morse Co., Montreal.
Frank H. Scott, Montreal.
J. H. Williams & Co., Brooklyn, N.Y.

MANDRELS
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

MARKING DEVICES
Matthews, Jas. H., & Co., Pittsburg, Pa.
Pritchard-Andrews Co. of Canada, Ottawa, Ont.

MARINE ENGINES
Cunningham & Sons, St. Catharines, Ont.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Noble & Westbrook Mfg. Co., Hartford, Conn.
Perrin, Wm. R., Toronto.

MARQUISES
Dennis Wire & Iron Works, London, Ont.

MEASURING TAPES AND RULES
James Chesterman & Co., Ltd., Sheffield, Eng.

METALLURGISTS
Can. Inspection & Testing Laboratories, Ltd., Montreal.
Toronto Testing Laboratory, Ltd., Toronto.

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Canada Metal Co., Toronto, Ont.
Lovetz, Louis, Toronto, Ont.
L. S. Tarshis & Sons, Montreal.

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Coleman Fare Box Co., Toronto, Ont.

MILL MACHINERY
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Alexander Fleck, Ltd., Ottawa.

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John Bertram & Sons Co., Dundas.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Hendey Mach. Co., Torrington, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Rockford Drilling Machine Co., Rockford, Ill.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Brown & Sharpe Mfg. Co., Providence.
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Gooley & Edlund, Cortland, N.Y.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rockford Drilling Machine Co., Rockford, Ill.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Edgar Bloxham, Inc., New York, N.Y.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Chicago, Ill.
Hendey Machine Co., Torrington.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rockford Drilling Machine Co., Rockford, Ill.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
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Cook, Asa S., Co., Hartford, Conn.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rockford Drilling Machine Co., Rockford, Ill.

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Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Tabor Mfg. Co., Philadelphia, Pa.

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Can. Fairbanks-Morse Co., Montreal.
Jenckes Mach. Co., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke.
Modern Tool Co., Erie, Pa.
Peacock Bros., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Cleveland Pneumatic Tool Co., of Canada, Toronto.
Jenckes Mach. Co., Sherbrooke, Que.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
Toronto & Hamilton Electric Co., Hamilton, Ont.
A. R. Williams Machy. Co., Toronto.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Fisher, A.D., Mfg. Co., Toronto, Ont.
Lachapelle, J. D., & Co., Montreal, Que.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Toronto & Hamilton Electric Co., Hamilton, Ont.
A. R. Williams Machy. Co., Toronto.

MOTORS, PNEUMATIC
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MUFFLERS
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MULTIPLE INDEX CENTRES
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NAME PLATES, BRONZE, ETCHED AND STAMPED
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Pritchard-Andrews Co., Ottawa, Can.

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NOZZLES, SPRAY
Can. Blower & Forge Co., Berlin, Canada.

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NUT MACHINES (HOT)
National Machy. Co., Tiffin, O.

NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machy. Co., Tiffin, O.

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Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corporation, Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
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National Machy Co., Tiffin, O.

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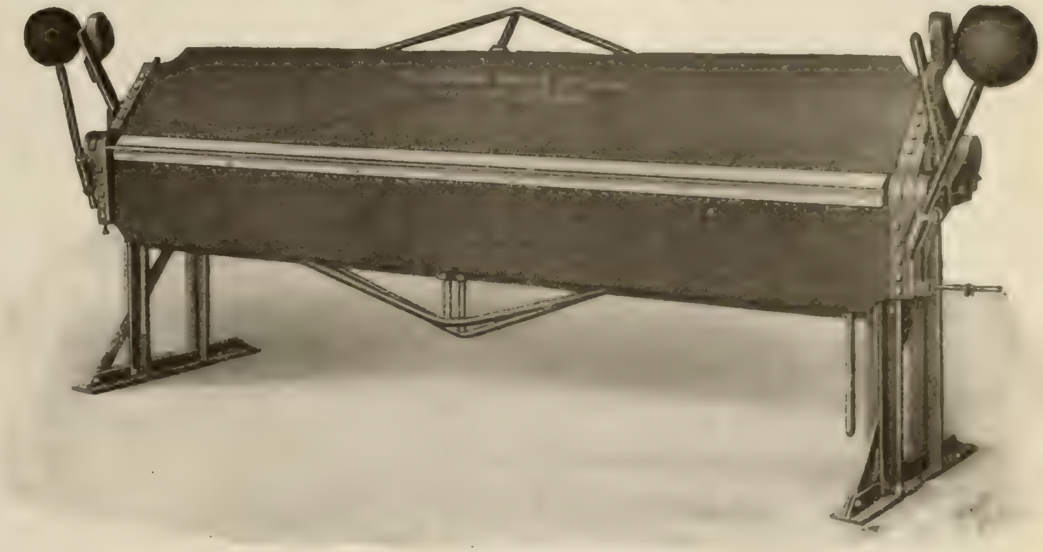

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If you have a lathe
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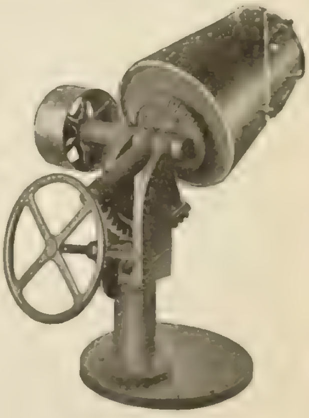

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Oven Equipment & Mfg. Co., New Haven, Conn.

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L'Air Liquide Society, Montreal, Toronto.
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Oliver Machy. Co., Grand Rapids, Mich.

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Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Ross Thomson & Co., Ottawa, Ont.

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Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
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A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
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Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.

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Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles Bement-Pond Co., New York.
Oliver Machy. Co., Grand Rapids, Mich.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.

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Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

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Sheldons, Ltd., Galt, Ont.

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PLUG MILLERS
Banfield, Edwin J., Toronto.

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Atlas Press Co., Kalamazoo, Mich.

PRESSES, BANDING
Chapman Double Ball-Bearing Co., Toronto, Ont.
Perrin, Wm. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

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Atlas Press Co., Kalamazoo, Mich.

PRESSES, BROACHING
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Toledo Machine & Tool Co., Toledo.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo, O.

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Can. Locomotive Co., Kingston, Ont.
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Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago, Ill.
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Niles-Bement-Pond Co., New York.
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H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

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Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, PNEUMATIC
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Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
Geo. Gorton Machine Co., Racine.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
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Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

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Can. Boomer & Boschert Press Co., Montreal
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Dodge Mfg. Co., Toronto, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont,
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Bawden Machine Co., Toronto, Ont.
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Jenckes Mach. Co., Sherbrooke, Que.
Peacock Bros., Montreal, Que.
Smart-Turner Mach. Co., Hamilton.

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D'Olier Centrifugal Pump & Machine Co., Philadelphia, Pa.
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H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

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Peacock Bros., Montreal, Que.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

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Can. Blower & Forge Co., Berlin, Canada.
Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

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Charles F. Elmes Eng. Works, Chicago, Ill.
Darling Brothers, Montreal.
Peacock Bros., Montreal, Que.
Smart-Turner Mach. Co., Hamilton.
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Coleman Fare Box Co., Toronto, Ont.
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Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

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John Bertram & Sons Co., Dundas.
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Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont,
Niles-Bement-Pond Co., New York.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Peacock Bros., Montreal, Que.
Niles-Bement-Pond Co., New York.

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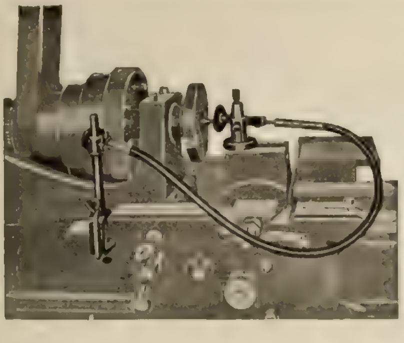

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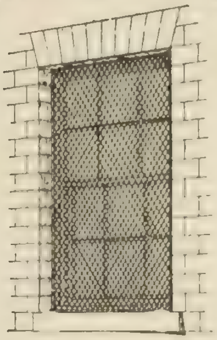

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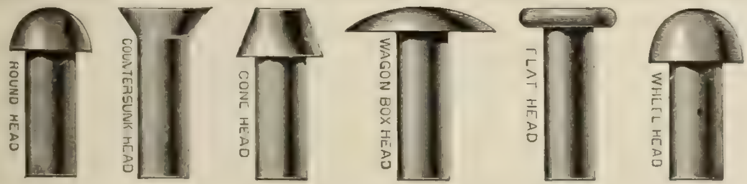

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A. R. Williams Machy. Co., Toronto.

VACUUM PUMPS
Can. Blower & Forge Co., Berlin, Canada.
Smart-Turner Machine Co., Hamilton. Ont.

VALVE LEATHERS
Graton & Knight Mfg. Co., Montreal.

VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto

VALVES, FOOT
Smart-Turner Mach. Co., Hamilton.

VALVES, HYDRAULIC
Can. Boomer & Boschert Press Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.

VALVES, BACK PRESSURE, STEAM
Sheldons, Limited, Galt.

VENTILATING APPARATUS
Can. Blower & Forge Co., Berlin, Ont.
Sheldons, Limited, Galt.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

VISES, BENCH
Aikenhead Hardware Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Toronto.

VISES, PIPE
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Mfg. Company, Bridgeport, Conn.
Bignall & Keeler Mach. Works, Edwardsville, Ill.
Butterfield & Co., Rock Island, Que.
J. H. Williams Co., Brooklyn, N.Y.

VISES, PLANER AND SHAPER
Aikenhead Hardware Co., Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.

WASHER MACHINES
National Machy. Co., Tiffin, Ohio.

WASHERS
Barnes, Wallace, Co., Bristol, Conn.
Graton & Knight Mfg. Co., Worcester, Mass.
London Bolt & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WATCHES, TIME STUDY
Silberberg, M. J., Chicago, Ill.

WATER CINDER MILLS
Whiting Foundry Equipment Co., Harvey, Ill.

WATER TOWERS
Toronto Iron Works, Ltd., Toronto.

WATER WHEELS
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.

WELDING MACHINES, ELECTRIC, ETC.
Tabor Mfg. Co., Philadelphia, Pa.

WELDING, WORK AND SUPPLIES (Autogenous and Oxy-Acetylene). SEE OXY-ACETYLENE

WINCHES
John H. Hall & Sons, Brantford.
Northern Crane Works, Walkerville.

WIRE COILING AND POINTING MACHINES
Baird Machine Co., Bridgeport, Conn.
F. B. Shuster Co., New Haven, Conn.

WIRE CLOTH AND PERFORATED METALS
Canada Wire & Iron Goods Co., Hamilton.
Dennis Wire & Iron Works Co., Ltd., London.

WIRE FORMING AND STAMPING MACHINERY
Brown, Boggs Co., Ltd., Hamilton, Canada.
F. B. Shuster Co., New Haven, Conn.
Baird Machine Co., Bridgeport, Conn.

WIRE NAILS
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WIRE NAIL MACHINERY
National Machy. Co., Tiffin, Ohio
A. R. Williams Machy. Co., Toronto.

WIRE, RUBBER-COVERED
Lachapelle, J. D., & Co., Montreal.

WIRE, STEEL, BRASS, COPPER, BRONZE
Steel Co. of Canada, Ltd., Hamilton, Ont.

WIRE STRAIGHTENERS AND CUTTERS
Baird Machine Co., Bridgeport, Conn.
Brown, Boggs Co., Ltd., Hamilton, Canada.
F. B. Shuster Co., New Haven, Conn.

WOOD BORING MACHINES
Canada Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool. Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto.
H. W. Petrie, Toronto.

WOODWORKING MACHINERY
Can. Blower & Forge Co., Berlin, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto.
New Britain Machine Co., New Britain, Conn.
Oliver Machy. Co., Grand Rapids, Mich.
H. W. Petrie. Toronto.
A. R. Williams Machy. Co., Toronto

WOOD LATHES
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

WOOD TRIMMERS.
Oliver Machy. Co., Grand Rapids, Mich.

WRENCHES
Armstrong Bros. Tool Co., Chicago, Ill.
Butterfield & Co., Rock Island, Que.
Canadian Billings & Spencer, Ltd., Welland.
Keystone Mfg. Co., Buffalo, N.Y.
Wells Bros. Co. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
J. H. Williams Co., Brooklyn, N.Y.

WRENCHES, AUTOMOBILE NARROW JAW AND MONKEY
Bemis & Call Hardware & Tool Co., Springfield, Mass.
Whitman & Barnes Mfg. Co., St Catharines, Ont.

WRENCHES, PIPE, MONKEY
Aikenhead Hardware Co., Toronto, Ont.
Bemis & Call Hardware & Tool Co., Springfield, Mass.
Whitman & Barnes Mfg. Co.; St. Catharines, Ont.

WRENCHES, RATCHET AND BASIN
Bemis & Call Hardware & Tool Co., Springfield, Mass.
Keystone Mfg Co., Buffalo, N.Y.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XVI. TORONTO, JULY 13, 1916 No. 2

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THE MACLEAN PUBLISHING COMPANY, LIMITED

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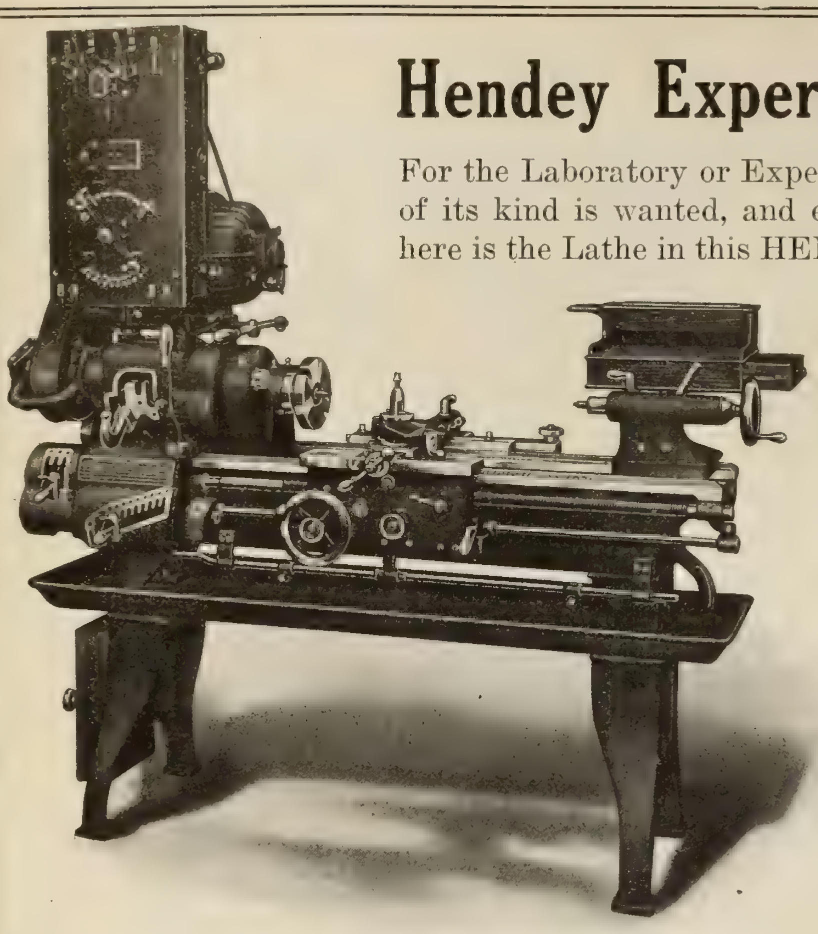

Hendey Experimental 12" Lathe

For the Laboratory or Experimental Department where the best of its kind is wanted, and each machine must be motor-driven, here is the Lathe in this HENDEY 12".

In addition to its complete regular equipment it has Small Tool Cabinet for operators' fine tools, also gear closet for extra gears to cut special threads.

Write for Descriptive Matter.

**The
Hendey Machine Co.**

Torrington, Conn., U.S.A.

Canadian Agents: A. R. Williams Machinery Co., Toronto, Ont.; A. R. Williams Machinery Co., 260 Princess St., Winnipeg; A. R. Williams Machinery Co., Vancouver; A. R. Williams Machinery Co., St. John, N.B.; Williams & Wilson, Montreal.

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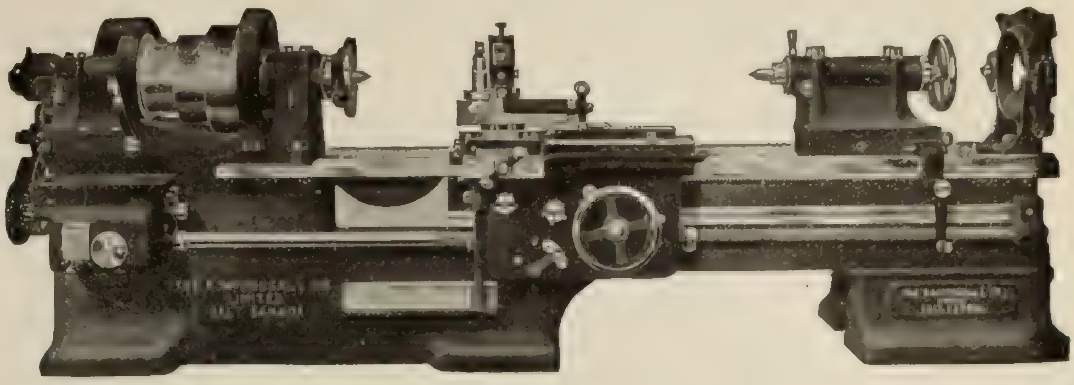
McDougall Gap Lathes

Strength
Accuracy
Quality



Take a look at the next money you intend to invest in a Lathe.
Then, take a look at the money's worth we offer you in our machine.
Your money will soon come back to you in increased production and we will have the pleasure of having a satisfied user. Our machines are just as good as they look and they look good too.
We invite the closest inspection.

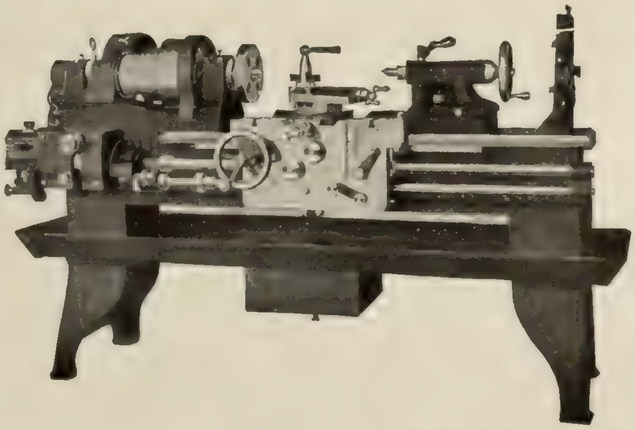
Particulars on request.

ARE-MAC-DEE IS A GUARANTEE

The R. McDougall Company Limited

Manufacturers
GALT, Ont., Canada
The Canadian Fairbanks-Morse Co., Limited, Sales Agents.

In Stock for Immediate Delivery



1—No. 29 Osterlein Full Universal Milling Machine.
1—No. 2 Ford Smith Milling Machine, with dividing head and vise.
1—No. 3 Osterlein Universal Grinder.
1—Style "BX" New Yankee Drill Grinder.
1—Style "B" Yankee Drill Grinder.
1—26" Conradson Turret Lathe.
1—8 x 10 American Lathe Quick-change Gear 3-step cone.
1—16 x 6 Flather Tool Room Lathe, compound rest, draw in and taper attachments.
1—18 x 8 Flather Tool Room Lathe, compound rest, and draw in attachment.
3—18 x 8 Cincinnati Lathes, three-step cone, double back gear and double plate apron.
4—28 x 8 Mueller Heavy Duty Lathes.
3—16 x 8 South Bend Lathes.
1—8" Rivett Precision Lathe, with back gear, power feed, draw in, milling and grinding attachments.

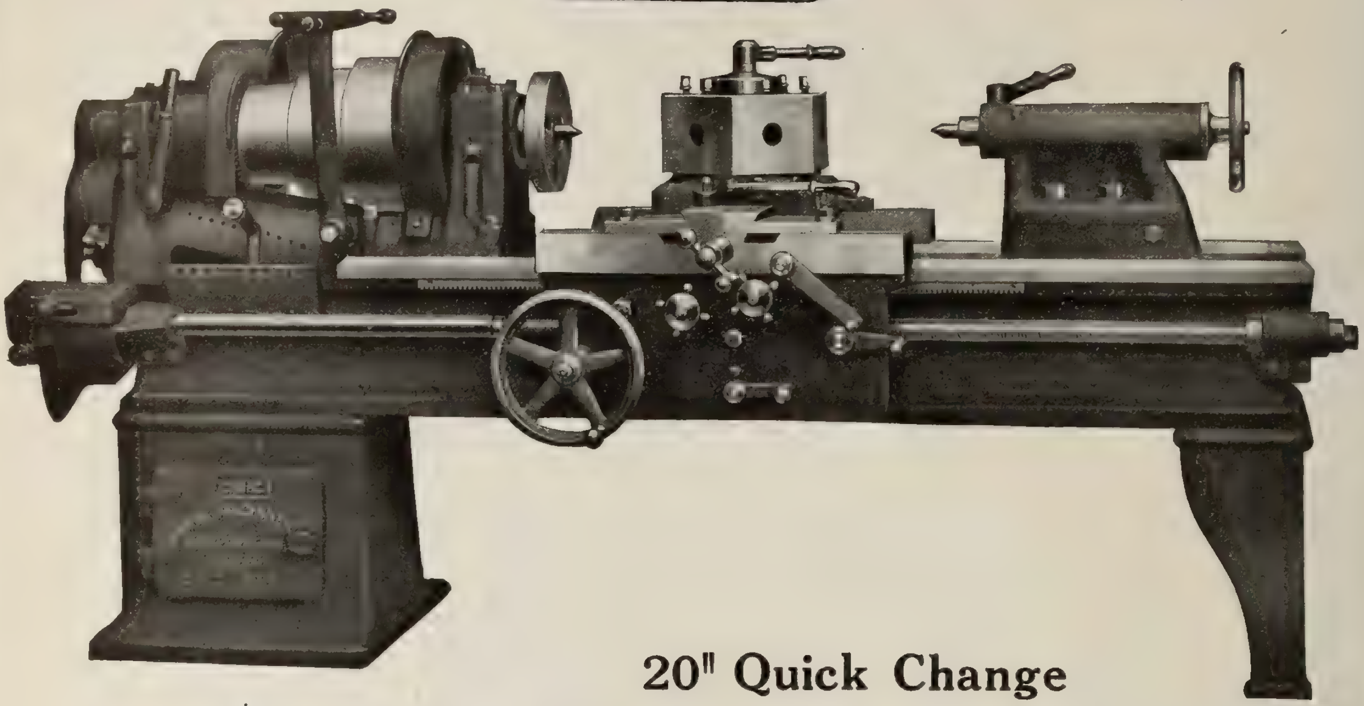
1—No. 1 Diamond Surface Grinder.
1—No. 2 Diamond Surface Grinder.
1—38 x 9 Plain Milling Machine, B.G., vertical and slotting attachment, dividing head, vise and arbor.
1—No. 2 Reed Sensitive Drill Press.
2—12" Sensitive Drill Presses.
3—3-spindle Sensitive Drill Presses.
1—4-spindle Sensitive Drill Press.
2—25" Sibley Sliding Head Back-geared Drill Presses.
1—24 x 24 x 6 Cincinnati Planer.
1—26 x 26 x 6 Wheeler Planer.
1—20" Ohio Heavy Duty Shaper.
1—20" Hendey Shaper.
5—Roulsted Std. Engine Lathes for turning 4.5 or 6" shells.
5—Roulsted Turret Lathes, for boring 4.5 or 6" shells.
Racine Saws for cutting off 4.5, 6 and 8" shell stock.

THE FOSS & HILL MACHINERY CO.

305 ST. JAMES STREET - - - - MONTREAL, QUE.

If any advertisement interests you, tear it out now and place with letters to be answered.

Machines with this mark C.M.C. **are Powerful and Accurate**



20" Quick Change

Engine Lathe

with turret on the saddle

We are prepared to furnish to the above type of turret for all sizes of our Lathes.

Particular care in the selection of material and accuracy of work insure the turrets being extremely strong and very accurate.

The Hexagon Block is of semi-steel and the locking mechanism is of the best cast steel, hardened and ground.

We are also prepared to furnish machines equipped with Turret on the bed, automatic revolving, and with or without power feed.

Write for full particulars.

CANADA MACHINERY CORPORATION
LIMITED
GALT, ONTARIO

Builders of Machine Tools and Woodworking Machinery

For convenience of the Trade we have opened Showrooms in Toronto at Brock Avenue Subway, where a full line of our Machinery can be inspected.

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CANADIAN MACHINERY AND MANUFACTURING NEWS

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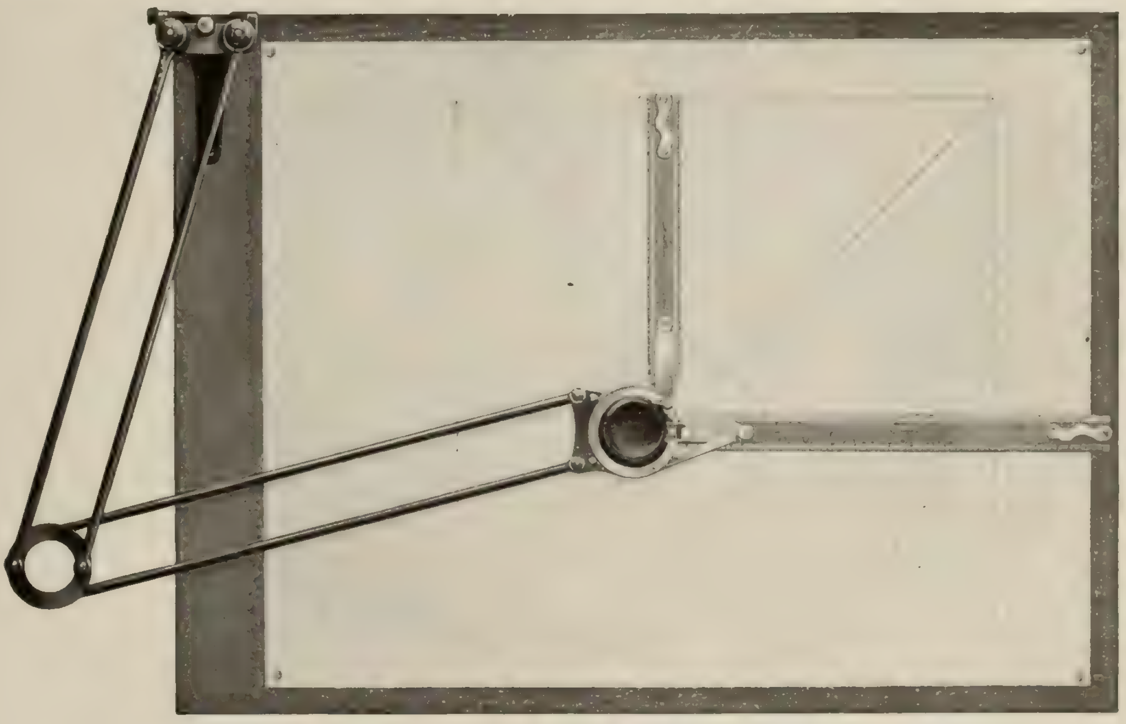


Universal Drafting Machines

For Maximum Efficiency

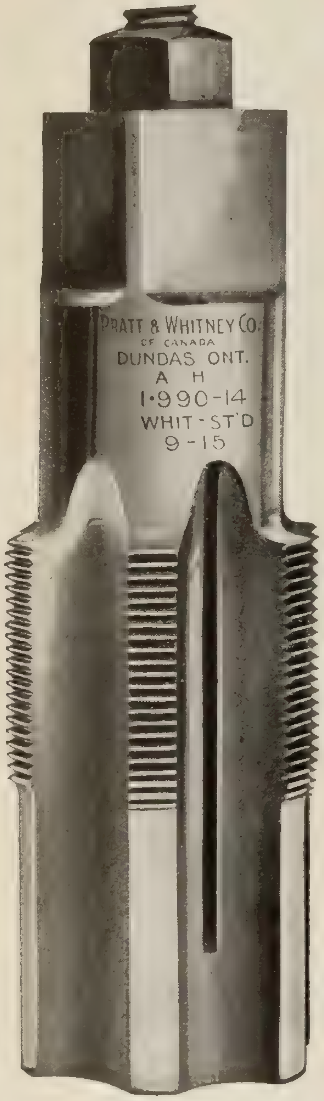
25 to 50% time saved in *any* drafting room. The Universal Drafting Machine not only makes drafting quicker, easier, and more interesting, but it increases accuracy.

Adapted to all forms of drafting. Thousands of them in use in all parts of the world. Simple, durable and easily handled. It is not expensive.

Write for our latest descriptive catalogue.
It goes into details that will interest you.

Universal Drafting Machine Company
Cleveland, Ohio, U.S.A.

Special Tools for Shells

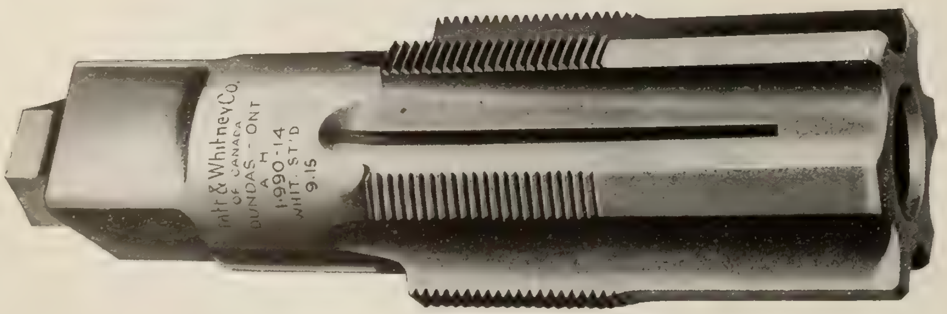

PRATT & WHITNEY Co.
OF CANADA
DUNDAS ONT.
A H
1·990-14
WHIT-ST'D
9-15

ILLUSTRATIONS show the construction of a special tool for rough tapping the fuse hole in 18-pounder High Explosive Shells and for bushings on 4.5 High Explosive Shells.

A similar tap without the guide can also be furnished for *finish tapping* on the same shells.

The adjustment, which is provided by means of a tapered internal plug, permits the maintenance of the tool to accurate size.

A full line of adjustable taps for 18-pounder and 9.5 shells is carried at all our branches.


Pratt & Whitney Co.
OF CANADA
DUNDAS - ONT
A H
1·990-14
WHIT. ST'D
9-15

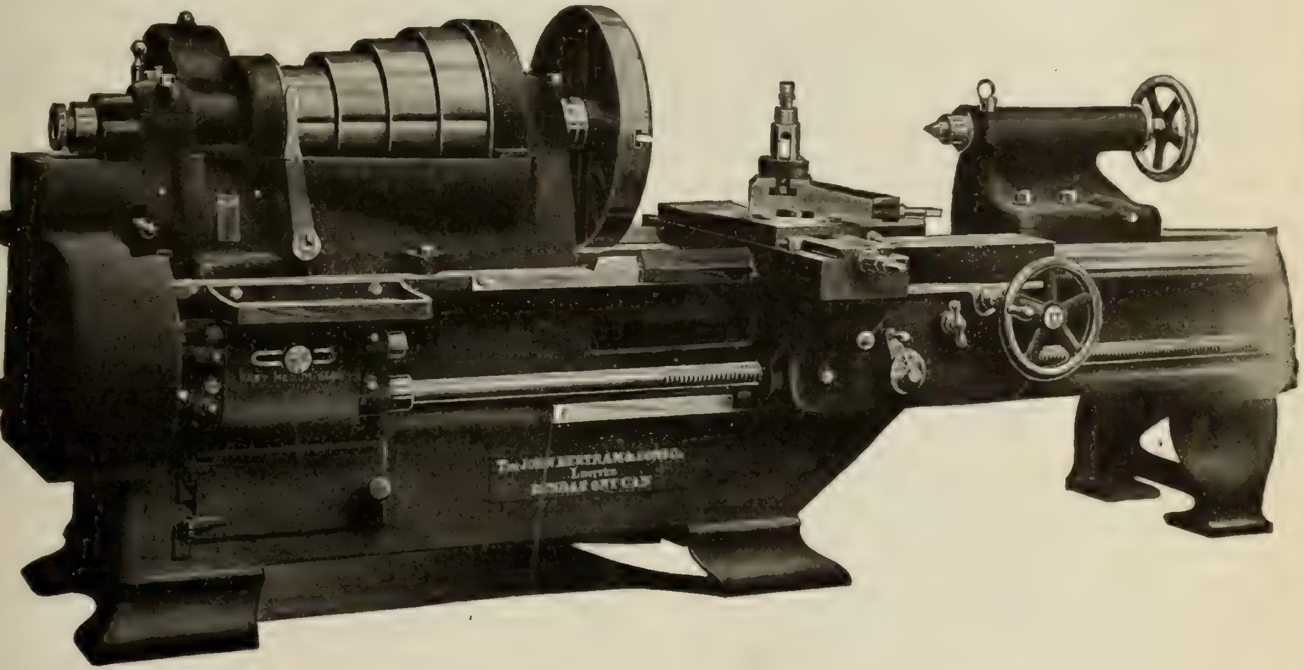
We guarantee quality and accuracy.

Write for our lists of *Special Shell Tools.*

Pratt & Whitney Company of Canada, Limited

DUNDAS	MONTREAL	WINNIPEG	VANCOUVER
Ontario	723 Drummond Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS



Double Back-Geared Gap Lathe

26-inch x 42-inch Swing

Bertram Machine Tools are built for safety and service, and are backed by a concern with sixty years' experience and the largest of its kind in Canada.

The John Bertram & Sons Co., Limited

MISCELLANEOUS DEPARTMENT

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Building

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

Why the American Telephone and Telegraph Company Advertises

The following is a portion of an address delivered before the Associated Ad. Clubs Convention in Philadelphia, on June 26, by N. C. Kingsbury, Vice-President of the American Telephone Co. It is well worth reading, throwing as it does an interesting sidelight on the purpose and results of a most unusual advertising campaign:

IT has been said a good many times, but I must repeat here, that the corporation which I have the honor to represent and which spends large sums of money each year in national advertising, does not do so with the direct object of inducing people to subscribe for telephone service. Our president, Mr. Vail, has said to me over and over again, "You must keep out of your advertising anything in the nature of an invitation to purchase telephone service; get away from the commercial idea." Well, that is a pretty hard thing to do, but we have conscientiously tried to do it.

We advertise in a national way because we serve a nation-wide public, and we want that public to know all about our business. We have intricate problems; we want the people to understand them. We have lofty purposes, and we are entitled to have them known. We have high ideals as to civic service, and you can readily understand that a corporation doing business in some 70,000 places in the United States needs some measure of sympathy from the public it is trying to serve, with its tremendous difficulties. We believe in some great fundamental principles as applicable to our business, such as the necessity for one policy as regards the general use and protection of every telephone in the United States. We believe in one system, because we cannot conceive of a nation-wide service being performed by numbers of unrelated companies. We believe in universal service, because the ultimate benefits incident to telephone service obviously cannot be given or received in a restricted territory.

Perhaps the one great test that can be applied to our national advertising is to consider whether or not it has made these problems, purposes, ideals, difficulties, principles and policies known throughout the United States. If it has made them known, and to the extent it has made them known, our national advertising has been a success, but if we have spent these large sums of money without that result, our national advertising has not accomplished the purpose we have had in mind.

As advertising men I am pleased to tell you that our campaign in these particulars has been a success and there are many evidences which go to confirm our belief in this direction.

Advertising Has Brought Business, Despite Warning

But I must confess to you that I am up against it. In spite of our endeavors to follow out Mr. Vail's instructions, the record shows that we have not been successful, and I tremble when I realize that he is sure to learn that somewhere or other the commercial idea must have crept into some of our advertising without our really knowing it. We have often stated that we could not key our advertisements or directly note results in the way of increase of business, but a study of the figures shows a very gratifying result when viewed from the advertising man's standpoint.

Our national advertising campaign began in June, 1908. We will assume that the advertising has affected only the number of Bell telephones as shown in the annual reports of the American Telephone and Telegraph Company. The stations of our connecting companies, private-line stations, etc., have been omitted in making up these figures. For the five years of 1904 to 1908, inclusive, we gained 1,690,078 subscribers, and this gain was 1.72 telephones for each 100 of the total population of the United States. That was before our advertising campaign began.

Now let us take the period from 1908 to 1913, inclusive, omitting, as you will note, the years 1914 and 1915 in order to avoid the effect of the abnormal conditions due to the European war. During these five years, while our advertising campaign was in progress, we gained 2,199,964 stations, and that gain was 1.95 telephones per 100 of the total population of the country, so that during the period covered by our national advertising the gain in telephones was .23 of one per cent. greater than during the period when we were not advertising. If you will apply this .23 of one per cent. to the total population of this country, you will notice it represents a large number of telephones. And this gain was made in spite of the fact that the possibilities for new business were considerably less in the latter period than in the former period.

There are probably few national advertising campaigns wherein it is as difficult to trace direct results as in that conducted by the American Telephone and Telegraph Company, but the above facts speak for themselves. The statistics we have considered could be translated into the terms of the dollar, but it would be impossible to estimate the benefit which we have received because of the education of the public concerning our business. We cannot calculate the value of an enlightened public interest and knowledge in our affairs, but the benefits are apparent in hundreds of different ways.

CANADIAN MACHINERY
143-153 UNIVERSITY AVE., TORONTO, CANADA
Montreal Winnipeg London, England Boston New York Cleveland Chicag

Quality Service

The Steel Company of Canada, Limited

PRODUCTS

"HAMILTON" PIG IRON
BASIC, MALLEABLE AND FOUNDRY

IRON AND STEEL
BLOOMS, BILLETS, BARS, WIRE RODS, ANGLES, CHANNELS, PLOW BEAMS, ETC.

FORGINGS

Car Axles, Shape and Drop Forgings, Horse Shoes, Carriage and Automobile Hardware, Top Goods, Etc.

WIRE, ETC.

Steel, Brass, Copper and Bronze, Heavy and Fine, Bright Annealed, Coppered Liquor Bright, Galvanized and Tinned. Stranded, Steel and Copper Cable, Clothes Line, Wire Nails, Staples, Barb Wire, Woven Wire Fencing, Fence Gates.

RAILWAY FASTENINGS

Angle Bars, Track Bolts, Tie Plates, Spikes, Tie Rods, Etc.

NAILS, SPIKES, RIVETS, ETC.

Wire, Cut, Boat and Horse Shoe Nails, Railway, Pressed and Drift Spikes. Tacks and Shoe Nails, Steel and Copper Rivets, and Burrs, Iron, Brass and Copper.

POLE LINE HARDWARE

Pole Steps, Cross Arm Braces, Guy Clamps and Guy Rods, Etc., Black and Galvanized.

BOLTS, NUTS AND WASHERS

Machine, Carriage, Elevator, Stove, Tire and Sleigh Shoe Bolts, Blank, Tapped Nuts, and Washers.

WROUGHT PIPE

Black and Galvanized Nipples and Couplings.

SCREWS

Wood and Machine Steel, Brass and Bronze.

LEAD PRODUCTS

Lead Pipe, White Lead, Shot and Putty.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG

A convenient type of Crawford Sectional Oven largely used by manufacturers turning out Shells up to twenty-eight pounds each.

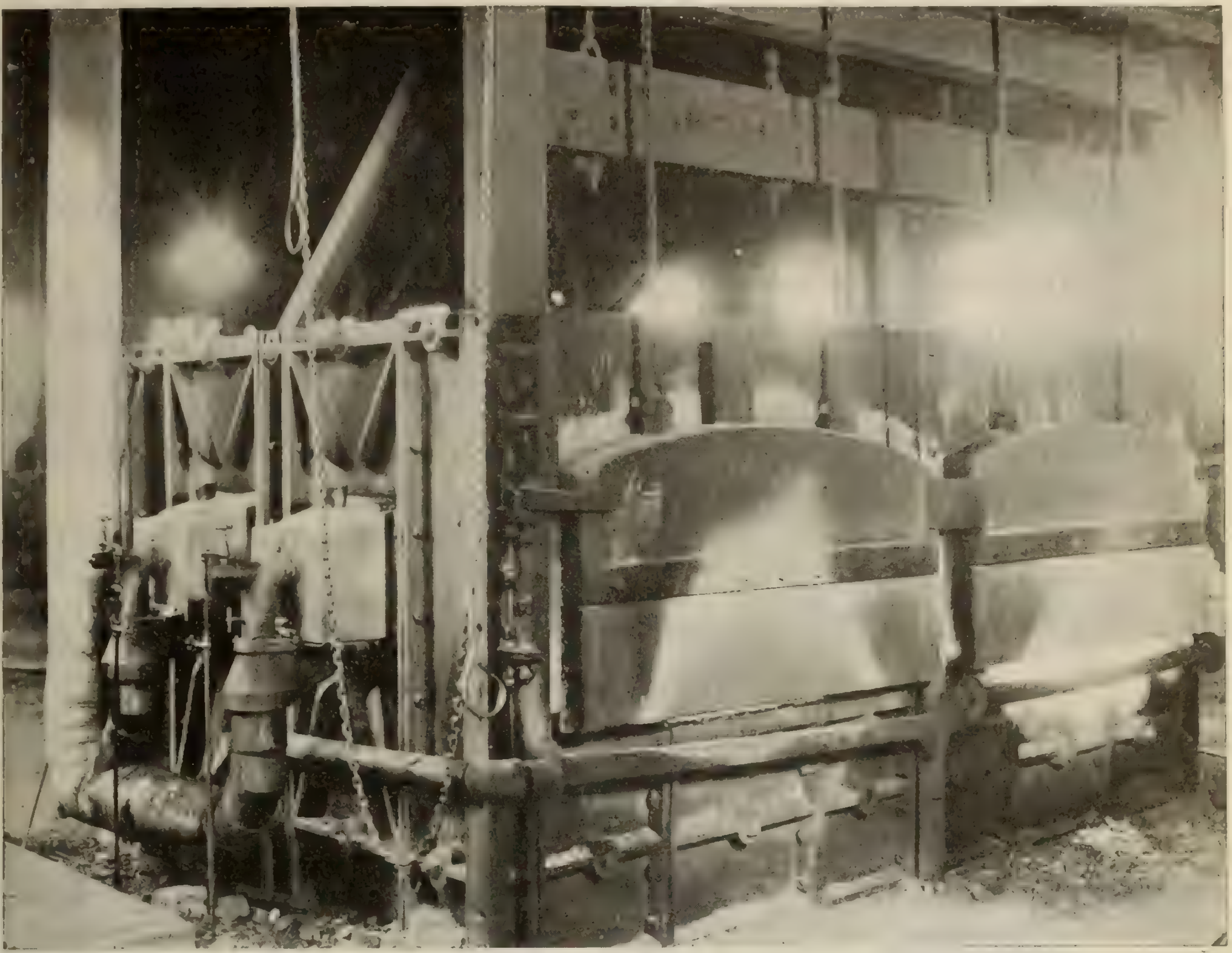
The method of heating explained in previous issues is the same with all types of Crawford Ovens—no direct flame coming in contact with the material in the oven.

Either city, natural, gasoline or producer gas can be used with either type of oven.

Ovens and trucks built for baking the varnish or finish on any number or size of shells required at a time.

The Oven Equipment & Manufacturing Company
NEW HAVEN, CONN., U. S. A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA



HEAT-TREATING FURNACES FOR **SHELL WORK**

When they are "MECOL" FURNACES, are giving entire satisfaction with OIL, GAS, and other fuel.

We have a Special Continuous Furnace for *annealing Brass Cartridge Cases.* See it before buying your equipment.

OUR FURNACES ARE DESIGNED AND BUILT IN CANADA

All Furnaces designed and built under personal supervision of F. DITCHFIELD, "THE FURNACE MAN."

Mechanical Engineering Company, Limited
55 COTE STREET, MONTREAL, QUE., CANADA
PHONE—MAIN 3585

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas XX	Carbon Tool Steel
High Speed Steel, Atlas X	"Deward" Oil Tempering, Non-Shrinking
Chrome Vanadium Steel	

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

YOUNG, CORLEY AND DOLAN, Inc.

149 BROADWAY, NEW YORK CITY, U.S.A.

Don't make patterns for your Gears

We make

Machine Moulded Gears

Any size up to 18 feet in diameter, in either steel, semi-steel or grey iron. No patterns required.

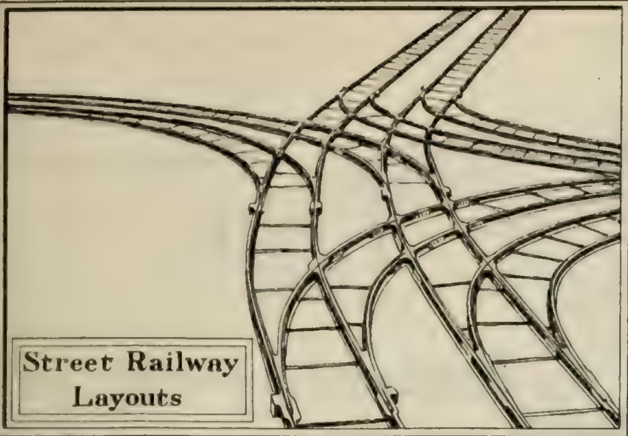
TRADE MARK

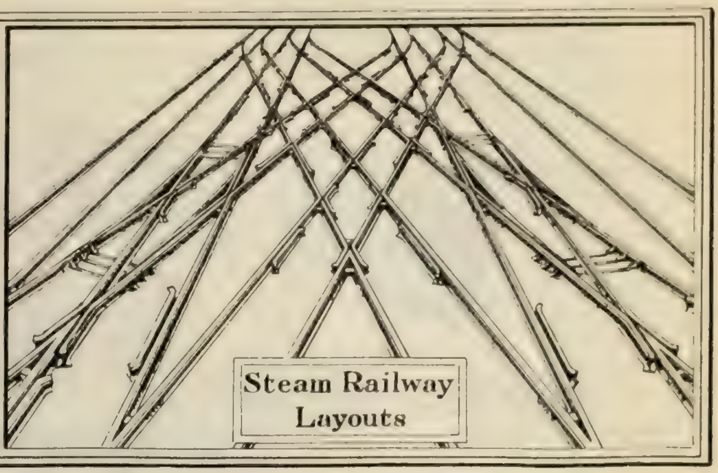
Also manufacturers of all parts pertaining to Cement Mill Machinery, Crushing, Mining and Dredging Plants in "Adamantine," Chrome, Manganese and Nickel Steel.

Let us figure on your requirements. Write

HULL IRON & STEEL FOUNDRIES, Limited

HULL, P.Q., CANADA





Switches, Frogs and Every Description of Trackwork.
Solid Manganese Steel Construction. Cast Iron and Cast Steel bound Construction with Manganese Steel Inserts.

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

Red Cut Superior High Speed Steel

Quality First
THE BEST FOR MACHINING
ALL HARD MATERIALS
Are your tools made of Red Cut?
Send for folder
**VANADIUM-ALLOYS
STEEL COMPANY**
PITTSBURGH, PA.
Works at Latrobe, Pa.

"EXTRA"
Die Steel

is produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

You get extra service from "EXTRA" DIE STEEL. A trial is convincing.

H-A-DRURY COMPANY
LIMITED
STEEL

MONTREAL TORONTO NEW YORK

Manufactured By SANDERSON BROTHERS & NEWBOULD, Limited
SHEFFIELD, ENGLAND

STELLITE

Is not a steel **Contains no iron**

MADE IN CANADA
STELLITE

Tools made of **STELLITE HIGH-SPEED TOOL METAL**

will increase your output 20% to 100%. *They cut much faster than steel tools*, because they are harder, tougher, and are not susceptible to heat. They cut when red hot just as well as when cold; there is no loss of temper.

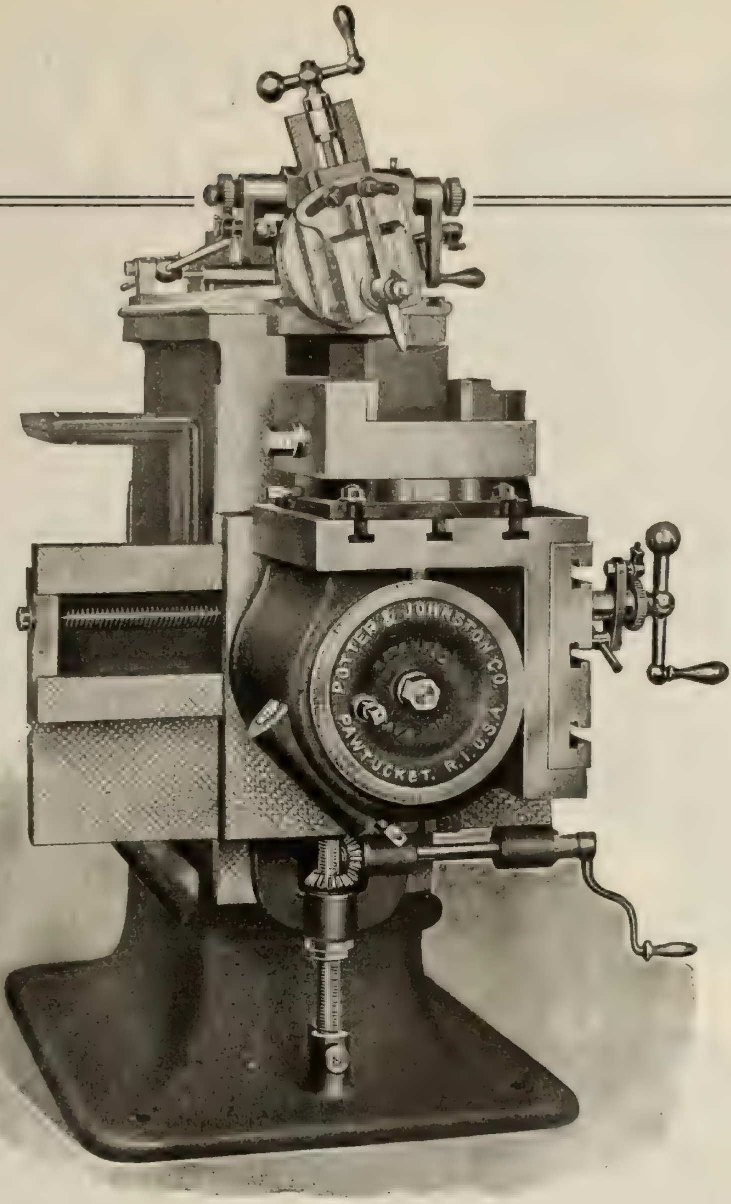
A STELLITE TOOL HAS TURNED OFF TEN POUNDS OF SOFT CAST IRON IN 30 SECONDS. Can you conceive of any steel tool standing up to this speed? Records like this, in many varieties, can be duplicated in *your* shop.

After you have tried "Stellite," you'll begin to figure up what you have already lost by not using "*Stellite*" tools for your high-speed work.

Made in Canada by
Deloro Mining & Reduction Company, Limited
Deloro, Ontario
C.P.R. Building, Toronto, Ont.

Sold Exclusively in Canada and Newfoundland by
The Canadian B. K. Morton Company, Limited
49 Common St., Montreal, P.Q.
86 Richmond St. E., Toronto, Ont.

Full particulars and price on request.



Potter & Johnston 15-inch Universal Shaping Machine

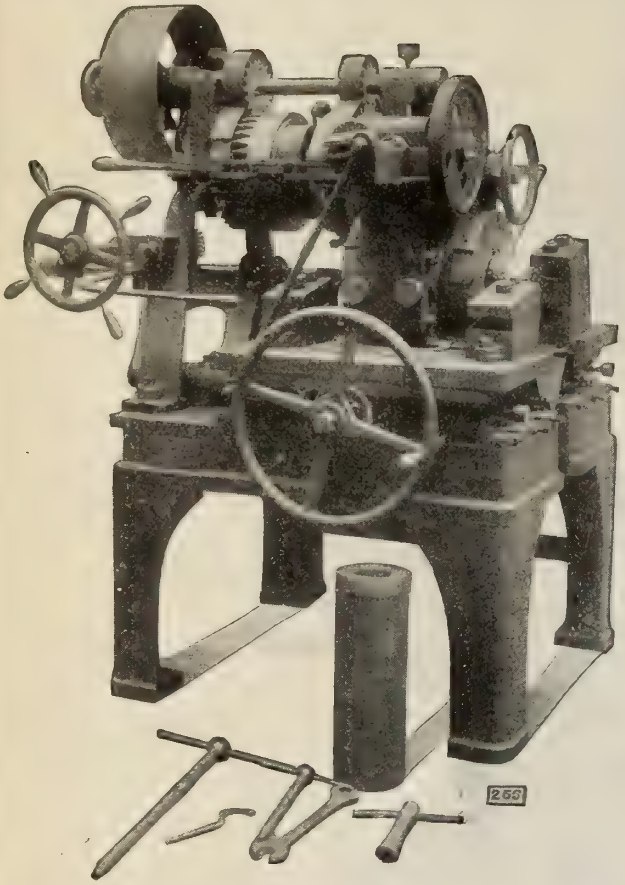
Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA



CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal

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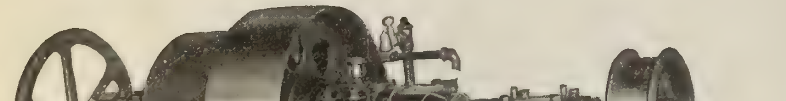


THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells. Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

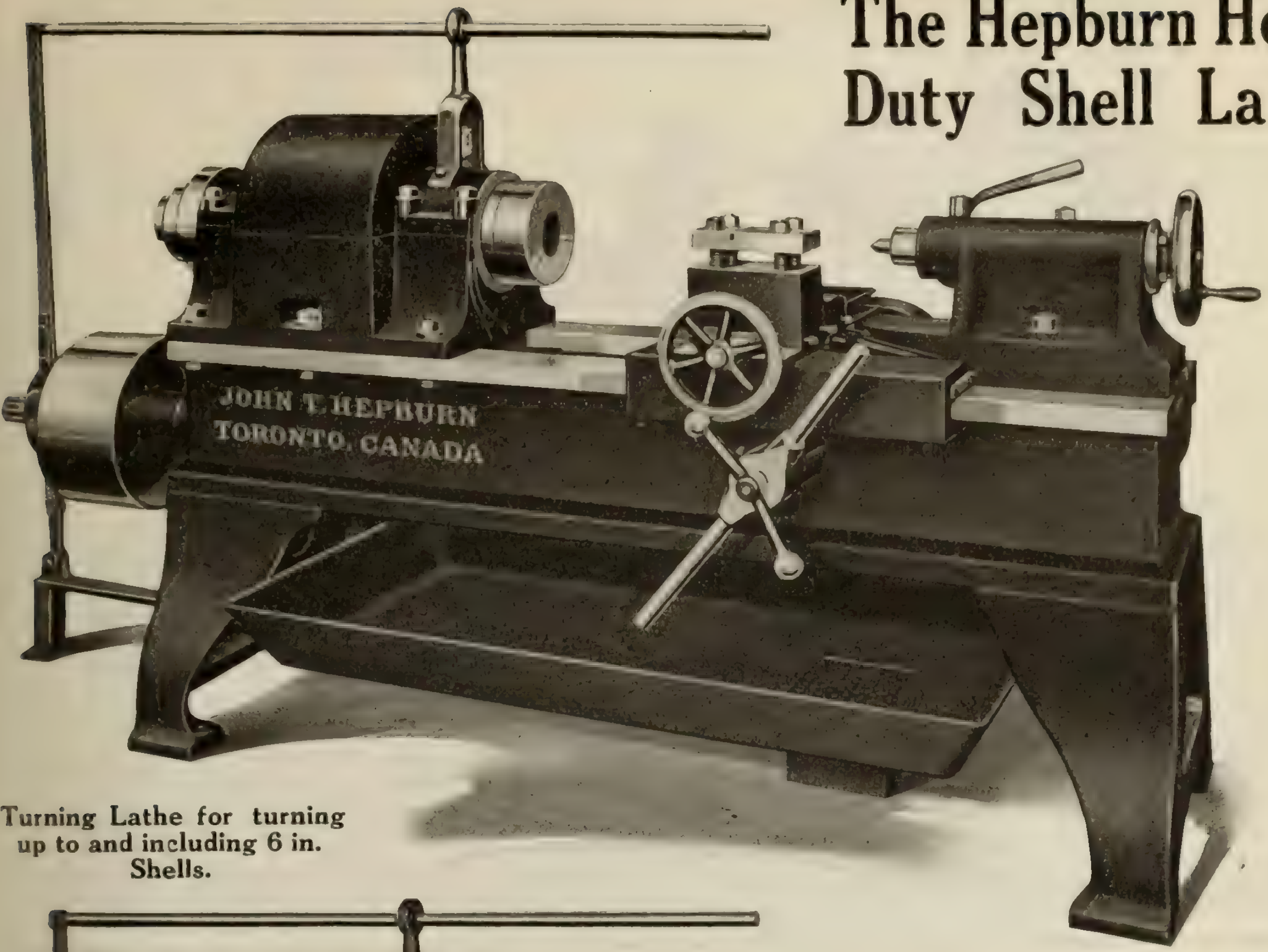
These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

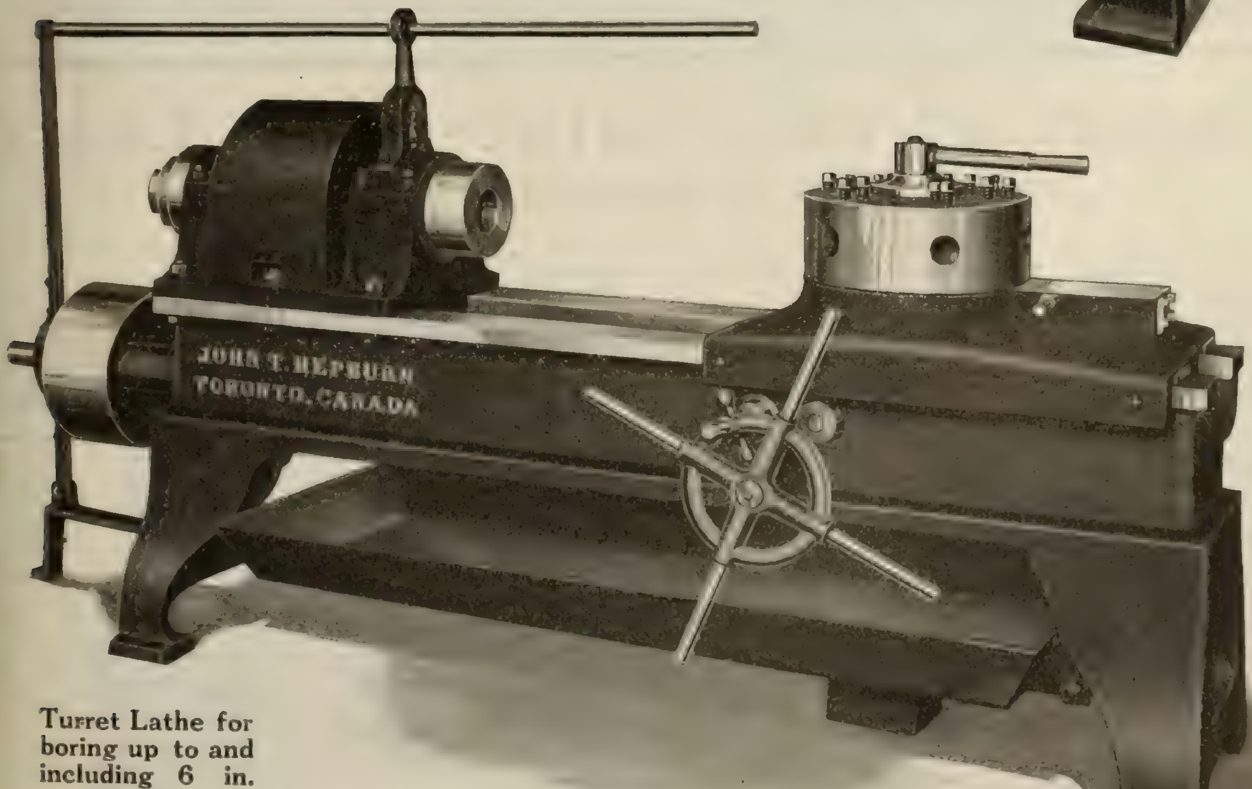
Prompt Shipment
BUILT EXCLUSIVELY BY
Edwin J. Banfield
STAIR BUILDING, TORONTO, ONT.

For Turning, Facing and Milling the Thread on Gas Check Plugs for 6-inch High-Explosive Shells.

The Hepburn Heavy Duty Shell Lathes


JOHN T. HEPBURN
TORONTO, CANADA

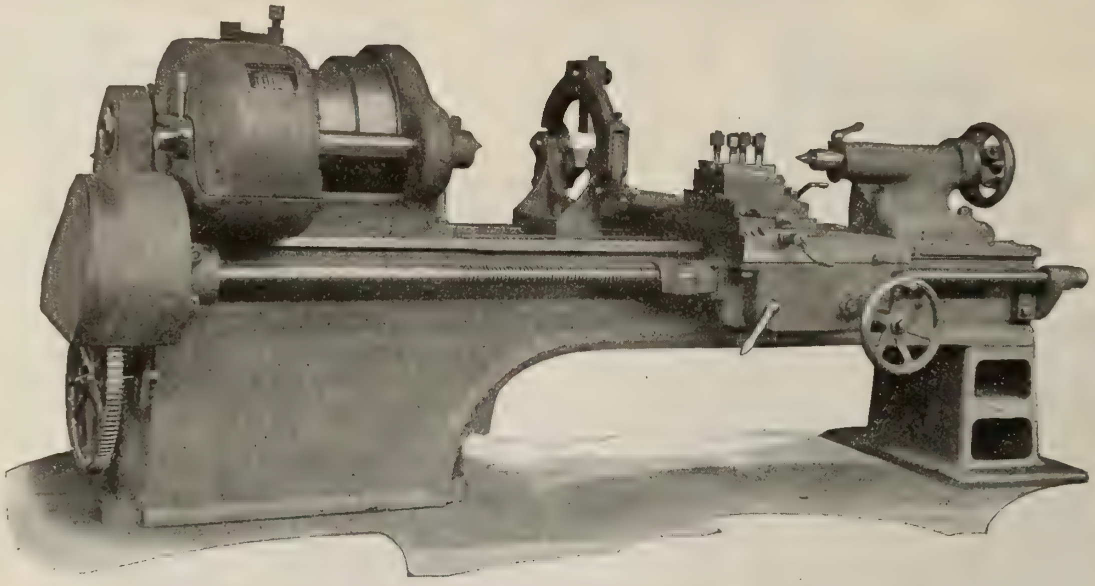
Turning Lathe for turning up to and including 6 in. Shells.


JOHN T. HEPBURN
TORONTO, CANADA

Turret Lathe for boring up to and including 6 in. Shells.

JOHN T. HEPBURN, Limited, 18 to 60 Van Horne St., Toronto, Can.

PB



PB

LANG SINGLE PURPOSE LATHE

Made in the United States under supervision of British Government. (Lang's Design.)

59 BEAVER HALL HILL **PEACOCK BROTHERS** MONTREAL, QUE.

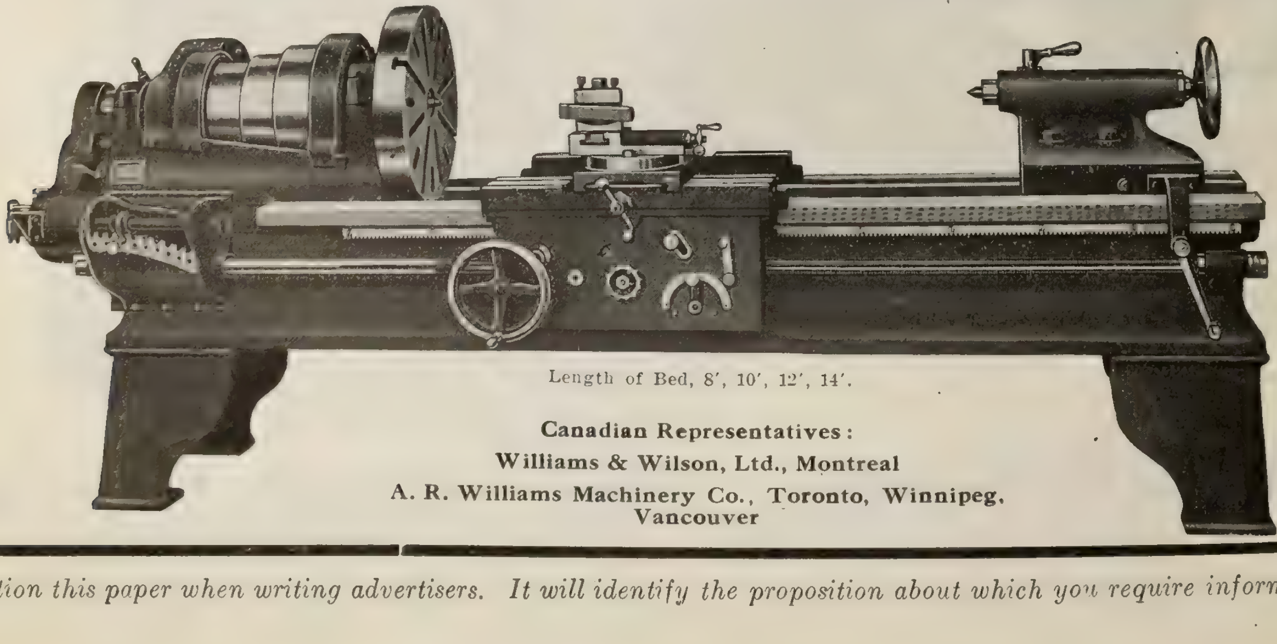
Davenport 22-Inch Lathe — For Extra Heavy Service

These lathes are built exceptionally rigid and heavy. No feature has been omitted, to secure great strength and power. The bed, the headstock, the tailstock, the carriage—every detail has been designed and constructed with a view to driving the heaviest cut that any tool will stand up against. At present we can make quick deliveries on this machine.

Built with ordinary change gears unless otherwise specified.

Write at once for Bulletin. It gives full details of construction.

DAVENPORT LOCOMOTIVE WORKS
DAVENPORT, IOWA



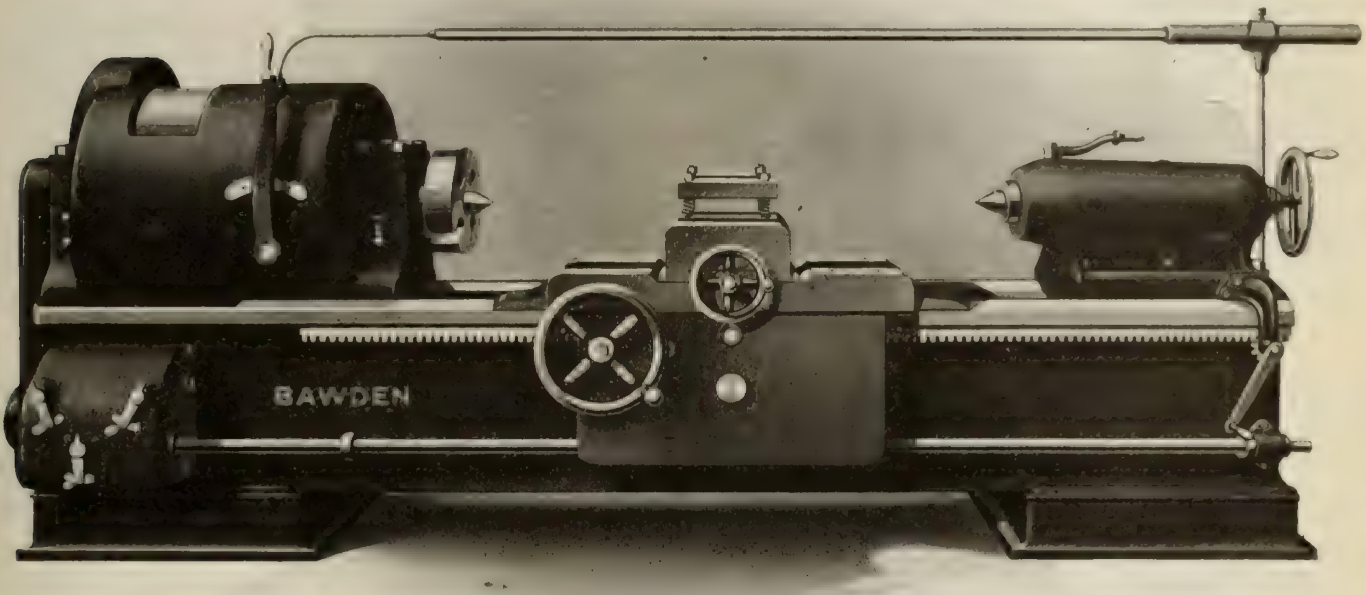
Length of Bed, 8', 10', 12', 14'.

Canadian Representatives:
Williams & Wilson, Ltd., Montreal
A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver

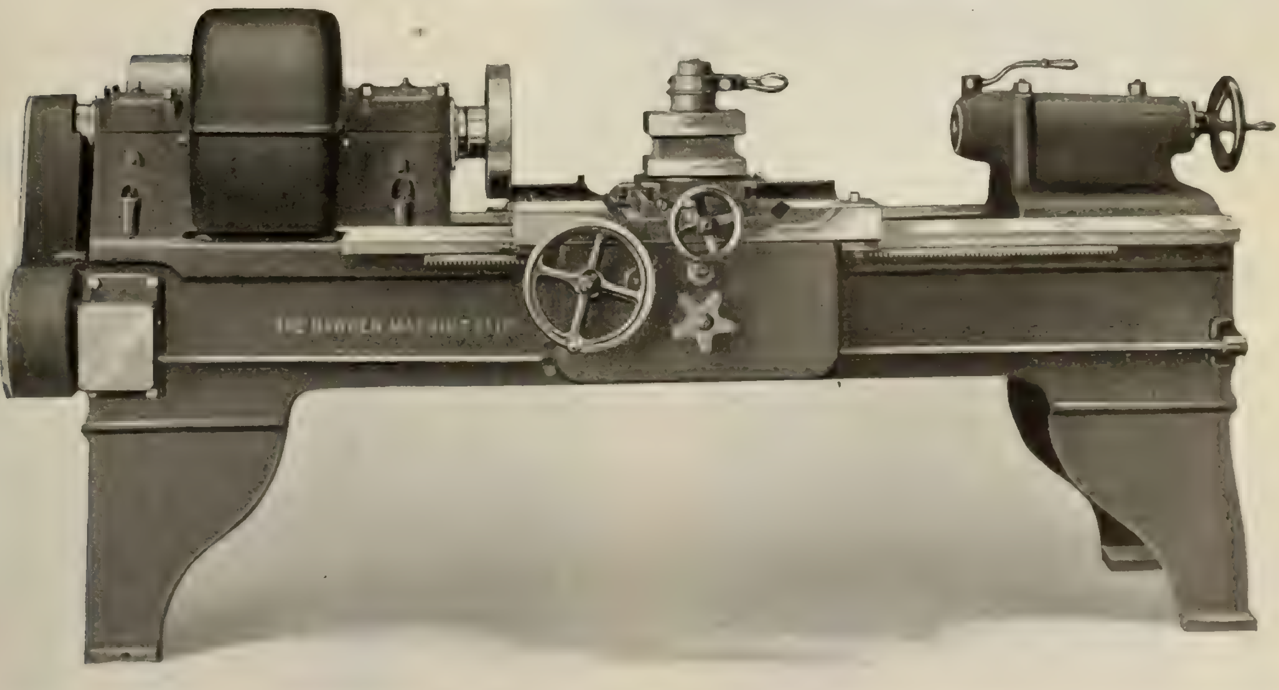
The Bawden Machine Co., Limited

Bawden Heavy Duty Shell Lathes

Every part made in our plant. Bronze bearings, steel spindles and gears. Best material and finish throughout.



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.



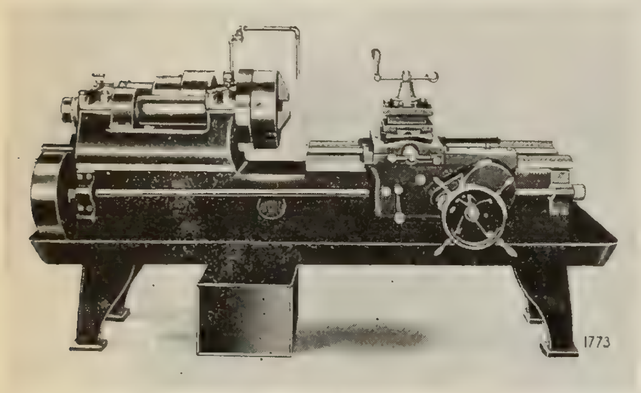
New Bawden 24 in. Double Back Geared Shell Lathe for Shells up to 6 in. Gear Ratio 19½ to 1. Rough turn 6 in. H.E. Shell, in 6½ mins.

Write for particulars and learn what Bawden Lathes are doing. Lathes fitted with attachments for all operations.

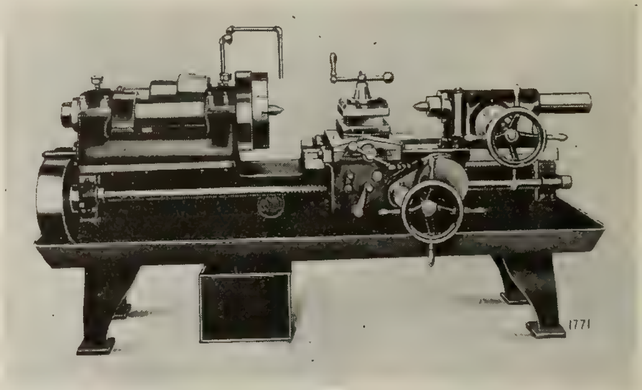
The Bawden Machine Co., Limited, 125-137 Sterling Road, **Toronto, Canada**

Simplified Lathes

Built by Gisholt Machinery Company



Gisholt 16" Special Lathe, Type "B"



Gisholt 16" Special Lathe, Type "C"

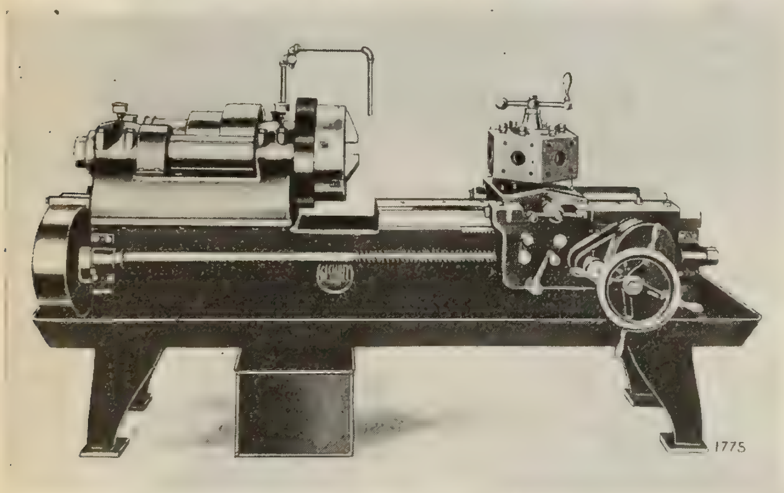
Nearly 1,000 of these Machines have already been shipped to England, France, Russia and the United States.

All went for simplified operations on munitions.

Operations vary so much with the design of shell, we have shown the machines without tools.

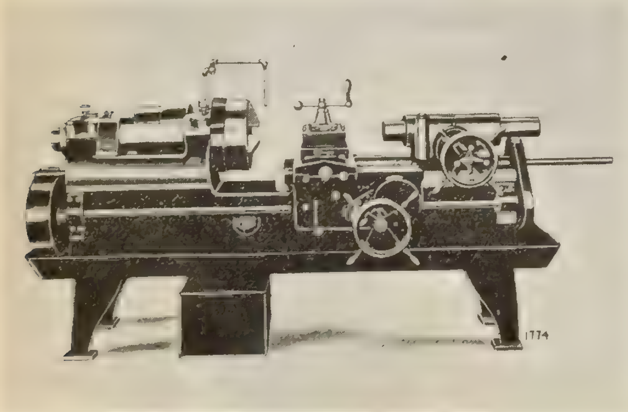
Our years of experience in special tool manufacture and our modern equipment are offered as an aid on your manufacturing problems.

Delivery during July and August is offered subject to prior sales.

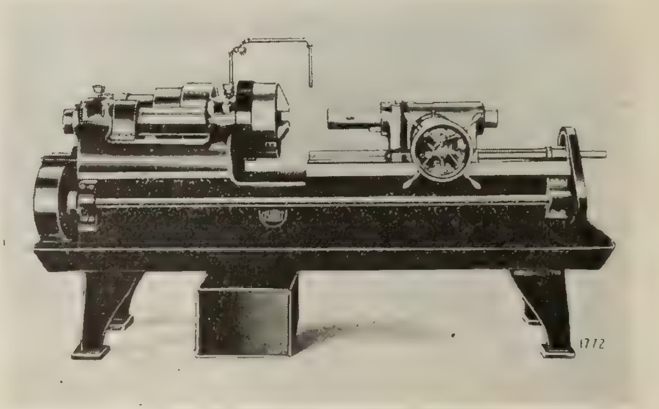


Gisholt 16" Special Lathe, Type "A"

Gisholt Machine Company, Madison, Wis.

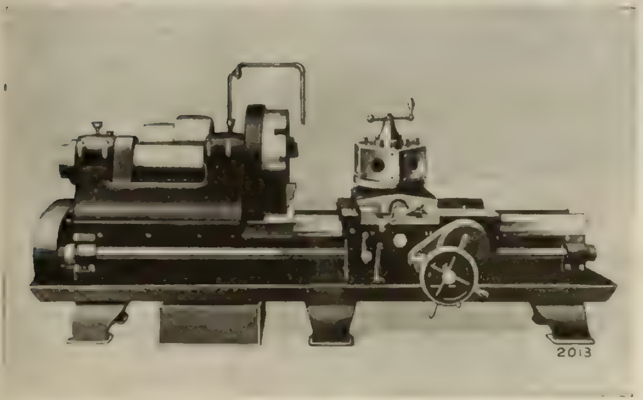


Gisholt 16" Special Lathe, Type "D"

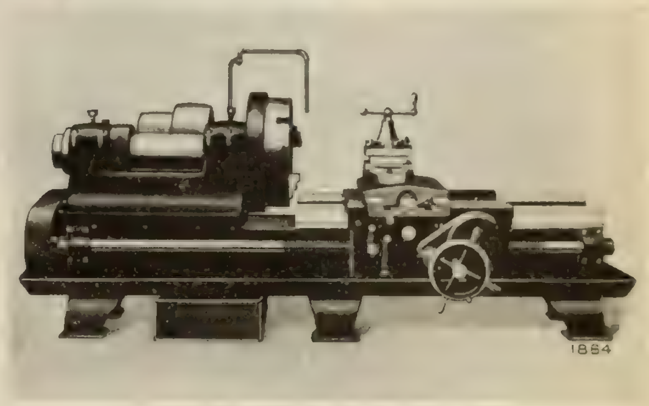


Gisholt 16" Special Lathe, Type "E"

Simplified Machines
For Simple Operations



Gisholt 25" Special Lathe, Type "A"

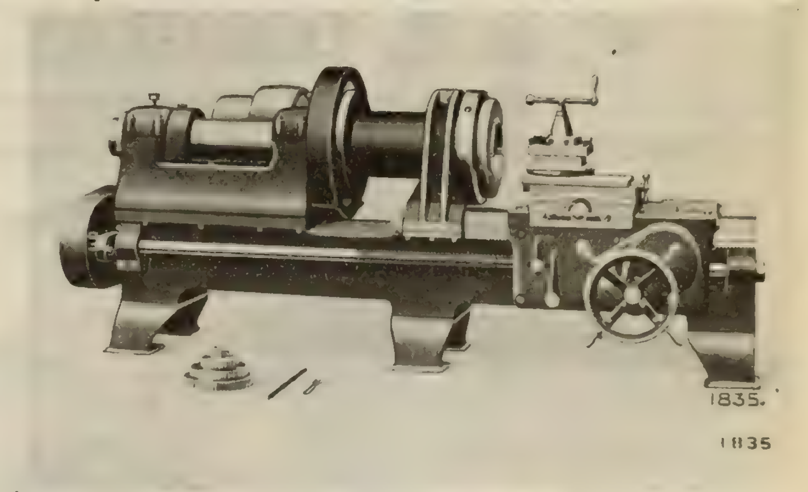


Gisholt 25" Special Lathe, Type "B"

25 Years' Experience in Building High-Grade Machine Tools is back of these Machines

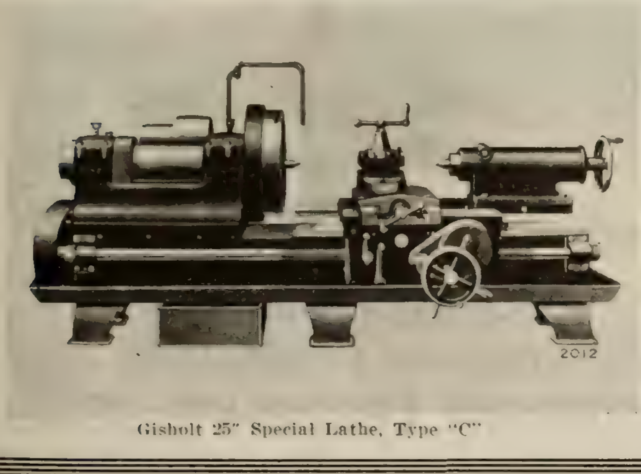
The machines shown on these two pages are made in addition to our standard line of heavy Turret Lathes, Tool Grinders, Vertical Boring Mills, Horizontal Boring Mills, etc.

Write us about your requirements, whether it be the equipment of an entire new shop or just a single machine to balance your present equipment.

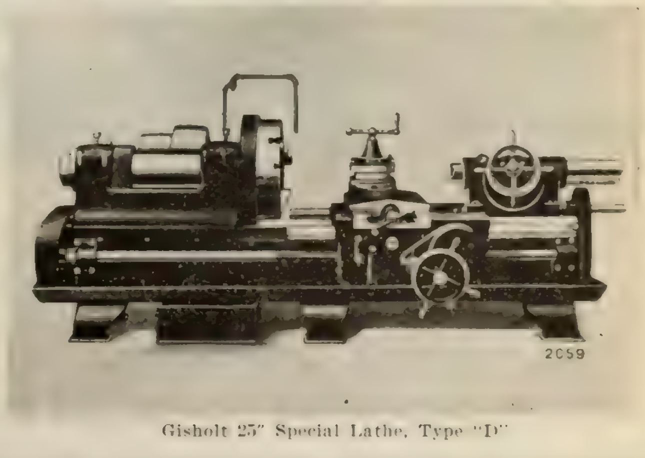


Gisholt 25" Special Lathe, Type "F"

Gisholt Machine Company, Madison, Wis.

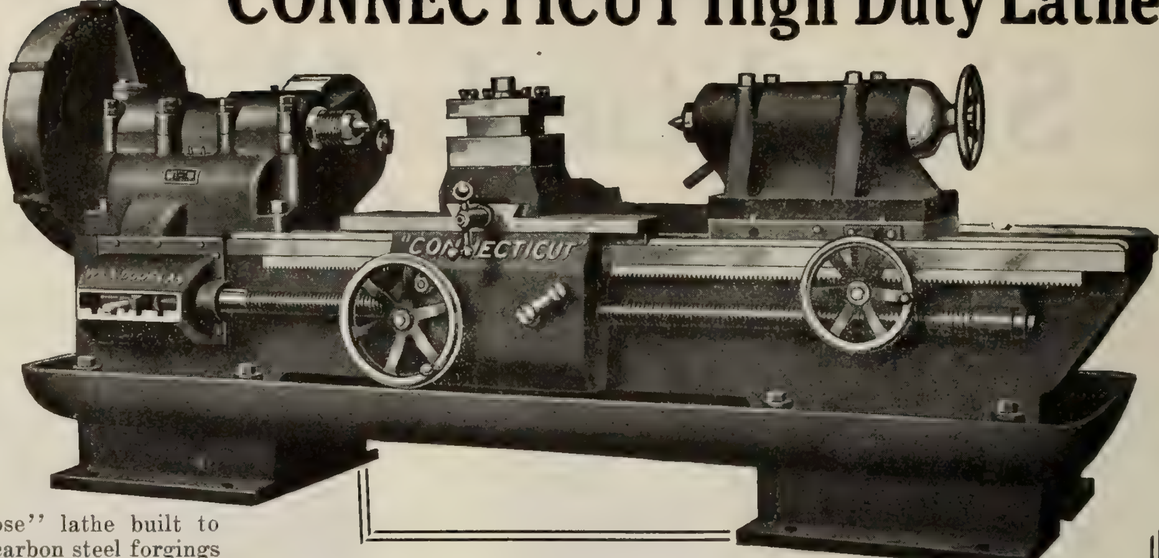


Gisholt 25" Special Lathe, Type "C"



Gisholt 25" Special Lathe, Type "D"

CONNECTICUT High Duty Lathe



Sets the pace on HEAVY WORK

A "Single Purpose" lathe built to turn or bore high carbon steel forgings at maximum speeds.

It is in all respects heavier and more rigid than standard 30-inch or even 36-inch lathes giving the same distance between centers.

The usual cutting speeds on shell work are 40 to 50 feet per minute on shells up to 8" diameter, 30 feet per minute on larger sizes. Depth of cut from ¼" to ⅝", depending upon the eccentricity of the piece. Our lathes will stand more than this.

We admit the **Big Gear** is not particularly handsome, but it eliminates the train of small gears, and adds greatly to the strength and wearing qualities.

Write for bulletin giving full details.

W. & B. DOUGLAS, *Middletown, Conn.*

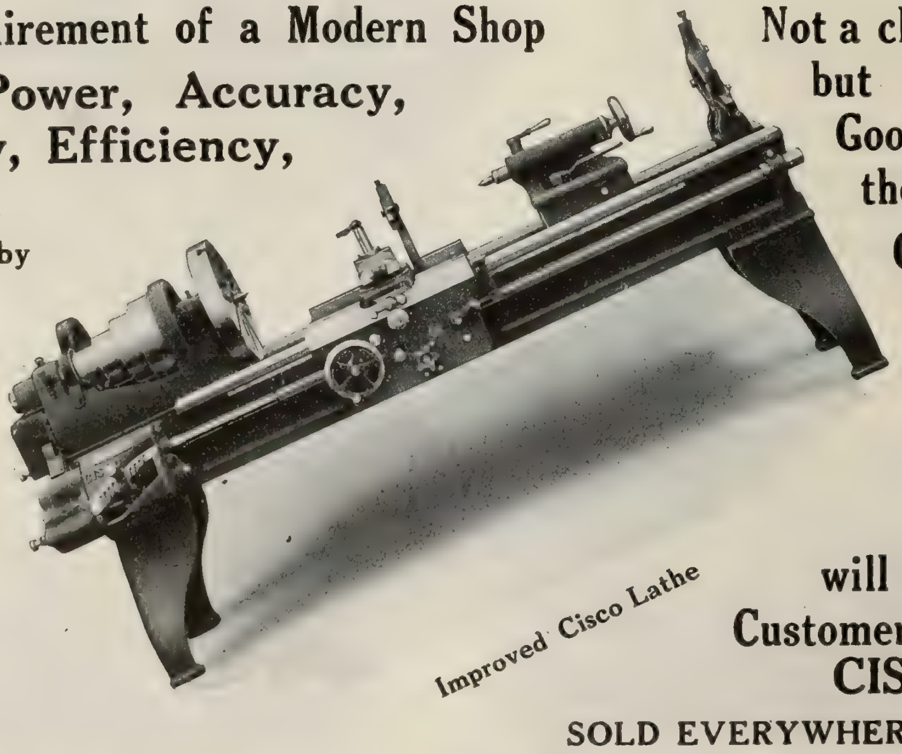
Every Requirement of a Modern Shop

Speed, Power, Accuracy, Simplicity, Efficiency, Economy,

is met by

CISCOS

The Lathe with the Pull



Not a cheap Lathe but a Rattling Good One for the money.

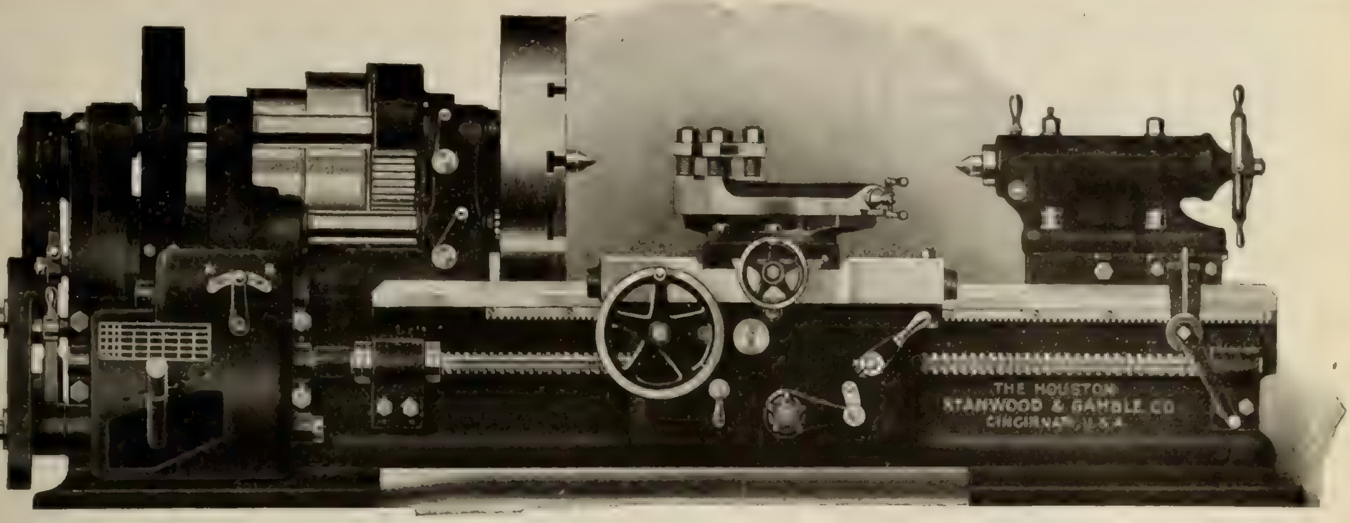
Compare it with other High-Grade Lathes and you will see WHY Customers demand CISCOS

SOLD EVERYWHERE

MADE IN 14", 16", 18", 24" BY

SOLD IN CANADA BY WILLIAMS

THE CINCINNATI IRON and STEEL COMPANY, CINCINNATI, U.S.A.



H-S-G TRADE MARK

Heavy Duty Engine Lathe, triple-geared into internal gear on face plate. Prompt shipment in 30" and 36" sizes.

This is a well-designed lathe. The cone has 7" face for 6" belt. Spindle has 8" x 10" front bearing. All parts are of correspondingly liberal proportions. Absolutely all gears are of steel. The net weight of the 30" lathe with 14' length of bed is 16,500 pounds. The design, materials and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

CINCINNATI, U.S.A.

Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto

---

Two Cuts at One Time

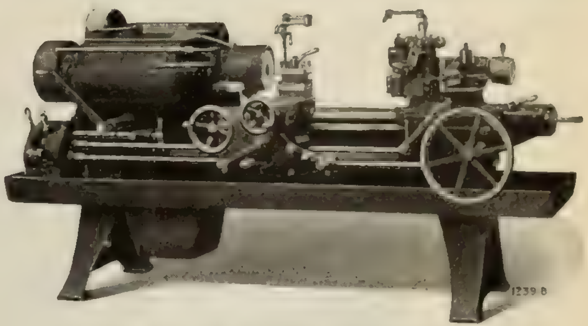
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

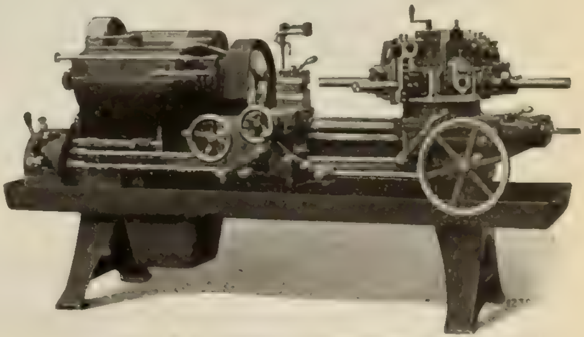
Universal Hollow-Hexagon Turret Lathes

Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.


No. 2-A—With "Bar Equipment"


No. 2-A—With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal

"W. & B." Drop FORGINGS

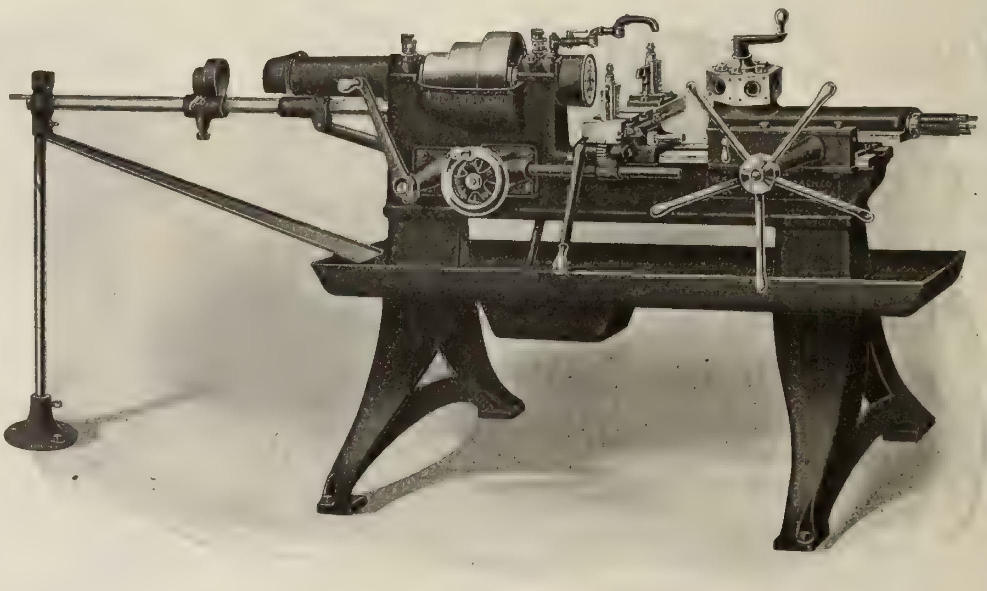
¶ We make a specialty of the highest grade Drop Forgings. Our exceptional capacity and equipment insure accurate forgings and prompt delivery.

The
Whitman & Barnes Manufacturing Co.
Established 1854
St. Catharines, Ontario

Send us Blue Prints on Special Forgings, three pounds and under in weight, and permit us to estimate on your requirements.

Every Feature to secure strength and stiffness on the heavy cuts is embodied in

Millholland
1"x7"
Screw Machine



The Bed is of box construction well ribbed, and with the headstock cast solid.

The Headstock is made with plain head three-step cone. The steps of the cone pulley are of large diameter and wide face and are so proportioned as to transmit the maximum power with proper spindle speeds.

The Spindle, high-carbon steel with hardened and ground thrust washers.

The Cut-off Slide, with broad, flat, well-gibbed bearings.

The Turret is of heavy construction and mounted on a large steel stud.

The Automatic Chuck and Bar Feed, operated by the long lever on the front of the bed, grips or releases the work instantly. The operator with one movement opens the chuck and feeds the bar without stopping the machine.

DROP A LINE FOR FULL DETAILS AND SPECIFICATIONS.

Manufactured by
W. K. Millholland Machine Company
INDIANAPOLIS, IND.

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO. LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Heavy Machine Tools for

8-inch, 9.2-inch and 12-inch Shells

18" and 20" Engine Lathes for Tool Room Equipment.

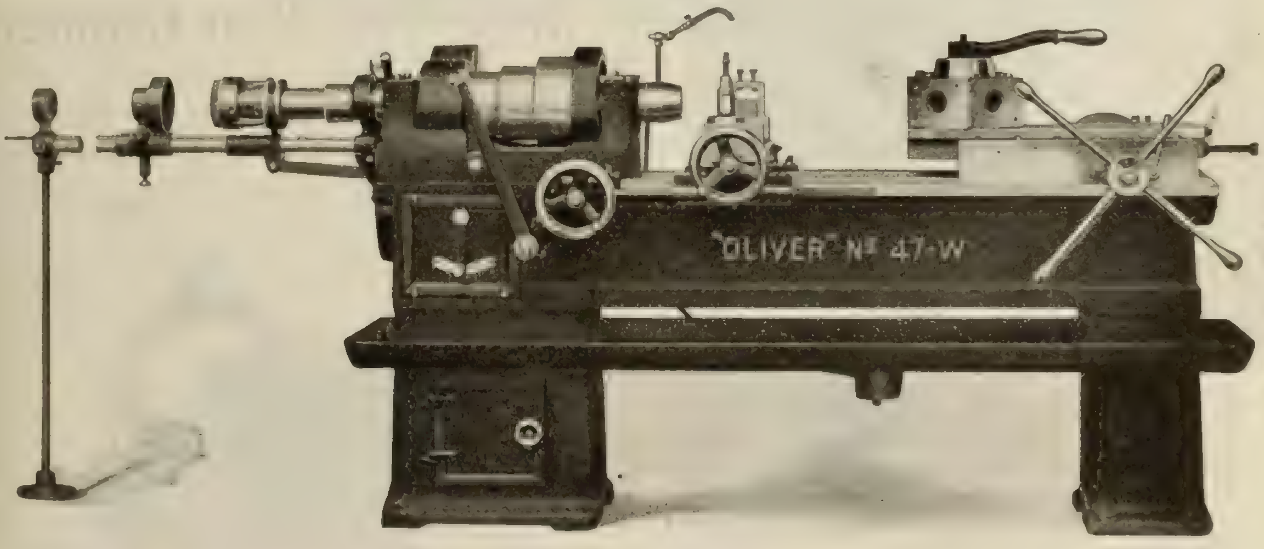
Single Purpose Turret and Turning Lathes for 6" Shells and under.

Write us for prices and deliveries on anything in the way of Iron or Wood Working Tools.

GARLOCK-WALKER MACHINERY CO., Limited, Telephone Main 5346 **32 Front St. West, TORONTO**

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds

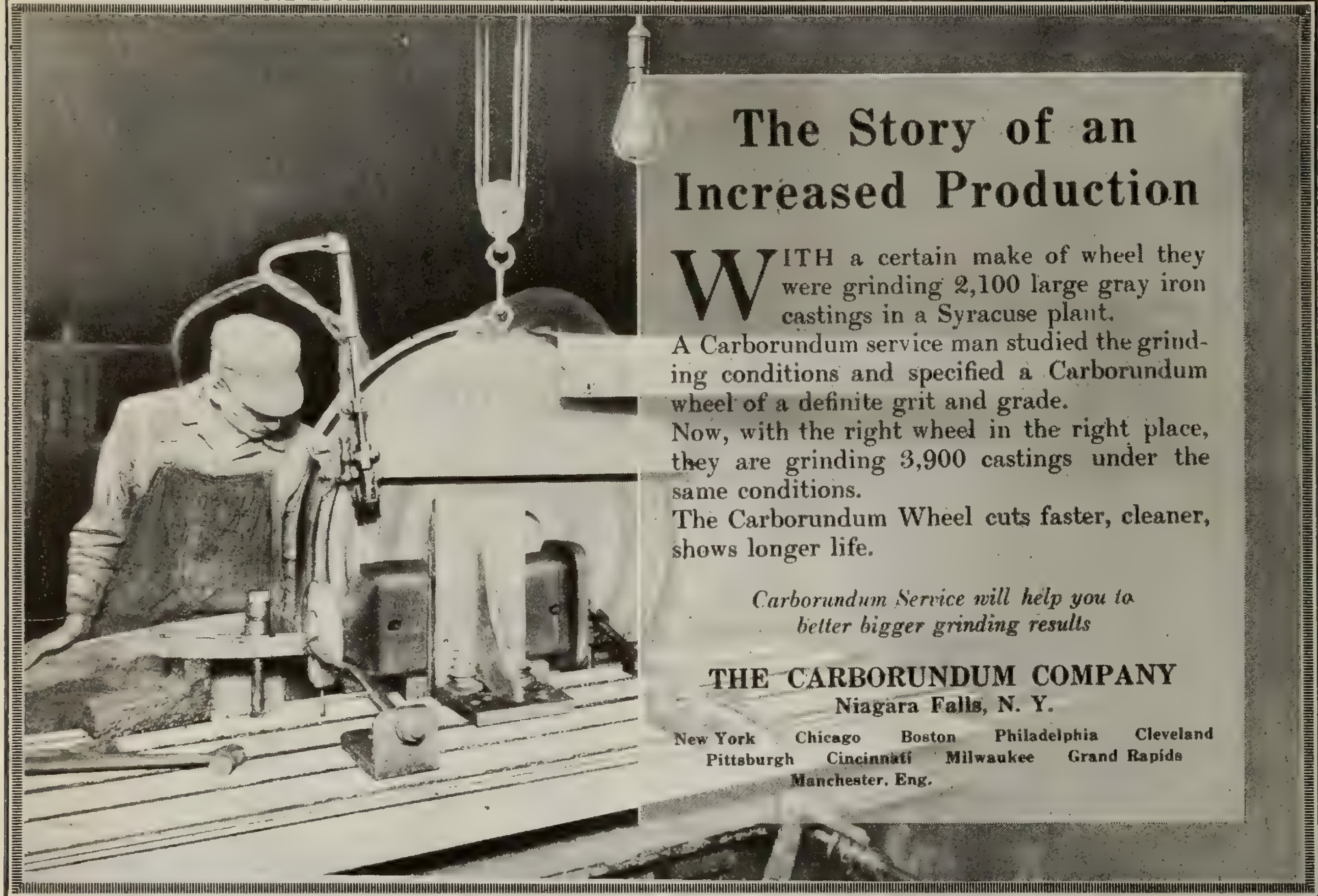


"OLIVER" NO. 47-W HEAVY DUTY SCREW MACHINE $2\frac{1}{4}$"—SWING 16".

A HEAVY TOOL FOR HEAVY WORK—A MODERN MACHINE—OLIVER QUALITY—PROMPT DELIVERIES.

WRITE FOR FULL INFORMATION.

OLIVER MACHINERY COMPANY, Grand Rapids, Mich.



The Story of an Increased Production

WITH a certain make of wheel they were grinding 2,100 large gray iron castings in a Syracuse plant.

A Carborundum service man studied the grinding conditions and specified a Carborundum wheel of a definite grit and grade.

Now, with the right wheel in the right place, they are grinding 3,900 castings under the same conditions.

The Carborundum Wheel cuts faster, cleaner, shows longer life.

Carborundum Service will help you to better bigger grinding results

THE CARBORUNDUM COMPANY
Niagara Falls, N. Y.

New York Chicago Boston Philadelphia Cleveland
Pittsburgh Cincinnati Milwaukee Grand Rapids
Manchester, Eng.

WE BUILD THEM BY HUNDREDS

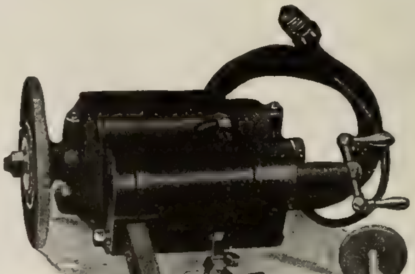
Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only $60 Complete

The Blake & Johnson Co., Waterbury, Conn.

Stow Tool Post Grinder

Does the most accurate of work—patent bearings, for Internal and Surface Grinding—A.C. or D.C. Immediate shipment from stock. Plain or with slide.

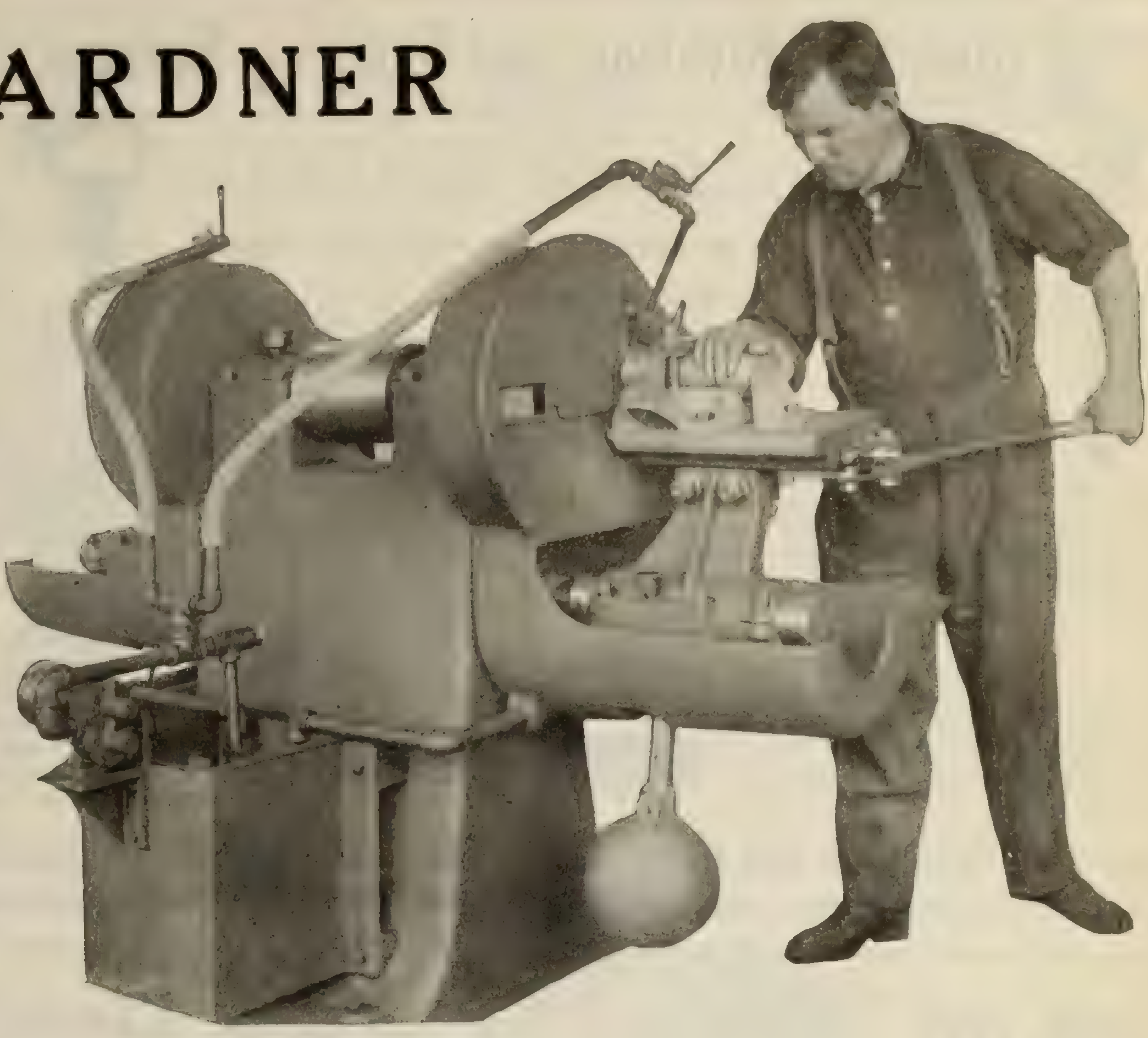


One of the many electric portable tools built by

Stow Manufacturing Co.
Binghamton, N.Y.

Oldest portable tool manufacturers in America.
London Stock, 85 Queen Victoria St.

GARDNER GRINDERS



For Grinding Ends of Shells

We have developed a Special Grinding Machine for removing the hub or centre projection from the ends of shells. This grinder is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates.
We build as well a much heavier and more Powerful Grinder to be used for these same operations on 6" Shells.

FEATURES

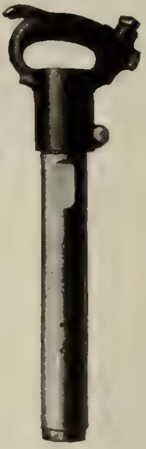
- High-Grade Babbitt Bearings and Lever Feed.
- Rapid clamping of Shell into "V" fixture.
- Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.
- Can be equipped and operated at both ends for double output.
- Output, according to size of projection to be removed, from 40 to 100 per hour.
- Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments.
- Weight, 4,500 lbs.

For further particulars write

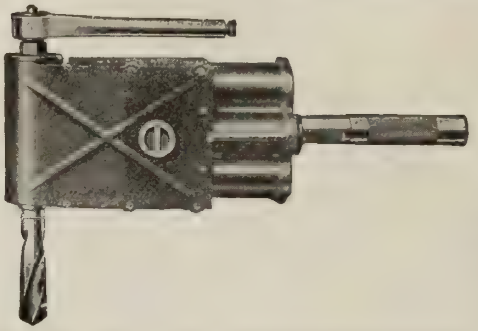
The Gardner Machine Company, Beloit, Wis., U.S.A.

Cleveland Riveting and Chipping Hammers

Fitted with either Inside or Outside Throttle Lever as preferred. They are made in several different sizes and weights for all classes of work.
The Riveting Hammers have a range in rivets from ¼ inch to 1½ inches.



CLEVELAND CORNER DRILL For Close Quarter Drilling



The Body of the Cleveland Corner Drill is in one piece with cylinders and valve chambers cast integral which insures absolute alignment of working parts.

The Driving Crank is mounted upon Annular Ball Bearings which reduce friction to a minimum. Made in two sizes, Nos. 38 and 49, with Nos. 3 and 4 Morse Taper Sockets.

Either size machine will drill or ream within 1⅛ inch of side wall or corner.

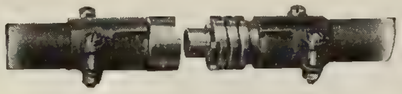
IN STOCK:—Sand Rammers, Bench and Floor, Portable Emery Grinders, Air Drills, etc.

BOWES AUTOMATIC AIR HOSE COUPLINGS

Over 1,000,000 in general use

¶ They are instantly connected or disconnected.

¶ They are absolutely tight under all pressures.



¶ They are interchangeable in all sizes commonly used.

¶ They quickly pay for themselves by stopping costly leaks.

Cleveland Pneumatic Tool Co. of Canada, Ltd., 80 Duchess St., Toronto, Ont.

Thor SINGLE VALVE CHIPPING-HAMMERS

Equipped with a valve mechanism so perfectly balanced as to eliminate practically all vibration.

Made in five sizes, with piston diameter of 1 1/16" by strokes of from 1 to 5", designated as sizes A, B, C, D and E.

Shipped on Trial at Our Expense

Independent Pneumatic Tool Co.

CANADIAN OFFICE:
334 St. James St., MONTREAL, QUE.

General Offices: Thor Building, Chicago, U.S.A.
Branches: New York, Pittsburgh, Detroit, San Francisco, Birmingham

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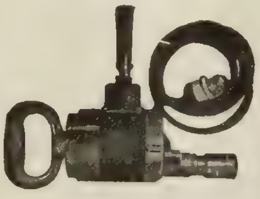
U. S. Electric Drills and Grinders

Save Time, Labor and Money



They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

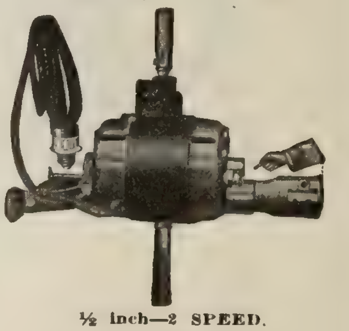
3 SIZES

5-16 inch, W.G.T. 6 lbs.
¼ inch, W.G.T. 9 lbs.
⅜ inch, W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.

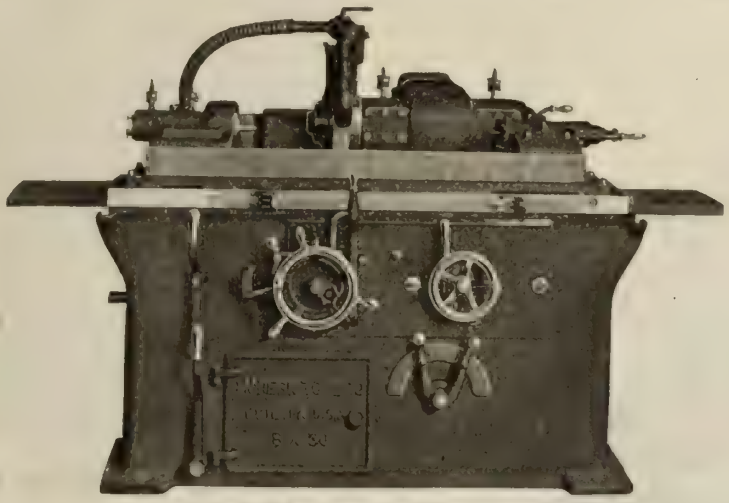


½ inch—2 SPEED.
Speed, 400-750 R.P.M.

For Sale By
The Canadian Fairbanks-Morse Co., Limited
Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver.

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO

Modern Self-Contained Plain Grinding Machines

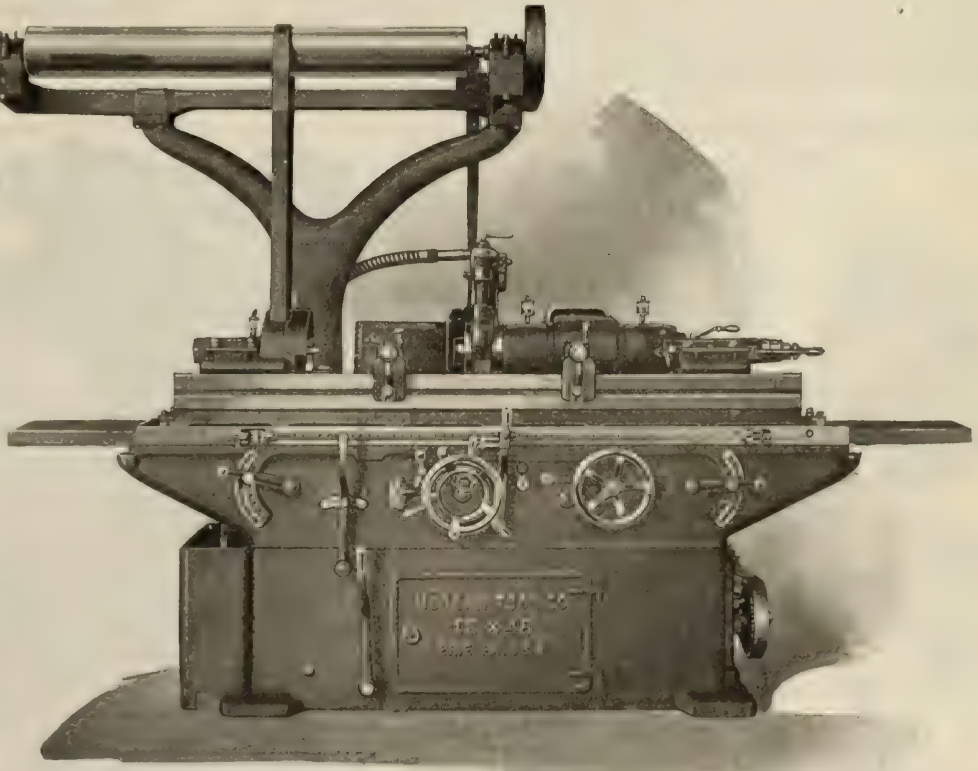


"MODERN" 8" x 30" Self-Contained Plain Grinding Machine.

The big problem to-day is output. If you desire big production you will promptly investigate the MODERN Line, and this is the best and most opportune time to seriously consider the economies resulting from the intelligent use of MODERN Machines. Many manufacturers are meeting the delivery problem by the use of MODERN Grinding Machines, and have materially profited by the installation of such Machines.

MODERN Grinding Machines mean that parts are finished accurately, production increased and with economy in operation. The smaller Plain Machines have 8" swing, 18" and 30" centres. The larger Machines have 12"-16" swing; 24", 36", 48" and 60" centres. The Crank Shaft Machines grind multiple throw cranks up to 6"; single throw cranks up to 8", and up to 40" and 52" lengths.

Absolute central control—all levers and hand wheels concentrated on front of Machine — quickly and easily operated. Work speeds and table feeds entirely independent and cover every range within the capacity of the machine. Automatic feed at either or both ends of table reverse. Auxiliary feed for bringing the wheel into work without traversing table. Positive stop provided when feeding the wheel by hand. Head Stock entirely belt driven. Steady rests that are universal in all their movements and have positive stops for grinding duplicate work. Interchangeable wheel centres.



"MODERN" 12" x 48" Self-Contained Plain Grinding Machine.

MODERN TOOL COMPANY

Main Office and Works: STATE and PEACH STREETS, ERIE, PENNSYLVANIA, U. S. A.
Canadian Agents: Rudel-Belnap Machinery Co., Toronto and Montreal.
New York Office: 50 Church Street. **Chicago Office: 32 N. Clinton Street.**

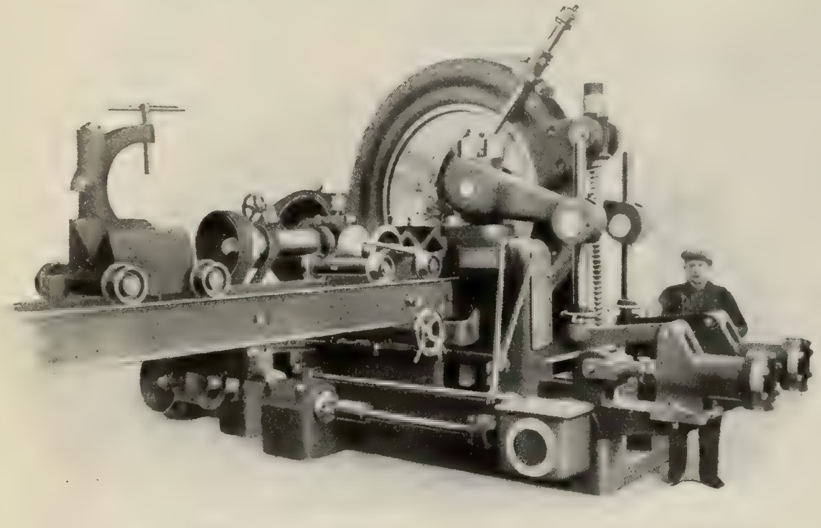
Gorton Heavy Duty Cutting-Off Machine

No. 2-E

The principle of construction of the Internal toothblade type of machine shown here admits of a cutting speed which cannot be approached by machines of the ordinary type.

Vibration is so completely eliminated that the output of this machine is controlled by the efficiency of the **Tool Steel.**

For instance, at present it is not practicable to maintain the maximum speeds of which this Cutting-Off Machine is capable with present Tool Steels.



FRONT VIEW GORTON NO. 2-E HEAVY DUTY CUTTING-OFF MACHINE—capacity 13-in. rounds and less. Photograph shows the Standard Machine, self-contained, motor-driven, with power clamping front and rear, and stock rack No. 155-1. Net weight without motor, 53,000 pounds.

The No. 2-E Gorton Heavy Duty is pre-eminently suitable for **constant, hard service, and capable of being operated continually month in and month out without the excessive repairs ordinarily placed on such machine.**

Especially suitable for Rolling Mills, Car and Locomotive Works, Engine Builders, Electrical concerns, and Machine builders generally.

Capacity 3 in. to 13 in. rounds; 3 in. to 9¼ in. squares; and for any other size or shape that can be contained within a 13 in. circle.

For catalog and full particulars write

George Gorton Machine Co.

Manufacturers of Engraving Machines and Heavy Duty Cutting-off Machines

RACINE, WIS., U. S. A.

Cable Address: "Gorton, Racine." Use A.B.C. Code (4th edition) or Western Union Code (Universal edition.)

WILLIAMS "AGRIPPA"
TOOL HOLDERS
Headless Cam
Hex Head Cam
"THE HOLDERS THAT HOLD"

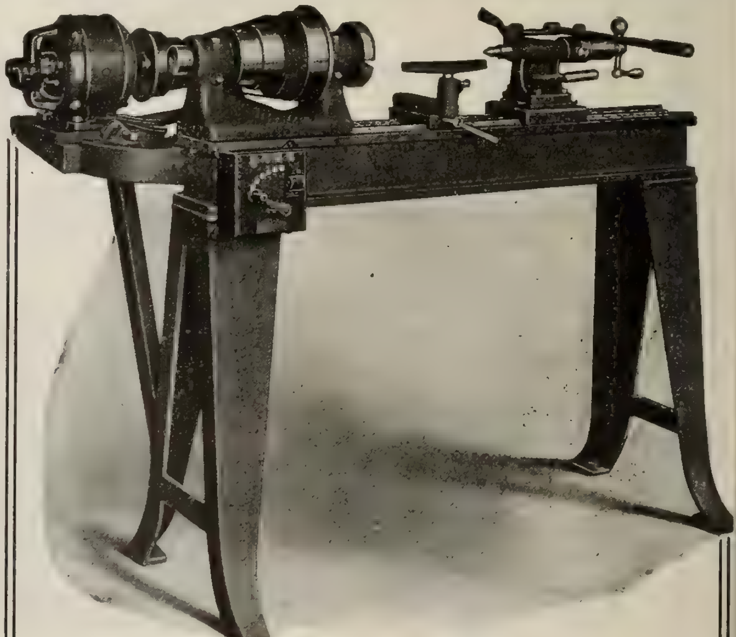
are now used in numerous Government arsenals and munition plants, as well as in the great industrial works at home and abroad.

J. H. WILLIAMS & CO.

45 Richards Street BROOKLYN, N.Y. CITY

The Wrench People

Western Office and Warehouse:
40 So. Clinton Street CHICAGO, ILL.



Motor Driven Speed Lathe

This style of motor drive employs a constant speed motor mounted on a plate having an extension arm to support a bearing for the outer end of the motor shaft. The motor plate is fitted to a slide on a shelf which is securely fastened to the back of the lathe bed. The motor plate is moved by means of a screw which tightens or loosens the belt. A four-step cone pulley on the motor shaft is belted to a four-step cone pulley on the spindle. This gives the same speed variation as when a countershaft is used, and by means of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is crossed-braced and all clamping levers are above the ways.

J. G. BLOUNT CO. - Everett, Mass., U.S.A.

Why does the Peerless lead?

Because it was designed by the originators of this class of high speed machinery and every detail is perfected from real shop experience. It embodies all the latest improvements in this type of machinery, and also some exclusive features that are well worth consideration in selecting a tool of this type.

In operation it is semi-automatic, which means it continually saves time instead of wasting it. Just stop to figure if one man operates ten machines and saves only ten seconds on each cut. In a short time your figures will show a saving in operator's time that will cover the cost of machine.

A saw blade in this machine will cut as much material as in any other machine on the market, and will also cut considerably faster according to the grade of material.

In order for anyone to appreciate the many labor-saving improvements in this machine it must be tried out under your own cutting conditions. For this purpose we will gladly send you one on thirty days' free trial.

PEERLESS MACHINE COMPANY
1607 Racine Street **RACINE, WISCONSIN**

MORE SPEED **LESS BLADES**

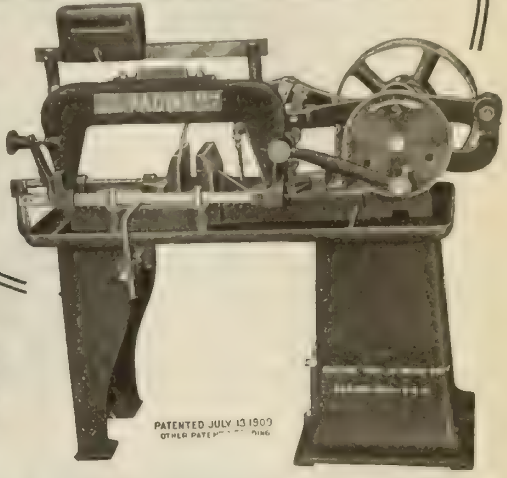
One Canadian
Steel Company uses 120

RACINE METAL CUTTERS

and has saved $11,019.50. Particulars on request.

These machines are popular everywhere because they work fast and are easy on the blades because springing is absolutely prevented by the mechanically correct design and construction.

The heavy, rigid saw frame guide of the Racine is made of the best grade of semi-steel and will hold the saw frame absolutely rigid and [illegible] at all times, insuring a straight cut with the least possible waste of material.



There are other Racine features well worth investigation — the **Positive Automatic Lifting Device, the Combination Vise, the Cooling System, etc.** May we tell you about them and about our unusual trial offer?

RACINE TOOL & MACHINE COMPANY
15 Melbourne Avenue, Racine, Wis., U.S.A.

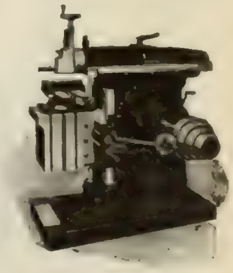
Cut Your Shop Costs

Nobody would think of putting 16-inch lathe work on a 30-inch lathe, then why leave small parts on a large Milling Machine?

A Steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

That same principle applied to your small planer work will cut the cost of planer work.

A Steptoe Shaper will do the work faster because it can be handled quicker.



The John Steptoe Company, **CUMMINSVILLE, CINCINNATI, OHIO, U.S.A.**

"STERLING' HACK SAW BLADES

will prove an economical investment. Give them a trial and be convinced.

DIAMOND SAW & STAMPING WORKS

BUFFALO, N.Y.
U.S.A.

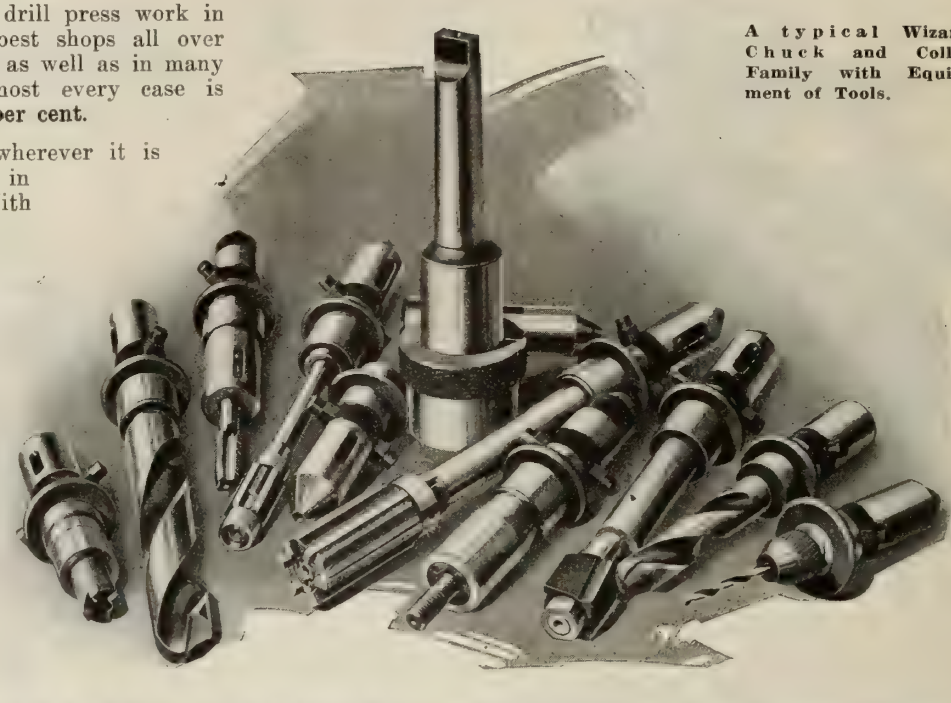
The WIZARD Quick-Change Chucks and Collets

The Wizard is revolutionizing drill press work in hundreds of the largest and best shops all over Canada and the United States, as well as in many foreign countries, and in almost every case is **actually saving from 25 to 50 per cent.**

The Wizard is indispensable wherever it is desired to use more than one tool in succession on the same job. With it you can use all sizes and kinds of tools, you can drill, tap, ream, set studs, counterbore, etc., etc., all in rapid succession **without** stopping the machine and when running at any speed.

The Wizard also has other features aside from the quick change feature that make it a **real cost cutting tool.**

Our catalog gives full particulars. It's yours for the asking.



A typical Wizard Chuck and Collet Family with Equipment of Tools.

THE McCROSKY REAMER COMPANY, MEADVILLE, PA., U.S.A.

EXPORT AGENT, BENJAMIN WHITTAKER, 21 STATE STREET, NEW YORK, N.Y.

The

TRADE MARK

BARNES DRILLS

Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

W. F. & JOHN BARNES CO.

104 Ruby Street - ROCKFORD, ILL.
Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal

16 in. Lever
POST DRILL

A Giant Little Machine For Light Drilling.

Will drill up to ⅞ inch.

The Feed Lever Socket is adjustable on the feed shaft, to provide for setting the lever in the most convenient position for the operator.

An adjustable friction is provided for the feed shaft, which acts as a balance to the weight of the spindle.

Bevel Gears, Feed Pinion and Rack are all machine cut, working smoothly and without noise.

Drills to centre of 16-inch circle.

Run of feed 5¼ inches.

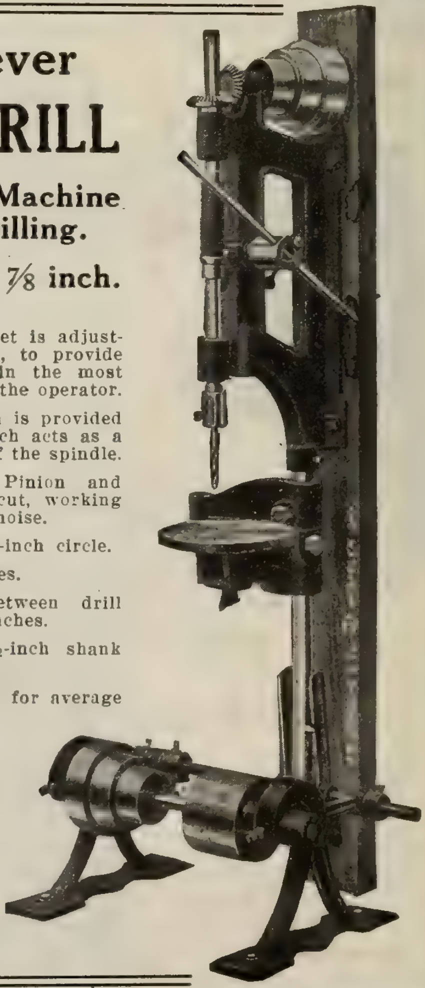
Greatest distance between drill spindle and table, 22 inches.

Spindle bored for ½-inch shank twist drills.

Speed of countershaft for average work, 300 per minute.

A. B. Jardine & Co.

Hespeler, Ontario



CELFOR

High Speed Steel is Scarce—

BUT—

We are making more high speed tools today than ever before.

FURTHER—

We make nothing BUT high speed tools—and all are made by the forged and twisted process.

A modern and efficient plant—together with an ample supply of high speed steel, makes it possible to carry out prompt deliveries in these busy times.

A trial order will convince you of two things—that we can deliver the goods—and that the quality will be all you desire.

Write for Catalog No. 15.

Celfor Tool Company

Buchanan, Mich.

Canadian Agents: Rudel - Belnap Machinery Company, Toronto, Montreal

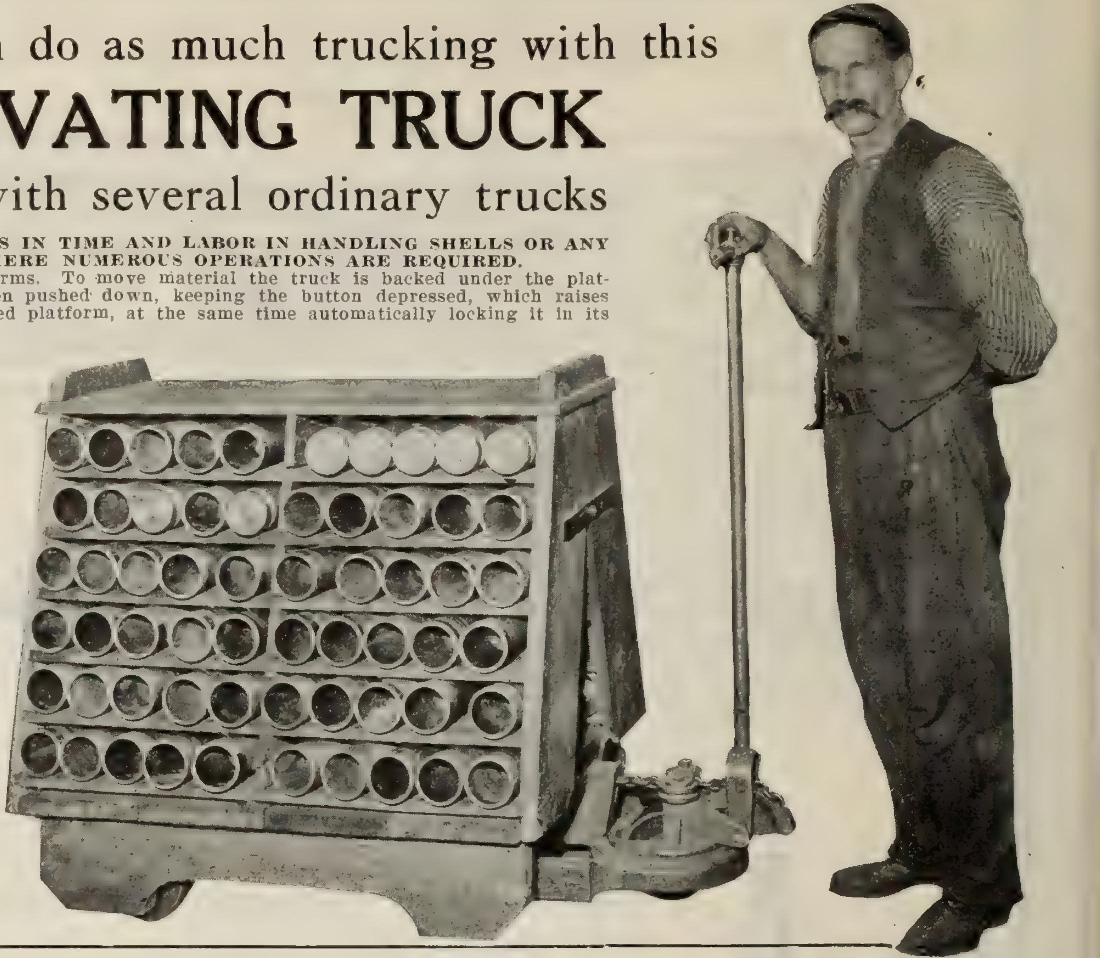
ONE MAN can do as much trucking with this
ELEVATING TRUCK
as several men with several ordinary trucks

IT EFFECTS ENORMOUS SAVINGS IN TIME AND LABOR IN HANDLING SHELLS OR ANY OTHER FACTORY PRODUCT WHERE NUMEROUS OPERATIONS ARE REQUIRED.
All material is stacked on the platforms. To move material the truck is backed under the platform; the handle of the truck is then pushed down, keeping the button depressed, which raises the truck bed and with it the loaded platform, at the same time automatically locking it in its raised position. When hauled to the desired position the button is pressed and the handle is raised, lowering the platform to the floor. The truck is then drawn from underneath and is ready to move another platform. **Raising and lowering of the Truck can be operated with one hand only.**

—can be raised or lowered at any angle.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises and Presses, with attachments for pressing in** band—fixtures especially adapted for the manufacture of 18-pr. Shrapnel Shells.

We shall be pleased to submit prices and give any particulars required.



The Chapman Double BallBearing Company
OF CANADA, LIMITED
339-351 Sorauren Avenue,
Toronto, Canada

Transmission Ball Bearing Co.,Inc.
1407 West Ave., Buffalo, N.Y.

Marking Base of SHELLS

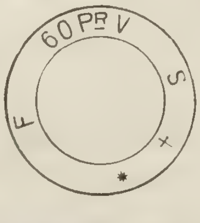
A PERFECT JOB in 15 Seconds

The "Grant" Shell Marker

is so arranged that the blow is brought to bear on each individual letter successively, while the blow can be adjusted to give a shallow or deep impression which is uniform for each letter or figure. The work is completed in one revolution of the shell, which is done by hand. **Made for 18 pdr., 4.5 in., and 60 pdr. high explosive shells.**

Drop a card for full particulars.

Cut on right shows marking on shell.



THE GRANT MFG. & MACHINE CO.
Holland Ave.
BRIDGEPORT, CONN.
U.S.A.

HIGH SPEED HAMMERS

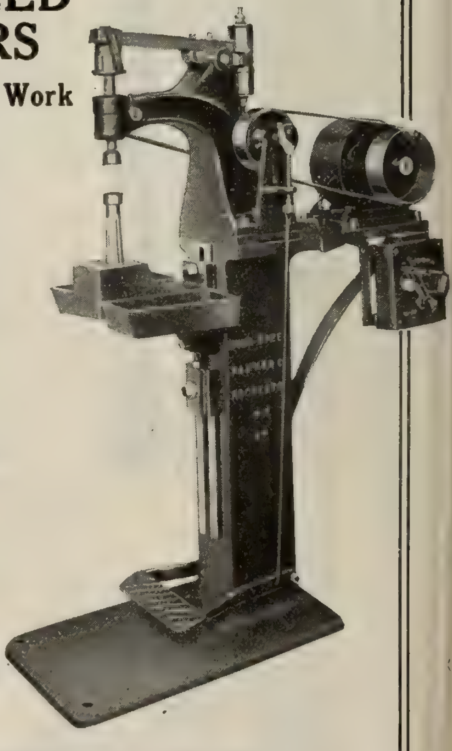
For High Speed Work

FEATURES:

Economy in floor space, elimination of weight and a guaranteed saving of from 15% to 20% on any class of work. The life of the machine is practically indefinite as phosphor bronze bushings are used throughout.

No riveting too intricate for us; no riveting which our machine cannot accomplish.

Send for our **High Speed Hammer Book.**



THE HIGH SPEED HAMMER CO.
Rochester, N.Y.
Sales Agents: The A. R. Williams Machinery Company, Limited, Toronto, Ontario.

Shell Painting, Nosing and Banding Machines

PAINTING MACHINE

4.5 and 60 POUNDER SHELL
BANDING and STAMPING MACHINE

SIMPLICITY: That is the beauty of these machines; they are so simple that a **woman or even a child can control them.** This is an important feature in reducing operating expenses.

Banding Press is sold without stamping attachment if desired.

Painting Machine is operated with an ordinary air drill, and, if desired, a heating coil under table, enclosed in a sheet steel shell, can be supplied, as shown in cut.

Canadian Locomotive Company, Limited, Kingston, Ont.

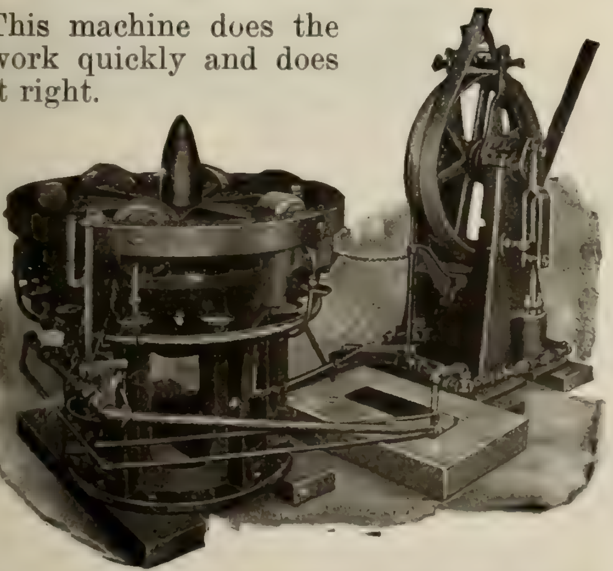
SALES HANDLED EXCLUSIVELY BY

The John Bertram & Sons Company, Limited, Dundas, Ontario, our Agents for these machines

Hydraulic Banding Machine

For compressing bands on shrapnel shells and other projectiles

This machine does the work quickly and does it right.



In writing for information or quotation please advise width and thickness of bands and diameter of shells to be handled.

Machines for our Canadian Customers are built in Hamilton, Ont.

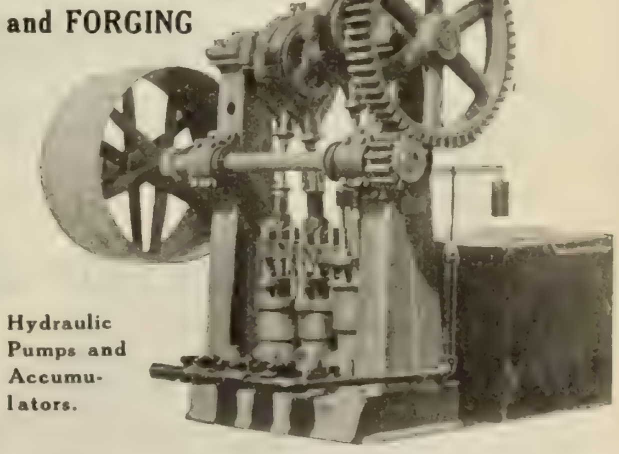
We also manufacture machines for setting wagon and carriage tires, cold.

Please address all communications to our Rochester Office

THE WEST TIRE SETTER COMPANY
ROCHESTER, NEW YORK, U.S.A.

PRESSES FOR SHELLS

Hydraulic Presses for
**NOSING, BANDING
and FORGING**



Hydraulic Pumps and Accumulators.

Hydraulic Presses for all purposes.

WRITE FOR FULL DETAILS NOW.

William R. Perrin, Limited
TORONTO, ONTARIO

MURCHEY TAPS AND DIES

—very extensively used on 6-in., 8-in. and 9.2-in. shells.

The great advantage of using MURCHEY COLLAPSING TAPS AND DIES on large shells

Murchey Collapsible Tap.

MURCHEY Taps and Dies save the buying of extra machines. The time alone required to thread one of the large shells, together with rehandling, will more than pay for the tap in a very short time.

The largest American firms are doing all the threading on shells with Murchey Collapsing Taps and Murchey Self-opening Dies, and are getting most desirable results.

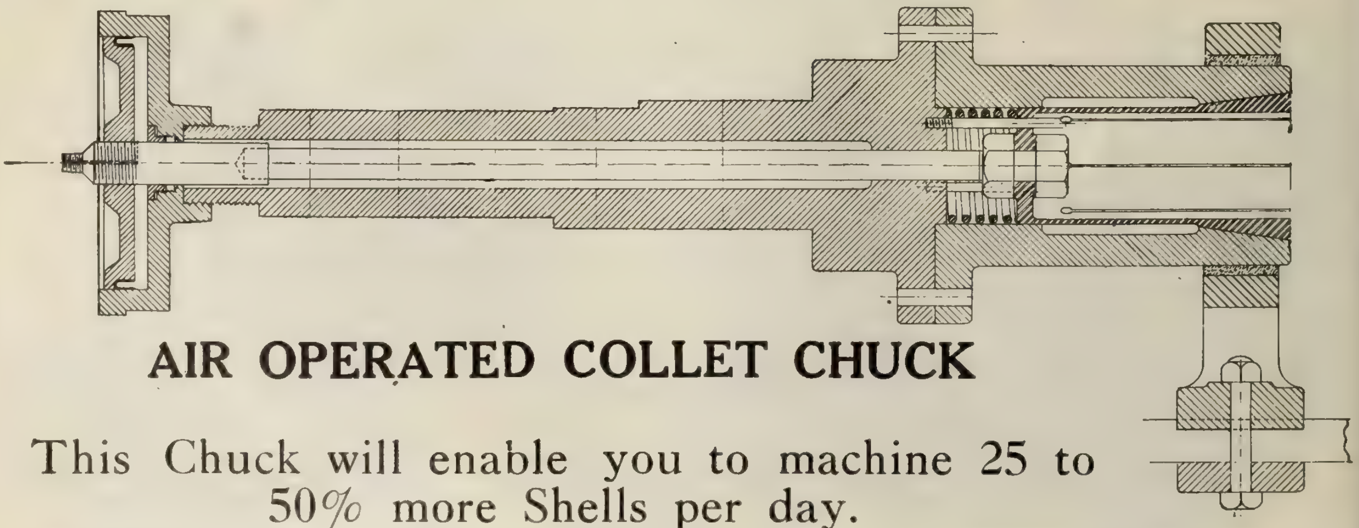
They save the time of rechucking and rehandling, the possibility of the shell getting out of center. By using a roughing and finishing tap they are able to tap the base and nose of these shells in about one-fifth of the time it requires on a thread miller and produce accurate work.

Send us Blue Prints of your requirements and we'll gladly quote you on the necessary tools.

Murchey Machine & Tool Company

75 Porter Street, Detroit, Mich.

INCREASE YOUR PRODUCTION



AIR OPERATED COLLET CHUCK

This Chuck will enable you to machine 25 to 50% more Shells per day.

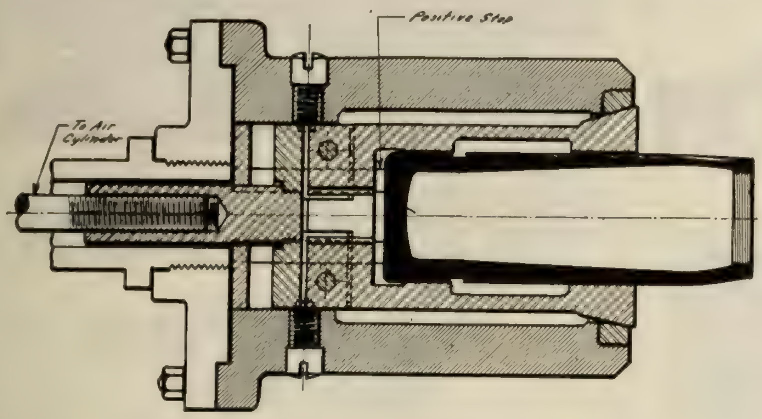
MADE IN ALL SIZES. ADAPTABLE TO ANY HOLLOW SPINDLE LATHE.

Particulars on Application. *Prompt Delivery.*

HYDE ENGINEERING WORKS

P.O. Box 1164 **27 William St., MONTREAL**

You Can Produce More Shells Per Day



M. E. C. Air Operated Hinge Collet Chuck adapted for rough and finish boring operations.

If you are interested in Machining Fuse Plugs, Shells, Etc., the best Chuck and Taps are M. E. C.

These devices will increase your production from 25 to 40 per cent. over any other method now employed.

ONCE KNOWN—ALWAYS USED

It will pay you to investigate at once.

Manufacturers Equipment Company

175-179 North Jefferson St., CHICAGO, ILL.

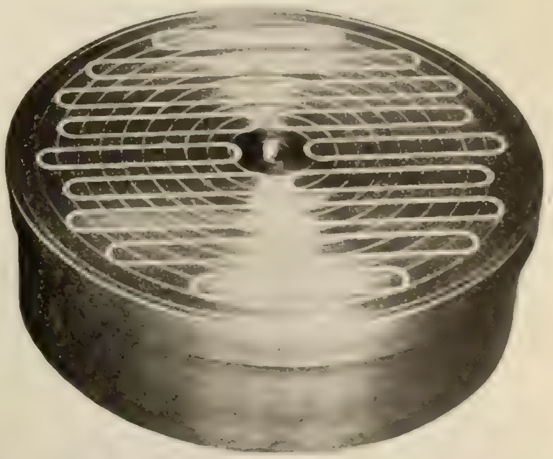
FOREIGN AGENTS: C. W Burton Griffiths & Co., Ludgate Circus, Ludgate Hill, London, England.
Louis Besse, Bureaux & Caisse, 39 Rue de Lappe, Paris, France; Geo. A. Todd, 152 Bay St., Toronto, Canada

Heald Magnetic Chucks

have a

UNIFORM PULL

over the entire magnetic surface and it does not vary 5% at any point on any size or type of chuck.



Thus it is possible to use Heald Chucks for large and small parts with the same efficient results.

Try Heald Chucks on your planing, milling or grinding jobs. You'll be surprised at the saving effected.

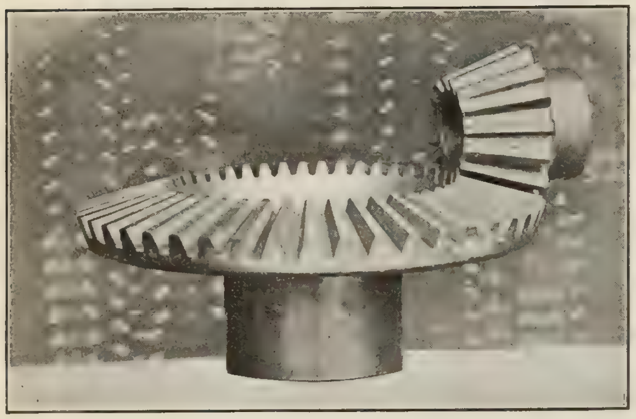
Full information on request.

The Heald Machine Company

8 New Bond Street, Worcester, Mass.

Branches: Chicago, 24 So. Jefferson St. Cincinnati, 602 Provident Bank Bldg. Cleveland, 710 Engineers Bldg. Detroit, 303 Majestic Bldg.

CUT GEARS



GOOD GEARS

—ANY KIND

LARGE OR SMALL

Write for Quotations.

Hamilton Gear & Machine Co.

COR. CONCORD
& VAN HORNE

TORONTO

—He's a Poor Workman

who complains of his tools, as a general rule. But he's a poorer workman who, knowing his tools are inefficient, does not complain.

Educate your men to turn in their files the moment they reach their "inefficient point." That will give them no excuse for poor work.

The cost of the extra files will be much less than the loss in labor, time and mental energy spent in using files that have worn smooth.

Send for a copy of our book, "File Filosophy." It is worth the while of any manager, factory superintendent, shop foreman and workman to read it.

The Famous Five Are:

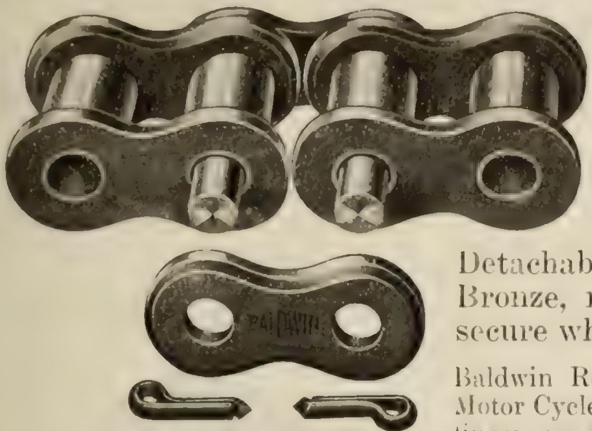
KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE
(*Made in Canada*)

GLOBE
GT.WESTERN
AMERICAN
ARCADE
NICHOLSON FILE CO.
PORT HOPE
ONTARIO

Baldwin Roller Chains

for

Motor Trucks



We carry in stock, for immediate delivery, this standard Roller Chain in Cotter Pin Detachable type. The Cotter Pins are of Phosphor Bronze, rust-proof, easily detachable, yet absolutely secure when inserted.

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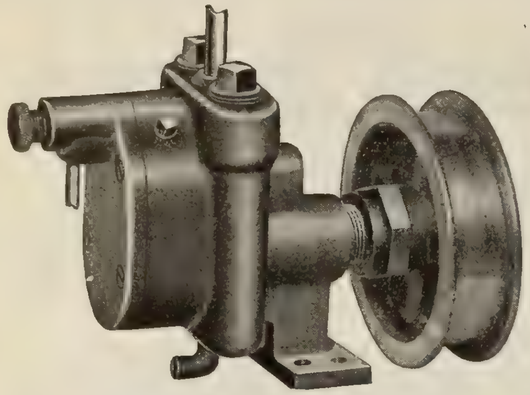

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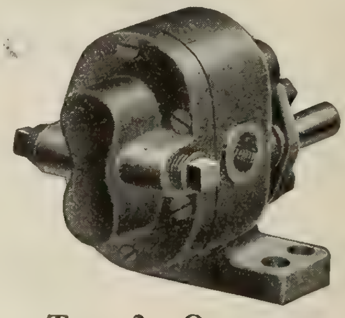

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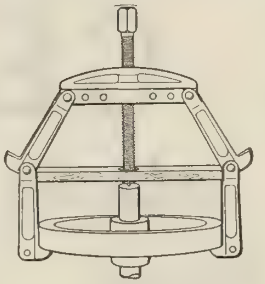

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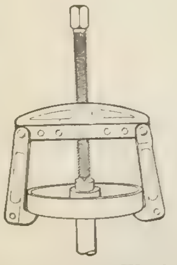

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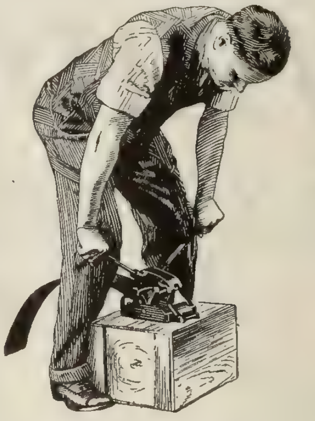

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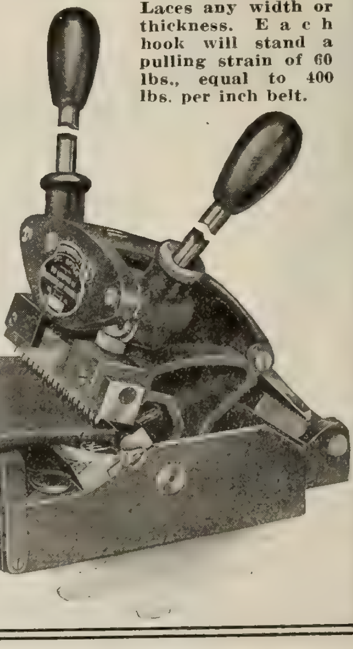

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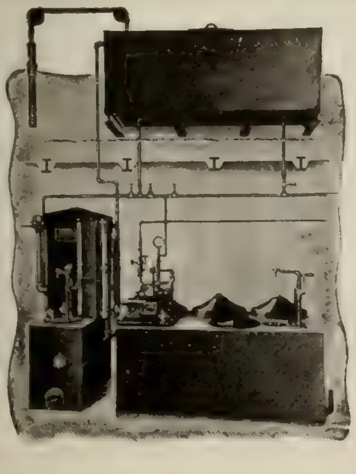

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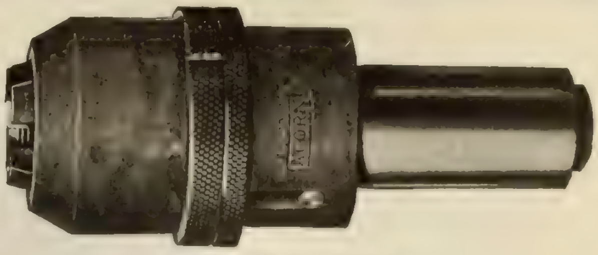

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SOME ADVANTAGES

IDEAL ADJUSTMENT—All the lands have an equal bearing against the bevel of the cap, hence they will close in *equally*.

PERFECT SUPPORT to the cutting lands due to the ground surface in the cap. It cannot cut a taper thread.

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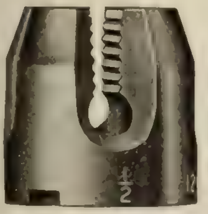

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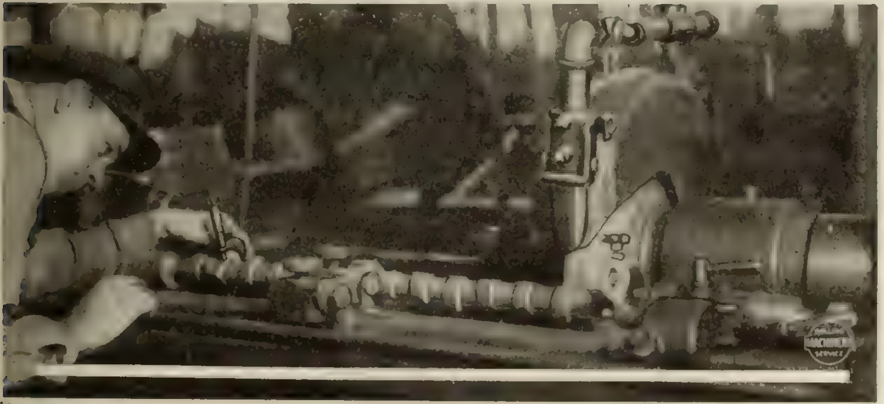

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Sixty-five cam shafts, such as shown in the illustration, are completed on two grinding machines in a day of 9½ hours, at the Continental Motor Mfg. Company shops. The work is a cam shaft for a 6-cylinder engine, with 12 cams and 2 pump eccentrics.

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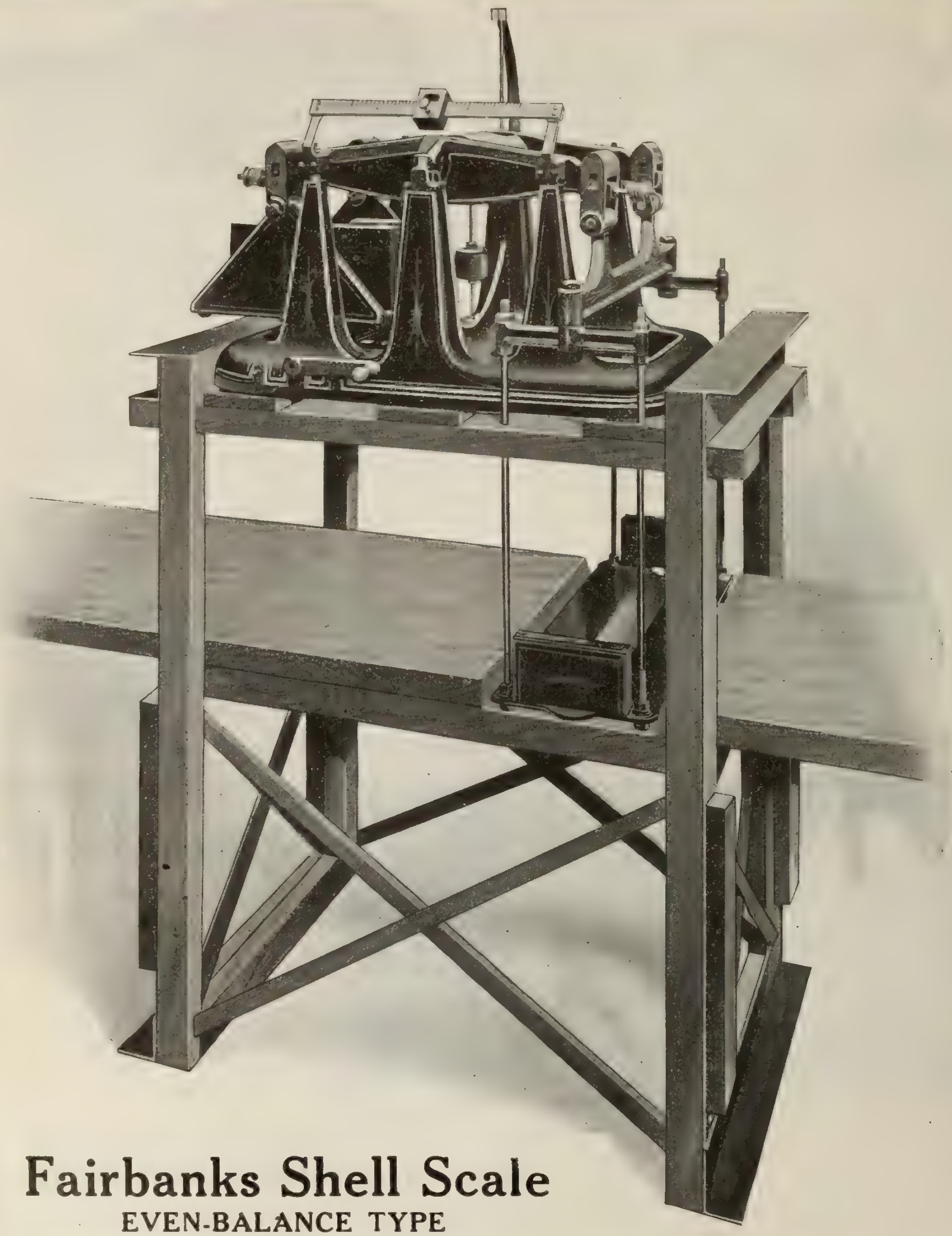

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CANADA'S
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GOODS

Canada's 72-Inch Reflecting Telescope Installation

By J. S. Plaskett*

The scope of astronomical research in Canada has been materially enlarged by this latest addition to its operating equipment. The 72-inch reflecting telescope installed in the new Observatory, Victoria, B.C., has the distinction of being the largest of its kind in the world. Its construction has been the work and study of two and a half years on the part of the Warner & Swasey Co., Cleveland, Ohio, and in the opinion of those competent to judge, the completed instrument is a masterpiece of engineering genius, enterprise and skill.

THE completion of the mechanical parts or mounting of the 72 in. telescope, and the near approach to completion and erection of building and dome for the telescope, have stimulated public interest in this national undertaking and render the present an opportune time to present a description of the mechanical features illustrated by recent photographs which show the meantime condition of the enterprise.

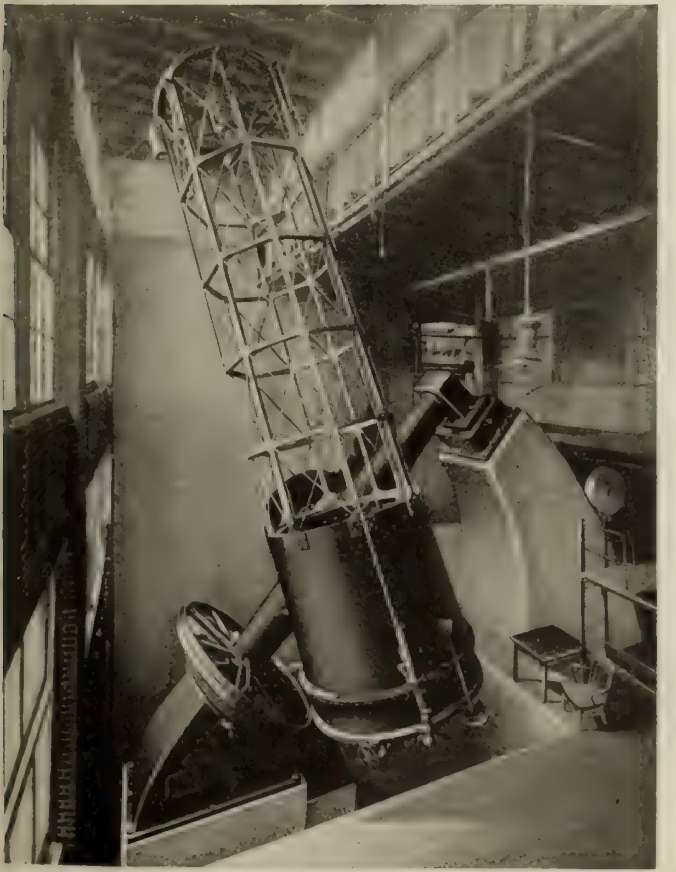
The mounting of the telescope was practically completed and it was temporarily erected in the factory of the makers, the Warner & Swasey Co., of Cleveland, Ohio, about the end of March last. Some finishing touches to one or two details, the holding of a formal reception and exhibition of the telescope, delayed by the absence of members of the firm until May 25th, and the fact that the dome was not sufficiently advanced to offer protection from the weather, caused the postponement of the shipment to Victoria until the middle of June. The erection of the mounting will occupy some three months, hence occurring during the most favorable season, and should be completed by the early autumn.

The 72 in. mirror, which is 12 inches thick at the edge, has a hole 10⅛ inches in diameter through the centre, and weighs some 4,340 lbs.; is finished on edges and back and its front surface is now practically spherical. Before it can be made a paraboloid of revolution, the surface necessary to bring the parallel pencil of light from any celestial object accurately to a focus, it is necessary to prepare a large flat surface for the purpose of testing the paraboloid. It is hoped that this will be finished and the mirror completed as soon as the mounting is ready to receive it.

The New Observatory

The road to the summit of Saanich Hill, the site of the new observatory, which is about seven miles north of Victoria, B.C., was completed early in the spring of 1915, by the government of British Columbia who contributed $10,000 towards the purchase of the site and had agreed to build a road from the present main road to the summit of the hill where the observatory building was to be located. Although the first source of water supply was a failure this important question is now satisfactorily solved.

The concrete pier for carrying the telescope and the surrounding circular steel building whose wall serves to support the dome, was commenced last summer and is now completed except for some minor details which are delayed until the telescope arrives. One of the essential features about the building and



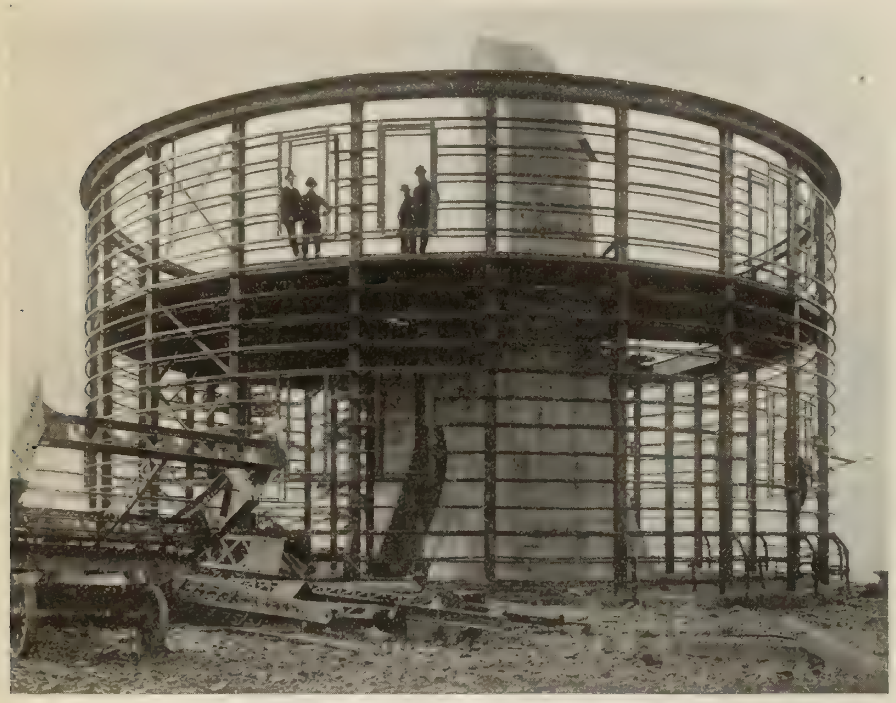
TELESCOPE MOUNTING TEMPORARILY ERECTED AT CLEVELAND, OHIO.

SHOWING TELESCOPE PIER AND TELESCOPE BUILDING FOUNDATION.

---

*Of the Dominion Observatory, Ottawa, and head of the New Observatory at Victoria, B.C.

dome is that they are entirely of steel construction which allows them to rapidly assume the air temperature. They are provided with double walls and a system of louvres at the top of the dome ensuring a thorough circulation of the air and the maintenance of the interior at the shade temperature.



STRUCTURAL STEEL FRAMEWORK OF TELESCOPE BUILDING.

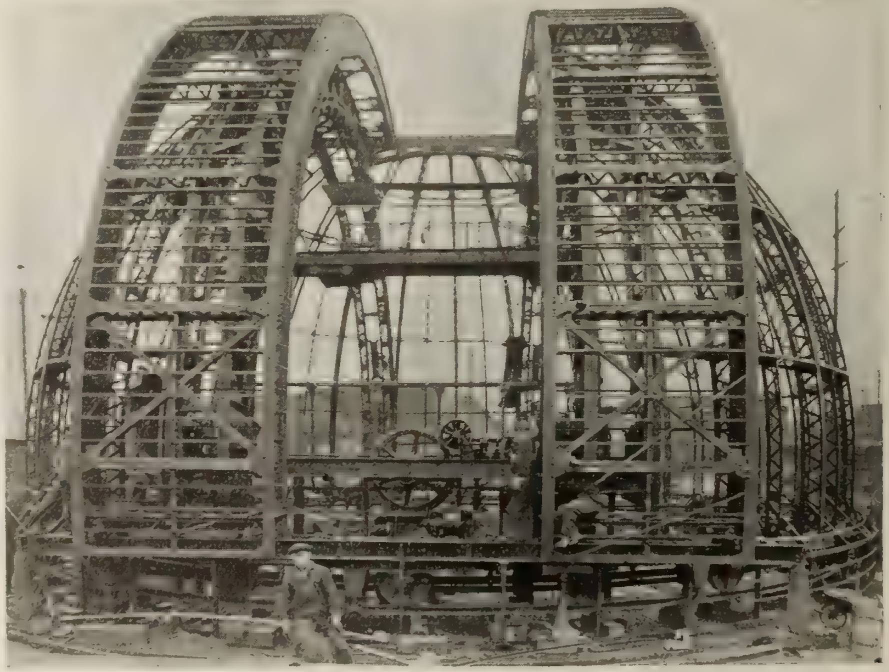
A contract for the 66-foot revolving dome which in the case of a large reflecting telescope is a most important part of the equipment as it has to be provided with many accessories required in the handling of and observation with the telescope was awarded in May 1915, to the Warner & Swasey Co., so that dome and telescope were designed together and should work in proper relation to one another. This dome is now being erected on its building at the observatory site and although it has not yet been operated its temporary erection at Cleveland sufficed to show that it will be the most complete and convenient in every operating detail of any ever built.

One of the observer's houses is completed, but none of the other buildings required have yet been begun. This dwelling will enable the supervision of erection of dome and telescope and the preliminary adjustments and experimental work to be efficiently performed. It is hoped that by the time the telescope is in shape for regular and systematic operation the necessary building equipment will be provided.

Telescope Features

It may be of interest to give a summary of the main features of the telescope mounting at this time leaving a full account until its final erection and completion.

The telescope is to be used in three different forms, observations being made at the prime focus, at the Newtonian focus and at the Cassegrain focus. In the photography of the heavenly bodies or in obtaining spectra of very faint objects, the photographic plate or small spectrography may be placed at the upper end of the tube in the "prime focus" 30 ft. above the great mirror. In the Newtonian form a plane mirror 19 in. in diameter about 4 ft. down the tube and inclined at 45 degs. reflects the light to a focus on the plate or spectrograph at the side of the tube. In the Cassegrain form a convex mirror 19 inches in diameter placed about 7 ft. below the prime focus reflects the light back through the central hole of the main mirror to a focus below the mirror cell where it can be visually observed, photographed or analyzed by the spectograph. The equivalent focal length of this combination is 108 ft. giving images of exactly the same size as a refractor with a tube 108 ft. long.



DOME TEMPORARILY ERECTED AT CLEVELAND, OHIO.

Telescope Mountings

The function of the mechanical parts or mounting of this or any telescope is to hold the optical parts invariably, and at the same time without flexure or strain, in their correct relative position, to enable them to be readily pointed to any desired object, and to move them as a whole accurately to follow the motions of the stars. It will be realized that mechanical and engineering problems of a very exacting character were encountered in the design and construction of this great telescope, when it is considered that the star image in photographing has to be held in one position on the plate within less than the thousandth of an inch, and that this image is formed by an optical combination with a focal length of 108 feet. In other words the enormous mass, nearly 45 tons, of the moving parts of this telescope must be so accurately pointed to and follow the motion of the star that the deviation of a line 108 feet long from the true pointing is less than the thousandth of an inch. The previous experience of the makers in the design and construction of the largest refracting telescopes in the world, the Yerkes 40 in., the Lick 36 in., and many others, has been of great value in this connection. Further, the great advances in recent years in the production of high grade steel castings, in the manufacture of bearings in which friction has been reduced to a minimum, and in other directions has enabled a telescope to be constructed which is not only considerably larger in size but is superior in design, in accuracy, and in convenience and smoothness of operation to any existing instrument.

The telescope, whose general form follows the English type of equatorial mounting and is well shown in the first photograph, has a long polar axis supported at its north and south ends by bearings, in a direction parallel to the earth's axis. The declination axis, to which the tube is attached at right angles, passes rectangularly through the central cubical portion of the polar axis, the weight of the tube on one side being counterpoised by the declination gearing and housing on the other.

Polar and Declination Axis

The polar axis is composed of three sections, all of the best steel castings, firmly bolted together, namely, the central cubical section above mentioned and north and south conical tubular sections. It is nearly 23 feet long and weighs about ten tons. The declination axis is a steel forging, 5¼ tons in weight, 14½ ft. long by 15½ in. in diameter, with a flange 41 in. in diameter by 4 inches thick, to which the tube is bolted. The tube is also in three sections, the central cylindrical steel castings, about 7½ ft. in diameter by 6 ft. long, weighing 7 tons, being attached to the flange of declination axis; to the bottom flange of this central section is bolted the steel mirror cell, weighing with mirror counterpoises and mirror, 6 tons; while to its upper end is firmly attached the skeleton tube, a beautifully designed and extremely rigid piece of structural work, upwards of 23 ft. long by 7½ ft. in diameter, and weighing, with attachments, about two tons.

Spectograph and Visual Appliances

Below the mirror cell the spectograph and visual appliances for use at the Cassegrain focus are attached. At the upper end of the skeleton tube an exceedingly ingenious arrangement, avoiding the use of several heavy and awkward extensions of the skeleton tube, which were necessary with all previous reflectors, enables either the prime focus, Newtonian or Cassegrain attachments to be used at will and with the minimum of trouble and delay in changing from one to the other.

The driving clock, similar in design to that which has been so successful in the Lick and Yerkes telescopes, moves the telescope in right ascension by means of an accurately cut worm-wheel 9 feet in diameter, mounted on the polar axis by ball and ball thrust bearings and clamped to it when required by an electric motor.

Telescope Electrically Operated

The telescope is moved from one position to another and set and guided wholly by electric power, no less than seven motors besides several solenoids and magnetic clutches being required for these motions. The quick motion motors move the telescope at the rate of 45 degs. per minute, one revolution in 8 minutes, in both coordinates. The slow motions have two speeds, a fast one for fine setting at the rate of one revolution in 36 hours, and a slow one for guiding, one revolution in 720 hours or 30 days. With the Cassegrain focal length of 108 ft., the guiding speed of the star image at the focal plane is 1/300th inch per second or 1/5th inch per minute.

SHOWING DOME, ETC., OF TELESCOPE BUILDING, MAY 5, 1916.

The electric wiring and control systems have been carefully worked out, all sliding brush contacts avoided, and the whole system installed in a permanent and yet easily accessible form, giving the maximum of convenience in operation with the minimum of attention and repair. The method of operation will be as follows: An operator on the observing floor controls the quick motion and clamps of the telescope and the rotation of the dome from the most convenient of the switchboards, one on the east and the other on the west side of the south pier, the telescope being quickly set approximately to the tabular position of the desired object by the sideral and declination setting circles. The observer at either the upper or lower ends of the tube can clamp or unclamp the telescope, make the fine settings and guide by means of push buttons located on a small keyboard which he can carry around with him or attach to any convenient place.

High Grade Workmanship

The mechanical workmanship throughout is of the very highest grade, such indeed being necessary for the proper performance of the required operations. The principal mechanical feature wherein it differs from other telescope mountings is in the main bearings, in the skeleton tube, in the accurate cutting of the driving worm wheel and in the extensive use of steel castings for the principal parts.

It has always been considered necessary hitherto by astronomers to have the alignment or collimation of the polar and declination axes determined by cylindrical journals and bearings and to reduce the friction on these sliding contacts by ball or roller relieving devices. The perfection of modern ball bearings has rendered this arrangement unnecessary and the main bearings are wholly of the self-aligning ball form, the S.K.F. Swedish bearing. The friction is thus much reduced and a very slight pressure on the tube is sufficient to set it in motion. The amount of current consumed in moving the telescope in quick motion would only be sufficient to light one 16 c.p. incandescent lamp.

The Skeleton Tube

The essential features about the skeleton tube are its lightness, its great stiffness and the new method of interchanging the attachments at the upper end. It is built up of ordinary structural members the stiffness being given by diagonal steel tension rods which are screwed up sufficiently tight so that they are always under tension, even the lower set when the tube is horizontal. The interchanging of the Newtonian & Cassegrain mirrors at the upper end of this tube previously accomplished by fitting each into a separate extension of the tube thus entailing the handling of awkward and heavy pieces has been much simplified in this telescope by leaving the tube full length and devising a simple means of interchanging the mirrors only. Less than one-quarter the weight has to be handled, it can be done in one-tenth the time, and with no danger of accident.

The worm wheel which is 9 ft. in diameter with 720 teeth cut in its bronze rim was mounted on a rigid stand on its own ball and ball thrust bearings and each tooth cut by a cutter set at the proper angle. The spacing was done by means of a circle 42 in. diameter graduated on silver to half degrees by the Warner & Swasey circular dividing engine whose greatest error is six tenths of a second of arc. This was concentrically mounted on the worm wheel and the settings made by two micrometer microscopes. The teeth were cut around three times to remove any error due to springing and the previously lapped worm and the worm wheel were finally polished together by running them for several days with rottenstone and oil.

The three sections of the polar axis, the declination sleeve, the central section of the tube and the mirror cell are all steel castings heat treated. They were cast and machined at the Bethlehem Steel Works and are striking examples of the perfection to which the process has attained. They are entirely free from blow holes or other defects and as tough and homogeneous as forgings.

I desire to place on record my appreciation of the spirit which has governed the Warner & Swasey Co., in the design and construction of this great telescope. Their ideal has been to make this instrument the most accurate, perfect running and convenient of any every constructed and to that end no pains or expense have been spared. When to this determination was added their unequalled experience in the design and construction of large telescopes, and their unrivalled facilities for producing the highest grade of workmanship the result cannot fail to be, and undoubtedly is an instrument of the greatest accuracy and one in which every needful and desirable movement or attachment is provided in the most simple and direct way.

The cause of astronomical research in Canada is to be congratulated that this great addition to its equipment was entrusted to such capable and sympathetic hands and that this magnificient instrument has been so promptly and adequately completed.

THE WAR AFTER THE WAR

THERE was a unique gathering of shipping and commercial men at the Mansion House, London, on June 21, to hear an address—the last but one before he returned to Australia — by Premier Hughes, on Empire trade now and after the war. The Lord Mayor of London (Sir Charles C. Wakefield) presided, and the meeting was organized by the British Empire Producers' Organization.

Mr. Hughes said that the Paris Trade Conference, from which he had just returned, had given official recognition to the great fact that between national welfare and national safety and trade relations there was a relation so intimate that it was impossible to treat them separately. It would have been well if that great principle had been recognized earlier, for it was certainly true that owing to our failure to recognize it, Great Britain had escaped national disaster almost by a miracle.

It was well that our people should be reminded of the peril they had thus escaped, for there were many in Britain still opposed to such changes, and who spoke still about returning and renewing those friendly connections with Germany after the war. However, those who were present at the meeting, did not intend that they should be renewed, and he believed that an overwhelming majority of people in Great Britain agreed with them.

National Welfare vs. Personal Profit

They had to face the question of national welfare against mere personal commercial profit. What could it profit a nation if it gained the whole world and lost its own soul? They could only make themselves great and free by making themselves safe, and the first thing they had to fight was not Germany, but the German agents in Britain, those people who were acting as caretakers to the interests of Germany during the war, so that the Germans after the war could come back and find a jumping off place from which to fatten on the vitals of Britain, a policy they had pursued with such tremendous success during the last 25 years. Unless they fought those people with resolution, and all together, they would not win the war.

The first thing they had to do was to show their approval of the Paris Conference resolutions, and insist upon those resolutions being carried out. Those resolutions formed a great treaty between 600,000,000 people, of which half were white people. It was the only great alliance ever made in the history of the modern world. By doing their duty in that way they would not only gain economic independence, but get for the world a perfect peace.

Organization of Industries Urged

Mr. Hughes went on to urge an organization of British industries, raw material, and labor, for the industrial problems arising after the war, unless fully met, would be greater than the problem of the war itself. The Central Powers were organizing and we had to do the same, not only to fight their competition after the war, but the competition of neutrals, who would otherwise capture the carrying trade of the world. They had to find a man whose function in regard to industry would be like that of a lockkeeper on the Thames, letting in or out of Great Britain what was best for the interests of the nation.

They were determined to have the control of British industry in the hands of the British people. All those valuable lives were not to be poured out in vain, and they must not tamely submit to slip back into the economic maw of Germany. He believed the British Government would help the Empire in the great task of inter-Imperial trade relations by adopting the scheme for providing the spelter requirements of Great Britain from the concentrates produced within the Empire, which he had had the honor to lay before the government the other day. He hoped the Government would also adopt the scheme put forward by the British Empire Producers' Organization to produce all the sugar we needed in the Empire, and stop the supply of beet sugar from Germany.

Let them all vow to regard the great work of national organization as a sacred duty, holding its heaviest labors as a glorious privilege, for upon the success of their efforts rested not only the future of Britain but of the entire British race.

BRITAIN AND RUSSIA

A. PROTOPOFF, vice-president of Russian Duma, a prominent personality, and one of the biggest textile producers in the country, in an interview relative to commerce, says: "I am absolutely certain that Britain and Russia will come to closest terms. We need English capital to enable us to fully exploit the reserve forces of our great country. The demand from some quarters that all invested capital shall be entirely under Russian control and only Russian engineers and workmen employed is nonsense. We shall, for many years to come, look to England to supply us with managers, directors, and engineers, and also, in many cases, with skilled workmen. The best means of inter-communication in business matters would be by means of a Business Bureau which would set about the formation of bona-fide Chambers of Commerce.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data
and Ideas Evolved from Actual Practical Application and Experience

DSEIGN OF LATHE, PLANER, SHAPER AND SLOTTER TOOLS—I.

THE present article is the first of a series which, in addition to discussing the design of lathe, planer, shaper and slotter tools, will designate the factors which decide what shape tool will prove most efficient for any given cutting operation; indicate the ideal tool to use when a certain combination of factors is known, and explain the effect that variation in these factors has on the shape of the tool. The data is courtesy of Alfred Herbert, Ltd., machine tool builders, Coventy, England.

It is a curious fact that we are usually content to accept the ordinary, everyday things of life without ever pausing to consider whether or not they can or should be improved. To nothing in modern machine shop practice does this apply with more force than to the design, manufacture, and use of lathe, planer, shaper, and slotter tools. It has however, been proved over and over again relative to these that it is well worth taking time and trouble to get an absolutely clear and complete knowledge of all the factors necessary to attain any desired result in order that we devise the most efficient means for achieving our object. For any operation, no matter how small or trivial it may be, there is one method and one set of circumstances which are more favourable to the satisfactory carrying out of that operation than any other. It is only fit and right then for us to set ourselves to the determination of that environment which will render every operation carried out in our shops as efficient as possible.

Progressiveness Everywhere Apparent

To-day we are not content with the methods of the last generation; we are not bound by the traditions of ten years ago, nor even of last year. We are constantly improving our methods, our processes and our plants. We inquire into the credentials of our previous practices and test them by theory, which in turn we prove by experiment. The whole trend of modern machine shop practice is to probe down to essentials, to find out the "why and wherefore" in every act of our business lives.

Our progress in this direction has gone further in some things than in others. The proper provision of efficient lathe and similar tools is one of the details of modern machine shop practice that has not yet received the attention it deserves. Most of the existing literature on the subject of cutting tools is a mere recapitulation of past and present practice, and makes no effort to prove that the tools and methods described are better than any others. Many works' managers have felt, sub-consciously perhaps, that present methods could be improved, but have not the time necessary for a satisfactory elucidation of their difficulties.

No apology is offered therefore for laying down some definite rules on tool making, particularly as these are the result of much thought and experimenting on the part of men whose time is entirely devoted to the subject.

Tool Forging

The whole underlying idea in the following remarks is that the most efficient form of tool shall be made and maintained in the cheapest manner. Most treatises on the subject take it for granted that tool grinding and regrinding are lengthy and laborious operations. They therefore devote the greater part of their remarks to the question of tool forging, which is to be done in such a manner that subsequent grinding shall take as short a time as possible. Forging is at best a rough and ready, inaccurate and inefficient process, and if, without detriment to the tool, it can be largely eliminated, we have reached one stage in our progress towards efficiency.

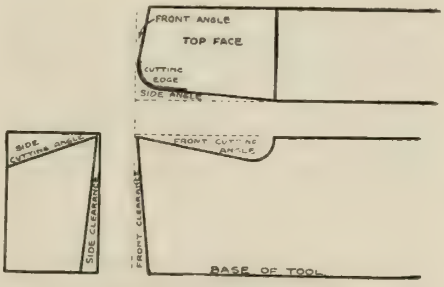


FIG. 1. DEFINITION OF TOOL PARTS.

It is sometimes claimed that tools should be forged because the cutting properties of the steel are thereby improved. This may conceivably be the case with steels of poor quality, but is certainly not true of any recognised brands of high speed steel. On the contrary, there is always considerable risk that the steel will suffer through being worked at too low or too high a temperature.

By the Lumsden method, the shaping of the tool is done in the majority of cases by grinding instead of forging. This grinding, which is done dry before hardening, has been proved to have no deleterious effect on the steel, nor is it conceivable how intelligent grinding could possibly cause any injury. If, therefore, by means of grinding, a tool can be made to a definite predetermined shape in a fraction of the time required for forging, we cannot afford to close our eyes to the advantages such a process offers.

These are the lines on which the designer of the Lumsden Oscillating Tool Grinder proceeded in devising a machine which would ensure an adequate supply of correctly shaped tools at a low cost. The Lumsden Oscillator has been on the market for some four or five years. During that time much valuable experience has been gained and a vast amount of experimenting has been done with the result that the Lumsden system now offers the most economical method of making cutting tools for lathes, planers, shapers and slotters, also flat formed boring cutters, flat drills, and blades for inserted tooth milling cutters.

The accumulated experience of the last few years is incorporated in a chart which is furnished with all Lumsden Oscillators. This chart contains full particulars of a complete set of standard tools suitable for the average machine shop. It will be found that the tools suggested are of the most efficient shape for any ordinary machining operation and that the method of their manufacture is the cheapest and quickest in existence.

Tool Design Concentration

Those who have given the whole question of cutting tools their careful consideaation have come to the conclusion that tool design is an immense and important subject that well repays any time and trouble spent upon it. If every lathe, planer, shaper and slotter operator were allowed to design or control the design of the tools he uses, there would be such a multiplicity of tools in the shop that confusion would be inevitable, and the result would be inefficiency, reduced output, increased power charges and considerable waste of time.

It behoves those in authority therefore to tackle the tool problem in real earnest. The first item in the programme is to carefully consider the machines which use tools of the lathe type and the nature of the operations performed thereon. Using in the first place the experience of other people—and we trust the remarks contained in this article will be of use in this connection—supplemented, when necessary, by experiments of their own, those who desire to revise their tool system will soon realise the necessity of a set of standard tools applicable to every machine and every operation concerned. They will also see the desirability of making such a set of standard tools as small as possible, yet with enough flexibility to cover every requirement.

When we use the term "Standard Tool," we do not mean a tool of fixed and unalterable shape, because according to the nature of the operation on which it is to be used, two or three variables will enter into its make up. A standard tool is one with a standard profile, but the rake of the top face, the radius at the cutting point, the inclination of the cutting edge to the tool shank, and the clearances of the cutting sides should be varied to suit the machine, the material being machined, and the nature of the cut.

None of these variables, however, need affect the decision to lay down certain standards; they merely influence the question of flexibility in suiting the standards selected to the needs of the shop.

Definition of Tool Parts

Before proceeding further with our enquiry into the tool problem, it is desirable to define the terms used to designate the various parts of a tool. See Fig. 1.

A tool consists of the shank and the nose, and unless otherwise stated the shank will be presumed to be rectangular.

The base is that side of the shank which bears against the support that takes the pressure of the cut. The top face is that which takes the friction of the chip as it is cut from the work.

Rake is the angle at which the top face is presented to the work. It is usually a combination of side cutting angle and front cutting angle, though it may in some cases consist of either of these separately.

The profile is a plan view when looking at the top face from a point at right angles to the base. It is determined by combination of the side and front angles, and the radius of the cutting point.

Clearance is obtained by grinding away that part of the tool nose which would otherwise rub against the work during the cut. According to whether it is measured from the front or the side of the tool nose it is called front clearance or side clearance.

The radius of cutting point is the amount the corner between the front and side angles is rounded off.

In determining a set of standard tools we must take into consideration the three elements profile, clearance and rake.

MACHINING 3 IN. RUSSIAN SHELL CARTRIDGE CASES

by R. K. Douglas

AFTER the cases are headed and tapered, the first step consists of inspecting for scratches, dents, or other defects, which might cause rejection after machining. Owing to the depth of the indent and small working limits allowed, the machining becomes a rather delicate operation, as compared with the 18 pdr. or 4.5 shell cartridge cases.

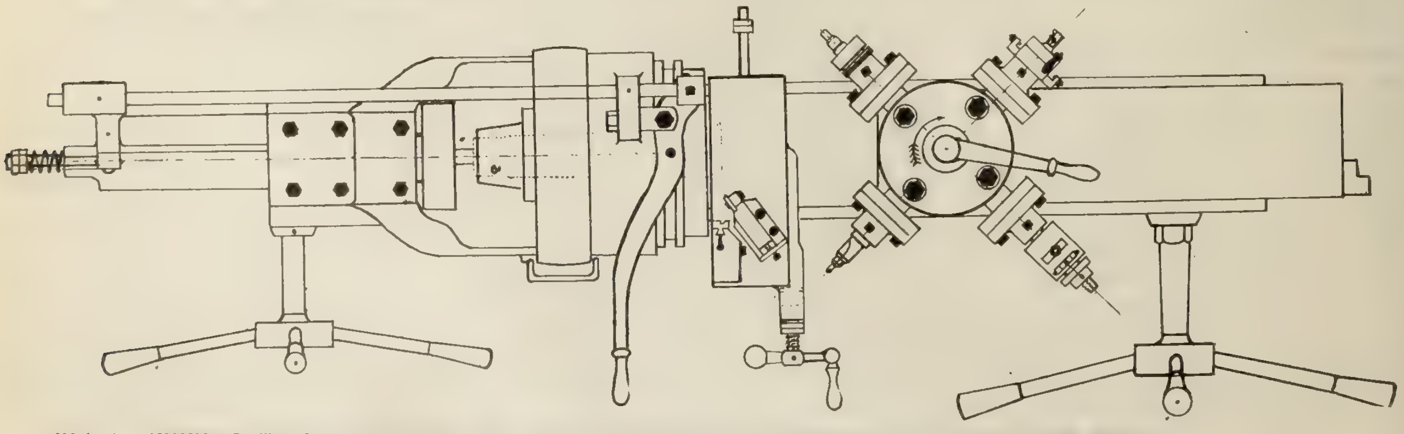


FIG. 1. GENERAL TOOLING LAYOUT FOR MACHINING THE 3-IN. RUSSIAN CARTRIDGE CASE SHELL.

The general tooling is shown in Fig. 1. The first operation consists of facing the case, turning the body and diameter of flange to gauge, producing thickness of flange and bevel by means of the formed cutter shown on cross slide. The case is cut to length at the same time by means of a suitable cutter attached to the tail-stock spindle, and operated by the pilot wheel on tail-stock.

The case is next drilled, This must be done with care, as the primer hole may not show more than .004 eccentricity, which is measured by means of an indicator gauge reading in thousandths of an inch. The drill has three steps, which rough form the primer head, body and flame hole, leaving .010 ins. to finish by reaming on diameter.

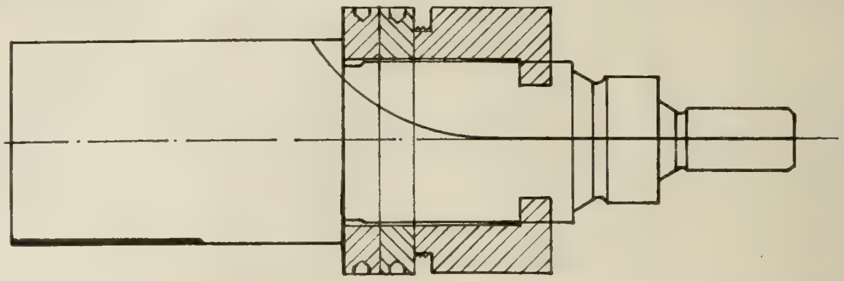


FIG. 2. REAMER AND STOP.

The primer hole is next rough tapped. An M.E.C. collapsible tap used, gives good results, leaving from .015 in. to .020 in. to finish by means of a hand tap. The tap must be in alignment with the spindle of the machine, or a tapered hole will result; leaving not enough stock to clean with the hand tap at the top, and too much at the bottom of the hole, thus possibly spoiling the case. There are seven full threads .14 pitch, Whitworth Standard, 1.070 in .dia. The machine is slowed down from 900 r.p.m. to 220 r.p.m. during this operation. The case is next recessed to clear the hand tap, and allow the last thread to be finished off nicely The tool has only one cutting point, because it does not finish the bottom of the indent as in the 18 pdr. case.

Following the above, the case is ready

to ream, which operation finishes the primer hole as far as the machine is concerned. The reamer cuts the primer head counter-bore to diameter and depth, the diameter of points of thread, depth of primer hole, diameter of primer hole below recess, cuts angle or chamfer on top of flame hole, reams flame hole to size, and chamfers top thread of primer hole.

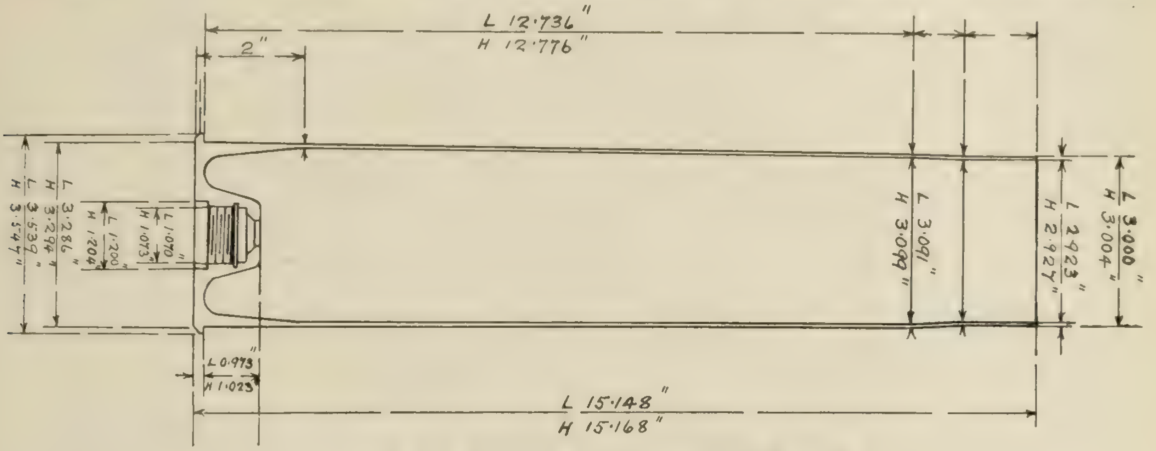
The depth of the primer hole and the head counterbore is regulated by means of a stop attached to the reamer, which, being set to the proper position, governs the depth independent of the stop on the turret slide. This stop serves a two-fold object, viz., by bringing it in contact with the face of the case, the proper depth is assured; it likewise does away with scraping the burr which is thrown up by the reamer, thus saving time and labor on the part of the operator, which naturally tends to increase production.

Referring to Fig. 2, the stop consists of a tool steel sleeve fitted with a lock nut for adjusting depth and attached to the reamer. The surfaces that act as a stop extend below the cutting edges of the reamer, and smooth out the burr. The part of the burr which is thrown below the diameter of the hole is removed by the reamer, leaving the corner smooth and square. It is essential that the contact surfaces be very hard and smooth, or trouble will result from the stop picking up pieces of metal and causing score marks. Two bearing points are required opposite each other. The stop should be left slack on the reamer for if it be held tight by set screws it is liable to chatter. This applies also to 18 pdr. and 4.5 in. cases.

The case is now transferred to another machine and bored at the muzzle. The extension (a) Fig. 1, is left off, and replaced by a bushing at the back of the spindle. This is a snug fit, so as to hold the outside diameter of the case to size, as it is apt to be expanded if not supported when the boring tool gets slightly dull. The boring tool is attached to the tail-stock spindle and adjusted by the pilot wheel in the same manner as the cutting-off operation. The case projects from the chuck about 3 inches, and as it has to be polished 2¼ inches from the flange, the operations of boring and cleaning are performed at the same setting.

The polishing is done by means of a felt wheel of proper width having emery or aloxite glued to the face, and running in suitable bearings attached to the cross slide, the drive being had from the machine countershaft. The wheel is brought in contact with the case with the right hand, the left hand operating the pilot wheel on the inward cut of the boring tool. With the wheel left running on the case, the operator's attention can be given to the outward cut which smooth finishes the bore. This operation, including setting work, machining and removing when finished takes about 25 seconds.

The cases afterwards go to another department to be hand tapped, after which they are given a final inspection, all gauge points being inspected, and each case tried for contour in a gauge, which is a duplicate of the gun breech. After being examined for visual defects they are stamped, cleaned and lacquered; being then ready to pack for shipment.



THE 3-IN. RUSSIAN SHELL CARTRIDGE CASE.

CLEARING DECKS FOR ACTION

By J. R. H.

WHEN ships are about to enter an engagement, one of the first orders issued is "Clear Decks for Action". This is absolutely necessary to the successful operation of the guns and other equipment; only the material required is permitted to be about, and that is kept in its proper place, and at such a point of convenience that the least possible effort will be required to apply it.

When a machine operator has completed a certain piece of work, and before he starts upon a fresh job, it is good practice to "Clear Decks for Action", so to speak. While performing some job, it is often found that a lot of stuff, such as cutings, files, scrapers, chisels, etc., accumulate about the machine in various places, and while necessary at the time, may not be required for the immediately following job. It is therefore advisable to clear the machine of all tools or other material, clean the cuttings and dust from the various slides, have tools sharpened and ready, so that when the next job is received, everything is in readiness to commence operations. Even when work is in progress, care should be taken that the machine, especially the movable parts, does not become littered with unnecessary material, which at any moment might interfere with the proper action of one or another of the moving parts.

Some few years ago, while working in a shop across the border, the importance of this was made clear to me by an experience we had one night, when the operator next to me met with a misfortune, caused by the dropping of a chisel from the saddle of his lathe onto the ways. The job he was working on was boring and threading a large housing nut, 30 inches long, 8 inches in diameter and 1¼ inch pitch. Everything ran along smoothly until about midnight, when the boring bar, which was held between the centers, was seen to drop from its position. After shutting the lathe off, investigation showed that a large chisel had fallen from the saddle onto the ways of the lathe, becoming wedged between the saddle and the tail stock, and as the saddle was moving backwards, the tail stock was shoved back allowing the bar to drop.

Little damage was done fortunately, and the trouble was soon remedied, but along about three in the morning the same thing again happened, with more serious results; the thread was nearing completion and as the bar dropped into the nut the threads were somewhat torn. Luckily, the lathe was stopped in time, and the damage was not sufficient to necessitate the scrapping of the nut. The operator however has received his lesson.

and needless to say he is now very careful to remove all material that might cause a repition of a like trouble.

FIRST PRINCIPLES IN THE USE OF CORES.

By D. A. Hampson

TO the person uninstructed in foundry practice, the subject of "cores" is shrouded in mystery—a state of mind intensified by the somewhat gruff way in which one's patterns are turned down by the foundry foreman because of lack of cores and by the reticence in volunteering any information that will enlighten.

Very little work that requires the use of castings, either iron, steel, brass or aluminum, but necessitates the use of cores as well. Fundamental principles of cored work may be acquired by a beginner with a little study; these being all anyone needs unless he is actually engaged in the mechanical trades. If the beginner has mastered the rudiments of pattern work in its relation to the foundry, he will have little trouble in understanding core work. Briefly, a pattern makes a space in the sand mould that is filled with molten metal which, cooled, becomes the casting. This casting will be (except for shrinkage and defects) of the same size and shape as the pattern and will be a solid mass of metal. Now it is evident that if some piece, say a rod, were stuck through the center of the mould before pouring and could be withdrawn after the metal had cooled, a hole would have been formed in the casting. This hole would be a "cored hole" and the rod that formed it would be a "core". All cores are but this same thing in varied and more complicated form.

Taking a concrete example, consider the casting, Fig. 1, that is required to have a rectangular hole through it. The pattern would be made, as Fig. 2, of the same size and shape as the casting, but solid, and at the ends where the mouth of the hole is to be, a block is added of the same cross section as that of the hole required, and of a length depending on the size of the casting—an average length might be one inch. These blocks, one at each end, are called "core prints" or just "prints".

Their function is to form a print or depression in the sand mould that will locate and support the core itself. Fig. 4 shows the depression in the mould formed by the core prints; likewise the larger space which the pattern proper has left. The other "half" of the mould contains no print, simply a depression left by the pattern beyond the surface of the prints.

Cores are made of sand, flour, glue, and molasses in various proportions according to the class of work. They are shaped in a mould and baked in an oven until they are hard, after which they are ready to take their place in the sand mould. Cores are formed in a mould called a "core box" usually made of wood, the box having the size and shape of the hole in the casting plus that of the prints on the pattern. (In all that has been and will be said, it is assumed that the reader knows that due allowance has to be made for the shrinkage of metal in cooling.) The core box for the casting, Fig. 1, is shown at Fig. 3. The space formed by the rim around the under board is measured in accordance with the rules just related. It is filled with the plastic core mixture level with the top, and the box is then inverted, dumping the core out. From this latter the shop name of "dump box" is derived. Dump boxes are simple and cheap and answer very well for plain work. The core mixture, though plastic, is sufficiently stiff to retain its shape long enough to get into the oven for baking.

A mould with the core set will be seen at Fig. 5. This view shows a core in place, and incidentally how a pattern may be bulky and solid while the casting produced may be extremely light and anything but solid. The hot metal after pouring disintegrates the materials of the core, and what remains of it on the finished casting is cleared off just as is the adhering moulding sand.

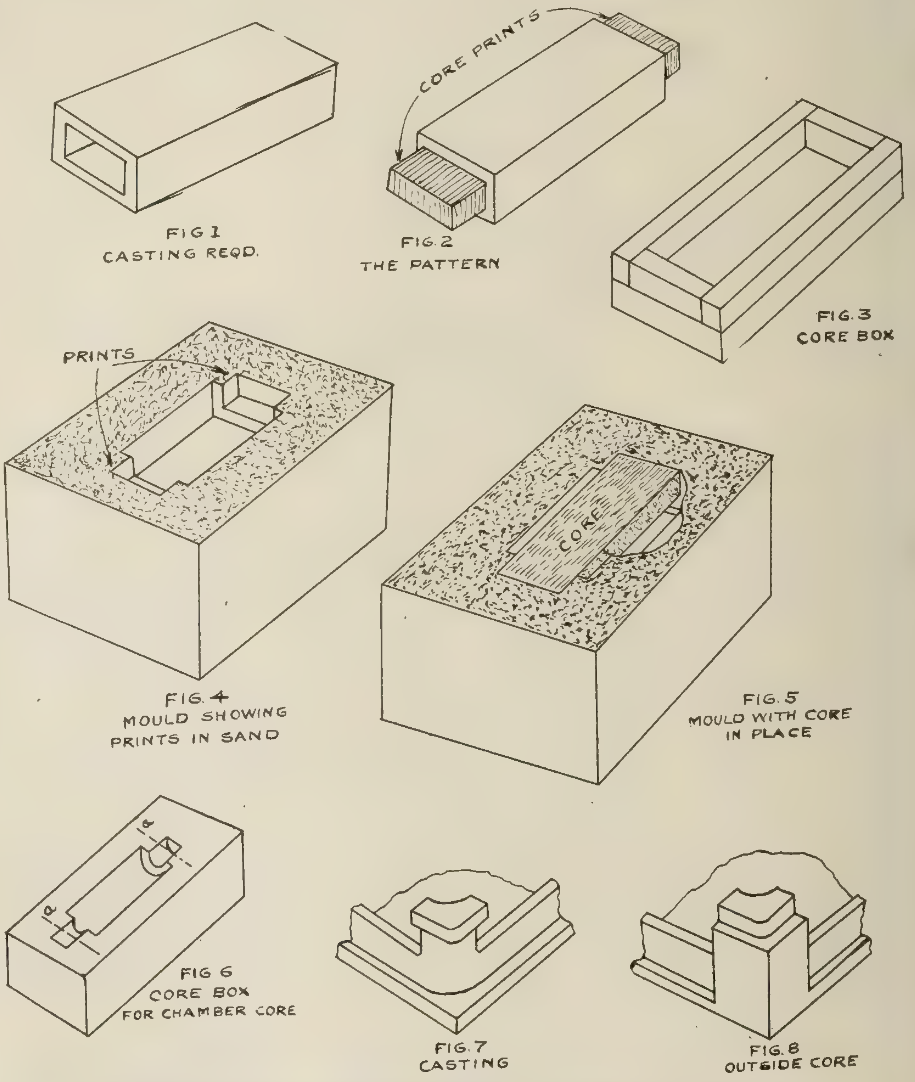


FIG 1
CASTING REQD.

FIG. 2
THE PATTERN

FIG. 3
CORE BOX

FIG. 4
MOULD SHOWING PRINTS IN SAND

FIG. 5
MOULD WITH CORE IN PLACE

FIG 6
CORE BOX FOR CHAMBER CORE

FIG. 7
CASTING

FIG. 8
OUTSIDE CORE

ILLUSTRATING FIRST PRINCIPLES IN THE USE OF CORES.

Cores which are symmetrical are very often made in half boxes, that is—the face of the box is the center place of the core, and the depression is one half of the core. Two half cores are made in the box and are pasted together before baking. Fig. 6 shows such a half box, and illustrates as well another important point. In this case, the casting is to have a cylindrical core through it but the diameter is to be of two sizes—small at each end and larger inside—forming an interval chamber. Such a core is called a "chamber" core. Its applications are numerous. Generally, when it is desired to have a bearing for a shaft at the two sides of a casting with a clearance space through the center—a chamber core is used. In Fig. 6, the length of the casting is from (a) to (a).

An outside core is a slight digression from the fundamental idea of a core in that it produces a "hole" on the outside of a casting. The portion of a casting, Fig. 7, shown inverted, is one leg of an iron topped table that has a projecting rim around the top and a foot at the end of the leg. While there are various ways to make this, the inexperienced person would do well to use an outside core making the pattern and its print as in Fig. 8. The construction of the core box will suggest itself if the general idea of those previously described has been comprehended.

Cores are second in importance only to patterns themselves. One of the highest developments of core work may be seen in the block castings for six and eight cylinder motor car engines. Taken throughout, the subject of cores is full of interest.

* * *

FUTURE TRADE POLICY

THE accusation is sometimes brought against our Chambers of Commerce, Manufacturers Associations, Boards of Trade, and kindred bodies, that, while they pass many excellent resolutions from time to time, urging the Government to take steps with a view to maintaining an increasing trade after the war, they have not formulated any precise proposals as to the manner in which these objects are to be brought about. It might perhaps be pleaded on their behalf says a writer in the Liverpool Journal of Commerce that it is outside the province of Chambers of Commerce etc., to do more than indicate broadly the policy which in their opinion should be adopted, and that it should be left to the Government to devise the means of carrying their recommendations into effect. It is surely obvious, however, that business men must be the most competent judges not only of the best policy to pursue in the interests of British or Empire trade and industry, but also of the machinery best adapted to carry that policy into successful operation. The London Chamber of Commerce has brought forward certain definite proposals for meeting the trade problems of the war, and being in the direction above indicated, it should receive the careful and favorable consideration of the Government.

In February last, the London Chamber of Commerce passed a resolution in the following terms:—"That the Government shall render impossible a return to pre-war conditions by considering the question of preference between all parts of the Empire and Allied countries, the favourable treatment of neutral countries, and the regulation by tariffs or otherwise of trade relations with enemy countries." The Chamber has now taken a further step forward, and has shown how the objects named in the resolution can be carried into effect.

The executive council has adopted a report of the Special Committee on Trade during and after the war, which states that the committee have considered the best methods of giving effect to the recommendations of the above resolution, and are of opinion that they can be largely carried out by means of a tariff. Practically no objections have been raised by the business community to this course, and, the report says, there seems to be a general recognition of the fact that, while prohibition from the enemy countries is effective during the war, it does not assist the equally important object of arranging for preferential reciprocal trading with the outlying parts of the Empire and Allied Countries.

The committee, therefore, have come to the conclusion that a tentative tariff for, say, five years on an ad valorem basis, might be applied almost immediately. Assuming the adoption of a tentative tariff, the committee suggest the appointment of a Royal Commission to consider the necessity or otherwise of altering the system of ad valorem duties to specific duties, and of increasing or modifying such duties.

Triple Application Tariff

The committee go even further than this in their practical suggestions. After consulting representatives of the various interests concerned, they have formulated a scheme for a tentative tariff, which, we venture to hope, will be adopted in principle by the Government. It provides a three column tariff, giving "general" "maximum," and "minimum" rates of duties. The maximum rates are for enemy countries, the minimum rates for British Possessions and our present Allies, and the general for neutral countries.

Thus, on imports of wholly manufactured goods from British Possessions and our Allies, the minimum rate would be 10 per cent., the Dominions being entitled to a reduction equal to the preference they accord to the Mother Country. From neutral countries the rate would be 20 per cent., with a surtax equal to the preference given to other countries; and from enemy countries the rate of duty would be 30 per cent. Similarly, with regard to semi-manufactured goods for further use in manufacture, the proposed rate of duty on goods from within the Empire and from the Allies would be 6 per cent.; on the goods from the neutral countries 10 per cent.; and on enemy goods 15 per cent. Raw foodstuffs would come in free from the Dominions and our Allies, while those from neutral countries would pay $2\frac{1}{2}$ per cent., and from enemy countries 5 per cent. On manufactured foodstuffs the rates suggested are $2\frac{1}{2}$, 5, and $7\frac{1}{2}$ per cent. respectively.

It is not proposed to put any duty on raw materials, from whatever quarter they come, while the duties on wines, spirits, tobacco, and other articles now dutiable, might be maintained at their present rates during the period of the tentative tariff, plus 30 per cent. for imports from enemy countries. It is also suggested that special duties should be imposed on enemy shipping using the ports of the Allied Countries with preferential treatment for British Empire shipping.

The proposals made in this tentative tariff have been carefully thought out by a body of experienced business men, and are well worthy the consideration of the Government and of all who are interested in the commerce and industry of the country. The scheme does not profess to be a perfect one, but it will (1)-provide additional revenue, calculated at about 375 million dollars; (2)-establish Imperial preference; (3)-increase trade with our Allies; (4)-give a moderate amount of protection to British labour and capital; (5)-provide a means for future tariff negotiations with neutral countries; (6) penalise the trade and shipping of present enemy countries with the British Empire and Allied countries.

It is recognised by men of all parties that the attainment of these objects is necessary not only to our industrial and commercial prosperity, but to our very existence as a great Power, and it is clear to everyone that they cannot be secured except upon the basis of a scientific tariff framed on lines similar in principle to those above laid down.

* * *

FORWARDING OF DOCUMENTS

BILLS of lading and consular invoices should be forwarded promptly to the consignee of the goods, so that they may be in his possession at the time of the arrival of the shipment, or even before, if possible. Should the consignee be without these documents when the goods arrive at their destination, they might have to be stored at his expense and risk, or he might be compelled at an inconvenience, to give a bond for the production of the papers. When consular invoices are not required, shippers should forward to the consignee itemized invoices, showing the quantities, brands, grades, prices, etc., of the different goods, for the purpose of entering same at the custom house abroad.

Single Purpose vs. Automatic Multi-Cutting Machines

"Automatic Manufacturer's Criticism"

The subject matter of the accompanying article constitutes, as will be noted, the criticism of a contribution which appeared under the above title in a recent issue of the Automobile Engineer. In view of the development of single purpose machines for munitions manufacture in Canadian plants, a perusal of what follows should be found unusually interesting.

IN a recent issue of the "Automobile Engineer," the writer of an article under the above heading, attempts to show the advantages of manufacturing by simple operations done on simple process machines, in preference to the more elaborate operations done on automatic turning machines. He takes as his example the methods which are extensively used on shell work, and his article suggests that the use of automatic turning machines for large quantities of repetition work, such as is met with in automobile practice, is not the paying proposition that the makers of such machines claim; also that the tendency of future workshop practice will be towards the use of simple lathes operated by unskilled labour.

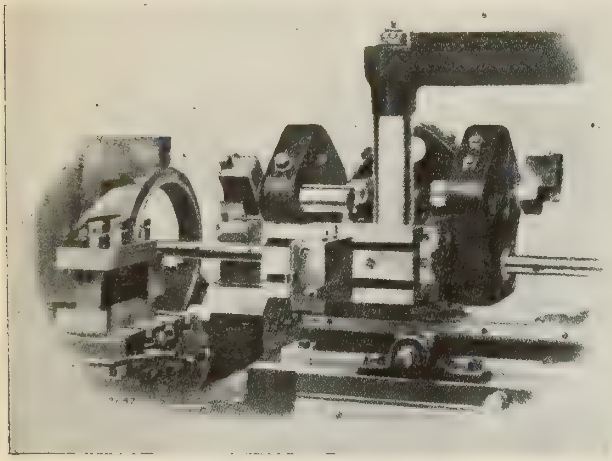


FIG. 1.

The Automatic Challenge

As makers of the latter, we—Alfred Herbert Ltd., Coventy, England have at least a first hand knowledge of our subject, and can hardly be expected to let such statements go by unchallenged. It has never been claimed that all work is suitable for automatic turning machines, and the analogy between shell manufacture and automobile manufacture is not a fair one, for a large amount of shell work is quite unsuitable for production by automatic turning machine methods, whereas on the larger shells the operations are long, and can be handled well on single operation machines. The smaller shells, which can be made from pieces cut-off from the bar, are, however, being regularly made on automatic turning machines, at costs with which no simple machine can compete, and as the tooling of automatic turning machines for shells which are made from pieces of bar material is very similar to the tooling of automatic screw machines, it rather weakens the case for simple lathes for our contemporary to rule automatic screw machines entirely out of the discussion

Initial and Installation Cost of Automatics

It is stated that the automatic turning machine is expensive, and the cost of installation high. This is certainly true, if the standard of comparison is the engine lathe, but the automatic turning machine is very little more expensive than a turret lathe of equal capacity. Since by the use of multi-cutting tools, the output of automatic turning machines it admittedly higher than that of an engine lathe, it follows that the number of engine lathes required for a given production will greatly exceed the number of automatic turning machines, and consequently the cost of automatic turning machines will compare favourably with the cost of engine lathes of equal productive capacity. Against the simple lathes are also the facts that they need more floor space, more operators, chucks, belting, power, lighting , and other contingencies, which, although not appearing in the first cost, all make the automatic turning machine the more profitable investment.

Another very important disadvantage in the simple lathe plant is that a very large volume of work must be put in hand at one time if all the lathes are to work simultaneously, as is suggested, and the inequality in the time for each operation must make it difficult to balance the output. We are told that the setting up of automatic turning machine tools is a lengthy operation, and consequently expensive. It will probably be found, however, that this setting up time is no more than the aggregate time for setting up the numerous simple machines, which perform the equivalent operations on the automatic.

The necessity for tools of special design and shape is also stated to be a disadvantage of the automatic turning machine. This may be assumed to include such tools as forming cutters, and it would be interesting to know how the simple lathe would handle any forming operation except with a tool of the same design as used on the automatic turning machine. The argument that special cams are required for each piece of work does not refer to the machines of our manufacture, which are fitted with our patent self-selecting feed motion , a feature which enables any tool to be used with the most suitable feed without changing the cams.

Low Labor Cost of Automatics

The most important feature of the automatic turning machine is undoubtedly the extremely low labour cost of operation obtained by the fact that all the cutting tools are automatically operated, while the only manual work necessary, apart from tool setting, is for the pieces to be put in the chuck, and removed when finished. This enables one operator to attend to from three to six machines, depending upon the length of the operation. It is therefore, misleading to say that since "the low operation costs are dependent upon the number of machines installed,......a considerable amount of money must be spent on automatic machinery before they can be operated on an economical basis." It is obvious that if only two machines were installed, it would still be an economical proposition, for the labor cost would be reduced directly one man operates more than one machine. The maximum saving would be obtained when from four to six machines were put

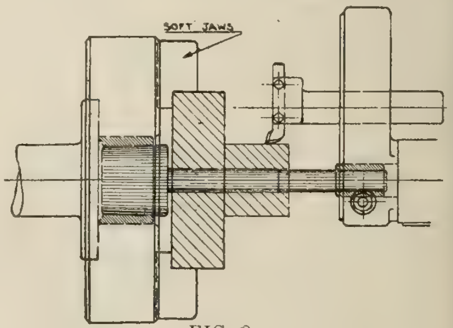


FIG. 2.

down, as any further extension of the battery calls for a proportionately greater number of operators.

Supervision Feature

The advocate of simple engine lathes tells us he "is given to understand" that the automatic turning machine can be operated by unskilled labor, and deduces from this that it is, therefore, necessary to give the operators a great deal of supervision. As in the opening part of his article, he states that the use of simple lathes was necessitated by the shortage of skilled labor at the outbreak of war, it is difficult to reconcile the two statements, especially as admittedly, the use of automatic turning machines reduces the number of operators necessary.

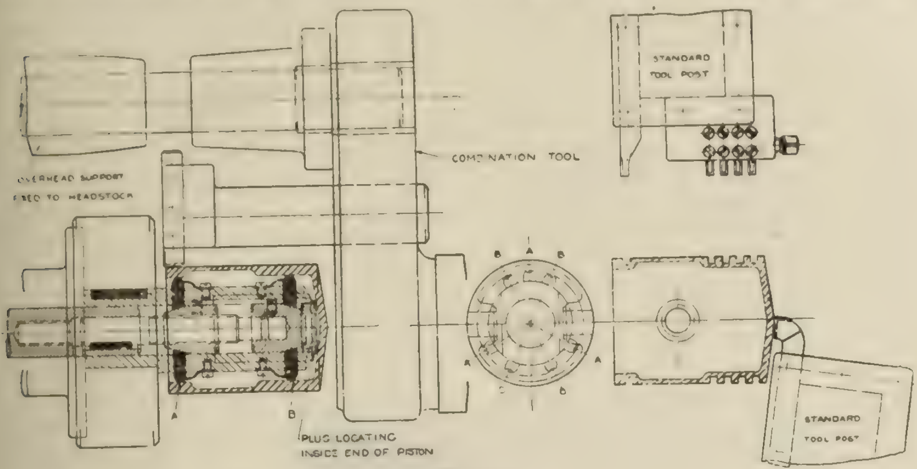


FIG. 3.

Skilled supervision in tool setting and gauging is equally as necessary on simple lathes as on the automatic turning machines, while the latter machines are the less likely to produce inaccurate work, as of course, the diameters and lengths produced by the cutting tools are all determined by stops. The argument is also advanced that castings or forgings to be used on automatic turning machines must be made to very fine limits at some additional cost, so as to make them as uniform in shape as possible. A shop manufacturing by modern methods, and turning out work in sufficient quantities to justify the installation of automatic turning machines, would of necessity be using machine moulded castings and drop forgings, the commercial accuracy of which is quite sufficient for the automatic turning machines, and therefore involves no additional expense on this account.

Tool Cost of Automatics

The high cost of tools, has always been stated to be one of the disadvantages of the automatic turning machines, but the fact is lost sight of by the simple lathe advocate, that many of the tools used on automatic turning machines are common to the hand operated turret lathes and engine lathes, so that many of these will already be in existence. The most expensive part of the tool outfit of the automatic turning machine is the combination tool holders. These, however, are common to practically every piece of work which can be put on the machine, therefore, although the cost of the first set of tools may appear high, the extra tools necessary for each successive sample becomes less as the scope of the work increases, so that the greater the variety of work, the smaller is the proportionate tool cost. The argument that there is a large amount of capital locked up in the tool stores is therefore fallacious, when it is realized that the cost of the particular part of the tool equipment peculiar to each article is small.

Cutting Speed Bogey

The writer in the "Automobile Engineer" seems to be under the impression that it is necessary to use cutting speeds on an automatic turning machine much slower than those used on the simple lathe, in order to obtain a longer life of the cutting tools before regrinding. These precautionary slow cutting speeds are unnecessary if the tool layout is correctly designed. The cutters which do the bulk of the work, and need regrinding oftenest, are obviously the roughing cutters, the setting of which need not be accurate, and which consequently can be sharpened and replaced quickly when they give out.

It is very questionable whether slowing down the cutting speeds really does lengthen the life of the cutting tools; if measured in hours it certainly may appear to do so, but the output per grinding will be found to be much the same, whether the machine is run fast or slow, within reasonable limits. The idle or non-cutting motions of the automatic are carried out on a fixed fast feed, and on a piece of work taking 20 minutes to machine, only one minute is non-cutting time, a negligible proportion.

Work Distortion

On automatic turning machines several tools are often cutting simultaneously, and it is suggested that distortion is caused by this. This again is entirely a question of correct tool designs. After the roughing cuts, it is not to be expected that the work is true, but the finishing cuts remove all this inaccuracy, and when correctly set, remove only a minimum amount. It would be extremely bad tool design to arrange an accurate finish turning cut at the same time as a rough grooving operation, and no one familiar with good tool practice would think of doing so.

It is also suggested that in order to stand the strain caused by the multi-cutting tools, the work must be of a robust nature, otherwise it will be distorted in chucking. This again is entirely a question of correct chucking, and the provision of suitable chucking pieces of clamping arrangements makes this objection disappear. An instance of a frail piece of work chucked on an automatic turning machine is shown in Fig. 1. This is an end shield of an electric motor, which has to be machined to very fine limits of accuracy. The driving is done from the central web by means of a plate fitted to the chuck. At this point, the work is stiff, and there is no possibility of distortion. The chuck jaws grip the work lightly round the rim, and only serve to centralize the work.

When a high degree of concentricity is required between the outside diameter and the bore, the fact that the outside diameter and the bore are machined at the same setting will ensure this, providing the boring bars are piloted in the chuck. At the second operation where the diameter has to be machined true with the previously finished hole, the required concentricity may be obtained by using a chucking arrangement as in Fig. 2. In this case, the work is gripped by the soft jaws of a Coventry chuck, and located central by a peg fitting in the bore. This peg extends into a bush carried in the combination tool, and ensures the work being turned true with the surfaces finished at the first operation. If this degree of accuracy is still insufficient, the obvious way to finish is by grinding, and no one familiar with modern shop practice would suggest finish turning on a mandril in a lathe.

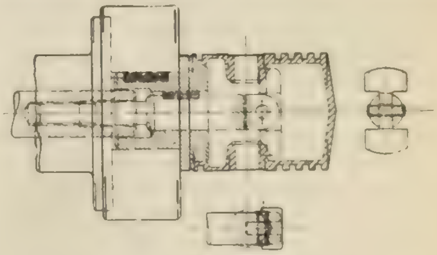


FIG. 4.

In selecting a concrete example for discussion in relation to the arguments advanced for the simple lathe, the writer in the "Automobile Engineer" takes a piston, which is probably the kind of work on which the simple lathe would make the best show. The design selected is shown in Fig. 3, and it will be noted that the dome of this piston is a straight bevel, which has obviously been chosen so that the hypothetical piston can be faced by a straight cut from the compound rest. The sequence of operations suggested for machining this piston on the ordinary lathe has evidently been drawn up by some one unfamiliar with the best practice in this work, and in brief, is as follows:

1.—Bore and face open end of piston, holding by the outside diameter in a lathe chuck.

2.—Mount on face plate chuck, and rough and finish turn outside diameter.

3.—Rough and finish face end.

4.—Rough and finish groove for piston rings, and form clearance around gudgeon pin boss.

It will be seen from operation (1) that gripping by the outside in a chuck does not ensure the inside black surface running true, as the inside may be eccentric, and therefore the walls will not be of even thickness when the outside is turned. Neither will the dome of the piston be of uniform thickness, as no provision is made in operation (1) for facing the open end the correct distance from the inside end. It should also be noted that if the simple lathe process is carried out to its logical conclusion, operations (2), (3), and (4) will each have to be split up into two further operations each, namely, roughing and finishing, making seven operations in all.

Production Comparison—Automatic

Compare with this, our method of machining the same piston on an automatic turning machine, as shown in Figs. 3 and 4. At the first operation (Fig. 3), the piston is gripped from the inside by the special expanding arbor operated by rod and hand wheel. The turning is done from the turret with the combination tool, while to face the conical dome a very simple method is adopted. The strip which clamps the cross slide to the bed shears is removed and instead are fitted two tapered strips, one on each side of the shears. This has the effect of inclining the cross slide to the spindle at an angle determined by the taper on the strips, and angular facing thus becomes as easy a matter as straight facing.

It will be noticed that by the method above described the dome of each piston is turned to an equal thickness, as the inside of the dome is pushed to the same position on the arbor every time. This makes the subsequent operation of finishing the open end to a definite length an easy matter.

The turning and the rough grooving proceed simultaneously, and it will be noted that the tools, apart from the combination tool, are no more expensive or elaborate than would be used on the simple lathe. The combination tool is, of course, part of the standard equipment, and is not peculiar to this work any more than is the saddle of the ordinary lathe.

It is very important to notice that each simple lathe requires its own chucking arrangement, so that if these are considered as part of the tool equipment, as they certainly should be, the cost of the automatic turning machine tool outfit will compare very favorably with that of the simple lathes. The time of production for this operation on the automatic turning machine on a piston, say 4½ in. diameter, 5⅝ in. long, would be 8½ minutes; allowing one minute for chucking, this makes a total of 9½ minutes. Doing the same operations on a simple lathe, using the same feeds and speeds, would take 10½ minutes; with three chuckings at one minute each, this makes a total of 13½ minutes.

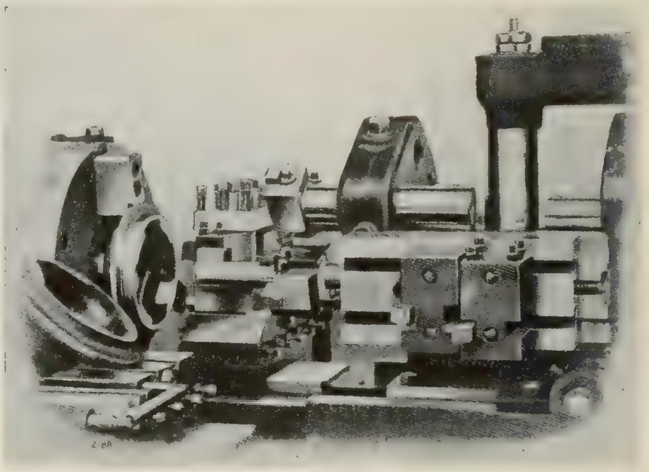


FIG. 5.

By our method, the next operation is to bore and face the open end of the piston, holding it in soft jaws, and using an ordinary lathe. The fact that we recommend this type of machine for this operation shows that we are not so biassed as to advocate automatic turning machines for every operation. This operation is common to the simple lathe process (operation 1), and therefore need not affect the comparison.

The next operation is done on the automatic turning machine, and the piston is now drawn back by the gudgeon pin bosses on to a face plate fixture (Fig. 4), which spigots in the open end. It will be seen that this holds it entirely without distortion. A finishing cut is then taken over the outside, so as to leave sufficient for grinding. The grooves are finish formed, and the end of the piston faced, the tool layout being exactly the same as shown in Fig. 3, except that there is another tool used to form the clearance around the gudgeon pin bosses. The machining time is seven minutes, and the chucking time one minute, which make a total of eight minutes. The equivalent operations done on the engine lathe at the same feeds and speeds would take ten minutes, and the chucking time three minutes, which makes a total of thirteen minutes.

Product Comparison—Labor Cost

We may now proceed to investigate the comparative labor cost of production by the two methods, and in doing this, we will base our figures upon actual labor costs, which have been furnished us by a firm using both automatic turning machines, and female labor on simpler machines. In this particular works, there are eleven automatic turning machines, which are run continuously day and night. The day shift consists of a skilled tool-setter, an improver who is also able to set up the smaller machines, an unskilled feeder, and a boy. The night shift consists of two unskilled feeders only, as the setting up is done entirely by the skilled man on the day shift. The average labor cost per machine per hour of this battery is at the present time 3.6 cents. On the simpler machines, where female and boy labor is employed, the labor cost per machine per hour is 8 cents; all classes of operators on both types of machines are in addition making a bonus which averages 85 per cent.

On the piston under consideration, the total time of production on the automatic turning machine is 17½ minutes, which gives a labor cost, exclusive of setting up time and bonus, of 1.04 cents each. On the simpler lathes, the time of production is 26½ minutes, which gives a labor cost of 3.5 cents each, exclusive of setting up time and bonus. It will thus be seen that the cost of production on simple lathes is between three and four times the cost of production on automatic turning machines, while on the other more involved work, such as front and rear wheel hubs, differential gear cases, differential boxes (Fig. 5), and gears, the automatic turning machine will show even greater savings.

Miscellaneous Comparisons

In the article in the "Automobile Engineer," the writer concludes by citing some instances of work which was produced on automatic turning machines, in which comparison is made with a time of production on simple lathes to the advantage of the latter. We have investigated these times of production very carefully, and are safe in saying that they reveal the fact that the automatic turning machines were being improperly run, either from lack of correct tool equipment, or other causes.

An instance is given of a pulley, 10-in. diameter by 4-in. face, which was machined in 42 minutes; in the ordinary way, we would guarantee to machine this in 23 minutes. Another pulley was 12-in. diameter by 6½ in. face, and was machined in 61 minutes; the time of production for this should have been no longer than 40 minutes, if the machines were running properly. In another instance, a gear wheel 10-in. diameter by 1-in. face, was being machined in 18½ minutes; the time for this should not have exceeded 9½ minutes. The last instance was a 6-in. cone pinion, which was machined on the automatic turning machine in 63 minutes, whereas, the time should not have exceeded 27 minutes.

The times in which these articles should be produced on automatic turning machines according to our calculations, are such as we should be prepared to guarantee, and we do not think we shall be accused of boastfulness, when we say that "we fulfil our guarantees."

CANADIAN PACIFIC OCEAN SERVICES

ALL the steamers of the Canadian Pacific Ocean Services are again in commission on their old route, and it is needless to say their return has been welcomed by travellers and shippers alike throughout the whole of the Far East. The resumption of this service has brought about certain changes in the personnel of the executive staff of the Company in China and Japan. The following list of changes has been furnished.

J. W. Wallace, appointed to general agent, Hong Kong Territory: Hong Kong, China, Straits Settlements, and India; relieving D. W. Craddock, who goes on leave of absence.

L. E. N. Ryan, of Samuel, Samuel & Co., Yokohama, appointed agent, Shanghai, relieving H. Thomas, acting agent, resigned.

A. J. Blaisdell, of St. Louis, appointed general agent, Passenger Department, Territory Shanghai and North China; new position.

T. G. Turnbull, appointed passenger agent, Shanghai.

P. D. Sutherland, appointed general agent, Passenger Department, Hong Kong new position.

J. R. Shaw, appointed passenger agent, Manila.

F. M. Flanagan, appointed passenger agent, Kobe.

POST BELLUM GERMAN MARKETS

THE new directorate of the Manchester Chamber of Commerce decided to consolidate their position by asking for a decisive opinion of its members as to the trend of policy which would best secure the future of the well-being of the trade and industry of the British Empire. The Chamber in their resolution, which has now received the general sympathy of its members, considers it essential that after the war the same facilities for trade with the British Empire should not be allowed to our enemies as those granted to our Allies and to neutral nations, and particularly that steps should be taken, not only to render dumping impossible, but also to eliminate effectually enemy influences so active in operation prior to the war. The Chamber also urge that immediate consideration be given by the Government to the desirability of preferential reciprocal trading relations between all parts of the British Empire and as far as possible our Allies.

CANADA'S EXPORT TRADE

CANADA'S export trade continues to expand, but it may be noted that her imports are also showing substantial monthly increases. For five months, January to May inclusive, total imports to this country amounted to $283,605,680, against about $170,000,000 for the corresponding period of last year. The following table shows exports by months from January to May, with the increases over the corresponding months of last year:

Month	Total	Increase.
January	$ 85,559,782	$54 729,445
February	58,879,321	26,227,332
March	89,772.422	20.089,603
April	55,372,720	19,115.445
May	106,000,000	61,023,623

Exports of agricultural products in May reached the high figure of $47,433,750, as compared with $12,746,727 a year ago. The movement abroad of manufactured goods is about 75 per cent. greater than last year, as the following indicates:

Month	Total.	Increase.
January	$47.015.283	$39.246,137
February	28 606.680	19,624,041
March	47,013.766	31.412.986
April	21,573.078	8,351,420
May	27,734.477	11,613,328

APPRECIATIONS OF SIR GEORGE FOSTER

LORD NORTHCLIFFE paid a neat compliment to Hon. Sir George Foster, Canada's Minister of Trade and Commerce, on June 24, at the Australian dinner in honor of Premier Hughes, of Australia. In supporting the principal toast, Lord Northcliffe said he did not know why a plain man of affairs should be called upon when there were assembled at the table probably the five best orators of the British Empire namely Lord Rosebery; that most eloquent of all Canadians, Sir George E. Foster, Lord Grey, Col. Winston Churchill and Premier Hughes, of Australia.

Reynolds' Newspaper, in an open letter extending a welcome to Sir George Foster, credits the Canadian Minister of Trade and Commerce with a magnetic personality, great vision and high ideals, combined with practical experience as a man of affairs.

GAS ENGINES FOR BLAST FURNACE GAS

IN a paper by Professor Hubert, Liege University, Belgium, before the Iron and Steel Institute, it is noted that the utilization of blast furnace gas in gas engines may be considered to date from 1894, when experiments were begun by B. H. Thwaite at the Glasgow (Scotland) Iron Works, and almost contemporaneously similar experiments were independently made at Seraing, Belgium, and at Hoerde, Germany. In 1897 the Cockerill Co., at Seraing, after experimenting on an 8-h.p. engine, built the first large blast-furnace gas engine, developing 200 h.p. This engine, put into operation in April, 1898, consumed 3,329 cu. m. of gas per horsepower hour. The calorific power of the gas was 981 calories per cubic meter. From this point rapid progress was made, until at present engines of 8000 h.p. in 4-cylinder types, and of 3200 h.p. in 2-cylinder types have been built by the Cockerill Co.

The Cockerill Product

The latest type of engine built by them has had unusual precautions taken with it to avoid the accidents common to all large gas engines, such as fractures of the cylinder heads, pistons, piston rods, connecting rods, and the bending or breakage of crank-shafts. Higher average working pressures are obtained by the use of a built-up piston, bolted to a ring forged on a rod. The mass of metal presented to the gas flame is reduced, thereby avoiding the danger of pre-ignition or premature explosion. Pressures of 78 lbs. per sq. in., instead of the usual 64 lbs. can be allowed, thereby securing higher compression and insuring high thermal efficiency and a limited gas consumption.

The governing mechanism allows a speed variation of plus or minus 2 per cent. for driving dynamos, while a hand mechanism permits of this being varied, while running, from 10 to 15 per cent.

The conditions of wide speed variation required by blowing engines have been met by a new system of governing which permits the mean speed of the engine to be adjusted as desired to 49, 90, 126 and 262 r.p.m. and to be further varied by governing within 50, 24, 16 and 11 per cent. respectively of the mean speeds.

Other Successful Products

Of successful gas engines of other types probably the most interesting are the high-speed vertical, multi-cylinder engines built by the British Westinghouse Co., and the National Gas Engine Co. These consist of units compounded together, each comprising two vertical single-acting four-cycle cylinders, the pistons of which are mounted on the same rod. Each unit drives a crank on the engine shaft and develops, usually, 250 h.p. Increased power is obtained by increasing the number of units. The engines run at from 200 to 250 r.p.m., which permits of their use for driving turboblowers. The weight per horsepower of these engines is only about one-half that of horizontal, double-acting, two-cylinder tendem engines.

Blast Furnace Gas Utilization

The latest development in the economic utilization of blast-furnace gas consists in passing the exhaust gases from the gas engine through a boiler and economizer, wherein steam is generated at a pressure of about 114 lbs. per square inch. The amount of heat carried off in the exhaust from the engines may be as high as 2600 B.t.u. per horsepower hour. In the arrangement adopted at the Cockerill Works, the gas enters the boiler at about 450 degs. Fah., and is reduced in the economizer to 230 degs. The gases from four gas engines aggregating 5000 b. h.p. are now employed in this manner.

About 1.93 lbs. of steam per electrical horsepower of the engine are generated by this means, developing about 650 h.p. in a steam turbine. The boilers recover about 55 per cent. of the heat of the gases and increase the thermal efficiency of the engine about 13 per cent. With an installation of four blast-furnace gas engines, developing 10,000 h.p. and costing $380,000, the cost of the recovery appliances (boilers and turbine) is put at $46,000. With interest and redemption of capital taken at 13 per cent., and with an annual outlay of $2,000 for wages and maintenance, the saving to be effected by the recovery of the heat in the exhaust will amount to approximately $19,400 per year.

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BOOTS FOR RUSSIAN ARMY

A SPECIAL article in a recent issue of the Yorkshire Post gives some interesting information with regard to the millions of boots which British manufacturers are turning out for the Russian Army. In the course of his remarks the writer says: The British Army Contract Department are now making rapid progress with the details regarding the 9,000,000 pairs of boots of several types which are required from British boot and shoe manufacturers to meet the needs of the Russian Army.

This order is by far the largest ever undertaken in Britain, and the magnitude of the task will be grasped when it is stated that 3,000,000 were required for delivery before the end of June. To assemble the various kinds of leather required to produce on an average more than 55,000 pairs of boots per day so as to keep to the time stipulated, involves very great skill and complete organization, in order that all the machinery may be kept working up to its full capacity. The boots are of weights and sizes for giants, and the Russian troops for whom they are intended must be men of magnificent physique. The sizes run from 10's to 15's, and 7 lb. to 8 lb. per pair are quite common weights. With boots of this special character, and of such exceptional sizes and designs, there were enormous preliminary arrangements to make before the machines could get into active operation. Thousands of metal lasts had to be cast, as each boot had to be lasted whilst the various operations were being carried through by the machines, and, of course, different metal lasts have to be used for every size or half-size manufactured.

Then, again, thousands of massive cutting dies of steel (called knives in the trade) had to be manufactured in order to stamp out in a machine the various sizes of soles and upper parts, and also for the heel builders, and distributed in sufficient numbers to every factory where the boots were being manufactured. Duplicate sets were also required for the purpose of the cutting edges being ground and sharpened by the boot and shoe engineers. It will be seen that this was a gigantic undertaking, especially when it is remembered that all this is in addition to providing for the ordinary requirements of the general home and Colonial trade for all classes of footwear, and also in addition to meeting the constant needs of the British Navy and the ever-expanding British Army. The great task was only rendered possible by the great revolution in automatic or semi-automatic boot and shoe machinery. By this means production has grown by leaps and bounds in extent, and the character and artistic appearance, especially of ladies' shoes, has been greatly enhanced. A shortage of footwear for general purposes is feared, and intense activity will prevail in the boot industry for many months.

◆

"LEGAL," "NET" AND "GROSS" WEIGHTS

IN arranging consular documents for some countries, it is necessary to state the "net" as well as the "gross" weight. The "net" weight represents the weight of the merchandise in its original package. The "gross" weight is the entire weight of the package as shipped. The New York Journal of Commerce gives the following definitions of net, gross, and legal weight:—

Strictly speaking the net weight of goods is simply the weight of the goods themselves, without any package or container of any kind. The gross weight is the weight of the goods and the package containing them. "Legal" weight is determined in such manner as the particular law in question may direct, and there is no other way to find it except by consulting the law. While net weight is, strictly, such as we have defined it to be, some tariff laws give it a special definition for the purpose of assessing and collecting duties. This is true also of "legal weight," and it is sometimes true even of gross weight, thus actual weight of the goods freed from all packing, receptacles, or wrappers." In other cases dutiable net weight does not include the weight of any common exterior cover, receptacle, package, wrappers or packing, but includes all interior or immediate receptacles. The Mexican definition of "legal weight" is more or less common and is as follows:—

By legal weight is meant the weight of the goods, together with that of their interior packing, such as wrappers, receptacles, card board and wooden boxes, tins, etc., inclosed in the outer packing case in which imported. When goods duitable on legal weight are not inclosed in interior packages, but in one outside inclosure only, the intrinsic weight of such goods will be considered as legal weight. The important point is to note that the law of the particular country in question must be consulted as to the definition of these terms in the tariff act of that country.

◆

Munition Board Orders Cars. — The first order placed for the Russian Government through the Imperial Munitions Board, is for 7,000 box cars, and has been divided chiefly between the Canadian Car and Foundry Co., and the National Steel Car Co. The total is likely to reach 50,000, and orders for locomotives and other railway equipment, except rails, will follow. Manufacturers are being urged to give these preference to munitions orders, as railway equipment is badly needed.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

LARGE SHELL WEIGHING SCALE

OWING to the peculiar nature of the materials and the extreme accuracy required, ordinary weigh scales were found to be not entirely suited to the successful and economic weighing of the shell. The high and low limits in many instances were very close, and the slightest error in registration would often cause considerable inconvenience at the termination of operations. Many scales have been specially designed and constructed for the purpose.

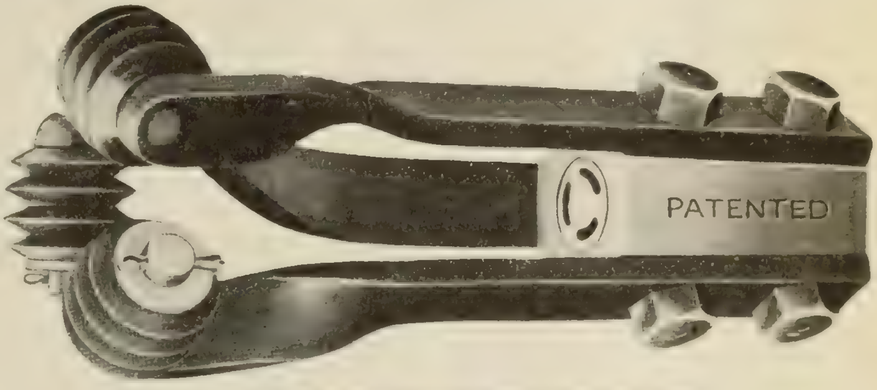
The accompanying illustration shows a shell weighing scale recently designed by the Canadian Fairbanks- Morse Co., of Montreal, its capacity ranging from 6 in. to 12 in. shell diameters. The scale is supported upon a specially constructed framework, erected above a long bench upon which the shells are placed and then rolled on to a special platform that hangs by four rods from the cross beam of the scale. The construction is of the simplest form, the whole mechanism being well balanced, accurate and reliable, besides requiring little adjustment or attention. A relieving device is fitted, and the register guarantee is within $\frac{1}{8}$ ounce of the absolute weight. The scale can be furnished either for use when shells are rolled on, or with a different type of platform when the shells are set on end. A plus and minus beam shows at a glance just how much the shell weight is over or under the required amount.

LARGE SHELL-WEIGHING SCALE

* * *

TUBE SCRAPER

THE tube scraper illustrated, and known as type K.C., is a product of the Babcock & Wilcox Co., Toronto, Montreal and London, England, and forms an accessory to their well known water-tube boilers. A special claim made for this scraper is its efficiency in dealing with hard scale. The scraper is attached to a length of wrought iron tubing screwed $\frac{3}{4}$ in. gas thread, which in turn is connected to a water supply by means of a rubber hose for conveying a small stream of water through the centre of the tool, in order to cool the cutters and wash away the scale removed. A small tap is fixed between the wrought iron tubing and the hose for regulating the water supply. The cutting edges of the rollers are of a radius to suit the size of tube, being contained within a circle the same diameter as the inside diameter of the latter. It will be seen, therefore, that, when all scale has been removed, the rollers will not cut into the surface of tube. To operate, remove the hand-hole caps, insert the scraper, turn on the tap at the top end of handle, and allow the water to flow. At the same time, move the scraper up and down the tube, slightly twisting the handle while doing so, until the apparatus comes out at the bottom of the tube. Twice down is claimed to be sufficient to thoroughly clean the tube.



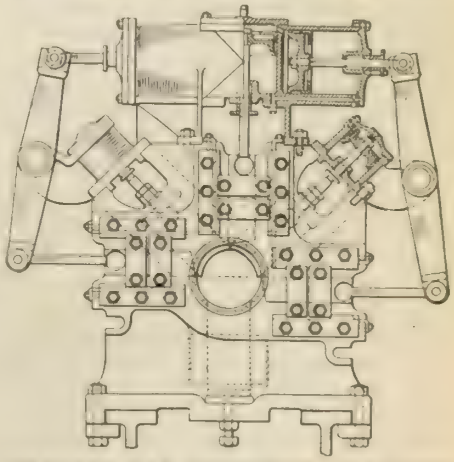
TUBE SCRAPER FOR B. & W. WATER TUBE BOILERS

* * *

IMPROVED BAR CUTTING-OFF MACHINE

THE Southwark Foundry & Machine Co., Philadelphia, Pa., are marketing a new size and type of air-operated cutting-off machine for projectile bar stock, the latter embracing from 7 in. to 10 in. diameters. There is also introduced in its construction a special arrangement for feeding the tools into the stock, and the incorporation of guide cylinders to handle bars that may not be absolutely round.

A heavy cast iron bed supports at one end a quick-acting chuck for gripping the bar, also the gearing to transmit power from the driving motor for rotating the stock. A number of cutting-off heads are mounted on the bed and consist of steel castings with five air cylind-



IMPROVED BAR CUTTING-OFF MACHINE.

ers on each. Three of the cylinders operate the cutting-off tools. Air is admitted at the top of the cylinder and divides into three parts to operate the three tools, the one pointing downward being acted upon directly, while those at the sides are operated through a system of links. The lower tools operate horizontally, and all three tools cut in the same skerf.

The remaining cylinders operate guides which centre the bar in the machine, this arrangement making possible the cutting of bars that are out of round to the extent of ½ in. in 12 ft. The use of compressed air to bring the tools in contact with the work enables the former to accommodate themselves to irregularities in the bar and in some cases bars that are chipped badly have been handled. The piping used to convey the air to the different heads is arranged in multiple, each head drawing its supply directly from the air supply line. All the gears are mounted between bearings and the pinions do not overhang. A flexible coupling is located between the motor and the pinion, the latter being journaled in ring oiling bearings, while a substantial cast iron base is located underneath the motor and pinion bearings.

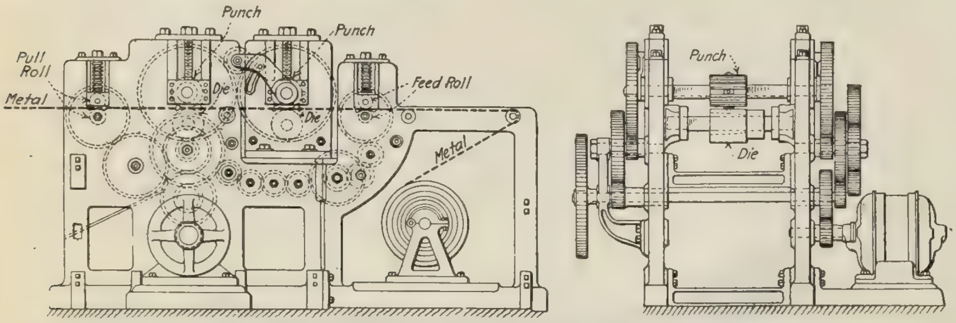
Air cylinders and a small roller table, which is placed in line with the end of the machine, are employed to handle the stock. This air cylinder pushes the bar through the bushings on the cutting-off head into the chuck, and, when the cut in the bar has reached the predetermined depth, the machine is stopped and the air cylinder at the chuck end pushes the bar from the machine on the roller table from which it goes to the breaking equipment. As the bars are handled in full, even after being cut, it is pointed out that the handling is rapid.

The cutting time in seconds is approximately three and one-half times the square of the diameter in inches, the usual practice being to leave about 15 per cent. of the original area uncut for the fracture test required by the specifications of the various governments covering the production of shell blanks. For example, a round bar 10 in. in diameter will be cut from the outside to a point where it may be easily broken in about 350 seconds or a trifle less than six minutes. The illustration is a part sectional elevation of the machine and shows the arrangement for admitting air to the horizontal pistons.

* * *

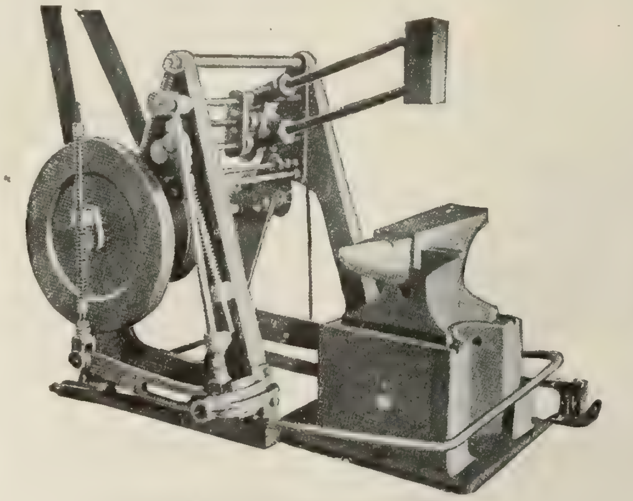
RAPID PRODUCTION PUNCH PRESS

A NEW rotary punch press, in which the punch and the die drums are mounted on independent shafts, has been designed by the Malm Machine Co., Dayton, Ohio. The punch drum is keyed on the punch driving shaft, while the die drum is mounted on an idler shaft, thus allowing it to revolve freely. Upon the punch drum are mounted multiple punches that engage a similar number of dies mounted on the die drum.



RAPID PRODUCTION PUNCH PRESS.

The material is fed from the rear of the machine by automatic feed rollers, and the punchings drop through the die slot into a chute and from there down to containers placed at the front of the machine. The machine is constructed with either one, two, or three heads, for either plain blanking or piercing, blanking or piercing, blanking and forming. The punch shaft makes 50 r.p.m., and if the size of the part to be punched warrants putting 20 punches on the punch drum and the corresponding number of dies on the die drum, a machine thus equipped will turn out 1,000 complete pieces per minute. It is estimated that a 162 h.p. drive for the punch shaft is sufficient for the heaviest work.



MECHANICAL TRIP HAMMER.

The shape of the piece to be punched is immaterial, the thickness of stock can vary from 0.003 in. up to ⅛ in., while a width of 12 in. can readily be handled. This applies to the stock machines, but wider machines can be built. If the material is very thin and comes in spools, provision is made in the form of a winder designed to take care of the spool, but if the material is in sheets or strips, this is placed upon idlers and automatically fed by the feed rollers through the machine.

In addition to punching metal, the machine is claimed to be equally good on fiber or other goods, the speed in punching some classes of material, it is understood, being considerably faster than on a vertical punch press. For making washers up to ⅛ in. thick, an output of nearly ten times the record of vertical punch presses is said to be possible. It is emphasized also that with the rotary principle applied in this machine, a shearing cut is always made even should the punch or die get dull.

* * *

MECHANICAL TRIP HAMMER

THE accompanying illustration shows a very interesting and highly efficient type of trip hammer, for the economic production of small forgings and other blacksmith or machine work. These hammers are made in a variety of sizes, to meet a diversity of needs. The mechanism is so constructed that the motion is conveyed to the head by means of parallel arms, so that the head is always held in a vertical position, and is so designed to allow any reasonable height of tool or thickness of metal to be worked. In some of these hammers provision is made for a lateral traverse of the head, by means of a fine pitch, rapid lead screw, operated through bevel gearing at one end of the machine; as a result swaging, punching, flattening or any similar work may be accomplished.

The hammer is operated by the depression of the treadle around the anvil. The arrangement of the springs is so designed that no accident can possibly occur through breakage. In the heavier types of these hammers, the mechanical features of design are similar, with the exception of the lateral traverse of the head. Where two or more separate operations are required on the one piece, as die or swage work, multiple headed hammers are provided, which possess every means for the exact adjustment of die blocks or swages, and may also be equipped to successfully operate on any desired shape of work.

The striking force of the hammer can be controlled by the variation in the depression of the foot treadle, which is directly connected to a block in a slotted link, one end of which is fulcrumed and the other secured to the lower end of the connecting rod. This rod is held in a neutral position by means of heavy springs, one on either side of the crank, so that the action of the hammer is not a dead blow on the material, and consequently does not chill the work in operation. These machines are intended to operate at an average speed of 130 blows a minute, with a striking force of from 3 to 9 cwts. according to the size of the machine; but so economically is it produced that it takes less than one h.p. when working at its maximum. One of the chief features in connection with this hammer is the elimination of the helper, as one man can operate the hammer at the same time as he handles the work and to much better advantage.

The weight ranges from about 500 lbs. for the smallest size, to over 1800 lbs. for the largest size of single headed hammer; while the multiple headed types vary according to the number of heads and work requirements. These mechanical operated trip hammers are manufactured under the Blacker's Patent, and are being placed on the Canadian market by Alexander Gibb, St. Nicholas Bldg., Montreal.

◆

MARKETING B.C. LUMBER

THE British Columbia Government is actively engaged in investigating new markets for the lumber produced from her immense forests. The stand of merchantable timber in British Columbia, is estimated to reach the enormous total of four hundred billion feet (400,000,000,000) board measure, which is over half the total of all Canada. The annual cut is at present, in the neighborhood of only one and a half billion feet (1,500,000,000), board measure. The forests can, therefore, supply indefinitely a yield considerably greater than that.

British Columbia's location and export facilities demand that every effort be made to secure a full share of the export lumber trade, but the main markets for British Columbia forest products are on this continent. In proportion to population, Canada uses more lumber than any other country. Eastern Canada constitutes a natural field for the expansion of British Columbia's lumber markets, particularly now that the Panama Canal renders direct water shipment possible. The forest areas of Eastern Canada are already unable to supply the local demand. This is clearly shown in the official returns of imports.

MARKET FOR CANADIAN LUMBER IN CUBA

THE following article, forwarded to the Department of Trade and Commerce, by J. C. Manzer, special representative of the New Brunswick Government in Havana, will be of interest to Canadians, showing as it does the wide market in Cuba for lumber, and the part that this island is taking in the industrial activity of the world.

Cuba imports annually about 600,000,000 feet of lumber. This consists, for the most part of pine, spruce and fir, and is imported in the form of inch boards, running from six inches to twelve inches in width; planks two or three inches thick and of various widths and deals sawn to various dimensions to conform with orders received. It is shipped just as it comes from the saw without being planed, and when imported in this form is not subject to duty. The greater part of this lumber comes from the United States, principally from the gulf of Mexico ports, but Canada supplies a large quantity which might be increased to a great extent.

A large part of this lumber is brought on schooners, but since the ferry service between Cuba and Key West has been in operation, considerable lumber from Florida and Georgia is shipped by rail. This lumber on arrival in Cuba is taken direct from the docks to the mills, where it is planed and made ready for building purposes. It is then shipped to all parts of the island. The increasing prosperity of the island has largely increased the demand for lumber of all kinds, but lack of vessels has prevented the necessary supply from being obtained, and consequently has curtailed building operations to a great extent.

The labourers in the cane fields, now that they are getting more pay for their work are no longer content to live in houses constructed of palm leaves, but are constructing wooden houses which are much more comfortable. The clerks in the business houses, many of whom have been living in small poorly ventilated rooms in the crowded parts of Havana, are now getting building lots outside the city where they are constructing houses, mostly of wood, where their families can enjoy the fresh air and sunshine. The business men are also building residences in the suburbs, mostly of brick or concrete, but even these require large quantities of lumber for doors, windows, staging, moulds for concrete, etc.

Spruce and pine from New Brunswick, Nova Scotia and Quebec; also spruce, fir, hemlock and cedar from British Columbia would be suitable for all building purposes in Cuba. Besides this class of lumber, Cuba imports quantities of shingles, thousands of crates for fruit, shooks for packing cases, stave heads and hoops for making barrels, and large quantities of broom-handles. Canadian pine, spruce and fir would be quite suitable for the manufacture of fruit crates and packing cases. These are imported cut in exact lengths ready to be nailed together, and tied in bundles. Birch, maple and ash would be quite suitable for barrel heads, staves and hoops. These arrive tied in bundles, and when put together are used for packing beer. Canadian yellow birch and maple make the best broom-handles.

Canadian lumber will fill nearly all the requirements of the building trade in Cuba; and as Canada is a large seller of lumber while Cuba is a heavy buyer, it would be advisable as soon as the war is over, and conditions become normal again to make an effort to secure a larger proportion of this Cuban lumber trade.

◆

DOMINION REVENUES INCREASE

THE consolidated revenue of Canada for the three months of the fiscal year ending June 30, was $50,772,903.92, and the expenditure was $37,055,289. The revenue from all sources amounted to $56,000,000. Of the expenditure only $10,528,045 comes under consolidated fund account while $26,527,243 is under capital, $22,173,031 of which is war outlay. In the month of June last the war expenditure was $12,439,187.93. During the three months' period the expenditure on both capital and revenue accounts outside of the capital outlay on war has decreased substantially, due to the policy of rigid economy adhered to by the spending departments of the Government. The June revenue increased from $11,433,970 to $17,600,149, the increase being found in nearly all branches including $4,000,000 in customs.

The buoyancy of the Dominion's financial situation is shown throughout the statement. The total assets of the Dominion on June 30 were $420,395,783, as against $257,943,948 a year ago. The net debt increased from $450,287,721 to $593,910,637. The credit that Canada has extended to the British Government now totals $150,000,000, and munition orders to this amount have been placed with her by the Imperial Government.

Canadian deposits on savings account total over $700,000,000, having increased a little over $100,000,000 during the 20 months of the war.

◆

The Storey Pump & Equipment Co., Toronto, have recently installed two Morris turbine pumps, capacity 1,500,000 gallons each, for water supply at Camp Borden.

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CANADIAN MACHINERY
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A weekly newspaper devoted to the machinery and manufacturing interests.
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HAS THE TRANSITION PERIOD BEGUN?

THE lessening demand in Canada and the United States for the smaller size shells is exhibited in the growing tendency to place on the market more or less complete equipments of machine tools and other appliances which have in past months done duty in production of these munitions. While nothing in the nature of a slump in small shell orders is immediately imminent, it is abundantly evident that requirements are being met in large measure within easy range of the various battle fronts. The gradual tapering off, noticeable both in number and quantity contracts for small shells might aptly be termed a "humane" proceeding, enabling as it does a reasonable opportunity for plant readjustment to either the production of the larger type shells or to such a condition as will facilitate return to the spheres of manufacture vacated in the early wartime urgency.

Here and there we find equipments offering, yet so far as we have been able to gather, their disposal has neither wrought hardships on the seller nor on the machine tool market as a whole. It may almost be said that the transition stage from wartime to peacetime production is already inaugurated. Judging from appearances, and having regard to the well-authenticated advices that something approaching another two-year period of active hostilities is being provided for, we are inclined to the opinion that the transition progress is now being steadily and systematically developed and that business disturbance will as a result be free from a succession of more or less intensive outbursts.

The demand for large shells may be said to show little abatement, and, to their manufacture, numerous Canadian plants formerly engaged on shrapnel, etc., are now turning their attention. Purchases of a heavier type of machine tools for that purpose continue to be satisfactory. It is not anticipated, however, that requirements will in any respect approach those of the shrapnel era. Whether significant or otherwise, it is worth noting that the additional financing in Canada on behalf of the Imperial Munitions Board, is, according to report at least, of quite modest proportions compared with that immediately preceding. Naturally, therefore, one would infer that a curtailed munitions output in Canada is in the immediate future highly probable. In any case, the manufacture of munitions and the aspect of the war as its result, have reached a stage at which our metal-working plants may not become too deeply or at least unwisely involved. Such a condition as the latter would materially unsteady the transition movement in its meantime satisfactory progress.

* * *

CANADIAN NICKEL AND THE "DEUTSCHLAND"

THE arrival of a German merchant submarine in an American Atlantic port has re-opened the controversy as to the export of nickel of Canadian origin. Nero fiddled while Rome burned, at least so we are told, and as if one such horrible example weren't enough even in nineteen hundred odd years of the same Christian era, we are asked to sit up and take notice of this latest and equally stupid performance. Digressing just a little more, and perhaps not so, it looks as if German vanity was badly punctured by a recent submarine ocean voyage achievement in which Canada figured to an appreciable extent.

What the Deutschland brought to the United States, and what she or her sisters may be permitted to take back from there, cut very little figure in this day of achievement and enterprise. It was only natural to expect, however, that Canada's little accomplishment in the direction already indicated would be subject for attack and that, if possible where the thrust would be most keenly felt. It was deemed only necessary to advertise the fact that nickel would constitute the major portion of the Deutschland's return voyage cargo, in order to strike us hard. It was well-known in Germany that we were not lacking in advocates of Canadian nickel being refined as well as mined within our borders, and that our nickel resources are easily the greatest in the world. Whether then the Deutschland takes back a cargo of refined nickel of Canadian origin or otherwise, the exploit has succeeded in opening the controversy concerning our nickel export.

On the subject of Canadian nickel export, we have had the most specific public assurances from British as well as Canadian Government officers, and the general disposition has been to accept such statements; their effect being that no nickel of Canadian territorial extraction does reach our meantime enemies. On the other hand, we have just as explicit assurances that our nickel is reaching the enemy, and while the leaning as to conviction may be altogether to the first named, nevertheless a horrible nightmare of uncertainty supervenes. Aside entirely from the holdful of nickel whose origin is open to question that the Deutschland will essay to land in Germany, isn't it rather a reflection on our public life that any question should arise as to the destination of Canadian mined nickel.

As we see it, the ultimate destination is somewhat hard to determine, particularly as the refining is done in a foreign country. On the other hand, were refining as well as mining purely Canadian, would we be able to control the ultimate destination? Not unless the entire sales were direct to Great Britain or her Allies. Without a doubt, Canadian nickel caters to the needs of the American domestic market, and may do more, in any case the purchase ramifications may reach as far as the hold of the Deutschland. It seems to us that unless the refined product of our nickel mines becomes a meantime monopoly purchase of Great Britain and her Allies, the openings to our enemy are many.

On the nickel refining and export questions, as on a myriad others that are ripe for action and settlement in this Dominion of Canada to-day, we have too much politics, too many politicians, and too few, if any statesmen. Until politics and politicians are displaced by statesmanship and statesmen, neither the nickel refining and export questions, nor the thousand and one other equally pressing problems, the solution of which halts Canada's progress, can be approached for settlement.

INDUSTRIAL NOTABILITIES

WILLIAM INGLIS, president, The John Inglis Co., manufacturers of boilers, engines, machinery, etc., Strachan Avenue, Toronto; Member of Commission to Investigate Labor Conditions in Munitions Factories, was born in Guelph, Ont., October 20, 1867, the son of the late John and Margaret (Lewis) Inglis.

WILLIAM INGLIS

He was educated at Guelph Public and High Schools, and became apprenticed to Inglis & Hunter, Guelph, Ontario, 1880. The factory was removed to Toronto in 1881, where he continued his work and learned the business thoroughly. In 1890 his father took him into partnership and the firm name became John Inglis & Sons. After the death of his father, in 1899, the business was continued under the same name until 1903, when the present company was incorporated, Mr. Inglis becoming president.

He is a member, Toronto Board of Trade; member, Canadian Manufacturers' Association, and chairman of its Engine and Boiler Section.

Mr. Inglis married Louise Hewett, daughter of William Hewett, Toronto, December 19, 1899, there being one daughter of the union.

His clubs are Toronto; Engineers (Toronto); R.C.Y.C.; Lakeview Golf and Country; O.J.C.; Parkdale Curling; Parkdale Bowling; and recreations: motoring, curling, bowling. His residence is 1286 King Street West, Toronto.

—Photo Courtesy British & Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$18 70
Lake Superior, charcoal, Chicago	19 75
Michigan Charcoal iron.	28 00
Ferro nickel pig iron (Soo)	25 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base, Toronto	3.25
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.25
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.10
Bars, 2 in. and up	4.00
Structural shapes	3.10
Plates	3.50

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$29 50
Electrolytic copper	31 00	29 50
Castings, copper	30 00	29 00
Tin	44 00	44 00
Spelter	14 00	13 50
Antimony	22 00	24 00
Aluminum	65 00	67 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4.25	$4 25
Heads	4 50	4 50
Tank plates, 3-16 in.	4 75	4 75

WROUGHT IRON PIPE

Prices in effect April 26, 1916

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 06	5 31
½ in.	3 91	6 08
¾ in.	4 72	7 65
1 in.	6 97	11 31
1¼ in.	9 43	15 30
1½ in.	11 28	18 29
2 in.	15 17	24 61
2½ in.	23 99	38 90
3 in.	31 37	50 87
3½ in.	37 72	61 18
4 in.	44 69	72 49

Lapweld

2 in.	$17 02	$26 46
2½ in.	25 16	40 07
3 in.	32 90	52 40
3½ in.	39 56	63 02
4 in.	46 87	74 67
4½ in.	57 15	90 81
5 in.	66 60	105 82
6 in.	86 40	137 28
7 in.	116 62	179 70
8 in. x 25 lbs. per ft.	122 50	188 75
8 in. x 25 lbs. per ft.	141 12	217 44
9 in.	169 05	260 48
10 in. x 32 lbs. per ft.	156 80	241 60
10 in. x 40 lbs. per ft.	201 88	311 06

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$15 00	$15 00
Copper, crucible	18 99	18 00
Copper, heavy	18 00	18 00
Copper wire	18 00	18 00
No. 1 machine compos'n	14 00	14 00
No. 1 compos'n turnings	12 00	12 00
New brass clippings	13 50	13 50
No. 1 brass turnings	11 50	11 50
Heavy melting steel	9 00	9 00
Boiler plate	11 75	9 50
Axles, steel	13.00	15.00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	12 50
Shafting	16 50	16 00
Malleable scrap	10 00	11 00
Pipe, wrought iron	10 00	9 00
Stove plate	10 00	10 50
Heavy lead	5 00	5 00
Tea lead	5 00	5 00
Scrap zinc	7 00	8 00
Aluminum	33 00	35 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	50
Stove bolts	62½
Plate washers	25
Machine bolts, ⅜ and less	40
Machine bolts, 7-16 and over	30
Blank bolts	30
Bolt ends	30
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$4.85
Structural rivets, as above	4.75
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent.
Sq. & Hex Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	.65
Coupling bolts	net
Planer head bolts, without fillet	.15
Planer head bolts, with fillet	net
Planer head bolt nuts up to 1 in.	.60
Planer head bolt nuts, over 1 in.	.55
Planer bolt washers	list plus 10
Hollow set screws	list plus .20
Collar screws	list plus.20
Thumb screws	.20
Thumb nuts	.75

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$40 00
Open-hearth billets, Pittsburgh	42 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3 75	$3 70
Cut nails	3 40	3 40
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs.		$3 90

MISCELLANEOUS

Solder, guaranteed	0.28½
Solder, strictly	0.26½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	13.95
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.32
Benzine, single bbls., per gal.	0.31½
Pure turpentine, single bbls., gal.	0.70
Linseed oil, raw, single bbls.	0.79
Linseed oil, boiled, single bbls.	0.82
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.13
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHING DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	55
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	25
3-fluted drills over 1½ in.	15
Bit stock	55
Ratchet drills	15
Machine bits for wood	20
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	30
Sockets	30
Sleeves	50
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	4 60	4 50
Canada plates, dull, 52 sheets	4 50	4 50
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	7 00	7 00
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28, U.S.	7 00	6 75
Premier, 10¾ oz.	7 30	7 00

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$19 55	.....
1¼ in.	19 55	.....
1½ in.	19 55	14 00
1¾ in.	25 00	16 50
2 in.	25 00	16 10
2¼ in.	28 50	18 50
2½ in.	32 00	21 00
3 in.	40 00	25 00
3¼ in.	.....	27 00
3½ in.	45 00	29 00
4 in.	50 00	37 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜ in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	
Axle	Prices on
Anvil	application
Anchor	
WASHED WIPERS	
Select White	
Mixed colored	Prices on
Dark Colored	application

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.35 to .37
Tin	.55 to .58
Zinc	.20 to 23

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 in.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	1.75 to 1.90
Polishing wheels, bullneck.	.90
Emery in kegs, American.	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.

Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14-.18
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents

Montreal, Que., July 17, 1916.—The industrial situation generally is still very encouraging. Much manufacturing activity is to be noted throughout the country. In addition to the volume of business being done in munitions, the domestic activity is constantly improving. A pleasing feature of the situation is shown in the statement recently issued by the Government, pointing out that during the past three months public expenditures have decreased considerably, and revenue has increased; the total revenue for the period being approximately 56 million dollars. The increase for June was $6,000,000. The total assets of the Dominion have increased 62 per cent., while the total debt has only increased about 32 per cent. In every direction prosperity is being demonstrated. Satisfactory crop conditions also continue to be reported.

Pig Iron

With the market quiet and inactive, there is little to report. Furnaces are very busy. Slight price movements are noted in foreign markets, but dealers here report unchanged conditions.

Steel

It is generally expected that, owing to the midsummer season, the production of steel of all descriptions will be materially reduced, but this will be offset by the comparative decline in placed orders. It is thought, however, that about the first of September buying will again develop, consumers then interesting themselves in last quarter and next year's requirements. Agricultural implement makers are contracting for large tonnage of steel bars, and it is anticipated that additional orders for larger quantities will shortly be placed. It is impossible to satisfy the demand of plate consumers; as a result, deliveries are constantly getting in arrears. The mills are so rushed that delivery cannot be had for at least four or six months. Some producers can offer fairly early positions for small lots, but at premium prices. Blue annealed sheets are becoming easier, owing to the situation being relieved by the continued heavy production of some of the mills which have made better progress than expected. This has also been assisted by the policy of some mills not to take on heavy forward business. The Philadelphia quotation on blue annealed sheets has declined $5 a ton. Domestic demand for tin plate is heavy, several large lots being required for last quarter delivery. Wire and wire products are in good demand, having increased during the past two weeks. One mill on the other side has advanced their prices $4 a ton. Galvanized products have not yet been affected by the low level of spelter. Boiler tube demand is very heavy, and mills are booked ahead for many months.

Metals

The general condition of the metal market is unchanged. Copper is showing signs of becoming weaker, and prices are easier. Tin is quiet and weak. Spelter shows signs of returning strength, but nothing to indicate a continued rise. Lead is quiet, but comparatively firm, while antimony is becoming steadier.

Copper.—Very little has transpired in the copper situation. The general market is quiet and inactive. The consumption of copper at the present time is undoubtedly as great as ever, but users are not in the market for further supply, the stock on hand being sufficient for immediate needs. Future demand is very light. Producers are well supplied with orders, but unless additional war contracts are placed the possibilities are for a declining market, as domestic business is not sufficient to sustain the present high prices. No heavy sales are being made, and quotations are nominal, being based on resale offerings. While the London market is comparatively quiet, spot prices showing no change, the quotation on futures has advanced 10 shillings. Electro spot has declined £4 10s.; present quotations being £91 for standard spot; £89 10s. for futures, and £124 10s. for spot electro. The New York market is weaker, electrolytic having declined ¾c and castings ½c. Nominal quotations are 26½ cents for lake, 25½ cents for electrolytic, and 23½ cents for castings. Local dealers report a quiet market, with prices easier, there being a decline of ½ cent on lake and electrolytic and 1 cent on castings. This week's quotations are 31 cents for lake and electro, and 30 cents for castings.

Tin.—Dullness prevails, and the market continues very quiet. Little business is being done; consumers are apparently well covered for present requirements, and are awaiting the trend of general conditions. Concessions on quoted prices are no inducement to buyers, who are holding off from purchasing futures. London reports a weak market, with lower quotations, a general decline of £4 being noted. Latest cables show the market to stand at £169 for standard spot; futures 15 shillings stronger, with Straits tin at £170. New York has declined ¾c, the present nominal quotation being 38½ cents per pound. The local situation is unchanged with an undertone of weakness. Dealers are quoting 44 cents, a decline of 1 cent per pound.

Spelter.—While there is little to indicate that the market is again on the upward movement, the general situation is apparently stronger, and prices are steadier. Owing to the heavy production of spelter at the present time it is not considered likely that any great advance will be made, although prices may be firmer for a time. The decline was arrested by recent inquiry for fairly large quantities of metal and some good sales. The relative low price of spelter is creating some interest among galvanizers, and inquiries are general. The London market has taken on strength, an advance of £3 being shown on spot, and £2 10s. on futures; present quotations being £47 and £43 10s. respectively. New York prices are slightly easier, but the market is a little steadier; a decline of ½c on the week shows the current quotation to be 8.8 cents per pound. Local dealers are quoting 14 cents on a quiet market; this is a decline of 1 cent.

Lead.—The lead situation is practically unchanged. Due to the lower price which the outside interests have been offering, it is generally conceded that much business has been lost to the leading producers, with the result that the Trust has recently reduced its quotation. The effect has been to cause a further cut in the prices asked by independents. This metal is more active than any other, but comparatively quiet to what it has been. London is a little stronger, and American prices are from $1 to $2 a ton lower The situation here is unchanged, dealers still asking 9 cents per pound.

Antimony.—The stagnant condition of antimony continues. Rumors of further munitions orders had an encouraging effect upon the market, which has shown a steadier tone than for some time past. The American market, however, has declined another 1½ cents, and the quotation is now 14½ cents per pound. Dealers here report a further decline of 1 cent, the current price being 22 cents per pound.

Aluminum.—The market is unchanged with prices firm at 65 cents per pound.

Machine Tools and Supplies

The machine tool situation is unchanged. The demand for shell-making machinery is gradually becoming lighter, especially for the smaller equipments. Inquiries are still in the market for the heavier machines, many of which are still needed. The completion of early shell orders and the unlikelihood of additional large orders is gradually having the effect of bringing resale machinery on the market; but this consists largely of tools that have been used for the making of the smaller sizes of high explosive and shrapnel shells. The demand to meet domestic requirements continues fairly good, and the volume of business along these lines is very encouraging. All kinds of supplies are still in great demand, deliveries being now much better.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

Scrap

The market in old materials continues to fluctuate, and prices are subject to change from day to day New York quotations generally show a decline over last week. Heavy brass is stronger, as is light copper, but crucible shows a decline. Quotations on nearly all metal scrap have declined from ¼ cent to 1½ cents per pound. Aluminum scrap is easier, new scrap having declined 2 cents per pound. Dealers here report an unchanged situation, with prices holding firm, but with a tendency to weaken.

Toronto, Ont, July 18.—The general situation in manufacturing circles continues favorable, considerable development taking place in many industries. Numerous factories are being extended to take care of the increased volume of business and from a financial standpoint a large number of concerns are in a stronger position than they ever have been. Orders for munitions which are being distributed from time to time, principally for the larger calibre shells, promise to keep plants busy for the remainder of the year and well into 1917. The placing of orders for cars by the Imperial Munitions Board is a new development and indicates an extension of the Board's activities which will have a distinctly beneficial effect on certain industries in Canada.

Steel

The steel market is seasonably quiet but prices are firm, being sustained by the export business which continues heavy. Domestic business is lighter and there is less tendency to hold out for higher prices, which is a further indication that the upward movement has stopped. The demand for shell forgings is as urgent as ever, so much so, that enquiries have been sent to the States for this material for delivery during the second quarter of 1917. The Canadian mills are so busy on shell material that the rolling of rails has to be neglected and orders for the latter being placed in the States by Canadian railways. There are no price changes of importance to note and the situation with regard to wrought iron pipe, boiler tubes, boiler plates, etc., is also unchanged.

The situation in the galvanized sheet market is steadily improving following the consistent decline in spelter. Prices of galvanized sheets have declined slightly but not in proportion to the drop in spelter, as manufacturers are still receiving higher priced spelter on older contracts and will not begin to get deliveries at present prices for some weeks yet. Furthermore, other raw materials such as black sheets and acids are still very high, and show no indication of a decline in the meantime. The market for black sheets is seasonably quiet but renewed buying is expected next month. Blue annealed grades continue in good demand with quotations firm. The sheet bar situation is unchanged, a shortage still exists and prices continue firm.

In the United States market, export business continues to be the main stay, but there are signs of a material increase in domestic buying. The buying of the Allied countries is heavy and promises to be for months. Large orders for rails, barb wire and shell steel have been placed; the demand for rails from Russia being particularly heavy. Quotations continue firm on most steel products. Bessemer billets have declined $2 and are now quoted at $40 per ton, while open-hearth and forging billets are unchanged at $42 and $69 per ton Pittsburgh, respectively. Wire rods are firmer at $55 per ton Pittsburg. Steel bars and shapes are unchanged at 2.75c and 2.50c but tank plates are higher at 3.50c Pittsburg.

Pig Iron

Although the consumption of steel making grades of pig iron continues on a large scale, the market is not greatly affected as the majority of the steel companies produce their own pig iron. On this account the market is dull as consumers of foundry grades are only buying to meet immediate requirements. The situation is unchanged and prevailing prices are given in the selected market quotations.

Scrap

Prices of old materials have still a downward tendency due principally to the weakness in the metal markets and also to light demand. Scrap copper, brass and composition materials are weaker and have declined ½c per pound, while zinc is also lower at 8c per pound, having declined 1 cent. Heavy melting steel although in good demand is a shade weaker due to an increase in supplies; it has declined 50c per ton. Prevailing prices are given in the selected market quotations.

Machine Tools

Orders for shells continue to be the chief feature of interest in the machine tool business. Some contracts have been recently placed while others are pending on large shells principally of 9.2 in calibre. On this account there have been some interesting inquiries received by local dealers principally for heavy duty lathes, drills etc., and some nice business is anticipated. There is a decidedly easier tendency in the market with regard to prices of second-hand tools. In the United States several large houses who deal almost entirely in second-hand machine tools have reduced their prices on equipment of this character by 25 to 30 per cent. The reduction applies to practically all kinds of used tools with the exception of plain and universal grinders and milling machines, for which there is still a big demand. This development in the market has been caused by a falling off in demand and increase in supply, the latter being due to the fact that several large concerns who are unable to secure further contracts for shells have no further use for the equipment. No weakness has developed in prices of new tools as makers are so well sold ahead, there is even a tendency for higher prices on some tools, particularly grinders for which there is a heavy demand.

Supplies

The market continues firm but prices are unchanged except for a few lines. A change in discounts of carbon drills and reamers has been made on some lines while others are unchanged. The new prices are slightly lower which is a favorable indication of the trend of the market. Turpentine and linseed oil have both made a sharp advance, the former due to a reaction in the market in the south and the latter on account of firmness in the flax seed market.

Metals

Although the metal markets continue to have a weak tendency, declines are not so general as those registered during the past two or three weeks. The markets however are dull and are characterized by lack of demand. There are no new developments in the copper situation and quotations continue nominal, being based almost entirely on offerings by second-hands. The tin market is stagnant and little interest is being shown in this metal. Spelter has reached a point where consumers are beginning to show a little more interest, but the market is still weak and lower. The lead market is dull and unchanged while there is nothing of particular interest to note in either antimony or aluminum. Solders are also unchanged.

Copper.—The market is dull with sellers devoting their time to filling orders already booked. The outlook for copper is good but unless a buying demand develops in the near future it is probable that price concessions will be generally offered. No material decline however may be expected, as all large producers are sold up to practically the end of the year and the demand for copper will be extremely heavy for a long time to come. Quotations are unchanged and nominal at 29½c per pound.

Tin.—The market is dull due to lack of demand, sellers reporting an unusual absence of inquiries. The tin market has declined in London on spot metal, while heavy June deliveries have weakened the market in New York. Tin has declined locally and is quoted at 44c per pound.

Spelter.—The decline in the market continues. Consumers are still showing little or no interest in the market and producers are not anxious to sell. The lower level of prices however is beginning to interest galvanizers, but little business has resulted so far. Quotations are lower at 13½c. per pound.

Lead.—The market is very dull but the "Trust" price has been maintained at 6.50c New York and the outside market are a shade lower for both spot and futures. The demand continues light with consumers delaying buying. Lead is unchanged at 8¾c per pound.

Antimony.—The market is very dull and prices lower and nominal at 24c per pound.

Aluminum.—The market is quiet and prices have a weaker tendency although they are unchanged in the meantime at 67c per pound.

Solders.—Quotations are unchanged but may decline further unless the tin market reacts. Guaranteed is quoted as 28½c and strictly at 26½c per pound.

* * *

AUSTRALIA BUYS FREIGHTERS

W. M. HUGHES, Premier of Australia, who has been in London for some time past, has solved the difficulty of a dearth of ships for moving the Australian harvest by going into the market and purchasing 15 large steamers, which will be renamed and operated by the Australian Government as the Commonwealth Government line. The vessels purchased are the Strathendrick, 4,379 tons; Strathavon, 4,403 tons; Strathairly, 4,326 tons; Strathleven, 4,396 tons; Strathdee, 4,409 tons; Strathspey, 4,432 tons; Strathgarry, 4,398 tons; Strathdeg, 4,338 tons; Strathesk, 4,336 tons; Strathearn, 4,419 tons; Ardangorm, 3,570 tons; Ardanmohr, 4,554 tons; Vermont, 4,271 tons; Daltonhail, 3,534 tons; and Kirkoswald, 4,021 tons. The price is believed to approach ten million dollars. The ten Strath ships, were purchased from Burrell & Son.

British shipowners ask what their position will be in competition if these Australian State-owned boats are to be exempt from British income tax and excess profits of taxation. Also, have the British Government who now control all shipping, finally assented to do the same with Canada and the other Dominions that contemplate similar semi-Socialistic adventures? Many of these vessels are now employed on Government war business, and they cannot be available for Australian wheat cargoes until the Imperial Government has done with them.

Australia's purchase of a fleet of fifteen steamers to handle its wheat crop is not at all likely to be emulated by the Canadian Government. The conditions which obtain in the two Dominions being reckoned wholly different. At one time Canada had some difficulty in securing the necessary ocean tonnage, but this has been largely overcome until now. Between twenty and twenty-five million bushels per month are going forward.

On the other hand, Australia's crop movement has been greatly retarded, if not prevented, because of inability to secure ships. The trip is usually long with little offering by way of return cargoes, while the rate quoted by the Commonwealth Government was low, at a time when tonnage is scarce, anyway. These conditions necessitated the State-owned fleet now acquired.

A Canadian merchant marine has been suggested, and may come as a future development, but the grain crop is already being moved with reasonable expedition and sufficient ships for the purpose have, so far we understand been available.

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COPPER AND SPELTER PRICES DROP

COPPER and spelter continue to decline abroad. Futures and spot copper declined £6 in London on July 7, and spelter was off £2 10s. It is difficult to forecast the effect the recent slump in copper prices abroad will have as sales have been few and far between. Second hands are offering copper several cents a pound below the pegged price of the large agencies .

Certain large agencies viewed the further sharp decline in copper prices with indifference, but there is no getting around the fact that some sort of a readjustment between London and American prices will have to be made. London will either have to bring its prices up closer to New York prices, or domestic producers will have to lower theirs to correspond more closely with London.

The quotation for spot copper in London is now below 20 cents a pound, with quotations of agencies and second hand dealers in this New York ranging all the way from 26 cents to 29 cents a pound. There is very little change in the domestic copper market. Few sales are being made with production going on at an unprecedented rate. Quotations are regarded as nominal.

◆

AUSTRALIA LOOKS AHEAD

IT is announced that William Morris Hughes, Premier of Australia, before departing for Australia by way of South Africa, completed with the British Government a plan for marketing the manufacturers of Australia in Great Britain instead of, as before the war, in Germany and other countries.

Mr. Hughes also conferred with representatives of South Africa, the West Indies and India on the subject of the sugar industry, with regard to the control of that industry after the war. The plan discussed provides for the prohibition of the importation of sugar from countries enemy to Great Britain for five years after the war and that thereafter sugar imported from enemy countries will be subject to a general tariff plus a fifty per cent. surtax, while sugar from neutrals will also be subjected to a surtax wherever neutrals decline to enter into reciprocal tariff arrangements .

The scheme will concede to the Allies a preference of 12½ per cent., and grant the sugar grown in the British Empire a fifty per cent. preference. Mr. Hughes also recommended a bonus to stimulate the growth of sugar in Great Britain.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign potr.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia .

C. F. Just, c/o British Consul, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsythe Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canadian Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgrow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Strete, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Austraasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegad No. 4, Christiana, Norway. Cable address, Sontums.

SOUTH AFRICA

D. M. McKibbin, Room 34, Permanent Buildings, Harrison Street, Johannesburg.

E. J. Wilkinson, Durban, P.O. Box 673, Durban, Natal.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM
W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Dartmouth, N.S.—The Imperial Oil Co, Montreal, contemplate erecting a large refinery here.

Sorel, Que.—The Longborough Mining Co. propose building a mica factory here to cost about $10,000.

Vancouver, B.C.—The Colonial Lumber and Paper Mills will build a pulp and paper mill at Quatsino, B.C.

Toronto.—The William Davies Co. have taken out a permit for the erection of an ice-making plant at Front street east, which is to cost $45,000.

Renfrew, Ont.—Fire on July 15 destroyed part of the O'Brien plant near here. The damage is estimated at about $100,000, which is covered by insurance. The plant will be rebuilt.

Porcupine, Ont.—The Northern Canada Power Co. propose installing in their power plant at Wawaitin a 4,000 h.p. water turbine and generator.

Beauceville, Que. — Marcoux & Porier's foundry, which was recently destroyed by fire with a loss of $12,000, will be rebuilt and new machinery installed.

Medicine Hat, Alta. — The Alberta Foundry & Machine Co. will build an addition to its plant, 120 x 160 ft. to include an iron foundry and machine shop to cost $20,000.

The Northern Canada Power Co. is installing at Sandy Falls, B.C., a 2,500 h. p. Canadian General Electric generator, direct connected to an I.P.Morris water wheel, with surge tank wooden stave penstock, and controlling valves.

Niagara Falls, Ont.—The new plant of the Canada Nickel Smelting & Refining Co. at Chippawa is practically finished, and will likely be in operation within a few weeks. It will be the first nickel refining plant to use Niagara power.

The Armstrong-Whitworth Co. of Canada, at Longueuil, Que., will instal two 6-ton "Heroult" electric furnaces for making forged tires, wheels and axles from cold scrap. These are in addition to the one 3-ton furnace used for making tool steel.

St. John, N.B.—The C. P. R. will spend $100,000 on improvements to its yards at St. John, N.B., including the erection of a coal-handling plant, a new water tank of 200,000 gal. capacity, etc. J. M. R. Fairbairn, Montreal, is assistant engineer.

Montreal.—Announcement is made that the new sulphuric acid plant of the Consolidated Mining & Smelting Co., Trail, B.C., has been completed, and will be started up very shortly. It will manufacture the acid as a by product of the smelter fumes. The company's other extension includes the new zinc plant recently started up and a copper refining plant.

Ottawa, Ont. — That erection would start immediately of the big steel plant which the United States Steel Corporation plans to erect at Ojibway, near Windsor, Ont., was the statement made by Wallace Nesbitt, K.C., recently.Mr. Nesbitt was in the city arranging certain departmental matters in connection with the going ahead of the work. The company over two years ago secured a large tract of land at Ojibway, but little has been done up to the present to be erected will cost about $25,000,000.

Electrical

Petrolea, Ont.—As result of a Hydro meeting held in Courtright the Village Council will make request to the Hydro Commission for its estimate of a plant that will serve the needs of Courtright for light and power.

Municipal

Calgary, Alta—The city council propose to install a sewage disposal plant at a cost of $300,000.

Watford, Ont.—A by-law will be submitted to the ratepayers on Aug. 1, to raise $10,000 for a hydro-electric plant.

Petrolia, Ont.—A by-law will be voted on by the ratepayers on July 31, to authorize a loan of $1,700 to the Lambton Flax Co.

Prince George, B.C.—An expenditure of $150,000 is contemplated on extensions to the waterworks, and installation of an electric light system.

Kingsville, Ont.—The by-law authorizing the expenditure of $16,000 for improvements to waterworks system has been passed. A new pump will be included among the improvements.

Cobourg, Ont.—Plans are out for a new intake pipe to be installed at Cobourg by the Ontario Hydro-electric Power Commission, Central Ontario System. It is to be a 24-inch pipe, extending 900 feet into the lake. With the filters now in use this will give Cobourg a splendid water supply. It is expected that the work will be carried out this summer.

Stamford Village, Ont.—By a vote of 100 to 34, the ratepayers of Stamford Township on July 10, requested the Provincial Government to take over and operate the plant of the Ontario Distributing Co. in Stamford and Niagara townships pending the passing of legislation that will give the township the right to operate its own lighting plant under Hydro-Electric supervision.

General Industrial

Montreal.—The J. J. Joubert Co., will build a factory at a cost of $8,000.

Sherbrooke, Que.— The Canadian Connecticut Co. contemplate building an extension to their plant.

St. Jerome, Que.—The Regent-Spinners, Ltd., contemplate building a mill here.

Moncton, N.B.—The Atlantic Underwear Co. propose building an extension to their factory.

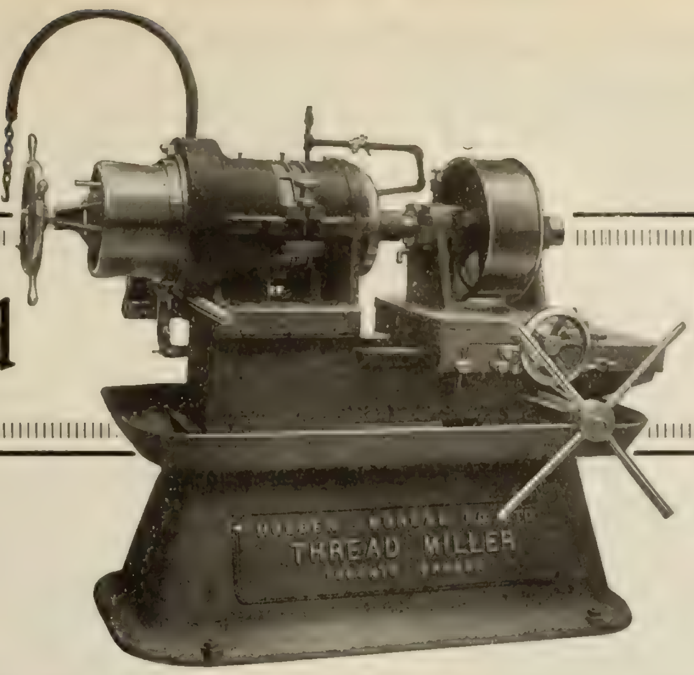
Toronto, Ont.—The Canadian Bag Co. of Montreal will build a factory here to cost about $40,000.

Montreal.—The Dominion Textile Co. will build an extension to the mill at Montmorency Falls, Que. A. Byers & Co., Montreal, are the general contractors.

Hamilton, Ont. — The Appleford Counter-Check Book Co., have been granted a building permit for an addition and alterations to their factory on Stirtor street, to cost $7,500.

St. Thomas, Ont. — The Monarch Knitting Co. are asking the city to provide a loan of $30,000 for the erection of a hosiery factory, and a by-law is to be submitted to the ratepayers early in August.

Thread Miller



An Ideal Machine for 9″ Shells.

Specifications

Net Weight	3300 lbs.
Weight Crated	3400 lbs.
Weight Boxed	3500 lbs.
Shipping Dimensions	108 c ft.
Time per operation	16 mins.
Threading or Recessing Base, Threading Nose	10 mins.

WHAT importance do you place on the internal threads of your shells? How about the machine that does that threading? Illustrated here is a thread miller for 9-inch shells. We do not ask you to buy it—yet, we want you to study it, look its features over and we feel that its quality and price will convince you that it is a machine of exceptional merit.

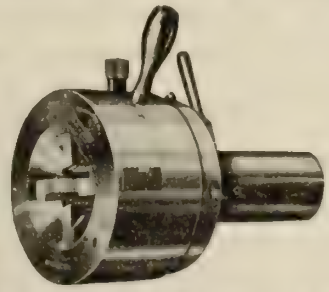
The shell is carried between two conical surfaces in the interior of the mandrel, thus ensuring the thread being milled perfectly true with the axis of the shell. By this method the shell is held much firmer and truer than by collet chucks. The master screw is chased on the outside of the mandrel. The milling head is carried in moveable carriage and both slides are moved up to positive stops and locked, so that the thread is milled exact.

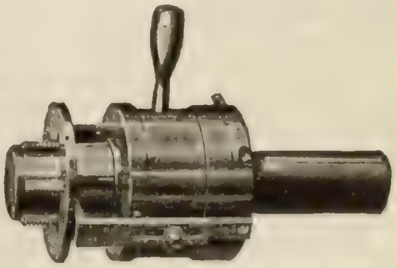
The A. R. Williams Machinery Co., Ltd. **64-66 Front Street West, Toronto**

WHO KNOWS A BETTER?

> "Our real reason for using Geometric Tools is the service they give—and we use them exclusively."

So says a Shop Foreman. He particularly mentioned a job, then in hand, of threading a piece $3\frac{3}{4}$ in. diameter, $11\frac{1}{2}$ threads per inch, to shoulder. Between 400 and 450 such pieces were threaded daily. Each threaded piece an exact duplicate—correct in every particular.


Geometric Self-opening and Adjustable Screw-cutting Die Head.


Geometric Adjustable Collapsing Tap.

Whether it is an outside thread or an inside thread, of whatever diameter, length, pitch or form, a Geometric Screw-cutting tool will produce it. Whatever the make of your Screw Machine, a Geometric will fit it.

Let us know the class of thread-cutting that you have to do, and we will send booklet describing the type of tool best suited to it.

THE GEOMETRIC TOOL CO., NEW HAVEN, CONN.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal. **The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.**

If any advertisement interests you, tear it out now and place with letters to be answered.

New Incorporations

The Cracroft Copper Mines, of Vancouver, have been incorporated at Victoria, B.C., with a capital of $100,000.

Canadian Comstock Co., has been incorporated at Ottawa with a capital of $40,000 to erry on business as contractors and engineers at Montreal. Incorporators, A. Wainwright, A. H. Elder and F. W. Hackett all of Montreal.

Dominion Linens Ltd., has been incorporated at Ottawa with a capital of $550,000 to carry on business as weavers, spinners, etc., at Guelph, Ont. Incorporators, D. M. Lanson, T. W. Yyon and William Berry all of Quelph, Ont.

The Modern Tool Mfg. Co., has been incorporated at Ottawa with a capital of $100,000 to make machinery, gauges, tools, shells, etc., at Montreal. Incorporators, T. Y. Sarault, L. P. Renaud and J. Peloquin all of Montreal.

Gunn Richards, & Co., has been incorporated at Ottawa with a capital of $50,000 to carry on business as production and consulting engineers at Montreal. Incorporators Thomas Mr. Fyshe, John L. Reay and Charles G. Ogden all of Montreal.

Metal Spray Ltd., has been incorporated at Ottawa with a capital of $10,000 to manufacture metals, metal powders, chemicals, etc. Head office at Montreal. Incorporators, Louis B. Schwary, George H. Spencer and Constantine A. O. Gorman all of Montreal.

The Turner Wheel & Machine Co. has been incorporated at Ottawa, with a capital of $20,000, to manufacture automobiles and parts thereof at Windsor, Ont. Incorporators are: Harry E. Guppy, William T. Turner and George F. Turner, all of Windsor, Ont.

The Manitoba Steel Foundries, Ltd., has been incorporated at Ottawa with a capital of $300,000 to carry on the business of steel and iron founders, mechanical engineers, etc., at Winnipeg, Man. Incorporators are Peter J. Smith, Arthur M. Tirbutt all of Winnipeg.

The Canada Broom & Brush Co. has been incorporated at Toronto, with a capital of $15,000, to manufacture brooms, brushes and woodenware, at Ridgetown, Ont. Provisional directors are: W. Purdy, A. V. Farnsworth and J. M. Sheldon, all of Ridgetown, Ont.

The Canadian Conley Frog & Switch Co. has been incorporated at Toronto, with a capital of $150,000, to manufacture track equipment and railroad supplies at Port Arthur, Ont. Incorporators are: W. F. Langworthy and G. A. McTeigue, all of Port Arthur, Ont.

Booth Fisheries Co. of Canada, has been incorporated at Ottawa with a capital of $1,000,000 to carry on the business of fish curing and packing etc. Head office is at Toronto and the incorporators are William A, T. Case, James B. Taylor and W. M. Smith all of Toronto.

Richelieu Industrial Co. has been incorporated at Ottawa, with a capital of $45,000, to operate saw mills and make machinery of all kinds. Head office at Montreal. Incorporators are: Salluste Lavery, of Longueuil, Que.; Henri Prieur and Thomas Robillard, of Montreal.

The Woodstock Reinforced Concrete Post Co. has been incorporated at Toronto, with a capital of $40,000, to manufacture concrete posts and products of all kinds, at Woodstock, Ont. Provisional directors are: B. Blair, J. Fairbanks and D. Thomson, all of Woodstock, Ont.

The Hoover Co. has been incorporated at Ottawa, with a capital of $100,000, to acquire the Canadian rights of the "Hoover" process of purifying water and to manufacture plants. Head office at Montreal. Incorporators: Louis Gosselin, Eugene Provost, and J. A. Beauchamp, all of Montreal.

The Exeter Creamery Co., has been incorporated at Toronto with a capital of $40,000 to manufacture milk products and to establish a public cold storage plant at Exeter, Ont. Provisional directors are William G. Medd, George Jaques and F. Bruce Medd all of Usborne Township, Ont.

The Algoma Construction & Engineering Co. has been incorporated at Toronto, with a capital of $100,000, to manufacture steel, nickel and any other ore products, charcoal, coke and by-products, etc., at Sault Ste. Marie, Ont. The provisional directors are: Alexander Taylor, R. E. Nicholson and J. G. Gibson, all of Toronto.

Leaside Munitions Co., has been incorporated at Ottawa with a capital of $250,000 to carry on business as mechanical engineers and to manufacture shells, bombs and fuses, etc., at Toronto. Incorporators are William A. T. Case, James B. Taylor and Charles L. Valens all of Toronto.

Remington U.M.C. of Canada has been incorporated at Ottawa, with a capital of $25,000, to manufacture cartridges and munitions, and to take over the business heretofore carried on by the Remington Arms-Union Metallic Cartridge Co. at Windsor, Ont. Incorporators: John A. Worrell, William D. Gwynne and John S. Smith, all of Toronto.

The Metals Coating Co. of Canada has been incorporated at Ottawa, with a capital of $200,000, to acquire the rights of "The Schoop Process of Metallic Deposition" and to manufacture mechanical specialties of all kinds. Head office at Montreal. Incorporators are: A. A. W. Plimsoll, Reigner Brodeur and Adolphe Chouinard, all of Montreal.

Tenders

Outremont, Que.—Tenders will be received till August 2, for the construction of an incinerator. Specifications and forms of tender may be obtained at the office of the city engineer.

Ottawa, Ont.—Tenders for incandescent lamps, public buildings, Ottawa, Ont., will be received until July 24. Specification to be seen on application to Thos. A. Hastings, clerk of works, Postal Station "F," Toronto; to R. L. Deschamps, overseer, Dominion Bldgs., Montreal, and to the chief architect, Department of Public Works, Ottawa.

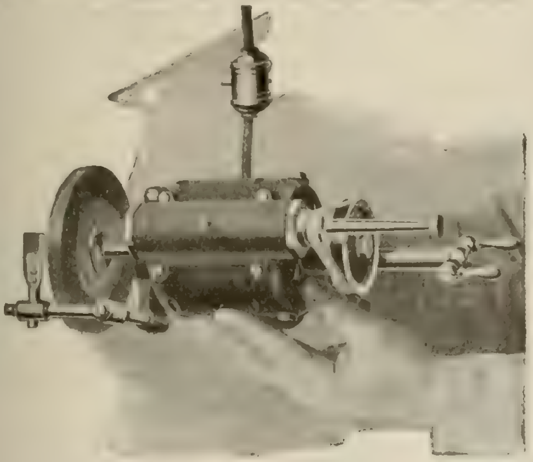
Ottawa, Ont.—Tenders addressed to J. W. Pugsley, secretary, Department of Railways and Canals, Ottawa, Ont., will be received up to August 7, for the construction and erection of passenger station at Halifax, N.S. Plans, specifications and blank form of contract may be seen at the offices of the following: Chief Engineer, Department of Railways and Canals, Ottawa, Ont; Chief Engineer, Canadian Government Railways, Moncton, N.B. Superintending Engineer, Halifax Ocean Terminals, Halifax, N.S.; Ross & Macdonald, architects, Montreal and Toronto. Contractors who wish to obtain plans and specifications temporarily for their own use, may obtain same from Ross & Macdonald, Montreal, on depositing with them a certified bank cheque for $100, which will be refunded on the return of the plans and specifications to them.

Assiniboia, Sask.—Tenders will be received up to August 8, for the supply and delivery of the following machinery and materials: (A)—For the supply, delivery and erection of an 150 h.p. internal combustion engine; (B)—For the supply and delivery and erection of generator, exciter, switch board, and other apparatus; (C)—For the supply, delivery and erection of pumps, motors, piping and air compressor; (D)—For the supply and delivery of two pneumatic storage tanks; (E)—For the supply and delivery of one oil storage tank; (F)—For the supply and delivery of poles, wire and line material; (G)—For the supply and delivery of approximately 17,500 feet of 4 in., 6 in. and 8 in steel pipe, or cast-iron pipes and specials; (H)—For the supply and delivery of 20

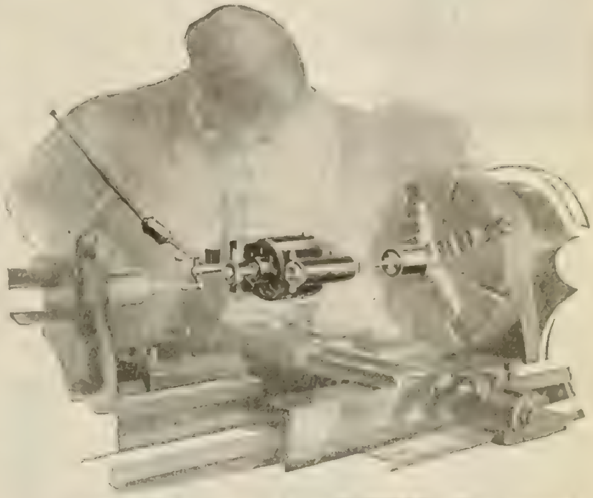
Aikenhead's

DUMORE GRINDER

This GRINDER has become known as the most **efficient** portable grinder. Wherever there is grinding to be done it is as valuable as the services of one or two extra men. The DUMORE does all kinds of grinding, longitudinal, cylindrical, internal and other hard-to-get-at jobs. It is equipped with a rest for grinding cutters, enabling the operator to grind his cutters right on the Miller Arbor, whether angular, straight or spiral.



The DUMORE Portable Grinder. The only small grinder giving wheels the correct surface speed. Speed, 30,000 R. P. M.



Internal Grinding with the DUMORE. The internal attachment is easily put on or removed.

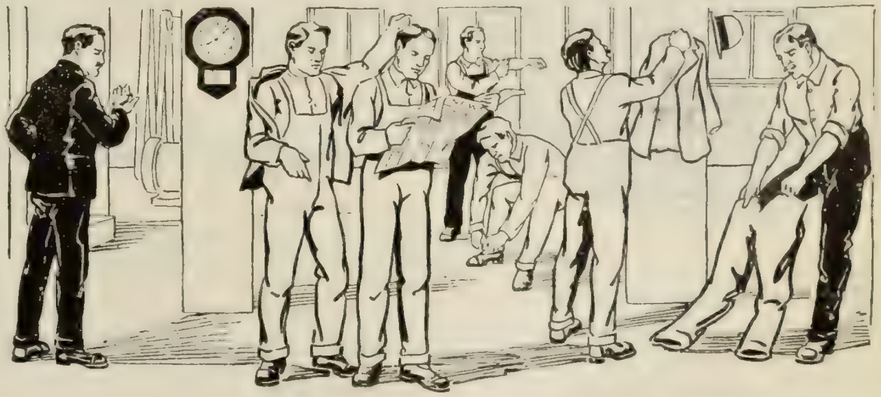
Aikenhead Hardware Limited

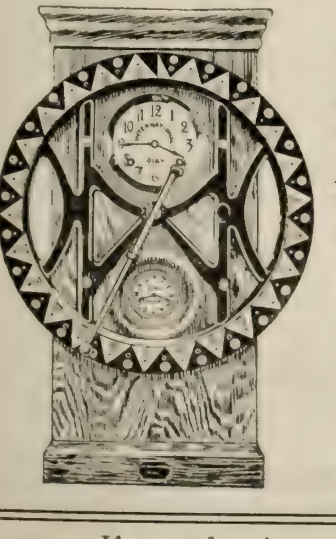
TORONTO 17, 19, 21 TEMPERANCE STREET **CANADA**

The best way for you to know how much the DUMORE Portable Grinder will mean to you will be to try one out. Let us ship you a DUMORE.

Taking it Easy in the Boss' Time

Of course they've "rung in.' Bless your heart they did that long ago, right on time, away down at the factory entrance.





What about the time they lose in actually getting to work?

Don't say "I should worry, they're working on piece-work—the loss is their's." It isn't. You want your employees at work on time, turning out as much of your product as possible in order to keep your overhead down.

Of course, if your employees are working on a regular weekly time payment basis, their delay in actually getting to work, after they have rung in, is even more serious. Then there is a direct wage loss as well as a loss in overhead expense for light, power, heat, etc.

How are you going to cure this? With an International Time Recorder.

Remember, we are the largest makers of Time Recorders in the world. Our Canadian plant can equip you with a system to suit any requirements.

The International Time Recording Co. of Canada, Limited

TORONTO
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Cartier Bldg., Cor. McGill and Notre Dame Sts. Phone M. 7025

Stampings and Metal Specialties

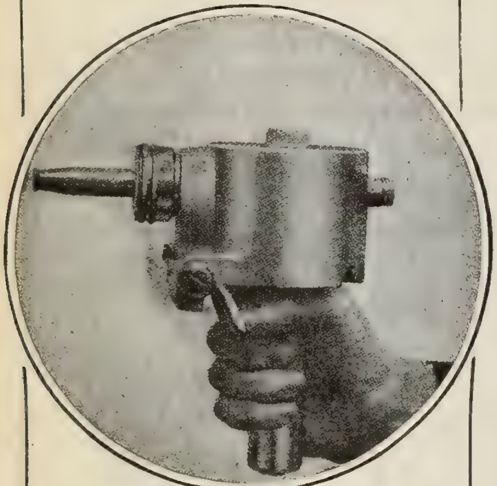
We have the plant and equipment for turning out stampings of the highest quality in brass, copper, aluminum, tin and steel, and are prepared to undertake the manufacture of metal specialties of any description.

PUNCHES, DIES, TOOLS.

COLEMAN FARE BOX COMPANY, LTD.
70 Bond St., Toronto

The Metals Coating Co. of Canada, Ltd.

Versailles Building, 90 James St.
MONTREAL, CANADA



A machine gun making its ammunition from Reeled Wire, and coating objects by bombarding with minute plastic particles of metal. The **Schoop method** of Metallic deposition, any object and any size coated with a positive adhesive and homogeneous coating with any metal for any desired thickness.

Solves one of the greatest problems heretofore confronting the structural engineer, because it produces on iron or steel a permanent coating not susceptible to corrosion.

Carbons can be coated with copper, etc.

For full information write for booklet "D".

hydrants, 29 gate valves and boxes; (J)—For the erection of power station; (K)—For the supply, delivery and installation of heating plant. Complete sets of plans and specifications may be seen at the office of the consulting engineers, Murphy & Underwood, Saskatoon, and at the secretary-treasurer's office, Assiniboia, Sask.

Saskatoon, Sask.—Tenders are being called until July 26 for a high pressure water main system.

Toronto, Ont.—The Board of Education are calling tenders for motor generator set, program clocks and other electrical equipment, for the High School of Commerce. Specifications, etc., may be seen at the office of the clerk of supplies.

Toronto.—Tenders will be received by chairman Board of Control, City Hall, Toronto, up to Aug. 1, for the supply and delivery of air brake equipment, step and door operating mechanisms, gears and pinions. Specifications and forms of tender may be obtained at the Works Department, Room 12, City Hall.

Toronto.—Tenders for the erection of a court house at Sault Ste. Marie (separate tenders are required for the heating and ventilating and plumbing and electric wiring) will be received up to July 21. Plans and specifications can be seen at the office of the sheriff, Sault Ste. Marie, and at the Departments of Public Works, Ontario Parliament Buildings, Toronto.

Contracts Awarded

The Pas, Man. — The Town Council have awarded the general contract for the construction of a sewage plant to the North Western Construction Co., Regina, at $4,490. Engineers, Murphy & Underwood, Saskatoon.

Dauphin, Man.—S. Brown, a Winnipeg contractor, tendered the lowest bid for the construction of the new court house at Dauphin. Cotter Bros., also of Winnipeg, were the lowest bidders for the plumbing and heating contract in the new court house, their bid being $8,829 for the one-pipe system and $9,692 for the two-pipe system. J. H. Bossons, of Dauphin, is the architect.

Trade Gossip

The Wilt Twist Drill Co. of Canada, Walkerville, Ont., have increased their capital stock to $500,000.

The H. A. Drury Co., Montreal, are North American agents for Sanderson Bros., & Newbould, of Sheffield, England, and not Montreal agents only, as would be inferred in a catalogue notice which appeared in July 6 issue of Canadian Machinery.

Railroad Freight Rates.—Judgment has been handed out by the Railway Commission in the eastern freight rates case, which has been before the board for the last two years. The all-round increase asked for by the railways is not granted, but each rate is considered on its merits, the increases varying according to localities and commodities concerned.

Toronto, Ont.—It is reported that the Federal Dyestuff & Chemical Corporation, 30 Pine street, New York, with a plant located at Kingsport, Tenn., proposes to establish another in Western Ontario, in conjunction with some Toronto capitalists, for the manufacture of dyestuffs, etc. Walter A. Guile, Jr., vice-president of the Federal Dye Corporation, is in charge.

Railway Commission.—The Dominion Government has appointed a commission to enquire into the railway situation in Canada. The members of the Commission are Alfred H. Smith, President of the New York Central Lines; Sir Henry Drayton, Chairman of the Board of Railway Commissioners, and Sir George Paish, a Financial Adviser to the British Government.

Promote Asbestos Industry.—The Eastern Townships Associated Boards of Trade, have adopted a resolution calling upon the Quebec Provincial Government to take immediate steps to conserve its valuable asbestos asset to the limit, by the introduction of legislation which will force the manufacture within the province of finished articles, into which asbestos enters.

Montreal Automobile Trade Association makes the announcement that the 1917 Motor Show will be held from January 13th to 20th inclusive. The New York show is announced for January 1st to 8th, and the Chicago show from January 27th to February 3rd. The latter dates will avoid the clashing of the Montreal and Chicago shows, as has been the case for several years past.

Iron Ore Shipments. — Bradstreet's says that iron ore shipments through the Soo Canal during June totalled 9,507,000 tons. This is a new high record in history. Since the opening of navigation 19,615,000 tons have passed through en route east to United States and Canadian plants. These figures indicate two things, the enormous activity of the iron and steel industries, and the busy season for lake freight companies.

New Marconi Invention.—At the annual meeting of the Marconi Interna-

James McKay Company

Pittsburgh, Penn., U.S.A.

MANUFACTURERS OF

SHELL FORGINGS

We have the Steel, Equipment and Experience and can execute orders for

Shell Sockets
Adapter Plates
Base Plates

for any size of shells.

Can make shipment of Nose Sockets, and Base Plates for British 6-in. H.E. Mark XVI soon as necessary inspections are authorized and executed.

ADDRESS OUR REPRESENTATIVE:

John A. Buchanan, King Edward Hotel, Toronto

3 BIG REASONS WHY YOU NEED

PURO

(MADE IN CANADA)

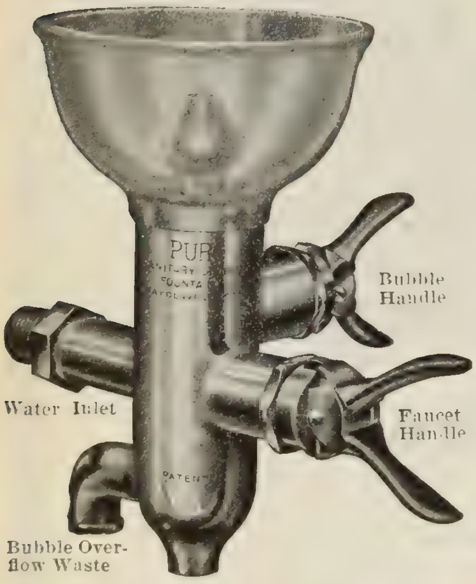
1. Puro Sanitary Drinking Fountains will give you a *better* water supply *cheaper*.
2. Puro will cut your water bills 15% to 35%.
3. PURO will safeguard the health of your employes and raise the standard of efficiency.

Are not these reasons enough? Then why hesitate longer?
PURO equipment is not expensive—the first cost is *low* and the up keep *nothing*.
Easily attached; positively fool-proof.
Let us make you a special proposition for a try-out in one of your departments.
Write us now to-day giving us the number of men; an inquiry will cost you nothing.

"PURO -FY"

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
143 University Ave.
TORONTO, CANADA



"Barnes-made" SPRINGS

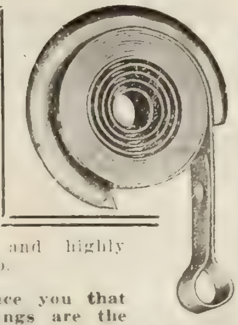
are unusual in service and wear

They are the result of sixty years' experience, unsurpassed equipment and highly skilled workmanship.

A trial will convince you that "Barnes-made" Springs are the best buy.

Established 1857.
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U.S.A.

Man'f'rs of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire



tional Communication Co. held recently in London, England, Godfrey Isaacs, who presided, said that Mr. Marconi had authorized him to say that in the very near future he would introduce a new, independent and very simple apparatus, to be worked from the bridge of a ship by an officer, which should put an end to all danger of collision in darkness or fog. There was little doubt that every sea-going vessel would be equipped with this invention.

Blast Furnace for British Columbia.—A movement is on foot to establish a blast-furnace plant in British Columbia. At a recent meeting of representatives of the Vancouver Chamber of Mines and the Intermunicipal Industries Committee, and others, a resolution was passed for the employment of a staff of engineers to report in four months on the supplies of iron ores accessible to the coast, and on the feasibility of establishing a smelter for such ores on the coast. At present there is only one small Bessemer steel casting plant in British Columbia, but there are a number of copper smelters.

The Thomson Porter Cataract Co., headed by T. Kennard Thomson and the Hon. Peter A. Porter, has applied for a Dominion charter, with rights to construct in the rapids of the Niagara River, below the falls, the Canadian half of an international dam to raise the water 100 feet and develop, as stated, 2,000,000 horse-power. One-half would go to Ontario and the other half to New York. Without any Government aid, the company says it expects to expend $80,000,000 or $100,000,000 and undertakes to submit plans and specifications for the approval of the Dominion and Ontario Governments.

The Storey Pump & Euipment Co. have secured a contract for two 6 in. two-stage Morris pumps with electric motors, from the corporation of Niagara-on-the-Lake. They have also supplied two similar pumps for water supply at Camp Borden. Among other orders of recent date are the following: Gutta Percha & Rubber Co., 16 x 4 x 10 in. Worthington duplex hydraulic pump; Goldie & McCulloch Co., 4 x 12 in. Deane duplex hydraulic plunger pump, for 1,500 lbs. pressure; several pumps for the New Imperial Oil building; five manganese steel-lined Morris centrifugal pumps for the Cobalt Reduction Co.; two three-stage, high duty motor-driven centrifugal pumps for Cordova Mines, Ltd., etc.

Forgings Cranks, Connecting-Rods, Valves and any other special work.
MACHINE HANDLE FORGINGS
Blue finish, ready for use.
Write for prices to
ST. CLAIR BROS., Galt, Ont., Can.

MORTON MANUFACTURING CO.
PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R.R SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE AND WORKS: MUSKEGON HEIGHTS U.S.A.

We are qualified Tool, Die, Jig, Gauge and Fixture Makers.
WRITE US.
Windsor Machine & Tool Works.
WINDSOR, ONT.

"HAWK"D
CHROME
VANADIUM
STEEL

Will Give You Exceptional

Shell Forging

Production

WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

There are many cases where each punch has turned out over 2,000 shells.

It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

Hawkridge Brothers Company
303 Congress St., BOSTON, MASS.
U.S.A.

Substitute for Gasoline. — Arthur D. Little, a well-known chemical engineer of Boston, in a lecture delivered recently before the Vancouver branch of the Canadian Society of Civil Engineers, predicted that ethyl-alcohol would before long be very widely used as a substitute for gasoline for internal combustion engines. Not, because the price of gasoline was being inflated by manipulation, but due solely to the fact that the manufacture of automobiles and other vehicles driven by internal combustion engines was increasing so rapidly that the supply of gasoline was fast becoming too small. Ethyl-alcohol, could now be produced very cheaply from sawdust and other lumber waste, and he believed that eventually British Columbia would derive considerable revenue from that source.

Personal

A. E. Boyle has been appointed secretary of the Winnipeg Board of Trade in succession to Dr. C. N. Bell who has resigned after eight years service.

Lieut.-Colonel Noel Marshall, of the Standard Fuel Co., Toronto, and chairman of the executive of the Canadian Red Cross, has sailed for Canada on the Baltic.

D. O. Lesperance, ex-M. P.; D. H. Pennington and Alfred S. Gravel have been appointed harbor commissioners of Quebec City. Mr. Lesperance will be the chairman.

Major T. C. Irving, D.S.O., of Toronto, now serving at the front with the Canadian Engineers, was married in Kent, recently, to Jessie, daughter of Angus Murray, of Toronto.

Sir Donald Mann is in the West inspecting the Canadian Northern System, and is accompanied by Messrs. Loomis, Platten and Coverdale, of New York. Mr. Loomis is vice-president of the Delaware & Lackawanna Railway, and the others are connected with big financial institutions interested in the C. N.R. They are making the trip for the purpose of inspecting the property and the territory which the lines serve.

Captain Eugene McCormick, mate of the Canadian lightship Falken, which is stationed at the Southeast Shoal, Lake Erie, died at his home, Amherstburg, on July 5. His illness is said to have resulted from exposure and hardship while bringing the lightship from her station to Amherstburg in December, 1914. The boat arrived with the pilot-house windows broken by the sea, and the hull and upper works heavily coated with ice. Capt. McCormick was born on Pelee Island in 1849. He was master of

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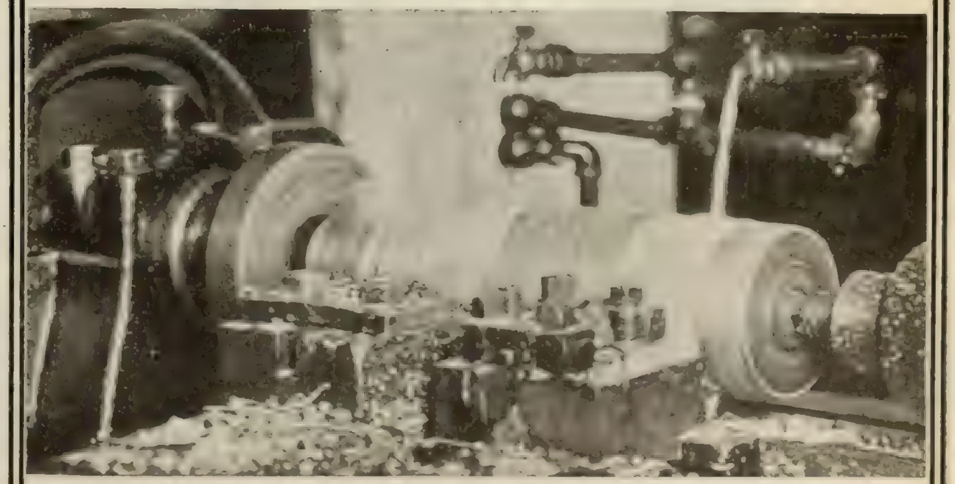

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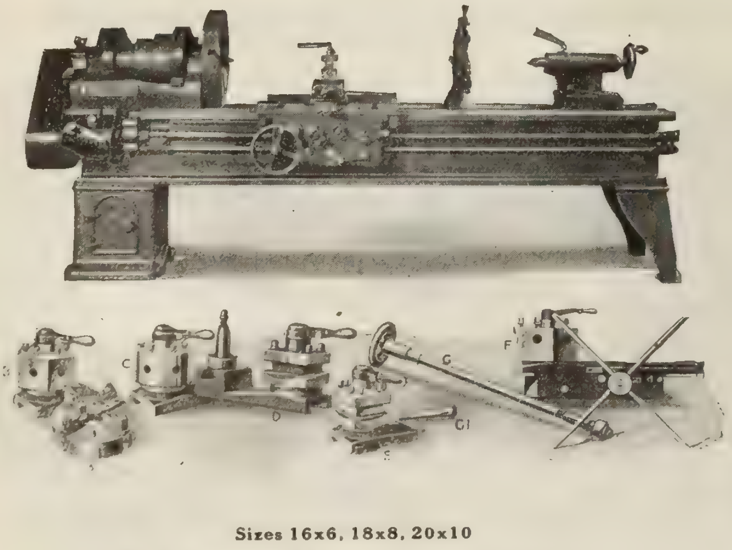

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the steamer Imperial for twelve years before that vessel was succeeded on the Windsor-Pelee Island route by the steamer Clarke.

Catalogue

Graphite Sheet Lubricator. — The Strong, Carlisle & Hammond Co., Cleveland, Ohio, are distributing to the trade a series of leaflets describing the "Randall" graphite sheet lubricator for all kinds of machinery and wheel journals on cars and locomotives, etc. Directions are given for applying this lubricator and a number of illustrations show various types of bearings that have been equipped with it. A sample together with literature can be obtained on application by any dealer sufficiently interested.

Book Review

The Engineer's Year-Book, by H. R. Kempe, Crown 8vo. (7 in. x 5 in. x 2¼ in.) limp leather, gilt 1,500 pages, specially engraved illustrations. Published for the proprietors by Crosby, Lockwood & Son, London, England. Price $5 net. This is the twenty-third edition of Kempe's "Engineer's Year Book," of formulae, rules, tables, data and memoranda for 1916. It is so well known as to hardly need any introduction, and it is generally conceded to be one of the most useful reference books for engineers published. This edition has been enlarged, corrected and brought right up to date, and contains a large amount of new information covering the latest engineering practice. It covers a wide field and contains a great deal of valuable and reliable information for the use of engineers in the various branches of the profession, manufacturers, work's managers, draftsmen and power users. The Year Book forms a compendium of the modern practice of civil, mechanical, electrical, marine, gas, and mine engineering. There are thirty-five sections, each devoted to some branch of engineering, contributed or revised as the case may be, by well-known authorities on the different subjects, a sufficient guarantee of the reliability of the information contained. A creditable feature of this publication is the way in which information on each subject and covering such a wide field has been arranged in so compact a form. The tables, of which there are a large number, are well arranged and the formulae easy to follow, while the descriptions of machinery and apparatus are written in a comprehensive manner. The illustrations which are exceptionally clear have been produced from specially prepared engravings. The book which is printed on fine paper has a 60-page index, and is bound in attractive red covers.

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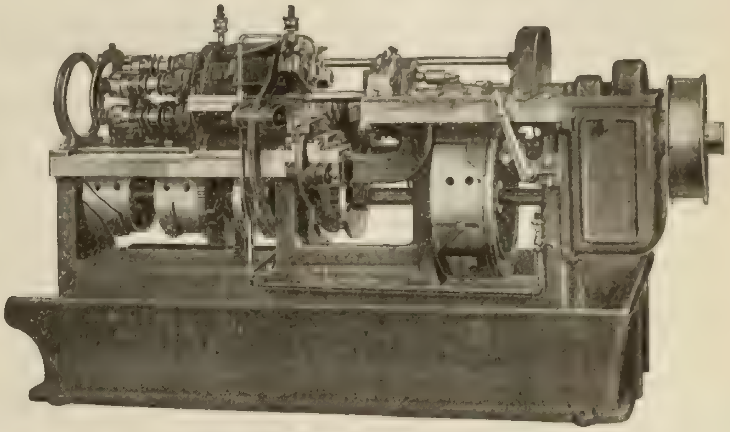
Features of
"New Britain" Six Spindle Automatic
Screw Machines



LUBRICATION

THE system for distributing oil to the tools on the "New Britain" Six-Spindle Automatic Screw Machine is designed to eliminate much of the exterior piping heretofore common to all screw machines.

Oil is conveyed from the pump by means of a flexible metallic tube through an opening in the underside of the tool slide into a machined chamber at the centre surrounding the drive shaft bushing. From radially drilled holes connecting with this chamber the oil is tapped off at the circumference through short tubes to the individual tools.

This construction adds materially to the convenience of the operator as well as to the simplicity of appearance of the machine itself.

The pump is driven by spur gear from indexing shaft, which runs at constant speed regardless of speed of cam shaft or spindles. This insures a uniform supply of oil to the work under all conditions.

Sight feed oilers on top of spindle cylinder housing supply oil to the spindles when in the upper position, each bearing being lubricated in turn as the cylinder indexes.

The danger of core dust and sand working into the bearings, which is common to many types of screw machines, is eliminated from the "New Britain" by machining the spindle carrier all over.

"New Britain" Six Spindle Automatics are built in the following capacities: 1" x 5", 1⅝" x 7", and 2½" x 9".

DESCRIPTIVE BULLETIN UPON REQUEST

The New Britain Machine Company
—Automatic Screw and Chucking Machines—
New Britain, Conn., U.S.A.

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HORIZONTAL GAS ENGINE 25 H.P. IN SERVICE at present time, $375.00 cash. Write Penberthy Injector Co., Limited, Windsor, Ontario. (5)

FOR SALE OR RENT — MACHINE SHOP with railroad siding. Box 208, Canadian Machinery. (4)

TEN TYPE "F" COOPER-HEWITT ELECTRIC lamps for sale—110 volts, 60 cycles, alternating current. Will sell at bargain price. Canadian Ingersoll Rand Co., Limited, Sherbrooke, Que. (2)

LATHE FOR SALE—ONE 39 x 17-FOOT Pond engine lathe, suitable for heavy shells; in good condition; $1,500.00. A. B. Ormsby Company, Limited, Toronto. (2)

A BARGAIN FOR QUICK SALE—30 H.P. 10 x 14 engine; guaranteed in first-class working condition; drive belt included. Hamilton Whip Co., Hamilton.

FOR SALE—SCREW-CUTTING LATHE, 14 FT. bed, 16-inch Imperial chuck, 24-inch Swing Countershaft. Apply Thos. H. Ruth, 314 Pearl Ave., Peterboro. (1)

FOR SALE—ONE DAVIS 4½" CUTTING-OFF machine; practically new; been used less than three months; very reasonable. Canadian Linderman Co., Ltd., Woodstock, Ont. (tf)

12-INCH HEAVY DUTY (CANADIAN CORPORATION) moulder; just used six months; also band saw, shaper, buzz planer, used two years. Apply W. A. Rumney, 36 Fuller Ave., Toronto. (28)

20,000 LBS. ⅝ GALVANIZED STEEL GUY wire. We can offer this wire at very attractive prices. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (25)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make. used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

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- 1—Box Girder Type Overhead Hand Power Crane, 48′ 6″ span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.
- 1—12″ Single "I" Beam Overhead Hand Power Crane, 30′ 10″ span, 3 tons capacity; complete, less the Hoist.
- 1—10″ Single "I" Beam Overhead Hand Power Crane, 23′ 0″ span, 2 tons capacity; complete, less the Hoist.
- 1 Brantford (Gas) Bake Oven and 4 Racks.
- 1—No. 5 High Speed Hammer.
- 2 Baker Type Vises.
- 1—Linderman 2 Spindle Boring Machine.
- 1 24″ Drill, Bertram Company.
- 1 26″ Drill, London Machine Tool Company.
- 1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

M. BEATTY & SONS,
Limited
Welland, Ont.

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Fox Monitor Lathe, 18″ x 5′ 6″, 9-hole turret, cross feed, hollow spindle, 5-step cone; good as new. Plating dynamo, 6 volts, 250 amp.; used only a short time.

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DROP PRESS FOR SALE—NO. 9 MINER & Peck drop press; anvil 2,000 lbs.; base 30,000 lbs.; 36″ between uprights; 40″ x 35″ between poppets; 34″ x 29″ top of anvil; guaranteed as good as new. Can be shown in operation to any genuine prospective buyer. The Metallic Roofing Co., Limited, Toronto. (4)

FOR SALE — THREE HOLDEN-MORGAN threading millers; one arranged for nose threading; two for base threading. One base threader can be changed to 4.5, as it was reduced from this size. Also two Bertram wavers and groovers, and one Martin, all used for 3.3 shells. Canadian Linderman Co., Ltd., Woodstock, Ont. (27)

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FOR SALE—NEW HAVEN, 60-INCH SWING Standard Engine Lathe—triple geared. 15 ft. bed, hollow spindle, cuts threads 1 to 12. Compound rest, countershaft, steady rest, wrenches, etc. This tool is in excellent shape and owner offers special bargain. Particulars from Winnipeg Machinery Exchange, Sutherland and Gladstone Streets, Winnipeg, Man. (24)

FOR SALE—McDOUGALL ENGINE LATHE 20″ swing, 10′ bed, complete with 20″ 4-jaw chuck, countershaft, steady rest, face plate, gears, etc. This tool, we understand, has never been used; has been lying crated for about 5 years. We are having it cleaned and offer a decided bargain for quick sale. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg. (3)

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MECHANICAL AND ELECTRICAL ENGINEER, 16 years' experience, plant layout and maintenance; expert draftsman; wishes change. Box 207, Canadian Machinery. (26)

POSITION WANTED AS SALESMAN. agent, or traveler, for mechanical goods, or machinery, by Chief Engineer, (Marine), thoroughly reliable, of good education and appearance. Box 209, Canadian Machinery. (3)

MECHANICAL ENGINEER OPEN FOR POSITION of shop superintendent. Wide experience in mining machinery and electric motors, hot water boilers and radiation. Experienced in tool-making, designer, and a keen cost observer. Has had seven years' foundry experience, familiar with moulding machines and a post-graduate of McLain's system of mixing iron. Familiar with shell work. Can give the best of references. Box 211 Canadian Machinery (4)

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Wanted to buy or sell Scrap Iron, Metals, etc.

At the present time we are paying the following prices:

No. 1 Scrap Wrought Iron, $13.75 gross ton.
Heavy Scrap Copper, $20.00 per cwt.
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One Pryibil Spinning Lathe No. L7. 6-foot Bed with screw control gap. Complete attachments.

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One Windsor Machine Co. No. 4 Turret Lathe.

Six-hole turret hollow spindle take two-inch stock. Partly fitted with chaser bar attachments, screw adjustments and quantity of draw chucks.

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5—24 x 10 New Engine Lathes, double back gear, similar to LeBlond.
6—18 x 8 New Engine Lathes, double back gear, similar to LeBlond.
1—18 x 8 Reed Lathe, not used six months, with 14" four jaw chuck.
1—18 x 8 American Tool Works Engine Lathe, quick-change gear.
1—15 x 6 Bertram Engine Lathe, compound rest, hollow spindle.
1—20 x 10 Rhan Carpenter Engine Lathe, double back gear.
1—14 x 6 Champion Engine Lathe.
4—24 x 10 Rhan Larmon New Engine Lathes, double back geared, quick change gear.
1—20" New Ohio Back-geared Shaper.
1—16" New Ohio Back-geared Shaper.
1—New No. 25 Plain Back-geared Becker Milling Machine.
1—28" Davis Back-geared Drill Press.
1—14" Henry & Wright Sensitive Drill
1—14" Avery Drill
1—14" Two-spindle Reed.
1—3-spindle Reed Drill, with tapping attachment.

Write for particulars and prices on our Tool-room Grinder.

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Two 24-inch standard Gisholt Turret Lathes, completely tooled for boring 4.5" H.E. Shells.

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16" x 5' Windsor, wire feed
15" x 5½' fox, American
2" x 24" Jones & Lamson flat turret
No. 22½ Garvin, wire feed
Garvin Double Turret Screw Machine
8" x 31" Brown & Sharpe

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36" x 15' Putnam
32" x 22' London D.B.G.
30" x 10½' Pond
26" x 14' Hamilton, D.B.G. (3)
26" x 14' Gleason D.B.G. (2)
26" x 12' Canada Mach. Corporation, D.B.G.
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22" x 8' Bertram, D.B.G.
20" x 12' Lodge & Shipley, patent head (2)
20" x 10' Bertram
20" x 8' Lodge & Shipley, patent head
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20" x 8' Bullard
20" x 8' Ames
18" x 8' New Haven
18" x 8' Lodge & Davis
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16" x 6' Porter
16" x 24" x 10' South Bend Gap

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D4 Colburn, heavy duty
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32" Rockford Back-geared, sliding head
28" Rockford Back geared, sliding head
24" Rockford, heavy duty
No. 1 Avey high-speed, sensitive
24" Bickford, shaft-driven (2)
24" Foote-Burt
24" London
20" Canedy-Otto, back geared (2)
20" Canedy-Otto, lever feed
20" Bertram, power feed
15" Avey, 2-spindle sensitive
14" Excelsior
14" Garvin, 4-spindle
10" Barnes, friction (2)
60" Bertram Semi universal Radial
48" Gang, plain radial
36" New Century, plain radial
32" Fosdick Plain Radial

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30" x 30" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
24" x 24" x 6' American
24" x 24" x 6' Bertram
20" x 20" x 5' Bertram
26" Smith & Mills

Milling Machines

No. 5 Becker-Brainard, plain
No. 25 Becker, plain
No. 12 Brown & Sharpe plain (2)
No. 2A Owen Universal
No. 1½ Brown & Sharpe Universal
Ennecking & Trautman Universal
24" Bertram, plain

Presses

No. 12 Geared Rhodes, roller feed
No. 4½ Bliss
No. 5 Waterbury

Miscellaneous

4½" Davis Cutting-off Machine
No. 7 Racine Hack Saw
No. 1 Racine Hack Saws (4)
Lo-Swing Lathes (2)
No. 1 Davis Keyseater
No. 14 Besly Grinder
32" x 9' Special Facing and Tapping Machine
40" Binsse Horizontal Boring Mill
No. 60 Heald Cylinder Grinder
No. 2 Garvin Automatic Tapping Machine
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High-Grade Used Machinery

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1—16" x 8' Greaves & Klusman Quick-Change Gear Lathe, single back geared.
1—18" x 10' Lodge & Shipley Quick-Change Gear Engine Lathe, single pulley drive, variable speed countershaft, plain block rest.
1—18" x 8' Rahn-Carpenter, plain screw cutting; rebuilt.
1—18" x 10' Bradford, plain screw cutting.
1—24" x 12' American Quick-change, double back-geared; nearly new.
10—22" x 10' Milwaukee, double back-geared, plain screw cutting, comp. rest; new machines. Write or wire for circular and prices.
1—30" x 14" James, raised to swing 38", plain screw cutting.

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5—1½" Milwaukee Screw Machines, complete. Write for circular.
1—1½" Dreses Geared Friction Head Screw Machine, complete.
1—1½" x 9" Acme Turret Screw Machine, friction geared head, complete; excellent shape.
1—No. 2 Brown & Sharpe Semi-Automatic Wire Feed Screw Machine; rebuilt.
2—⅝" Cleveland Automatics.
1—1" Cleveland Automatic.
1—2" x 24" Jones & Lamson Flat Turret Lathe, cone drive, rebuilt; excellent condition.

MILLING MACHINES.

1—No. 0 Owen Plain Milling Machine; rebuilt.
1—No. 3-H Becker-Brainard Profiler; rebuilt; first-class shape.
1—LeBlond Heavy Design Worm Cutting Attachment for use on No. 2 LeBlond Miller.

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1—No. 60 Heald Cylinder Grinder; rebuilt; 20" table.
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1—12" x 42" Landis Universal Tool Room Grinder; rebuilt.

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1—24" Lutter & Gies "Milwaukee" Back-geared Crank Shaper; fine shape.
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1—30" Mueller Radial Drill.
1—No. 1 26" Diamond Automatic Face Grinder.
1—2" Bignall & Keeler P.D.Q.C. Pipe Machine.
1—No. ½ Schuchardt & Schutte Gear Hobber.
1—32" x 32" x 6' Pond Heavy Pattern Planer, one head.
1—48" x 48" x 14' Pond Planer, one head.
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1—No. 3½-A Bliss Toggle Drawing Press; nearly new.
1—60" Stevens Pulley Lathe.
1—48" Brainard Automatic Gear Cutter.
1—17-G New Doty Single End Punch or Shear, 12" throat, capacity 2" in 1".

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The list below is a small portion of our present stock. Write for complete lists.

12—26" 48" x 14' new style McCabe Double Spindle Heavy Pattern New Lathes.
2 -26"-48" x 18' new style McCabe Double Spindle Heavy Pattern New Lathes.
24" x 10' Putnam, H.S., C.R.
20" x 8' Prentice, H.S., C.R., T.A.
3 -19" x 8' Sidney New Lathes, swing 21".
2 19" x 8' Sidney New Lathes, Quick Change, swing 21".
2—17" x 8' Sidney New Lathes, Quick Change, swing 19".
2 -18" x 10' Rahn Mayer, H.S., C.R.
18" x 10' Cincinnati, H.S., C.R.
18" x 10' Hendey, New Taper Attachment.
9—17" x 8' National, New, Quick Change.
14" x 10' Prentice, Taper Attachment.
2 13" x 7½' Carroll, Jamieson, New.
40" Swing, 3¾" H.S. Conradson Semi-Automatic Turret.
No. 00 B. & S. Automatic Screw Machine, with slotting attachment.
⅜" Pratt & Whitney Screw Machine.
36" Baker Bros. Tapping and Boring Drill.
36" Currie & Snyder Sliding Head Drill.
30" Hamilton Sliding Head Drill.
No. 3½ Fox Miller, Vertical Attachment, Index Head.
Pedrick & Ayre Back-geared Miller, table swivels 42" x 9", 3 power feeds.
No. 210 Heald Wet Ring Grinder.
16" Steptoe New B.G. Shaper.
20" Steptoe New S.G. Shaper.
24" American B.G. Shaper.
18 x 18 x 5' Pond Planer.

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1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 193 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
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2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 360 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES
58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13" Gisholt Semi-Automatic (12 mos. old).
20 21" Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES
1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES
1 8-spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.
2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS
1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES
38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES
2 Noble & Westbrook No. 1 (new).

PROFILERS
1 No. 3H Becker (new).

PLANERS
1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 48" x 48" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS
1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES
1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES
1 12" Jackson (new).

KEY SEATERS
1 No. 1 Catlin (new).

SCREW MACHINES
1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2" x 24" Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼" capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES
1 No. 3 La Pointe (nearly new).

BOLT CUTTERS
1 2" Landis Double Head (nearly new).

BORING AND TURNING MACHINES
1 4' Bickford Boring & Turning Mill (nearly new).
1 20" swing 4-Spindle Moline Vertical Boring Machine with 18" x 36" table.

BULLDOZERS
1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES
1 Large Filing and Sawing Machine with 12" stroke.

PUNCHES AND SHEARS
1 No. 3 Walsh Punch Press.
1 Moser 1½" stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8" throat capacity ¼" x ¼".
1 27½" throat lever punch ½" capacity 1¼" stroke.
1 Thompson Bevel Shear ½" capacity.

PIPE MACHINES
1 6" Saunders.

SHAPERS
1 14" Hendey Geared Friction.
1 20" Hendey Geared Friction.

TAPPING MACHINES
1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
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1 Waterbury Farrell ⅜" capacity (nearly new).

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16" Foster, ring turret.
24" Garvin Turret Boring Lathe, back-geared.
28" Gisholt, with taper attachment.

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14" x 6' Davis, q.c.g.
14" x 6' Fairbanks, c.r. and taper.
14" x 6' Prentice, c.r.
16" x 6' Robbins, c.r
16" x 6' Sebastian, p.r.
16" x 8' Lodge & Shipley, pat. head.
16" x 10' Greaves & Klusman, c.r.
18" x 6' Bradford, c.r.
18" x 8' Lodge & Shipley, pat. head.
18" x 10' Bradford, c.r. and taper.
18" x 12' Barker, c.r.
18" x 12' American, q.c.g.
18" x 12' Greaves & Klusman, c.r.
20" x 10' Flather, c.r.
21" x 12' Bradford, c.r.
21" x 12' New Haven, c.r.
24" 40" x 12' McCabe, two-spindle.
24" x 16' Schumacher & Boye, c.r.
32" x 12' Pond, c.r.
30" x 14' Reed, c.r.
36" x 12' Hamilton, c.r.
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Pratt & Whitney No. 1 friction gear.
1 3 16" Hartford Automatic.
2" Cleveland Automatic.
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52" Niles, car wheel.
48" Colburn, two heads.
60" Colburn, vertical, two heads.
51" Bullard, two swivel heads with motor drive and motor.

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17" x 17" x 12' Whitcomb, crank.
22" x 22" x 6' Gray, one head.
24" x 24" x 4' New Haven, one head.
24" x 24" x 6' Pond, one head.
24" x 24" x 6' Gray, one head.
30" x 30" x 8' Woodward & Powell, one head.
36" x 36" x 10' Powell, one head.
36" x 36" x 12' Powell, two heads.
36" x 36" x 16' Sellers, one head.
29" x 39" x 12' New Haven, one head.
40" 40" x 12' New Haven, one head, one side head.
54" x 54" x 14' Pond, two heads, arranged for motor drive.

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No. 2 Cincinnati, plain.
No. 2 P. & W., Lincoln Type.
No. 23 Fox Miller.
No. 13 P. & W., Lincoln Type.
Garvin No. 1½ Universal.
No. 3 LeBlond, plain.

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24" x 7" Gould & Eberhardt, for spur gears.
24" x 9" Gould & Eberhardt, for spur, bevel and face gears.
36" Walcott.

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16" Niles, back geared.
18" Barker & Chard, back-geared.

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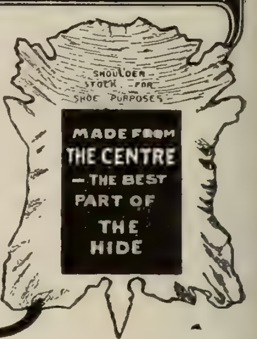
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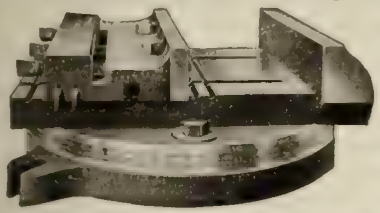

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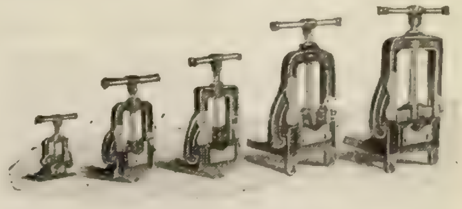

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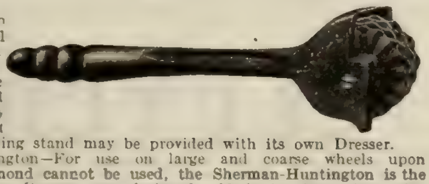

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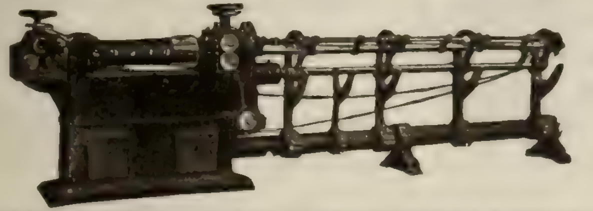

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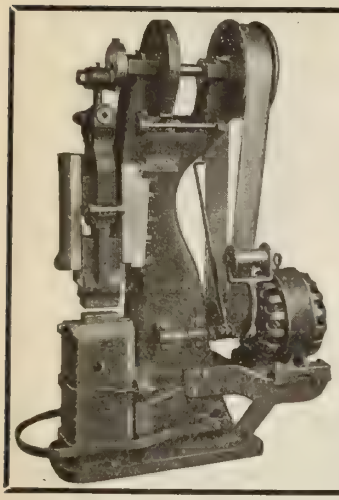

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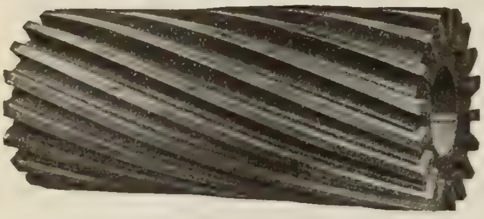

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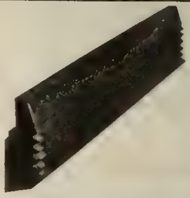

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Canadian Fairbanks-Morse Co., Montreal.
Canada Metal Co., Toronto.
Foss & Hill Machy Co., Montreal.
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
H. W. Petrie, Toronto.
Tallman Brass & Metal Co., Hamilton.

BALL BEARINGS
Canadian Fairbanks-Morse Co., Montreal.
Chapman Double Ball Bearing Company, Toronto.
Lyman Tube & Supply Co., Montreal, Que.

BALL BURNISHING MACHINES
H. W. Petrie, Toronto.

BARRELS, STEEL SHOP
Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

BARS, BORING
Charles F. Elmes Eng. Works, Chicago, Ill.
Niles-Bement-Pond Co., New York.

BELT LACERS
Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT DRESSING AND CEMENT BELT LACING, LEATHER
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Graton & Knight Mfg. Co., Worcester, Mass.

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Canadian Fairbanks-Morse Co., Montreal.
Morse Chain Co., Ithaca, N.Y.
H. W. Petrie, Toronto.

BELTING, LEATHER
Canadian Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Graton & Knight Mfg. Co., Worcester, Mass.
Main Betling Co., Montreal.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
H. W. Petrie, Toronto.

BELTING, STITCHED COTTON DUCK
Dominion Belting Co., Hamilton, Ont.
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Can. Blower & Forge Co., Berlin, Canada.
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Charles F. Elmes Eng. Works, Chicago.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo, O.
Steel Bending Brake Works, Chatham, Ont.

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L'Air Liquide Society, Montreal, Toronto.

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Geo. A. Joyce Co., Ltd., New York, N.Y.

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H. W. Petrie, Toronto.

BOILER MAKERS' SUPPLIES
Jno. F. Allen Co., New York.

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Canada Machinery Corp., Galt, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
Galt Machine Screw Co., Galt, Ont.
London Bolt & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, O.
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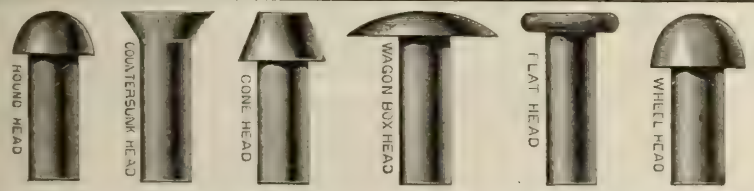

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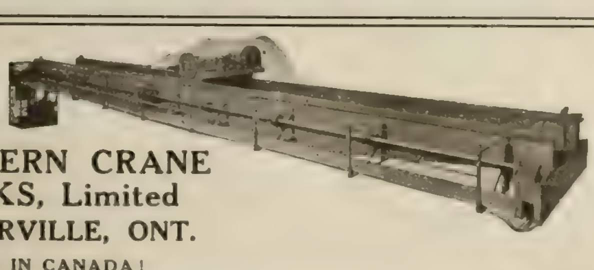

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Lachapelle, J. D., & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.
A. R. Williams Machy. Co., Toronto.
Wisconsin Electric Co., Inc., Racine, Wis.

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Foss & Hill Machy. Co., Montreal.
Morse Twist Drill & Machine Co., New Bedford.
W. F. & John Barnes Co., Rockford, Ill.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, MULTIPLE SPINDLE
Niles-Bement-Pond Co., New York.
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DRILLS, OIL TUBE
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Can. Fairbanks-Morse Co., Montreal.
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Morse Twist Drill & Machine Co., New Bedford.
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Pratt & Whitney Co., Dundas, Ont.

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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy Co., Montreal.
Peacock Bros., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

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Foss & Hill Machy Co., Montreal.
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Morse Twist Drill and Machine Co., New Bedford.
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Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

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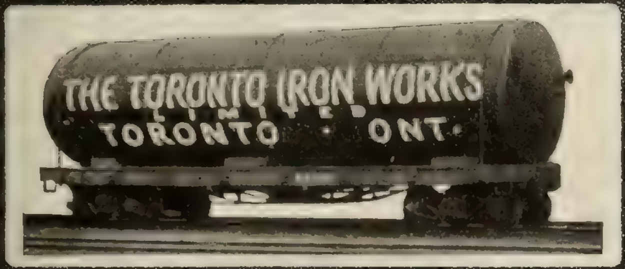

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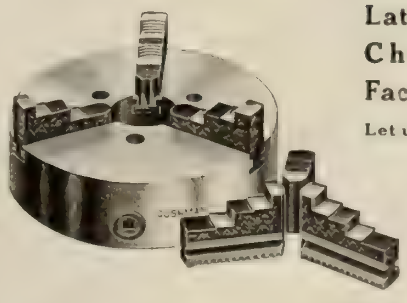

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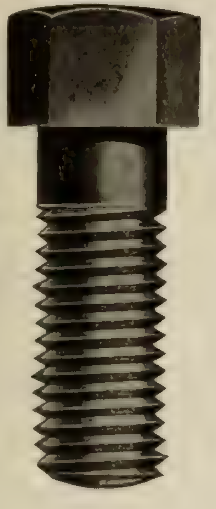

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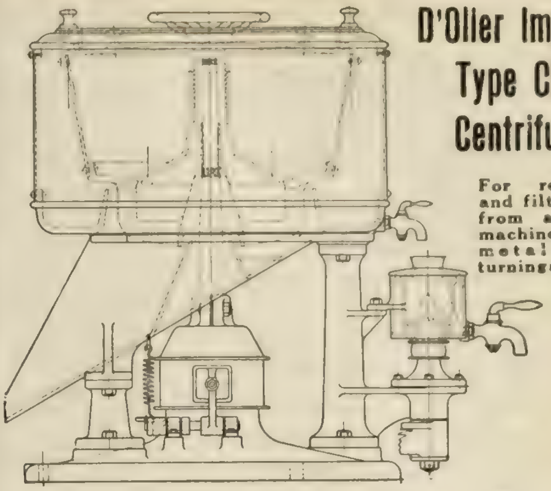

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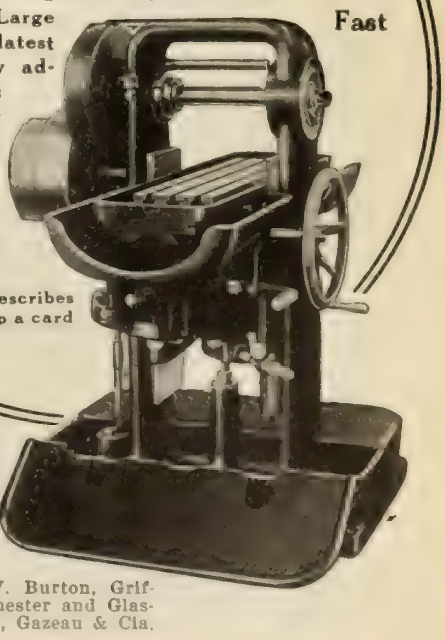

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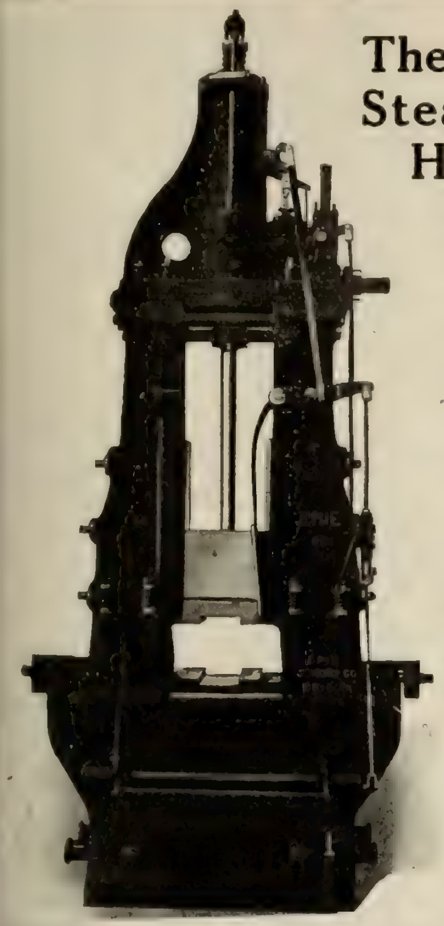

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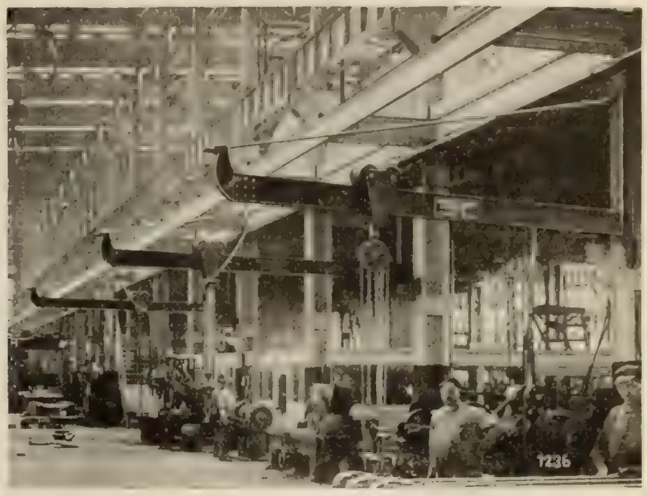

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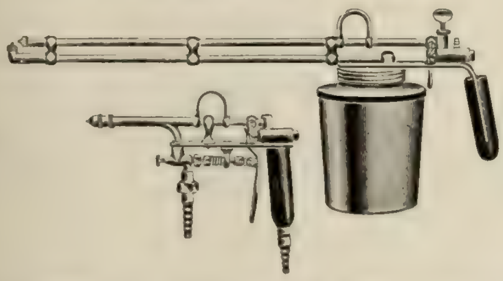

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A weekly newspaper devoted to the machinery and manufacturing interests.

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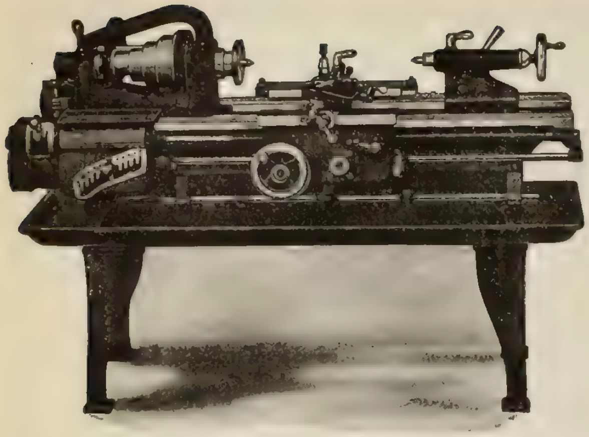

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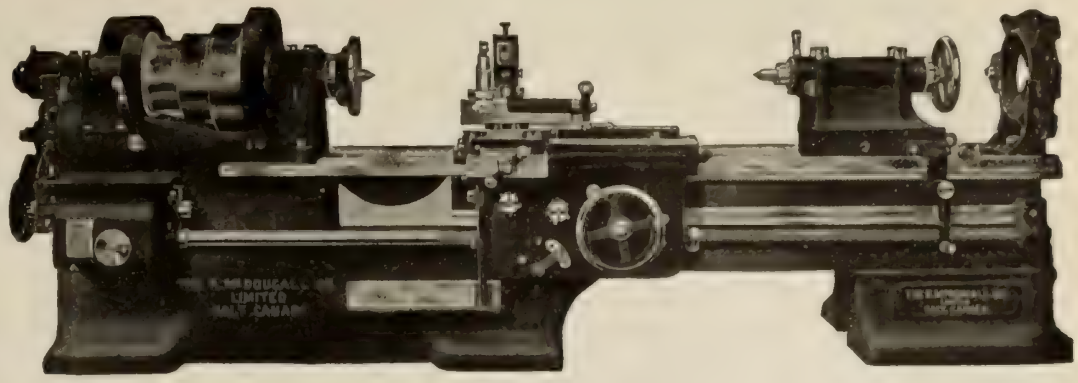

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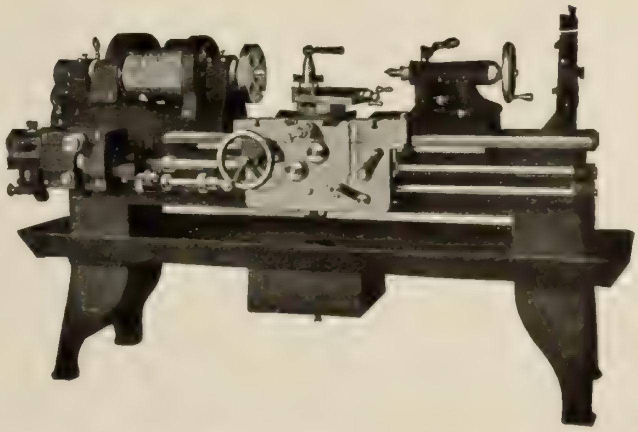

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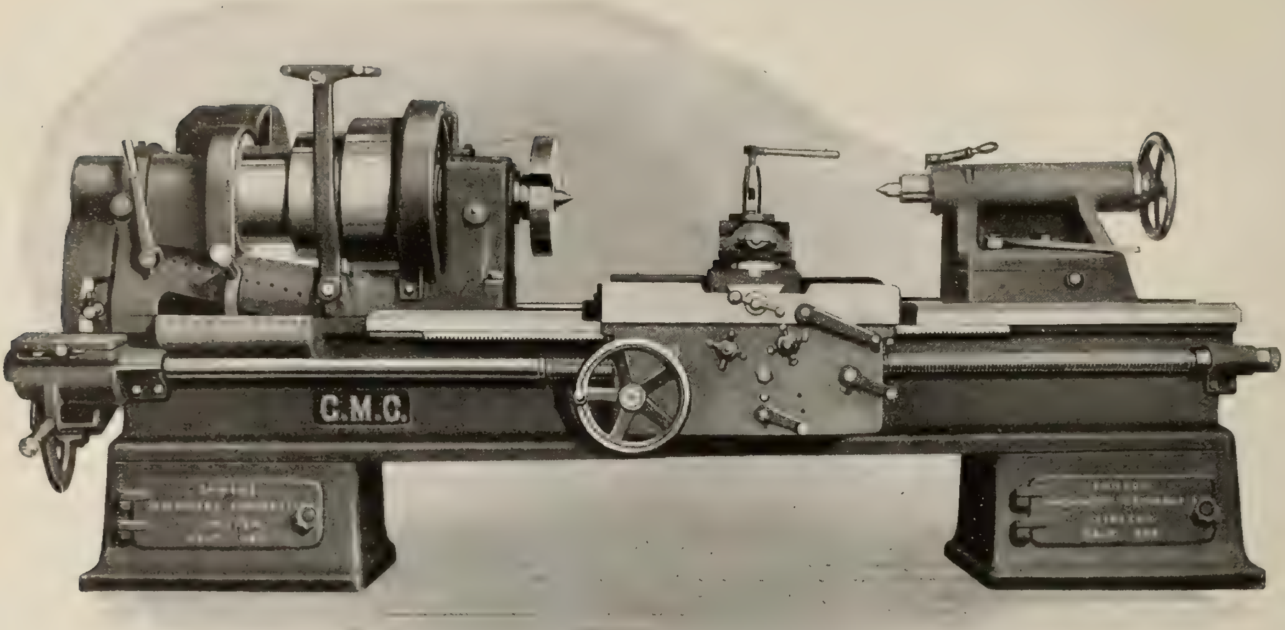

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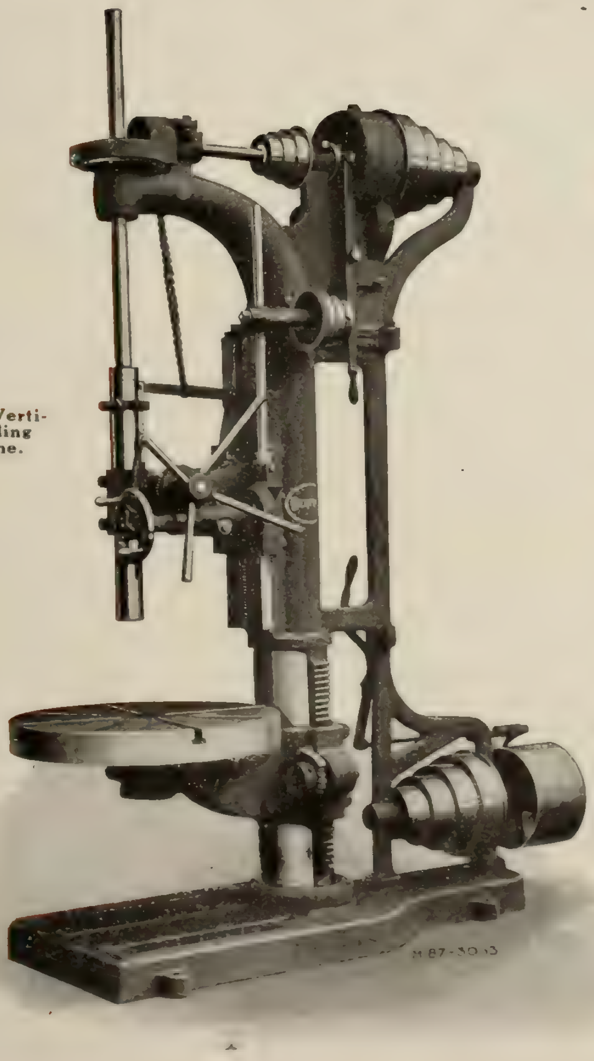

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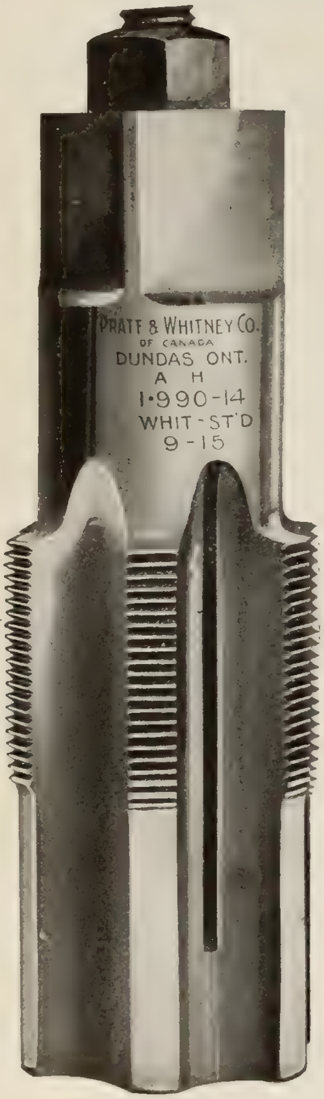
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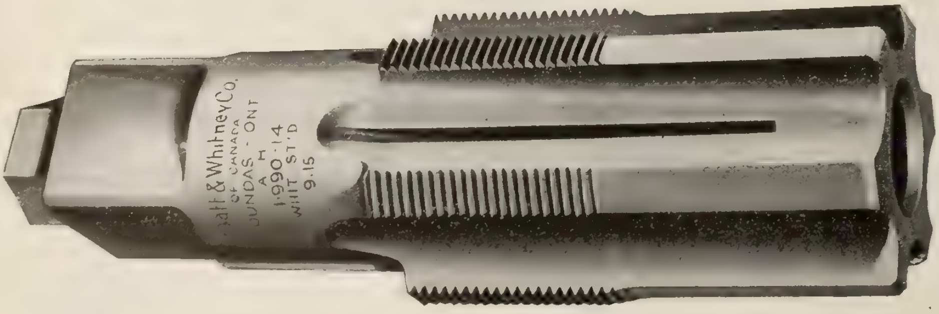
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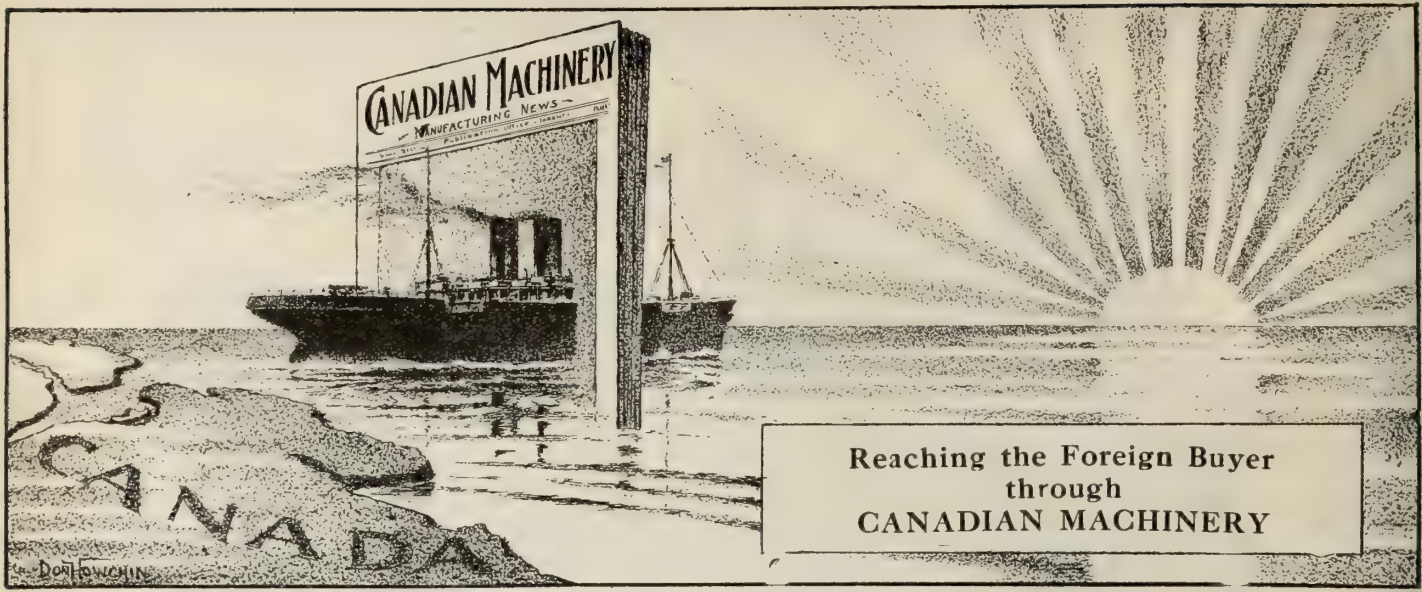
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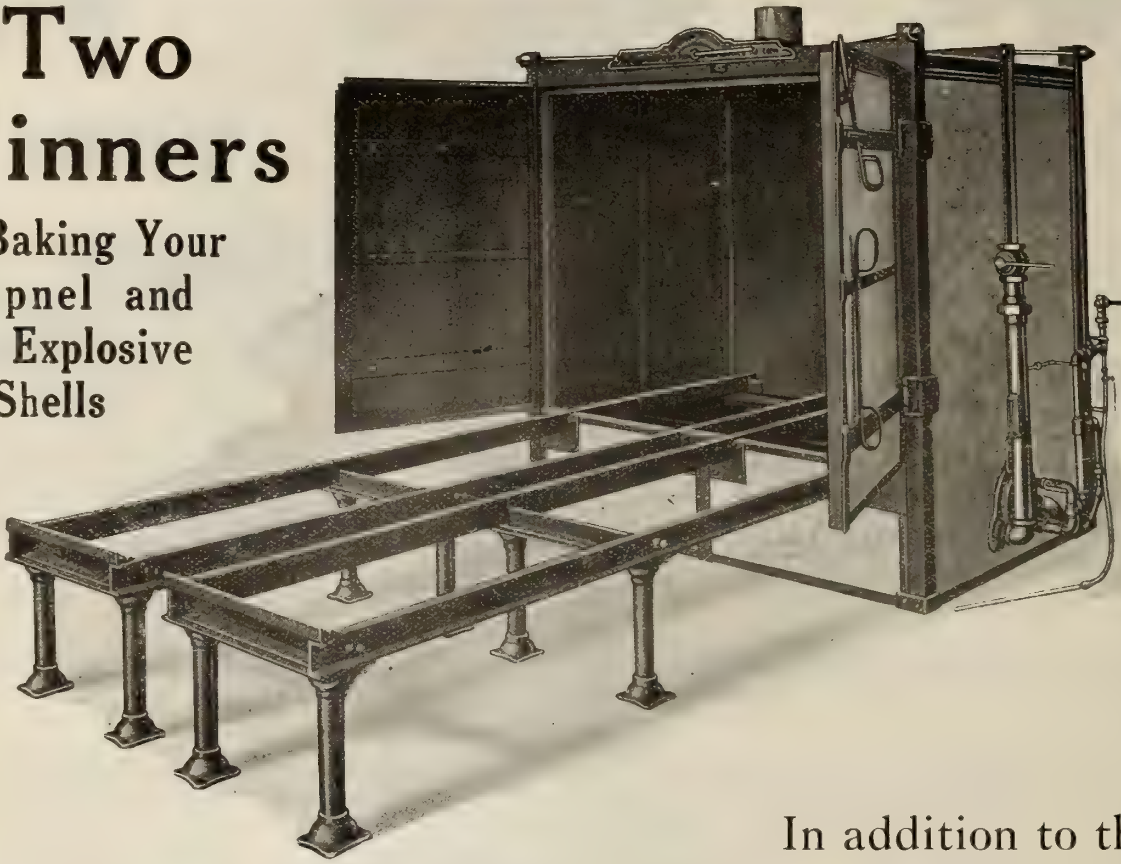
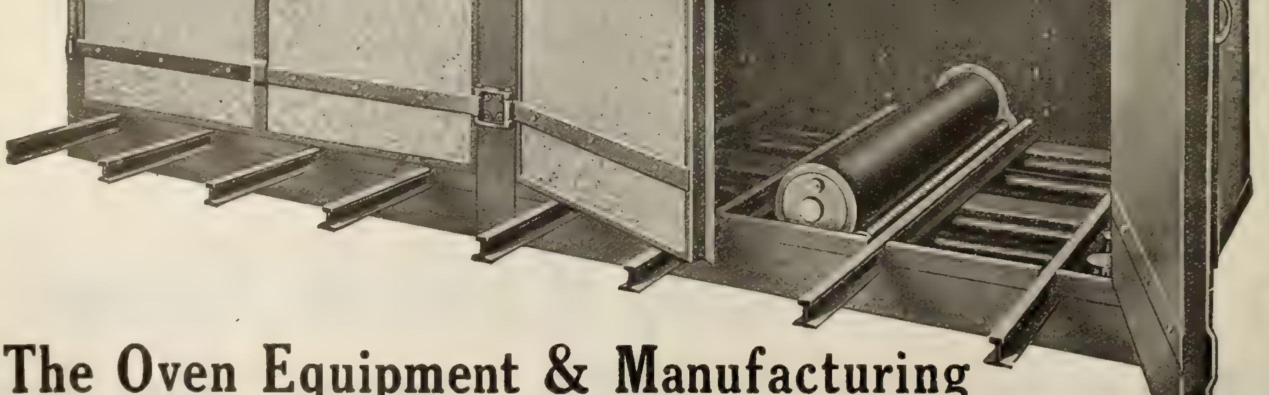
for Baking Your Shrapnel and High Explosive Shells



In addition to the constructing of Special Oven Equipment, we design and build trucks suitable for handling any size of shell.



The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN., U. S. A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA

A CHAIN OF EVIDENCE

The "Rocker-Joint" construction placed MORSE Chains in the "different" class, exclusive class in the silent chain field.

As in many other things embodying a radical departure from the usual practice, this difference at first proved a handicap. It called for additional proof.

In other words, on a great many propositions years ago, prospects figured on "chain drive" and when half convinced that "chain drive" was a better proposition for them than belt drive or gearing, we had to show additional evidence that MORSE "Rocker-Joint" Chains — the differently constructed type, would do the work as well or better than the ordinary "chain drive."

Some prospects, we must admit, wouldn't go farther than just "chain drive", but they were not many. That we did show the additional evidence is proved by the yearly increase in sales, and that MORSE "Rocker-Joint" Chains will do all that any other chain will do and do it better—more economically, is proved by the service records in practically every known industry.

Almost 1,500,000 horsepower in daily use testifies to the general acceptance of, and the satisfaction given by, MORSE "Rocker-Joint" Chains.

The first four (5000, 1500, 1200 and 1000 HP), and probably the first ten, largest chain drives in the world are of the MORSE type, in fact almost all chain drives over 500 HP are of this type, showing a decided preference where a large amount of money is to be invested. The same reasons for this preference hold good for the smaller drives such as ¼, ½ and 1 HP.

Literature and information will be gladly furnished free without obligation to you. Write us of your transmission problems.

MORSE CHAIN CO., ITHACA, N. Y.

MORSE--Of Course

STEEL

for

SHRAPNEL

SHELLS

AND SHELL BLANKS

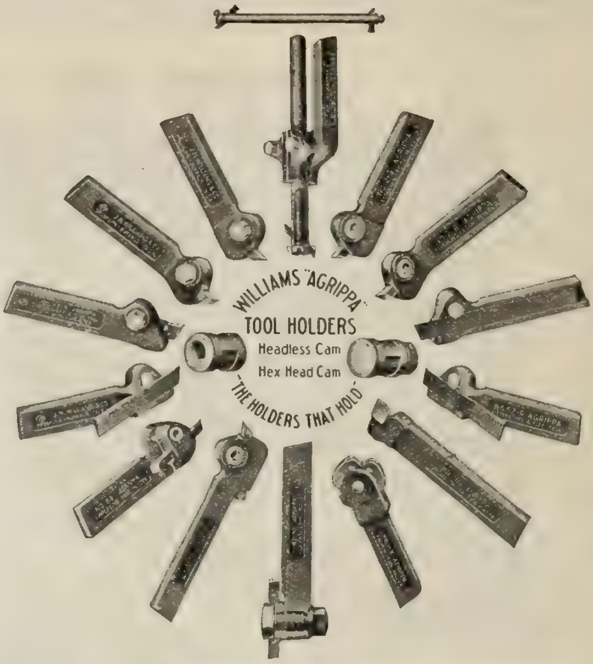
Only Company in Canada producing steel ingots by the "HARMET" Liquid Process.

REASONS WHY THESE INGOTS ARE SUPERIOR TO THE ORDINARY KIND:

1. Prevention of cracks, due to shrinkage; of internal stresses and resulting cracks and fissures.
2. Early cessation in the crystallization of the metal, and the production of fine crystallization of the metal, without cleavage planes.
3. Lessening of segregation, i.e., reduction of tendency to carbon and other impurities to concentrate in the central and upper parts of the ingot.
4. Prevention of "Pipes" or interior cavities, and thus preservation of absolute solidity in the ingot.
5. Improvement in physical properties.
6. Reduction in waste of ingot.

WE CAN SUPPLY FORGINGS OF ALL SHAPES AND SIZES MADE OF ORDINARY OR "HARMET" FLUID COMPRESSED OPEN-HEARTH STEEL ON THE SHORTEST NOTICE.

Nova Scotia Steel and Coal Company
Limited
Head Office:
NEW GLASGOW,
N. S.
Western Sales Office,
Room 14 Windsor Hotel,
MONTREAL



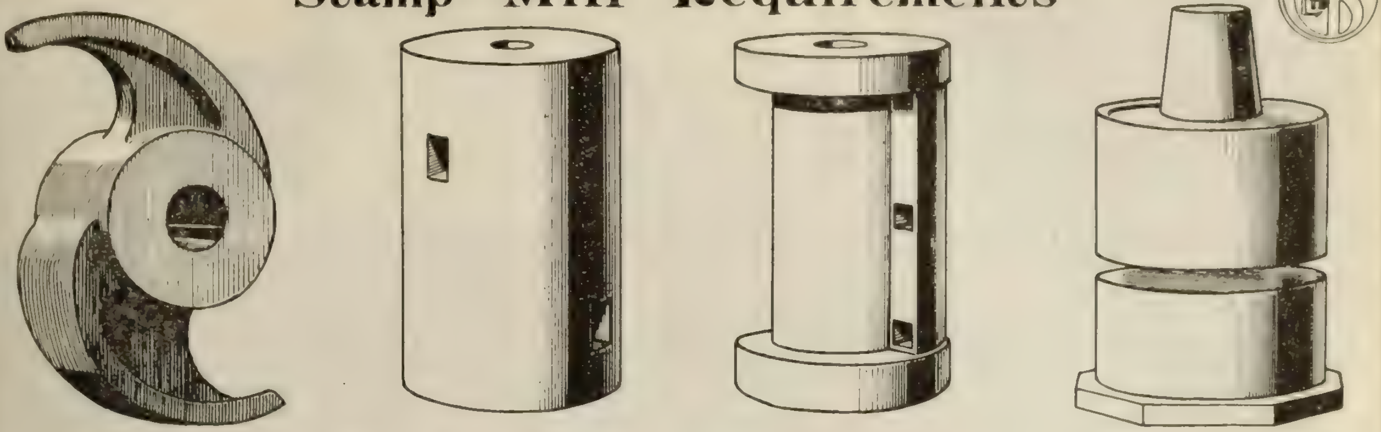
are now used in numerous Government arsenals and munition plants, as well as in the great industrial works at home and abroad.

J. H. WILLIAMS & CO.
45 Richards Street BROOKLYN, N.Y. CITY
The Wrench People
Western Office and Warehouse:
40 So. Clinton Street CHICAGO, ILL.

Red Cut Superior High Speed Steel

Quality First
THE BEST FOR MACHINING ALL HARD MATERIALS
Are your tools made of Red Cut?
Send for folder
VANADIUM-ALLOYS STEEL COMPANY
PITTSBURGH, PA.
Works at Latrobe, Pa.

Stamp Mill Requirements



Cams, Heads, Tappets, Shoes and Dies

SUPERIOR QUALITY & QUICK DELIVERY

CANADIAN STEEL FOUNDRIES,

LIMITED

MONTREAL AND WELLAND.

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas XX	Carbon Tool Steel
High Speed Steel, Atlas X	"Deward" Oil Tempering,
Chrome Vanadium Steel	Non-Shrinking

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

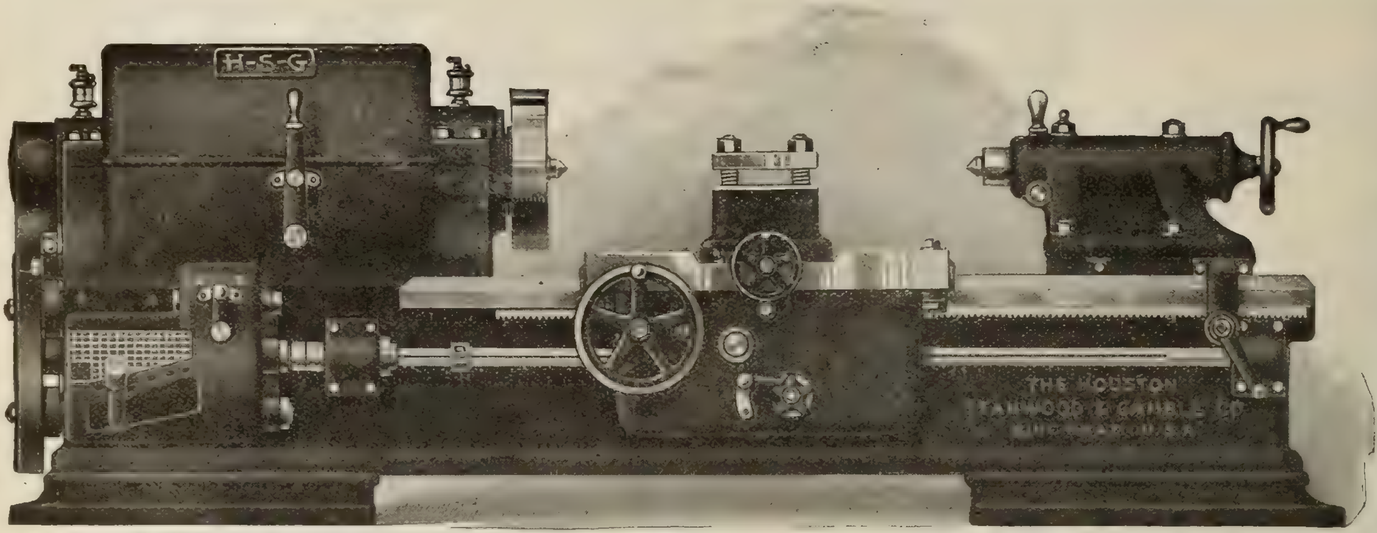
"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

YOUNG, CORLEY AND DOLAN, Inc.

149 BROADWAY, NEW YORK CITY, U.S.A.



H-S-G TRADE MARK single-pulley, high-powered, all-geared engine lathe which can be shipped promptly in three sizes, 26", 30" and 36" swing.

This is a heavy duty lathe. For instance, the 30" swing lathe has 7" face drive pulley, 8" x 10" front spindle bearing and other parts of correspondingly dimensions. The net weight with 12 ft. long bed is 15,000 pounds. All gears without exception are of steel. The design and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

CINCINNATI, U.S.A.

Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto

---

Machines that put a New Speed to Shell Banding Operations

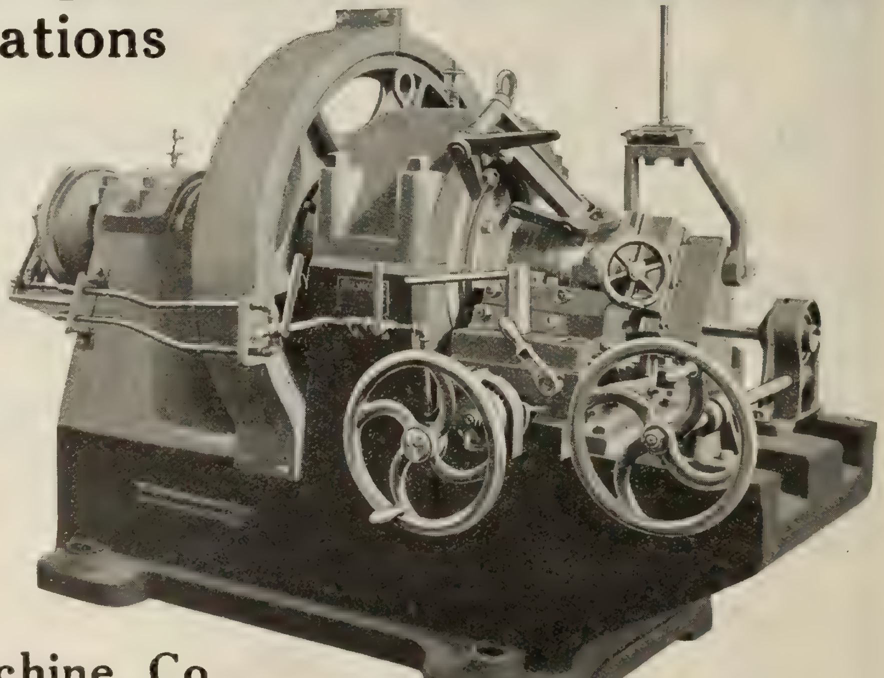
Jenckes Banding Lathes will give the best production of anything in shell banding tools yet designed.

You can clearly see by the liberal proportions of these machines that they are built for long, heavy service.

We manufacture banding machines for 18 pdr., 4.5", 5", 6", 8", and 9.2" shells.

These machines are also tooled when required for the mm. sizes corresponding to Russian and French ammunition.

Single Purpose Lathe for turning copper band on 9.2" British Shell. Illustration shows spindle enlarged to adapt this machine for finishing the bands on the 12" British Shell. Air chuck and friction.

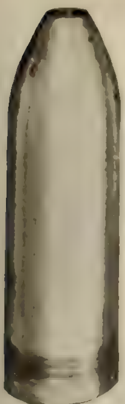


For turning the bands on 9.2" and 12" British shells.

The Jenckes Machine Co., LIMITED

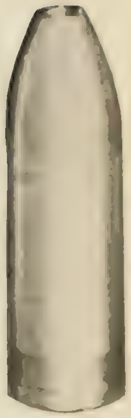
Works: Sherbrooke, Que.; St. Catharines, Ont., Canada

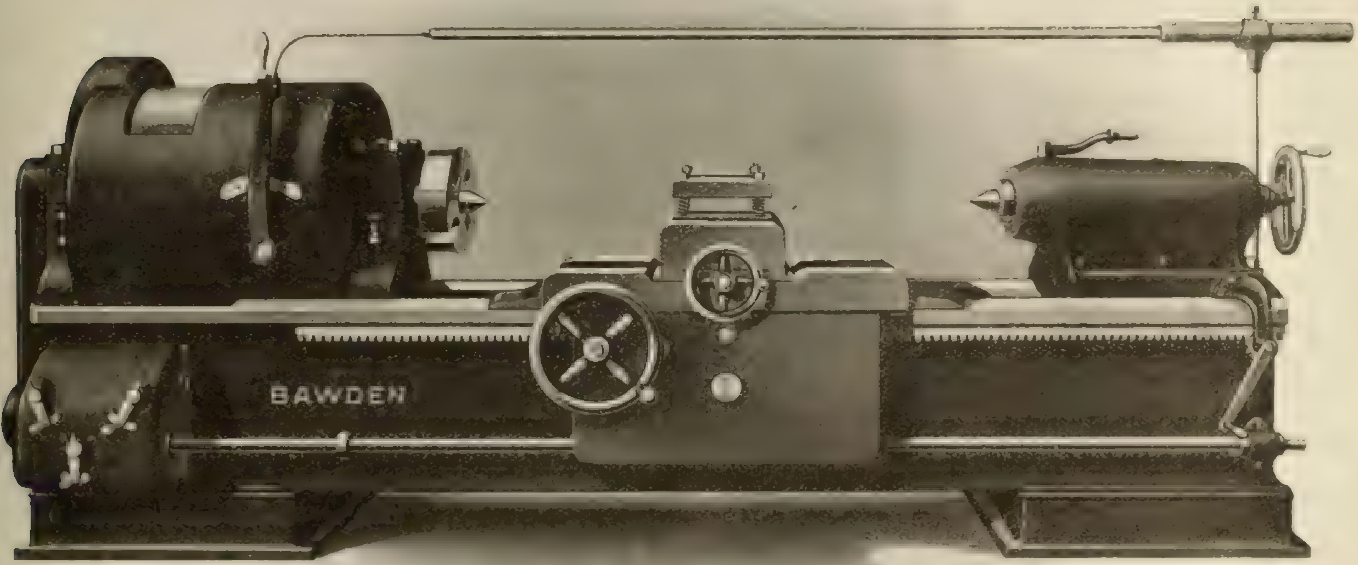
CANADIAN SALES OFFICES: 727 Traders Bank Bldg., Toronto; 908 E. T. Bank Bldg., Montreal; West Chester Ave., St. Catharines; Cobalt, Ont.; Exchange Bldg., Vancouver; Nelson, B.C.



BAWDEN

Heavy Duty Shell Lathes





36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

These Bawden Machine Tools are most capable masters of the big shell situation for 8 inch, 9 inch, 10 inch and 12 inch shells.

They are wonderful in their Power, Rigidity and Accuracy. They have the backbone that will stand up to big jobs long after the demand for munitions is over.

Bawden Lathes are Quality and Quantity producers—they will give you more profit on your shell contracts.

Write for full particulars and learn what Bawden Lathes are doing.

Lathes fitted with attachments for all operations.

We manufacture a full line of gauges for all sizes of British, Russian and French shells and component parts.

We are Rough Turning 6" British H. E. Shells in 6¼ mins.

The Bawden Machine Co., Limited

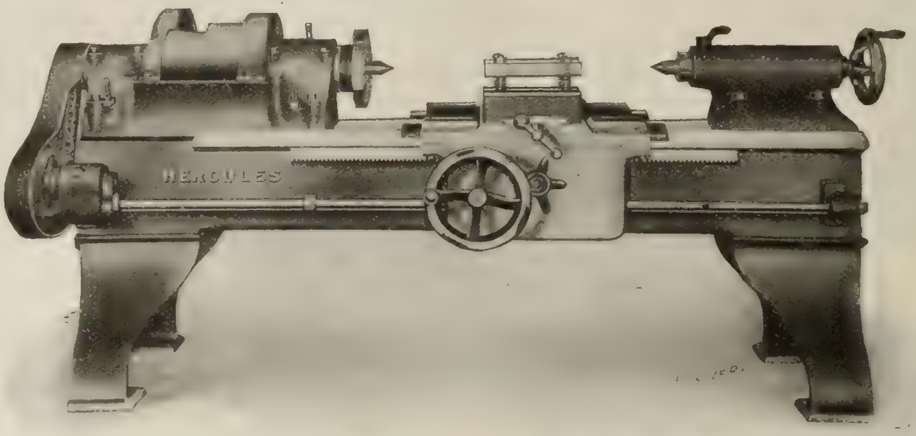
TORONTO, CANADA

How Lathe Simplicity Solves Labor Problems

The great simplicity, the compact, convenient design, make the Hercules Lathe an ideal single-purpose machine. To train an unskilled laborer to perform accurately one or two operations on this machine requires but a short time. The rugged, powerful construction then enables that laborer to turn out precise work continuously at the maximum speed.

Where skilled mechanics are not always available — the Hercules Single-Purpose Lathe is the logical machine tool.

At the present time, we can still make early deliveries. Write — at once—for full details.



HIMOFF MACHINE COMPANY, INC.

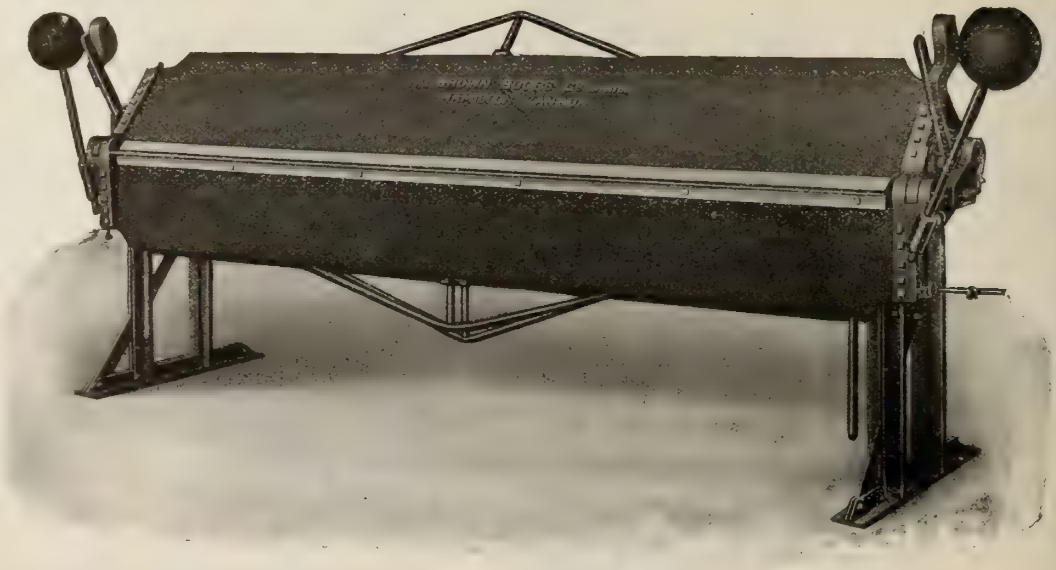
128 MOTT STREET, NEW YORK CITY

A GOOD INVESTMENT

A "B.B." STEEL BRAKE

FOR a Cheap Brake the "B.B." Steel Plate Machine is the best investment you can make. It is especially designed for rapid forming of sheets, and is suitable for a large variety of work, such as can be accomplished on an ordinary Cornice Brake. We can furnish these Brakes for bending all sizes and gauges of metal.

Write for Catalogue if Interested.



"ALWAYS, EVERYWHERE, SPECIFY 'B.B.' QUALITY."

The Brown-Boggs Co., Limited, Hamilton, Canada

Tinsmiths' Tools, Sheet Metal Working Machinery, Dies, etc.

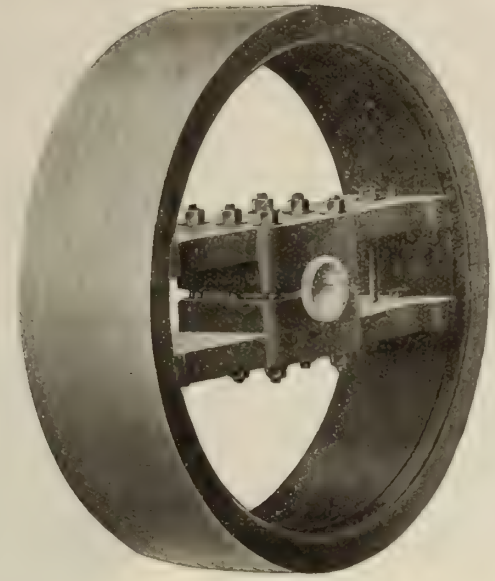
Western Representatives: MESSRS. BISSETT & WEBB, LIMITED, WINNIPEG AND EDMONTON

PULLEYS

No Keys

No Set Screws

In Perfect Balance



Lighter

Stronger

Better Belt Surface

The Dodge Standard Wood Split Pulley

The Wood Split Pulley is better than either cast iron split pulleys or steel split pulleys for the following reasons—

The wood pulley is lighter, stronger, better balanced, and provides a very much better belt surface. It costs 33 1-3% less money and provides 50% more returns in horse-power value. It may be run at very much higher speeds with no danger of bursting—also it may be had quicker and in a greater range of sizes.

It costs less to get—less to put on—and less to keep.

We make approximately 300 Dodge pulleys every day—everybody uses them.

There are more Dodge pulleys making ammunition than any other kind—you can get them quick.

Every pulley is thoroughly nailed. Every pulley is guaranteed for Double Belts.

We are Canada's greatest pulley makers.

If you have not our Books, write us.

DODGE MANUFACTURING COMPANY

Toronto - - Montreal

Ever Shaved by a Blunt Razor?

Remember how long it took; how you scraped away and were finally disgusted with the shave?

Well, that is how a workman feels when using a file that has reached its "inefficient point."

He gets irritated — does not take the same pleasure in his work. The foreman thinks he is slow. There is no satisfaction anywhere.

But, give that man a new file and he puts new enthusiasm and new energy into the job.

This is a homely illustration, but it is true, for it is human nature.

The line of least resistance and greatest efficiency in shop practice to-day is to give men new files to work with when their files reach the "inefficient point."

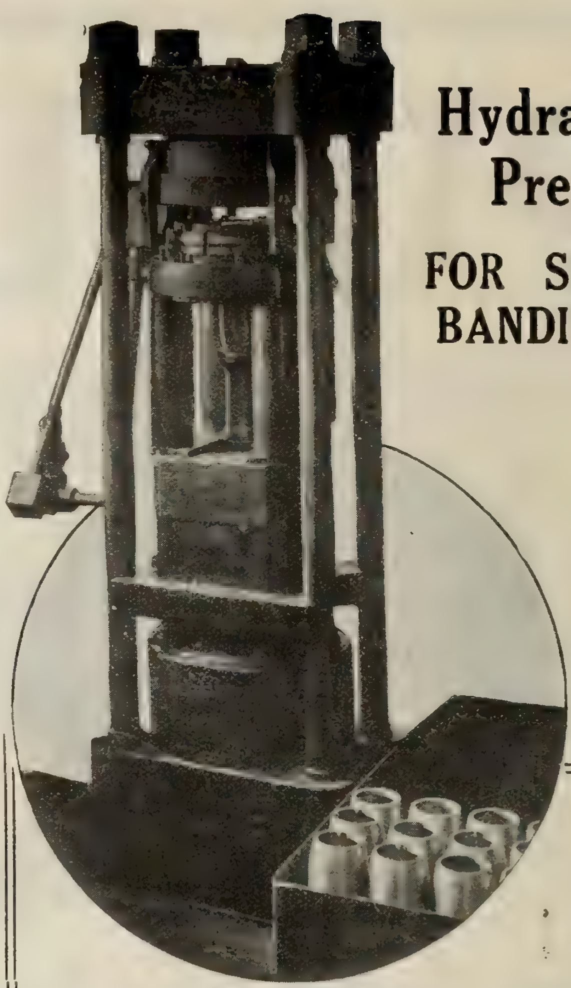
Manufacturers, suggest to your superintendents,

Superintendents, instruct your foremen,

Foremen, tell your men

to turn in old files the moment they reach their "inefficient point." It costs less for a new file than it does to have a man slowed down and irritated by an old file.

Nicholson File Company
Port Hope Ontario
DEALERS EVERYWHERE



Hydraulic Press
FOR SHELL BANDING

Simple, Strong, Reliable, Low Cost

Power is obtained from continuous running belt-driven pump located near the press and is applied to the ram underneath the table.

Table Rises and Forces Steel Taper Wedges, eight in number, up into the Hollow Steel Forging at the top, the wedges conforming to the shape of the shell and are thus pressed in equally against the copper band; pressure is then released, the shell is readily taken out.

Operates by lever shown on the left-hand side. Pressure gauge behind.

As this machine is a standard Hydraulic Press, it can be used in any other capacity.

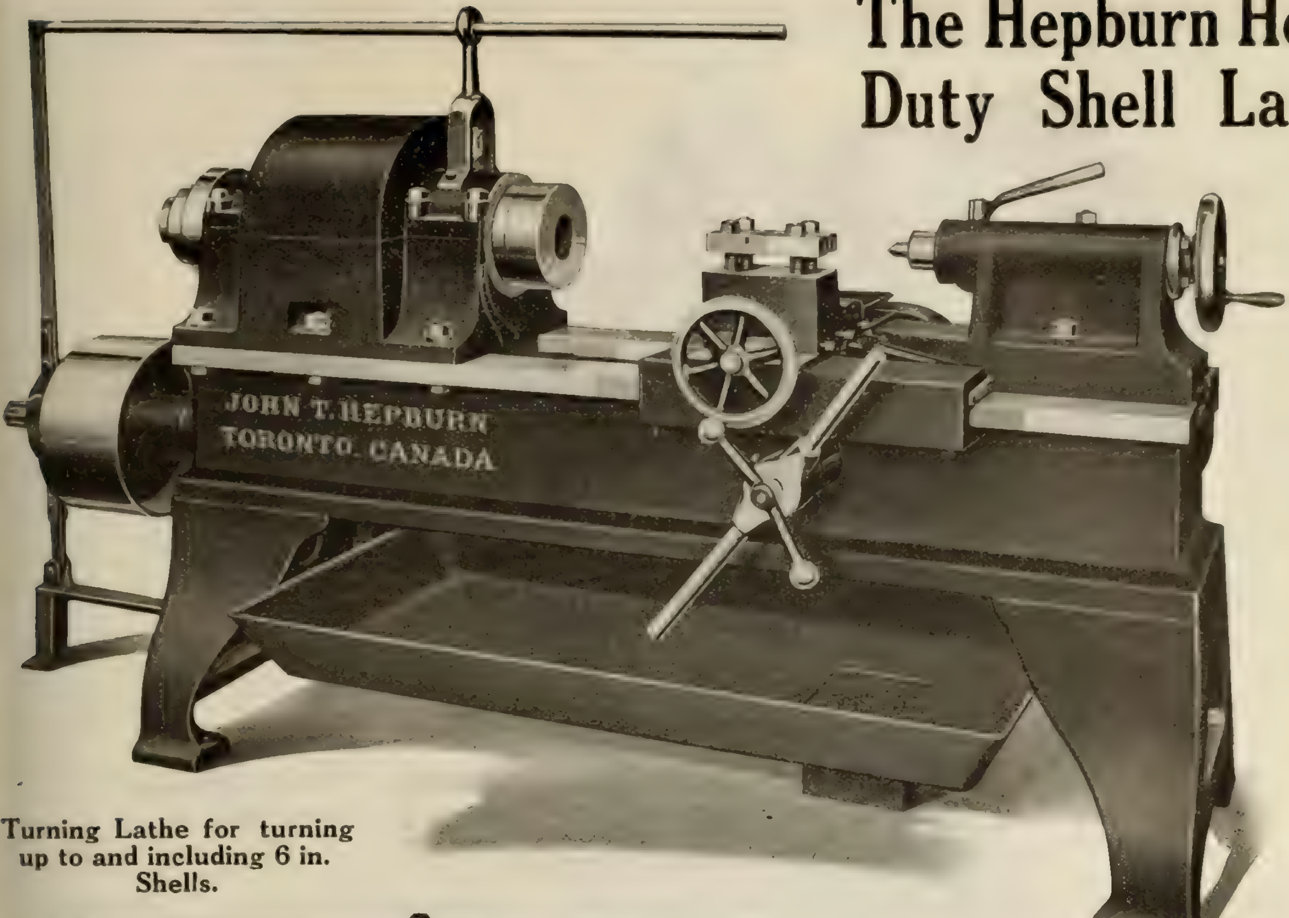
SEE OUR BIG TIME AND LABOR-SAVING ELEVATING TRUCK in next week's ad. It is proving indispensable everywhere.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises.**

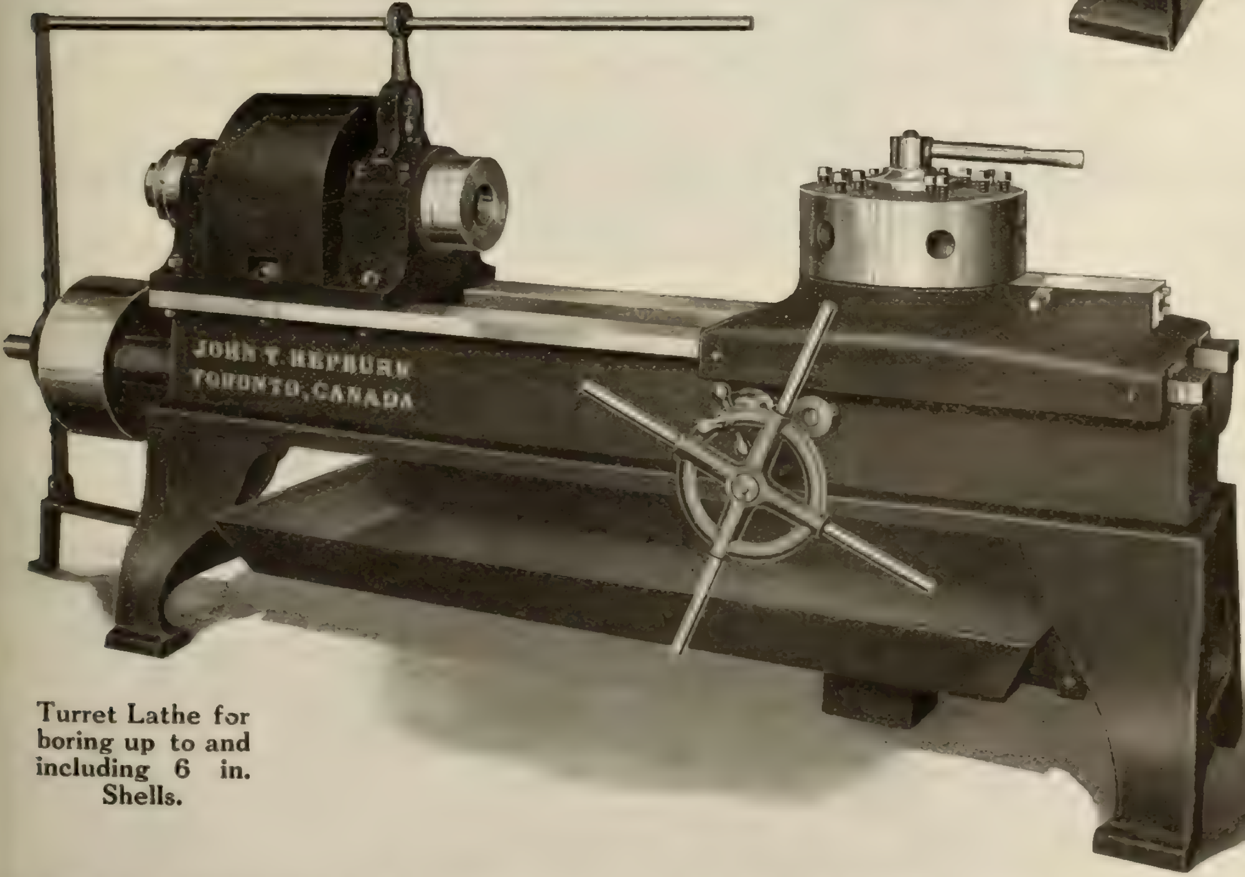
We shall be pleased to submit prices and give any particulars required.

THE CHAPMAN DOUBLE BALL BEARING CO. OF CANADA
LIMITED
330-351 Sorauren Avenue, TORONTO, CANADA
TRANSMISSION BALL BEARING CO. Inc.
1407 West Avenue, Buffalo, N.Y.

The Hepburn Heavy Duty Shell Lathes

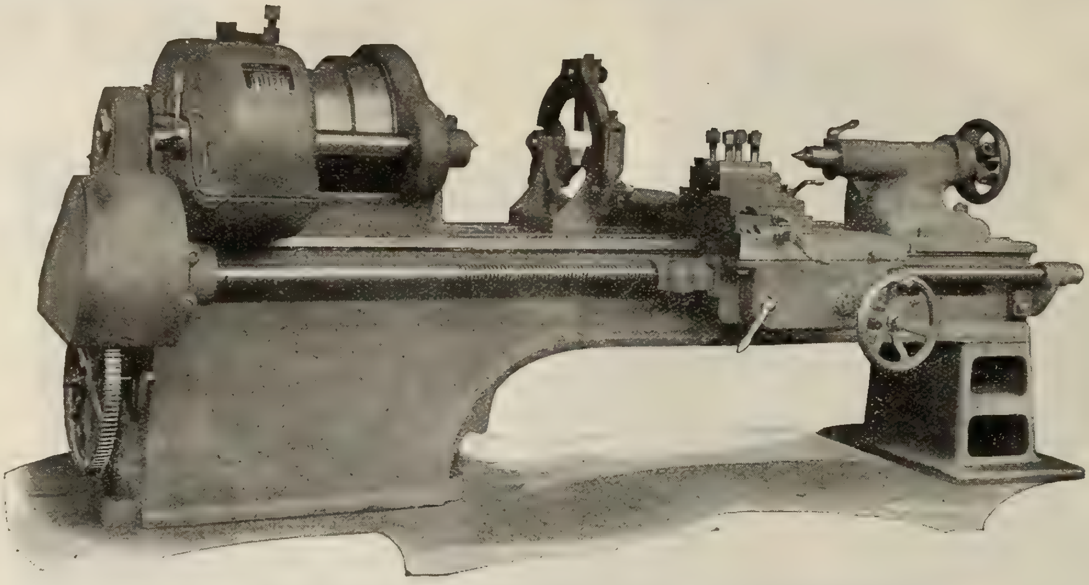

JOHN T. HEPBURN
TORONTO. CANADA

Turning Lathe for turning up to and including 6 in. Shells.


JOHN T. HEPBURN
TORONTO, CANADA

Turret Lathe for boring up to and including 6 in. Shells.

JOHN T. HEPBURN, Limited, 18 to 60 Van Horne St., Toronto, Can.



PB

LANG SINGLE PURPOSE LATHE

Made in the United States under supervision of British Government. **(Lang's Design.)**

59 BEAVER HALL HILL **PEACOCK BROTHERS** MONTREAL, QUE.

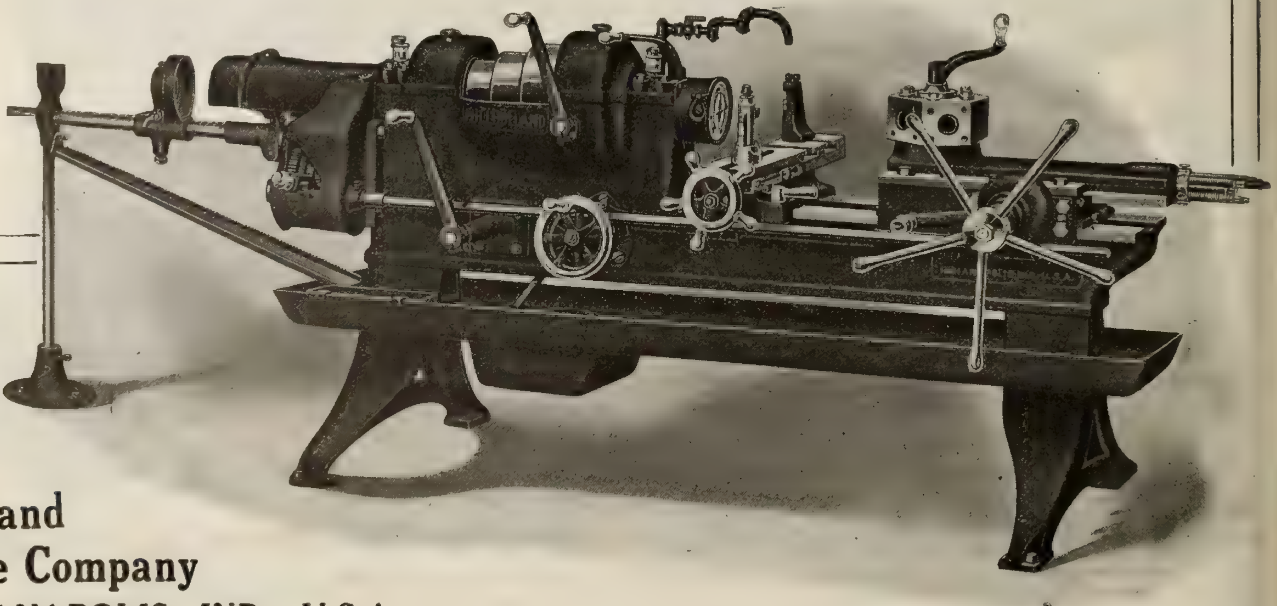
PB

Millholland $1\frac{5}{8}$x10 Turret Screw Machine

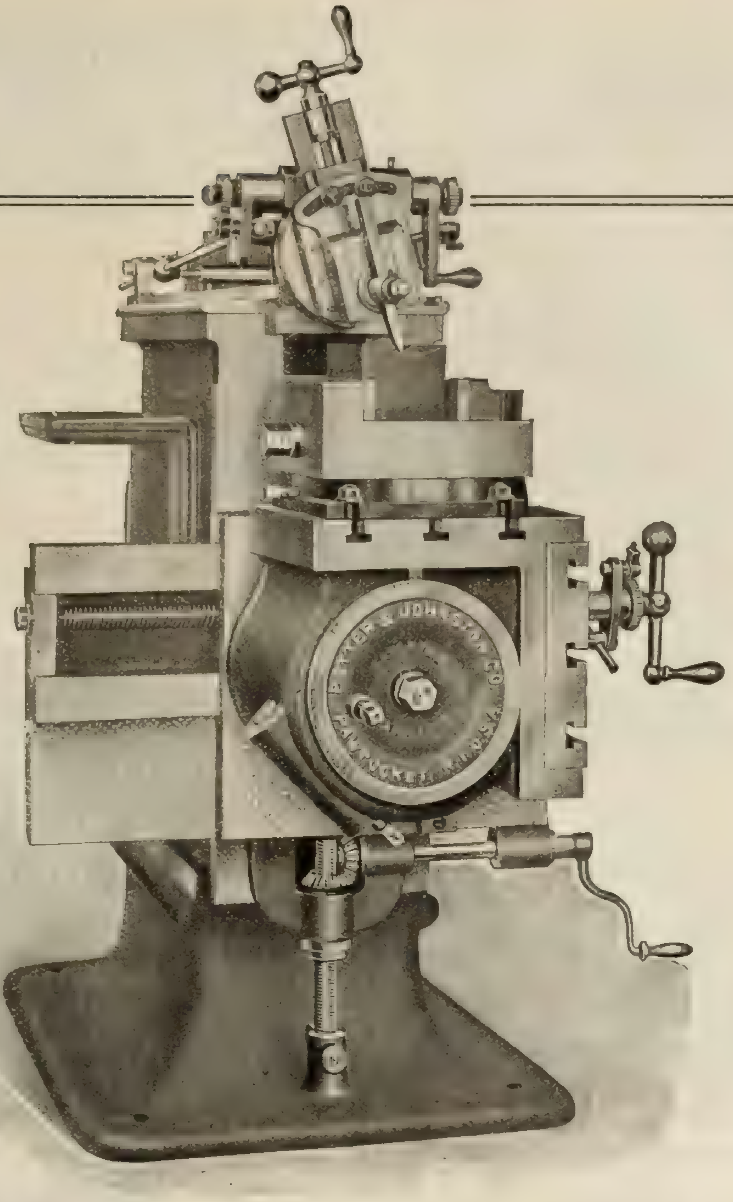
The combined result of two generations of engineering and mechanical experience. While, as a whole, it is no radical departure from established lines of the turret lathe, it has many **original features**, and with these features are combined well-known devices.

Safety, rigidity, convenience, production and durability are the ideas behind every step in their construction.

Your request will get you full details and specifications by early mail. Make it.



**W. K.
Millholland
Machine Company**
INDIANAPOLIS, IND., U.S.A.



Potter & Johnston 15-inch Universal Shaping Machine

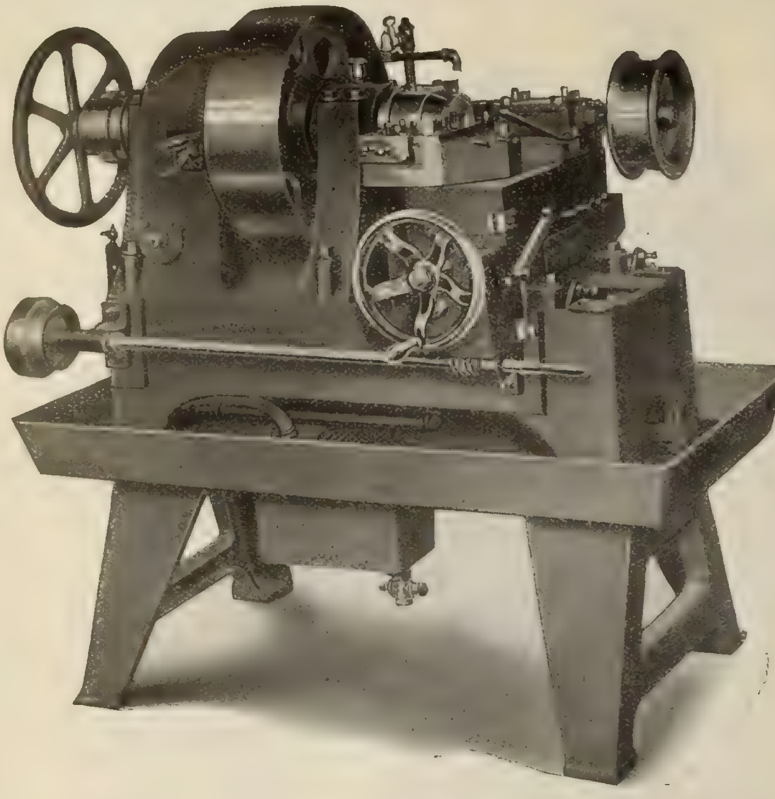
Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA



For Turning, Facing and Milling the Thread on Gas Check Plugs for 6-inch High-Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells. Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield

STAIR BUILDING, TORONTO, ONT.

KEMPSMITH

UNIVERSAL MILLING MACHINES

Every Kempsmith Milling Machine of whatever size, is provided with a slotted spindle nose for positive drive of arbor and for positive drive of face milling cutter in either direction.

Every machine is equipped with our patented keyed overhanging arm which insures positive alignment of arbor and boring bar and also prevents the cutter being pounded out of line under cut.

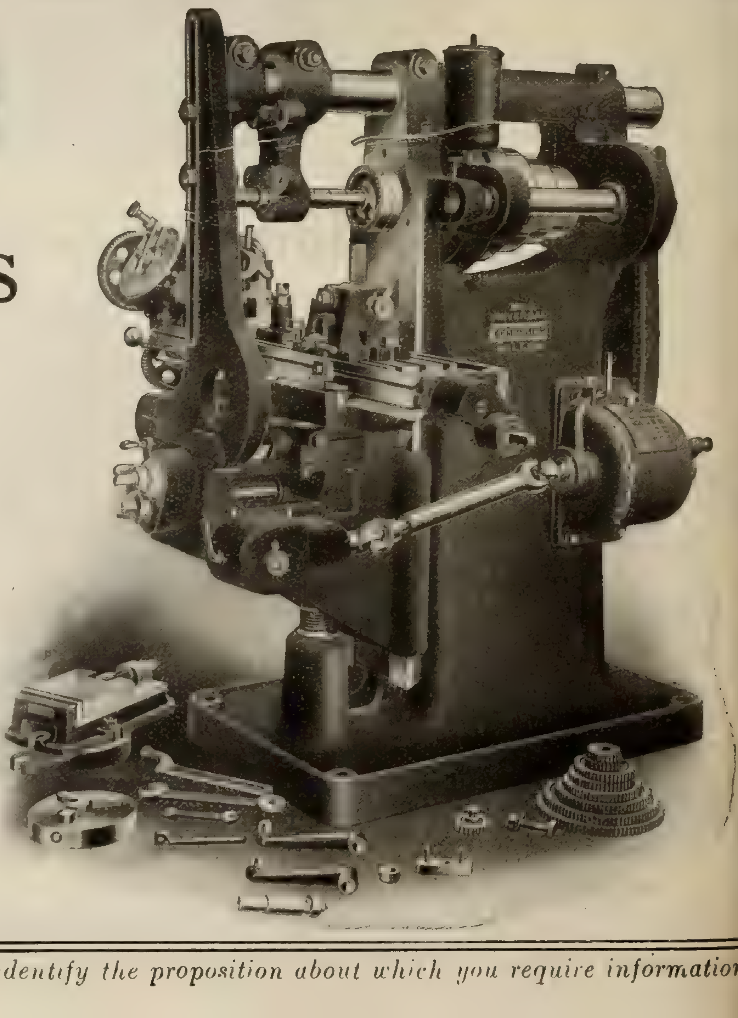
Kempsmith machines are heavy, with weight well distributed and their accuracy is guaranteed within very close limits.

Send for illustrated catalogue.

Kempsmith Manufacturing Co.

MILWAUKEE, U. S. A.

Agents:—Foss & Hill Machinery Co., Montreal
General Supply Company, Toronto and Ottawa
Western Supply and Equipment Co., Calgary



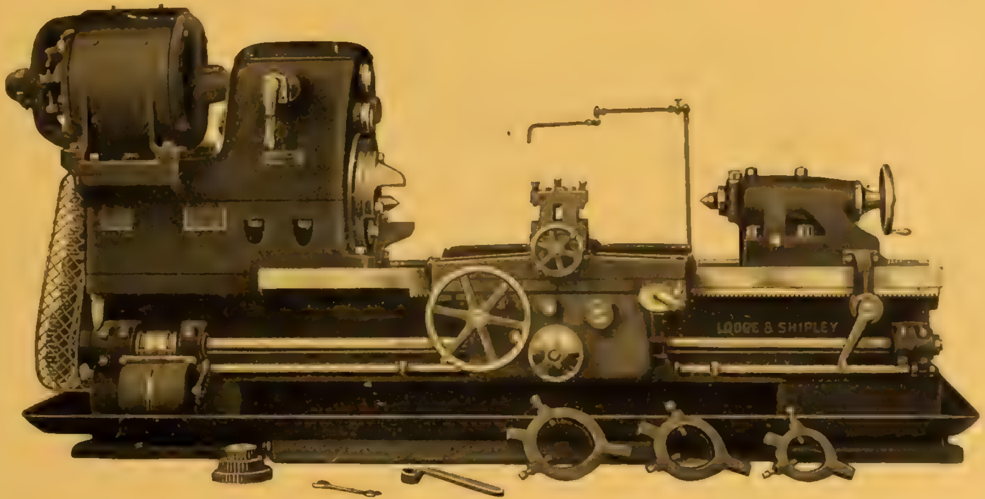
G&W MACHINERY

GARLOCK-WALKER MACHINERY CO.
LIMITED

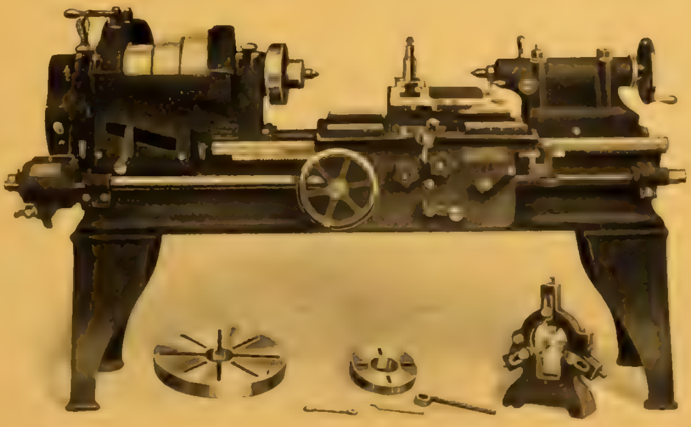
32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Some of the Tools We Offer for Machining 6-in., 8-in., 9.2-in., 12-in. Projectiles

These machines are in use in the Munitions Plants in England, France, Russia and the United States



LODGE & SHIPLEY HEAVY FORGE LATHE
For Outside Turning
EITHER MOTOR OR STANDARD DRIVE



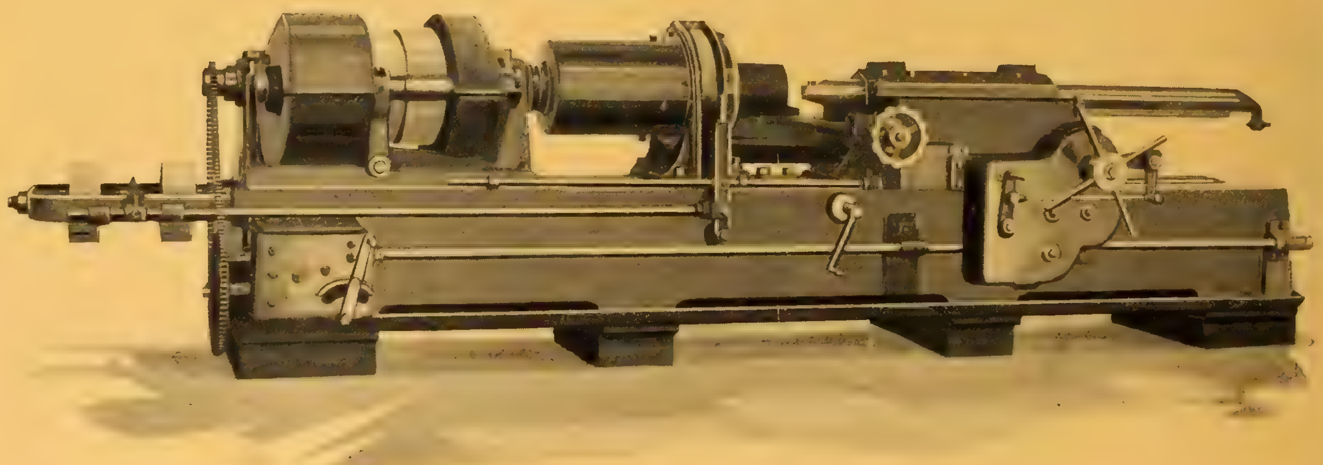
TOOL ROOM LATHES

METAL and WOODWORKING MACHINERY of all Kinds

GARLOCK-WALKER MACHINERY CO.
LIMITED
32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

For INTERIOR Roughing and Finishing by Profile Attachment or by Removable Form Cutters, on 8-in., 9.2-in., 12-in. Projectiles

These machines are in use in the Munitions Plants in England, France, Russia and the United States.



G. & L. HEAVY BORING LATHE.

Front Spindle Bearing $5\frac{15}{16}''$ x 10".

Steel Spindle.

Double Back Geared.

Quick Return to Boring Bar Carriage.

Machine Complete Ready for use, without Cutters.

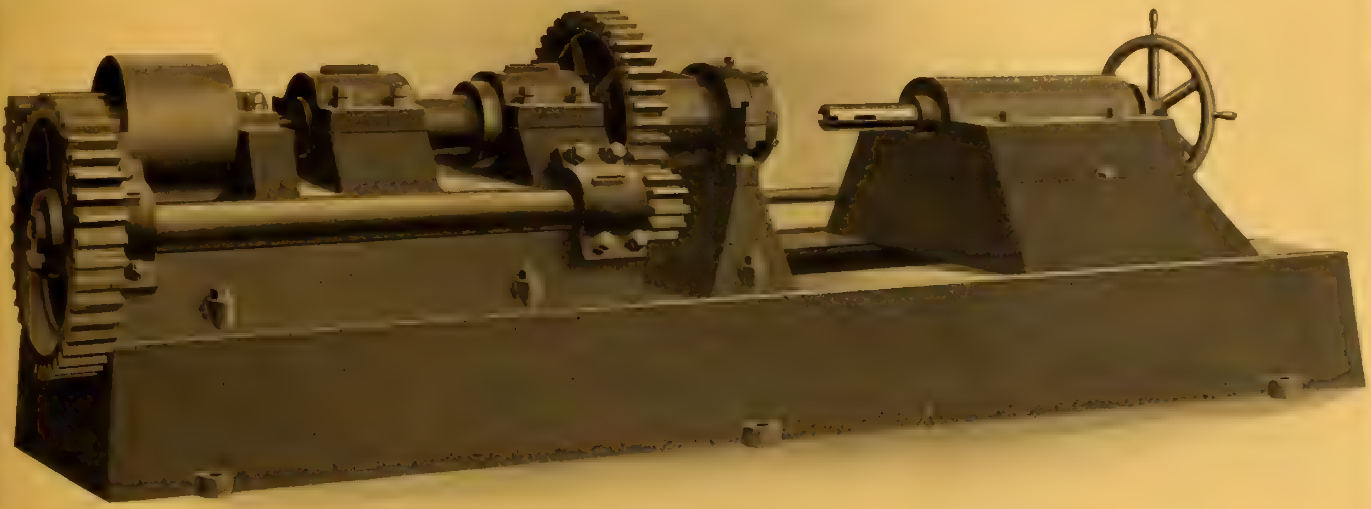
Weight, 16,000 lbs.

METAL and WOODWORKING MACHINERY of all Kinds

GARLOCK-WALKER MACHINERY CO.
LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

These machines are in use in the Munitions Plants in England, France, Russia and the United States.



O. & S. HEAVY DUTY BORING LATHE
For 6-in. Projectiles.

Will Bore 6-in. Shell Forging in 5 Minutes

A modern, substantial lathe of accurate and massive construction, turning out work rapidly and with precision, capable of obtaining maximum results.

WEIGHT, 16,000 lbs.

Shipment Immediately from Stock

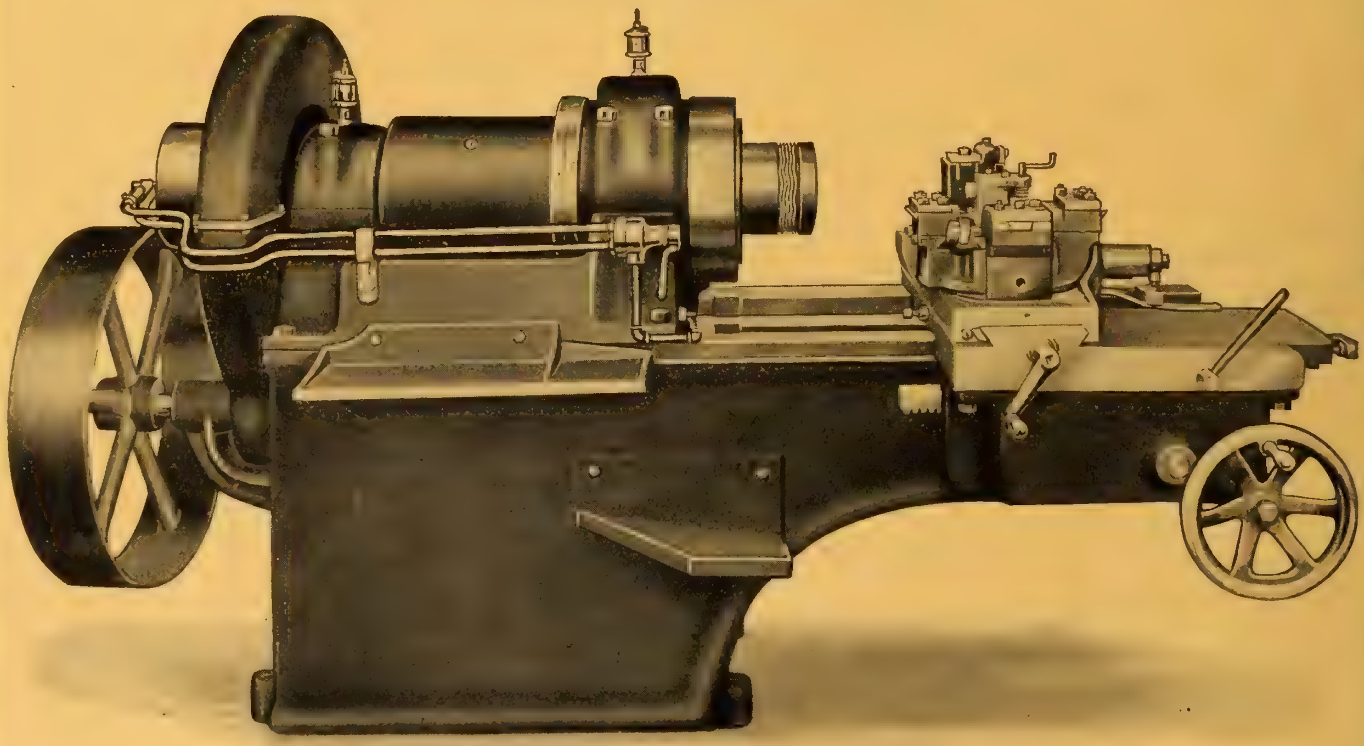
METAL and WOODWORKING MACHINERY of all Kinds

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO. LIMITED

32 FRONT ST. WEST. **TORONTO** TELEPHONE MAIN 5346

These machines are in use in the Munitions Plants in England, France, Russia and the United States



R & V HEAVY DUTY WAVING LATHE
6-in., 8-in., 9-in. Projectiles

MACHINES ALSO OF THIS TYPE FOR

- Cutting Off
- Forming for Copper Band, Groove, Undercutting and Waving
- Rough Turning
- Finish Turning
- Counter Boring and Facing Off
- Thread Millers

These Machines come to you completely tooled.

ALSO

Drills, Grinders, Banding Presses, Shapers, Screw Machines, Bradley Nosing Hammers, Hydraulic Nosing Presses, Shipping Plug Machines, Adapter Equipment, Pattern Shop Tools

Full Line of Woodworking Machinery

METAL and WOODWORKING MACHINERY of all Kinds

The *Greenfield*

For Special Work, Tools, Jigs, Etc.

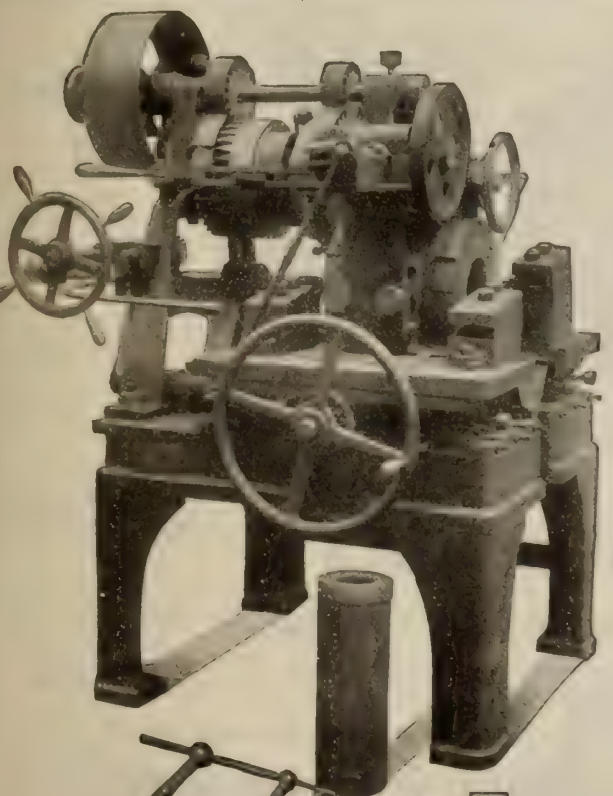
This Universal Grinder is just the machine needed in many of the shops engaged in equipping for the manufacture of special lines. It is an all-around grinder and will handle about any kind of a job that comes within its range.

It has a stiffer, more rigidly supported table than any similar machine. It will turn out accurate, dependable work. Also, we believe we are perfectly correct in stating that we furnish this machine with a larger and more complete set of attachments than can be had for any grinder selling at anything like the same price.

How can we do it? Specialization and building in quantities.

Ask for Catalog No. 5, showing the machine in twenty-one different "set-ups" and explaining the purpose of each.

Greenfield Machine Company
Greenfield, Mass., U.S.A.



CUTTING-OFF MACHINES

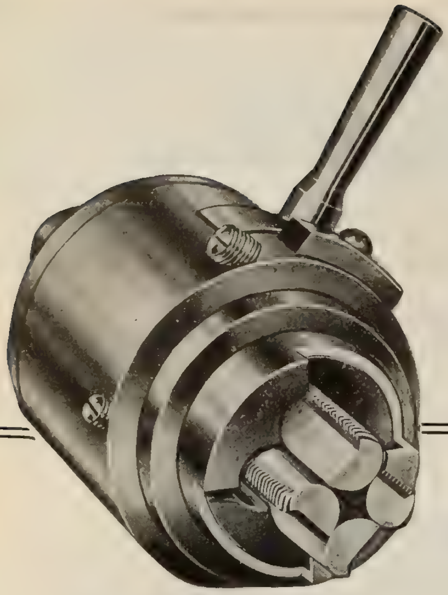
Quick Delivery

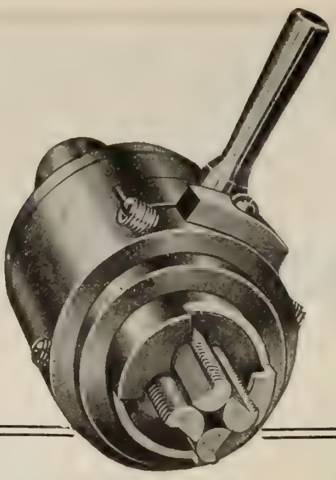
For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

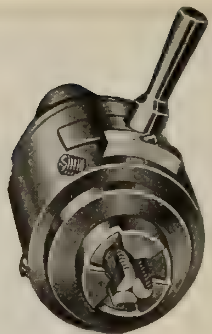
Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal







M.E.C. Collapsible Taps

Big Favorites of Shell Makers

Manufacturers of shrapnel shell parts find them invaluable because of their convenience, rigidity and accuracy. Many of Canada's largest manufacturers of munitions have adopted them as a **practical way of reducing cost and increasing output**, after putting them to a severe test.

Would you like to hear what users have to say? We'll be glad to put you in touch with our Canadian customers.

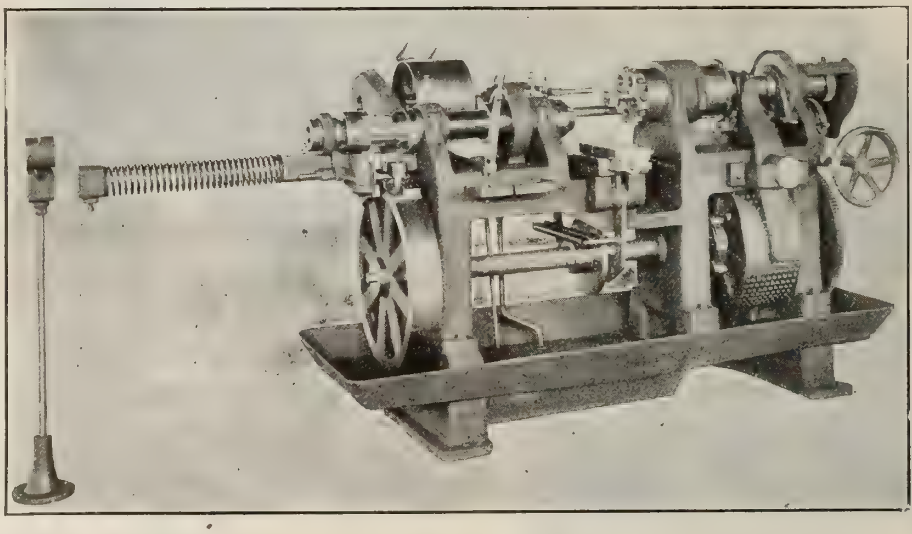
Drop us a line now for our proposition—it's a liberal one that's sure to appeal to you.

MANUFACTURERS EQUIPMENT COMPANY

175-179 North Jefferson Street, CHICAGO

FOREIGN AGENTS: C. W. Burton Griffiths & Co., Ludgate Circus, Ludgate Hill, London, England. Bureaux & Caisse, 39 Rue de Lappe, Paris, France. Geo. A. Todd, 826 Traders Bank Building, Toronto.

A Screw Machine of Unusual Merit



Delivery in Six Weeks

Chicago Automatics

MANUFACTURE RAPIDLY AND ACCURATELY WITHOUT THE USE OF A COMPLICATED MECHANISM OR A SYSTEM OF CAMS THAT ARE DIFFICULT TO DETERMINE AND ARRANGE ON THE MACHINE.

The rigidity of the machine has not been sacrificed for the flexible features which are embodied in the Chicago Automatic. Alignment is correct, and there are no parts where excessive wear takes place—therefore ACCURATE PRODUCTION is assured during the long life of the machine.

Chicago Automatic Screw Machines are not an experiment—**ten years of intensive manufacture of one product—Automatics—stands behind every machine.**

FULL PARTICULARS ON REQUEST.

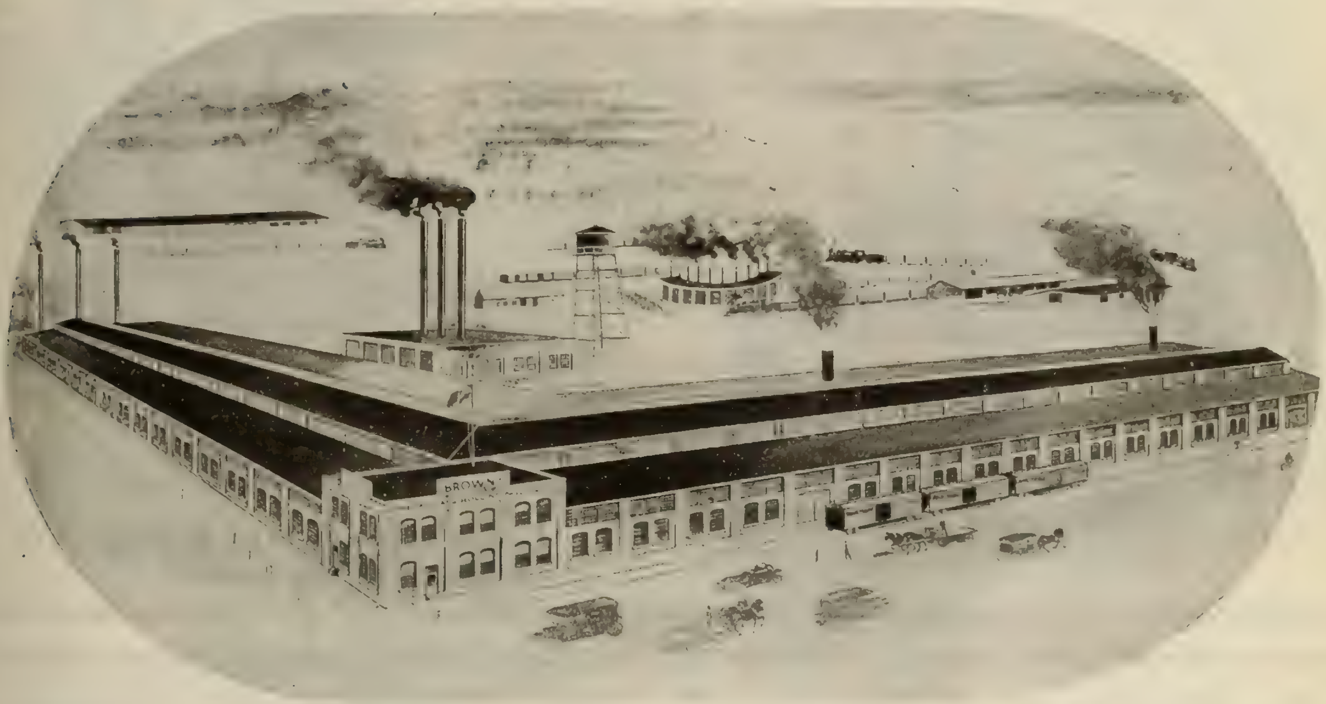
THE JOHN McNAB MACHINERY COMPANY

NEW YORK CITY, U.S.A.

European Representatives : John McNab, Hyde, England.

BRASS, BRONZE

AND GILDING METAL IN SHEETS, ROLLS, PLATES AND RODS



SPECIAL MARINE BRONZE ROD FOR SHAFTING AND BEARINGS.

FOR DRILLING AND FREE-TURNING, ORDER BEAVER BRASS ROD.

BEAVER BRAND "SPINNING BRASS."

You get top-notch quality plus quick service when you buy Beaver Brand Products, and the cost is very reasonable.

Once known always used.

It will pay you to get acquainted by sending a trial order.

Brown's Copper and Brass Rolling Mills, Limited

General Offices and Mills:
NEW TORONTO, CANADA

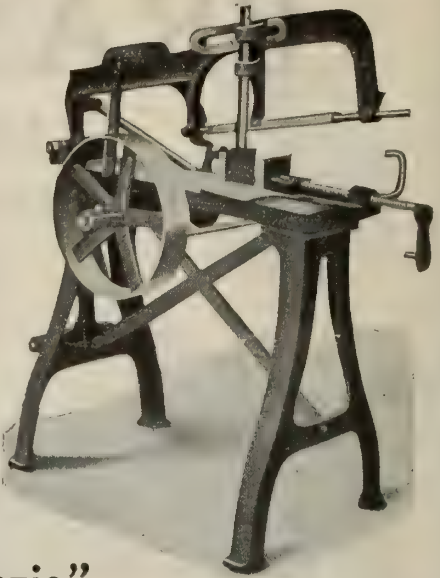
BEAVER BRAND COPPER & BRASS BROWN'S QUALITY ROLLING MILLS MADE IN CANADA

MADE IN CANADA

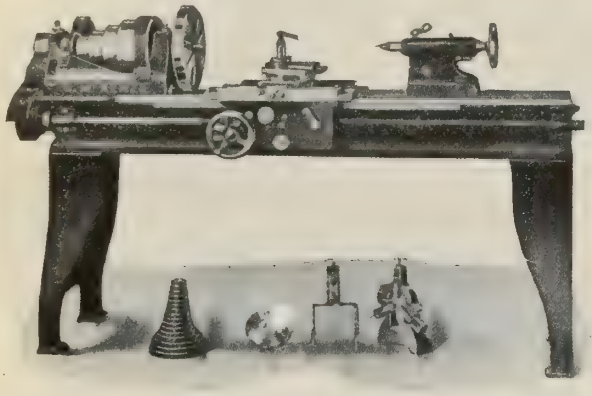
The Improved Power Hack Saw

will cover its cost many times over with the money it saves through long, efficient service.

Saws bars 6 x 6 in., either round or square, and is so constructed as to require no attention after work is put in vise, and stops automatically when piece is cut off.



The Improved Saw Guide is a Special Feature — it keeps the saw perfectly in line at all times.



The "McKenzie" Engine Lathe

The Standard of Accuracy

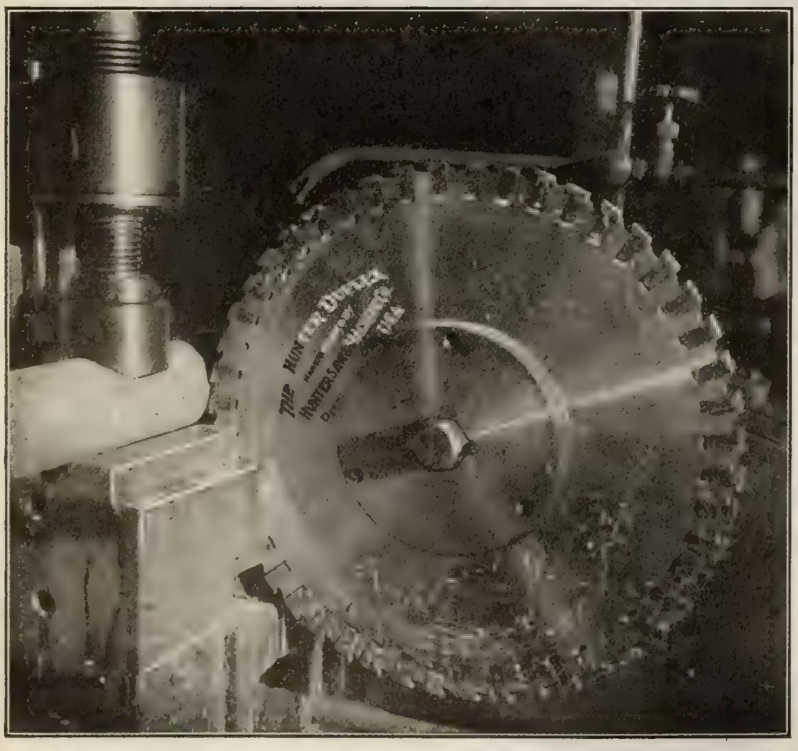
Made from new patterns, of improved design, and constructed of the very best material by expert workmen. Every part is mechanically perfect and excellently finished.

Its accuracy and durability mean a big saving of money to you.

Let us put full details before you. Write!

The D. McKenzie Machinery Co.
GUELPH, ONTARIO

A Hunter "Duplex" on Shrapnel Stock



FAST GOING
on Newton Machine

Through 3½" round 60 Carbon, 70 Manganese Shrapnel Stock every

2 MINUTES

The secret of Hunter "Duplex" Saw speed is the method of holding the high speed teeth.

You can use this speed profitably—on shrapnel or any other stock.

Let us send full Particulars.

HUNTER SAW & MACHINE COMPANY, Pittsburg, Pa.

Why does the Peerless lead?

PEERLESS
PEERLESS MACHINE CO. RACINE WIS. U.S.A.

Because it was designed by the originators of this class of high speed machinery and every detail is perfected from real shop experience. It embodies all the latest improvements in this type of machinery, and also some exclusive features that are well worth consideration in selecting a tool of this type.

In operation it is semi-automatic, which means it continually saves time instead of wasting it. Just stop to figure if one man operates ten machines and saves only ten seconds on each cut. In a short time your figures will show a saving in operator's time that will cover the cost of machine.

A saw blade in this machine will cut as much material as in any other machine on the market, and will also cut considerably faster according to the grade of material.

In order for anyone to appreciate the many labor-saving improvements in this machine it must be tried out under your own cutting conditions. For this purpose we will gladly send you one on thirty days' free trial.

PEERLESS MACHINE COMPANY

1607 Racine Street RACINE, WISCONSIN

MORE SPEED LESS BLADES

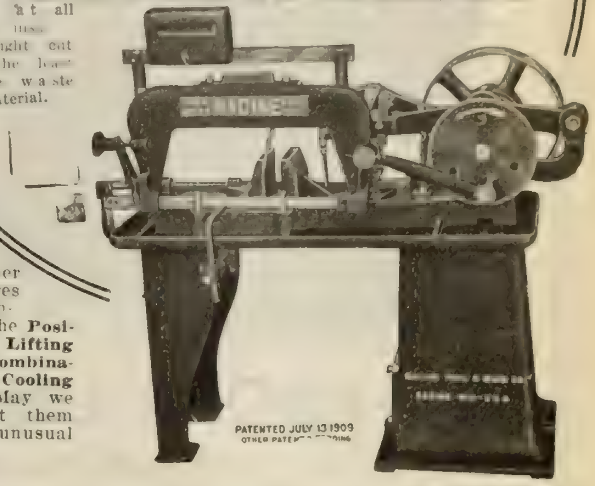
One Canadian Steel Company uses 120

RACINE METAL CUTTERS

and has saved $11,019.50. Particulars on request.

These machines are popular everywhere because they work fast and are easy on the blades because springing is absolutely prevented by the mechanically correct design and construction.

The heavy, rigid saw frame guide of the Racine is made of the best grade of semi-steel and will hold the saw frame absolutely rigid and work at all times, insuring a straight cut with the least possible waste of material.



There are other Racine features well worth investigation — the **Positive Automatic Lifting Device, the Combination Vise, the Cooling System, etc.** May we tell you about them and about our unusual trial offer?

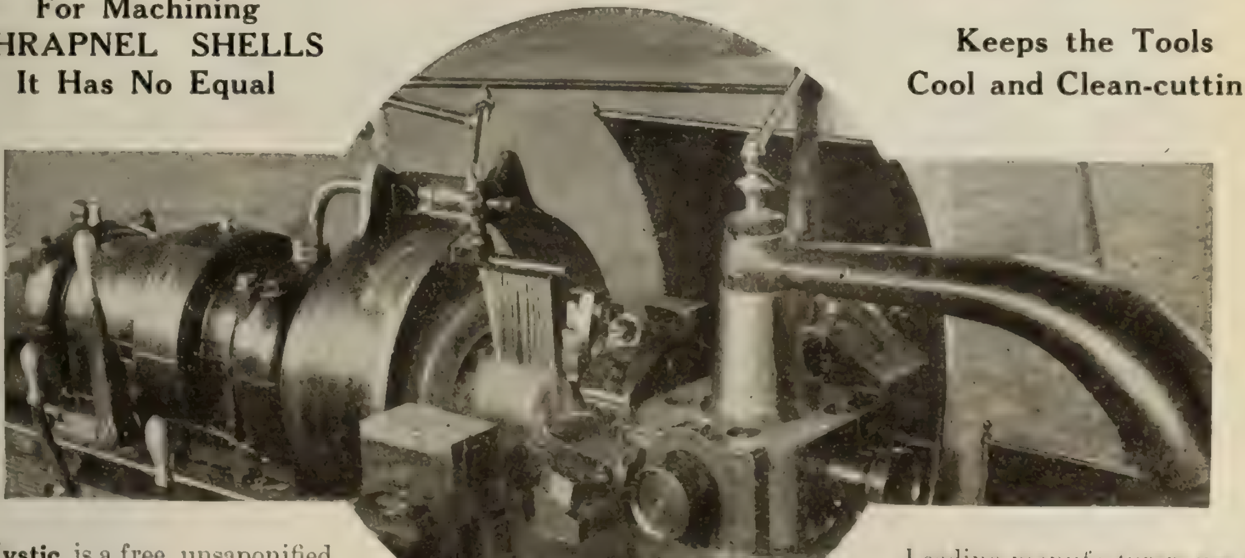
RACINE TOOL & MACHINE COMPANY

15 Melbourne Avenue, Racine, Wis., U.S.A.

Mystic Cutting Compound

For Machining
SHRAPNEL SHELLS
It Has No Equal

Keeps the Tools
Cool and Clean-cutting



Mystic is a free, unsaponified animal oil lubricant. Will not separate in solution, gum machines or rust.

Leading manufacturers use it on Shell Work in preference to oil. It increases production and costs less.

Cataract Refining Company, Limited, Toronto, Ont.

HEATING and VENTILATING

"Keith" Fans will be found more economical and have a greater efficiency where conditions are unusually severe, because they possess advantages over other Fans used for the same purpose.

The "Keith" Fan is the one that will give you continued and unqualified satisfaction.

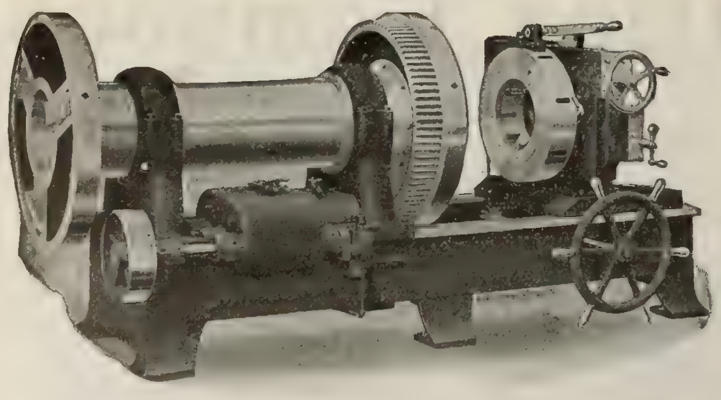
Our New Catalogue No. 55 has just come from the Press. Tell us where to address it and you will receive one by first mail.

SHELDONS LIMITED, Galt, Ont., Canada

Toronto (Canada) Office: 609 Kent Building.

AGENTS:

Messrs. Ross & Greig, 412 St. James St., Montreal, Que.
Messrs. Walkers, Ltd., 259-261 Stanley St., Winnipeg, Man.
Messrs. Gorman, Clancy & Grindley, Ltd., Calgary and Edmonton, Alta.
Messrs. Robert Hamilton Co., Ltd., Bank of Ottawa Bldg., Vancouver, B.C.



Cut Your Threads on a B & K and remove the frown

Frowns have no place around a Bignall & Keeler Pipe Machine. When a machine satisfies both the owner and the user, frowns are unknown. "Satisfies" is a big word when applied to pipe threading. There is the owner of the machine; the man who operates the machine, and the man who makes up the threaded joints. B&K machines satisfy all along the line.

What size are you interested in?

Bignall & Keeler Machine Works, Edwardsville, Ill.

CFM

The Canadian Fairbanks-Morse Co., Limited, Sales Agents for Canada

Montreal St. John Toronto Winnipeg Calgary Saskatoon Vancouver

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

IT TAKES MORE TIME TO SHARPEN A TOOL WHEN WHEELS ARE DULL OR COATED—

there's a delay in production too.

Both these losses are offset by the use of

Desmond-Stephan Grinding Wheel Dressers

No matter whether it is the ordinary shop grinding wheel or the largest, coarsest, hardest wheel, we have the tool that will return it to its original cutting efficiency.

Insist upon having your dealer supply you with one of our tools for trial. If he cannot, write us, and we will send any of them on approval.

For the ordinary shop grinding wheel specify the "DIANO-CARBO."

For large, coarse, hard wheels ask for the "SHERMAN-HUNTINGTON."

THE DESMOND - STEPHAN MFG. CO.
URBANA, OHIO

Alfred Herbert, Limited, Coventry, Agent for Great Britain

James McKay Company

PITTSBURGH, PENN., U.S.A.

Manufacturers of

SHELL FORGINGS

We have the Steel, Equipment and Experience and can execute orders for

SHELL SOCKETS
ADAPTER PLATES
BASE PLATES

for any size of shells.

Can make shipment of Nose Sockets, and Base Plates for British 6-in. H.E. Mark XVI soon as necessary inspections are authorized and executed.

Address Our Representative:

JOHN A. BUCHANAN
King Edward Hotel, Toronto

"Make Overs"
THE PROFIT ROBBER
DH

Make-overs take time, labor, etc., and delay production. They eliminate much of would-be profit.

Make-overs in castings that are due to blow holes, sand holes, etc., can be prevented by the use of

Shelton Metallic Filler

It is applied to the affected parts by means of a spatula, and becomes part of the casting itself: is durable and can never be detected.

Its reliability is proven by the fact that many of America's leading manufacturers are steady users.

Don't waste another dollar by scrapping castings.

Shelton Metallic Filler Co., **Derby, Conn., U.S.A.**

Agents: Webster & Sons, Limited,
31 Wellington St., Montreal, Canada

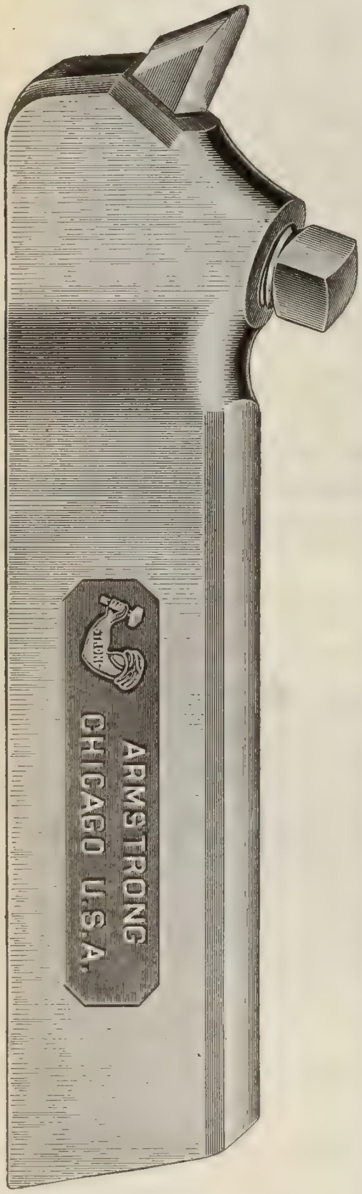
The Only Grand Prize for TOOL HOLDERS

Awarded separately and independent of other lines exhibited at the

PANAMA-PACIFIC EXPOSITION

WAS WON BY

ARMSTRONG TOOL HOLDERS


ARMSTRONG
CHICAGO U.S.A.

HIGHEST AWARD

at 4 World's Expositions

Paris - - - 1900
St. Louis - 1904
Liege - - - 1905
San Francisco 1915

THEY ALWAYS MAKE GOOD

OFFICIAL
AWARD
RIBBON
PANAMA PACIFIC
INTERNATIONAL
EXPOSITION
SAN FRANCISCO
1915
PRESIDENT
DIRECTOR OF EXHIBITS
GRAND
PRIZE
DEPARTMENT OF
MACHINERY
CHIEF

They Are Saving Millions of Dollars in High Speed Steel

CATALOG FREE

Armstrong Bros. Tool Co.
"The Tool Holder People"
306 N. Francisco Ave., CHICAGO, U.S.A.

The Panama-Pacific MEDAL OF HONOR was also won by ARMSTRONG Drop Forged Wrenches, Ratchets, Clamps, Lathe Dogs, Etc.

SAWS FOR SHELLS

We have experimented on the

SPECIAL SHELL STEEL

and have produced a *HACK SAW BLADE* that will give unequalled service on this material in *HIGH-SPEED MACHINES.*

Possibly we could help you.

"VICTOR BLADE— CANADIAN-MADE."

Victor Saw Works, Ltd.
Hamilton, Ont., Canada

VICTOR HACK SAWS Get a Box and Try Em.

TRADE B&C MARK

—in Corners and Confined Places

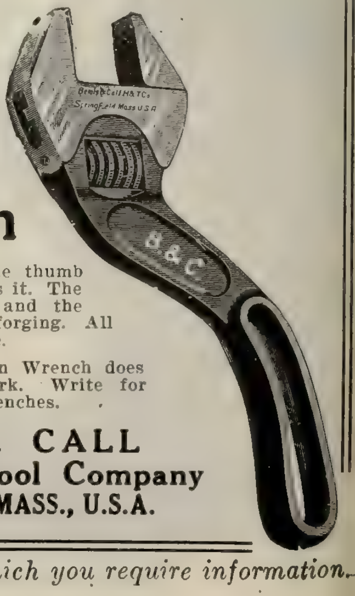
A MONKEY wrench is almost useless in the case of corners and confined places. Such positions call for a specially designed wrench. You have the required tool in the wrench illustrated. Note its design and construction. Our

B. & C.
ADJUSTABLE
"S" Nut
Wrench

is easily adjusted by the thumb of the hand that operates it. The operating nut is steel, and the sliding jaw a steel drop forging. All parts are interchangeable.

Our B. & C. Combination Wrench does both pipe and nut work. Write for complete catalogue of wrenches.

BEMIS & CALL
Hardware & Tool Company
SPRINGFIELD, MASS., U.S.A.


Bemis & Call H&T Co.
Springfield Mass U.S.A.
B & C

Two Cuts

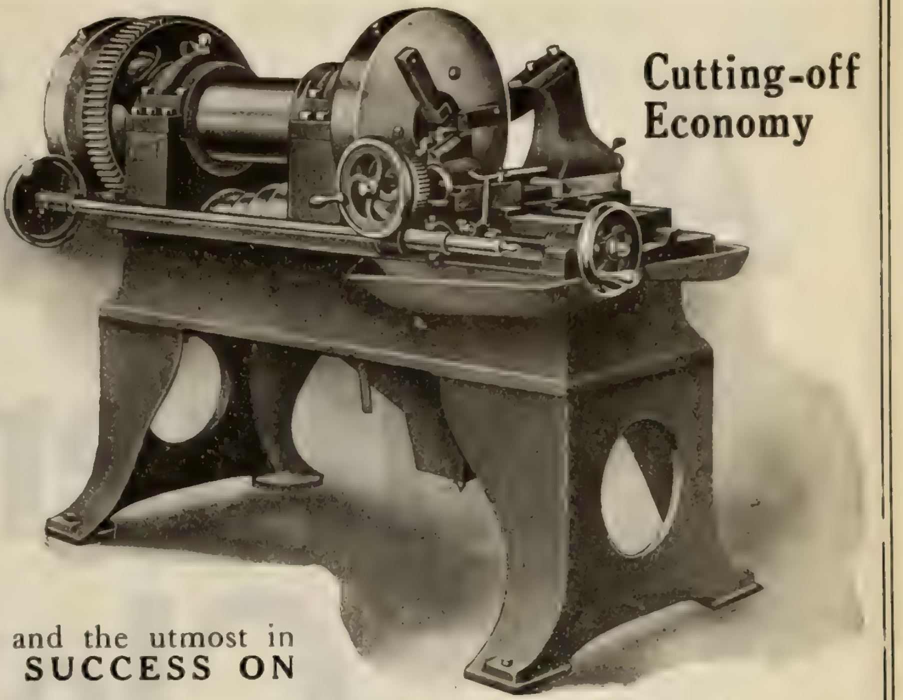
Simultaneously

One up, the other down. This is what makes the **Hurlbut-Rogers Cutting-Off and Centering Machine** virtually double the output and reduce the cost per piece about one-half.

The Hurlbut-Rogers Machine gives you capacity of two machines at the expense and in the floor space of one machine.

We build them for hard work and the utmost in accuracy—and their **GREAT SUCCESS ON SHELLS** shows it.

Let us go into details.

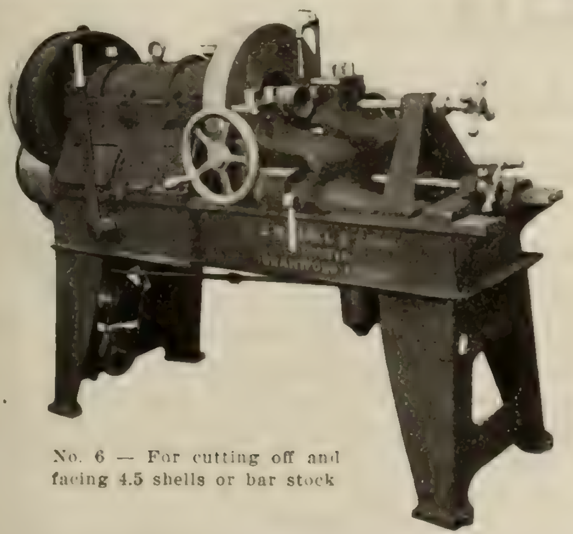


Cutting-off Economy

5-inch Cone-Driven Machine

HURLBUT-ROGERS MACHINERY CO., South Sudbury, Mass.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle-on-Tyne. H. W. PETRIE, TORONTO, CANADA.



No. 6 — For cutting off and facing 4.5 shells or bar stock

HALL

SHELL CUTTING-OFF and FACING MACHINES

For Shells, Bar Stock, Ingots—High Speed, Heavy Duty

For cutting off the open ends.
For facing off the closed ends.
For facing off projecting ends of plugs.
For cutting off bar stock.
For cutting off ingots, any size.

We manufacture a full and complete line of machinery for the above operations, used in the manufacture of shrapnel, 4.5, 60-Pr. and 10" shells.

Write us for particulars of our new 12" cutting-off machine, designed especially for the new 10" shells and ingots now to be made in Canada. Single or double cut at one chucking.

Let us tell you the nearest point at which you can see some of our machines in operation.

John H. Hall & Sons, Limited

Manufacturers of Pipe Threading and Special Machinery

BRANTFORD, CANADA

J.H.HALL & SONS LTD
BRANTFORD CANADA

No. 6—Double or Triple, for ingots or bar stock.

ACME Mineral Cleaner

Removes Grease and Oil from All Metals

ESPECIALLY WELL ADAPTED FOR REMOVING GREASE FROM SHELLS

Trials conducted with searching thoroughness prove Acme Mineral Cleaner RAPID, ECONOMICAL, HARMLESS and LASTING.

The cleaner everyone likes.

Acme Mineral Cleaner as you receive it is in granular form, easily handled with an ordinary scoop or cup. Unlike caustics it does not lose its strength should the cover be left off the barrel.

Put up in 250-lb. barrels.

Write for full particulars.

Sample sent on request.

Canadian Hanson & Van Winkle Company
Limited
TORONTO, CANADA

15-25 Morrow Ave.

Factories: C.P.R. and Morrow Ave.

$1\frac{13}{16}$

HIGH SPEED DRILLS

No. 5 Taper Shank 12" Flutes

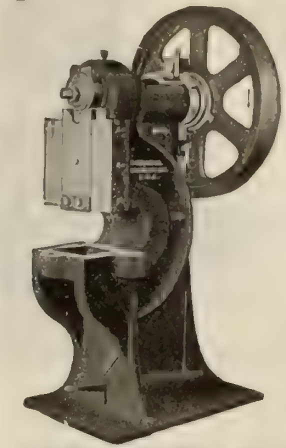
Price Attractive

In Stock for Immediate Shipment

The General Supply Co. of Canada, Limited
OTTAWA
Montreal Toronto Winnipeg

Entire Pressure is through Solid Metal

BLISS



The graduated eccentric adjustment facilitates setting dies. The slides are long and well gibbed.

Watchmakers whose dies are most delicate use "Stiles Presses" extensively.

The flywheel can be turned backward to release a punch when stuck in the die.

"Stiles" Punching Presses

are built in ten sizes and adapted for punching, stamping, forming and bending operations, in the economical manufacture of cutlery, hardware, locks, auto parts, sewing machines, typewriters, etc. **Write us at once.**

Talk to us about Presses for any and every purpose.

E. W. Bliss Co., No. 20 Adams Street
Brooklyn, N.Y.
Chicago Office: 622 West Washington Boulevard
Detroit Office: Dime Bank Building

Buffalo-Niagara CONOIDAL FANS

are strongest

One of the largest American concerns has occasion to use fans for service where sudden starting and stopping is necessary. A testing machine was used to approximate actual working conditions, by bringing the fan wheels from rest to 1500 R.P.M. and stopping in one second.

Fans of a well known make—multiblade type—after several improvements and changes in design, made as their best tests 2580 and 1488 cycles of starting and stopping before they went to pieces.

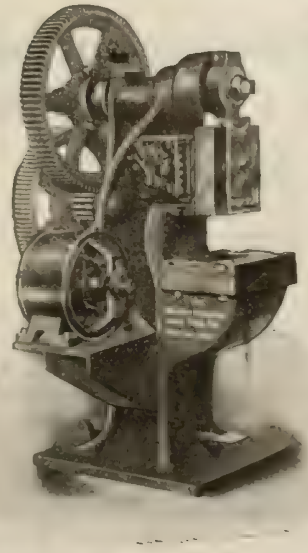
A Conoidal Wheel, the only one offered, and without the advantage of previous test, had made 37333 cycles when the shaft of the testing machine broke, leaving the fan apparently in good condition to go on indefinitely as reported by the buyers' engineers.

Send for Catalog 201

Canadian Blower & Forge Co.
BERLIN, ONTARIO

Unusual Strength in the Frame of

"Toledo" PUNCHING PRESSES



and more than ordinary productiveness in their operation.

Crank shafts are of large diameter and hammer forged from special steel.

Eccentric adjustment insures rapid, accurate adjustment for all classes of work.

Die space is extra high.

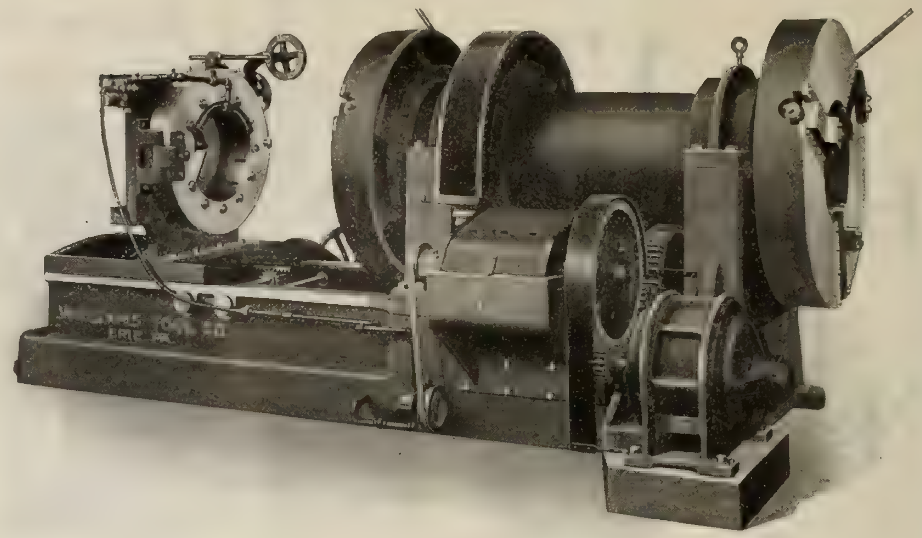
Built in 15 sizes, ranging in weight from 600 to 14,000 lbs. and adapted to punching, shearing, and cutting out blanks of heavy metal; operating, trimming and forming dies, and an extensive line of similar work.

Prompt Deliveries of "Toledo" Presses for Every Requirement.

The Toledo Machine & Tool Co.
Toledo, Ohio, U.S.A.

WILLIAMS PIPE MACHINES

Received Highest Award at Panama Exposition



The Following Letter Explains Why:

Williams Tool Co., Erie, Pa.: Rochester, N.Y., 12-3-14.

Gentlemen:—We are so pleased with our No. 3 Pipe Machine, and it is doing such splendid work for us at a minimum of expense that we are now considering the advisability of displacing two smaller machines for one of your No. 1½ or No. 2 motor drive.

The machines which we would displace, if we make a change, are belt drive, are (names of two of the oldest and best known machines on the market) equipped with nipple holders, extra dies, etc. Both of these machines are still in fairly good condition. On what basis could we make an exchange with you?

Yours very truly, SAMUEL SLOAN & CO.

WILLIAMS TOOL CO. - - - ERIE, PA.

MURCHEY
TAPS AND DIES

—very extensively used on 6-in., 8-in. and 9.2-in. shells.

The great advantage of using MURCHEY COLLAPSING TAPS AND DIES on large shells

Murchey Collapsible Tap.

MURCHEY Taps and Dies save the buying of extra machines. The time alone required to thread one of the large shells, together with rehandling, will more than pay for the tap in a very short time.

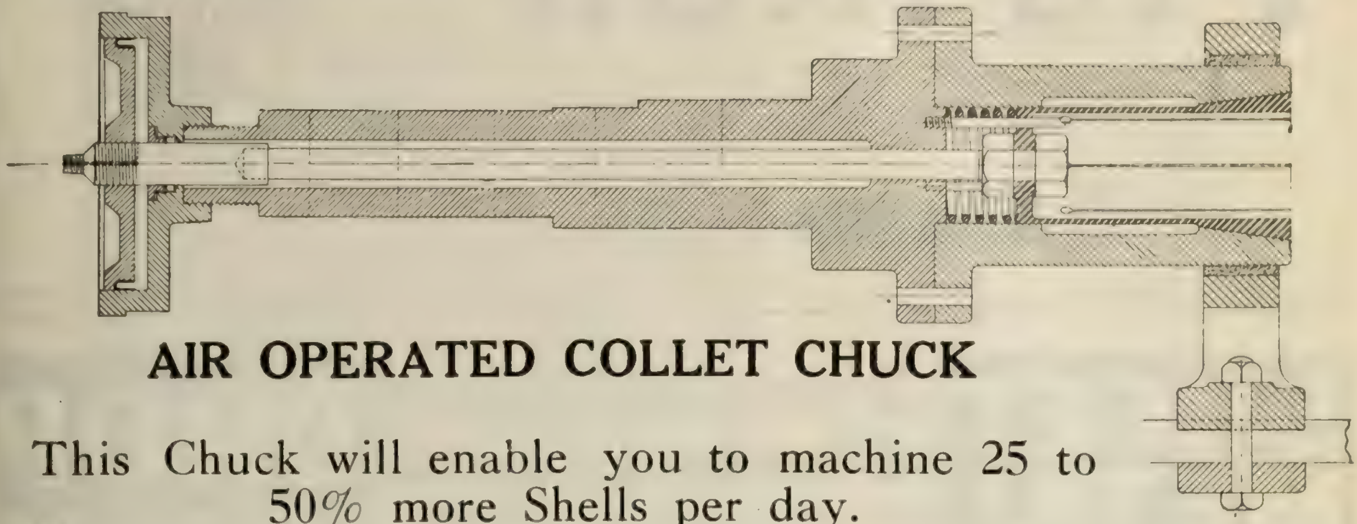
The largest American firms are doing all the threading on shells with Murchey Collapsing Taps and Murchey Self-opening Dies, and are getting most desirable results.

They save the time of rechucking and rehandling, the possibility of the shell getting out of center. By using a roughing and finishing tap they are able to tap the base and nose of these shells in about one-fifth of the time it requires on a thread miller and produce accurate work.

Send us Blue Prints of your requirements and we'll gladly quote you on the necessary tools.

Murchey Machine & Tool Company
75 Porter Street, Detroit, Mich.

INCREASE YOUR PRODUCTION



AIR OPERATED COLLET CHUCK

This Chuck will enable you to machine 25 to 50% more Shells per day.

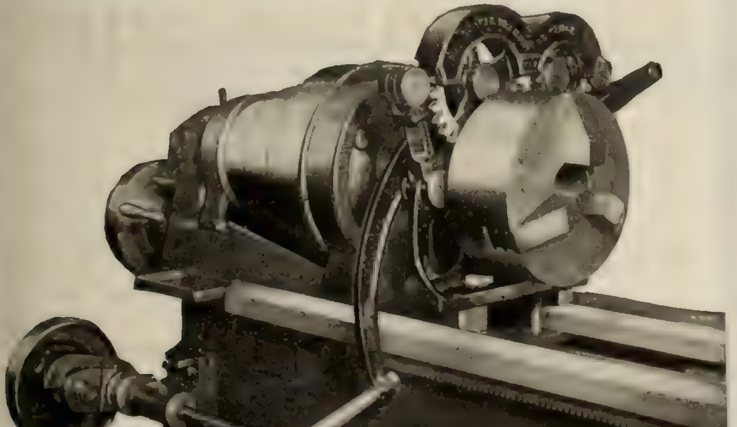
MADE IN ALL SIZES. ADAPTABLE TO ANY HOLLOW SPINDLE LATHE.

Particulars on Application. ***Prompt Delivery.***

HYDE ENGINEERING WORKS

P.O. Box 1164 **27 William St., MONTREAL**

Speed Up! Production
With a Barker Wrenchless Chuck



You don't consider money spent, on something which will bring returns—it is invested.

A chuck which will cut the time of setting-up in half and at the same time not be prohibitive in initial cost or maintenance is a most worth-while investment in your plant—is it not?

Barker Wrenchless Chucks are proving their worth as an investment in many plants where multiple chucking has been a profitless bugaboo—perhaps your neighbor is a Barker fan—let us send you a list of users in your territory.

An inquiry to-day will bring the Barker proposition to you by return mail. You can't go wrong and you do not obligate yourself in any way whatsoever.

The entire opening and closing operation is accomplished with a short action of the hand lever—think what this means in saving of time.

THOMAS ELEVATOR COMPANY

22 South Hoyne Avenue - - CHICAGO, ILLINOIS, U.S.A.

PIG IRON

M·A HANNA &Co

"Victoria" Foundry and Malleable, made by The Canadian Furnace Co., Port Colborne, Ont., Canada

M.A.HANNA&CO. Sales Agents: CLEVELAND, O., U.S.A.

SHEET METAL STAMPINGS

Dominion Forge & Stamping Co., Limited
WALKERVILLE ONTARIO

DROP FORGINGS

Our facilities and equipment enable us to give you a top-notch quality at a very reasonable price.

AUTOMOBILE FENDERS, HOODS AND GASOLINE TANKS

SMOOTH-ON
TRADE MARK-REG.U.S. PAT.OFF.

Iron Cements

Positively stop all leaks of steam, water, fire or oil, in iron, steel or concrete. They are easy to apply, harden quickly and make permanent repairs, proved by years in use.

Every engineer should have a copy of our instruction book.

Smooth-On Mfg. Company
Jersey City, N. J., U. S. A.

Send for New No.15 Illustrated Instruction Book

Brass, Phosphor, Bronze, Copper and Aluminum Castings

We have the largest Jobbing Brass Foundry in Canada.

Can make prompt delivery.

Tallman's reputation is in the goods.

Tallman Brass & Metal Co.
HAMILTON, ONT.
CANADA

MISS ELLEN TERRY
As Portia in "The Merchant of Venice"
"Be merciful;
Take thrice thy money,
Bid me tear the bond."
—Merchant of Venice

Shakespeare Series—"No. 2"

ELLEN TERRY is here depicted in one of her favorite characters, and one might almost think she is pleading in all sincerity for the life of her client.

Take Thrice Thy Money

reminds us forcibly of a large user of

HARRIS HEAVY PRESSURE

who recommended an engineer to send an order for a trial box. He stated it is worth

Three Times the Price

This is the experience of all. It is worth more because it gives

LONGER SERVICE.

HARRIS HEAVY PRESSURE

THE BABBITT METAL WITHOUT A FAULT

IS BEST

For All General Machinery Bearings

HARRISMETAL
HEAVY
PRESSURE
THE CANADA METAL CO. LIMITED
TORONTO

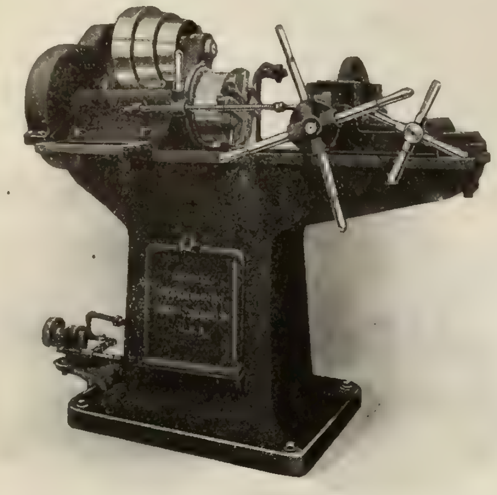
We Guarantee Our Babbitt Metals to Give Excellent Service.
ORDER A TRIAL BOX FROM OUR NEAREST FACTORY.

THE CANADA METAL CO., LIMITED

HEAD OFFICE AND FACTORY **TORONTO** FRASER AVENUE

HAMILTON MONTREAL WINNIPEG VANCOUVER

"Running Night and Day for a Year Without Being Down for Any Repairs Whatever"



That is the record of a Landis Bolt Cutter in the plant of the Packard Motor Car Company, Detroit, Mich., and it is not unusual at all.

You are aware, too, of the high degree of accuracy and the great production required by automobile manufacturers. The Landis Die has qualified in both respects and is also reducing threading costs considerably.

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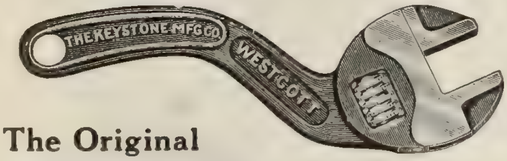
EXCLUSIVE CANADIAN AGENTS: WILLIAMS & WILSON, MONTREAL, CANADA



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HANDLE MALLEABLE IRON, JAW FORGED STEEL.

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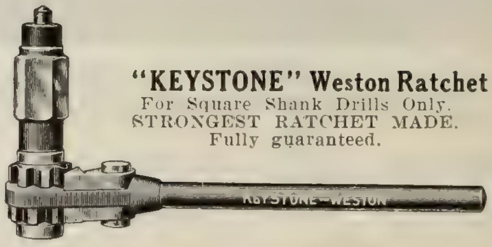

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STRONGEST RATCHET MADE.
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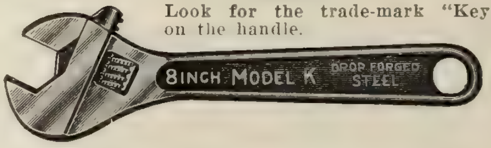

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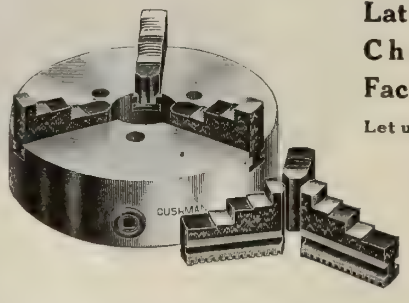

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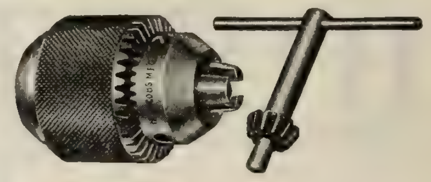

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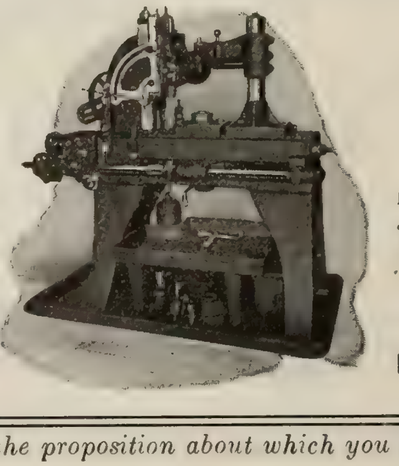

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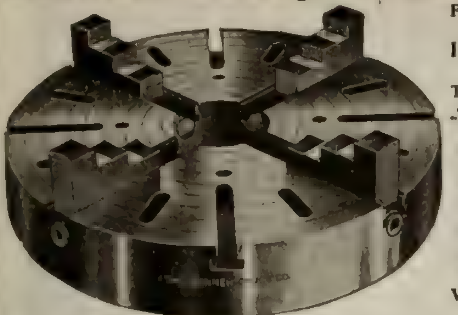

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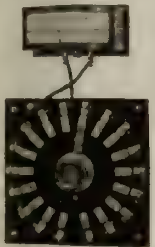

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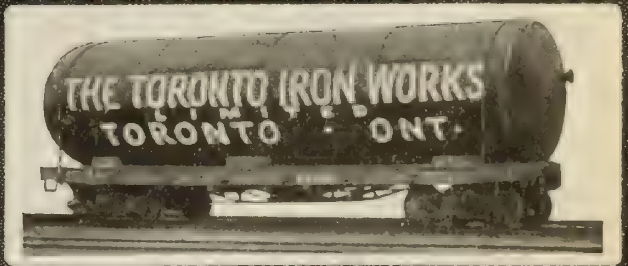

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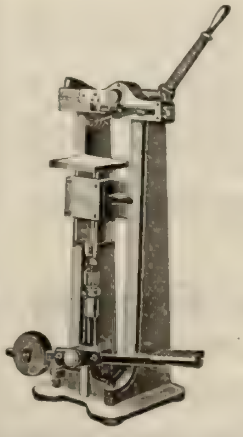

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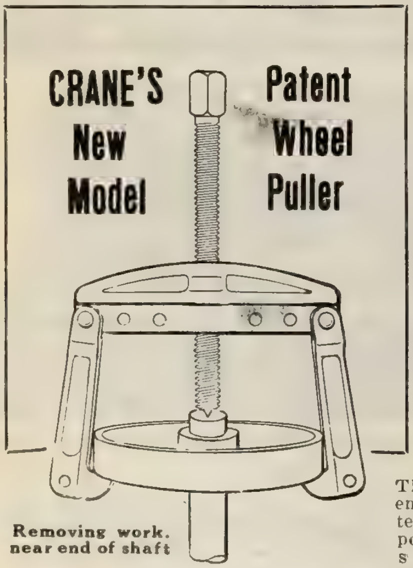

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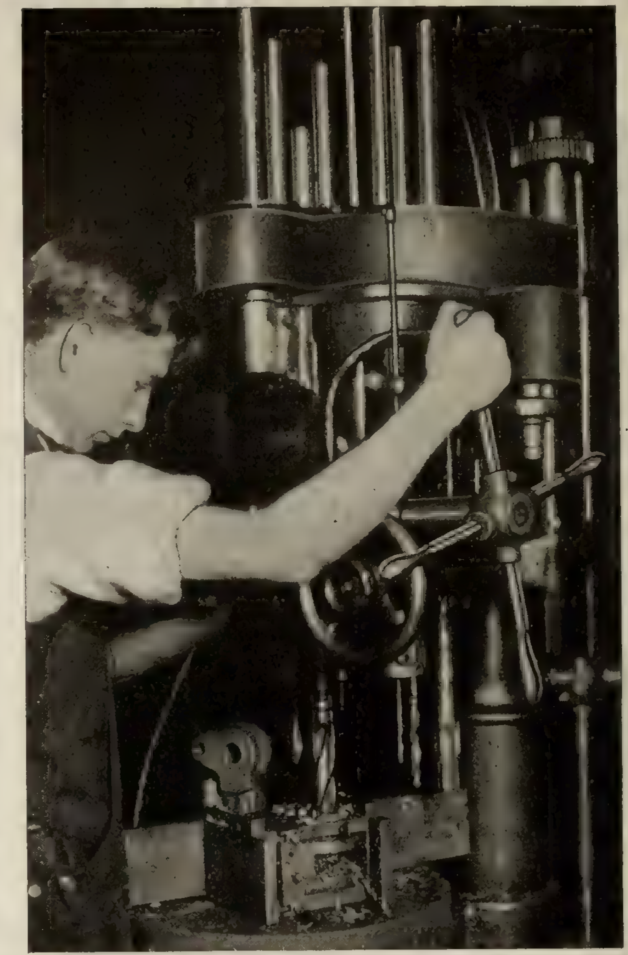

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The casting is a malleable iron socket for a 100-ton Norton Jack. The operations are: 1st Spindle, drill 1⅛", hole through two ¾" sections. 2nd Spindle, a double cutting tool reams the lower section and counterbores the upper section. 3rd Spindle, drill a 5" hole 2¾" deep. 4th Spindle, drill ¼" hole through two ¼" lugs. 5th Spindle, drill 5-16" hole ½" deep. 6th Spindle, drill 3-16" hole and counterbore to ½". **And all this work is done on the Turner Turret in 8 minutes.**

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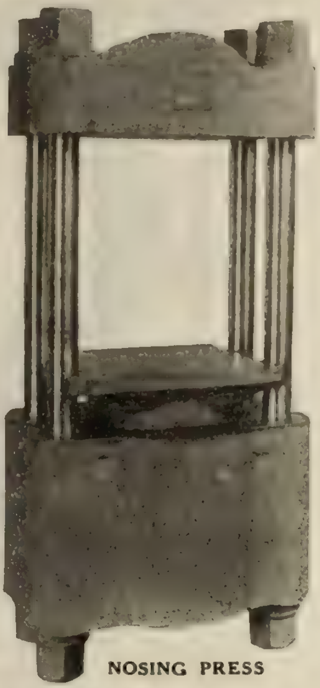

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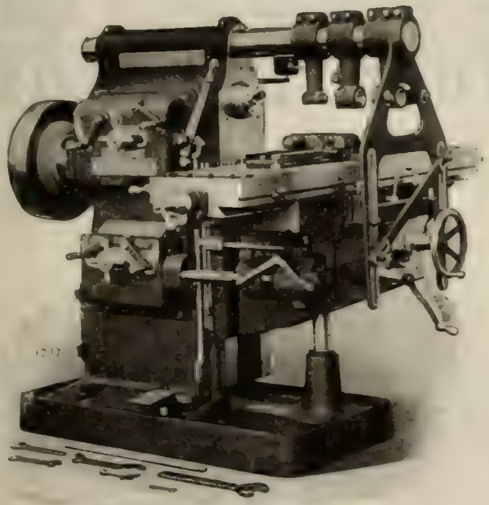

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These are some of the reasons why you should use
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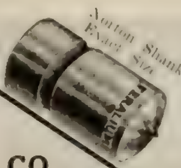

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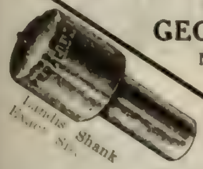

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Give Excellent
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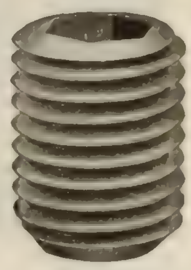

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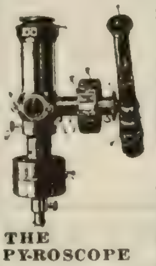

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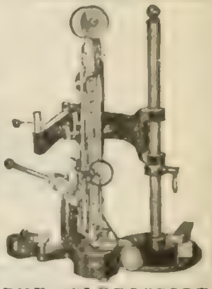

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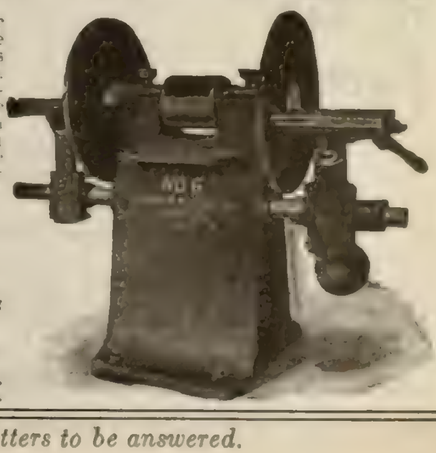

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A NAVAL OFFICER'S OPINION

U. S. S. DOROTHEA,
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CLEVELAND.

January, 18, 1916.

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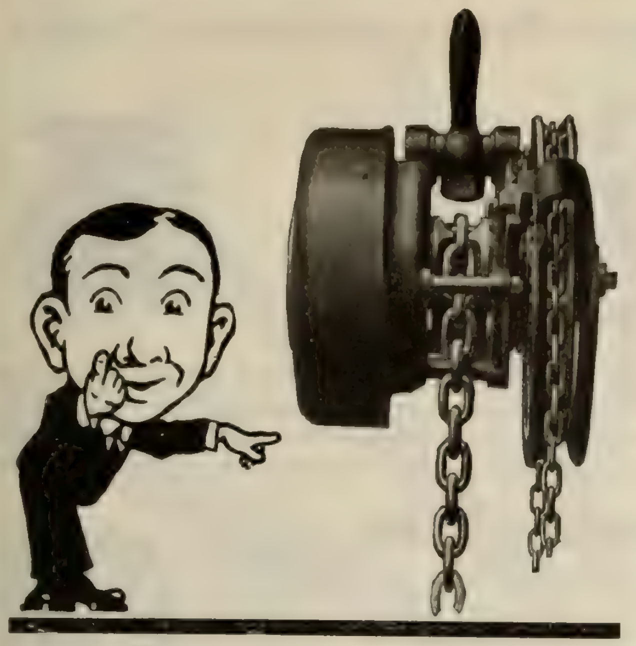

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It's the

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CHAIN HOIST

the hoist with steel parts, planetary gears and the highest kind of efficiency. It's the Hoist that has the famous Ford Loop Hand Chain Guide that keeps the chain from gagging, enables you to operate it at any angle and at any speed you wish to.

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139 Oxford Street PHILADELPHIA, PA.

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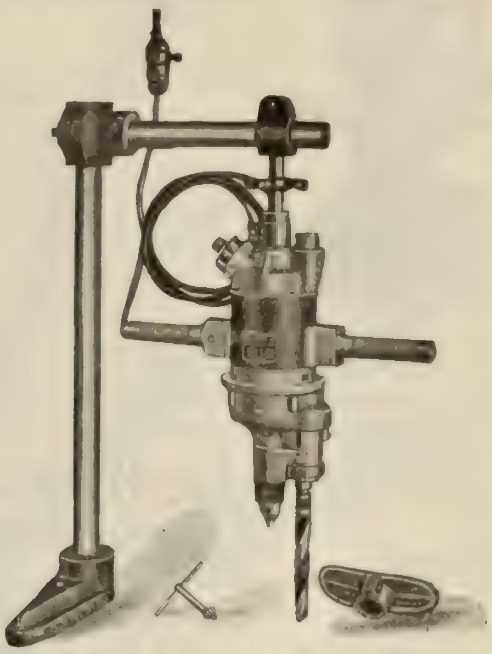

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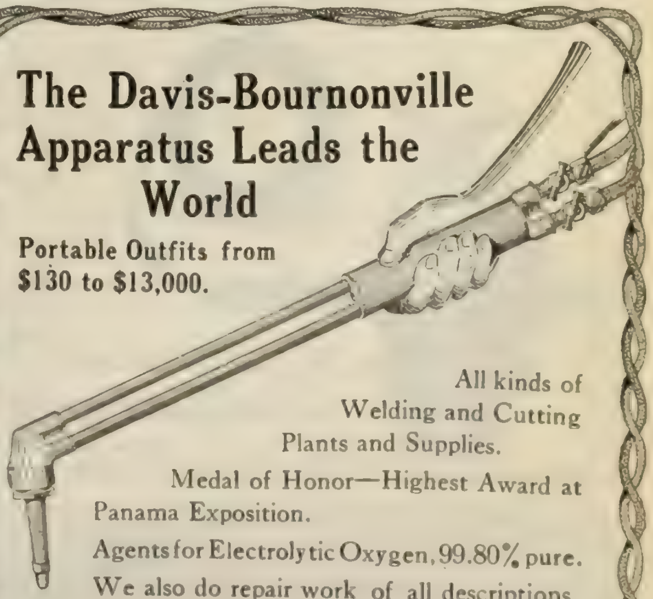

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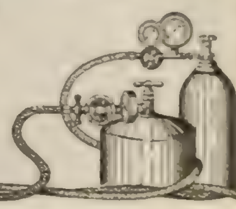

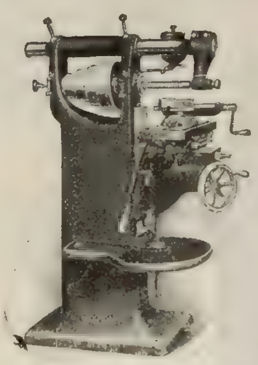

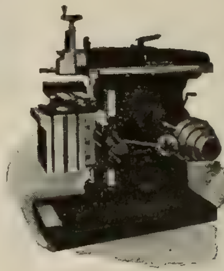

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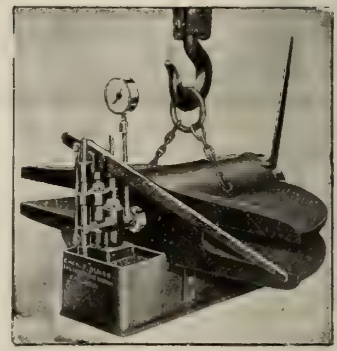

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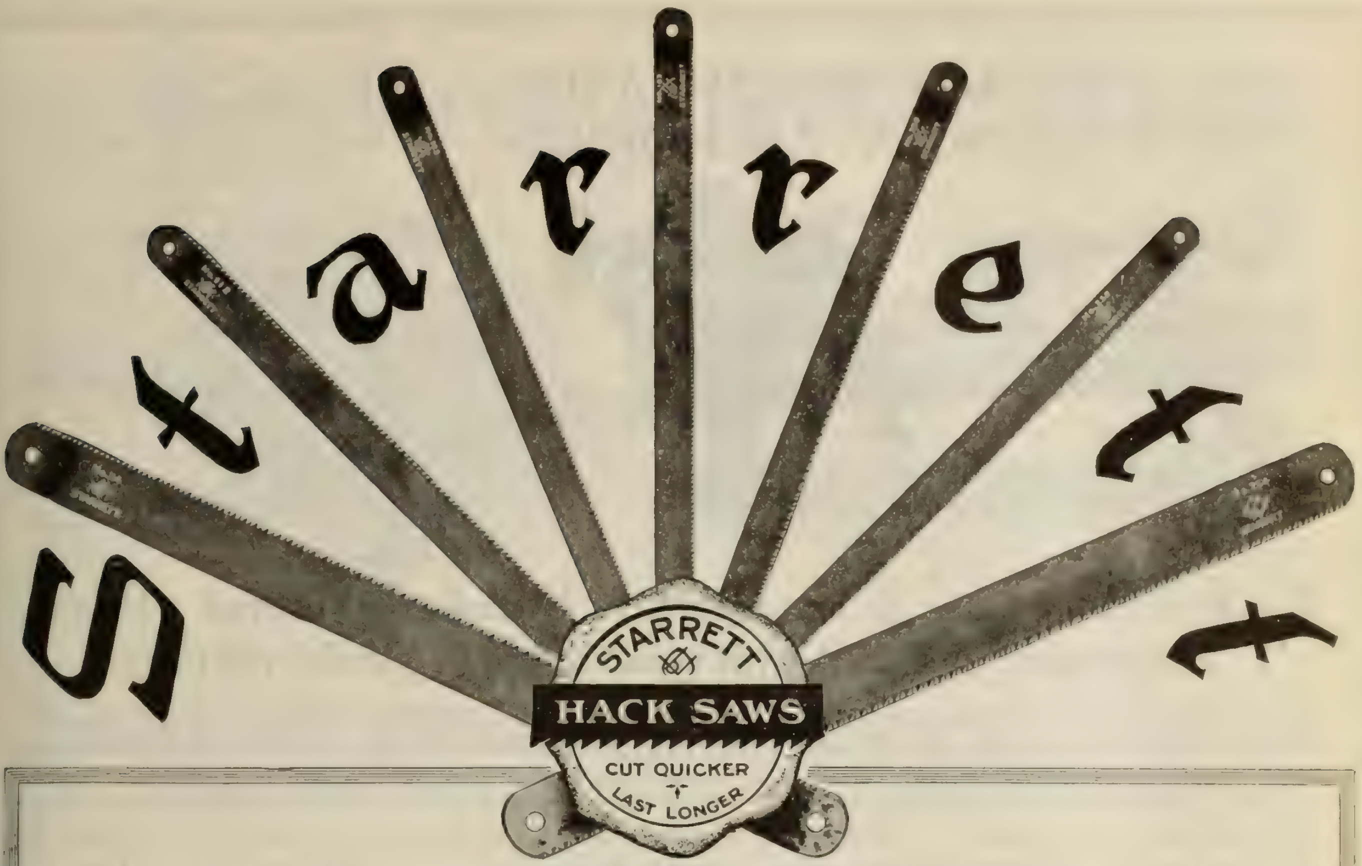

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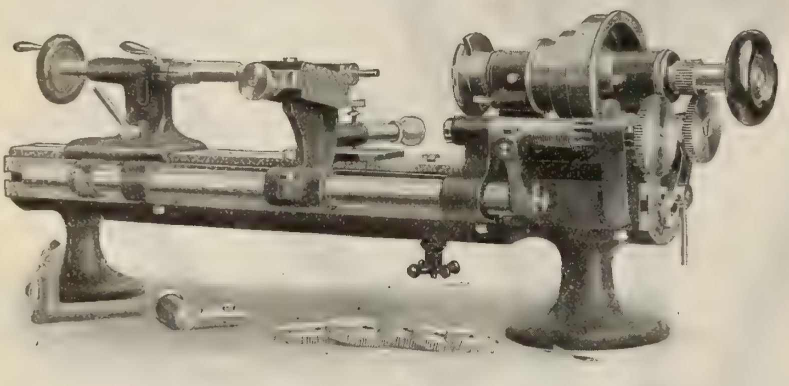

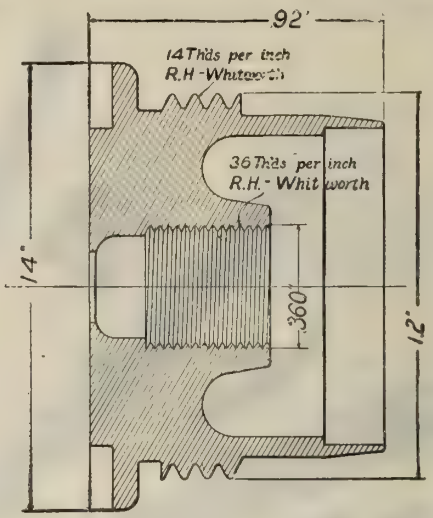

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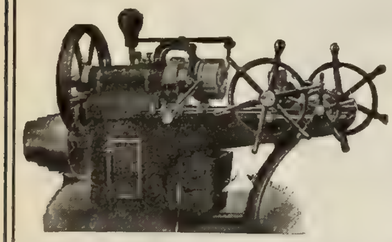

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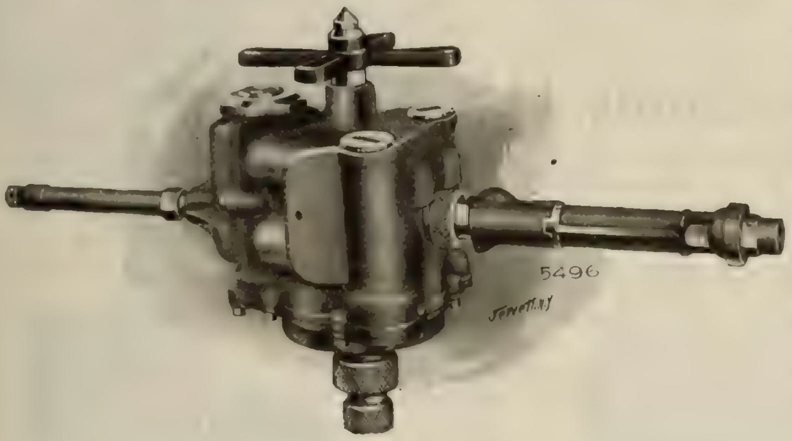

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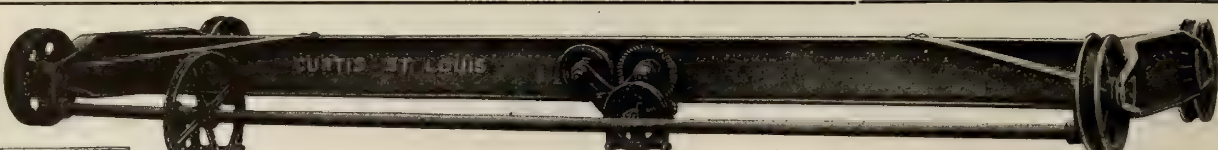

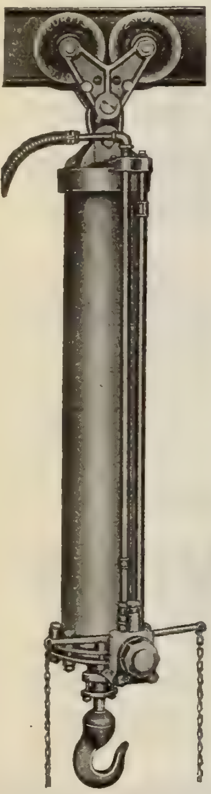

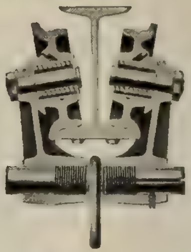

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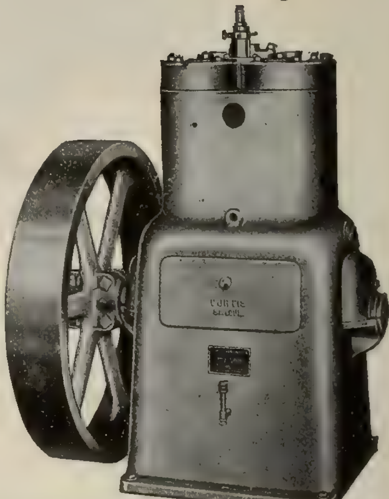

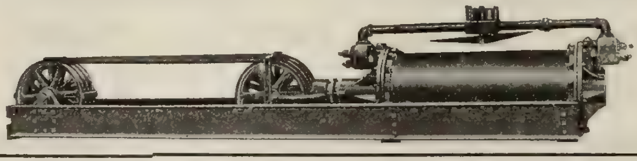

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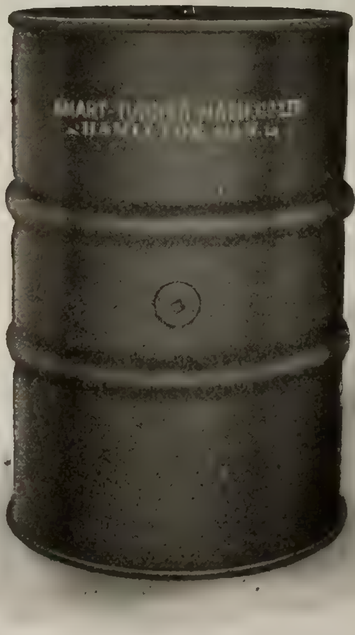

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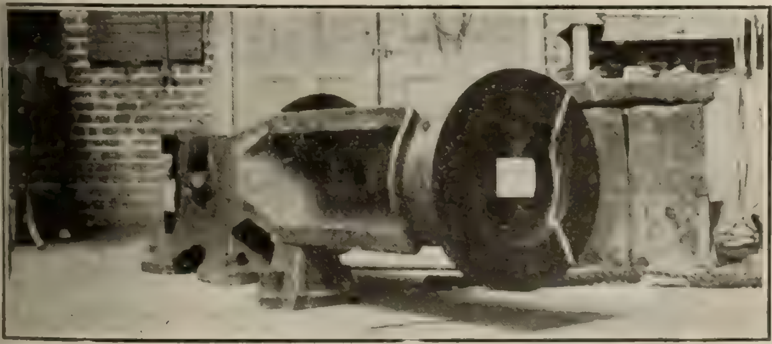

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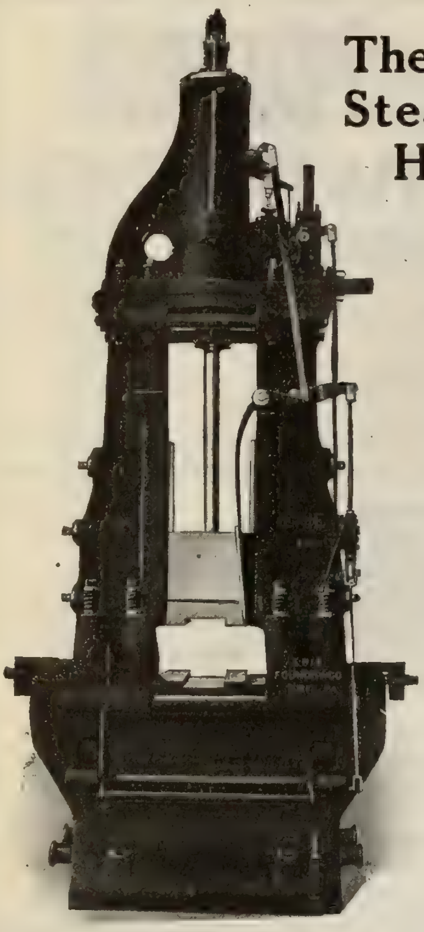

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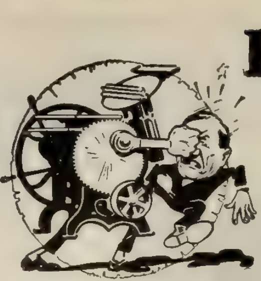

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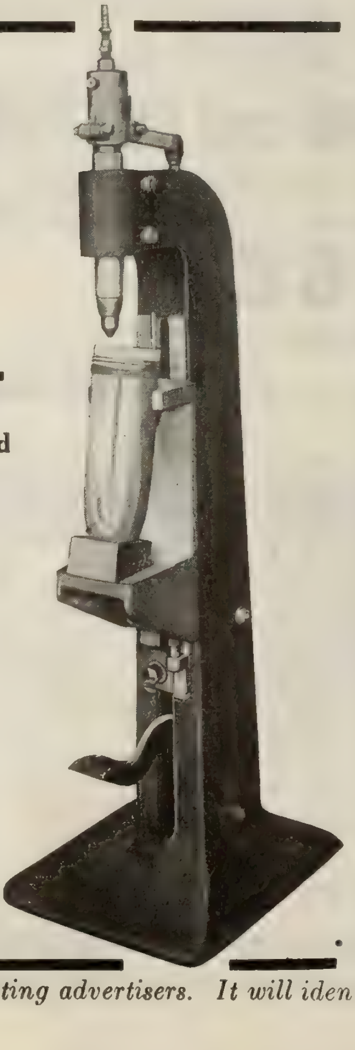

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Economic Shell Washer

If you wish to wash your shells quickly and cheaply; it will remove all grease, oil, lead, etc., and makes the shells easy to lacquer.

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Employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene (ready-made carbide gas) is backed by Prest-O-Lite Service, which provides dry, purified gas, insuring better welds, quicker work and lower cost, and also avoids the large initial outlay and heavy depreciation incurred in making crude acetylene in a carbide generator.

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Put your production problems up to our oxy-acetylene experts. Send for thoroughly illustrated literature that shows specific instances of the savings made and how easy it is to apply these economies in your shops.

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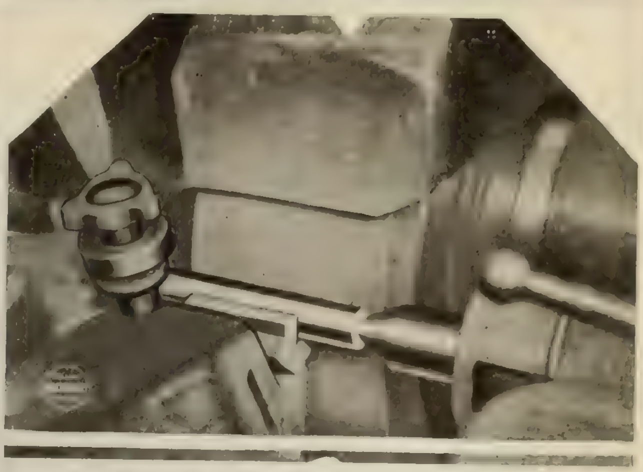

Grinding the Ford Drive Shaft with a Wide Face Norton Alundum Wheel

AN interesting grinding operation is that of grinding the Ford drive shaft. It is made from a hot-rolled bar of 0.20 per cent. carbon chrome nickel vanadium steel and is 53-11/16" long. Special purpose machines are used, the wheel being fed directly into the work. The wheel used is 5¼" wide by 20" diameter and is rotated at 1,150 r.p.m. or as close as possible to 6,000 s.f.p.m. A Norton Alundum wheel 24 comb, grade N, is being used. The work is rotated at 200 r.p.m. and 0.030" to 0.040" of material left on the diameter for grinding. The finished diameter of the shaft is 1" and the total limit on the diameter 0.001". Sixty pieces are ground for each truing of the wheel and production is 375 in eight hours.

NORTON

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Alundum and Crystolon Plants, Chippawa, Ontario and Niagara Falls, N.Y.

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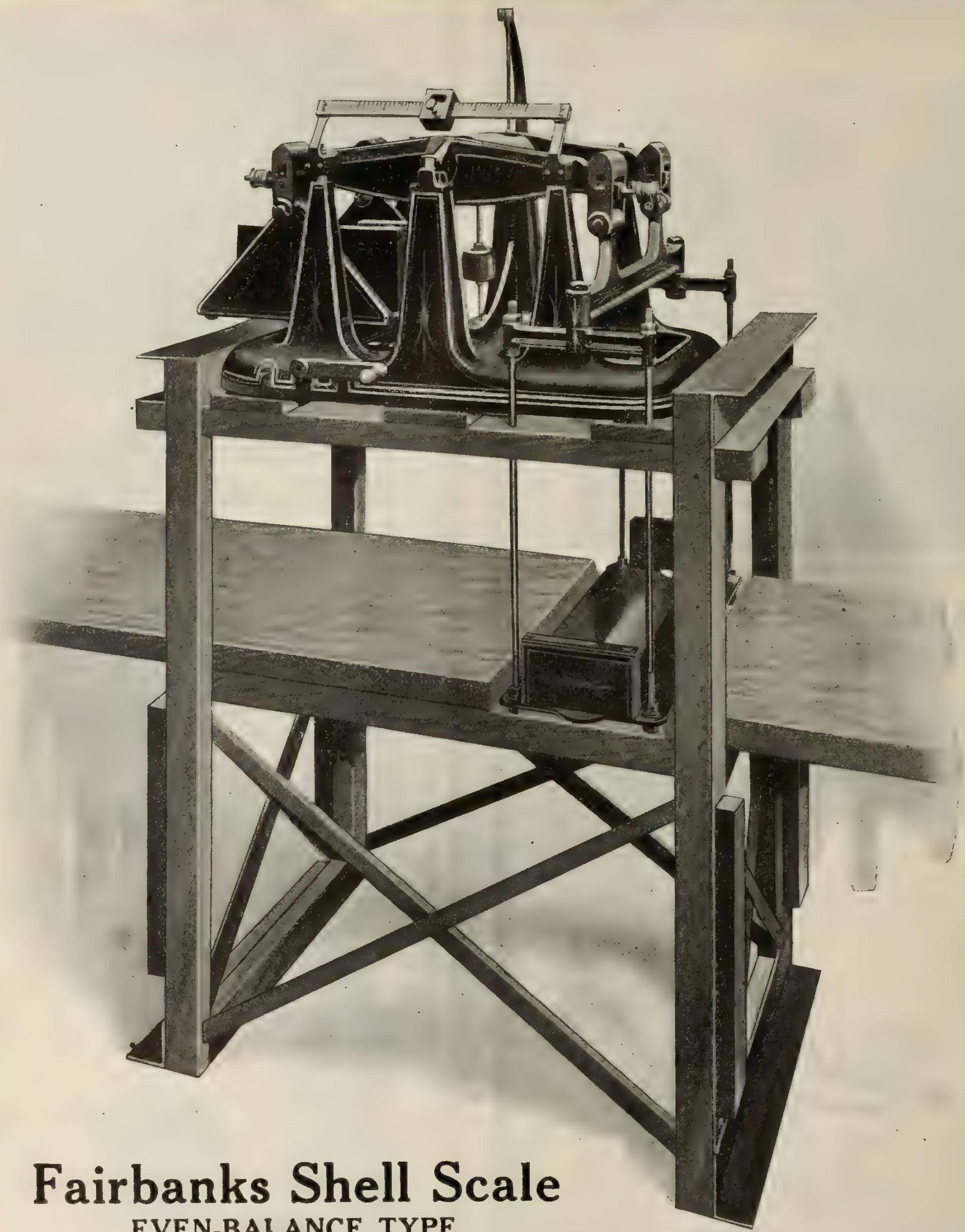

Fairbanks Shell Scale

EVEN-BALANCE TYPE

The simplest and most accurate scale made. Equipped with relieving device. Can be furnished as shown or with platform to hold shells standing on end. A plus or minus beam gives the variation of the shell from standard weight. Made for shells from 6″ to 12″ in diam.

Guaranteed to weigh within 1/8 of an oz.

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THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

St. John Montreal Quebec Toronto Hamilton Winnipeg Saskatoon
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CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

Casting 8 in. H.E. Shell Ingots and Forging the Rough Shells

Staff Article

In our June 29 and July 13 issues are to be found articles descriptive of the machining and completion of 8-inch high explosive shells in a Canadian metal-working plant. The present article deals with their inception from the raw material in two other plants, and demonstrates as in the machining processes the same high degree achievement in the direction of both quality and quantity output; the casting and forging conditions being if anything the more exacting and irksome when compared with the machining, as might be anticipated.

DURING the earlier stages of the war, the demand was very largely for the smaller type of high explosive and shrapnel shells, but the conditions arising from the special nature of modern trench warfare, required that the heavier types of explosive shells be used in constantly increasing numbers. To meet the requirements of the Imperial Government, many Canadian manufacturers have been for several months installing and preparing equipment. Some plants as a matter of fact have been shipping large shells for a considerable period now, while others are rapidly reaching a point where production will only be governed by the supply of raw material and by labor conditions. As the original British specifications called for the body of the shells to be made from acid open-hearth steel, the billets now being used are generally produced by this method. The brief description here given outlines the process of casting and forging the 8-inch shell blanks, in preparation for the succeeding machining operations.

Preparing and Melting the Charge

To meet the requirements of shell specifications, it is necessary that the various metals comprising the charge shall be so proportioned that the molten mixture as it flows into the ladle or moulds shall embody the desired physical properties. Under normal conditions where many grades and classes of scrap are being used, it is often difficult to determine the quantity of the various materials, to obtain certain results unless the scrap is first analyzed. In shell steel manufacture, the bulk of the scrap has already been in the furnace for shell making purposes, and, therefore, it becomes much easier for the melter to calculate his charge.

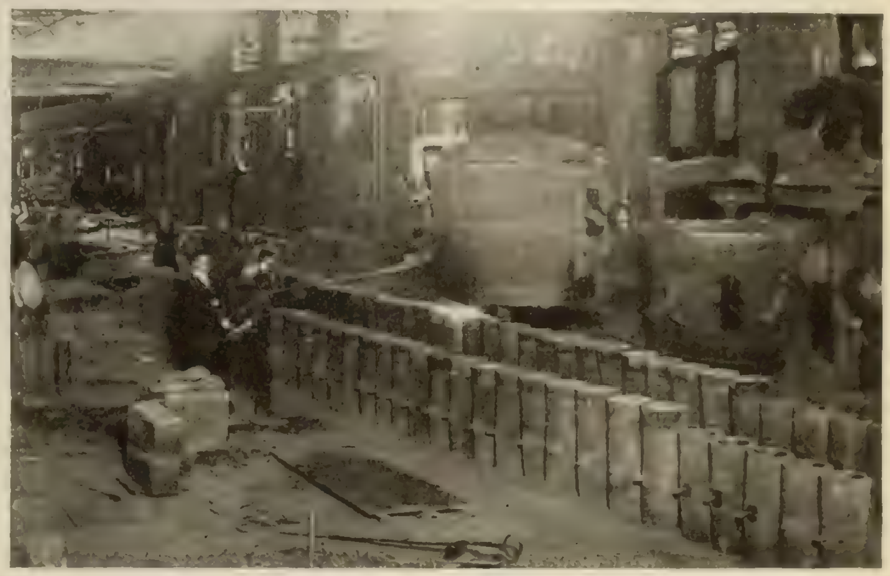


FIG. 2. POURING THE INGOT MOLDS.

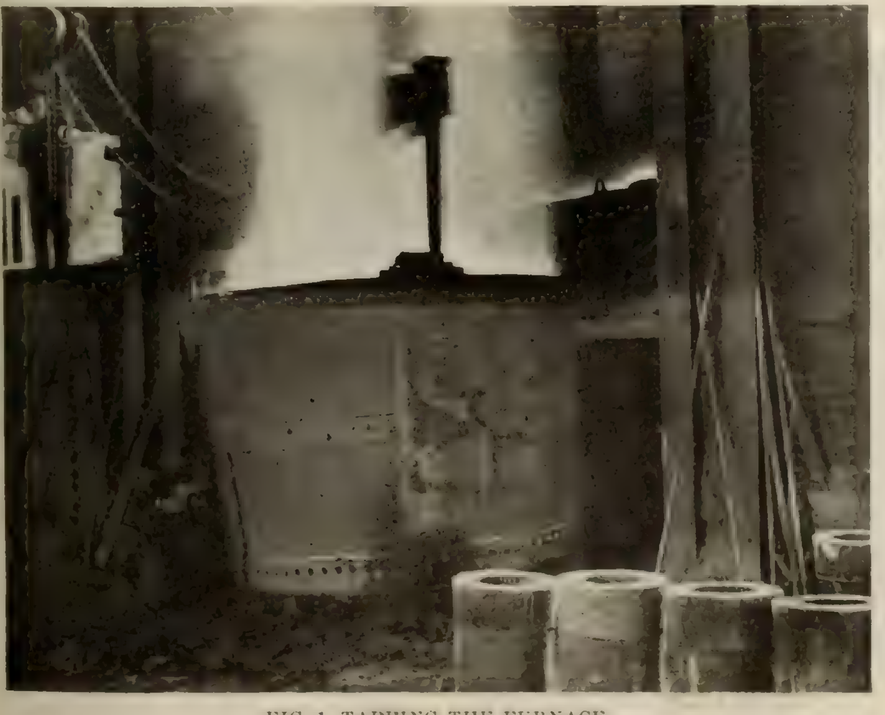


FIG. 1. TAPPING THE FURNACE.

Constituent of the Charge

The plant here featured, is now using in a 20-ton charge from 7,000 to 7,500 pounds of pig; 13,000 pounds of shell head scrap; 7,600 pounds of plate scrap, and about 11,000 pounds of crop ends from the tops of the previous ingots. These with the addition of iron ore, silicon and manganese bring the total charge up to between 38,000 and 42,000 pounds, or approximately 21 tons. Of the pig iron (which is about 20 per cent. of the total charge), 75 per cent. is placed in the furnace first, and as this begins to settle, the shell scrap, plate scrap, and crop ends are added. When these have become partly melted, the remaining 25 per cent. of pig is placed in the furnace. The time required to melt the charge of about 20 tons is from 4½ to 5 hours; in addition, another hour or so elapses before the molten mass comes to a tapping condition. During this last period, after the graphitic carbon has been entirely burned out, sufficient ore, silicon and manganese are added to bring the molten metal up to the desired quality.

Fuel oil is used to heat the metal, a

burner being placed at each side of the furnace and operating under a pressure of about 45 lbs., with sufficient air to insure proper combustion of the oil gases. These two burners do not operate at the same time, but alternately; the direction of the flame being altered every 20 minutes. This is to permit of proper and uniform heating of the mass of metal, as the action of the burning gases over the top of the charge in different directions, helps greatly to thoroughly mix the large body of metal. Each time the burners are changed, the dampers are regulated so as to allow the burned gases to pass on through the opposite regenerators or checkers and on up the stack. The approximate amount of oil used to melt a charge of about 21 tons, averages some 700 galls; which on eight heats a day from two furnaces, will use up about 5,600 galls. a day, or roughly speaking 35 gallons per ton of metal.

Tests for Carbon Content

When the heat is about ready to tap, tests are made for carbon content by removing a small quantity of the metal from the furnace by means of a long light ladle inserted into the fire chamber. This is poured into a small metal mould, having a cross sectional area of about 1¼ square inches, and is cooled quickly, after which the bar is broken. The trained eye of the melter readily tells him the amount of carbon contained in the steel, by the exposed surface of the fracture. No chemical test is made of a charge until the metal has been poured into the moulds, but during the pouring process a small quantity of the molten metal is taken from the ladle, poured into small moulds and allowed to cool. Drillings from these pieces are then given a laboratory test to determine the various physical properties contained in each heat; this record being again checked by a second test made by the Government chemists. As each heat is kept seperate from the others in its journey from the furnace to the finished shell, it is possible to make the billet when heating for the forging operation to more closely conform to the desired specifications.

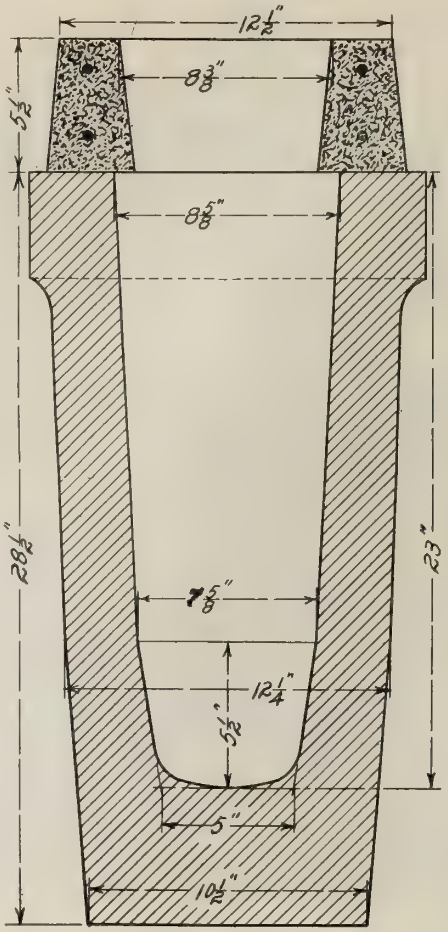


FIG. 3. SECTION OF MOLD AND CAP.

Tapping and Pouring the Molten Metal

When the bath of molten metal has attained the proper condition, the entire charge of over 20 tons is tapped into a large ladle, which has previously been heated by a special oil burner; this being necessary to avoid chilling of the hot metal. The general practice in the making of large steel castings or ingots, is to fill the moulds from a bottom pouring ladle. The mechanism, which controls the flow of the metal, requires to be overhauled after each heat and certain parts renewed, before using the ladle for the next heat. When the melter decides that the molten mass is ready, the stopper connections are placed in the ladle, which is then picked up by a 25-ton Morgan traveling crane, and taken to a position in front of the open-hearth furnace. Fig. 1 shows the large 20-ton ladle (supported by the crane) receiving the metal as it comes down the trough from the furnace. When the ladle is filled, the slag forms a dome-shaped arch over the top of the metal, as can be seen in Fig. 2.

The ladle is now taken to a position above the moulds to be filled. As can be seen in Fig. 2, the moulds for the 8-inch ingots are placed in two rows, and two sections; the one in the foreground being in the centre of the floor and the other on one side farther down the shop. The set in the foreground is usually poured first, as the crane is more easily operated when the heavy load is evenly distributed. When the side section is filled first, trouble is experienced in moving the crane from one mould to another, there being a tendency of the wheels on the opposite side to leave the rails, causing an irregular and jumping movement when shifting from one position to another.

When filling the moulds, the pouring

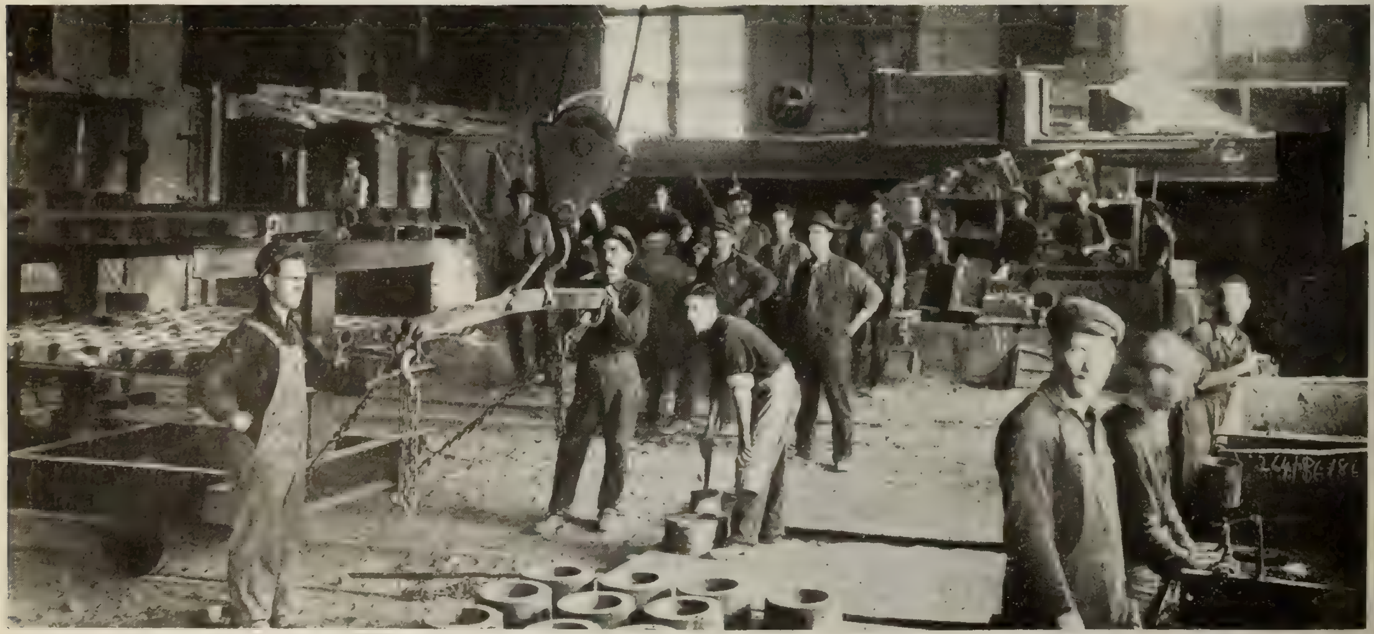


FIG. 4. PREPARING THE SAND CAPS.

nozzle is kept as close to the opening as conditions will permit, so as to avoid any unnecessary splash when the metal strikes the bottom of the mould. The successful production of good clean ingots depends largely upon the skill and experience of the man operating the ladle, as proper control of the stream of metal is essential to the economical and rapid production of this class of work. To facilitate operations, the pouring nozzle is kept in such a position that the mouth of the moulds can be clearly seen by the crane operator; which aids considerably in locating the nozzle over each mould.

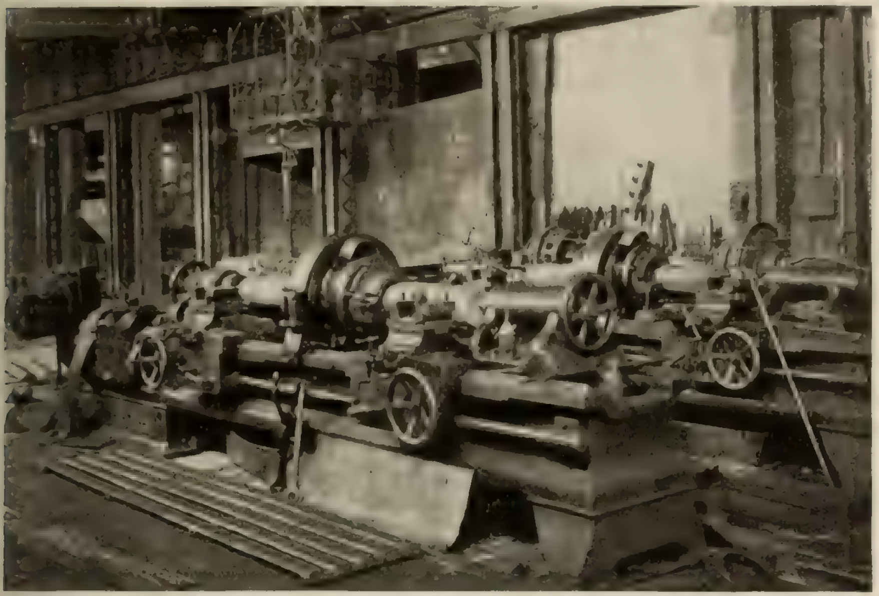


FIG. 5. CUTTING OFF THE CROP ENDS.

Ingot Output Per Heat

The capacity of the 20-ton ladle will fill approximately 120 eight-inch molds, or 360 four point five-inch moulds. In the case of the 8-inch billets, little difficulty is experienced in pouring the metal; but in order to avoid any possibility of the metal "freezing," it is advisable to have the molten metal very hot when working on the 4.50 ingots; as the time required to fill the 360 moulds averages about one and one-half hours. Under these conditions it is necessary that the nozzles be made of the very best grade of fire brick in order to withstand the intense heat of the metal, and the opening and closing of the stopper 360 times. Owing to a poor nozzle fusing some time ago, this plant had the misfortune to lose an entire heat, which had to be run out on the floor. In addition to the selection of good nozzles, it is important to avoid a "swirl" of the metal when leaving the ladle, as this is injurious to the nozzle and stopper, and also gives a bad surface to the ingot.

As each ingot is poured, the top surface is covered with floor sand to retain the heat, and also to aid in the feeding of the metal as the billet solidifies. It requires about 15 or 20 minutes for the ingots to become solid, but they are often left in the moulds for an hour or so before they are shaken out. By means of special tackle, five ingots are removed at a time, and placed in a pile to cool.

Preparing the Ladle and Moulds

When the 8-inch ingots were first being made, the moulds were made similar to those of the smaller sizes; but the type of mould now being used has a solid base, as shown by the sketch, Fig. 3. These moulds are made of grey cast iron, the bore being formed by a core of the proper dimensions. The caps, which are made of 60 per cent. floor sand, 30 per cent. new sand, and 10 per cent. fire clay, are re-enforced by two rings of 1/4 inch iron wire, and made in aluminum molds. One man can turn out 175 of these caps a day, when working on the 8-inch, and 300 when working on the 4.5-inch. As shown in Fig. 4, the caps are placed on steel plates, which are afterwards mounted on structural steel cars and run into the drying ovens, where they are subjected to the heat of a coke fire for three or four hours. When placing these on the tops of the moulds, care should be taken to have a good joint, as any fins formed at the top of the metal mould will prevent proper feeding of the metal, and cause slight cracks to develop on surface of ingot.

Ladle Refitting

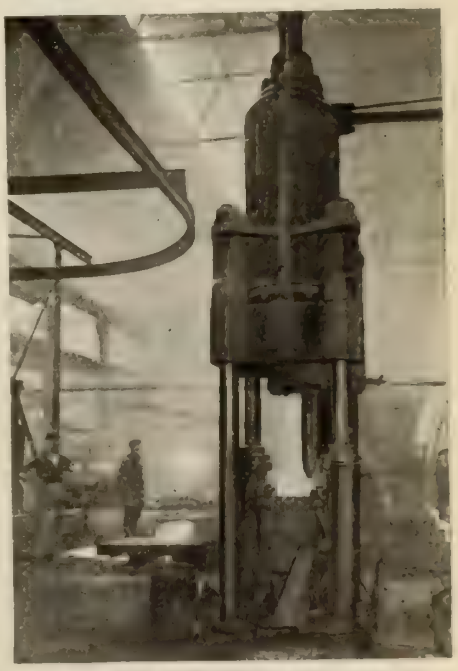
Owing to the injurious effect of the molten metal upon the graphite sleeves and stopper, and also the nozzle, these are renewed for every heat. When the last of the good steel has been run into the moulds, the ladle is taken to the dumping pit, the stopper connections removed and the remainder of the metal and slag allowed to run out; after which the ladle is turned completely over, thus permitting the top crust of slag to fall away. While the interior of the ladle is being prepared for the next heat, the stopper rod and graphite connections are being repaired.

Cutting Off the Crop Ends

When the ingots have sufficiently cooled, they are removed to the opposite end of the shop, where the crop ends are cut off. This operation is performed on four Bridgeford axle lathes, three of which are shown in Fig. 5. These machines are each driven by a 20 h.p. Canadian Westinghouse motor. The time required to cut off the end averages about ten minutes each. As in all other instances, the amount of crop to be removed is about 20 per cent. of the volume of the ingot.

Forging the Eight-Inch Shells

Owing to the extensive scale upon which the manufacture of shells is now being carried on, there are very few factories equipped with the necessary machinery and facilities for the complete process of production, from the cast ingot to the finished shell. In spite of these conditions, however, and because of the thorough co-operation of the different makers, the successful production of shells is being steadily maintained, and increased. When the crop ends of the ingots are cut off, the billets are taken to another plant where they are forged into the rough shell, in readiness for the succeeding machining operations. The billets, 15 at a time, are placed in oil-burning Ferguson furnaces and are heated to about 2,100 degs. F., this takes from 1¾ to 2 hours. When the billets are a little high in carbon,


. FORGING 8-IN. HIGH EXPLOSIVE SHELLS.

they are allowed to soak a little longer, thus slightly reducing the percentage of carbon.

Forging Capacity

The 350-ton Wood forging press shown has a capacity of approximately 450 shells per day of 24 hours; and to maintain this production it requires the continuous operation of four 15 shell heating furnaces. When the billets have been heated to the desired temperature, and as uniformly as possible, they are removed from the furnace by means of tongs about 14 feet long, the weight of the billet and tongs being supported by a monorail overhead, which runs from in front of the fire door to the forging press. To insure satisfactory operation, the scale is removed from the surface of the heated billet by means of scrapers. This is not only necessary for the longer life of the dies, but is essential to the uniform drawing of the shell, as the adherence of scale will often tend to produce a forging with eccentric walls. After removing the scale, the billet is rolled to a hole in the block, permitting the nose to drop in, and the billet to stand in a vertical position, when it is gripped by a pair of tongs, which are supported by means of an air hoist, travelling on the arm of a jib crane. By means of the air lift, the shell billet is raised above the die and dropped into position. Two operations are required to complete the shell, forming the nose profile and piercing the billet.

Two Forging Operations

Secured to the ram of the press, is a large casting which carries the swivel block containing the two punches. When the billet has been placed in position, the large diameter punch is swung to a central position and locked by the stop shown to the right of the press. The ram is now forced down, the pressure causing the hot metal at the bottom of the billet to take the shape of the forming die. The ram is raised and the piercing punch swung into position and locked as before. The punch is lubricated with a little graphite and oil, and a small quantity of coal dust is thrown on the top surface of the billet, after, which the ram again descends, and the piercing punch is forced into the steel, the metal flowing up and around the punch. It sometimes requires two or more applications of water before the ram reaches its final position. The outside diameter of the rough shell is practically the same as the hot billet, which is about 1-16 smaller at the top end than the bore of the die.

The forging being completed, the punches are swung clear, the shell being removed by the air hoist and dropped to one side of the press, where it is gauged for length and wall thickness, being next removed to another department to cool. It occasionally happens that a punch will seize while forging a shell. Provision is, therefore, made whereby a stripping block can be placed in a slide on the upper surface of the die to remove the shell from the punch as the ram ascends. However, even with all due precautions, this device may refuse to operate successfully, and it is then necessary to remove the punch, with the shell still on it, from the press. By carefully hammering and expanding the shell under a steam hammer, before it becomes too cold, the punch may be withdrawn; but it is often more profitable to scrap both the shell and the punch. Punches, under ordinary conditions, have a life of about 300 shells.

CATALOGUES AND SAMPLES TO RUSSIA

THE best method for United Kingdom firms to adopt in sending catalogues and samples to Russia is by parcel post; they are of course submitted to the Russian censorship. Catalogues should be printed in Russian. The best method of distributing catalogues is through a local agent. No distinction is made in the customs duties to be paid whether catalogues or goods are sent by post or express. Samples should be as small as possible to avoid extra charge for freight and duty, as it frequently happens that valueless and useless samples pay heavy duties. The duty on unbound catalogues imported into Russia is levied at the rate of 18.70 roubles per poud (about 26 cents per pound). Bound or half-bound catalogues pay an additional duty of 1-65 roubles per poud, making the duty about 28 cents per pound.

GERMAN TRADE PROMOTION IN CHINA

REVIEWING the methods used by the Germans in seeking trade expansions in China, the Assistant British Commercial Attache states that every effort is made by German firms to get into friendly relation with the Chinese, and to create a demand for their goods, not waiting for the demand to come to them, as British firms have often done. Specialization is not required at present, but quick decision, enterprise, and determination. The German technical bureaux are very successful. Groups of non-competing manufacturers in Germany send out a joint representative, with expert knowledge of the Chinese and their methods of business, and he does the work of advertising and suggesting. When orders are forthcoming they go direct to the manufacturers of the group, and thus openings are secured at a minimum of expense. Several British organizations have attempted to follow on these lines, but they have generally failed through their schemes being too ambitious.

FUTURE OF HYDRAULIC POWER

A REMARKABLE sequel to fuel shortage is being witnessed throughout the world. The press records the attention which, almost suddenly, is concentrated upon the utilization of water power and the prospective development of energy in that direction is used at times as a consolation for the long- prophesised diminution of British coal resources. It seems quite reasonable to assume that we are nearer the beginning than the end of our knowledge of utilising the world's three great prime movers—water, steam and internal combustion—and it seems certain that water power energy will in the future have a great bearing upon the question of fuel consumption.

All the civilised nations, also Germany, are devoting more and more attention to hydraulic power, and Italy in particular—spurred by the present enormous cost of coal—finds something worth attention in the calculation that there is enough water power in the peninsula to answer all industrial requirements. One feels certain that Britain's Dominions across the sea will continue to harness even more fully the magnificent water powers which exist in so many areas and develop their local resources on the most advanced engineering lines.

TESTING AND MOUNTING GRINDING WHEELS.

TIGHTEN the flanges only enough to hold the wheel firmly, avoiding any unnecessary strain. The importance of this statement is emphasized by the fact that on a 1½ in. floor stand, equipped with 8 in. standard relieved flanges, a man with a 24 in. wrench can easily exert a crushing pressure between the wheel flanges of 3,600 pounds or over 1¾ tons.

Every grinding wheel should be protected with a hood—in fact, in many instances it is necessary to use a hood to comply with the laws for safety and dust removal. The hood should have some method of adjustment so that the top end may follow the wheel as it wears, thus giving ample protection for small wheels as well as large ones.

If grinding is done dry, the hood should be connected with a suitable dust removal system. After the wheel is in place, the hood should be adjusted to the size of wheel and the rest should be so adjusted that work cannot be caught between the rest and the wheel.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data and Ideas Evolved from Actual Practical Application and Experience

DESIGN OF LATHE. PLANER, SHAPER, AND SLOTTER TOOLS—II.

As stated in the closing paragraph of Part 1 of this series of articles on page 60, July 20 issue, the three elements of profile, clearance and rake must be taken into consideration when determining a set of standard tools. These features are therefore dealt with in the order named.

Standard Profiles.

It is not often realized what an important bearing the profile of a tool has on its efficiency as a cutting instrument. Why do we first use a taper for threading a hole? Obviously, because we spread the cut over a greater length of cutting edge. In Fig. 2 is seen a representation of two tools performing the same work at the same depth of cut and at the same rate of feed.

The cross sectional area of the chip is the same in both cases, yet the one on the right is obviously a much thinner chip than the other. The cut being spread over a greater length of cutting edge, this tool will be therefore much more durable than the one on the left. On the other hand, if the tool on the left will stand up to the work imposed on the short length of cutting edge in action, it follows that, with the tool on the right, the rate of feed can be increased, until for an equal length of cutting edge the same cross sectional area of chip is being cut from the work. Suppose the length of cutting edge in the one case to be twice the length of the other, twice the amount of work can be done in the same time.

Curved or Straight Cutting Edge

The first rule, then, in selecting a tool profile is that the maximum length of cutting edge must be in action for any given depth of cut. Whether the portion of cutting edge in action should be straight or curved depends somewhat on circumstances. A straight-edged tool is easier to make than a round-nosed tool and deserves consideration on that account. It also distributes the cut evenly over the cutting edge no matter what the depth of cut.

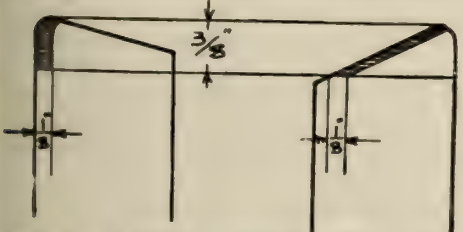


FIG 2. DIAGRAM ILLUSTRATING THE EFFECT ON THE CHIP THICKNESS WHEN THE CUTTING EDGE IS LENGTHENED, WHILE THE DEPTH OF CUT AND RATE OF SPEED REMAIN THE SAME.

A round-nosed tool has a certain advantage in that it lends itself to a greater variety of operations without material alteration. Where the depth of cut is constantly varying, as in turning a hammered forging, the cut is distributed over the cutting edge in a varying amount more proportional to the strength of the tool nose. The choice between the two, therefore, is perhaps more one of preference than of efficiency.

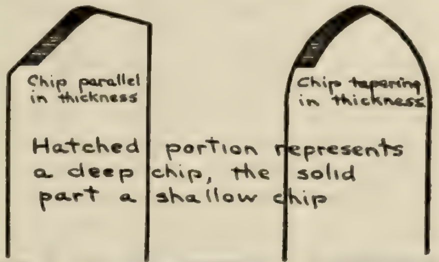

Chip parallel in thickness
Chip tapering in thickness
Hatched portion represents a deep chip, the solid part a shallow chip

FIG. 3. DIAGRAM SHOWING DIFFERENCE IN THE CHIP SECTION CUT BY A STRAIGHT-EDGED AND A ROUND-NOSED TOOL

The Chip Feature

There is one side of the question, however, on which we have not touched, because we have no data other than intuition, on which to base our conclusions. A study of Figure 4 reveals the fact that the chip from a straight-edged tool consists of a band of metal with straight serrations across it, while that from a round-nosed tool has curved serrations across it.

The Metal Being Cut

This would seem to point the moral that the metal in the chip is more distorted, therefore more power is consumed, when using a round-nosed tool than when using a straight-edged tool, for the following reasons.

Each portion of the width of the chip passes away from the cutting edge at right angles to a tangent at the point of cut. With a straight-edged tool the chip passes over the top face freely because the directions of motion of every portion of the chip are parallel to each other. With a round-nosed tool the extreme edges of the chip are, while passing across the cutting edge, running towards each other, therefore extra work is done in forcing the chip away from the cutting edge owing to the rubbing action that must take place between the particles of metal forming each chip section.

The action can be likened to a column of soldiers in fours marching through a passage too narrow to accommodate them. The soldiers will find it much harder work marching while trying to squeeze through the passage than when stepping freely along the open road. It may therefore be assumed that in the main the preference would seem to lie with a tool having a straight cutting edge. Any advantage which the round-nosed tool may be considered to possess can easily be given to the straight-edged tool by grinding a large radius on the point.

So far we have assumed that the metal to be cut is homogeneous. That this is not so every lathe hand knows. Frequently the cut must be taken just under a hard skin, which very soon destroys that part of the cutting edge against which it bears. Again the surface of the work may be scaly or gritty, which is equally as bad for the tool.

These things must influence our choice of a suitable tool. It is logical to assume that the shorter the length of cutting-edge in contact with the skin, the less damage will be done to the tool and the easier it will be to repair what damage is done. The shortest distance through the skin is at right angles to the surface, therefore where the tool comes in contact with the skin, the cutting-edge should be as nearly as possible following that shortest distance.

This leads us to the statement of our second rule, which is that the least amount of cutting edge must come in contact with the skin of the work, if this is liable to damage the cutting-edge.

The third point to be considered is the absorption of the heat generated by the cut. This heat can be dissipated very largely by means of a copious flow of lubricant, but this will not prevent damage to the point of the tool unless there

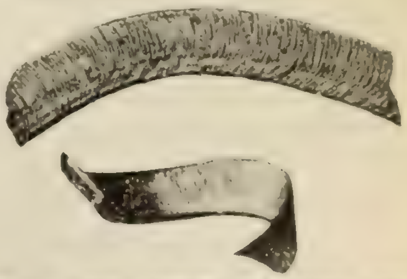


FIG. 4. TWO PIECES OF CHIP, BOTH MADE AT SAME DEPTH OF CUT AND RATE OF FEED. THE UPPER CHIP WAS MADE BY A ROUND-NOSED TOOL, THE OTHER BY A STRAIGHT-EDGED TOOL.

is a sufficiently large amount of metal in the tool nose to prevent the extreme point from becoming overheated. Any lubricant or coolant, as our American friends prefer to call it, which flows past the cut without touching either the tool or the work is wasted from a cooling point of view. Therefore the broader the tool nose the greater will be the chance that plenty of cooling fluid will fall on it. It is a mistake to consider that any metal not directly concerned with the cutting-edge, should be ground away. All non-essential metal that can be left on the tool nose should be left, as it assists materially in absorbing and dissipating the generated heat. The third rule, then, resolves itself into the following:—The maximum amount of metal must be left on the tool nose behind the cutting-edge to absorb the heat generated by the cut.

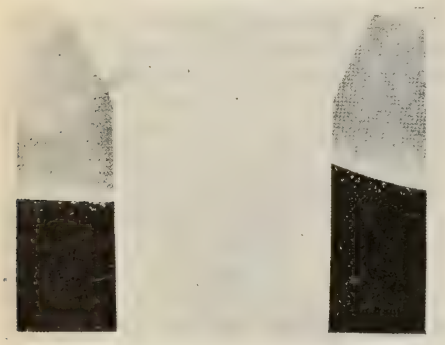


FIG. 5. TWO SIMILAR TOOLS, THAT ON THE LEFT BEING A VERY COMMONLY USED ROUGHING TOOL, AND THE ONE ON THE RIGHT BEING GROUND TO CONFORM TO RULE THREE.

This rule is aptly illustrated in Fig. 5, which shows two precisely similar tools as far as the cutting angles are concerned. The one on the left is a very common tool for rough turning, and is to be found in many tool stores and lathe cupboards at the present time. If, however, such a tool is ground, as shown on the right—that is, with all possible metal left on the nose behind the cutting edge, the life of the tool will be greatly increased, while the actual turning will not be affected in the least. The three rules already discussed may be summarized as follows:—

(1)—Maximum length of cutting-edge in action.

(2)—Least amount of cutting-edge in contact with the skin.

(3)—Maximum amount of metal behind the cutting-edge.

They do not apply to every case without exception, but should be adopted in the selection of tool profiles wherever possible. The exceptions will not be numerous, only presenting themselves when the cut is out of the ordinary or the work is frail and liable to spring under the cut.

Factors in Tool Selection

To illustrate the application of these rules, it will not be out of place to consider a specific case—let us say the turning of a forged shaft or spindle. How shall we select a tool for our purpose? Our decision will depend on several factors which may be stated thus:—

(1)—Hardness or otherwise of the material to be cut, and whether the work is annealed or not. These affect the rake as much as the profile of the tool, but must be taken into consideration in deciding on the rate of feed it is possible to adopt.

(2)—Whether the work has a hard skin or not. This has considerable influence on the choice of tool, as will be shown later.

(3)—The strength, rigidity and power of the machine to be used. This will govern the depth of cut and rate of feed.

(4)—The solidity of the support the tool will have in the tool-rest. The American type of single swivelling tool-post offers a poor support to the tool. The English pattern with four clamping bolts and no overhang gives plenty of support to the tool and allows a much heavier cut to be taken than any other type.

(5)—The frailty or otherwise of the work. If the work is liable to spring away from the tool, light cuts with a more or less pointed tool are necessary, otherwise the work will not be true and will be full of chatter-marks.

Assumed Combination of Foregoing Factors

Let us take as our first assumption the following combination of the above factors. The forging to be turned is 0.30 carbon steel, tough but annealed, therefore fairly easy to cut. The skin is clean and will not affect the tool very much. The machine to be used is one with plenty of power and strength, so that it will not be possible to overload it with the $\frac{3}{8}$-in. depth of cut and $\frac{1}{8}$-in. feed we intend to adopt, while the forging is also strong enough to take such a cut without spring. Our machine will carry a tool of $1\frac{1}{4}$-in. x $1\frac{3}{4}$-in. section.

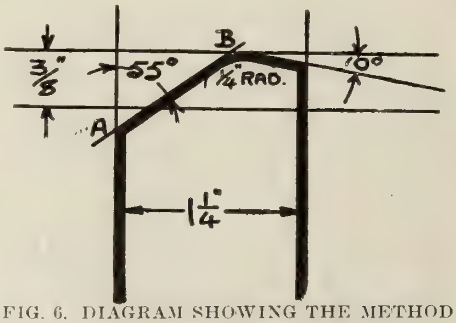


FIG. 6. DIAGRAM SHOWING THE METHOD OF ARRIVING AT THE PROFILE OF A TOOL WHEN THE CONDITIONS ARE ALL KNOWN.

Rule 2 does not apply in this case, as the forging has been annealed and the skin hardness need not worry us. Rules 1 and 3 decree a long cutting edge and a mass of metal behind the cutting edge.

Draw two parallel lines $\frac{3}{8}$-in. apart to represent the depth of cut, and two more parallel lines at right angles to these $1\frac{1}{4}$-in. apart to represent the width of tool, as shown in Fig. 6. Next draw the line AB, the intersection with the side of tool at A to come about $\frac{1}{8}$-in. outside the work, while the intersection with the top line at B should leave, say, $\frac{1}{2}$-in. of metal to the right to comply with Rule 3. The tool shape is then completed by drawing a radius of, say, $\frac{1}{4}$-in. at B, and a tangent to it at about 5 to 10 degrees so as to clear the work as the tool feeds along. We now have a tool profile, as indicated by the heavy lines in Fig. 6. This tool profile gives a long cutting edge with an allowance for any small variation in depth of cut, while plenty of metal remains at the back of the cutting edge to absorb the heat. Such a tool is ideal for the class of work outlined. The angle which AB makes with the side of the tool—the side angle, see Fig. 1—is 55 degrees.

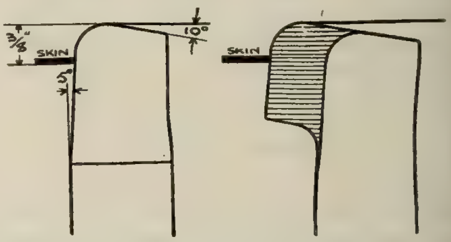


FIG. 7. A SUITABLE TOOL FOR ROUGH TURNING WHEN THE WORK HAS A HARD SKIN.

Now let us inquire into what changes, if any, are rendered necessary by variations in the five factors previously mentioned. Suppose the forging is unannealed and has a skin that is hard enough to quickly wear away the cutting edge. All three rules come into operation now, that is, in addition to the cutting edge being as long as possible, it must cut through the skin at, or nearly at, right angles to the surface of the work.

Turning to Fig. 6 again, this means that AB, instead of being drawn at 55 degrees to the side of the tool, must be very much steeper, even as steep as 5 degrees, while the long cutting edge is obtained by making the radius of the point very little less than the depth of cut. We now have a tool similar to that on the left of Fig. 7.

An alternative tool with exactly the same profile is shown on the right of Fig. 7. This tool, however, has been bent to give an overhung cutting edge, allowing all the metal indicated by the shaded portion to be ground away by resharpening, before the tool is unfit for further use without re-making.

Vibration Feature

Our next supposition will be that the machine is not over strong and vibration sets up under a $\frac{3}{8}$-in. cut and $\frac{1}{8}$-in. feed. Is it possible to maintain such a cut and feed by variation in the cutting tool used? The first point that arises is that the machine, unless there is something radically wrong with its design, must obviously be smaller than the one previously under consideration. It will, therefore, require a smaller tool section. Assuming this to be 7/8-in. x 1 1/4-in., and following the method depicted in Fig. 6 for determining its shape, it is obvious that the side angle cannot be 55 degrees; it will be about 35 degrees, as shown in Fig. 8. It will be seen that with such a tool the cutting edge is not so long, and end thrust on the tool will not be so great.

It is possible, therefore, that the tool depicted in Fig. 8 will, on the weaker machine, take a 3/8-in. cut at 1/8-in. feed. If not, vibration can only be overcome by reducing the feed or the cutting speed, or both. It would not be policy to reduce the depth of cut, if it can be avoided.

This exhausts the variations in the combinations of factors previously named. It will be noted that all the tools developed to meet these variations are of the straight-edged variety. Exponents of the round nose will probably say we are at fault in this, that while admitting the straight-edged tool has some advantages, the round nose has more, especially when the work is excessively hard, as in turning shrapnel shell forgings. Our reply to this is, that the obvious advantages of the straight-edged tool are combined with all those that the round nose can possess by grinding a radius on the point. The chip then tapers off to nothing at the point, while the thickest part of the chip is of even thickness and tends to curl away from the tool without absorbing more power than need be. The importance of selecting the right profile of tool for any particular operation can only be appreciated when it is realized that the right tool

(1)—Will cut at the highest possible surface speed.

(2)—Will need less re-grinding per amount of work done.

(3)—Will be more durable under all conditions.

(4)—Will help to materially increase he output.

(5)—Will, when ground with the correct rake, use up the minimum amount of power.

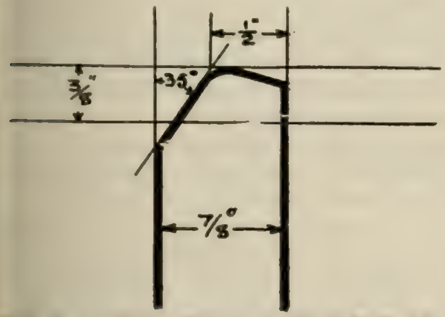


FIG. 8. A TOOL SIMILAR TO THAT DEVELOPED IN FIG. 6, BUT HAVING A SMALLER SECTION.

Clearance

The subject of clearance on cutting tools has, in the past, received scant attention from tool users. Everyone knows that clearance is necessary, though if asked why, most of them would be at a loss to give their reasons. If asked how much clearance a tool should have, they give the airy reply, "Oh, so much," as if the matter were of no moment and did not warrant any time being wasted on it. Those, however, who have made a careful study of tools, as we are endeavoring to do in this article, realize that clearance is almost as important as profile or rake. Let us first of all ask ourselves these questions: "What is clearance for? Is it necessary? If so, how much clearance shall we adopt on different tools?"

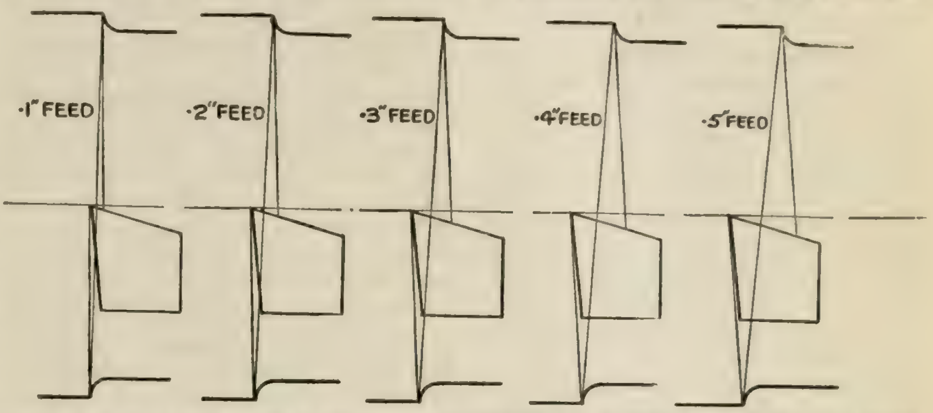


FIG. 9. DIAGRAM SHOWING RELATION BETWEEN SIDE CLEARANCE ON A LATHE TOOL AND RATE OF FEED. THE TOOL SHOWN IN EACH CASE HAS SIX DEGREES OF CLEARANCE, WHICH IS AMPLE FOR MUCH MORE THAN THE HIGHEST FEED RATE ANY TOOL WOULD STAND.

Purpose of Clearance

What is clearance for? To answer this, let us consider one or two concrete cases. Take a planing tool and imagine it at work; if it has no front clearance underneath the tool, it will start cutting on the end of the work, but as soon as the cut has got going, the tool will rub along the cut surface. We have never actually tried planing with a tool having no clearance, but we can easily imagine what will happen. Bits of chip get under the tool, terrific heat will be generated and the tool will be rendered useless in a very short time.

This seems simple and logical, but when we consider the action of a turning tool, there is a difference. The work being round, recedes from the cutting edge as soon as it passes it, therefore the tool action cannot be compared to that of a planing tool. Yet can it not? We are leaving out of reckoning the elasticity of metals. To keep the tool up to its work there is a certain amount of pressure required. This is proved by running a tool back over a surface it has just machined without withdrawing it from its cutting position. This happens every day on automatic turning machines, turret lathes, and other machines with fixed tools, so everybody should be aware that a tool mark is left, signifying that during the cut the tool was sprung away from the work or vice versa.

The elasticity which allows this spring is tending all the time to force the tool back against the work. If the tool, therefore, has no front clearance, this tendency will (presuming, of course, that the cutting edge is in line with the centre of the work) soon destroy the cutting edge and render the tool useless.

Then there is the question of side clearance, or clearance on that part of the tool which faces in the direction of the feed. In a planing or shaping tool precisely the same principles govern both side clearance and front clearance. In a turning tool, if we stop the lathe in the middle of a cut and trace the ridge between the turned and unturned surfaces, we find that it follows the path of a screw thread. In one complete turn round the work it strikes a point some distance behind the cutting edge of the tool, as shown in Fig. 9. It is obvious then that clearance on the tool is necessary, otherwise the side of the tool will not only rub along the ridge formed by the cut, but will actually

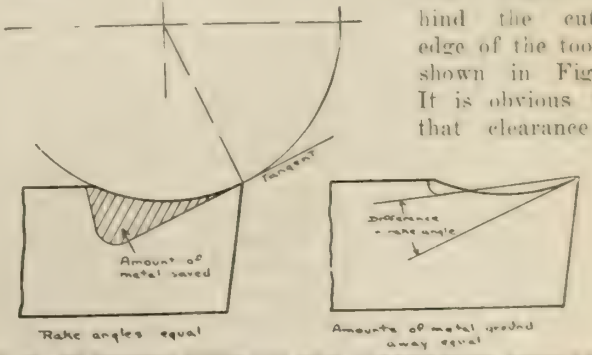


FIG. 10. SKETCHES SHOWING THE DIFFERENCE BETWEEN A TOOL GROUND WITH A CURVED TOP FACE AND ONE GROUND WITH A STRAIGHT TOP FACE

prevent the tool from cutting at all. ..

Given then that clearance is not only desirable, but necessary, what amount of clearance shall we adopt as our standard? On this point there are many different opinions. A little thought, however, will enable anyone to realize that the old proverb, "A miss is as good as a mile," holds good here. In other words, as long as the parts of the tool which should clear, do clear, that is all that is necessary.

Transmission and Dissipation of Heat

As stated previously, it is desirable that as much metal as possible should be left in the tool nose to assist in the transmission and dissipation of the heat generated. Further, the more metal that is ground away underneath the cutting edge, the less support the edge will receive to enable it to resist the pressure of the cut. This leads us to the logical conclusion that clearance must be as small as possible.

Varying conditions would seem to indicate that under this rule, as stated, different clearances should be adopted for every different combination of factors. Can we fix on a standard angle of clearance for each kind of tool and still conform, within reasonable limits, to the rule stated? Will any such tool, ground to our standard clearance angle, adapt itself without alteration to all the circumstances it is likely to meet?

Perhaps the widest variation of circumstances will be differences of feed. In Fig. 9 is seen the diagrammatic representation of a 3-in. bar being turned at five different rates of feed. The tool angles are the same in each case. If then a tool can be found which will be equally suitable for the extravagant rate of a half-inch feed per revolution and the more ordinary rate of 0.100-in. per revolution, then, we think, the above question is satisfactorily answered. The tool shown in Fig. 9 has six degrees of side clearance, which is the standard clearance for the majority of the tools included in the Lumsden Chart. We recommend, however, that five degrees be adopted as the actual standard in the finished tool, the six degrees being ground on in the roughing before hardening. In the subsequent hand sharpening, it is then an easy matter to just touch up near the cutting edge, when the standard of five degrees or thereabouts is at once obtained.

There are many cases where even a smaller clearance than five degrees is desirable, especially in delicate tools, such as parting tools. A parting tool is an example of clearance being reduced to minimum. The sides of the tool nose taper from front to back one degree only each side, and from top to bottom only two degrees each side.

Rake

Watch a tool at work in any lathe or planer and trace the path of the chip as it curls away from the cutting edge. A straight line drawn in the direction of that path from the cutting edge gives the rake of the top face of the tool. This applies whether the tool has a straight top face or a curved top face.

Now we venture to assert that there are as many different ideas on rake as there are men using cutting tools. One man likes a very keen rake; he takes the precaution of having two tools for each job, so that as soon as one is dulled he changes them and has the used one reground. Another prefers a smaller rake angle because his tool lasts so much longer. Still another prefers to use a tool with very little rake; chips come off in short curls all blue and violet, and it looks as if he were doing such a lot of work. The kind of tool for which a man shows preference is a fairly good criterion by which to judge his character.

Theoretically, the question of rake is extremely complicated. Practically, it resolves itself into a long series of compromises. It is intimately concerned with the nature of the metals being cut; thus, we require a different rake on a tool of any one profile for cutting hard and soft steels, cast iron, brass, bronze, copper, aluminum, etc. If we inquire, even in the briefest manner, into the theory of rake, we are confronted by a problem that could not be exhausted in many articles of this description, while in the end we should be no nearer the establishment of our set of standard tools than we were at the beginning. Let it suffice then to make a few statements on the subject, based on the experience of every tool user. Metals divide themselves naturally into a number of groups, summarized into those which are:—

Metal Groups

(1)—Soft and tenacious, including very soft steels and copper.

(2)—Tough, but fairly easy to cut, including the majority of low carbon steels and certain kinds of bronze.

(3)—Very tough and difficult to cut, including carbon steels, tool steel and most alloy steels.

(4)—Brittle, including ordinary unchilled cast iron and some grades of bronze.

(5)—Very brittle, including most brasses and chilled cast iron.

Each one of these groups require a different rake—those in Class 1 a very keen rake; those in Class 5 little or no rake at all, while Classes 2 to 4 require varying degrees of rake in between the two extremes. The great majority of tools are required for Classes 2 and 4, therefore, if we can so frame our standards that they cover the requirements of these two classes, while, with very little alteration, they can be made suitable for the other classes, we have introduced the desirable quality of flexibility into our standard set of tools, and we have reduced our standards to the smallest possible number of variations.

This matter will be gone into more fully when we come to the considerations of what shall be included in our standard set of tools. We pass next to a discussion on the relative merits of straight and curved top faces.

Curved Face Tools

When the Lumsden oscillating tool grinder was first offered for sale on the Continent of Europe, it was not fitted with any attachment by means of which tools with curved top faces could be produced. This type of tool was in such general use, managers and machine hands being united in insisting on its manifold advantages, that it became necessary to design an attachment which would enable such tools to be quickly and accurately produced. This attachment now forms part of the standard equipment of every machine, and we believe we are stating a fact when we say that it offers the only mechanical means in existence for grinding hollow-curved tool faces.

Are our continental neighbors ahead of us in this matter, or are they wrong in attaching such importance to the curved face? That the hollow-curved face has many advantages is being amply demonstrated in many British works, since the Lumsden attachment opened up an easy means of grinding tools with curved faces. What are these advantages? They may be stated in two sentences as follows:—

(1)—They cut easily with the absorption of less power than straight-faced tools require.

(2)—They permit the use of keen angles without weakening the tool nose.

Both these statements require proof, but the first cannot be proved on paper; it can only be demonstrated in the shop. It is a statement of fact, nevertheless, and anyone can easily verify it for himself by taking two tools of precisely similar profile, and grinding one with a straight top face at the maximum rake angle he thinks the tool and the work will allow. The other he should experiment with, first by grinding a shallow curve in the top face and trying that; then he can grind the curve a little deeper and a little deeper still, trying it each time until he finds the cutting edge is so keen that it will not stand up to the cut. The experimenter will be surprised at the results he can thus obtain and incidentally he will gain much useful knowledge of the properties of cutting tools.

The second reason can easily be demonstrated by a sketch. See Figure 10. The rake at the extreme edge on a curved face tool is equal to the angle made by a tangent to the curve at that point;

a tool, therefore, to have the same rake as the curved face tool shown on the left in Fig. 10 must be ground to the absurd shape indicated by the non-shaded portion. On the other hand two tools from which an approximately equal amount of metal has been removed are shown on the right hand in Fig. 10. Here the extra keenness of rake obtained by grinding the top face with a hollow curve instead of straight is clearly shown.

This leads us naturally to ask whether such a keen rake is desirable .We refer any such enquirer to the experiments mentioned above, for they will prove to him that wherever rake is desirable at all, a curved-face tool will give better results and more efficient cutting than a straight-faced tool. The curved face seems to lend itself to the curl of the chip, which comes away more freely and with less apparent effort than it does from a straight face.

That the curved face is more natural is also shown by examination of any straight-faced tool that has been used for taking heavy cuts in steel. If the tool has been used for a reasonable length of time and is still cutting well, it will be noticed that at the extreme edge a small portion of the steel being cut has fused itself on the tool, while immediately behind this the chip has carved for itself a curved face by wearing the metal of the tool away. Most, if not all, operators of heavy lathes know that a tool in that condition is better even than a new tool. Grinding tools with a curved top face is then merely an endeavour to impart to them the natural condition they would otherwise assume for themselves after a little use.

Conclusions

In conclusion, we may state that after several years of experience devoted entirely to the manufacture and application of tools for use on hundreds of different machines under a very large variety of conditions, we have come to believe that wherever a curved face can be given to a tool, it makes for better all-round general use than is possible with a straight-faced tool. The amount of rake to adopt for all tools is so varied that it can only be considered in relation to each separate tool shape, and we have not yet reached that part of our subject. Its consideration will therefore be deferred till later.

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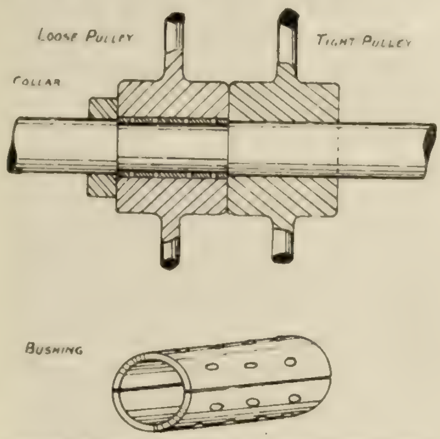
WORN LOOSE PULLEY REPAIR

By J. E. Simmons

THE writer has used the following method of repairing loose pulleys when the wear on both shaft and pulley has been excessive. When properly fitted the repaired parts are as good as new, while the cost and delay of providing a new shaft are avoided, as in most cases the shaft is worn down and no great benefit can be obtained by simply reboring and bushing the pulley.

The upper sketch in the illustration shows the complete job. The worn part of the shaft is first turned down sufficiently to clean up with a good surface over a length equal to the width of the pulley loss. The pulley is now bored out so as to allow space for a bushing of average thickness to fit between the pulley and the shaft. A piece of good sound bearing brass is bored out a running fit for the reduced part of shaft and turned a running fit in pulley, being then finished to length and split in halves with a hack saw. A number of small holes are now drilled in both halves for the purpose of holding lubricant.



REPAIRING A WORN LOOSE PULLEY.

In assembling, the tight pulley is mounted flush with the edge of the turned part of shaft, and the two halves of the bushing are then placed in position and the rebored loose pulley slipped over it, a shafting collar retaining all in position as shown.

◆

THE SCHEME OF THINGS

By F. H. Mayoh.

ALL progress and development are built around some centre of effort or enterprise, and in the realm of mechanical engineering the statement is specially evident. A gas engine is built about its piston; an automobile about its engine; a machine about the work it has to perform; a tool about the apparatus it serves to make; and industries—in the larger sense, about their product.

To-day, bullets are the centre around which much effort and energy are displayed. Guns are being built about bullets; chemicals are being manufactured for use with bullets, tools are being built for guns, industries are being built or revised for everything pertaining to bullets, and for some time, trade and technical journals have been devoting considerable space to the subject of bullets. This must, therefore, be the bullet age in mechanics. The word "bullet" is used here in the broad sense, that is any projectile fired from a gun.

Primarily, a bullet has two distinctions, and therein lies its difference from most mechanical problems. It is a composition problem, it is a tool making problem from a rapid production point of view, it is a heat treatment problem and a projection problem, and as labor required for its manufacture is uncertain, incidentally its elimination where possible also becomes a problem.

If one were to investigate a number of machine shops throughout the country he would no doubt be surprised at the number of different methods in vogue for obtaining the same result. If one were to go into a large arsenal and suggest a manufacturing change along lines of something seen in one of these shops, he would probably be confronted with the remark, "It isn't arsenal practice." Thus we notice there is a huge difference between standard arsenal practice and the practice of necessity.

As a function, the make up of a bullet takes first consideration and mechanically it does not present very great difficulties. Ordinary rifle shots are drawn and the swedging work handled, with the greatest possible speed. The machines for producing them are full automatic, fool-proof and in a large degree capable of being operated by girls. Shrapnel shell varies considerably in size, in composition and in method of handling. A good many separate operations are necessary; the parts must be well made and thoroughly gauged. Special machinery and tools are required throughout, embracing press tools, turning tools, thread millers, drilling machines, and graduating machines. Lastly a very high degree of interchangeability should be maintained so that all parts no matter where made, will go together on the field.

The second function is to maintain the outside bullet or shell dimensions. This must be done with full realization of where to work from, for in many cases it is not sufficient to caliper the outside but the lengths should be gauged relative to the outside, as for instance in gauging a shrapnel shell case the proper procedure would be to place the shell into a hole representing a gun barrel, push over a swinging latch which represents the breech block and thus having reproduced the conditions under which the shell will be fired the length of case must become evident. Likewise relative duties inside and outside of a shell must be borne in mind throughout the handling of shells or bullets.

It is impracticable to make guns with tool-makers. A gun is a highly developed instrument suited for rapid, interchangeable manufacture. All of a size should be bored alike to receive shells made anywhere, rifled true, sighted exact and manufactured by machinery, not men. It is impracticable to make guns without a large preliminary expenditure, the tools should be first-class, that's the tool-maker's function, that is the reason there's such a large demand for tool-makers at the present moment.

The first requisite of a gun is the steel. It must be a good quality, and properly treated to withstand the shock. The tools for its manufacture should be the best, quick operating, easily repaired, plenty of them and worked to the limit of capacity. The operations on some parts are many and are often so light that hand-feeding of the machines is profitable. Light grinding or filing operations are often profitable, complete gauging systems are necessary, but above all it does not pay to stint in equipment. If you must study mechanics from a bullet, study the game with an open mind; production and accuracy are the essentials. Develop the best system time will permit don't hesitate to consult the ordnance experts, for their life has been spent studying just your problems, and though strangers to you they are the experts of the moment.

TRANSMISSION SAFETY—II.

DUE to the high speed often attained by belts, it is necessary to make adequate provision for shifting them with safety. Approved mechanical belt-shifters should be provided in each case, in connection with tight-and-loose pulleys; and it is advisable to have these shifters equipped with rollers where they come in contact with the belts. This not only reduces the wear on the edges of the belts (which may be considerable in the course of a year), but also minimizes the chance of the ragged edge of a belt catching in the belt-shifter and causing damage. The belt-shifter should be provided with an approved automatic locking device, and the handle of the belt-shifter should be located so that the workman can operate it from his regular working position without inconvenience.

Belt Shifting Methods and Devices

A very common risk is run in connection with the shifting of belts by allowing an unshipped belt to ride on the revolving shaft. Such a belt, especially when loosely joined by lacing, may gradually travel around until the joint reaches the shaft, then be drawn tight enough to engage the driven pulley, and thus suddenly start the machine. This is particularly true of small pulleys, and though this specific danger may appear to be remote, we could cite cases in which it has led to serious consequences. For this reason, it is far better to hang the unshipped belt on a suitable hook or belt-perch.

Although we strongly advocate the installation of mechanical belt-shifters for all machines, we are well aware that in many plants the shifting is still done by hand, or by the use of poles. Hand-shifting is too dangerous to be tolerated under circumstances, and the use of a pole or stick adds but little to the safety of the operation. A recent accident may be cited as an illustration of the danger. While an employe was shipping a belt by means of a stick, the stick slipped between the arms of a moving pulley and was forced back into the workman's side. Two of his ribs were broken, and internal injuries also resulted. This accident could not have occurred if tight-and-loose pulleys and a suitable mechanical belt-shifter had been installed previously. An even more dangerous procedure is that of removing or shifting belts with the feet. Employees who persist in this practice should be severely disciplined.

Belt Dressing Application

The operation of applying dressing to belts to prevent them from slipping leads to many serious accidents. Care should be taken to apply the dressing at the point where the belt leaves the pulley, and to roll up the sleeves so that they will not catch upon belt fastenings or other parts of the belt. It is hardly feasible to stop the belt while the dressing is being applied, because it is then very hard to reach all parts of the belt, and to apply the dressing smoothly and uniformly. The safest and best way, without doubt, is to remove the belt altogether, when it needs dressing, and stretch it out along a bench or on a clean floor. It should then be thorougly cleansed and repaired after which the new dressing may be applied and worked in. There are few shops, however, in which the superintendents are willing to have the work done in this way, because it involves a considerable expense for labor, and it will also be necessary, in many cases, to have extra belts on hand, to take the places of those that are being cleaned and dressed. Small belts can be handled in this way without any very heavy expense, and in such cases it is possible to do the work outside of the regular hours, so that it will not be necessary to provide extra belts. It is not feasible, however, to remove large, heavy belts and treat them in this way, on account of the great labor involved.

Running Belt Treatment Precautions

If a belt must be dressed while it is running, the work should be assigned to a man who is known to be intelligent and cautious, because in such cases the problem of accident prevention is probably at least 75 per cent. a human problem. In other words, it will depend mainly upon the man himself, whether he is injured or not. Liquid dressing should first be warmed so that it will flow freely, and it should then be applied by a brush and never by the use of rags or cotton waste, because either of these is likely to catch on belt fastenings or rough places in the edges of the belt, and be drawn against the belt along with the man's hand. Experts often recommend that the engine (or motor) driving the belt be slowed down while the dressing is applied. This is a wise precaution, where it can be done satisfactorily.

In dressing a moving belt, the dressing, as previously stated, should be applied to the belt near the point where the belt **leaves** the pulley. Sometimes this is not practicable on account of local conditions, and in such cases extraordinary care should be taken.

Typical Example

We recall a case, says the Travellers' Standard, in which a belt two feet wide, runing over a six-foot pulley, had to be dressed under such conditions that the only part of the belt that was accessible was the part that was within two feet of the pulley, on the in-running side. Moreover, the belt could be approached only on one side, so that the man who applied the dressing had to reach over to the further side of the belt from where he stood. To guard against accident he was in the habit of removing his jumper and rolling his right shirtsleeve up into a tight roll as near as possible to his shoulder, working with his right arm bare.

When conditions of this kind have to be met, a stout railing should be provided for the protection of the man, and it should be placed so that he can lean upon it if necessary, and so that he can catch at it and thus save himself, in case he should lose his balance. When a man is engaged in any perilous operation, of this kind, care should be taken to prevent his being startled by any unusual sound or other disturbing cause. Nobody having ragged or loose-fitting clothing should be allowed near a rapidly-moving belt at any time, either to apply dressing to it or for any other purpose.

◆

Steamers Released.—The British Admiralty has released three of the White Star-Dominion Line steamers which were formerly in the Canadian trade—the Northland, Southland and Canada.

Series of Practical Questions and Answers for Mechanics

Every care is being taken to include only pertinent practical questions, and give same direct, reliable answers. Catch questions will be avoided. Arithmetic, consisting of simple addition, subtraction, multiplication and division will be found a useful companion study.

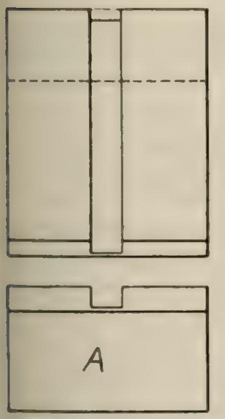
Question.—We desire to change the volume of a flue to twice its present capacity. It is now 8 inches in diameter, and requires to be changed to one of oblong cross-section, the width being 8 inches. What must be the length?

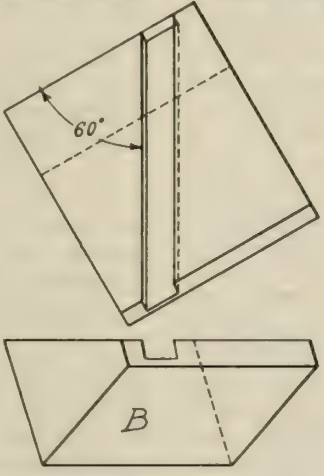
Answer.—The area of the 8-inch diameter pipe will be 8×8×.7854, or 50.2656 square inches. Twice this will be 100.53 square inches. As this will be the area of the oblong flue required, the length will be the area divided by the width, or 100.53 divided by 8 equals 12.57 inches.

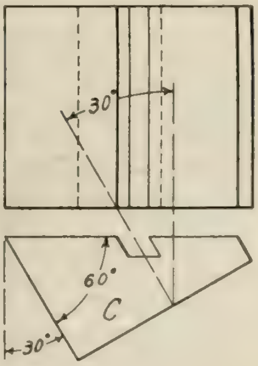
* * *

Question.—We have a groove to cut in the face of a cast iron block; the base is square and the sides are perpendicular to the base, while the top face makes an angle of 30 degrees with the base (on the ends), the front and back being parallelograms. The sides of the groove are to be square with the base and the bottom parallel with the top face, with the direction of groove inclined at an angle of 60 degrees with the front or back face. What must be the angle of inclination for the head when cutting the groove?

Answer.—What we gather from the data given is, that the groove is to be shaped on the top surface of the block, as shown at B. The elevations A, B and C illustrate the position of the block when held in the vise. With the groove running from the front to the back and parallel with the ends, the head would be in a vertical position. With groove running from end to end and parallel with front or back, the head would be inclined at an angle of 30 degrees, to keep the sides perpendicular to the base. By swinging the shaper vise around 30 degrees, to bring the block in the desired position, the angle of inclination would be reduced in proportion. Therefore, when in position A the head is vertical, and in position C the head is inclined 30 degrees, the inclination for position B would be 90 : 30 = : x, or $x = \frac{30 \times 30}{90} =$ 10 degrees.







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Question.—What is meant by "casting out the nines" when proving work in multiplication?

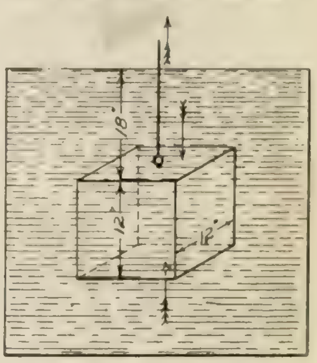
Answer.—This is the process frequently adopted in checking work in arithmetic, and very often is a sure means in tracing mistakes; for instance, suppose we are multiplying 638529 by .7854, we proceed as follows:—

```
   638529     33    9)33(3 — 6
    .7854     24    9)24(2 — 6
 ---------                ----
  2554116                9)36(4—0
 3192645
5108232
4469703
----------
5015006766    36    9)36(4 — 0
```

After multiplying the two numbers together and obtaining the product, add together the digits in the multiplicand, the multiplier and the product. In this example, the sum of the digits in the multiplicand is 33; dividing this by 9 we get 3 and 6 over. The sum of the digits in the multiplier is 24; dividing this by 9 we get 2 and 6 over. By multiplying these two remainders together and again dividing by 9 we get 4 and 0 over. This last remainder should be the same as that obtained by following the same process with the product. Thus, the sum of the digits in the product is 36, and this divided by 9 gives 4 and 0 over, so the work can be considered as correct. If, after multiplying the remainders in the multiplicand and the multiplier and dividing by 9, the remainder should be other than a cipher, a similar remainder should be shown in the product.

* * *

Question.—How is it that a body weighs less when submerged in water than when suspended in the air?



Answer.—If the specific gravity of the body is less than that of the liquid in which it is placed, the body will be only partly submerged, the displaced water being equal to the total weight of the floating body. When the specific gravity is greater than the water, it will be necessary to exert a force (as shown by the upper arrow) to keep the body from sinking to the bottom. Now, it is quite clear that the pressure of the water upon the sides of the block shown in the sketch will equalize each other, but the pressure on the bottom tending to lift the body will be greater, due to the larger head. The pressure acting downwards will be 12 × 12 × 18 × .03617 = 93.75 lbs., and the pressure acting upwards is 12×12××30×.03617 =156.25 lbs. Then the difference in this case will be the weight of the water displaced, or 156.25 minus 93.75 equals 62.5 lbs., which is the approximate weight of a cubic foot of water.

* * *

Question.—When making castings by the die-casting process, what is the method adopted to determine the soundness of the various parts of the metal?

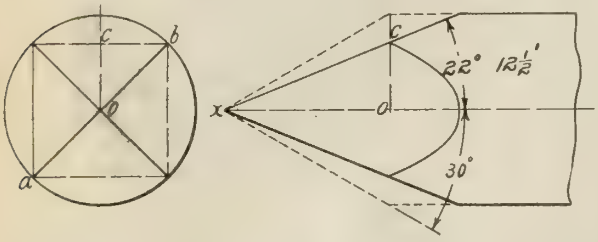
Answer.—The general process of determining the soundness of small castings is to select a few of the first pieces made and break them up until one is found that is entirely free from blowholes or other defects. When one is secured that is reasonably perfect, it is used as a basis for calculations and all subsequent castings must balance this test piece. By this method the smallest blow-hole or variation in weight is easily detected.

Question.—In the operation of a block and tackle, having a combination of pulleys, the weight is raised one foot while the free end passes through six feet. What force would be required to raise a weight of 350 pounds?

Answer.—From the above question it is seen that there are six ropes supporting the weight, therefore, the weight and the force applied will be in the same ratio as the supporting ropes and the free end, or 6 to 1. Then the power required to raise 350 pounds will be 350 divided by 6, or 58½ pounds.

* * *

Question.—A milling machine hand had a number of lathe square centres to shape up, so that the cutting angle would be 60 degrees. The question which puzzled him was the angle through which to tilt the head so that the included angle at the corners would be 60 degrees. What would this angle be, and how is it obtained?



Answer.—A solution to this problem was given in a former issue of Canadian Machinery, but to make it more clear we will again explain. As the angle of two opposite edges will represent the original angle of the conic centre or 60 degrees, it is clear that the angle of two opposite sides must be somewhat less. As shown in the sketch, the angle desired is C X O; the dotted portion being the original outline of the 60 degree conic centre. Suppose the diameter of the centre (a — b) is 2 inches, then to find the length (o — c) use the formula,

Side opposite = hypotenuse×sine = 1×sine of 45 degrees, or 1×.70711 = .70711 inches.

The length (x — o) will be the vertical height of an equilateral triangle, whose side is 2 inches, or by formula,

Side opposite = hypotenuse×sine = 2×.86603 = 1.73206 inches.

Then angle C X O can be found from the formula,

$$\text{Tangent} = \frac{\text{side opposite}}{\text{side adjacent}} = \frac{.70711}{1.73206} = .40824.$$

Angle corresponding equals 22 degrees, 12½ minutes.

* * *

SURFACE GRINDING

By H. W. Dunbar.

THERE is a fact relating to surface grinding which I do not believe is thoroughly understood, at least this is my observation, since the question "Why do you not have variable speed regulation on the work table of your surface grinding machine?" has been asked me so many times. The answer is very simple: "Because we do not need it," which will be understood by the following explanation:

In cylindrical grinding, a given size of machine has to handle a great variety of different classes and different kinds of work, which naturally introduces as many different diameters. With a given grade of wheel, in order to keep the surface speed of the work constant so that this wheel will have practically the same cutting action on all these different diameters, it becomes necessary to introduce a speed change device between the source of power which revolves the work and the latter itself. This usually takes the form of gearing or belting, and a considerable range is provided to maintain an equally constant surface speed of work, from the smallest it is practicable to grind in such a machine to the largest that the machine will accommodate. Also one other factor enters, but will be disregarded at this time and touched on a bit later, that is, the different arcs of contact in the diameter of the wheel or the diameter of the work.

No Change In Diameter.

Now in surface grinding this is different. There is no change in diameter; when you change work on the table of the machine the diameter has been stretched out in a long straight line. What corresponds to the periphery of the cylindrical piece of work being ground is now a flat surface resting upon the table of the machine, and no matter whether your piece is short or long, wide or narrow, the rate of speed with which it travels underneath the wheel is always constant. So that after the proper wheel speed has been determined, also the proper table speed, which gives you the correct relative work speed to wheel speed under average conditions, there is never any further need for change in the speed of the table which carries the work on a surface grinding machine.

The same is true of the wheel speed, this need not be changed either, since the design of the wheel sleeve is such that but a certain amount of wheel can be worn from the diameter, then it becomes useless. This amount, of course, is sufficient to make the wheel an economical proposition, even more so than by the practice of utilizing the greater amount of actual cubic inches of the wheel, and changing the speed at different intervals when the wheel action changes, there being a wide enough range in the possibility of a given grain and grade of wheel to be cared for by the single speed specified.

Arc of Contact of Wheel

One other fact that must be borne in mind when operating a surface grinding machine for surface work, and one which influences in a degree the selection of the wheel for a maximum amount of work, is the arc of contact which the wheel has with the work being ground. In the surface grinding operation there is considerably more wheel buried in the work during actual cutting time than with the same diameter wheel on a cylindrical piece of work. So that for surface grinding it is usually safe to say that very much softer wheels must be selected, and wheels that are somewhat coarser, since we must provide room for chips being removed while the particles of wheel are buried in the steel .The same principle, of course, applies to cylindrical work where the work gets larger and larger in diameter, as in this class of work the wheel is also buried deeper in the part being ground than on smaller diameters, and therefore, will require a somewhat softer and coarser wheel. From "Little Known Facts About Grinding" in "Grits and Grinds."

* * *

FALL OF OVERHEAD SHAFTING

A HAZARD that must be considered in workshops is that due to the fall of overhead shafting. This sort of accident is somewhat rare, because the danger is so obvious that even the most careless managers usually take precautions against it; but when a section of shafting weighing tons and running the length of the building does fall, enormous damage is likely to be caused. To much care cannot be exercised in making sure that the supports for line shafting are substantial, and that they are securely fastened. A weak or insecure hanger imposes an extra burden on the other hangers, and the shaft is ultimately thrown out of alignment. It then moves with an eccentric motion, which gradually becomes more pronounced as the other hangers are affected by it and work loose. The belt becomes tighter during one part of a revolution of the shafting than during the remaining part, and finally a time will come when a heavy load is applied at the moment when the belt is abnormally tight, and then the whole line of shafting may be pulled down with disastrous results to life and material.

Burning Blast Furnace Gas Under Boilers and Stoves*

By A. N. Diehl**

Being a discussion of ways and means whereby greater efficiency will be procurable from the use of the blast furnace gas in hot blast stoves and boilers. It is claimed that a saving of 12.3 cents per ton of iron can be made by increasing the boiler efficiency from 55 to 65 per cent. in burning that portion of the blast furnace gas not utilized in the hot blast stoves.

About 48 to 50 per cent. of the thermal value of the fuel used in the blast furnace passes from the top in the form of sensible and latent heat in the gas. Of this about 30 per cent. is used in the hot blast stove, 10 per cent. is lost, and 60 per cent. is used in the boilers and engines. The possibility of raising the boiler efficiency from 55 to 65 per cent. in burning the blast furnace gas has, the writer argues, been almost overlooked.

The average blast furnace gas on lake ores has approximately the following analysis by volume: CO_2, 12.5 per cent.; CO, 25.4 per cent.; H, 3.5 per cent.; nitrogen, 58.4 per cent. This gas will have a thermal value at 62 deg. Fah. and 30 in. barometer of 92 B.t.u., and contain from 30 to 35 gr. of water per cubic foot. It also contains considerable dust, which, however, can be removed by washing, the dust content being lowered from 3 gr. to approximately 0.2 gr. a cubic foot, the moisture at the same time being lowered from 30 gr. to 8 to 10 gr. per cubic foot. While washing the gas reduces its temperature 220 deg., this is counterbalanced by the gain due to the cleanliness of the heating surfaces with the washed gas and by the reduction of moisture. Equally high flame temperatures can be obtained from either clean or dirty gas, the temperatures being in the neighborhood of 2,030 deg.

Burner Performance

The performance of a burner may be determined by the observation of flame temperature, and by analysis of the products of combustion. The temperature observation cannot be used as an absolute standard of burner efficiency, and a method based on the analysis of the products of combustion must be used. A burner is put at 100 per cent. efficiency when the analysis of the products of combustion shows only carbon dioxide and nitrogen. It is suggested that the products of combustion be analyzed at a point about 2 ft. from the point of ignition. The 100 per cent. efficient burner is defined as follows: "A gas burner is operated at 100 per cent. combustion efficiency when the analysis of a sample, drawn from a point 2 ft. beyond the point of ignition, shows perfect combustion."

Under this definition the boiler efficiency does not enter into the problem, and burners may be compared with one another. The efficiency of burners varies with the load upon them, and it is desirable to develop a burner that will closely approach perfection at boiler loads of 75 to 200 per cent. of the boiler rated horse-power. The essential condition for this is a maximum flame temperature obtained by a perfect mixture of air and gas in the burner. The burners here discussed cannot be compared, however, on the basis of burner efficiency on account of insufficient data. Blast furnace gas burners may be classified under six general types, and are described below.

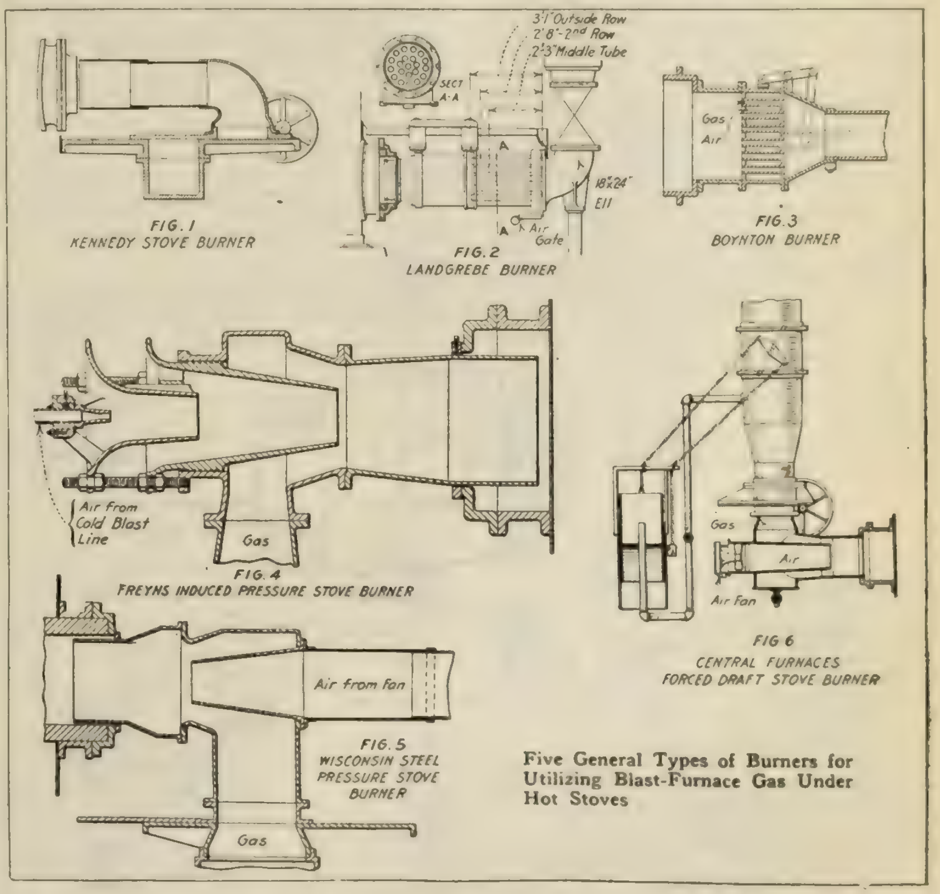


FIG. 1 KENNEDY STOVE BURNER

FIG. 2 LANDGREBE BURNER

FIG. 3 BOYNTON BURNER

FIG. 4 FREYNS INDUCED PRESSURE STOVE BURNER

FIG. 5 WISCONSIN STEEL PRESSURE STOVE BURNER

FIG. 6 CENTRAL FURNACES FORCED DRAFT STOVE BURNER

Five General Types of Burners for Utilizing Blast-Furnace Gas Under Hot Stoves

Stove Application

The following points should be observed in using blast furnace gas in burners in connection with stoves: Clean gas should be used when possible. Large heating surfaces should be exposed as an aid in lowering stack temperatures. Equal draft and blast distribution over the entire checker area is essential to good practice. All gas should be consumed in the combustion chamber. The closer the complete combustion is to the burner, the better heating exchange is possible. It is best to add both gas and air at only one point through the burner, and control them there. Gas and air have channeling tendencies when entered separately. Forced draft will facilitate flame intensity, and it acts in such a manner as to make combustion of more gas possible in the stove than under atmospheric conditions. If the stove is sufficiently large, considerable advantage can be derived by this method. It is advisable to make daily flue gas analyses and have a technical supervision of the combustion.

(1)—Rectangular or circular nozzle burner with air added around it or by separate doors or both. An example of this type is the Spearman & Kennedy burner, Fig. 1. Air enters the stove through the clearance space aound the burners and through doors in other parts of the stove circumference. Gas and air mix in the combustion chamber.

(2)—Rectangular or circular burner with air conducted into the gas jet by means of pipe or other opening. The Landgrebe burner, Fig. 2, is of this type. Air is admitted at the back of the gas tubes, and at the ends of them meets the gas, at which point mixing takes place. A separate gas valve is placed in the pipe connection to the gas main, and suitable slides, etc., are provided for regulating admission of air into the air chamber of the burner.

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*From a paper before the American Iron and Steel Institute.

**Asst. Supt. Duquesne Steel Works.

(3)—Burners which sub-divide air and gas into a series of streams, but do not mix in the burners. A burner of this type, developed at the Edgar Thompson Works of the Carnegie Steel Co., consists of two concentric passages—the inner one for gas and the outer one for air. The gas and air passages contain helically twisted vanes, the twists in the two helices being in opposite directions. The vanes run the full length of the respective barrels and serve to facilitate the mixture of the gas and air as they emerge from the burner. Another example of this class of burner is the Boynton burner, in use at the Lorain works of the National Tube Co. It is illustrated in Fig. 3. Air and gas are admitted in horizontal layers, this stratification being produced with the idea of obtaining an intimate mixture of air and gas at the point of admission.

(4)—A burner in which air is aspirated by means of an air jet at high pressure, as in a steam jet blower, the air from both sources mixing with the gas in the burner. The Freyn gas burner is of this type, and is illustrated in Fig. 4. These burners have been used on stoves of the Illinois Steel Co., South Chicago.

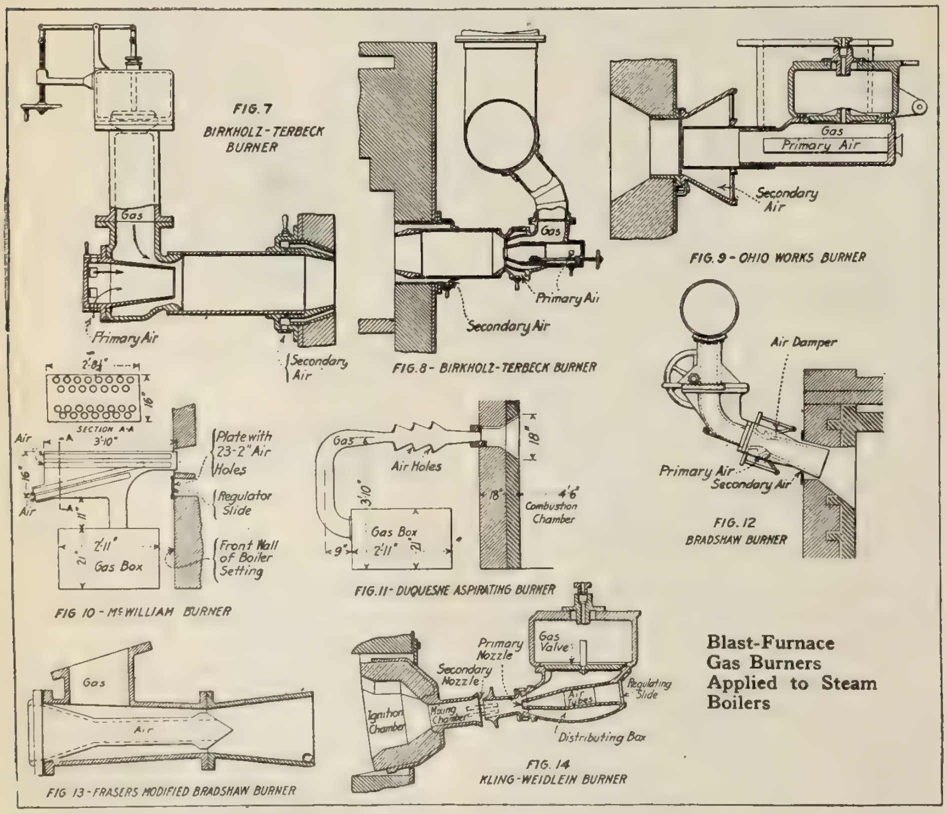
FIG. 7
BIRKHOLZ-TERBECK BURNER
Gas
Primary Air
Secondary Air
Gas
Primary Air
Secondary Air
FIG. 8 - BIRKHOLZ-TERBECK BURNER
Gas
Primary Air
Secondary Air
FIG. 9 - OHIO WORKS BURNER
2'8¼"
SECTION A-A
3'10"
Air
Air
Plate with 23-2" Air Holes
Regulator Slide
Front Wall of Boiler Setting
2'11"
Gas Box
FIG 10 - McWILLIAM BURNER
Gas
Air Holes
3'10"
18"
18"
4'6"
Combustion Chamber
Gas Box
2'11"
9"
FIG. 11 - DUQUESNE ASPIRATING BURNER
Air Damper
Primary Air
Secondary Air
FIG. 12
BRADSHAW BURNER
Gas
Air
FIG 13 - FRASERS MODIFIED BRADSHAW BURNER
Primary Nozzle
Gas Valve
Secondary Nozzle
Ignition Chamber
Mixing Chamber
Regulating Slide
Distributing Box
FIG. 14
KLING-WEIDLEIN BURNER

Blast-Furnace Gas Burners Applied to Steam Boilers

(5)—Burner through which all of the required air is forced and completely mixed with the gas before the ignition point. Fig. 5 illustrates a burner of this type in use on the stoves of the Wisconsin Steel Co., South Chicago. Another form of the same type is used at the American Steel & Wire Co. Central furnaces, Cleveland. The burner used at the latter is illustrated in Fig. 6. Air is supplied by a 16-in. turbo-blower, which runs at a constant speed, and, therefore, furnishes the required volume of air at a given rate. A gasometer-controlled damper placed in the gas downtake insures a correspondingly constant gas volume.

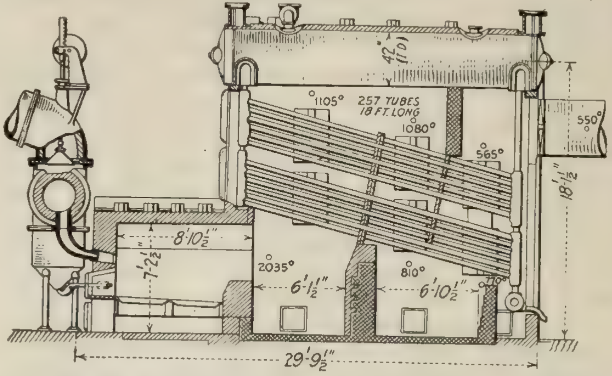
42"
1105°
257 TUBES 18 FT. LONG
1080°
550°
565°
18'4"
8'10½"
7'2½"
2035°
6'1½"
810°
6'10½"
29'9½"

FIG. 15. 500 H.P. B. & W. BOILER AT NATIONAL TUBE CO. PLANT, McKEESPORT, PA., SHOWING 72% EFFICIENCY WITH OLD STYLE BURNER.

(6)—Burners to which air and gas are supplied after being perfectly mixed in a fan, which draws in air on one side and gas on the other, discharging the mixture into a common outlet. This type is at present in process of development.

Boilers in operation at the present time in blast furnace plants range from 250 to 500 horse-power. They are usually equipped with feed-water heaters, but seldom with superheaters or economizers. Settings and baffles as a rule are in bad condition, and the efficiency of the average blast-furnace boiler plant could probably be increased from 5 to 10 per cent. by repair and constant upkeep of settings and baffles. The burner in general use comprises a pipe introduced into the combustion space under the boiler. The gas enters into a solid rectangle or circle, and the air in a thin layer around it. Air and gas are mixed in the combustion chamber and in the boiler flue space generally, the bulk of the work beingdone in the latter.

Controlling Gas Pressure and Quantity

The only method of controlling gas pressure and quantity is a butterfly valve placed in the supply line to the boilers. This method of control is used in order to insure the required pressure at all times at the gas cleaning plant, which is necessary so that the constant quantity of gas required by the stoves and the gas engines shall always be maintained. The variation in quantity and pressure of gas must be taken by the boilers. Pressure regulation at the boilers cannot be considered, and an amount of air proportional to the quantity of gas available must be supplied. This can be done in most equipments by means of damper regulation, in combination with sufficient air openings around the burners. Automatic damper regulation, controlled by pressure in the gas box between the butterfly valve and the burner, will probably give the best results.

Raw Gas Feature

When raw gas is used, the boiler tubes should be blown regularly. Under constant conditions, stack temperatures have shown decreases of from 50 to 100 deg. Fahr. before and after blowing. On account of the loss due to excessive air leakage through the open doors, while the tubes are being blown, the economical period of blowing is every 12 hr. After the 12-hr. interval the deposits accumulate rapidly, causing a correspondingly rapid rise in the stack temperature.

Three general types of burners are in use in connection with boilers as follows: — (1) — Rectangular or circular nozzles, with air added around them or by separate air doors, or by a combination of both. (2)—Rectangular or circular burners with air conducted into the gas jet by means of pipes or other openings, and by means of auxiliary doors through which additional air is admitted around the burner nose. (3)—Rectangular or circular burners with all the air required for combustion conducted into the gas jet by means of pipes or other openings. Type 1 is known as the common burner.

Distribution of Boiler Losses

The maximum average efficiency of a blast furnace boiler plant, using common burners and operating without the aid of technical supervision, is about 50 per cent., frequently being lower. An approximate distribution of the losses is about as follows:

Sensible heat in waste gases	36 per cent.
CO in waste gases	9 per cent.
Radiation	5 per cent.

The distribution of the loss will, however, vary greatly with the load, the gas pressure, and the position of the stack damper.

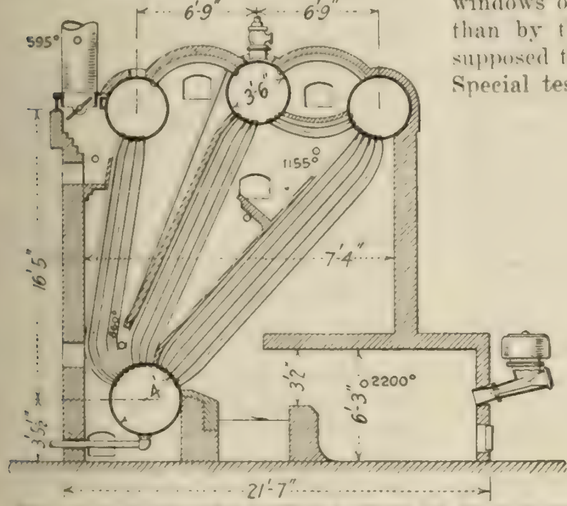

FIG. 16. GAS BURNER INSTALLATION IN 500 H.P. STIRLING BOILER, AT PITTSBURGH STEEL CO. PLANT, MONESSEN, PA.

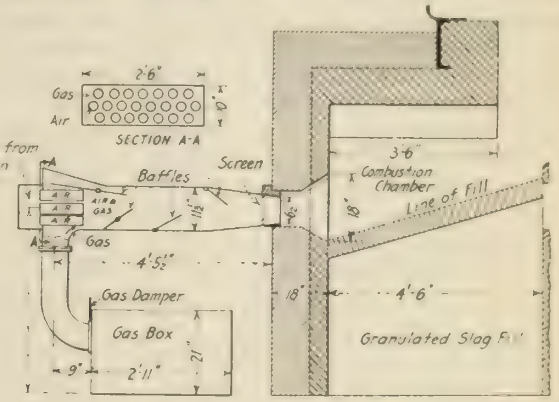

FIG. 17. POSITIVE AIR SUPPLY BURNER AT DUQUESNE WORKS.

The maximum efficiency occurs with neither a minimum sensible heat loss nor minimum CO loss, which is generally the case with high efficiency. The efficiency of 59.4 per cent. may be considered about the maximum under present conditions and equipment. It indicates that with attention to details of operation, a continuous operating efficiency of about 58 per cent. is possible at a rate of driving of 175 per cent. of rated boiler horsepower. While this is a low figure, it is probably exceeded by but few blast boiler plants. High efficiencies are possible, however, with old style burners, provided they are used in connection with large boilers, long combustion chambers, excellent conditions of setting and baffles, sufficient air supply and air regulation, together with close attention to performance.

Birkholz-Terbeck Burner

A representative form of a burner of the second class is the Birkholz-Terbeck burner, shown in Fig. 7. In this burner the primary air supply is admitted through openings in the back of the air nozzle, being aspirated by the force of the gas blowing through the burner. The primary air supply is insufficient, and a secondary supply is drawn in by furnace draft through the secondary openings around the nose of the burner.

A series of tests was made by C. J. Bacon on Stirling, Rust and Wheeler boilers to compare Birkholz burner with those of so-called simple construction. The tests were of short duration and the evaporation was measured by steam flow meters instead of by weighing the feed water. The results showed in part that it is extremely difficult to make reliable adjustments of burners when judging solely by the appearance of the flame. The best combustion is accompanied by slightly smoky appearance of the flame, as seen through the glass observation windows of the Birkholz burner, rather than by the bluish-white color usually supposed to indicate perfect combustion. Special tests demonstrated that the aspirating effect of a Birkholz burner with three adjustable air inlets could not be depended upon to supply the proper amount of air for combustion under varying conditions of gas supply and stack draft.

Manual adjustment by experienced attendants is necessary to accomplish lasting improvement. While the mechanical devices of the Birkholz burner facilitate such adjustment, it will not give uniformly good results if unattended. The usual efficiency of boiler plants over long periods does not exceed 55 per cent., while the tests prove that 60 to 65 per cent. efficiency is easily obtainable if close attention is given to the physical upkeep of the boiler plant, even without additional expenditure for special types of burners. As high as 70 per cent. efficiency may be obtained from ordinary types of boilers equipped with the better class of burners, when given expert attention under favorable operating conditions. The degree of improvement in performance accompanying the use of improved burners of the Birkholz type evidently will not be so great with boilers of the Rust and Stirling types as with boilers of the single-pass arrangement such as the Cahall and Wheeler.

Special Burners of Type 2

Fig. 9 shows a burner developed at the Ohio Works of the Carnegie Steel Co. A series of tests on two 400-h.p. Stirling boilers fired with mixed raw and washed blast furnace gas indicated that the efficiency of this type of burner was about equal to that of the Birkholz burner. The McWilliams burner, shown in Fig. 10, is built on about the same principle as the burner shown in Fig. 9. The combustion is no better than in the common type of burner. Experiments showed that the draft, due to aspirating effect, increases with the gas quantity, but not in direct proportion to it. In a series of six 8-hr. tests with this burner on a 250-h.p. Babcock & Wilcox boiler, an efficiency of 49.7 per cent. was found to be about the average operating efficiency. Efficiencies ranging from 53.5 per cent to 55 per cent. were obtained under the test conditions with the doors fastened tightly and all openings in the setting mudded up, additional air being admitted by moving back the screen around the burners.

Burners of Type 3

An aspirating burner of Type 3, made at Duquesne for experimental purposes, is shown in Fig. 11. It consists of a series of air vanes at the top and bottom of the burner, the gas jet being contracted at each vane, but each contracted area being made larger than the preceding one. When operated at the rated capacity of the boiler, 250 h.p., a burner efficiency of 92 per cent. was obtained, but, on increasing the capacity, the efficiency dropped rapidly, due to unconsumed CO. In tests with this burner on a 250-h.p. Babcock & Wilcox boiler, a boiler efficiency of 63.7 per cent. was obtained. Tests made at the same time on an adjoining boiler using the common type of burner showed a boiler efficiency in the neighborhood of 56 per cent.

The Bradshaw burner shown in Fig.

12 is supposed to follow the principle of the Venturi meter. It consists of a rectangular casting through which the gas passes, air being admitted through narrow openings top and bottom for the full width of the burner. The casting is contracted at this point, and the reduction in pressure due to the increase in velocity provides the medium for air aspiration. The casting then flares out to permit expansion from the throat of the burner into the furnace. In tests on a 500-h.p. Stirling boiler (Fig. 16) at the works of the Pittsburgh Steel Co., Monessen, Pa., the boiler efficiency over the usual working range of gas pressure averaged 65.1 per cent. The test results showed, with an increase of gas above the amount for which the original adjustments of the burner were made, a loss of 8.2 per cent. due to unconsumed CO gases, proving that air in proportion was not induced through the burner.

Two modifications of the Bradshaw burner have been made, known as Fraser burners No. 1 and No. 2. The principal difference between these modifications and the Bradshaw burner lies in taking air to the contracted portion of the gas jet inside instead of outside. In burner No. 1 the side gas passages past the air box were made too small, resulting in only a small amount of gas passing under the air box. Burner No. 2 was designed to provide ample passage for gas on the sides of the air box, which resulted in more nearly equal gas pressures at the top and bottom of the burners. The test of Frazer burner No. 2 showed an average efficiency or 65.4 per cent.

Another burner of the general type of Class 3 is the Kling-Weidlein burner, developed at the Ohio works of the Carnegie Steel Company and illustrated in Fig. 14. The gas leaves the primary nozzle at high speed and in two streams, drawing the primary air in between the gas streams. The air mixes with the inside layers of the gas streams on their way to the ignition chamber, but before the latter is reached the secondary air is brought in in two streams and mixes with the outside layers of the gas stream. The results of tests with this burner showed that within small limits of pressure variations, a burner will aspirate practically, though not exactly, the correct quantities of air. For large pressure differences, however, regulation of gas pressure or air supply would be necessary to the maintenance of maximum efficiency.

Burners With Positive Air Supply

A burner of the type in which all the air is forced into the burner and completely mixed with the gas before the ignition point is shown in Fig. 17. All the air required for combustion is supplied by a motor-driven fan. Air enters the rectangular box at the back of the burner, and after passing through the short pipes, mixes with the gas. Gas and air are thoroughly intermingled before reaching the point of ignition at the end of the burner. By careful regulation a burner efficiency of 96 per cent. was obtained. In a working arrangement of forced draft, the speed of the motor or engine driving the fan should be controlled by the gas pressure. Results of a representative test for this burner on a 250-h.p. Babcock & Wilcox boiler showed 21.9 per cent. of CO_2 in the stack gases, and 3.1 per cent. O_2, while CO was zero. The boiler efficiency in this test was 65.6 per cent.

Conclusions Regarding Boiler Practice

The most noticeable feature in the comparison of boiler tests with relation to the burners is that in the same plant nearly all of the burners compared showed very little difference in efficiency, although there may be considerable difference between particular tests in the same plant. The plant must, therefore, be considered a constant, and we must conclude that the equipment and supervision is superior in the plant showing the best results. The following general conclusions were drawn as a result of all the tests of burners in connection with boilers:

(1)—Under test conditions all types of burners appear to approximate equal results with the same equipment and management, although engineering features in some types render manipulation and control easier.

(2)—High efficiencies will prevail when the equipment is properly designed and in first-class condition.

(3)—Combustion chambers should be sufficiently large to accomplish full combustion of the gas before it passes the first row of boiler tubes. Combustion chambers should be proportioned to suit the burner conditions. In general, the size of combustion chambers should be inversely proportional to the degree of mixing in the burner.

(4)—Balanced draft control in the combustion chamber and necessary damper regulation with consequent exclusion of infiltrated air is a decided advantage.

(5)—Although a burner can be designed to aspirate the proper quantity of air at one pressure, none has yet been designed to aspirate over any very considerable range of varying gas pressures Over small ranges a number of the recently developed burners approach within practical limits the condition of sufficient air supply.

(6)—Gas pressures constantly varying within relatively wide limits render impossible the attainment of good combustion without constant regulation of the air supply.

(7)—Unless preheaters, superheaters or economizers are used, claims of boiler efficiencies of over 70 per cent. should be accepted with caution.

(8)—Constant gas analysis coupled with intelligent supervision is one of the principal factors in obtaining continuous high efficiency and control without much change in equipment.

(9)—A properly designed burner with easy means of controlling air and gas mixtures is far preferable to slip-shod methods which prevail in many plants.—Data courtesy The Iron Age.

NICKEL REFINERY TO BE BUILT

THE manufacture of nickel in Canada is to begin immediately, that is to say, as soon as the necessary arrangements can be completed and the necessary plant provided. The work will be done by the International Nickel Co., at whose refining plant in New Jersey most of the nickel from Ontario mines is now being manufactured. The International Nickel Co., has already given instructions for the incorporation of a Canadian Company. This information while not coming officially, is from an authentic source and the statement is made that no time is to be lost in giving effect to the arrangements now being made.

The question of the establishment of a Canadian plant by this corporation was taken up by the Government with the management of the International Nickel Co. some months ago and a return was tabled in Parliament containing the company's promise to erect in Canada a plant of sufficient size to provide all the nickel required by Great Britain. It was intimated by the company at that time that the Canadian plant should be erected somewhere along or near the Atlantic seaboard, apparently with a view to simplifying matters relating to the shipment of certain materials used in the treatment of the ore.

These considerations do not seem to have carried the same weight, as representatives of the company, after examining a number of sites in the Maritime Provinces have since been actively engaged in looking over a number of sites in Ontario, with a view to establishing the refinery near to the point of ore production. There is no information available as to whether a final selection of a site has been made, but the expectation is that the plant will be located in Ontario.

* * *

Edward Fitzgerald, of Montreal, former purchasing agent of the C. P. R., has been officially named as assistant to the chairman of the Imperial Munitions Board.

NEW PROCESS DEVELOPMENTS

Inventive Genius and Research Operate to a Dual End — They Aim to Improve What We Now Possess and Bring to Our Service Commodities Before Unknown

HEAT TREATMENT OF DROP FORGINGS

By W. C. Peterson.

THE manufacture of drop forgings involves mechanical treatment, consisting of forming the metal under a hammer, or in a forging machine, and heat treatment, which modifies the structure of the steel. The handling of the material, in the course of this treatment, has a great influence on the physical properties of the finished forging.

Temperature Feature

All steels have a certain temperature or range of temperatures, at which the structure of the steel undergoes a change. This range of temperatures is called the critical range. Upon heating a piece of steel from atmospheric temperature up through the critical range and then allowing it to cool very slowly down to its original temperature, the steel appears as a very close crystalline structure. Upon further heating of the steel through its critical range, it is found, just upon emerging from this range, to have a very fine grained structure. Allowing it to cool from this temperature it is found that a very slight crystallization takes place, after which practically no change in the structure is noticeable.

In drop-forging it is necessary to have the temperature well above the critical range, since otherwise the metal would not be plastic enough to forge. As the forging is being heated beyond the critical range the grain size increases, until, at the temperature at which forging begins, a very coarse crystalline structure is apparent. Application of heavy blows or of pressure soon breaks up this large grain, particularly if this hammering or pressing is continued sufficiently.

Getting Best Results

To get the best results in drop-forging the hammering should continue, for it must be remembered that large and crystalline grains will result if the steel be allowed to cool undisturbed, especially if the temperature is well above the critical range. This can easily be demonstrated by heating a piece of steel up to the proper forging temperature and hitting it just a few blows with the hammer and then allowing it to cool undisturbed. It shows a remarkable grain growth. On the other hand, if the steel upon heating to the proper temperature is hammered continuously to a point where the temperature is just above the critical range, it will be found to have a very finely grained structure. It is well, then, to designate a finishing temperature on forged work, and the nearer this temperature is to the critical, and yet above it, the better the forgings will be.

Effect of Cold Working

If the hot working of the metal is to continue to a temperature below the critical range, the structure will still be fine grained, since crystallization ceases at the beginning of this range, yet it would be distorted. Distortion in the structure of steel means decreased ductility and in some cases even brittleness. Such a condition actually exists in the cold working of steel, since it is known that the structure existing below the critical range has no tendency to crystallize. The effect of cold working is essentially to distort, by stretching the elements of the structure in the direction of the force applied, causing decreased ductility and brittleness. Instances of the decrease in ductility are noted in the cold working of steel where it is necessary to anneal before completing the final operation, such as in tube or wire drawing.

Although it may be possible to keep the finishing temperature as near the critical range as is practicable, it is found that the inner portions of a forging of small cross section have a much coarser grain than those of the outside. It is extremely difficult to prevent this, for if the finishing temperature is correct for the outside, the inner portions are hotter, causing grain growth, and again if it were possible to adopt the proper temperature for the inside portion of a forging, the outside would be affected by cold working, causing strains, etc.

Heat Treatment Features

In practice, then, conditions exist which are not ideal for forging, such as uniformity in finishing temperatures, and difference in structure from centre to outside. Heat treatment is destined to overcome to a marked degree the influences of these irregularities. It consists principally in heating the forgings to the proper temperature and holding this temperature constant until the entire forging is uniformly heated through, finally cooling to atmospheric temperature.

In heating up the forging, the temperature should be carried through the critical range, for in so doing any coarse structure which might have been present before is now destroyed, and the entire forging at this temperature presents an almost homogeneous structure. If the temperature remains below the critical range no change in structure takes place, and, of course, the purpose of heat treatment is defeated. There is danger also of heating too far above the critical range, since the steel when just out of the critical possesses the finest grain size, and upon further heating these grains grow large and coarse.

The distance the temperature should be carried beyond the critical is largely dependent upon the size of the forging. A forging of small cross section should be quenched perhaps immediately upon the completion of the transformation, while a large forging, on the other hand, should be heated to a slightly higher temperature. This demand is made largely on account of the relative rapidity with which a small forging cools as compared to a large one.

Cooling Regulation

In cooling from the heating temperature, such mediums as air, oil, water and brine are employed. Air cools much slower than water, and water slower than brine. It is very desirable to employ different rates of cooling because it is then possible to regulate the physical properties in the forgings. For example, if a forging is to be employed in such a way as to give ease in machining it would be cooled very slowly and perhaps in the same furnace in which it was heated. This would be done, of course, at the sacrifice of strength. Again, if it were desired that the forging possess strength and a certain amount of rigidity and hardness, it would be cooled more quickly, perhaps in oil or even water.

Selection of Cooling Mediums

The selection of cooling mediums in the heat treatment of forgings depends upon the constituents of the steel. With straight carbon steels, the lower the carbon content the more rapidly the metal will cool. In this class of steels where the carbon is below 0.15, water may be used. This would increase the strength and yet not impair the elongation. If a steel of higher carbon content is quenched in water, the elongation will be very low, necessitating a second or drawing heat. This reheating is absolutely necessary when two forgings of different size and of medium carbon content are to be quenched, if the same physical properties are to be retained.

With forgings made of high carbon alloy steel there is danger of cracking in water. On some forgings where the adjoining cross sections abruptly vary in size, even when oil is used as a quench, the second or drawing heat must be carried out almost immediately after the quenching heat. This is due to the great difference in the rate of cooling of the various cross sections, resulting in strains which eventually produce cracks. In forgings of this character it has been found very beneficial to first anneal the material so as to facilitate the machining operations which remove as much metal as is possible, leaving only enough for light cuts. Where possible, only sufficient stock for grinding should be left. This would no doubt leave the forging in many cases with more uniform cross sections, making a more uniform heat-treatment possible.

This method has been instrumental in increasing the strength of important automobile forgings at least 30 per cent. The advantage has not ended here, for the cost of tools and their upkeep has been considerably reduced on account of the ductility of the forging in its rough state when treated in this manner.—From a paper presented at the meeting of the American Drop Forge Association in Philadelphia last month. The author is associated with the Packard Motor Car Co., Detroit, Mich.

SPELTER, ITS GRADES AND USES

By G. C. Stone.

SPELTER, like all commercial metals contains impurities, but, unlike most other metals, none of these impurities are advantageous for any of the purposes for which it is used. The effects of these impurities on different products made from it vary greatly, hence the necessity for several grades differing in purity. Spelter is used for the following purposes, in quantities in the order mentioned:—Galvanizing, alloys, rolling, ornamental castings and miscellaneous uses.

For ordinary galvanizing, the effect of the common impurities is not very great. Iron is objectionable as causing a loss in dross and in making the coating more brittle and liable to crack and peel off. Lead, up to the limit found in commercial spelter, has no serious effect, but is objectionable when present in large quantity, as it liquidates in the bath and does not enter the coating and is, therefore, wasted. Lead is usually worth less than zinc and the purchaser does not wish to pay for it at zinc prices. The four higher grades of spelter are chiefly used for alloys and the specifications were principally made for the alloy makers and do not, in all cases, call for metal suitable for some of the other purposes for which it is used.

Aluminum

In alloys, aluminum is frequently very injurious, 0.01 per cent. in many cases making brass useless for the purposes for which it is intended. In the few instances where its presence is desired, it is more satisfactory to add it directly than as a contituent of the spelter. The specifications (as proposed for the American Society for Testing Materials in 1915), therefore, require that the four higher grades of spelter shall be entirely free from aluminum.

Iron

Iron is always present in spelter, but is very undesirable in brass and similar alloys, making them harder and greatly increasing the hardness due to cold working. The increased hardness is very objectionable, causing a greater consumption of power and endangering the rolling mills and drawing presses.

Lead

Lead is very objectionable in some alloys and essential in others, and the main variation in the different grades of spelter is in the allowable amount of lead. High-grade spelter, which is used for alloys that are to be subjected to the most severe spinning and drawing operations, can be rejceted if it contains over 0.07 per cent. of lead, as lead reduces the ductility of brass. Intermediate spelter, with a lead limit of 0.20 per cent. is used for alloys that do not have to undergo as severe treatment, and also very largely for alloys like manganese bronze that are used both cast and wrought.

Brass special has a lead limit of 0.60 per cent., and is mainly used for brasses where the maximum ductility is not required. The lead and iron are limited to 0.69 per cent. and 0.03 per cent. respectively, because brass made from such spelter is used for ordinary drawing, spinning and forming work where the requirements are not especially severe.

Selected spelter, carrying the maximum 0.80 per cent. of lead, and 0.04 per cent. iron, is used by brass manufacturers for making alloys to which lead is added in order to secure free cutting qualities. Material of this kind is usually made into rods and heavy sheets for the manufacturing of small articles by turning, milling and drilling operations. Such brass must contain sufficient lead to reduce the strength of the material and cause the chips to break easily.

Owing to the fact that brass is usually made in crucibles in small quantities, uniformity in the spelter is of the greatest importance. As lead segregates badly, and more markedly the higher the proportion, the lead limit of the average sample is made low enough to allow for this tendency without injurious effect on the product. Even when the brass manufacturer adds lead, he does so in known amounts and thus obtains a uniform alloy from the different pots, which would not be possible if all the lead needed were contained in the spelter.

Cadmium

There is very little doubt that cadmium in zinc is very injurious for some of the purposes for which it is used, as it renders it harder and much more brittle. There is, however, considerable difference of opinion as to how far these undesirable properties persist in alloys made from zinc containing cadmium. The majority of brass-makers are of opinion that the higher temperature of the brass pots cause so much of the cadmium to volatilize that the residual amount has very little deleterious effect.

There is no doubt that large amounts of cadmium, say 1 or 2 per cent., make brass hard and brittle. We have no reliable information at present showing the effect of small amounts of cadmium on the alloys, and the evidence on this point is extremely conflicting. Cadmium, together with lead, seems to intensify the effect of the latter and also causes the brass to become more sensitive to the effect of overheating in the various annealing operations to which the wrought material is subjected.

Very little spelter is made containing as much cadmium as is alloyed for intermediate and brass special, and the specifications, therefore, put practically no limit on cadmium except for high grade. Whatever the facts may be for alloys, it is certain that the amounts of cadmium allowed by the specifications are much greater than are permissible for other purposes for which zinc is used. The question of cadmium in the better grade is complicated by the fact that until the last year and a half practically all the high-grade and most of the intermediate spelter was made by one company from ores that are free from cadmium. The alloy makers have, therefore, had no extended experience with the effect of cadmium in the better grades of spelter, and during the last eighteen months conditions have been so abnormal that it is difficult to draw conclusions.

High Grade Spelter Uses

High-grade spelter is very extensively used for galvanizing telegraph and telephone wires which are required to stand sharp bending when making the "lineman's splice;" as it has been found that if impure spelter is used, the coating cracks and peels off the joint. The only high-grade spelter that has been used for this purpose is entirely free from cadmium. Cadmium being the element most likely to cause this trouble, it is very doubtful whether metal containing as much as is allowed by the specifications (0.05 per cent.) would be suitable for this purpose.

For rolling, cadmium causes such severe cracking that metal containing much of it is not economical; but as practically all the zinc rolling mills produce their own spelter, this matter is within their own control and the specifications do not affect them.

For ornamental castings no spelter described by the specifications would be satisfactory. The high-grade is all right as far as lead and iron are concerned, but with the maximum cadmium allowed, it would be impossible to make castings of many of the common shapes.

The foregoing was submitted as an addendum to the report of the Committee on Non-Ferrous Metals and Alloys at the meeting of the American Society for Testing Materials, Atlantic City, N.J. The author is metallurgist to the New Jersey Tire Co.

GAS WORKS AND HIGH EXPLOSIVES

In the presidential address before the Institution of Gas Engineers (England), it was stated that to-day we are largely dependent on our gas engineers for supplies of high explosives. The extraction of benzol and toluol from gas has been a problem that has engrossed the attention of every gas engineer. For obvious reasons the merits or demerits of particular systems, and methods adopted, were not discussed at any length. It was, however, indicated that the output of benzol and toluol had become more and more satisfactory, and was such as to encourage further effort toward even greater achievement.

Pre-War Benzol and Toluol

In pre-war times the production of benzol and toluol had not presented itself as a commercial proposition to the average gas engineer. The quantity produced per ton of coal carbonized under ordinary working conditions and the comparatively low prices obtainable were not of sufficient importance to attract attention. Occasionally it would be pointed out that if the whole of the benzol were washed out of the gas produced in the United Kingdom, the resultant quantity would be a considerable national asset, but the adherence of our legislators to an illuminating power standard precluded the possibility of any serious attempts being made to recover this valuable coal gas constituent.

Necessity knows no law, and the munition needs of the country has enabled the gas consumer to discover that an illuminating power standard is not a necessity, and that if he obtains gas of a sufficiently high calorific value he is quite as well served for all practical purposes as he was under the old conditions. If we can also show that the supply of a debenzolised gas will eventually enable us to supply gas at a lower cost, he will be more than reconciled to the change. I think it very probable that legislation abolishing the illuminating power standard will be one of the results of our present experiences.

Benzol After the War

The question arises, will the debenzolising of gas pay after the war is over? I most certainly think it will. About thirty years ago several installations of carbonizing plants were erected in colliery districts for the purpose of carbonizing cheap slack for the residual products only. These were in operation successfully for some years; but eventually prices of residuals fell, and the process was abandoned. It would be natural to say, Will not the same thing happen again? I think not. Our conditions are totally different.

In the case of the carbonizing works, most of the gas produced was used for fuel in the carbonizing plant; the rest was wasted. The coke produced was necessarily of an inferior quality, and was almost unsaleable. In our case, however, gas and coke are the principal means of revenue, and any enhancement of the value of other residuals is a clear gain. The process used by the carbonizing plant was quite simple. The gas produced was cooled, washed in heavy oil (creosote or green oil), purified from ammonia, and burnt in the retort-settings and under the steam boilers; the surplus gas, as I said before, being wasted. The heavy oil was distilled for benzol and toluol, and returned to the washers. The washers which were found most effective were of a modified Livesey type, and two or more were usually run in series.

Coal Tar Colors

Before the war most of us believed that we were conducting our business on the most economical and sound lines. Every care was exercised to prevent waste at every point of the process; and the price obtainable for residuals warranted us in supposing that supplies were just about equal to the demand. The war, however, has rudely shaken many of our preconceived ideas. It is not only in our business (i.e., the gas making business) that an awakening has taken place. Look, for example, to the great dye industry. Though the discovery of the manufacture of dyes and colors from coal tar extracts was made in Britain, the manufacture of them had become monopolized by the enemy, and practically the whole of the coal tar products we produced were being shipped abroad. Having regard to the close connection there is between the manufacture of artificial dyes and of high explosives—the fundamental raw materials being the same in each case—it is not too much to say that every dye manufactory in Germany could be, and probably was, converted into a manufactory of high explosives in a remarkably short period of time. It was also a serious thought for us that we had not only lost our grip on a wealth-producing industry, but allowed the country to be denuded of this means of defence.

An interesting speech was made by Milton Sharp at a recent meeting of the Bradford Dyers' Association. After pointing out the relationship that exists between the production of aniline dyes and the future protection of the country due to an enlarged capacity for the production of high explosives, he asked whether all the work that had been done, the money spent, and the plants erected for the production and working up of these raw materials were to be sacrificed when hostilities ended. I do not think they will be. The general trend of thought in the country to-day is to hold on to what we have got and to reach out further for extensions in trade in all directions.

Recently, in the House of Commons, Mr. Chamberlain gave a very clear intimation of the attitude which this Government has found itself constrained by the logic of facts to adopt. He declared that all sections would agree that, after the experience of this war we could not leave the work of reconstruction of our trade to chance, and could not maintain a policy of complete laissez faire free from Government interference or assistance. If such a new and constructive spirit is to guide the deliberations of our statesmen on the economic safeguarding of the trade of the Empire, we can rest assured that the demand for home produced benzol and toluol will be permanent.

Gas or Benzol First?

Will the debenzolising of gas pay after the war is over, and which will give the best financial results—a high benzol yield with some loss in the volume of gas produced, or the sacrifice of residual product returns by straining after the highest possible yield of gas? These are questions to which no definite answer can meantime be given, the future of residual products being in the "lap of the gods." If it should be found, as it may, that the production of benzol bears strongly on that of gas, then considerable research will be demanded relative to carbonization conditions.

Analyses of gasworks tars in the Counties of York, Durham, and Northumberland indicate that the best benzol and toluol results are attained where horizontal retorts are in use, the coal being carbonized in thin layers and at a medium temperature. In this connection it is interesting to note that the carbonizing works of thirty years ago found the adoption of inclined retorts to considerably reduce their benzol yield. An investigation into the conditions of carbonizing best suited for the economical production of both gas and benzol may be one of the results of the war.

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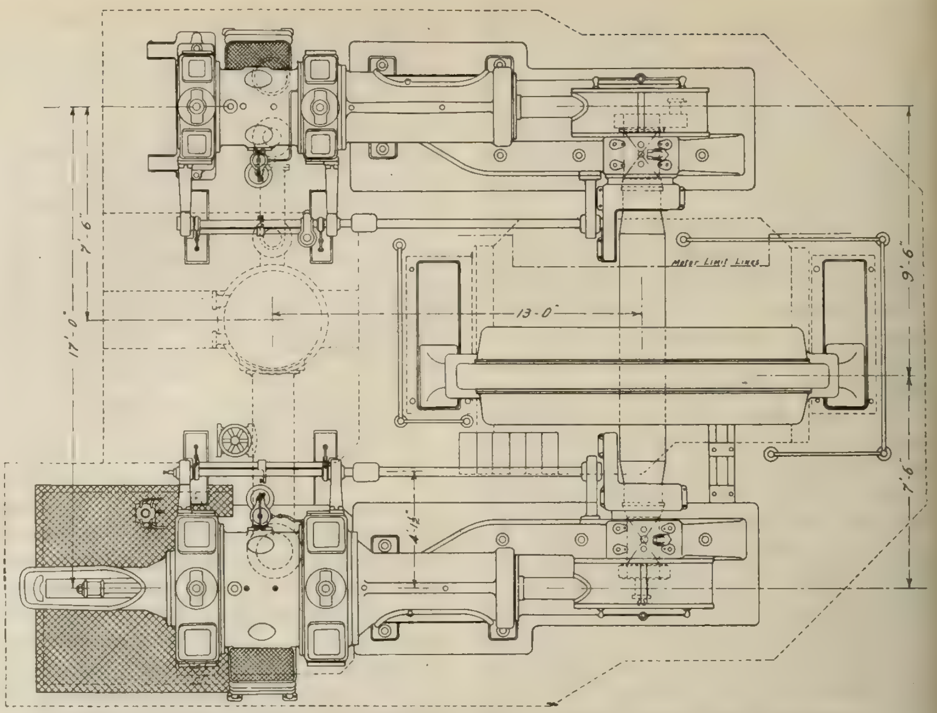


INSTALLATION PLAN OF LARGE CONSTANT SPEED, VARIABLE VOLUME AIR COMPRESSOR.

CONSTANT SPEED, VARIABLE VOLUME AIR COMPRESSOR

IN order to operate the extensive equipment at the Hollinger Gold Mines, there has recently been installed at their plant at Timmins, Ont., a large Fraser & Chalmers constant speed, variable volume air compressor. This machine, shown in the accompanying illustrations is direct connected to an 800 b.h.p. synchronous motor, three-phase, 25-cycles, 12,000 volts, having a speed of 125 revolutions per minute. The rotor is made in two halves, mounted on the crank shaft, and so designed as to give the necessary fly-wheel effect; the total weight of the rotor being approximately 17,000 pounds. Crank shaft is of steel, 20 inches in diameter, 17 feet long and weighs about 16,000 pounds. Main bearings are fitted with four-part boxes of cast iron, and babbitted. Sides and bottom boxes are made adjustable by means of wedges and screws, for taking up wear.

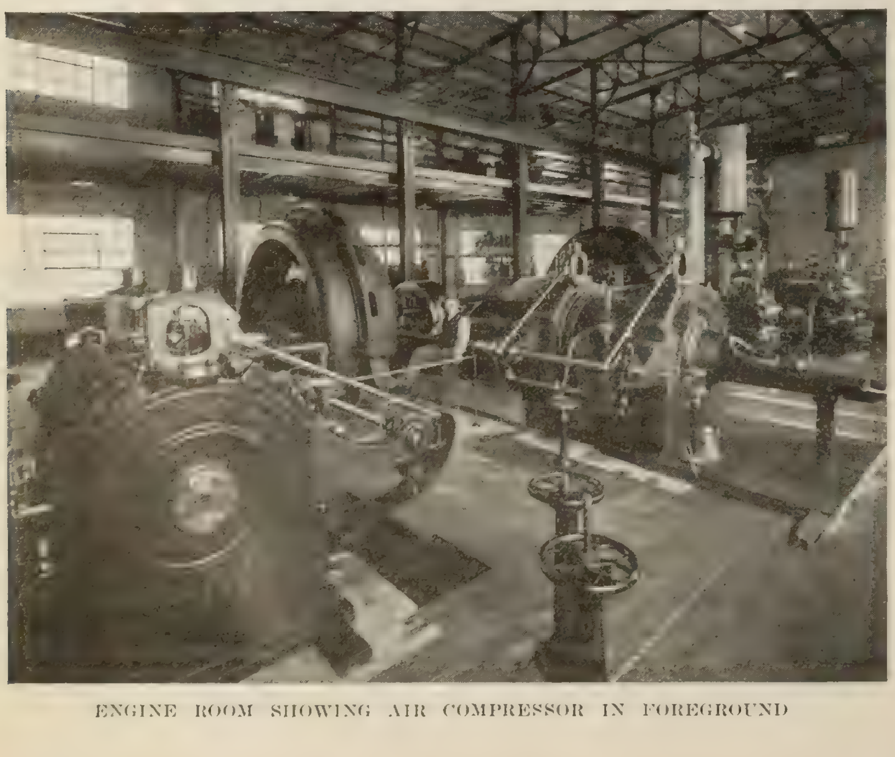
Cylinders are made of hard cold blast iron, barrels being cast with a liner to form a water jacket space around the cylinder. The high pressure cylinder has a diameter of 22½ inches, the low pressure cylinder a diameter of 38 inches, the uniform stroke being 30 inches. Four removable covers are located in the outer casing, for cleaning out dirt or other foreign matter that might settle in the water jacket. Cylinder heads or valve chambers are cast separate and bolted to the barrels, each head being fitted with suction and delivery valves of the Hoerbiger-Rogler patent frictionless guide type. The suction and delivery valves are made of forged steel, as light as possible consistent with strength, and are designed to automatically open and close without assistance.

Front heads are connected direct to the guides, and have stuffing boxes and glands complete, with Tripps metallic packing. The cylinders themselves are fitted with patent poppet unloading valves at each end, and are operated by eccentrics from a lay shaft on the high and low pressure side, driven by bevel gears off the crank shaft. The throw of these eccentrics, and the lift of the valves, are controlled by air governors (one on each cylinder), to regulate the amount of air to be delivered. Covers are arranged on each head to provide easy access to the valves and seats. Special valves are located in the discharge pipes, for opening to the atmosphere on starting up, and so reduce the starting torque to a minimum.

Air coolers, specially designed to suit local conditions, are installed in the basement. They are of the vertical type, arranged so that the tubes can be lifted out in one nest for cleaning purposes, without delay in operation. They consist of mild steel shells with cast iron covers. The interior cooling tubes are of brass, expanded and secured in muntz metal tube plates. Cold water passes through the tubes, the air across same being directed by means of baffle plates.

Forced lubrication is employed in the oiling system being supplied from a rotary pump. A tank is also installed to give a constant head of 15 feet on the bearings, in case anything goes wrong with the oil pump. When oil pressure falls below 5 lbs., it automatically feeds from the tank, at the same time ringing an alarm. A separate mechanically operated oil pump is used to lubricate the cylinders when under the air pressure.

The capacity of this machine is 4,500 cubic feet of free air per minute at 1,100 feet altitude, same being compressed to a pressure of 105 lbs. per sq. in. gauge.



ENGINE ROOM SHOWING AIR COMPRESSOR IN FOREGROUND

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

BEYER BAROMETRIC CONDENSER

THE Ingersoll-Rand Co., New York City, is placing on the market complete steam condensing plants for every service condition. This equipment includes the Beyer barometric condenser, for which the company has secured the patent rights, Imperial duplex and Ingersoll-Rogler straight line, reciprocating, dry vacuum pumps, and, where required, Cameron simplex and centrifugal pumps.

INSTALLATION OF BEYER BAROMETRIC CONDENSER.

The Beyer barometric condenser is of the counter-current type, in which air and cooling water flow in opposite directions. The steam inlet is at the bottom of the condensing vessel, the water inlet above, and the air removal opening at the top. The sheets of cooling water overflowing the pool at the inlet point meet the entering steam. The two are brought into intimate contact by conical baffle plates assisting the water to absorb to its full capacity the latent heat of the steam. The non-condensable air liberated by the condensing action rises through the falling water to the removal point at the top, being cooled to practically the temperature of the incoming water. It is also to be noted that ample opportunity is given for the removal of the air content of the water before it mixes with the steam. This the manufacturers point out not only facilitates the mixing process, but permits the removal of air and vapor at a comparatively low temperature, a distinct advantage, as the reduced volume saves in vacuum pumpage horse-power.

The steam inlet is of large diameter to secure low velocity, and is hooded in such a way as to discharge the steam into the centre of the condensing vessel. The air removal opening is also of ample area, and is protected by a self-draining baffle and trap. This, it is said, positively prevents water being carried over into the vacuum pump. The hot waste water is discharged through the self-draining tail pipe, this pipe straddling the hot well and rigidly supporting the condenser.

The Imperial and Ingersoll-Rogler vacuum pumps are of standard type. They are high-speed reciprocating machines, wholly enclosed, automatically lubricated, and are claimed to economize floor space. When a water pump is required to elevate cooling water to the condenser head, Cameron pumps are provided, these being either reciprocating or centrifugal as desired. Where the level of the cold well is of sufficient height above the hot well, the condenser will lift its own cooling water, dispensing entirely with a water pump.

With this equipment it is claimed that the vacuum and water pumps, being independently operated, can be regulated to suit varying water temperatures and conditions, that in addition to efficiency in general service, such a plant is well adapted for duty as a central condensing unit serving a number of prime movers.

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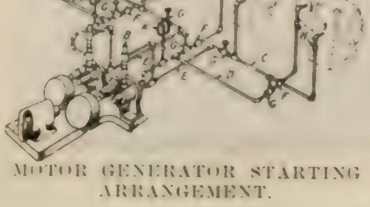
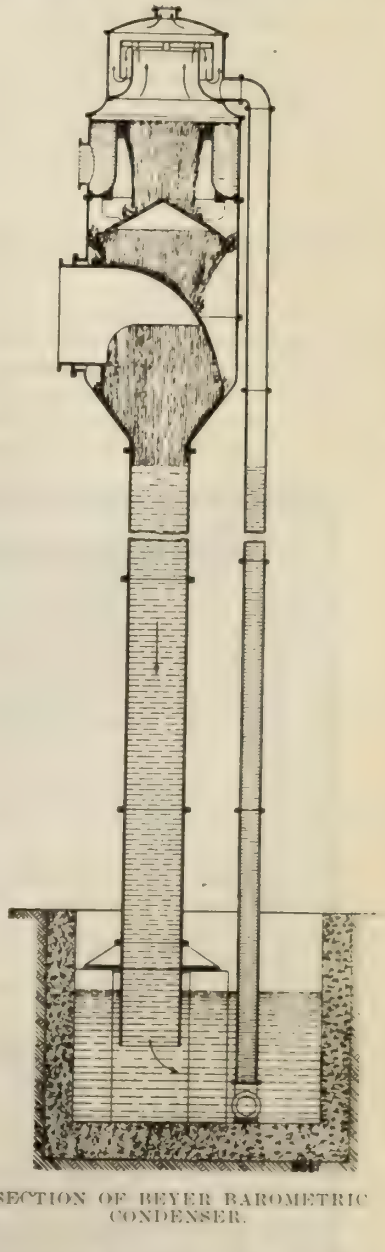
FORCED LUBRICATION FOR STARTING MOTOR GENERATOR SETS

EXCEPTIONALLY large motor generator sets and other similar machines can be started with comparative ease if the bearings are first flooded with oil. Writing in the General Electric Review on "Some Recent Developments in Central Station and Sub-station Equipment," J. R. Werth describes a special oiling system for the four bearings of a very large motor generator set, operating as a frequency changer. Prior to the installation of that oiling system, the large starting motor had to exert an enormous torque to "break" the shaft from its bearings, especially after the set had been shut down for some hours.



MOTOR GENERATOR STARTING ARRANGEMENT.



SECTION OF BEYER BAROMETRIC CONDENSER.

The difficulty has been overcome by the installation of a special oiling system shown in the accompanying illustration. A small ¾ horse-power motor driven pumping set forces oil between the shaft and the bearings of the frequency-changing set, thus floating the shaft on a film of oil. It is now possible to start the set without any special starting motor, thereby saving valuable floor space and eliminating the continuous loss of energy involved in keeping the starting motor revolving twenty-four hours a day. After the set has been started sufficient lubrication is provided by the usual oil rings.

It will be gathered from the illustration that there is one pump for each pair of bearings, and that both pumps are driven by the single ¾ horse-power motor. The holes in the bearings shown at A are for water-cooling connections. Relief valves are shown at B, equalizing pipes at C, pressure pipes at D, feed pipes to pumps at E, check valves at F, control valves at G, insulating couplings at H, and pressure gauges at K.

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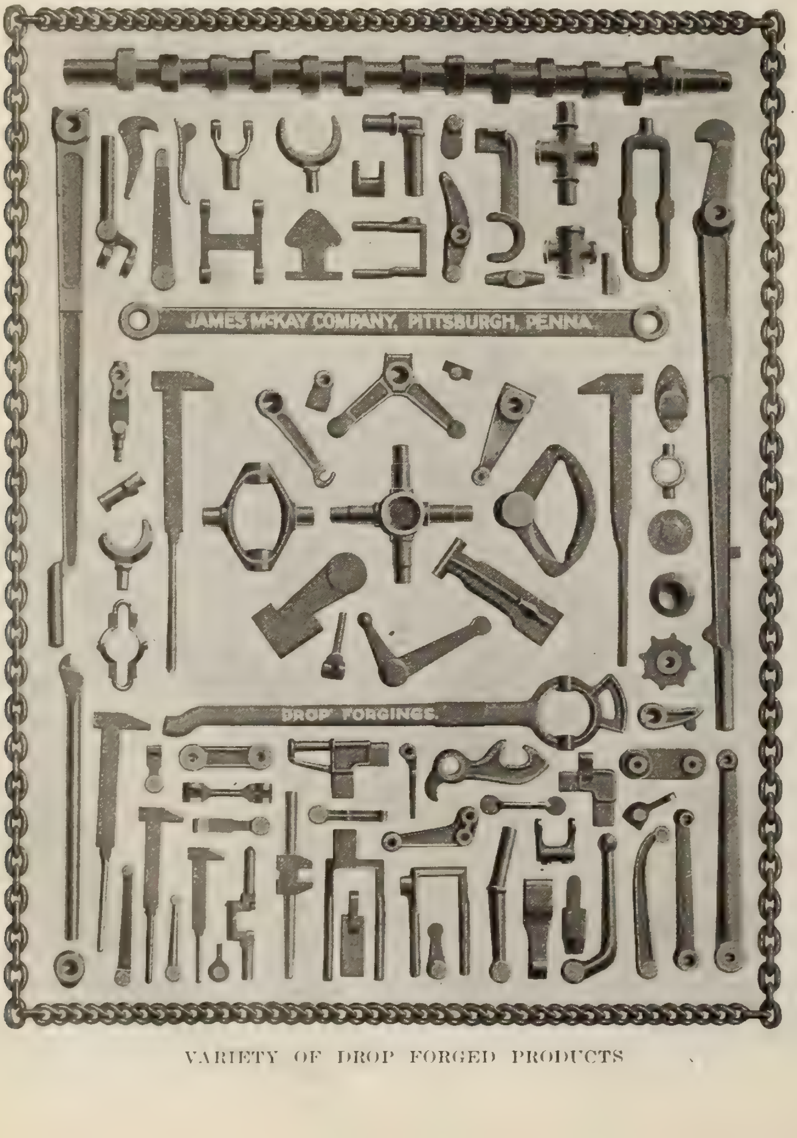
INTERESTING DROP FORGING PLANT

AN extensive line of chains and forgings is manufactured by James McKay Co., Pittsburgh, who have specialized in this line for many years. Chains of every description are produced at their works from various grades of material including such special irons as may be required to pass the most exacting tests. An interesting item of their plant equipment is a 680,000-pound Olsen testing machine which is 30,000 pounds higher capacity than the next machine of its type. Both this machine and a smaller one of 100,000 pounds capacity are licensed by Lloyds Register, Bureau Veritas and kindred controlling bodies, an item of interest to Canadian users of chain for railroad, mechanical, or marine purposes. Car and locomotive forgings and a general line of commercial drop forgings render the output of the establishment of interest to manufacturers, several examples of the product in this line being shown in the accompanying illustration.



VARIETY OF DROP FORGED PRODUCTS

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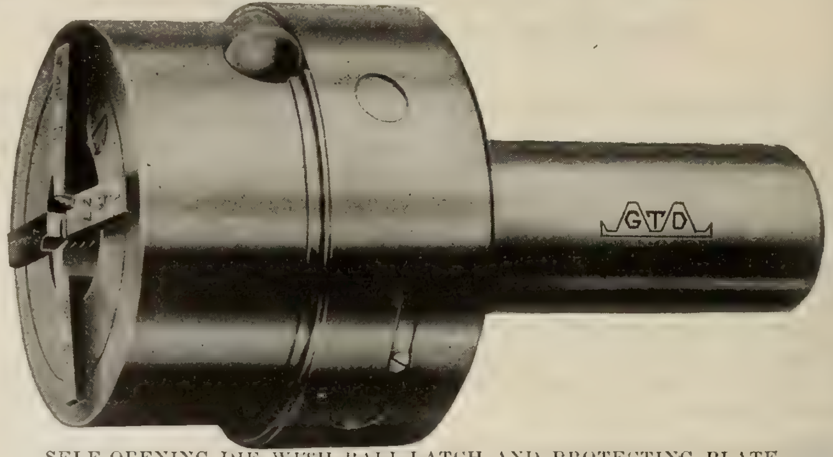

SELF-OPENING DIE WITH BALL-LATCH AND PROTECTING PLATE FOR SCREWS.

IMPROVED SELF-OPENING DIE

THE accompanying illustration shows the Model T Wells Self-Opening Die made by the Greenfield Tap & Die Corporation, Greenfield Mass., several changes affecting the general appearance and utility of this device having recently been made.

This model is especially designed for operations where the die revolves, the old style of projecting face trip having been discontinued, a neat and serviceable ball-shaped latch now opening the die when the cut is finished. A light steel shell is now provided for the purpose of covering the openings for chaser set screws which were formerly exposed, these preventing the entrance of fine chips and the resultant trouble. This shell can be instantly turned so as to expose the screws when it is desired to remove the chasers. In all other respects the die retains its essential points of construction.

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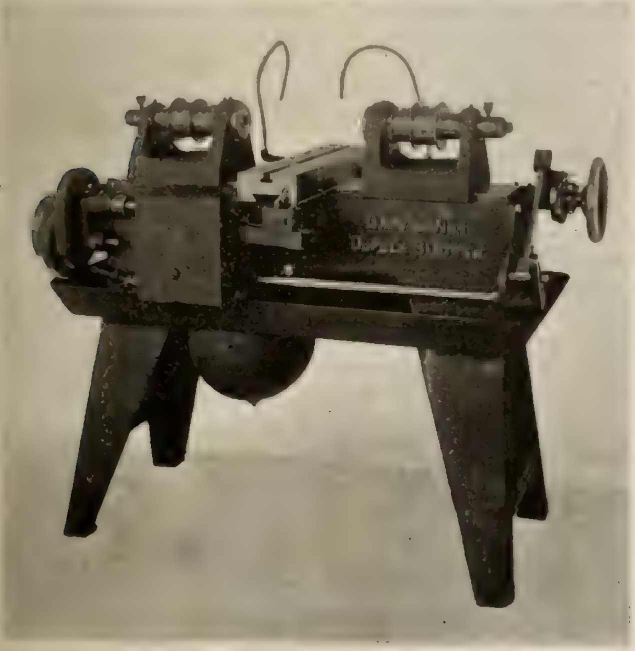
AUTOMATIC DUPLEX SLOT MILLING MACHINE

THE accompanying illustration shows a simple full automatic machine which it is claimed, gives satisfactory results in reduced costs and increased production. It is only necessary to place the piece in position and the machine will complete the work on it without any further attention, ceasing to cut when the price is completed.

The machine is capable of milling slots from ¼ in. to 4 in. long, and ¼ in. to 1½ in. wide clear through work up to 4 in. diameter or 2 in. on a side in steel or other material. The range of work includes drift slots in spindle, tool post slots, elongated holes, keyways, slots in castings, tools, etc., mortice cuts, open fork ends, cuts in both ends of a piece to be in line, all of which can be machined accurately and rapidly without skilled attention. When working from both sides at once, the work is done in one-half the usual time or two separate pieces may be handled simultaneously without effort on the part of the operator.

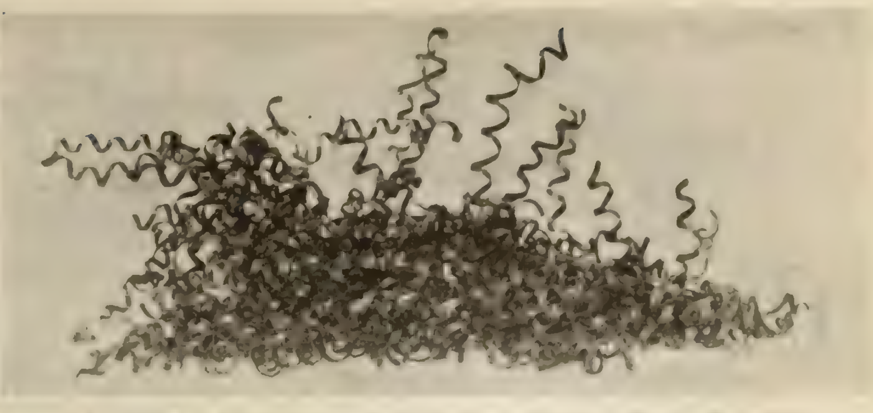
By means of a cam and adjustable lever, the table carrying the work is moved back and forth, the length of travel being quickly adjusted. Changes of speed in the table travel are obtained through a cone pulley and change gears.

The spindle heads are designed for high speed work, the spindles being tapered at both ends, running in solid bronze boxes, and having adjustment for taking up wear. A hardened step bearing is provided for receiving the thrust.



DUPLEX SLOT MILLING MACHINE.

Each head may be adjusted independently along the bed to suit different lengths and conditions of cutters, the headstocks being also moved in and out simultaneously by hand wheel to any distance without interfering with the setting of the machine. Feeding takes place at each end of the stroke, the feed by ratchet and pawl being adjustable and arranged to automatically lift out and stop feeding when the required depth of cut is reached. In milling a through slot, provision is made to automatically back away one head when the slot is almost through, so that the other head can continue to advance and complete the slot, leaving no partition or fin at the bottom of the cut.



SAMPLES OF CUTTINGS FROM HOLE TAPPED WITH GUN TAP.

Work can be set on the table at any angle to produce a taper end of slot Two-prong fish tail cutters are used, and adjustable fixtures to hold round work can be provided when desired.

The machine is built by the Garvin Machine Co., New York, and is supplied complete with steel oil pan, tank, strainer, pump, etc., all gearing being protected, and all working parts readily accessible.

* * *

TAP WITH NOVEL FEATURES

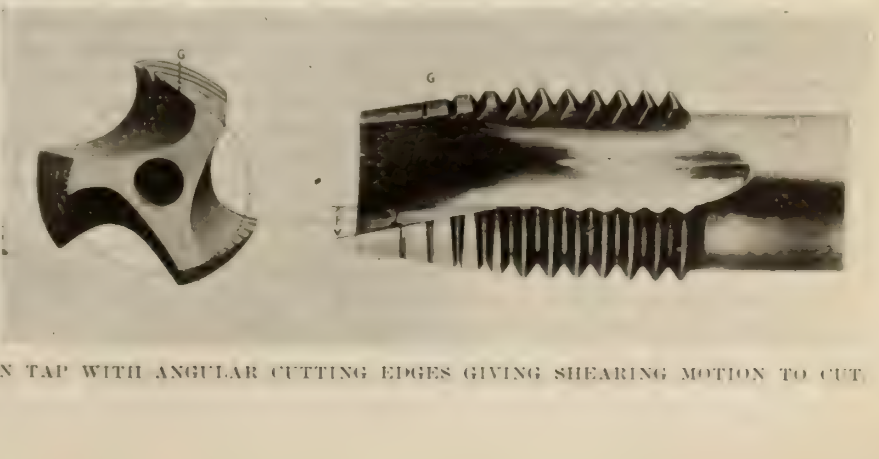
A NEW style of tap known as the gun tap has been developed, and is now being placed on the market by the Greenfield Tap & Die Corporation, Greenfield, Mass. This tap possesses certain features which vary from the regular style of tap, principal of which is the manner in which the cutting edges at the point are ground at an angle to the axis of the tap, which enables the tap to cut with a shearing motion, the angle deflecting the chips so that they curl out ahead of the tap and do not clog up the flutes. On account of this action, therefore, these taps do not have to be backed out frequently on deep holes.

The cutting edges are formed with a decided hook forward which causes the tap to work freely and make clean sharp threads. The remainder of the threaded portion of the tap acts as a lead screw, without any cutting action of its own, holding the work true to pitch. By using only two or three flutes to the tap, instead of four, and making them shallower than usual, much greater solidity is imparted to the body of the tap, rendering breakages comparatively rare.

The gun tap is ground on the angular cutting edge instead of in the flutes, regrinding being possible till only two or three full threads are left. It gets its name from the fact that it was originally designed for use in gun work, where the exceedingly tough and wiring material in use was very apt to cause breakage of ordinary taps. This tap has also proven of great value where a hole penetrates two or more different kinds of material, tapping holes of this description without any trouble due to the change from one material to the other.

* * *

One type of transmission apparatus that should certainly be closely guarded is the chain drive. The hazard of this drive is about the same as that of gearing. Most chains are installed in a horizontal or nearly horizontal position, so that both sprockets are within reach of the workman. He is then in danger of having his hands or clothing caught between the chain and the sprockets. It is essential, for proper safeguarding, that both the chains and the sprockets be completely inclosed.



GUN TAP WITH ANGULAR CUTTING EDGES GIVING SHEARING MOTION TO CUT.

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BLACKLISTING NEUTRALS

PATRIOTIC impulses of Canadian citizens have been stirred in some measure by the recent action of the Imperial Government in forbidding British subjects from dealing with American firms that have been blacklisted for suspected trading with Germany. That such action would be ultimately taken has been more or less expected in certain quarters, and while the restriction, so far, applies to subjects resident in the United Kingdom, the probability of the various Dominions following suit should not be overlooked. In the event of the latter development taking place, the effects of such restriction will be felt in this country to a greater extent than in almost any other part of the Empire.

The official attitude of the United States Government is indicated in advices from Washington to the effect that while the programme of resentment to be adopted has not been fully outlined, it is understood that the preliminary action of the State Department will be a protest, based on the ground that the blacklist is a violation of moral right, and not to be tolerated, etc., the actual legality of the action being reserved for discussion later. That the matter will have serious results for the parties affected is fully realized by the United States State Department which contends that the blacklist amounts to a world-wide boycott.

This latter admission throws light on the whole aspect of the present situation and incidentally brings home to us the realization that having stood by our guns in actual battle, we may be compelled to do the same, metaphorically speaking, in the commercial battle which seems destined to follow on the heels of hostilities. In the absence of full details regarding the terms of the proclamation, it is not possible to estimate the full effect of such a measure should it be instituted in this country, but the fact that it might disturb hitherto-friendly relations with firms across the line, is all the more reason why Canadian manufacturers dealing with firms who might be liable to proscription, should consider ways and means now whereby any resultant dislocation of business would be minimized if not altogether avoided.

A recent communication from the Swiss correspondent of an English contemporary contains several interesting statements regarding the future attitude of the Central Powers toward the trade of the British Empire. The importance of the engineering industry and the preparations being made by the Teutons for the utilization of that industry to its fullest extent during the period of recovery are hinted at....“Scarcely any German or Austrian technical journals are now allowed to enter Switzerland or other neutral country, despite their being severely censored before going to press. Needless to say, no publications are more strictly watched than those dealing with engineering....The Austrians and Germans as a rule believe or pretend to believe that the war will be followed by a period of immensely enhanced prosperity, when there will be a far greater demand for, than supply of labor, and when production in every department of commercial life will be proceeding with the utmost speed.” Finally, the pertinent statement is made. “A trade war against the United Kingdom and British Dominions generally is to begin the moment hostilities cease.

No one should be under any delusion on this point: the Germans and Austrians expect to be fought and expect to fight commercially, after the fighting on the battlefields is over. In England some people may imagine that both Central Empires have had enough of war in every sense of the phrase, but judging from the occasional speeches of statesmen and other signs, this is as far as possible from being the case. Both the Central Empires—Austria under the direction of Germany, are busy already, and have long been busy preparing for the commercial fray. Throughout the British Empire this aspect of affairs should be kept constantly in view, and our whole commercial policy directed accordingly.

Current events indicate that the Allies will have something in the way of a counter argument to offer against the best laid plans of our enemies, but the proximity of Canada to the United States, and the neutrality of that country render it a most desirable rendezvous from which enemy agents will continue the struggle after peace comes.

Much business has been and will continue to be done between here and the States, but if such business happens to be done with disguised Teutons who outrage the hospitality and flaunt the laws of their pro-tem fatherland, the severing of business relations with all such concerns does not constitute a violation of moral right any more than does the annihilation of an enemy outpost. The fact that it is done at the request of our Government shows that it is a duty to the nation, while if done voluntarily it would be no more than an expression of individual opinion. In other words, people who trade with Germany, help to sustain her in the struggle, therefore, why question our right to refuse to help those who help our enemies.

SHELL COMMITTEE VINDICATED

GIVING evidence of careful preparation, the Meredith-Duff Commission Report regarding the disposal of fuse contracts has made its appearance. Taking account of the duration of the inquiry, the number of witnesses and the volume of evidence forthcoming, it may be said that considerable despatch has marked the whole transaction. An analysis of the Commission finding discloses little, if anything, contrary to well-formed public opinion antecedent to and during the investigation proceedings.

It is a matter of considerable satisfaction, however, to the clientele of this journal that the integrity and honesty of purpose of the Shell Committee, individually and collectively, have been publicly vindicated, and from our personal knowledge, a still greater satisfaction will be felt by each of the gentlemen concerned. The Commission proceedings and findings have not been without their redeeming and compensating features, serving as they have done to bring into greater relief and to give that deserved prominence to ungrudged service to our Empire during a highly crucial period.

INDUSTRIAL NOTABILITIES

BASIL MAGOR, C.E., vice-president and general manager, National Steel Car Co. of Canada, manufacturers of railroad cars and motor trucks, Hamilton, Ont.; and president, Magor Car Co., New York, was born in Montreal, June 11, 1870, the son of John and Jane (Schroeder) Magor. He was educated at High School, Montreal; Rensaellar Polytechnic Institute, Troy, N.Y., graduating in Civil Engineering in 1894.

He spent four years as an apprentice with the Grand Trunk Railway, Montreal, 1884-1888; attended College at Troy, N.Y., 1888-1890; engaged for two years as engineer on World's Fair Buildings at Chicago, 1890-1892; returned to college, 1892-1894; and after graduating spent several years as engineer under Wm. Barclay Parsons, chief engineer on New York's first city subway, 1894-1898.

BASIL MAGOR

Mr. Magor next took an engagement on the survey of 740 miles of railroad work from Hankow to Canton, China, for a New York syndicate; this railroad has since been purchased by the Chinese Government. Following this he returned to New York and became a partner in the firm of Wonham & Magor, railroad supplies, 1900-1909. In the latter year he organized the Magor Car Co., of New York, of which he became president and general manager.

Early in 1912 Mr. Magor came to Canada to promote the National Steel Car Co., which was incorporated in July, 1912. The building was started in September of the same year, and the first completed car delivered in July, 1913. There has been recently added the building of motor trucks to the business.

Mr. Magor is a member of the Hamilton Board of Trade, the Canadian manufacturers' Association, and of the American Society of Civil Engineers. His clubs are Racquet and Tennis, and University, New York; the Tamahaac, Caledon Mountain Trout, Hamilton, and Hamilton Golf, all of Hamilton, Ont.; the Montreal Golf and Ottawa Country.

In politics he is Independent, and in religion an Anglican.

He married Ruth Chamberlain, daughter of H. P. Chamberlain, Buffalo, N.Y., on June 15, 1907, the family consisting of three girls. His residence is 42 Charlton Avenue East, Hamilton, Ont.

—Photo, courtesy British and Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$18 70
Lake Superior, charcoal, Chicago	19 75
Michigan Charcoal iron.	28 00
Ferro nickel pig iron (Soo)	25 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base, Toronto	3.25
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.25
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.10
Bars, 2 in. and up	4.00
Structural shapes	3.10
Plates	3.50

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs.	
	C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carliod	$31 00	$29 00
Electrolytic copper	31 00	29 00
Castings, copper	30 00	28 50
Tin	44 00	44 00
Spelter	16 00	13 50
Lead	9 00	9 00
Antimony	20 00	20 00
Aluminum	65 00	67 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4.25	$4 25
Heads	4 50	4 50
Tank plates, 3-16 in.	4 75	4 75

WROUGHT IRON PIPE

Prices in effect April 26, 1916

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 06	5 31
½ in.	3 91	6 08
¾ in.	4 72	7 65
1 in.	6 97	11 31
1¼ in.	9 43	15 30
1½ in.	11 28	18 29
2 in.	15 17	24 61
2½ in.	23 99	38 90
3 in.	31 37	50 87
3½ in.	37 72	61 18
4 in.	44 69	72 49

Lapweld

2 in.	$17 02	$26 46
2½ in.	25 16	40 07
3 in.	32 90	52 40
3½ in.	39 56	63 02
4 in.	46 87	74 67
4½ in.	57 15	90 81
5 in.	66 60	105 82
6 in.	86 40	137 28
7 in.	116 62	179 70
8 in. x 25 lbs. per ft.	122 50	188 75
8 in. x 25 lbs. per ft.	141 12	217 44
9 in.	169 05	260 48
10 in. x 32 lbs. per ft.	156 80	241 60
10 in. x 40 lbs. per ft.	201 88	311 06

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$15 00	$15 00
Copper, crucible	18 00	18 00
Copper, heavy	18 00	18 00
Copper wire	18 00	18 00
No. 1 machine compos'n	14 00	14 00
No. 1 compos'n turnings	12 00	12 00
New brass clippings	13 50	13 50
No. 1 brass turnings	11 50	11 50
Heavy melting steel	9 00	9 00
Boiler plate	11 75	9 50
Axles, steel	13.00	15.00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	12 50
Shafting	16 50	16 00
Malleable scrap	10 00	11 00
Pipe, wrought iron	10 00	9 00
Stove plate	10 00	10 50
Heavy lead	5 00	5 00
Tea lead	5 00	5 00
Scrap zinc	8 50	8 00
Aluminium	34 00	35 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	50
Stove bolts	62½
Plate washers	25
Machine bolts, ⅜ and less	40
Machine bolts, 7-16 and over	30
Blank bolts	30
Bolt ends	30
Machine screws, flat head, iron	66 & 5
Machine screws, fl. & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$4.85
Structural rivets, as above	4.75
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent.
Sq. & Hex Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	.65
Coupling bolts	net
Planer head bolts, without fillet	.15
Planer head bolts, with fillet	net
Planer head bolt nuts up to 1 in.	.60
Planer head bolt nuts, over 1 in.	.55
Planer bolt washers	list plus 10
Hollow set screws	list plus .20
Collar screws	list plus.20
Thumb screws	.20
Thumb nuts	.75

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$40 00
Open-hearth billets, Pittsburgh	42 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3 75	$3 70
Cut nails	3 40	3 40
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs.		$3 90

MISCELLANEOUS

Solder, guaranteed	0.28½
Solder, strictly	0.26½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	13.95
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.32
Benzine, single bbls., per gal.	0.31½
Pure turpentine, single bbls., gal.	0.70
Linseed oil, raw, single bbls.	0.79
Linseed oil. boiled, single bbls.	0.82
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.11
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHING DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	55
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	25
3-fluted drills over 1½ in.	15
Bit stock	55
Ratchet drills	15
Machine bits for wood	20
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	30
Sockets	30
Sleeves	50
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	4 60	4 50
Canada plates, dull, 52 sheets	4 50	4 50
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown. No. 28	7 25	6 75
Premier, No. 28 U.S.	6 75	6 75
Premier, 10¾ oz.	6 75	6 75

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch.	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$19 55	.....
1¼ in.	19 55	.....
1½ in.	19 55	14 00
1¾ in.	25 00	16 50
2 in.	25 00	16 10
2¼ in.	28 50	18 50
2½ in.	32 00	21 00
3 in.	40 00	25 00
3¼ in.	.....	27 00
3½ in.	45 00	29 00
4 in.	50 00	37 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil. Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	Prices on application
Axle	
Anvil	
Anchor	
WASHED WIPERS	
Select White	Prices on application
Mixed colored	
Dark Colored	

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.35 to .37
Tin	.55 to .58
Zinc	.20 to 23

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 in.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	1.75 to 1.90
Polishing wheels, bullneck.	.90
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.

Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14-.18
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, July 24, 1916.—The industrial situation retains the activity it has shown for many months, and with the exception of some slight relaxation, due to the hot weather and holiday season, the pressure of business continues to be as great as ever. A serious break in the Lachine Canal has resulted in tying up a large number of vessels, to and from the Great Lakes, with the result that shipments of grain, coal, etc., has been much delayed. The situation is being gradually relieved as the water is admitted as the coffer dam is constructed, allowing low draft vessels to proceed on their course. It is expected by the middle of the week the damage will be repaired and normal conditions resumed.

Steel

The chief feature in the steel situation is the large volume of export business and the constant inquiry for foreign shipment. Domestic activity is not very great, consumers being well covered for immediate needs. The production end of the steel business is experiencing some difficulty due to the falling off in output owing to the extreme heat. The demand for billets and sheet bars is very good, especially for foreign shipment. The requirements of plate users are enormous and in some instances higher prices are being paid than those quoted. Large orders have recently been placed here for cars, both for home and foreign use. Pittsburg prices on black, and blue annealed sheets have been advanced $3 per ton, the prices asked being 3.15 for black and 3.25 for blue annealed. The recent decline in the spelter market has somewhat disorganized the situation regarding galvanized sheets. Some large interests are insisting that buyers accept shipment of material, contracted for when prices were much higher; in fact several cases of litigation are pending. Wire and wire products are at present quiet, as is general during the summer months, but as the fall requirements begin to come in, the indications are for another advance. Boiler tubes are fairly active, and other steel and iron products are comparatively bright.

Metals

Slight improvement is shown in the general situation, and although no material change is made in prices the tone is apparently better. Copper is quiet, but steady. Tin is much stronger and advances are general. Spelter is resuming its former position with advancing prices. Lead is quiet but steady. Antimony refused to respond and continues to decline.

Copper.

The market at present is quiet but shows some signs of becoming steadier. Producers are firmer in asking prices, but inquiry from consumers is apparently light. The bulk of the sales are being made to dealers who have recently been disposing of metal at lower prices than the market quotations. The firm attitude shown by the large producers seem to indicate that higher prices are not improbable, the firm tone generally appearing to foreshadow a slight advance. London cables show a firmness in spot, but futures have declined 10 shillings, and electro spot is £2-10 lower, the latest quotations being £91, £89 and £122 respectively. New York reports a decline of 1c on prime lake, and ½c on electrolytic and castings; the current nominal quotations being 25½, 25 and 23 respectively. Local dealers are holding firm at 31c for lake and electro, and 30c. for castings.

Tin

The market is showing signs of steadying after a period of dullness. No considerable buying has developed but consumers are showing interest in the recent decline and buying activity is expected. Quiet purchases in small lots are reported, and sales for future delivery are fairly good. London cables show a decline on the week of 15 shillings on Standard spot, but on Wednesday of last week the quotation was as low as £163. Futures dropped to £163½ but latest reports are quoting £168¾.

Straits spot, which was as low as £164 during the week is now quoted at £169¼. New York prices weakened during the week, but a recent advance has again placed quotations at last week's figures of 38¼ c. per pound. Local dealers report a fairly active market with prices firm at 44 c. per pound.

Spelter

The steady tone of spelter continues and the market is gradually resuming its position among the other metals. Everything seems to point to a continued buying of spelter, as inquiries both from home consumers and abroad are constantly increasing. While many think that the sudden change is an effort on the part of producers to frighten the trade into the buying of metal, there appears to be every reason to believe that the market is firm and the improvement quite legitimate. Producers are apparently well sold up and the demand from abroad is quite heavy. The sharp break recently noted in the London situation made it appear that the market was over supplied, but the latest advances seem to contradict this as London reports show an advance on the week of £7 on spot and £6½ on futures. Latest quotations are £54 for spot and £50 for futures. New York price of 10.675 shows an increase of 1⅞ c. per pound. Local dealers report improved conditions with increased activity and are quoting 16 c., an advance of 2 c. over last week.

Lead

The situation in lead is very quiet, and with the exception of a few export orders, the activity is not pronounced. The Trust retains its firm attitude but declined another ⅛ c. Local dealers are firm at 9 c. per pound.

Antimony

The market continues stagnant and prices are still declining. The prospect of further shrapnel requirements was expected to strengthen the market but the contrary has been the case and the situation is becoming weaker. The increased use of high explosive shells has been the cause of the relative decline in the demand for antimony. New York quotations have again declined, the latest quotation of 13½ c. being a drop on the week of one cent. Dealers here report a very quiet market and have declined in their quotations to 20 c., a drop of 2 cents per pound.

Aluminium

No change is noted in aluminium and quotations are firm at 65 c. per pound.

Machine Tools and Supplies

Owing to additional orders having been placed for the heavier shells, inquiries for suitable equipment have shown some improvement. A feature of the present situation is the supply of resale tools which have done duty in the production of small shells, and the supply of these tools has resulted in substantial reduction in the prices asked. This feature has not affected the new machine market as builders are fairly well covered by future business. The demand for supplies continues very good with the question of delivery gradually resuming more normal conditions.

Scrap

The situation in the scrap and old materials is practically unchanged. Some consumers of heavy melting steel are showing a little interest and dealers are asking slightly higher prices .The tone of the general market in old materials is very quiet and prices are inclined to weaken, but any inquiry seems to bring out the fact that quoted prices are subject to change at a minute's notice. New York quotations on brass scrap have fallen off from ¼ to ½ c. per pound. Aluminium has declined one cent for old cast and 2 c. for old sheets. Following the renewed strength in spelter, scrap zincs have advanced from 1½ to 2 c. per pound. The situation here is unchanged and prices are firm with the exception of scrap zinc and aluminium, which are quoted at 8½c and 34c, an advance of 1½c and 1c respectively.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

Toronto, Ont., July 25.—The manufacture of munitions is still the most important feature in industrial circles, and indications point to the present activity continuing well into 1917. The credit which has been established by the Dominion Government will allow of further large orders for shells, running into many million dollars, being placed in Canada. The shells will be principally of large calibre, 6 in., 8 in. and 9.2 in. and will, of course, require a considerable quantity of steel. This will also mean further orders for machine tools, principally heavy duty lathes and drills. The chief difficulty now being experienced in keeping the output of munitions up to the required standard is the scarcity of skilled workmen. The only solution of this problem seems to be the dilution of labor as is employed in the Old Country. A considerable number of girls and women are already employed in shell factories in Canada and more will no doubt be utilized for this purpose.

Steel

The greatest activity prevails in the steel trade and the outlook is unusually favorable. The steel companies are getting more orders than they can handle for some products, especially rails and shell steel, and have been obliged to place some of their contracts in the United States. The C. P. R. is expected to place a large order for rails in the States. A firm of car builders has purchased 28,000 axles with wheels from U. S. concerns, and it is reported that a Canadian mill, presumably the Algoma Steel Corporation, being unable to buy blooms in the States to fill contracts from American railroads is endeavoring to place the rails there. As regards ordinary business such as merchant bars, plates and shapes, the market is quiet as is usually the case at this season of the year. There are no price changes to report this week but quotations continue very firm. The demand for boiler tubes is active in the primary market in spite of the fact that makers of both locomotive and merchant tubes are sold up for five or six months, and are much behind on deliveries. Prices on wrought iron pipe are unchanged but a decline in galvanized pipe is looked for in the near future on account of the weakness in spelter. The skelp situation is unchanged, this material being still difficult to obtain.

Prices on galvanized sheets are weak due to the decline in spelter and further reductions are probable. In the States the price of galvanized sheets, No. 28 gauge base, continues to follow the fluctuations of the spelter market. As quotations on black sheets are practically stationary, the cost of coating is the determining factor in fixing galvanized prices. Blue annealed sheets, particularly in the large sizes of the heavier gauges are in good demand, but black sheets are quiet. Prices of sheet bars are still high and irregular.

In the United States the steel market is stronger as a result of curtailed production due to hot weather, and also because of large export business in steel products particularly shell steel and rails. Domestic demand is lighter than usual, summer dullness having settled over the steel trade, nevertheless a buying movement is looked for early in September. Inquiries are pending for about 18,000 tons of structural material from Canada, and Canadian buyers also want large quantities of billets. Bars have declned, and are now quoted at 2.50 c. but plates and shapes are unchanged at 3.50 c. and 2.50 c. respectvely f. o. b. Pittsburgh.

Pig Iron

The pig iron situation is unchanged and the market is quiet, there being nothing of particular importance to note. Quotations are unchanged, Hamilton No. 1 being quoted at $24, and Victoria No. 1, $25 per ton.

Machine Tools

The market is more nearly normal as regards the volume of business although the demand is almost entirely from munitions concerns. On account of the orders for shells that are being placed from time to time, it is anticipated that there will be a steady demand for suitable machine tools for some time to come this will keep the market active. The demand in the States for machine tools is considerably lighter than it was, and makers are consequently able to make quicker deliveries. Canadian machine tool builders although exceptionally busy are able to make pretty good deliveries. Although prices of second hand equipment have declined there is some talk of further advances in new tools.

Metals

There is a little improvement in the situation but prices continue to decline in some metals such as copper and antimony. Copper buying continues on a restricted scale with second-hands offering concessions. Tin is also weak on light demand but there is a better undertone to the market. Spelter, although lower is also showing indications of a recovery. Lead is unchanged but there is a possibility of lower prices in the near future. Antimony has declined gain but aluminium is unchanged. Solders are unchanged.

Copper

Quotations continue entirely nominal and are slightly lower. Consumers are taking very little interest in the market, and resale lots are being offered at concessions. Local quotations are lower at 29 c. per pound.

Tin.

Although the demand is light, the market is more active which has tended to stop the recent downward movement. Local quotations are unchanged at 44c. per pound.

Spelter

The market is firmer as consumers are taking more interest in spelter, particularly the galvanizing interests. Quotations are unchanged at 14c. per pound.

Lead

The market is dull and unchanged with light demand. There is some possibility of the leading interests lowering their prices. Locally lead is unchanged at 9c. per pound.

Antimony

Quotations are lower and entirely nominal with the market dull and weak. Antimony is now being quoted at 20c. per pound.

Aluminium

The market is quiet and unchanged at 67c. per pound.

CONCERNING ALUMINIUM.

IN a recent note to the Faraday Society on the annealing of aluminium, Messrs. Seligman and Williams describe certain interesting anomalies in the behaviour of the metal. Hard-worked aluminium is more readily soluble in nitric acid than the annealed metal. On heating the hard-worked metal to 125 deg. Cent., a definite change in the rate of dissolution is brought about. A sample of the hard-worked metal which lost 56 mgr. per 100 square cm. per 24 hours in 1.42 nitric acid lost 39 mgr. when similarly exposed after being annealing for 10 hours at 125 deg. Cent. there was a decrease in the rate of dissolution of 5.3 per cent.

It was anticipated that if the heating were prolonged the decrease in the rate of dissolution might be augmented. This was not found to be the case, but, on the contrary, as the heating at 125 deg. Cent. was prolonged, the fall in the rate of dissolution diminished until samples heated for 80 hours at 125 deg. Cent. showed the same rate of dissolution as, or even a slightly higher rate of dissolution than samples which had not been heated at all. These facts do not tally completely with the observations of other workers.

NOVA SCOTIA STEEL PROPERTIES AND PROSPECTS

THE directors of the Nova Scotia Steel & Coal Co., has just completed a trip of inspection to the various properties of the company at Wabana, Sydney Mines and New Glasgow. One of the leading interests discussing the trip, says:—

"At Wabana we found that, while the quantity of ore being mined is much less than under normal conditions ,a considerable amount of new territory has been opened up during the past year in the submarine workings both east and west of the main slopes. All the levels driven have continued in ore from 18 to 32 feet high, all of which is clear and high-grade from pavement to roof. Electrically operated power excavating shovels are working at both the east and west faces, loading ore direct into cars. Rapid progress has been made with the pair of new slopes, work on which is being driven from three points, with a weekly advance of 60 to 68 feet on each of the three sections.

At Sydney Mines while the coal output is not equal to that in pre-war times, owing to the shortage of labor, the output of steel is much greater. An inspection was made of the new blast furnace in course of construction.

At New Glasgow the entire plant is making a record production, while the Eastern Car Co., a subsidiary, is working at high pressure on large foreign government orders. At the moment it is understood that the company is in close negotiation with two foreign governments for further orders."

Indications point to the fact that Scotia has actually booked at the present time business amounting to nearly four times that of any normal year in value.

CONSULAR DOCUMENTS

ALTHOUGH consular invoices may sometimes be certified by foreign government representatives in interior cities of Canada, it is, in most cases. better to have such documents certified at the port of shipment. It is not possible to give any general rules for the arrangement of consular invoices as different countries require different specifications. Invoices of most countries may be arranged in English. It is necessary to describe in most consular invoices the exact character of the goods shipped.

Many of the Latin-American countries allow shippers to arrange their consular documents in English, although the language of the country may be Spanish or Portuguese. If, however, the consignee requests that the consular documents be arranged in Spanish or Portuguese, this should be done, even though, as far as the consular regulations are concerned, it is optional with the shipper whether they are made out in English or some other language. Sometimes, as is the case with Brazil and Cuba, the government makes an "official" charge for the translation of shipping documents in a foreign language, which charge is usually much higher than the cost of making out the documents in the language of the country if done by the shipper. The consignee should, of course, be billed with the extra expense that he thus places upon the shipper.

When consular invoices are required to be arranged on a foreign language, great care must be taken in the translation of same, so that the foreign words used convey precisely the English meaning. In arranging consular invoices there must be no erasures or corrections or writing between the lines.

MINIMUM BILLS OF LADING

THE rates quoted by various transportation companies for minimum bills of lading and parcel receipts are subject to change at the discretion of the company issuing same, or through fluctuations in the rate of freight or exchange. Some steamship companies, in fact, have no fixed minimums, and will, on occasion, quote as low as may be required to secure the shipment. During the war in Europe, steamship lines are liable to increase the cost of their minimum bills of lading, even to non-belligerent countries, owing to the increased cost entailed by war insurance on the steamer, possibility of seizure, detention, etc.

A minimum bill of lading is the least sum of money for which a steamship company will take the responsibility of issuing a bill of lading. With the transatlantic lines this amount is usually one guinea (about $5.10) for direct ports, and with South American lines, $5.00. For ports not actually called at by the steamers of the lines, the minimum bill of lading is the sum of the minimum to the port where transhipment occurs and the minimum from that port to final destination. The minimum from the port of transhipment to final destination may be either greater or less than the minimum to the direct port, which accounts for the apparent discrepancies in minimums to the same pla e by different lines.

Any shipment which, according to the freight rate (weight or measurement), amounts to less than the minimum charge has to pay the full minimum. Small shipments, however, can sometimes be made on "parcel receipts," but such shipments must be of small weight, dimensions and value, and the responsibility of the steamship company is much less under a "parcel receipt" than under a bill of lading.

* * *

MARKING OF PACKAGES

ALL goods must be distinctly marked with the port of destination. The marking of packages plays a more important part in export shipping than most Canadian manufacturers are willing to believe. For instance, in shipping to several South American countries all the marks on the packages must be stenciled, brush marking not being allowed. Other countries require that the marks, numbers, etc., must be placed on two or more adjacent sides of the packages. Others again require the net and gross weights in kilograms on each package, also a number which must correspond with the number of the package as given in the consular documents. Failure to observe these regulations always results in fines, delays, and annoyance at destination.

In connection with marking cases, it is of the greatest importance that nothing but the shipping marks, such as appear on the invoice and the bill of lading, be put on the cases, otherwise the importer is liable to a fine. Frequently manufacturers use second-hand cases on which there are many old marks, so that it is often difficult to make out the proper ones. These superfluous marks and numbers cause much trouble in the custom house and oftentimes expense to the importer.

Some manufacturers have a weakness for stenciling or printing the contents on the sides of the cases which they think will serve as an advertisement.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign potr.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia .
C. F. Just, c/o British Consul, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsythe Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canadian Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgrow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Strete, London, E.C., England Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe,Africa, Austraasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.
R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegad No. 4, Christiana, Norway Cable address, Sontums.

SOUTH AFRICA

D. M. McKibbin, Room 34, Permanent Buildings, Harrison Street, Johannesburg.

E. J. Wilkinson, Durban, P.O. Box 673, Durban, Natal.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM
W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Electrical

West Lorne, Ont.—The Village Council will spend $8,000 on the installation of a hydro-electric system.

Earl Grey Sask. — The village council contemplate installing an electric light plant to cost about $2,000.

Engineering

Ottawa, Ont. — The Chevrolet Motor Co., will shortly begin the construction of an addition to their plant here to cost about $40,000.

Orillia, Ont.—The E. Long Co. have secured the old wheel works building of the Tudhope-Anderson Co., and will instal a machine shop there.

Vancouver, B.C.—The Granby Consolidated Mining & Smeltin Co. will instal a steam power plant at the Anyox Smelter to be used as an auxiliary during the winter.

Shawinigan Falls, Que. — A power house at the plants of the Northern Ammunition Co., was struck by lightning recently and some of the electrical equipment damaged.

Hamilton, Ont.—Fire on July 21 completely destroyed the Brown-Boggs Co. factory on King William Street. The loss, including the damage to the machinery is estimated at $75,000.

Edmonds, B.C.—The Olympic Metals Co. has taken a lease on the Edmond Electric Power Building and will remodel it for the installation of a modern metals refining and smelting plant.

Port Arthur, Ont. — The C. N. R. will make an extention to the roundhouse and build a machine shop here. Particulars may be obtained from T. E. Nelson, superintendent, Port Arthur.

North Bay., Ont. — The Donohoe Mines Corporation are making arrangements to install a 50 ton concentrator for the treatment of such ores from the mine as do not carry heavy lead values.

Trail, B. C. — It is anticipated that the copper refinery which is being built here will be in operation early in August. The plant will have an initial capacity of 10 tons of pure copper daily.

Stump Lake, B.C.—A Seattle syndicate has taken over the property of the Nicola Mining & Smelting Co. at Stump Lake, near Kamloops, B.C., and will instal a 100-ton concentrator plant and other machinery.

Winnipeg, Man. — General Manager McLeod, of the C. N. R., has signed contracts for the erection of a large machine shop and stores at Edmonton. The contract price is $65,000, and Nesbitt & Co. the successful tenderers.

Toronto, Ont., — A permit has been issued to the Toronto Harbor Commissioners, to erect one-story brick tile and stone addition to blacksmith and machine shop on the Don diversion of the channel, at the foot of Cherry street, at a cost of $2,700.

St. Thomas, Ont. — The American Brake Shoe & Foundry Co., whose head office is in New York, will establish a foundry here for making brake shoes and miscellaneous castings. The foundry will be 225 ft. by 50 ft., and will be located near the Canada Iron Corporation's plant.

Newcastle, N. B. — The villages of Richibucto and Rexton have been incorporated as a hydro-electric power company, to dam the Kouchibouguac and generate electricity for lighting and other purposes. It is also proposed to generate enough current to light Chatham and Newcastle.

Municipal

Montreal, Que. — The City Council propose spending $10,000 on water meters.

Peterborough, Ont. — The City Council are considering the purchase of a motor truck for the fire department.

Port Arthur, Ont.—A by-law has been passed by the council to give a bonus of $25,000 to the Western Drydock & Shipbuilding Co.

New Toronto, Ont. — The Village Council has decided to purchase a new pump for the waterworks system. It will have a capacity of 600 gallons per minute.

Renfrew, Ont.—A by-law is contemplated to raise $200,000 to purchase the first chute water power on the Bonnechere River and to develop it for the production of hydro power, and to purchase the fourth chute water power also, though not to develop it at present.

St. Thomas, Ont.—A by-law will be submitted to the ratepayers providing for a loan to the Monarch Knitting Co. of $30,000 for five years without interest. It is proposed also to give the company a fixed assessment for ten years of $10,000.

General Industrial

Almonte, Ont.—The Town Council are considering the installation of a Hydro-Electric plant.

Walkerville, Ont.—Walker & Sons will build a factory for the McCord Mfg., to cost about $20,000.

Stratford, Ont.—The Hydro-Electric Commission will build an additional distribution plant here.

Brandon, Man.—The City Council are considering the purchase of a four-million gallon turbine pump.

Toronto, Ont.—The Toronto Carpet Mfg. Co. will build an addition to their factory on King Street West.

Hamilton, Ont.—F. F. Dalley will build a factory estimated to cost $100,000. H. G. Christman & Co. are the contractors.

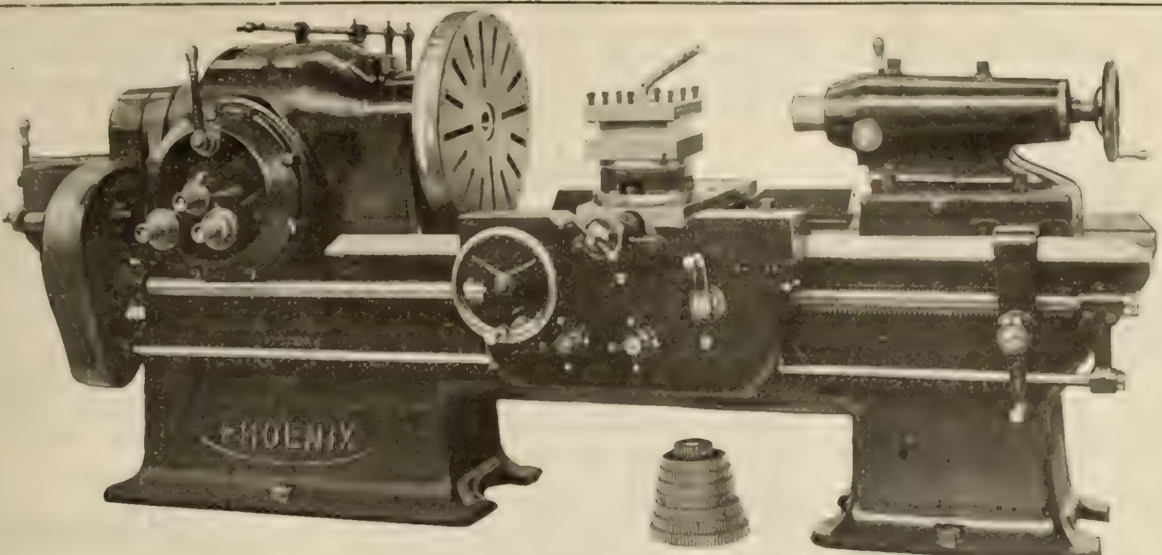
Doon, Ont.—The Doon Fibre Co. plant was practically destroyed by fire on July 22. The loss is estimated at $40,000, with only $5,000 insurance.

Toronto, Ont.—A building permit has been issued to the Ideal Bread Co., to alter a bakery on Argyle street and Dovercourt road, at a cost of $3,000.

Vancouver, B.C.—The British Columbia Sugar Refinery has taken out a permit for an addition to the factory on Powell Street, the cost of the work being $2,000.

St. Catharines, Ont.—The Chemical Refineries may shortly reopen their factory, which has been closed for some months. The company make potash from wood ashes.

Orangeville, Ont.—The Canada Clock Co., a recently incorporated concern, with a capital of $250,000, proposes to establish a factory here for making clocks. A by-law will be submitted at



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OUR unbounded confidence assures us that in a comparative test this machine would always stand paramount. Think of your present or proposed output, and compare it with 110 bands, with band turning equipment installed, per 10-hour day. That is what this machine is doing. Inspect the machine—superior quality will always stand the most rigid test—and when you have studied its features, its ordinary parts, its very construction you will be convinced that this is the machine for your requirements. It is specially adapted to band turning because of the worm drive on the main spindle; this prevents that undesirable chattering tendency. Complete band turning equipment can be supplied in a semi-finished condition.

The A. R. Williams Machinery Co., Limited, 64-66 Front St. W., Toronto

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"Here is a Die Head that you can depend upon"

A Geometric Self-Opening and Adjustable Screw-Cutting Die Head

They are being used with absolute satisfaction on every make of Screw Machine.

A micrometer adjustment makes possible quick and accurate variations for a tight or loose-fitting screw. The chasers open automatically, so that no backing off occurs to injure the thread. Length of thread accurately governed—short or long.

Arranged for cutting any diameter, pitch and form of thread. Right or left-hand. Flush to shoulder, where required.

Let us recommend the right sort of Die Head for your work.

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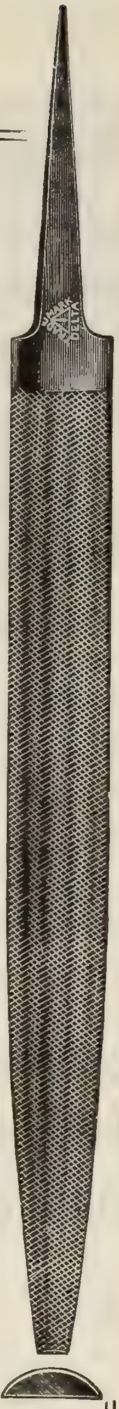
CANADIAN AGENTS: Williams & Wilson, Limited, Montreal.
The A. R. Williams Machinery Co., Limited, Toronto, Winnipeg, St. John, N.B.



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YOU take no chances when you supply your workmen with "Delta" files. You can't lose a cent. If for any reason a file bearing the "Delta" mark on the tang fails to give absolute satisfaction, we will refund its price.

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CANADIAN AGENTS:
H. S. Howland, Sons & Co., Toronto;
Starke, Seybold, Montreal;
Wm. Stairs, Son & Morrow, Halifax;
Merrick-Anderson Co., Winnipeg
All Leading Jobbers.

an early date to provide for a free site, exemption from taxation and a loan of $15,000. Messrs. Watson & Tannehill, of Toronto, are interested in the proposition.

Tenders

Beauceville, Que.—The foundry owned by Marcoux & Poirer was destroyed by fire recently, the loss being estimated at $12,000.

Matheson, Ont.—Tenders will be received until August 8 for the construction of a waterworks system. Particulars may be obtained from McAuslan & Anderson, North Bay, Ont.

Seagrave, Ont.—Tenders will be received until August 8 for the construction of a 50-ft. bridge across the Nonquon River, near here. Full particulars may be obtained from the engineers, Bowman & Connor, 31 Queen Street West, Toronto, or the county clerks at Lindsay and Whitby, Ont.

Toronto.—Tenders will be received by chairman Board of Control, City Hall, Toronto, up to August 1 for the supply and delivery of air brake equipment, step and door operating mechanisms, gears and pinions. Specifications and forms of tender may be obtained at the Works Department, Room 12, City Hall.

Toronto.—Tenders for the erection of a court house at Sault Ste. Marie, Ont. (separate tenders are required for the heating and ventilating and plumbing and electric wiring) will be received up to August 1. Plans and specifications can be seen at the office of the sheriff, Sault Ste. Marie, and at the Departments of Public Works, Ontario Parliament Buildings, Toronto.

Winnipeg, Man—Tenders will be received until August 21 for the various works required in the completion of the New Parliament Buildings, and not included in the general contract. The works include structural steel, heating and ventilation, electrical conduit and wiring. Particulars may be obtained from S. C. Oxton, Deputy Minister of Public Works, Winnipeg.

Lethbridge, Alta—Tenders will be received up to August 5 for the complete installation of a filtration system, capacity three million Imperial gallons per twenty-four hours. Plan showing location of buildings and elevations can be had by making application to the Public Works Department. A. M. Grace, Commissioner of Public Works.

Ottawa, Ont.—Tenders addressed to J. W. Pugsley, secretary, Department of Railways and Canals, Ottawa, Ont., will be received up to August 7 for the construction and erection of passenger station at Halifax, N.S. Plans, specifications and blank form of contract may be seen at the offices of the following: Chief Engineer, Department of Railways and Canals, Ottawa, Ont.; Chief Engineer, Canadian Government Railways, Moncton, N.B. Superintending Engineer, Halifax Ocean Terminals, Halifax, N.S.; Ross & Macdonald, architects, Montreal and Toronto. Contractors who wish to obtain plans and specifications temporarily for their own use, may obtain same from Ross & Macdonald, Montreal, on depositing with them a certified bank cheque for $100, which will be refunded on the return of the plans and specifications to them.

Personal

Paul Mercier, chief city engineer, of Montreal, has asked the Board of Control to appoint a consulting engineer to oversee all the activities of the Public Works Department, and report thereon to the Controllers.

Ernest G. Barrow, C.E., late city engineer of Hamilton, Ont., died in Toronto on July 21. The deceased was born in Bristol, England, in 1846, and came to Canada in 1871. He was appointed city engineer of Hamilton in 1896.

Harold K. Beach, until recently connected with the staff of Lockwood Greene & Co., New York, has been appointed mechanical superintendent of Brown's Copper and Brass Rolling Mills, New Toronto, Ont.

Sir Rider Haggard, honorary representative of the Royal Colonial Institute, who has been visiting Canada for the purpose of investigating conditions and facilities offered for proposed land settlements for British soldiers after the war, sailed from New York on July 22 for England.

Marine

The Taylor Engineering Works, of Vancouver, B.C., has received the contract for supplying two 160 h.p. Bolinders crude oil engines for the Cameron-Genoa Mills Shipbuilding Co., and six engines of the same type for the Wallace Shipyards.

Kaministiquia Channel. — President Livingstone, of the Lake Carriers' Association, is advised by the Canadian Department of Marine and Fisheries that the dredging of the northerly half of the entrance channel to the Kaministiquia River to a depth of 25 feet has been completed and tested by sweeping. The whole entrance between the buoys is now 25 feet deep, with a width of 600 feet up to the Empire Wharf.

Contracts Awarded

Brantford, Ont.—The contract for the erection of the new School of Mines at Haileybury, Ont., to cost $20,000, has been awarded to P. H. Secord & Sons, of this city.

The Foundation Company, Montreal, has received two contracts from the Algoma Steel Corporation, Sault Ste. Marie, Ont. One is for the revision of the yard, including the engineering and constructing of three plate-girder bridges, and the other is for the construction of the foundations of two open-hearth furnaces and a gas producer.

Wood-Working

Springhill ,Que.—The saw mill owned by D. M. McDonald has been destroyed by fire.

Montreal, Que.—The St. Lawrence Wagon Co. will build a factory here at a cost of $7,000.

Harrow, Ont.—C. F. Smith, proposes to rebuild his planing mill, which was recently destroyed by fire.

Jaffray, B.C.—A hurricane blew the top off the East Kootenay Lumber Co. mills here, and set fire to the building, which was totally destroyed, with five C.P.R. cars.

Calgary, Ala.—Tenders will be received until August 8. for the construction of a Drill hall here. Leo Dowler, of Calgary is the architect. The cost is estimated at $250,000.

Vancouver, B.C.—Fire practically destroyed the sash and door factory of W. G. Scrim & Co., on July 7. The loss is roughly estimated at $9,000. This includes damage to the stock, about $5,000, and damage to the building the remaining $4,000. The stock, it is understood, was insured for about $3,000.

New Incorporations

The Commercial Acetylene Railway, Light & Signal Co. have been granted a license to carry on business in the Province of Ontario.

La Compagnie d'Automobiles Agricoles Bruneau has been incorporated at Ottawa, with a capital of $100,000, to manufacture steam, oil and gas engines, and automobiles, etc., at Danville, Que. Incorporators: G. N. Letendre and E. T. Bruneau, of Danville, Que.

The Orillia Worsted Co. has been incorporated at Ottawa, with a capital of $300,000, to manufacture woollen, worsted and cotton goods of all kinds at Orillia, Ont. Incorporators: Melville B. Tudhope, George Rapley and Robert Wade, all of Orillia, Ont.

The Pine Lake Lumber Co. has been incorporated at Toronto, with a capital of $60,000, to carry on a lumbering business and operate saw and planing mills at Pickerel Landing, Ont. Incorporators are: F. A. Hammond, H. B. Palen and J. McIvor, all of Toronto.

British Acetones of Toronto has been incorporated at Toronto with a capital of $50,000, to manufacture explosives, including acetone, etc. The head office is at Toronto, and the provisional directors are: Thomas P. Galt, George E. McCann and A. L. Brooks, all of Toronto.

The Canada Stove & Foundry Co., has been incorporated at Ottawa with a capital of $1,500,000 to carry on the business of iron masters, steel makers, Head office to be situated at Montreal, Que. Incorporators, E. R. Parkins, R. E. Allan and F. W Tofield all of Montreal

Deloro Smelting & Refining Co. has been incorporated at Ottawa, with a capital of $1,500,000, to acquire and take over the Deloro Mining & Reduction Co. Head office to be situated at the Village of Deloro, Ont. Incorporators: S. King, O. H. King and Herman S. King, all of Toronto, Ont.

The Chipman-Holton Knitting Co. has been incorporatad at Ottawa, with a capital of $1,000,000, to manufacture all kinds of knitted goods and textiles. Head office to be situated at Hamilton, Ont. Incorporators: F. L. Chipman, of New York, and William A. Holton and M. Baldwin Holton, of Hamilton, Ont.

Railways—Bridges

Ottawa, Ont.—It is expected that the Quebec & Saguenay Railway line to Murray Bay will be completed by Nov. 1.

Ottawa, Ont.—The Toronto Harbor Commissioners have deposited with the Public Works Department plans for the railway bridge proposed to be built across the Don in the Toronto Harbor Industrial district.

Moose Jaw, Sask.—The C. P. R. have let the contract for the completion of the Assiniboia branch from Vantage to Assiniboia, a distance of eight miles, to W. H. Dutton & Co., of Winnipeg. The completion of this line will give Moose Jaw direct connection with Lethbridge.

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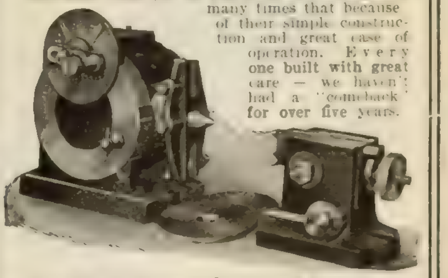

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Vancouver, B.C.—The Northern Construction Co., of Winnipeg and Vancouver, is interested in the contract for the erection of the million dollar Canadian Northern depot at Vancouver, their tender having been accepted jointly with that of the Carter-Halls-Aldinger Co., of Winnipeg.

Toronto, Ont. — The Scarborough Township Council has decided to ask tenders for two bridges to be built in the township, one at Scarboro' and the other across the River Rouge. Petitions were also received from Scarboro' Junction and Agincourt asking that the Hydro power be used in both villages for street lighting and domestic purposes.

Ottawa, Ont.—The linking-up of the Canadian Northern lines, between Toronto and Montreal and Quebec, involving the completion of the Mount Royal tunnel terminal scheme is being hastened by the C. N. R. in connection with the financial assistance, recently granted to the company. Both the company and the Government regard the early completion of the tunnel as of primary importance in ensuring the success of the whole scheme.

Trade Gossip

Credit Men's Officers.—At the annual meeting of the board of directors of the Canadian Credit Men's Association in Toronto, the following officers were appointed: President, W. H. Lamont, succeeding H. D. Eby. Mr. Eby continues as director. Vice-president, James A. Catto; secretary-treasurer and manager, A. S. Crighton.

C. P. R. Convention.—The C. P. R. held a convention in Winnipeg last week for the purpose of exchanging views and devising ways and means of closer co-operation so that the company may get and keep in closer touch with the public. Over 150 officials from all parts of the system were in attendance at the meetings which were held at the Royal Alexandra Hotel.

Big Windsor Merger.—Details have been practically completed for the consolidation of the Kelsey Wheel Co., of Detroit and Memphis; Kelsey Wheel Co., of Windsor, Ont., and the Herbert Mfg. Co., of Detroit, into a new corporation, to be known as the Kelsey Wheel Co., Incorporated. The new company will have a capital stock of $13,000,000. John Kelsey is to be president of the new corporation.

The Ontario Hydro-Electric Commission have secured from the Canadian Niagara Power Co. of Niagara Falls, Ont., a supply of 12,500 h. p. available from time to time as the Commission requires it. The Commission may call for a further supply up to the amount now being exported from Ontario. This arrangement settles for the time being the question of exporting power from the Province and relieves a growing shortage of power.

The Joseph Dixon Crucible Co., Jersey City, N. J., have appointed the Canadian Asbestos Co., Montreal, sole selling agents for all Dixon graphite productions with the exception of Dixon's lead pencils, erasive rubbers, crayons and penholders. This arrangement has been made in order to extend and increase their business throughout Canada and Newfoundland, and to be in closer and more frequent touch with all interested in graphite productions.

The Turbine Equipment Co., Toronto, have received from the Algoma Steel Corporation, Saulte Ste Marie, Ont., contracts to supply one 15 million gallon De Laval single stage, double suction, contrifugal pump, direct-connected to one 550 h. p. Canadian Westinghouse motor; one 3 million gallon unit direct-connected to a 125 h. p. motor, and two 1 million gallon units to be direct-connected to 40 h. p. motors.

Victoria, B. C.—Owing to unforeseen delays the completion of the work on the Saanich observatory and the mounting of the huge telescope, the largest in the world, will be delayed longer than at first contemplated, and it will be well on in the Fall before the obseratory will be ready for full operation. The chief delay has been occasioned by reason of the necessity of manufacturing on this side of the Atlantic the plain mirror to be used in testing the great concave mirror. This plain mirror is 55 ins. diameter and the concave mirror is 72 ins. diameter.

The Potash Products Co., Vancouver, B.C., has developed a process whereby kelp can be handled in an economical manner, eliminating the excess of salt and slime, producing commercial potash as well as a dry kelp fertilizer which ranks higher in actual results than the German product. The great shortage of potash in this country has resulted in prices in the neighborhood of ten times normal figures which allow very large profits where a good supply is obtainable, although in actual figures the company bases its profits on normal quotations.

Navigation on Hudson Bay.—The Department of Marine and Fisheries, Ottawa, is preparing for the immediate opening of navigation on Hudson Bay and Straits. Travelling up by one of the tramp steamers carrying construction supplies is an officer of the Department who will put in operation a dozen light-

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The strength, durability, economy of power and simplicity of adjustment of the Dupont Power Hammer make it a decidedly superior tool.
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Seven sizes.
With rams from 35 to 300 lbs.
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houses—ten in the Straits and two at Port Nelson. This year's tonnage promises to be small, and will be confined to a dozen tramp steamers. Next year when the Hudson Bay Railway and elevators are in operation the route will be put to a real test.

Regenerating Sulphated Accumulator Electrodes.—In the course of a research on lead sulphate and lead, G. A. Perley and C. W. Davis, of Durham College, New Hampshire, observed that sulphated electrodes of secondary batteries could be regenerated by being placed in caustic soda, without the use of an external current. The method, however, was not satisfactory, and after trying various solutions — sodium sulphate, chlorate, phosphate, carbonate, tartrate, etc., with or without the addition of caustic soda—they found that the old method of regeneration by sulphate of sodium was, after all, the best. They advise the placing of two additional positives next to the two outer negatives, in order to hasten the regeneration of these latter electrodes. The regeneration is effected by supplying the ordinary charging current for about 60 hours.

Building Notes

Winnipeg.—On August 21, T. H. Johnson, Minister of Public Works, will receive and open in public tenders for completion of the Manitoba Parliament Buildings.

Toronto, Ont.—The Toronto Hydro-Electric Commission have applied for a permit to erect a four-storey addition to their sub-station at the corner of Duncan and Nelson streets, to cost $90,000.

Leather Belting.—A new catalogue just issued by the Graton & Knight Mfg. Co., Worcester, Mass., illustrates in every respect just what a publication of this nature should be, for, besides featuring all the products made by the company, a great deal of space is devoted to facts of general interest to those who purchase belting, lace leather, packings and other leather products. The belting section of the catalog is of unusual interest to buyers of belting, as it not only describes the characteristic qualities of each grade manufactured, but also explains clearly and conclusively why these grades are essential, their particular differences and capabilities. This section also embodies valuable mechanical rules, tables and formulas, to further assist the buyer to determine the proper grade, width and weight of belting required for any given drive.

A special section of the catalogue is devoted to leather packings, describing all the various kinds, grades and the ad-

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Our large stock of Machine Bolts, Rivets and Washers assures quickly filled orders and prompt shipment. One quality only—The Best.
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CHROME
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WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.
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There are many cases where each punch has turned out over 2,000 shells.
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are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

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New Machines at Second-Hand Prices

1 only Foster, No. 1 Hand Screw Machine, with plain head, automatic chuck, wire feed, capacity 9/16, ...$500.00
1 only Hendy Type 18" stop Friction shaper, with Countershaft, with swivel vise, SECOND-HAND $300.00
1 only Puttnam Speed Lathe, 14" swing, 6-foot bed, 5-step cone, countershaft, SECOND-HAND (as good as new) $150.00
1 only Fox Monitor Lathe, No. 4, with Chaser attachment and standard equipment, SECOND-HAND $150.00
1 only 10 H.P. BRAND NEW Lincoln Motor, with Starting box, Pulley, etc., complete 25-cycle, 3-phase, 550 volts, 1,500 R.P.M. $250.00
1 only 1" Bolt Cutter, BRAND NEW, with lead screw, countershaft, no dies, National make.. ....$450.00

Ontario Metal Products Co., Ltd.
119 Adelaide St. W., Toronto

vantages of each. An interesting and extensive line of leather goods are illustrated and described in the section devoted to same. A copy of this catalogue will be sent upon request to interested readers.

Catalogues

Tool Chests made by the Union Tool Chest Works, Rochester, N. Y., Folder illustrating and describing many styles of tool chests for mechanics. Each style is illustrated and the dimensions are given for the various sizes.

The Chain Belt Co., Milwaukee, Wis., have issued a new folder No. 64 describing traveling water screens designed primarily to remove refuse and foreign material from water before it enters power plans or any industrial plant requiring large quantities of clean water. Illustrations are included showing installations.

T. W. Broadbent-Ltd., Huddersfield, England, have recently issued a leaflet No. 1, being a section of catalogue No. , dealing with "D" type generators for continuous current. The leaflet contains a specification covering the principal features in the design while a price list and shipping particulars are also included. The leaflet is illustrated.

Insuluminum.—Bulletin 118, just issued by the Diamond Power Specialty Co., Detroit, Mich., contains a number of photo-micrographs and describes the properties of this new product of the General Electric Co's. laboratories, which will withstand a continuous temperature of 1800 deg. Fahr., as compared to 1200 deg. Fahr., for iron and steel. Photographs and records of a series of comparative tests at high temperatures of insuluminum and iron pipes, made by a number of well-known companies, are included. The bulletin is "readable." It deals primarily with the interesting new metal, but the application of the material to the Diamond Mechanical Soot Blower System is described briefly on the concluding page.

"**The Logic of the Dean,**" is the title of an attractive new 20-page booklet just issued by The William B. Pierce Co., Buffalo, N. Y., illustrating and describing their Well-known "Dean" boiler tube cleaner. "The Logic of the Dean" is intended primarily for the management of the plant, although it contains a wealth of information of unusual value to the chief engineer or any of his assistants. The booklet, besides describing and illustrating the operation of the "Dean" cleaner, discusses the scale problem in detail. Some of

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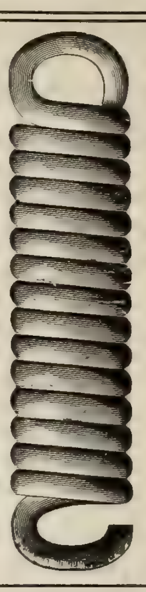

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We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

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OF EVERY DESCRIPTION

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Turn to them now
and see for yourself
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are of interest.
Canadian Machinery
Classified Advertising Section

the subject headings are: The Formation of Scale Cannot Be Prevented, The Relation of Scale to Fuel Consumption, How Shall Scale Be Removed, Some Things That Compounds Will and Will Not Do. Copies may be obtained on application by interested reader.

Bucket Conveyors. — The C. W. Hunt Co. Inc. West New Brighton, N. Y., have issued a catalogue No. 15-4 describing the "Hunt" noiseless pivoted bucket conveyor for handling coal, ashes, coke, phosphate rock, cement, clinker, etc. The catalogue has been issued with the object of suggesting to those operating or designing a power house the advantages and obvious savings possible with a properly arranged coal and ashes handling plant. The catalogue contains data valuable to an engineer in laying out a boiler house and a number of cuts showing different arrangements of the conveyors for various purposes. Several pages are devoted to reproductions of drawings showing conveyor details with dimensions. Other illustrations show driving mechanisms and valves etc .

Book Reviews

"Water-Works and Sewerage Systems of Canada," by Leo G. Denis. This is a new edition which has just been issued by the Commission of Conservation. In the present report the various physical and financial data respecting water-works have been brought up to date and a new section on sewerage systems has been added. The book is a royal octavo volume, handsomely bound in cloth, contains 176 pages of text and is well illustrated with 25 halftones and 5 diagrams. In the year of Confederation there were only 7 waterworks plants in Canada; to-day there are 528. These have been built at a total cost of $123,725,633 and entail an annual maintenance charge of $4,558,589. The total daily consumption is 426,877,000 imperial gallons, which gives an average daily consumption per capita of 111 gallons, ranging from 50 gallons in Manitoba to 143 in New Brunswick. There are 206 plants supplied from springs or wells and 322 from lakes or streams. In 72 plants the water is filtered and in 21 plants it is treated with hypochlorite. The municipally owned plants number 396. As to rates, where specified, it is shown that flat rates are used in 209 cases, meters in 30, and both flat and meter in 141. There are 279 sewerage systems in Canada, having an aggregate mileage of 4,223 and which have been built at a total cost of $74,504,418. In only 75 municipalities is the sewage treated.

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BELTING
DOMINION BELTING CO. LTD.
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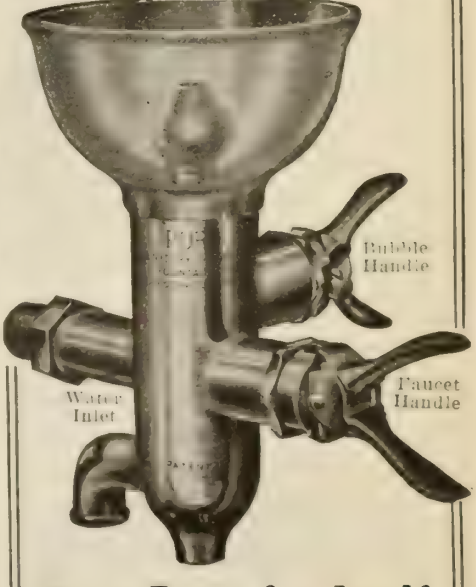
Saves Dollars
Why let that old fashioned faucet go on year after year wasting water MONEY?
Why more drinking cups and glasses, only to become unsanitary—lost, broken or carried away? Puro Sanitary Drinking Fountain stops all this needless waste. Puro saves you 35% on the water bill alone. Puro saves you all that money you spend for cups. YET Puro is always ready with a clear, cool drink with dollars in the bank.



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You don't have to wait years to get back the small investment you have tied up in Puro equipment.
You start cashing in at once not only on your water bill saving but on the increased efficiency of your workers as well.
Men like PURO it's clean. No danger of deadly germs lurking in its sparkling bubble.
Write us, tell how many men, how many departments, and we'll tell you how much the cost will be to
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YOUR WATER SUPPLY
Puro Sanitary Drinking Fountain Company
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Classified Advertising Section

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HORIZONTAL GAS ENGINE 25 H.P. IN SERvice at present time, $375.00 cash. Write Penberthy Injector Co., Limited, Windsor, Ontario. (5)

FOR SALE OR RENT — MACHINE SHOP with railroad siding. Box 208, Canadian Machinery. (4)

A SNAP IN TURRET LATHES SLIGHTLY used on shell work. Fourteen splendid machines at bargain prices. Do you need these machines? If so, drop a line to Box 953, Woodstock, Ont.

TEN TYPE "F" COOPER-HEWITT ELECTRIC lamps for sale—110 volts, 60 cycles, alternating current. Will sell at bargain price. Canadian Ingersoll Rand Co., Limited, Sherbrooke, Que. (2)

LATHE FOR SALE—ONE 39 x 17-FOOT Pond engine lathe, suitable for heavy shells; in good condition; $1,500.00. A. B. Ormsby Company, Limited, Toronto. (2)

A BARGAIN FOR QUICK SALE—30 H.P. 10 x 14 engine; guaranteed in first-class working condition; drive belt included. Hamilton Whip Co., Hamilton.

FOR SALE—SCREW-CUTTING LATHE, 14 FT. bed, 16-inch Imperial chuck, 24-inch Swing Countershaft. Apply Thos. H. Ruth, 314 Pearl Ave., Peterboro. (1)

FOR SALE—ONE DAVIS 4½" CUTTING-OFF machine; practically new; been used less than three months; very reasonable. Canadian Linderman Co., Ltd., Woodstock, Ont. (tf)

12-INCH HEAVY DUTY (CANADIAN CORporation) moulder; just used six months; also band saw, shaper, buzz planer, used two years. Apply W. A. Rumney, 36 Fuller Ave., Toronto. (28)

20,000 LBS. ⅝ GALVANIZED STEEL GUY wire. We can offer this wire at very attractive prices. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (25)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make. used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

DROP PRESS FOR SALE—NO. 9 MINER & Peck drop press; anvil 2,000 lbs.; base 30,000 lbs.; 36" between uprights; 40" x 35" between poppets; 34" x 29" top of anvil; guaranteed as good as new. Can be shown in operation to any genuine prospective buyer. The Metallic Roofing Co., Limited, Toronto. (4)

FOR SALE — THREE HOLDEN-MORGAN threading millers; one arranged for nose threading; two for base threading. One base threader can be changed to 4.5, as it was reduced from this size. Also two Bertram wavers and groovers, and one Martin, all used for 3.3 shells. Canadian Linderman Co., Ltd., Woodstock, Ont. (27)

FOR SALE

Fox Monitor Lathe, 18" x 5' 6", 9-hole turret, cross feed, hollow spindle, 5-step cone; good as new. Plating dynamo, 6 volts, 250 amp.; used only a short time.

PENDRITH MACHINERY COMPANY
970 Queen St. West, Toronto

FOR SALE—5 CARLOADS MACHINERY steel, consisting of rounds from ¼" to 5", squares, flats, angles and channels. Also tire sections. Slightly rusted through being outside. Will move this entire stock at great sacrifice in price to someone who can take delivery of entire quantity at once. This is an exceptional offer. Box 210, Canadian Machinery. (1)

FOR SALE—NEW HAVEN, 60-INCH SWING Standard Engine Lathe—triple geared. 15 ft. bed, hollow spindle, cuts threads 1 to 12. Compound rest, countershaft, steady rest, wrenches, etc. This tool is in excellent shape and owner offers special bargain. Particulars from Winnipeg Machinery Exchange, Sutherland and Gladstone Streets, Winnipeg, Man. (24)

FOR SALE — AT ALEXANDRIA, ONT. — Machine shop in two buildings; 10,500 sq. feet concrete floor space; equipped with lathes, shaper, plainer, miller and variety of other iron-working machines and tools; good foundry in connection. Inventory of buildings, machinery and stock, $64,272. Practically new plant, in good condition. F. T. Costello, Assignee, Schell F. & M. Co., Ltd., Alexandria, Ont.

FOR SALE—McDOUGALL ENGINE LATHE 20" swing, 10' bed, complete with 20" 4-jaw chuck, countershaft, steady rest, face plate, gears, etc. This tool, we understand, has never been used; has been lying crated for about 5 years. We are having it cleaned and offer a decided bargain for quick sale. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg. (3)

SITUATIONS WANTED

MECHANICAL AND ELECTRICAL ENgineer, 16 years' experience, plant layout and maintenance; expert draftsman; wishes change. Box 207, Canadian Machinery. (26)

POSITION WANTED AS SALESMAN, agent, or traveler, for mechanical goods, or machinery, by Chief Engineer, (Marine), thoroughly reliable, of good education and appearance. Box 209. Canadian Machinery. (3)

MECHANICAL ENGINEER OPEN FOR POSItion of shop superintendent. Wide experience in mining machinery and electric motors, hot water boilers and radiation. Experienced in tool-making, designer, and a keen cost observer. Has had seven years' foundry experience, familiar with moulding machines and a post-graduate of McLain's system of mixing iron. Familiar with shell work. Can give the best of references. Box 211 Canadian Machinery (4)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 40, 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN
AMP FACTORY
ST. CATHARINES, ONTARIO

WANTED

WANTED—ELECTRIC TRAVELLING GANtry crane, span about 57 ft., clearance 50 ft., overhanging at one end; load 15 tons. State full particulars and price. Thor Iron Works, Limited, Toronto, Ont. (27)

Wanted to buy or sell Scrap Iron, Metals, etc.

At the present time we are paying the following prices:

No. 1 Scrap Wrought Iron, $13.75 gross ton.
Heavy Scrap Copper, $20.00 per cwt.
Mixed Heavy Scrap Brass, $13.00 per cwt.
Heavy Scrap Lead, $5.75 per cwt.
Scrap Aluminum, $32.00 per cwt.
Scrap Babbitt, $8.00 per cwt.

Our Motto: Honest dealings and prompt settlements. Make us a trial shipment.

L. S. TARSHIS & SON
88-98 Wellington Street, Montreal

Lathes for Sale

Second Hand

CHEAP

One Pryibil Spinning Lathe No. L7. 6-foot Bed with screw control gap. Complete attachments.

Good as New. Price $450.

One Windsor Machine Co. No. 4 Turret Lathe.

Six-hole turret hollow spindle take two-inch stock. Partly fitted with chaser bar attachments, screw adjustments and quantity of draw chucks.

A Real Bargain at $350.

Write for further particulars to

ONTARIO LANTERN & LAMP CO., LTD.
Hamilton - Canada

For Sale Cheap

1—Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.
1—12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 3 tons capacity; complete, less the Hoist.
1—10" Single "I" Beam Overhead Hand Power Crane, 23' 0" span, 2 tons capacity; complete, less the Hoist.
1—Brantford (Gas) Bake Oven and 4 Racks.
1—No. 5 High Speed Hammer.
2—Baker Type Vises.
1—Linderman 2-Spindle Boring Machine.
1—24" Drill, Bertram Company.
1—26" Drill, London Machine Tool Company.
1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

M. BEATTY & SONS,
Limited
Welland, Ont.

FOR SALE

■ ■

Two 24-inch standard Gisholt Turret Lathes, completely tooled for boring 4.5" H.E. Shells.

■ ■

Box 212
Canadian Machinery
t.f.

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3¼" Gridley Automatic
40" x 16' Conradson, heavy duty
40" x 12' New Haven
[illegible]" x 5' Davis
24" x 10' LeBlonde
24" x 8' Lodge & Shipley
21" x 8' Gisholt
[illegible]" x 10' American (2)
[illegible]" x 7' Fay & Scott
17" x 6' Garvin
16" x 6' Pratt & Whitney
16" x 5½' Warner & Swasey
16" x 5' Windsor, wire feed
15" x 5½' fox, American
2" x 24" Jones & Lamson flat turret
No. 22½ Garvin, wire feed
8" x 31" Brown & Sharpe

Engine Lathes

36" x 16' Putnam
32" x 22' London D.B.G
30" x 10½' Pond
26" x 14' Hamilton, D.B.G. (4)
16" x 14' Gleason, D.B.G. (2)
24" x 10' Peerless
22" x 10' Lodge & Shipley, patent head
22" x 8' Bertram, D.B.G.
21" x 12' Peerless
21" x 8' Back-geared single purpose (12)
20" x 12' Lodge & Shipley, patent head (2)
20" x 8' Lodge & Shipley, patent head
20" x 8' Hercules, heavy duty
20" x 8' Bullard
20" x 8' Ames
19" x 8' LeBlonde
18" x 8' New Haven
18" x 8' Lodge & Davis
18" x 6' New Haven
17" x 8' Blaisdell
16" x 8' Back-geared single purpose (20)
16" x 6' Porter
16" x 24" x 10' South Bend Gap
14" x 6' Hendey

Upright Drills

D4 Colburn, heavy duty
32" Rockford Back-geared, sliding head
24" Bickford, shaft-driven (2)
24" Foote-Burt
20" Canedy-Otto, back geared (2)
20" Bertram, power feed
16" Avey, high speed, ball bearing, sensitive
16" Avey, high speed, 4-spindle, sensitive
14" Excelsior
14" Garvin, 4-spindle
10" Barnes, friction (2)
60" Bertram Semi universal Radial
48" Gang, plain radial, tapping attachment
36" New Century, plain radial
32" Fosdick Plain Radial

Iron Planers

30" x 30" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
24" x 24" x 6' American
24" x 24" x 6' Bertram
20" x 20" x 5' Bertram

Milling Machines

No. 5 Becker-Brainard, plain
No. 25 Becker, plain
No. 12 Brown & Sharpe plain (2)
No. 2A Owen Universal
No. 1½ Brown & Sharpe Universal
Ennicking & Trautman Universal
24" Bertram plain
Lees Bradner Thread Miller

Presses

No. 12 Geared Rhodes, roller feed
No. 4½ Bliss
No. [illegible] Bliss
No. 5 Waterbury
No. 150 Brown Boggs

Miscellaneous

No. 7 Racine Hack Saw
No. 1 Racine Hack Saws (10)
Lo-Swing Lathes (2)
No. 1 Davis Keyseater
No. 11 Besly Grinder
22" x 9' Special Facing and [illegible] Machine
40" Baush Horizontal Boring Mill
No. 60 Heald Cylinder Grinder
No. 2 Garvin Automatic Tapping Machine
No. [illegible] Garvin Automatic tapping attachment
¼" Shuster Riveters [illegible]
[illegible] Punch and Shear
6½' Bertram Bending Rolls
[illegible] Hydraulic Nosing Press

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Front St. W., Toronto, Ont.

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Two 96-horse-power Gas Engines.

Complete with producers.

Made by the largest English manufacturers.

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Cranes

15-ton Morgan, 48′ 6″ span, 3 motors, D.C., 220 volts.

15-ton Niles, 50′ span, 3 motors, D.C., 230 volts.

10-ton Shaw, 60′ span, 3 motors, D.C., 220 volts.

Air Compressors

Two Laidlaw-Dunn Gordon, 31″ x 42″ Duplex Single Stage, Rope Drive Air Compressors, displacement 5500 cubic feet air per minute, 75 R.P.M., fitted with aftercoolers. Practically new machines, used less than two months.

Grinders and Millers

Landis Plain, 12″ x 96″.

Landis Universal, 12″ x 66″.

Four Landis No. 1½ Internal.

Brown & Sharpe No. 1 Internal.

Norton Universal, Tool.

No. 2 Garvin Cutter and Reamer.

Sellers Twist Drill Grinder.

Brown Roll Grinder, 10″ x 72″.

No. 3 Brown & Sharpe Cutter and Reamer Grinder.

No. 3 New Model Becker-Brainard Plain Miller.

No. 1-B Milwaukee Plain Miller.

No. 1 Cincinnati Plain Miller.

Newton Vertical Miller, 48″ rotary table.

Detrick & Harvey Milling, Drilling and Boring Machine.

No. 12 Brown & Sharpe Manufacturing Miller.

No. 9 Kempsmith Plain Miller.

Brainard Plain Miller, 13″ x 46″ table.

Garvin Plain Miller, 9″ x 48″ table.

Ingersoll Slab Miller, adjustable rail, 42″ between housings, 36″ x 12′ platen, three heads.

New York Machinery Exchange
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NEW AND USED MACHINERY

Why buy these tools from Commission Houses? We own every tool that we advertise and guarantee each and every one to be as represented. You can secure immediate shipments by buying direct from us and save the middleman's profits.

NEW MACHINES

2—13″ swing x 6′ bed South Bend Lathes, H.S., C.R., P.C.F.; complete	$ 215
2—11″ swing x 5′ bed Meyers Lathes, H.S., C.R., P.C.F.	235
2—16″ swing x 8′ bed South Bend Lathes, H.S., C.R., power cross feed; complete	390
1—14″ swing x 6′ bed Neat Lathe, D.B.G., C.R., H.S., P.C.F.; complete	535
1—19″ swing x 8′ bed, Sidney, D.B.G., H.S., C.R.; complete	860
2—21″ swing x 8′ bed, Sidney, D.B.G., H.S., C.R.; complete	925
1—No. 24 Oesterlin Heavy Plain Miller	1,070
1—20″ Ohio Back-geared Shaper, complete	650
1—25″ Smith-Mills Back-geared Shaper, complete	900
1—16″ American High Duty Shaper, motor drive, 220-440 volt, 60 cycle, 3 phase	850
1—Wilmarth Morman Drill Grinder, style J.B.P.T.	100
No. 6 Standard Universal Cutter-Reamer Grinders	450
2—No. 28 Canedy-Otto Sensitive Drills	25

USED MACHINERY.

1—12″ swing x 5½′ bed Barnes, H.S., swivel rest, screw cutting, steady rest, turret on shears	200
1—18″ swing x 8′ bed, Porter Lathe, C.R., P.C.F., C.K.	400
1—30″ swing x 16′ bed, New Haven, P.R., P.C.F., chuck, 5″ belt; complete	450
1—30″ swing x 9′ bed, New Haven, turret tool post, chuck, taper attachment; complete	460
1—20″ swing x 8′ bed, Pond, C.R., P.C.F., H.S., chuck	550
2—16″ swing x 6′ bed, Lodge-Shipley Lathes, 5-step cone, 2″ belt, C.R., P.C.F., H.S., Q.C.G., countershaft	560
1—Potter & Johnson Semi-Automatic Turret Lathe, complete with 3″ hollow spindle	650
1—14″ swing x 6′ bed, Lodge-Shipley, Patent Head, Q.C.G., H.S., C.R., chuck, complete; in excellent condition	660
1—34″ swing x 22′ bed, New Haven Lathe, block to 44″, C.R., 34″ chuck; complete	800
1—2 x 24 Jones-Lamson, geared head	1,285
1—14″ swing x 6′ bed, Lodge & Shipley Tool Room Lathe, with pan bed, Q.C.G., taper attachment, releaving attachment; complete	950
12—22″ swing x 8′ bed, American, Q.C.G., D.B.G., four-sided turret tool post, complete; used three months	1,050
1—66″ swing x 16′ bed, Pond, C.R., P.C.F., H.S., 4½″ hole, 5″ belt; complete	2,000
1—No. 2 Kempsmith Plain Millers, perfect condition.	875
1—No. 1 Ohio Plain Miller, complete; perfect condition	900
1—No. 2 Cincinnati Universal Miller, latest type, complete; two months old	1,550
1—36″ Fellows Gear Shaper, practically new, serial number 784; complete	1,300
1—24 x 24 x 6 Lathe Morse Planer with Adams Universal Milling Head with Milling Cutter; complete with chuck	600
1—24 x 24 x 6 Gray Planer; excellent condition	675
1—30 x 30 x 16 Bement, extra heavy; perfect condition	750
1—24 x 24 x 8 Cincinnati Planer; good as new; 1 head	1,000
1—20″ Canedy-Otto Power Drill, tapping attachment.	105
1—Four-spindle Dwight Slate, 14″ Drill	120
1—No. 51 Canedy-Otto Drill with 3½″ arm	240
1—36″ Semi-Universal Radial, complete; perfect	750
1—No. 68-N Bliss Press, double acting; good as new.	550
1—31-S Bliss Press, back-geared	700
9—No. 52 National Acme, 4-spindle, 1¼-inch hole; used three months	1,800

Prices Quoted are F.O.B. Albany.

Simmons Machine Company, Inc.
981 Broadway, Albany, New York
New York Office: 902 Singer Building, New York City

Guaranteed Machinery for Immediate Delivery

TURRET LATHES

12" Windsor, plain head.
16" Lodge & Shipley, plain head.
No. 2 Warner & Swasey, hollow hex.
24" Niles, friction head.
16" Foster, ring turret.
24" Garvin Turret Boring Lathe, back-geared.
28" Gisholt, with taper attachment.

ENGINE LATHES.

14" x 6' Davis, q.c.g.
14" x 6' Fairbanks, c.r. and taper.
14" x 6' Prentice, c.r.
16" x 6' Robbins, c.r
16" x 6' Sebastian, p.r.
16" x 8' Lodge & Shipley, pat. head.
16" x 10' Greaves & Klusman, c.r.
18" x 6' Bradford, c.r.
18" x 8' Lodge & Shipley, pat. head.
18" x 10' Bradford, c.r. and taper.
18" x 12' Barker, c.r.
18" x 12' American, q.c.g.
18" x 12' Greaves & Klusman, c.r.
20" x 10' Flather, c.r.
21" x 12' Bradford, c.r.
21" x 12' New Haven, c.r.
24"-40" x 12' McCabe, two-spindle.
24" x 16' Schumacher & Boye, c.r.
32" x 12' Pond, c.r.
30" x 14' Reed, c.r.
36" x 12' Hamilton, c.r.
34" x 16' Blaisdell, c.r.
36" x 28' American, c.r.
42" x 24' Fifield, c.r.

SCREW MACHINES.

Pratt & Whitney No. 1 friction gear.
1 3/16" Hartford Automatic.
2" Cleveland Automatic.
2¾" Cleveland Automatic.

BORING MILLS.

52" Niles, car wheel.
48" Colburn, two heads.
60" Colburn, vertical, two heads.
51" Bullard, two swivel heads with motor drive and motor.

PLANERS

Morton Portable.
17" x 17" x 12' Whitcomb, crank.
22" x 22" x 6' Gray, one head.
24" x 24" x 4' New Haven, one head.
24" x 24" x 6' Pond, one head.
24" x 24" x 6' Gray, one head.
30" x 30" x 8' Woodward & Powell, one head.
36" x 36" x 10' Powell, one head.
36" x 36" x 12' Powell, two heads.
36" x 36" x 16' Sellers, one head.
39" x 39" x 12' New Haven, one head.
40" 40" x 12' New Haven, one head, one side head.
54" x 54" x 14' Pond, two heads, arranged for motor drive.

MILLING MACHINES.

No. 12 B. & S., plain.
No. 2 Cincinnati, plain.
No. 2 P. & W., Lincoln Type.
No. 23 Fox Miller.
No. 13 P. & W., Lincoln Type.
Garvin No. 1½ Universal.
No 3 LeBlond, plain.

GEAR CUTTERS.

24" x 7" Gould & Eberhardt, for spur gears.
24" x 9" Gould & Eberhardt, for spur, bevel and face gears.
36" Walcott.

SHAPERS.

15" Hendey, friction.
16" Niles, back-geared.
18" Barker & Chard, back-geared.

HAMMERS.

100-lb. American, steam post.
100-lb. Pittsburg, single frame, steam.
200-lb. Bliss, drop.
300-lb. Bliss, drop.
800-lb. Morgan, single frame, steam.

PRESSES.

No. 77A Toledo, o.b., straight side.
No. 3 Delivouk & George, o.b., inclinable.
No. 3 Toledo, o.b.
No. 430 McDonald, double crank.
No. 133 Ferracute, double action.
No. 95 Bliss, double crank.
No. 77A Toledo, o.b.

DRILLS.

5' Dreses Full Universal Radial.
3' Economic Plain Radial.
2½' Dreses Radial.
No. 30-C Baush, 12-spindle.

Advise us what you contemplate purchasing and we will keep you posted on our stock.

The H. A. Stocker Machinery Company, 566-572 W. Randolph St., CHICAGO, ILL.

High-Grade Used Machinery

ENGINE LATHES

1—16" x 8' Greaves & Klusman Quick-Change Gear Lathe, single back geared.
1—18" x 10' Lodge & Shipley Quick-Change Gear Engine Lathe, single pulley drive, variable speed countershaft, plain block rest.
1—18" x 8' Rahn-Carpenter, plain screw cutting; rebuilt.
1—18" x 10' Bradford, plain screw cutting.
1—24" x 12' American Quick-change, double back-geared; nearly new.
10—22" x 10' Milwaukee, double back-geared, plain screw cutting comp. rest; new machines. Write or wire for circular and prices.
1—30" x 14" James, raised to swing 38", plain screw cutting.

SCREW MACHINES

5—1½" Milwaukee Screw Machines, complete. Write for circular.
1—1½" Dreses Geared Friction Head Screw Machine, complete.
1—1½" x 9" Acme Turret Screw Machine, friction geared head, complete; excellent shape.
1—No. 2 Brown & Sharpe Semi-Automatic Wire Feed Screw Machine; rebuilt.
2—⅝" Cleveland Automatics.
1—1" Cleveland Automatic.
1—2" x 24" Jones & Lamson Flat Turret Lathe, cone drive, rebuilt; excellent condition.

MILLING MACHINES.

1—No. 0 Owen Plain Milling Machine; rebuilt.
1—No. 3-H Becker-Brainard Profiler; rebuilt; first-class shape.
1—LeBlond Heavy Design Worm Cutting Attachment for use on No. 2 LeBlond Miller.

GRINDERS

1—No. 60 Heald Cylinder Grinder; rebuilt; 20" table.
1—4" x 30" Pratt & Whitney Automatic Sizing Grinder; rebuilt.
1—12" x 42" Landis Universal Tool Room Grinder; rebuilt.

SHAPERS.

1—24" Lutter & Gies "Milwaukee" Back-geared Crank Shaper; fine shape.
1—20" x 50" Walker Traveling Head Open Side Planer or Shaper.

MISCELLANEOUS.

1—30" Mueller Radial Drill.
1—No. 1 26" Diamond Automatic Face Grinder.
1—2" Bignall & Keeler P.D.Q.C. Pipe Machine.
1—No. ½ Schuchardt & Schutte Gear Hobber.
1—32" x 32" x 6' Pond Heavy Pattern Planer, one head.
1—48" x 48" x 14' Pond Planer, one head.
1—48" x 48" x 16' Pond Planer, one head.
1—No. 3½ A Bliss Toggle Drawing Press, nearly new.
1—60" Stevens Pulley Lathe.
1—48" Brainard Automatic Gear Cutter.
1—17-G New Doty Single End Punch or Shear, 12" throat, capacity 2" in 1".

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LINCOLN TYPE MILLERS

No. 55 FOUR SPINDLE NATIONAL ACME

TWO 2-inch CLEVELAND AUTOMATICS

Etc.

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MACHINE TOOLS - THE VERY BEST

GRINDERS.

Two (2) 14 x 72 Norton, plain, excellent condition, modern type, each	$2500
Two (2) 10 x 72 Norton, plain, excellent condition, modern type, each	2200
12 x 36 Cincinnati Universal	1250
No. 3 Brown & Sharpe Universal 12 x 50	2000
No. 60 Heald Cylinder	1000
Landis plain, 8 x 38	1400
Springfield Universal, 16 x 40	850
Two (2) No. 5 Rivet, each	750
No. 3 Brown & Sharpe Cutter Grinder	300
No. 7 Geo. Gorton, double end disc grinder with wheel chuck on one end, steel discs and tilting table	300
Diamond Side Type Shop Face Grinder, working surface of table 9" wide x 2' long, cup wheel 14" dia	300
Wells Cutter Grinder	75
No. 1 Peerless Surfacing Machine, 10" belt	75
Plain Grinders, Wet Tool Grinders, Polishing Machines, large and small.	

HAND MILLING MACHINES.

Two Chicago, each	200
Pratt & Whitney No. 2	175
Four Pratt & Whitney No. 1, each	125
Two No. 2 Garvin, each	150
Two No. 3 Garvin, each	175
Six Pratt & Whitney, No. 1½, each	175
Two Pratt & Whitney Hand Millers	...
Reed	150
Pratt & Whitney	150
Pratt & Whitney, with vise	150
Two Pratt & Whitney	...

HORIZONTAL BORING MACHINES.

No. 2 Beaman & Smith Combination Boring, Drilling and Milling Machine; good as new	5000

HORIZONTAL BORING MACHINES (Continued)

Beaman & Smith No. 8, 5" spindle	$3500
Bement & Dougherty No. 3, Knee Type, 3¾" bar	1450

PLANERS.

48 x 48 x 20' Putnam, 2 heads on rail; excellent condition.	3500
36 x 36 x 14' Powell, 2 heads on rail	1750
32 x 32 x 10' Gleason, single head; good as new	700

LATHES.

60 x 28' Fifield, raising blocks to swing 75". double back-geared, face plate drive, dia. of face plate 56" x 8"; good as new	7000
50 x 20' Fifield, Massive Pattern, 48" four-jawed chuck	2750
52 x 16' Gleason, heavy triple-geared, faced plate drive	2500
24 x 18' Lodge & Shipley, quick-change gear, taper, motor driven, carriage control	2000
16 x 8' Pratt & Whitney, quick-change gear, taper attachment, H.S., C.R.; good as new; latest type	1000

MULTIPLE SPINDLE DRILLS.

Bausch 8 spindle, 1¼" joints	1150
Foote-Burt 8 spindle, spindles adjustable on rail, center to center outside spindle 6' max	800
Snyder 28" 4 spindle, back geared, sliding head, table 30" long, 16½" wide	300
Five (5) Gardan 4 spindle, each	250
No. 11 Pratt & Whitney 15 spindle	325
Two 14" Barr 3 spindle Sensitive, each	90
No. 11 Pratt & Whitney, 10 spindle	325
2 spindle Barr	60
Bausch 16 spindle	750
Three 4 spindle Fenn Sensitive, adjustable heads, each	150
Allen 4 spindle	200
Henry & Wright 3 spindle	200

REMEMBER, THESE ARE ONLY SAMPLES ! ! ! WRITE FOR OUR STOCK LIST.

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50 Church St., Suite 482, Telephone Cortlandt 665, New York   Warehouse, 408 Claremont Ave., Jersey City, N.J.

FOR SALE

GRINDING MACHINES

1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16" x 66" Landis Crank Shaft Grinder (18 months old).
2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES

58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 15" Gisholt Semi Automatic (12 mos. old).
20 21" Gisholt Semi Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES

1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 6 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES

1 8-spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.
2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS

1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES

38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES

2 Noble & Westbrook No. 1 (new).

PROFILERS

1 No. 3H Becker (new).

PLANERS

1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 4 " x 48" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS

1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES

1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES

1 12" Jackson (new).

KEY SEATERS

1 No. 1 Catlin (new).

SCREW MACHINES

1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
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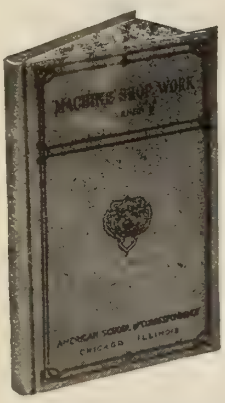

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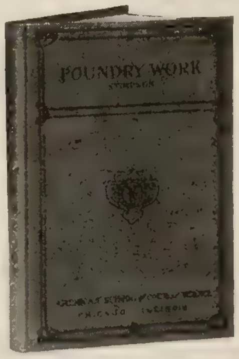

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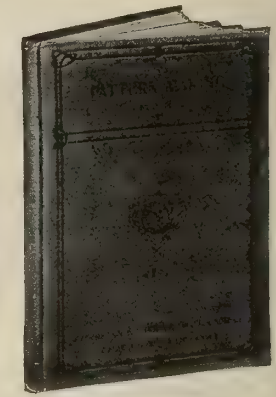

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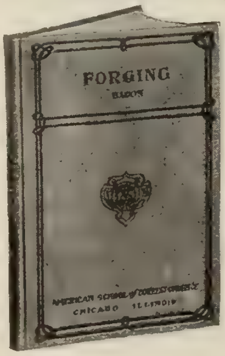

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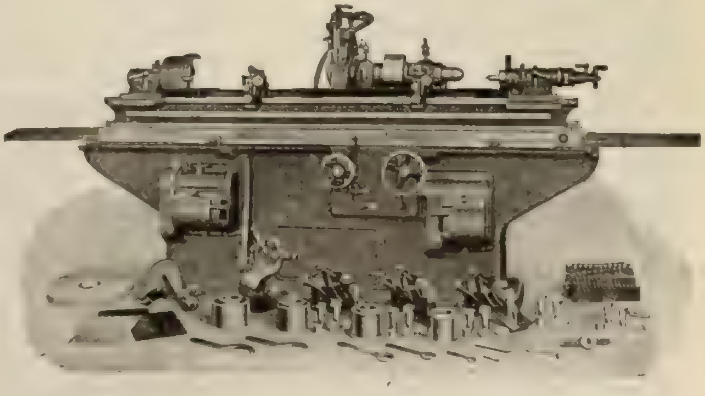

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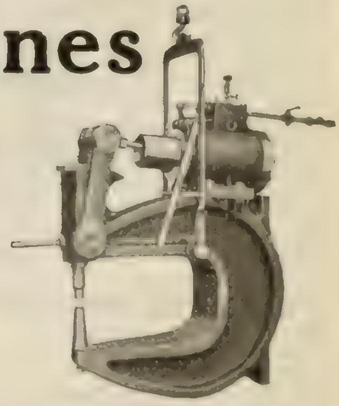

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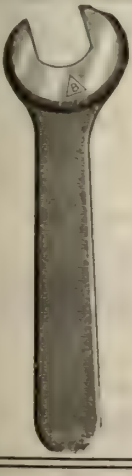

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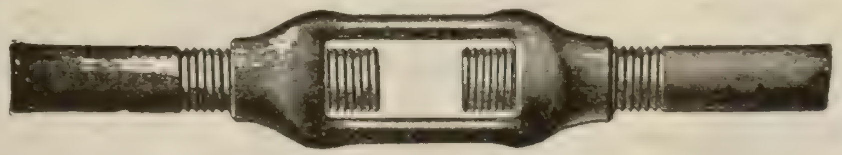

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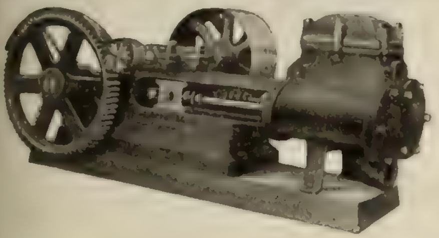

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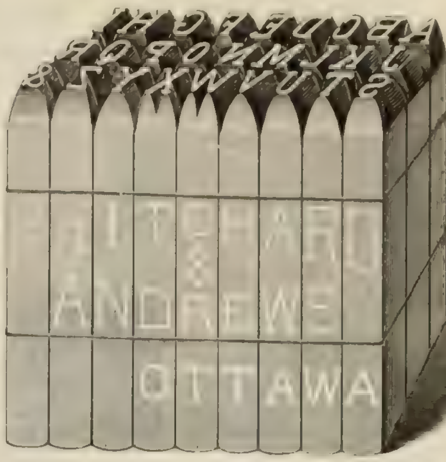

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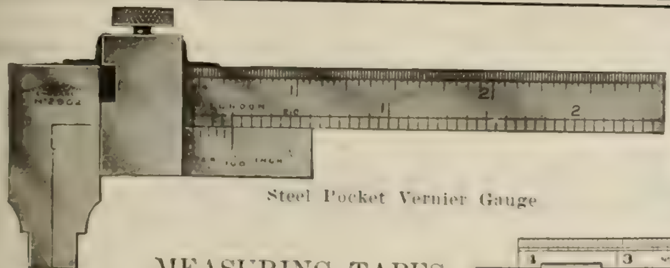

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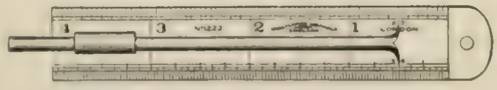

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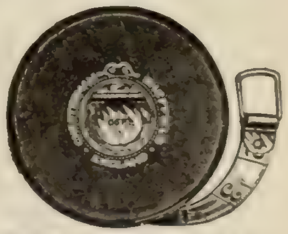

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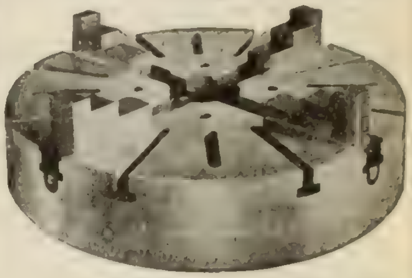

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A weekly newspaper devoted to the machinery and manufacturing interests.

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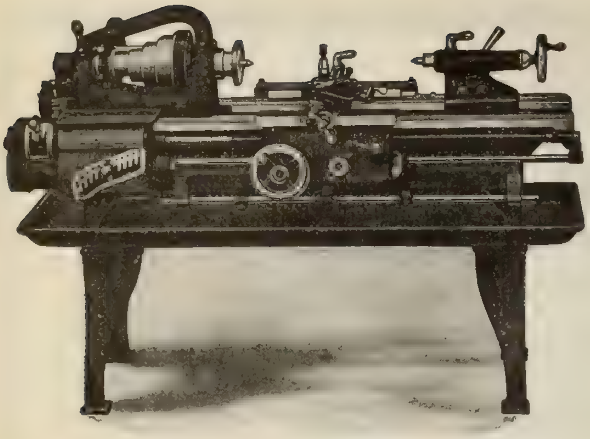

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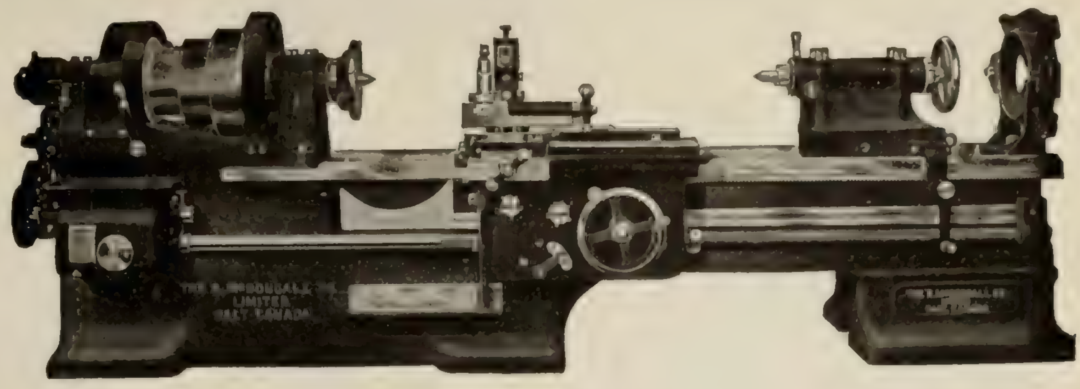
McDougall Gap Lathes

—

Strength
Accuracy
Quality



Take a look at the next money you intend to invest in a Lathe. Then, take a look at the money's worth we offer you in our machine. Your money will soon come back to you in increased production and we will have the pleasure of having a satisfied user. Our machines are just as good as they look and they look good too.

We invite the closest inspection.

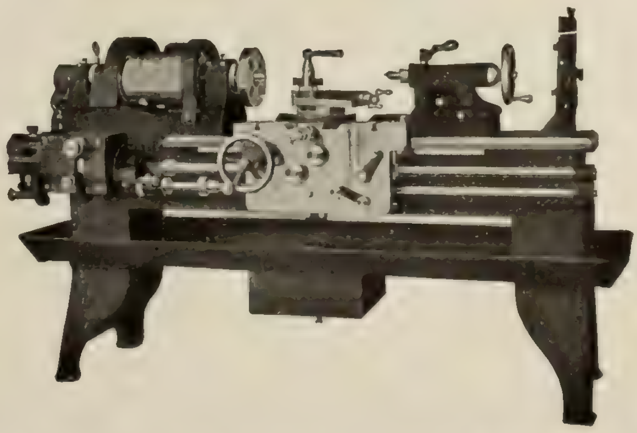
ARE-MAC-DEE IS A GUARANTEE

Particulars on request.

The R. McDougall Company Limited

Manufacturers
GALT, Ont., Canada
The Canadian Fairbanks-Morse Co., Limited, Sales Agents.

In Stock for Immediate Delivery

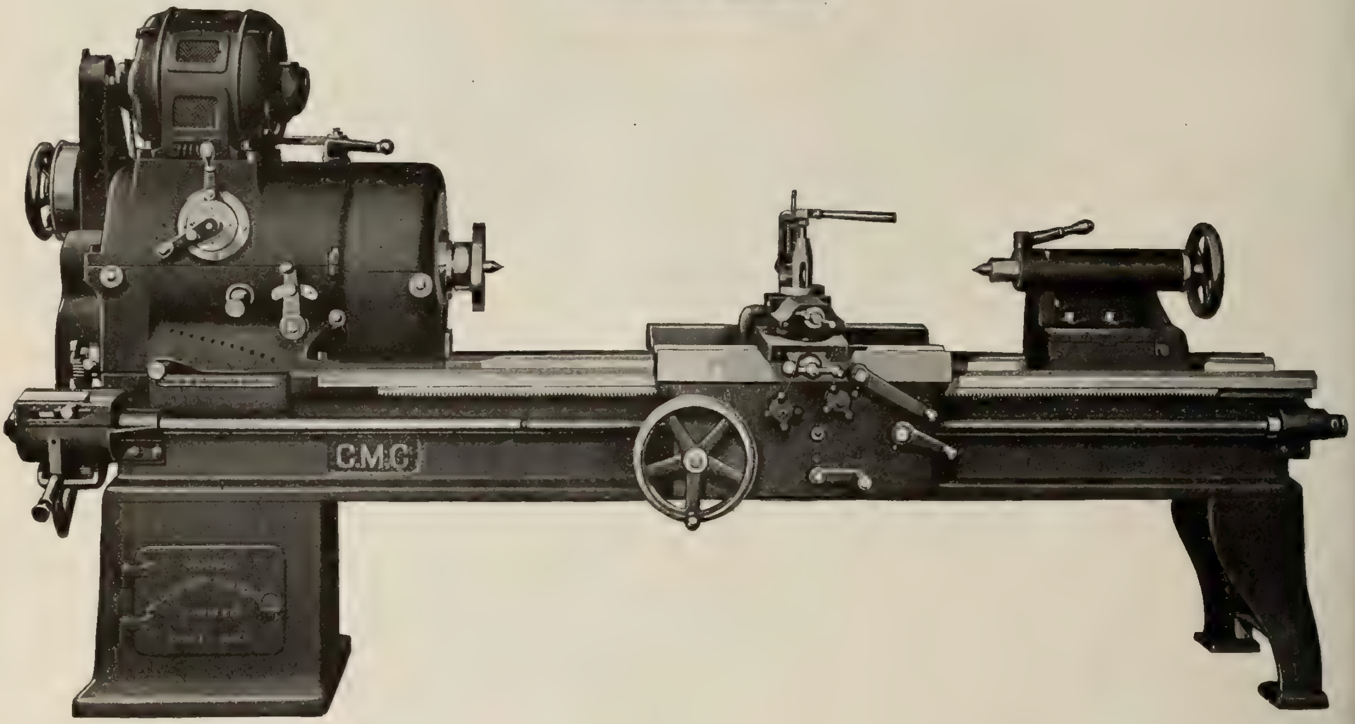


1 8" Rivet Lathe, back-geared, power feed, draw-in collets, grinding and milling attachment.
2 17 x 8 Sidney Standard Gear Engine Lathes.
1 16 x 6 Flather Tool Room Lathe, complete with draw-in collets and taper attachment.
1 18 x 8 Flather Tool Room Lathe, compound rest and draw-in attachments.
1 16 x 8 Prentice All Geared Turret Lathe, power longitudinal and cross feed.
1 20 x 8 C.M.C. Turret Lathe, three-step cone, double back-geared, power feed to turret.
2 16 x 8 South Bend Screw Cutting Lathes, No. 19.
1 No. 1 [illegible] Turret Screw Machine.
1 18 x 10 American Lathe, quick-change gear, single back gear.
1 36 x 14 Conradson Turret Lathe, for 8 and 9" shells.
3 21 x 8 Roulsted Heavy Duty Lathes for turning 4.5, 5 and 6" shells.
4 21 x 8 Roulsted Heavy Duty Lathes, with turret on carriage for boring 4.5 and 6" shells.
1 Cincinnati Planer, 24 x 24 x 6.
1 Whitcomb Planer, 24 x 24 x 6.
1 London Planer, 24 x 24 x 6.
1 [illegible] Shaper.
1 25" Hendey Friction Shaper.
1 24" Hendey Friction Shaper.
1 24" Sibley Back Geared Drill Press, Sliding Head.
1 24" Buffalo Back Geared Drill Press.
1 24" Buffalo Drill Press, Worm and Lever Feed.
3 20" Champion Drill Presses, Back Geared, Power Feed.
1 14" 4-Spindle Sensitive Drill Press.
2 Woodward & Rodgers 24" 3-Spindle Sensitive Drill Press.
1 14" 3-Spindle Sensitive Drill Press.
1 No. 19 Oesterlein Full Universal Milling Machine.
1 Rockford Plain Milling Machine, [illegible] x 8.
2 Ford-Smith Plain Milling Machines.

THE FOSS & HILL MACHINERY CO.

305 ST. JAMES STREET - - - - MONTREAL, QUE.

MACHINE **C.M.C.** TOOLS



All-geared Head Lathe

Sizes 16", 18", 20", 24", 26", 32"

Our all-geared Lathe is ideal for constant speed motor or single pulley drive.

In this head we offer a larger speed range with fewer gears than any other head on the market.

18 Spindle Speeds with 13 Gears

The gears are made of special alloy steel heat treated.

Full descriptions and details on request.

CANADA MACHINERY CORPORATION

LIMITED

GALT, ONTARIO

BUILDERS OF MACHINE TOOLS AND WOODWORKING MACHINERY

For the convenience of the Trade we have opened Showrooms in Toronto at Brock Avenue Subway, where a full line of our machinery can be inspected.

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CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XVI—No. 5 Publication Office: Toronto, Aug. 3, 1916 Subscription Price $3.00 per Year

Jenckes Single Purpose Lathes

TURNING COPPER BANDS ON SHELLS

The two most important factors in the machining of shells, **SPEED AND ACCURACY,** can be achieved when turning copper bands with Jenckes Machine tools.

We build Copper Band Turning Lathes for 18 pr., 4.5-in., 5-in., 6-in., 7-in., 9 2-in. and 12-in. shells.

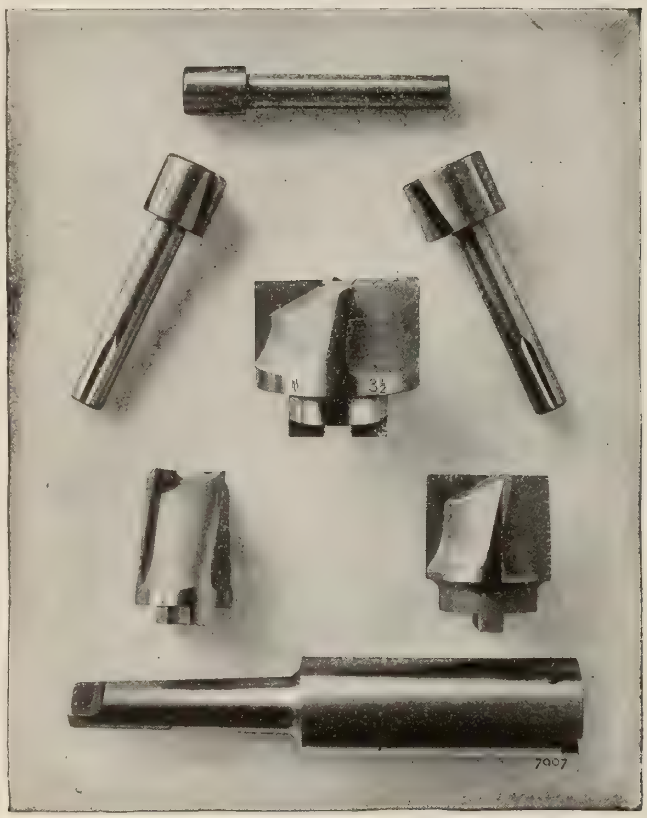
Write for deliveries.

THE JENCKES MACHINE COMPANY, LIMITED

Works: SHERBROOKE, QUE.; ST. CATHARINES, ONT.

SALES OFFICES: 727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

The Right Combination At Once



Holder, Cutter and Guide

For every counterboring job you can immediately make the right combination of holder, cutter and guide, if your tool room is equipped with

P. & W. Interchangeable Cutter Counterbores

Holders, Cutters and Guides furnished in wide range of sizes.

Holders

End of holder is milled to receive the driving lug of the cutter and there is also a hole and set screw to accommodate the shank of the guides.

Guides

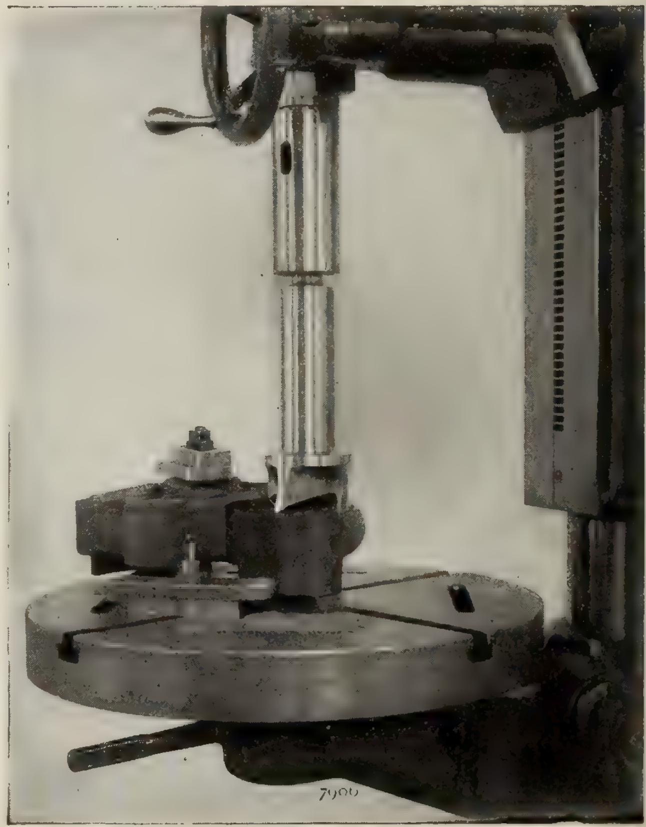
Are of hardened tool steel. They are held in place by means of a set screw in the holder engaging a V-slot in the shank of the guide.

Cutters

Can be furnished of either carbon or high speed steel.

The shank of the guide passes through the hole in the cutter and the shoulder between the guide and its shank keeps the cutter in place. Cutters can be sharpened on the face and the guide is simply pushed further in the hole after grinding.

Write for catalog "Small Tools" showing our complete line.



Spot Facing
with a P. & W. Interchangeable Cutter Counterbore

Place a trial order with our nearest store.

Pratt & Whitney Company of Canada, Limited

DUNDAS
Ontario

MONTREAL
723 Drummond Bldg.

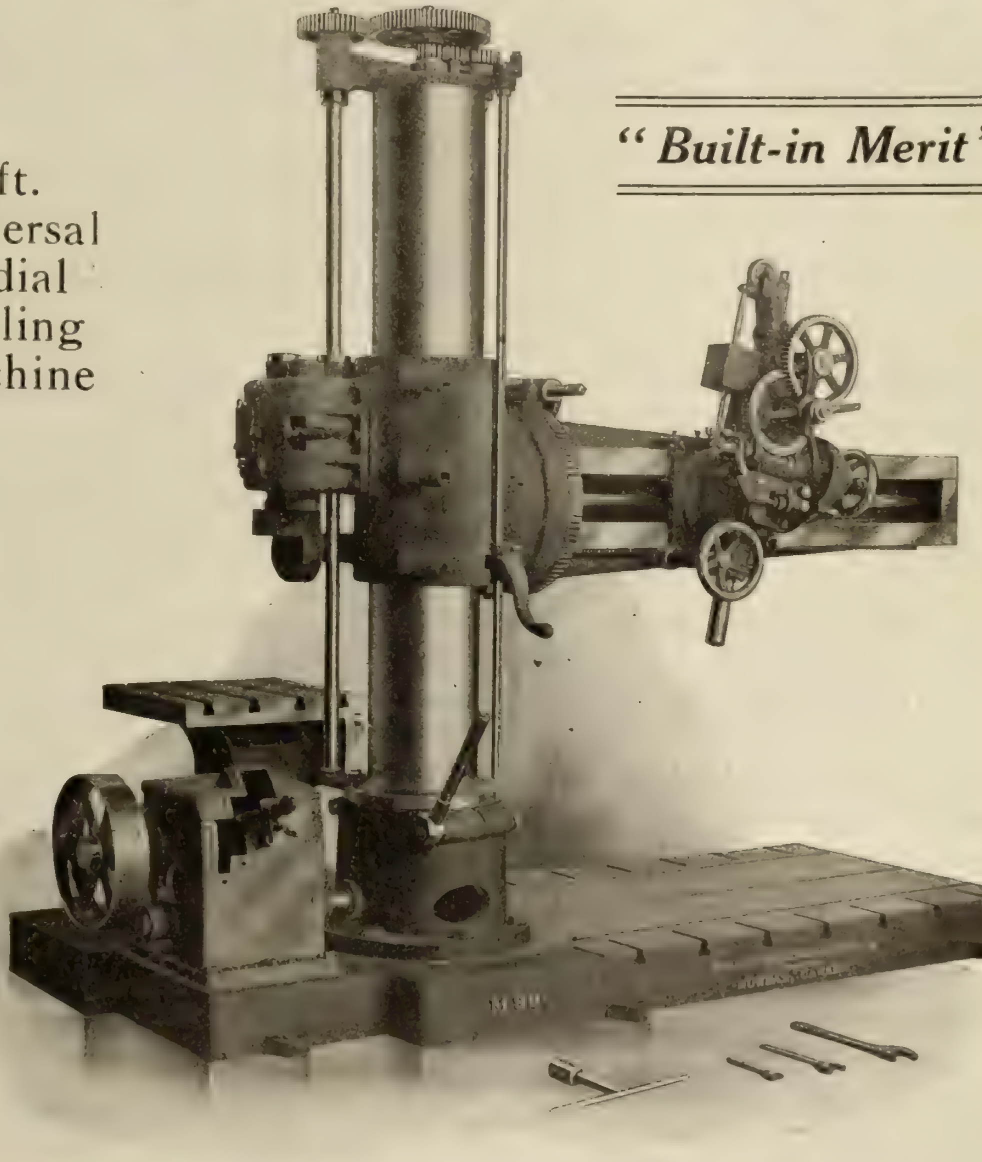
WINNIPEG
1205 McArthur Bldg.

VANCOUVER
B.C. Equipment Co.

BERTRAM MACHINE TOOLS

"Built-in Merit"

6 ft.
Universal
Radial
Drilling
Machine



DROP US A LINE FOR PHOTOGRAPHS AND FULL DETAILS
on any machine or machines in which you are interested

The John Bertram & Sons Company Limited

Dundas, Ontario, Canada

MONTREAL	VANCOUVER	WINNIPEG
723 Drummond Bldg.	609 Bank of Ottawa Bldg.	1205 McArthur Bldg.

If any advertisement interests you, tear it out now and place with letters to be answered.

The Publisher's Page

TORONTO **August 3, 1916**

Canada's Era of Expansion

CANADA is entering the arena of world-trade, to supply the markets of Europe, Asia, Africa, Australia and South America. Necessity and opportunity have combined to force her into this larger energy.

* * *

Time was, and that until yesterday, when the manufacturers of Canada as a class were largely indifferent to foreign trade — this for the perhaps sufficient reason that the home demand was taxing them to the limits of production. In a sense this same condition continues to obtain, for the burden on the Canadian manufacturer to meet home demand is made the heavier in view of the cutting off of supplies from other lands—from Great Britain and the Continent in particular.

* * *

But a clamorous demand from abroad joined to alluringly attractive prices, is multiplying the energies of Canadian producers, and a new vision and a new purpose have impelled them to greater efforts than ever before.

* * *

All this to meet the immediate situation. Beyond this is the larger future — the opening markets of the East and South, into which Canada, as one of the Allies, will have a ready access and a hearty welcome. Great Britain, France, Italy, Russia will depend heavily on Canada for her distinctive products; and Canada's economic advantages, due to her possession of essential raw materials in unreckoned measure, will, in the economic adjustments of trade following peace, be utilized to the full.

* * *

It is to be remembered that Canada has three ocean coasts—the Atlantic, the Pacific and the Arctic—this latter of very real value when the ports on Hudson's and James Bays are opened up, and trade routes via these waters established.

* * *

Also, for half of her Continental width, Canada possesses a magnificent waterway—the way of the five great inland seas and their outlet, the St. Lawrence River.

* * *

Add to all this her three transcontinental railway lines to carry East and West the yield of forests, fields, mines and seas; and her manufactured products; and it must be apparent that Canada, strategically and by the arts and labors of man, is able in a marvellous way to enter the business of supplying the world's needs.

* * *

The fruitage of the present era of expansion will have a sure result: it will multiply Canada's production. If her own people and industries are insufficient in point of numbers to meet the demands of the new conditions, then it is inevitable that the population of tillers of the soil and workers in the factory; and other toilers will come in from without, attracted by the magnet of prosperity long continued.

* * *

Canadian Machinery
and
Manufacturing News
143-153 University Avenue
Toronto
also at Montreal, Winnipeg, New York,
Chicago, Boston and London.

Quality Service

The Steel Company of Canada, Limited

PRODUCTS

"HAMILTON" PIG IRON

BASIC, MALLEABLE AND FOUNDRY

IRON AND STEEL

BLOOMS, BILLETS, BARS, WIRE RODS, ANGLES, CHANNELS, PLOW BEAMS, ETC.

FORGINGS

Car Axles, Shape and Drop Forgings, Horse Shoes, Carriage and Automobile Hardware, Top Goods, Etc.

WIRE, ETC.

Steel, Brass, Copper and Bronze, Heavy and Fine, Bright Annealed, Coppered Liquor Bright, Galvanized and Tinned. Stranded, Steel and Copper Cable, Clothes Line, Wire Nails, Staples, Barb Wire, Woven Wire Fencing, Fence Gates.

RAILWAY FASTENINGS

Angle Bars, Track Bolts, Tie Plates, Spikes, Tie Rods, Etc.

NAILS, SPIKES, RIVETS, ETC.

Wire, Cut, Boat and Horse Shoe Nails, Railway, Pressed and Drift Spikes. Tacks and Shoe Nails, Steel and Copper Rivets, and Burrs, Iron, Brass and Copper.

POLE LINE HARDWARE

Pole Steps, Cross Arm Braces, Guy Clamps and Guy Rods, Etc., Black and Galvanized.

BOLTS, NUTS AND WASHERS

Machine, Carriage, Elevator, Stove, Tire and Sleigh Shoe Bolts, Blank, Tapped Nuts, and Washers.

WROUGHT PIPE

Black and Galvanized Nipples and Couplings.

SCREWS

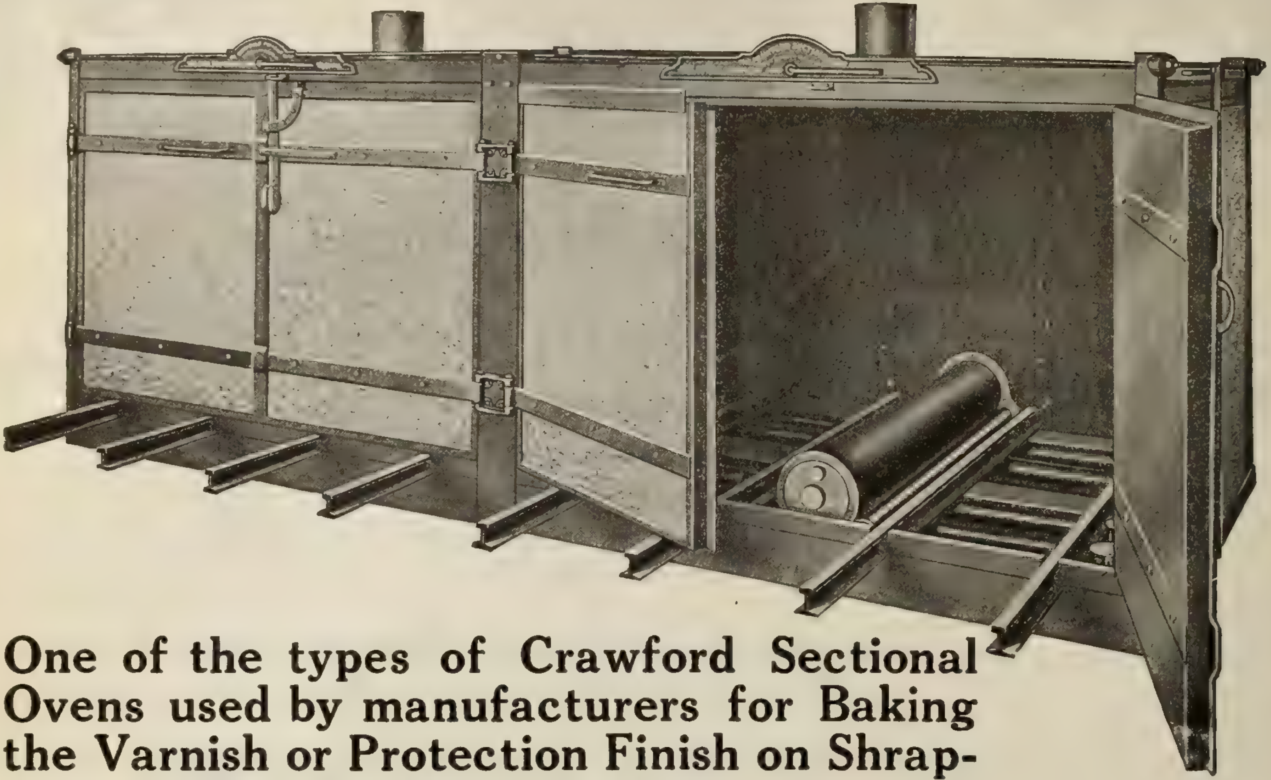
Wood and Machine Steel, Brass and Bronze.

LEAD PRODUCTS

Lead Pipe, White Lead, Shot and Putty.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG

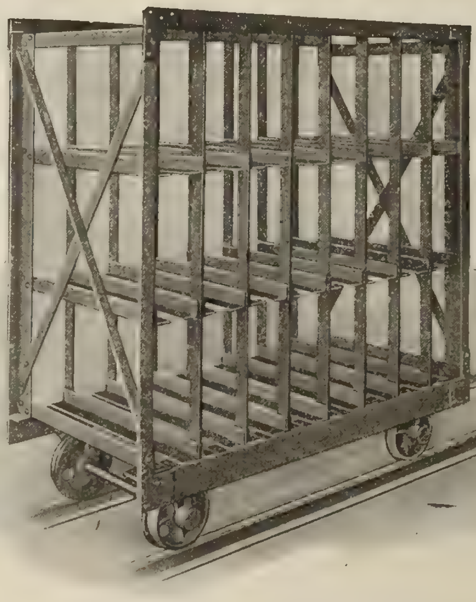


One of the types of Crawford Sectional Ovens used by manufacturers for Baking the Varnish or Protection Finish on Shrapnel and High Explosive Shells.

These ovens are equipped with the only gas burner that gives a combined radiated heat and circulation of preheated air in the oven.

The gas and air are mixed and combustion in the large cylinder supported by air from a positive pressure blower which gives the highest efficiency and economy known for burning either city, natural, gasoline or producer gas, and there is no exposed flame in the oven.

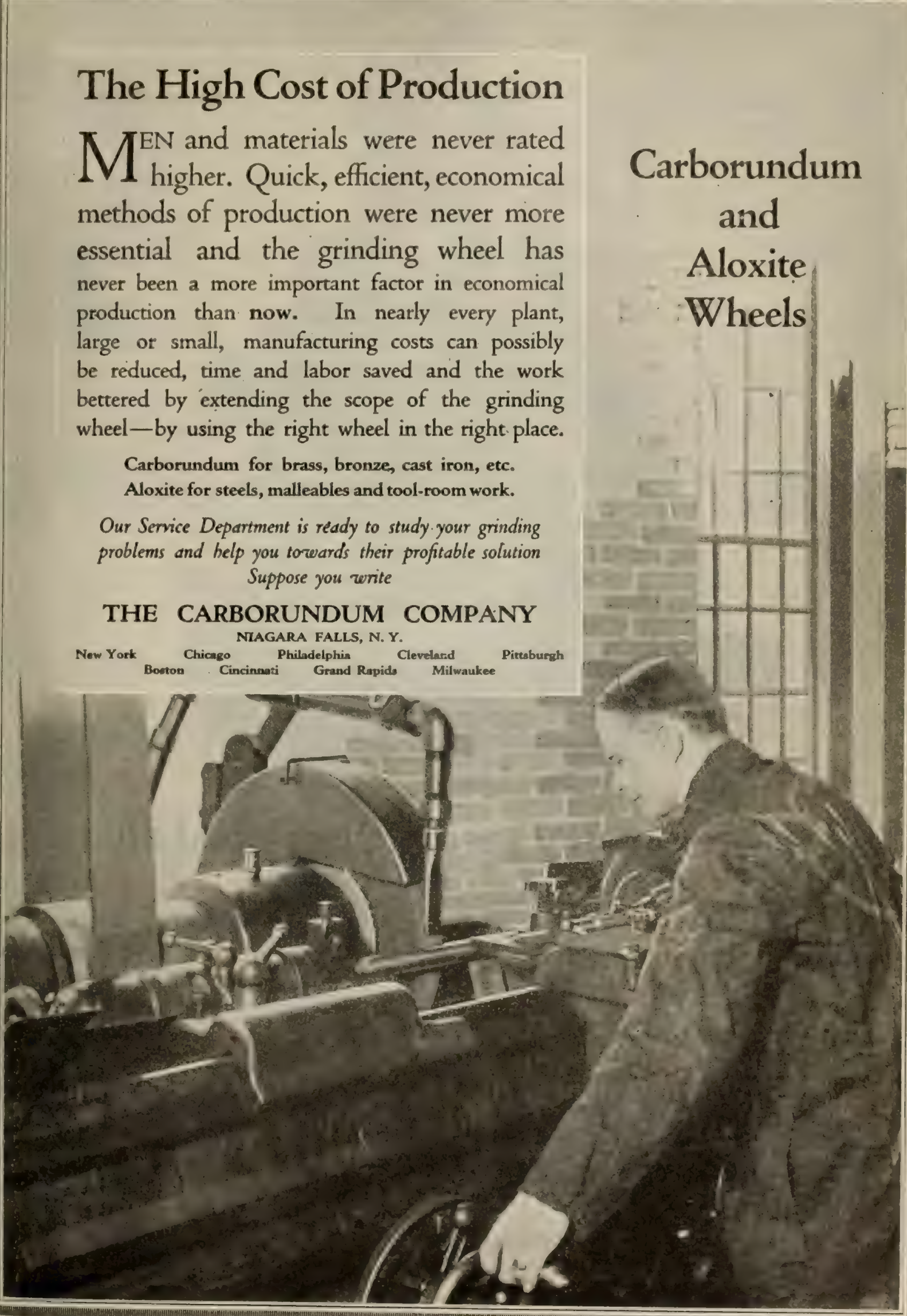
The truck shown holds (120) twenty-eight-pound shells and is planned to stand the shells on end, resting on angles. Other designs have been built for shells ranging in weight from fifteen to eight hundred pounds, the last mentioned shell being forty-eight inches high by twelve inches in diameter.



The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN., U.S.A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA



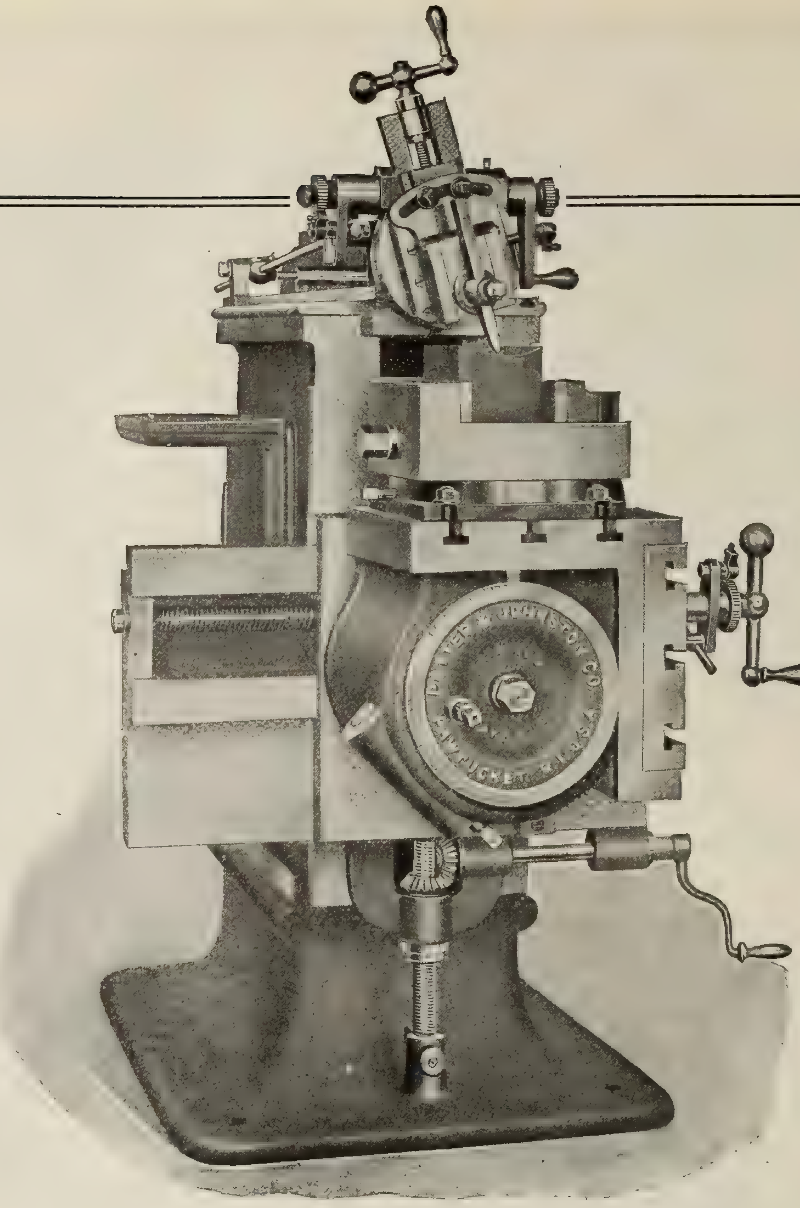
The High Cost of Production

MEN and materials were never rated higher. Quick, efficient, economical methods of production were never more essential and the grinding wheel has never been a more important factor in economical production than now. In nearly every plant, large or small, manufacturing costs can possibly be reduced, time and labor saved and the work bettered by extending the scope of the grinding wheel—by using the right wheel in the right place.

Carborundum for brass, bronze, cast iron, etc.
Aloxite for steels, malleables and tool-room work.

Our Service Department is ready to study your grinding problems and help you towards their profitable solution
Suppose you write

THE CARBORUNDUM COMPANY
NIAGARA FALLS, N. Y.
New York Chicago Philadelphia Cleveland Pittsburgh
Boston Cincinnati Grand Rapids Milwaukee



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

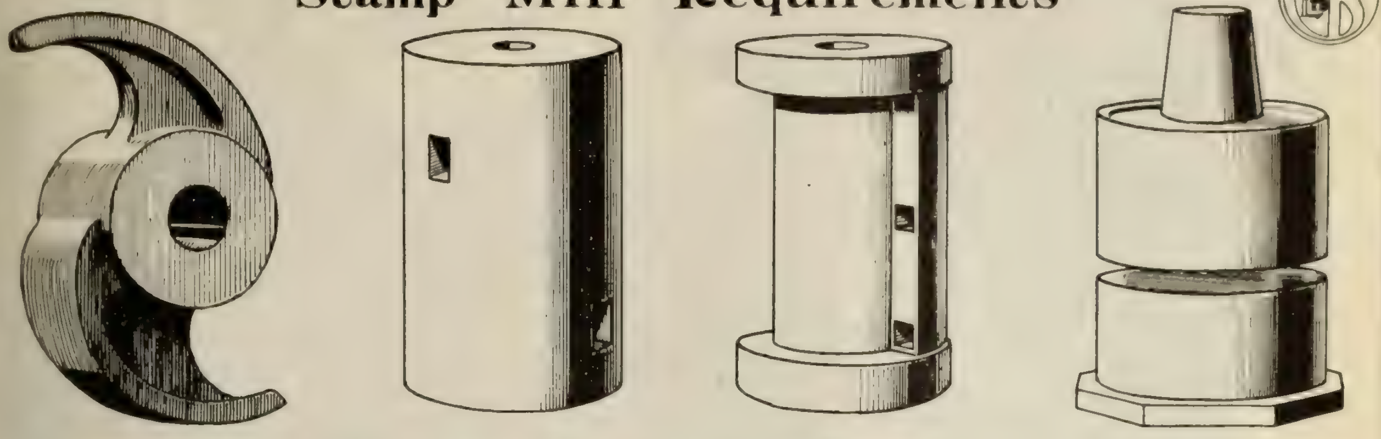
WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

Stamp Mill Requirements



Cams, Heads, Tappets, Shoes and Dies

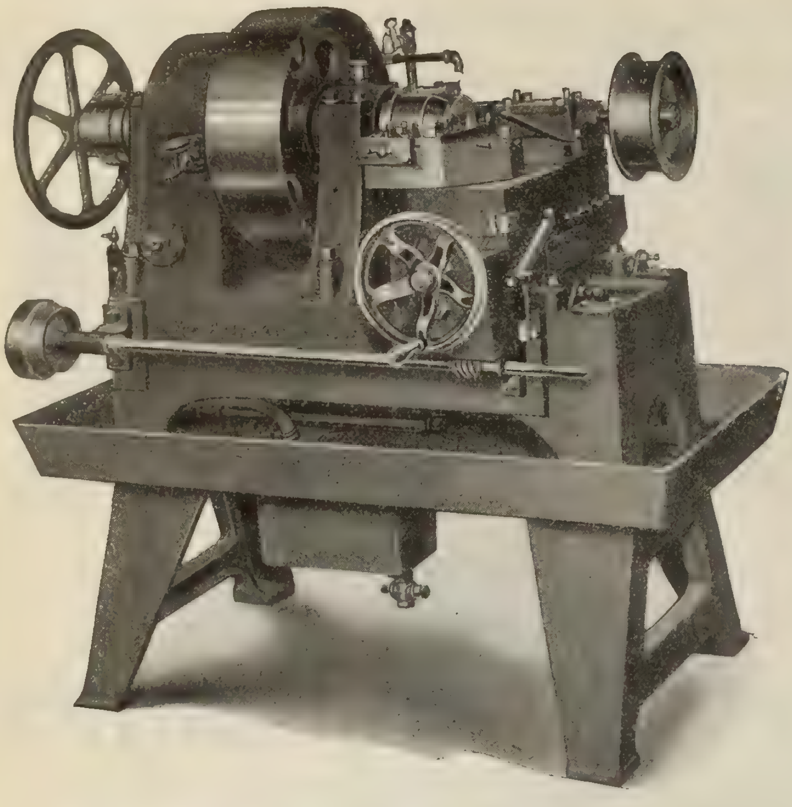
SUPERIOR QUALITY & QUICK DELIVERY

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

ARMSTRONG, WHITWORTH OF CANADA, LIMITED
22 VICTORIA SQ. MONTREAL P.Q.
"T.Y.R."
Highspeed Steel
(Made in Canada)
Works: LONGUEUIL, Que.
DOMINION BANK BLD'G TORONTO

Immediate shipment of all standard sizes and shell-turning sizes can be made from stock.

MADE IN CANADA



For Turning, Facing and Milling the Thread on Gas Check Plugs for 6-inch High-Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling. driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft)**. Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells. Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield

STAIR BUILDING, TORONTO, ONT.

ACCURACY

Good screws must have good threads — in both fit and finish.

When nuts are added and drawn up tight, the contact is even. "**GALT**" Cap and Set Screws are always accurate.

Specialists in Cap and Set Screws.

THE
GALT MACHINE SCREW CO., LIMITED
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company, Limited, 49 Common St., Montreal, Que.

16 in. Lever
POST DRILL

A Giant Little Machine For Light Drilling.

Will drill up to ⅞ inch.

The Feed Lever Socket is adjustable on the feed shaft, to provide for setting the lever in the most convenient position for the operator.

An adjustable friction is provided for the feed shaft, which acts as a balance to the weight of the spindle.

Bevel Gears, Feed Pinion and Rack are all machine cut, working smoothly and without noise.

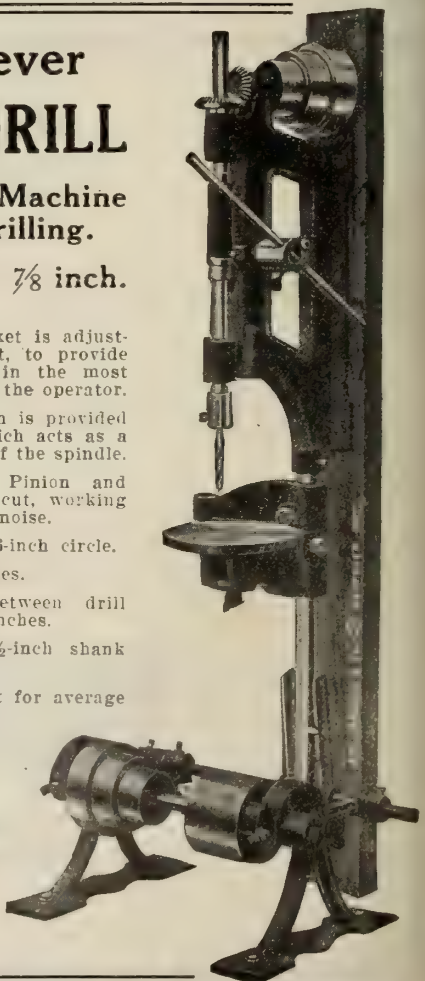
Drills to centre of 16-inch circle.

Run of feed 5¼ inches.

Greatest distance between drill spindle and table, 22 inches.

Spindle bored for ½-inch shank twist drills.

Speed of countershaft for average work, 300 per minute.

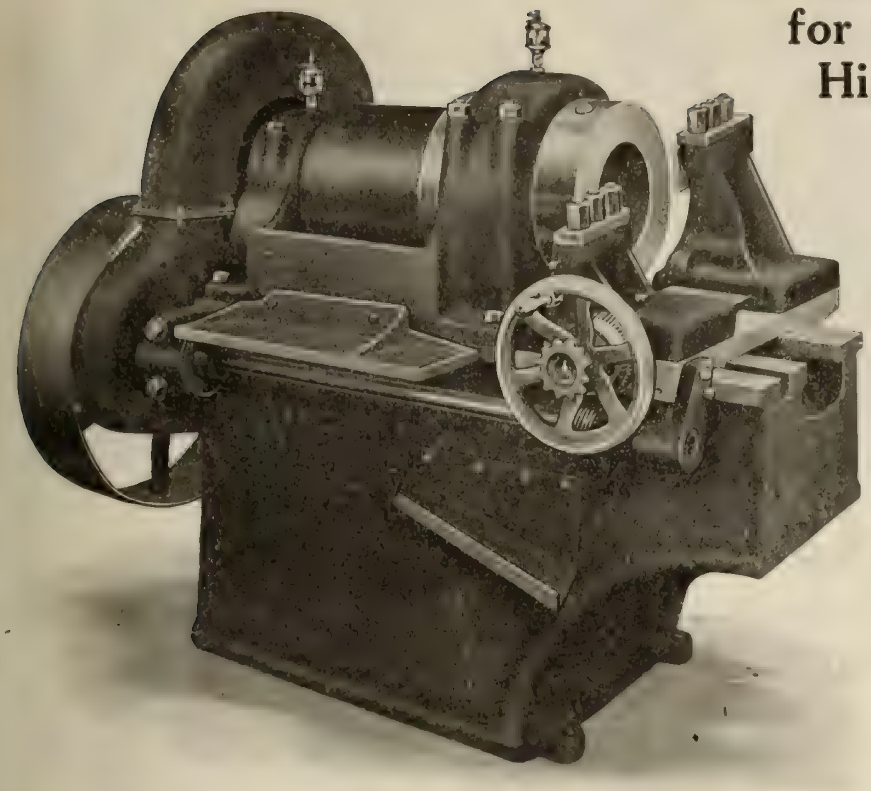


A. B. Jardine & Co.

Hespeler, Ontario

R. & V.

Special Single Purpose Lathes for the Manufacture of High-Explosive Shells



"R. & V." Cutting-Off Lathe for 6", 8" and 9.2" Shells

We Specialize on—

- **Cutting-Off Lathes**
- **Outside Roughing Lathes**
- **Inside Boring Lathes** (roughing and finishing).
- **Outside Finishing Lathes**
- **Waving and Undercutting Lathes**
- **Copper Band Turning Lathes**
- **Facing Lathes**
- **Turret Lathes**—for counterboring, necking, truing for thread, and adjusting to weight.

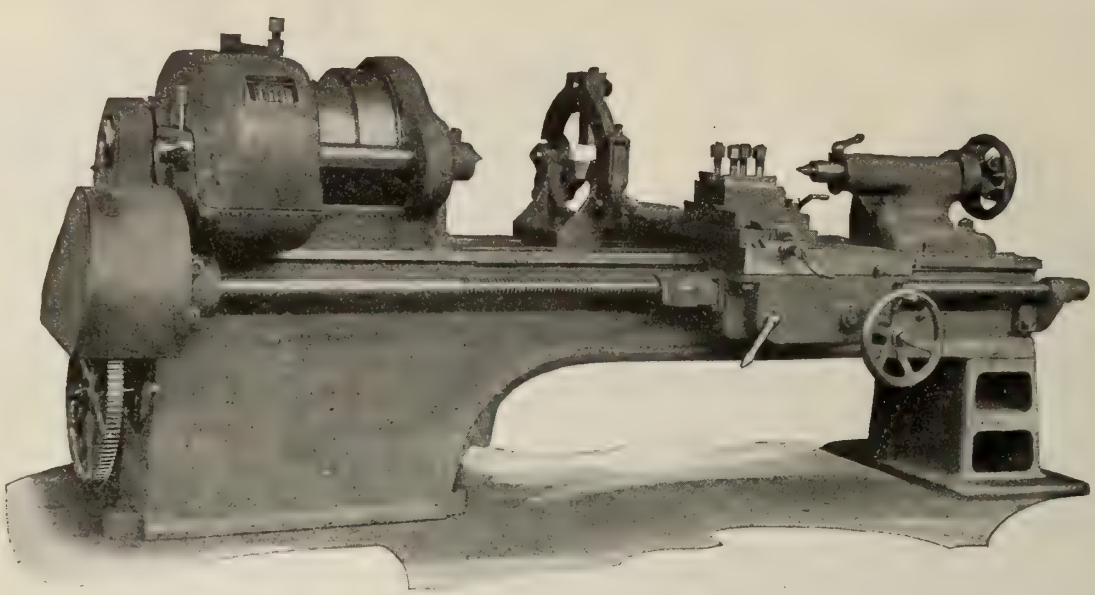
They are all of exceptionally heavy construction and simple design to meet the severe service and special requirements of the Munition manufacturers.

These machines are making records equalled by few, and are already favorably known.

If you are a manufacturer of, or contemplate making shells, write us for estimates and deliveries.

The Root & Van Dervoort Engineering Company

EAST MOLINE, ILLINOIS, U. S. A.



LANG SINGLE PURPOSE LATHE

Made in the United States under supervision of British Government. (Lang's Design.)

59 BEAVER HALL HILL **PEACOCK BROTHERS** MONTREAL, QUE.

Davenport 22-Inch Lathe — For Extra Heavy Service

These lathes are built exceptionally rigid and heavy. No feature has been omitted, to secure great strength and power. The bed, the headstock, the tailstock, the carriage—every detail has been designed and constructed with a view to driving the heaviest cut that any tool will stand up against. At present we can make quick deliveries on this machine.

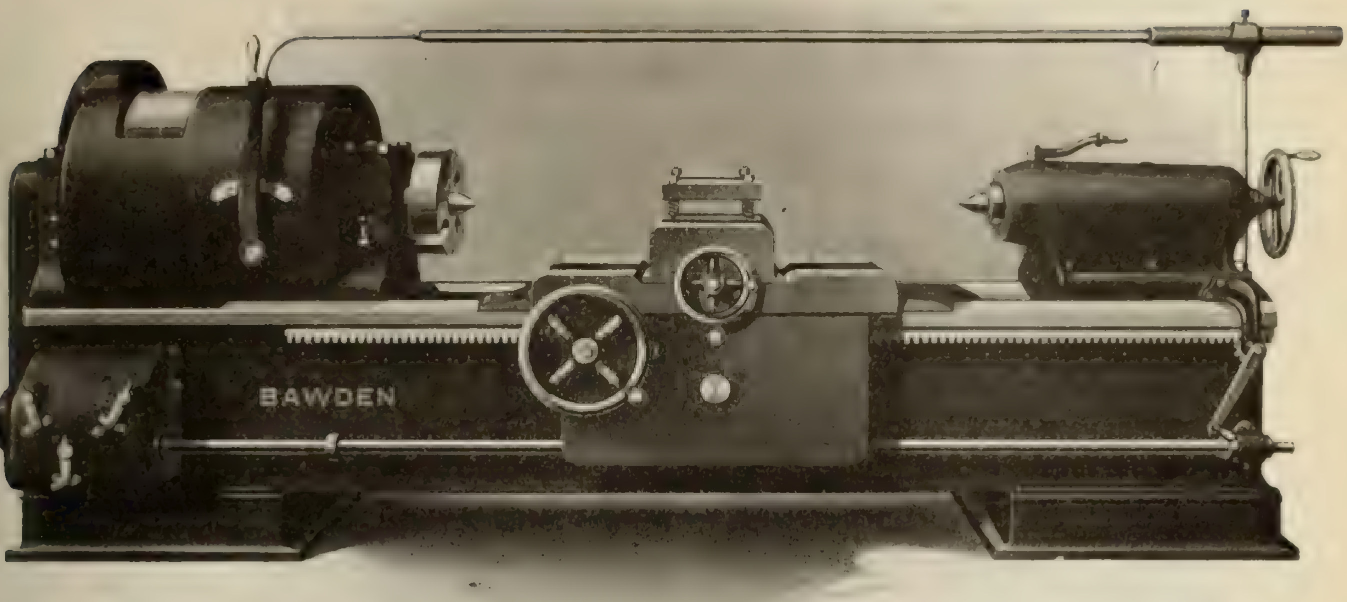
Built with ordinary change gears unless otherwise specified.

Write at once for Bulletin. It gives full details of construction.

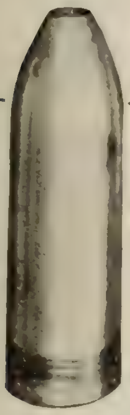
DAVENPORT LOCOMOTIVE WORKS
DAVENPORT, IOWA

Length of Bed, 8', 10', 12', 14'.

Canadian Representatives:
Williams & Wilson, Ltd., Montreal
A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.



BAWDEN

Heavy Duty Shell Lathes

Are unique in their speed, rigidity, power and accuracy.

We are Rough Turning 6" British H.E. Shells in 6¼ minutes.

Bawden Lathes are built for long service—to stand up under quantity and quality production of big jobs for years after the war is over. For all sizes Shrapnel and High Explosive Shells.

Investigate Bawden Shell Lathes now. Let us tell you what they are doing in other shops.

We manufacture a full line of gauges for all sizes of British, Russian and French Shells and component parts.

The Bawden Machine Co., Limited

TORONTO, CANADA

TELEPHONES

Who to-day has not a telephone? Who could get along without it? Yet twenty years ago they were scarce, a luxury, and sort of laughed at.

Do you know that is like CISCO Lathes? Started seven years ago; pooh-poohed by other manufacturers, looked upon as an outcast.

To-day the world buys CISCOS and every man knows and calls for

THE LATHE WITH THE PULL

They *satisfy, serve* and *save;* they are *economical* and *efficient* and, like the little telephone, they *make your minutes into dollars.*

WHO SAYS SO? WHY, ASK ANY CISCO USER.

Made in 14-in., 16-in., 18-in., 24-in. by

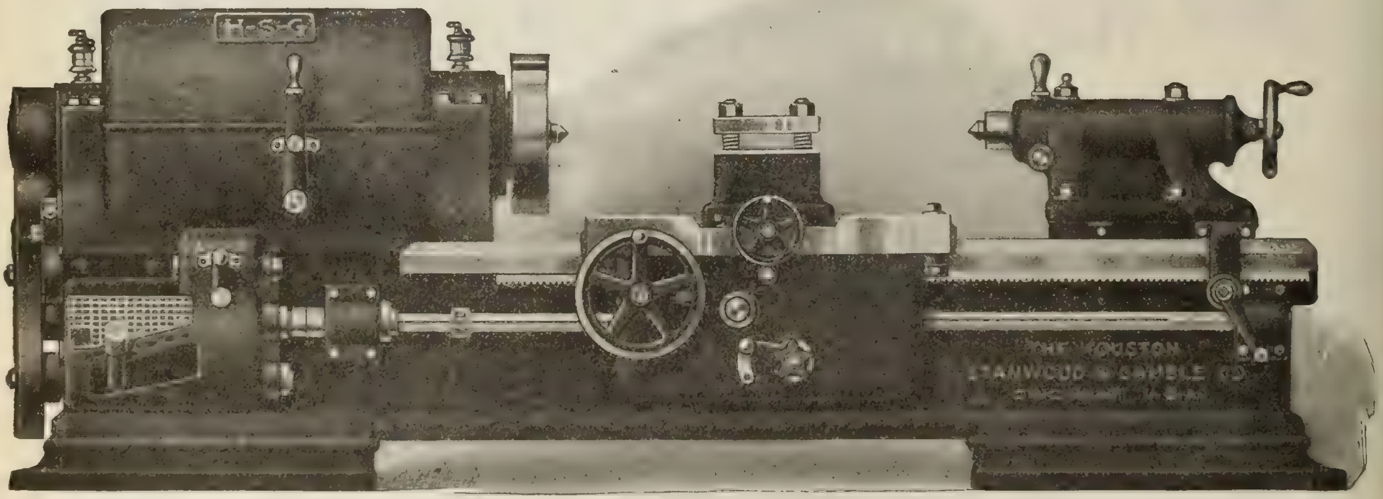
The Cincinnati Iron & Steel Co.

Cincinnati, U.S.A.

Sold by

WILLIAMS

in Canada



H-S-G TRADE MARK single-pulley, high-powered, all-geared engine lathe which can be shipped promptly in three sizes, 26", 30" and 36" swing.

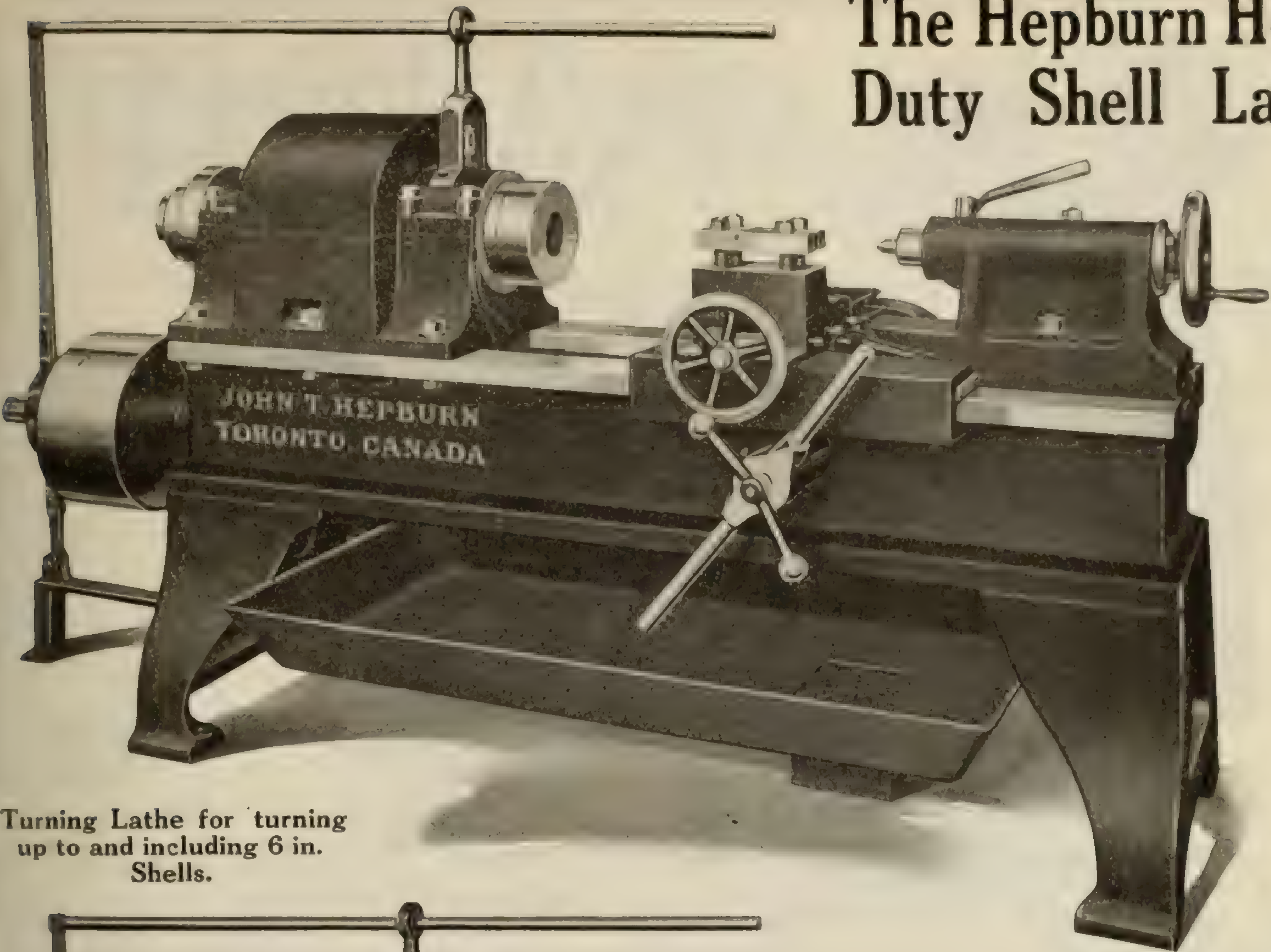
This is a heavy duty lathe. For instance, the 30" swing lathe has 7" face drive pulley, 8" x 10" front spindle bearing and other parts of correspondingly dimensions. The net weight with 12 ft. long bed is 15,000 pounds. All gears without exception are of steel. The design and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

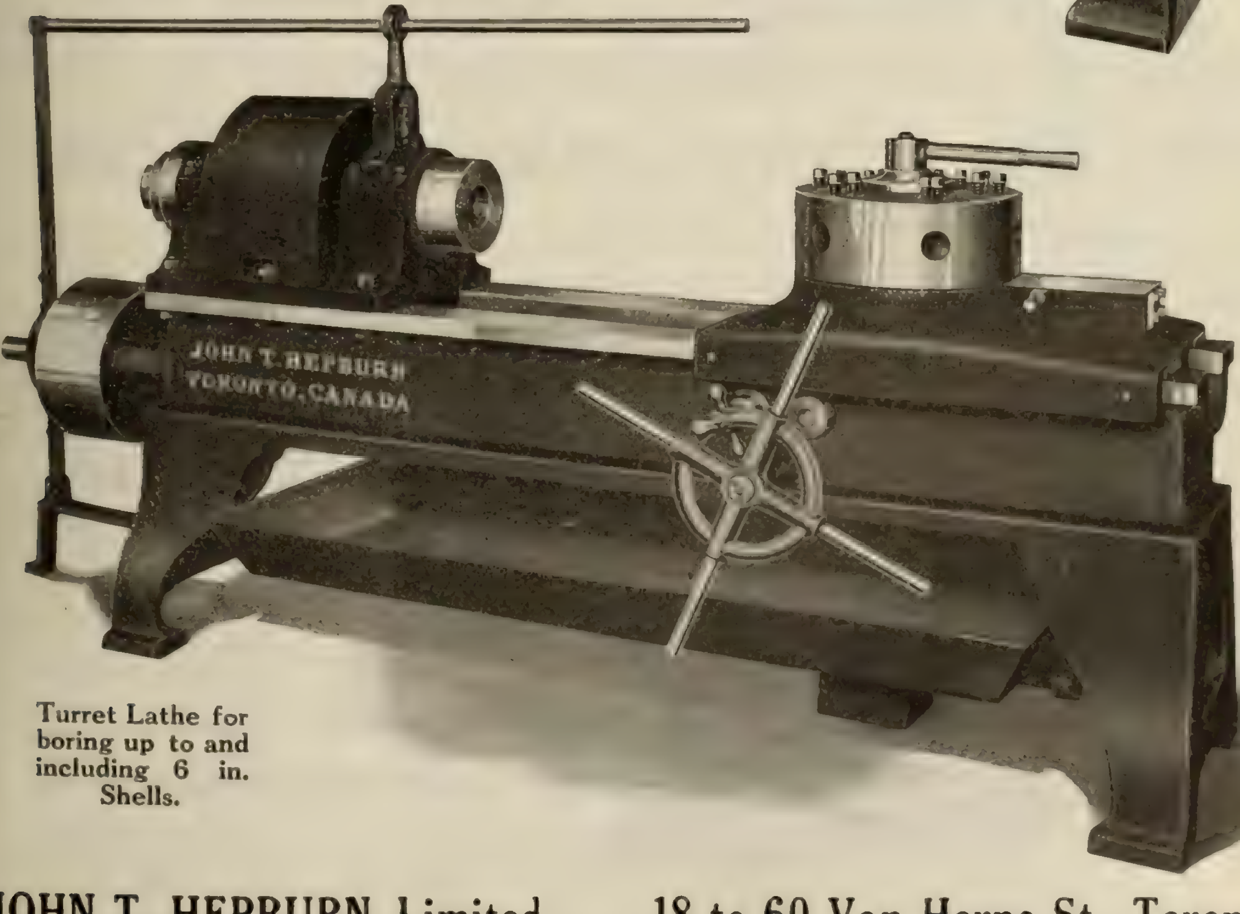
CINCINNATI, U.S.A.

Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto

The Hepburn Heavy Duty Shell Lathes

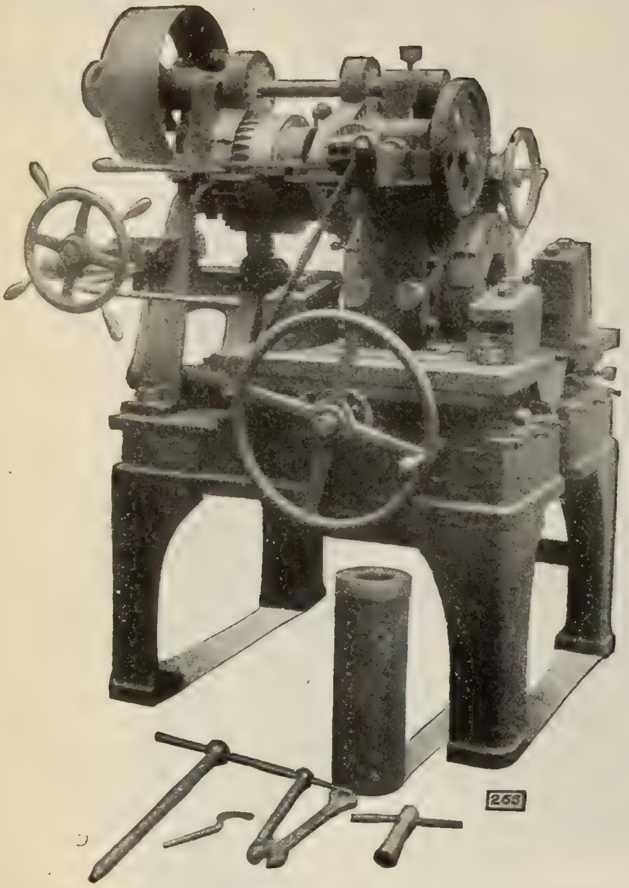

JOHN T. HEPBURN
TORONTO, CANADA

Turning Lathe for turning up to and including 6 in. Shells.


JOHN T. HEPBURN
TORONTO, CANADA

Turret Lathe for boring up to and including 6 in. Shells.

JOHN T. HEPBURN, Limited, 18 to 60 Van Horne St., Toronto, Can.



CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal

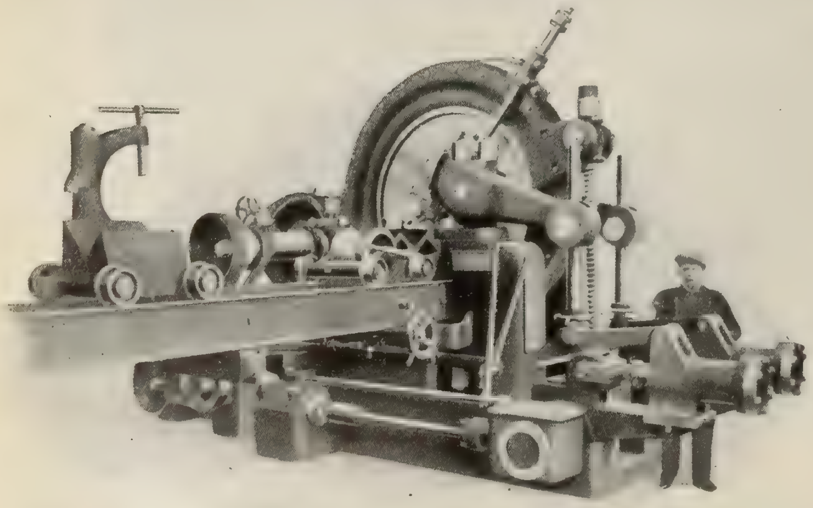
Gorton Heavy Duty Cutting-Off Machine

No. 2-E

The principle of construction of the Internal toothblade type of machine shown here admits of a cutting speed which cannot be approached by machines of the ordinary type.

Vibration is so completely eliminated that the output of this machine is controlled by the efficiency of the **Tool Steel.**

For instance, at present it is not practicable to maintain the maximum speeds of which this Cutting-Off Machine is capable with present Tool Steels.



FRONT VIEW GORTON NO. 2-E HEAVY DUTY CUTTING-OFF MACHINE—capacity 13-in. rounds and less. Photograph shows the Standard Machine, self-contained, motor-driven, with power clamping front and rear, and stock rack No. 155-1. Net weight without motor, 53,000 pounds.

The No. 2-E Gorton Heavy Duty is pre-eminently suitable for **constant, hard service, and capable of being operated continually month in and month out without the excessive repairs ordinarily placed on such machine.**

Especially suitable for Rolling Mills, Car and Locomotive Works, Engine Builders, Electrical concerns, and Machine builders generally.

Capacity 3 in. to 13 in. rounds; 3 in. to 9¼ in. squares; and for any other size or shape that can be contained within a 13 in. circle.

For catalog and full particulars write

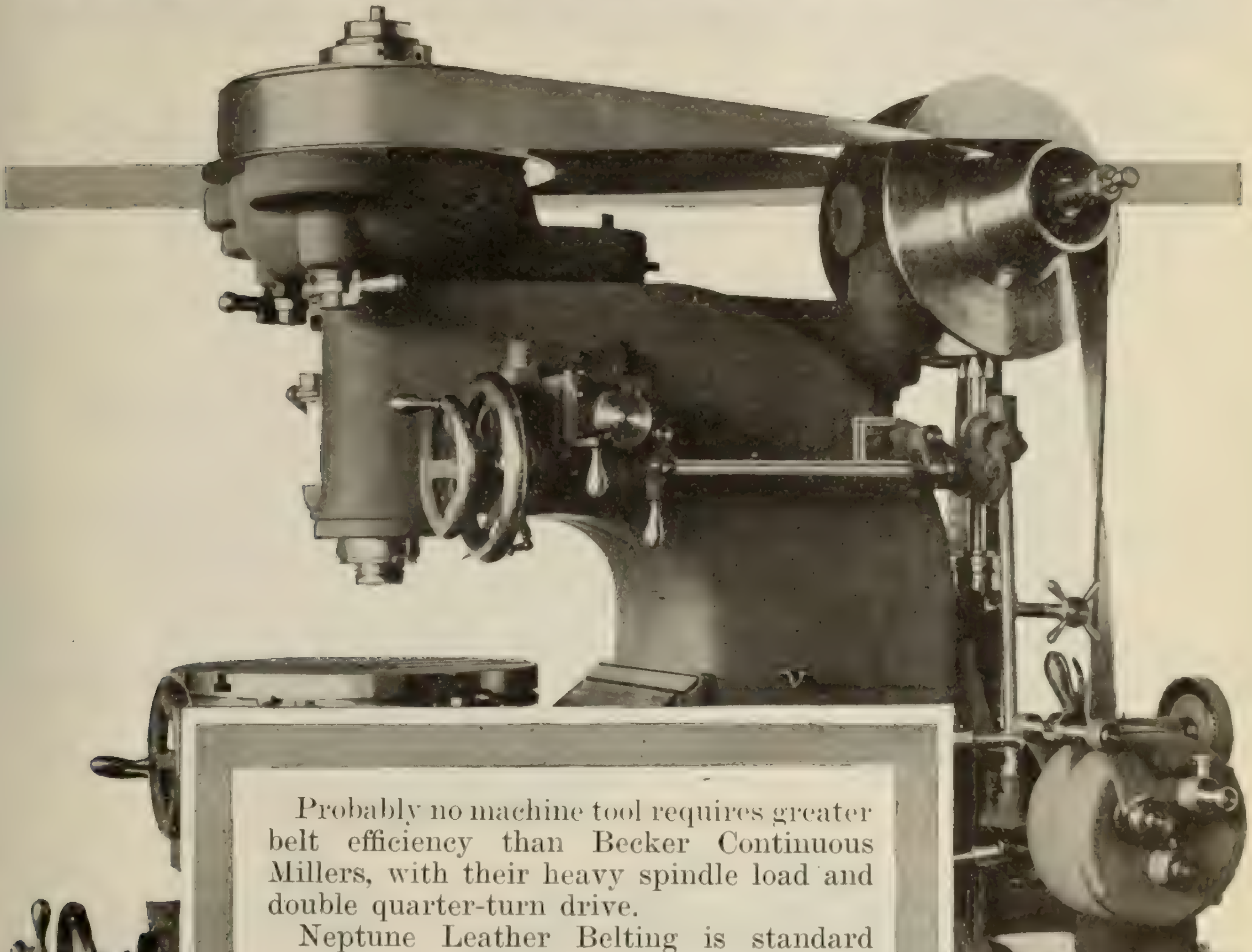
George Gorton Machine Co.

Manufacturers of Engraving Machines
and Heavy Duty Cutting-off Machines

RACINE, WIS., U. S. A.

Cable Address: "Gorton, Racine." Use A.B.C. Code (4th edition) or Western Union Code (Universal edition.)

NEPTUNE BELTS DRIVE BECKER CONTINUOUS MILLERS



Probably no machine tool requires greater belt efficiency than Becker Continuous Millers, with their heavy spindle load and double quarter-turn drive.

Neptune Leather Belting is standard equipment for Becker Continuous Millers, because it possesses the pliability, firmness, strength and durability so essential to their efficient and economical operation. Neptune Belting is not only guaranteed unreservedly as to quality and workmanship, but also guaranteed to be absolutely moisture-proof.

The qualities which make Neptune Belting so successful on Becker Continuous Millers serve equally well to make it highly efficient for other machines where economy and maximum production are the prime factors.

Engineering advice and catalog furnished upon request.

The Graton & Knight Mfg. Co.
OAK LEATHER TANNERS AND BELT MAKERS
WORCESTER MASS., U.S.A.
BRANCHES IN PRINCIPAL CITIES

GARLOCK-WALKER MACHINERY CO. LIMITED

G&W MACHINERY

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Heavy Machine Tools for 8-inch, 9.2-inch and 12-inch Shells

18" and 20" Engine Lathes for Tool Room Equipment.

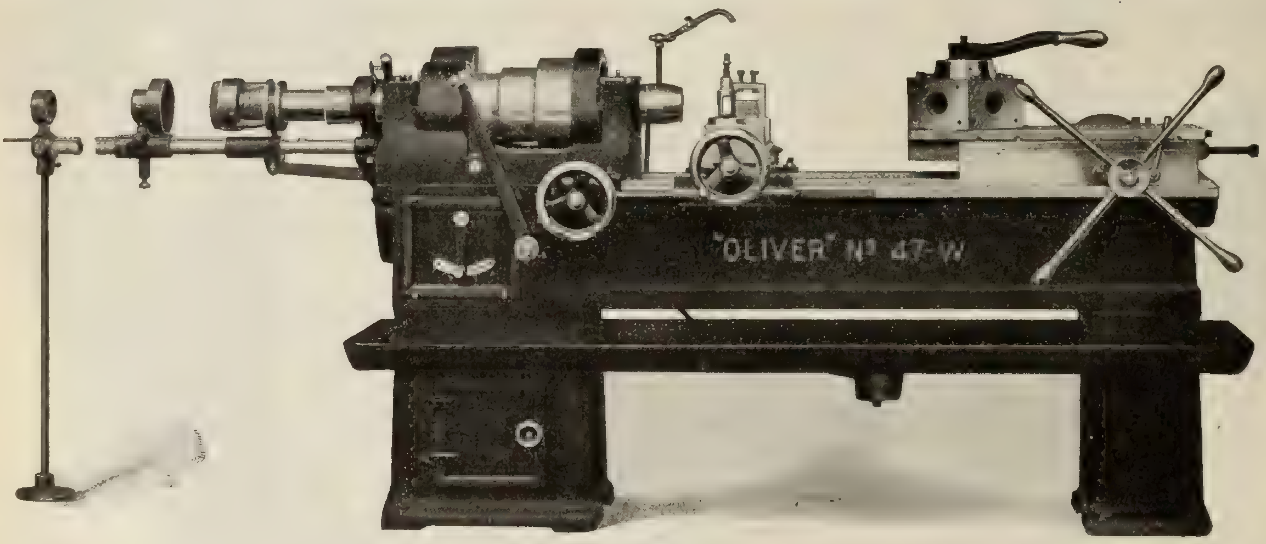
Single Purpose Turret and Turning Lathes for 6" Shells and under.

Write us for prices and deliveries on anything in the way of Iron or Wood Working Tools.

GARLOCK-WALKER MACHINERY CO., Limited, Telephone Main 5346 32 Front St. West, TORONTO

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds



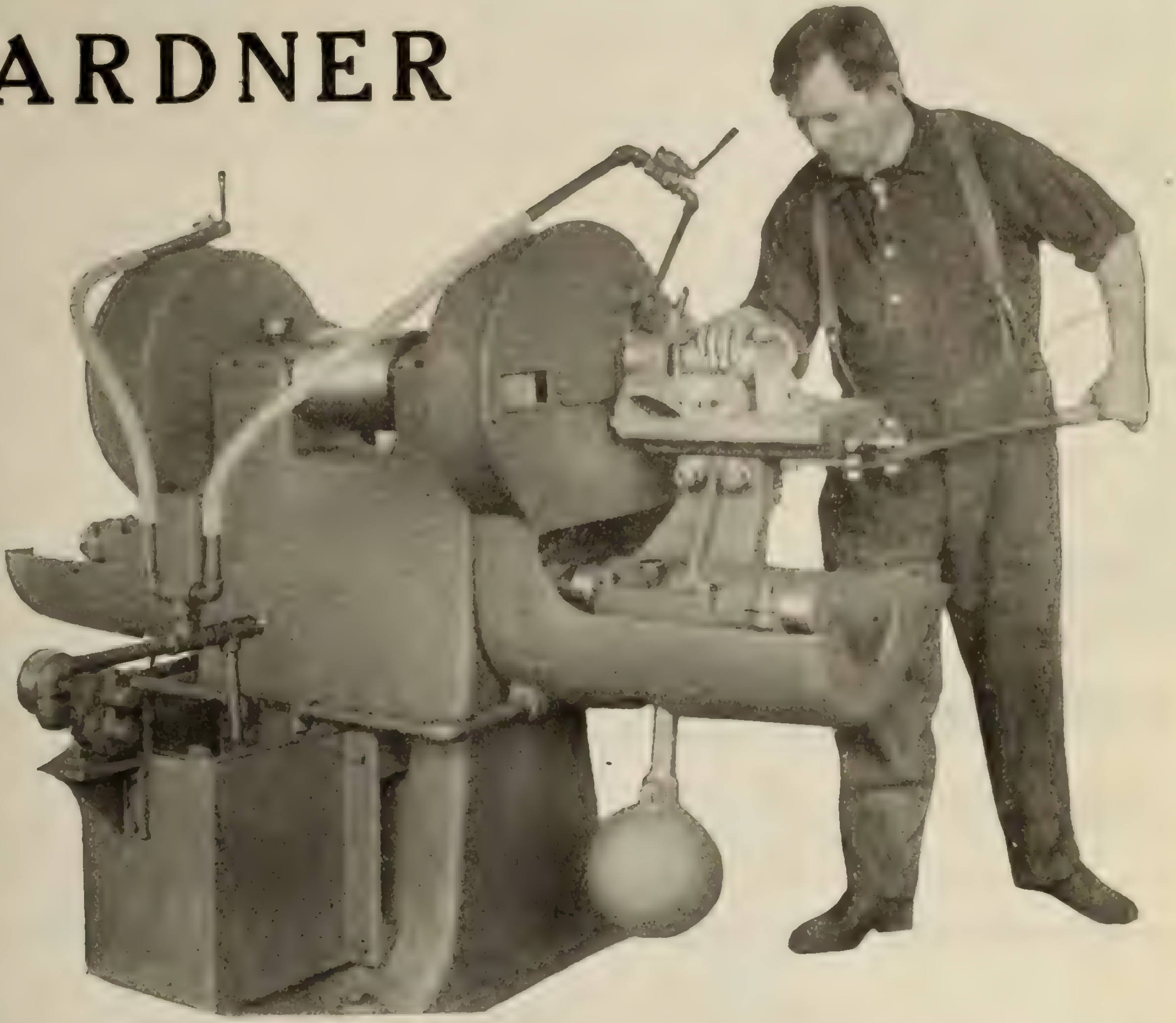
"OLIVER" NO. 47-W HEAVY DUTY SCREW MACHINE 2¼"—SWING 16".

A HEAVY TOOL FOR HEAVY WORK—A MODERN MACHINE—OLIVER QUALITY—PROMPT DELIVERIES.

WRITE FOR FULL INFORMATION.

OLIVER MACHINERY COMPANY, Grand Rapids, Mich.

GARDNER GRINDERS



For Grinding Ends of Shells

We have developed a Special Grinding Machine for removing the hub or centre projection from the ends of shells. This grinder is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates.
We build as well a much heavier and more Powerful Grinder to be used for these same operations on 6" Shells.

FEATURES

- High-Grade Babbitt Bearings and Lever Feed.
- Rapid clamping of Shell into "V" fixture.
- Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.
- Can be equipped and operated at both ends for double output.
- Output, according to size of projection to be removed, from 40 to 100 per hour.
- Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments.
- Weight, 4,500 lbs.

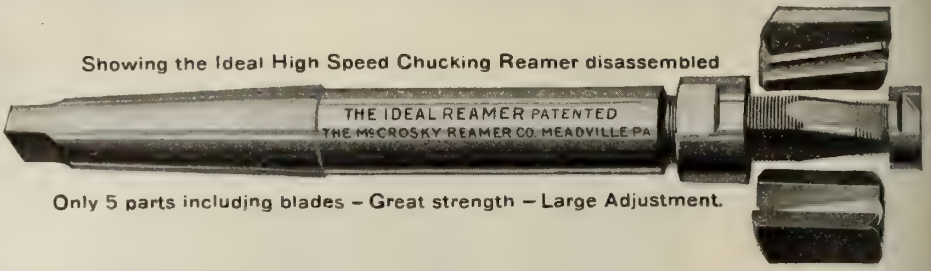
For further particulars write

The Gardner Machine Company, Beloit, Wis., U.S.A.

The Toughest, Hardest and Most Fibrous Metals
ARE REAMED WITH EASE WITH
THE "IDEAL" ADJUSTABLE REAMER

Every hole is reamed true, smooth, and round. There is no binding, heating up nor clogging with chips. It is without equal in most classes of machine reaming.

We recommend **THE IDEAL** for any job in phosphor bronze, steel tubing, steel castings, steel forgings, aluminum or any job you may have where other reamers have failed.


Showing the Ideal High Speed Chucking Reamer disassembled
THE IDEAL REAMER PATENTED
THE McCROSKY REAMER CO. MEADVILLE PA
Only 5 parts including blades – Great strength – Large Adjustment.

A 2" **IDEAL** Reamer will adjust 3/32" and other sizes in proportion. Thus one Ideal will outwear a dozen or more solid reamers, and then it is only necessary to buy a new set of blades.

THE IDEAL is radically different in design from all other types of adjustable reamers. Two solid blocks of High Speed Steel held on an arbor by two powerful collars—nothing more. No screws or small parts. There are four left-hand spiral cutting edges, and every tooth is milled in the solid head—no inserted teeth. Greater simplicity and strength is impossible in an adjustable reamer.

Adjustment is effected by loosening rear collar and tightening front collar, which forces the two halves of the reamer head up the inclined surfaces of the arbor. No shimming under the blades.

Assembled

THE IDEAL REAMER PATENTED
THE McCROSKY REAMER CO MEADVILLE PA

TRY IT ONCE AND YOU'LL USE IT ALWAYS.

THE McCROSKY REAMER COMPANY, MEADVILLE, PA., U.S.A.

EXPORT AGENT, BENJAMIN WHITTAKER, 21 STATE STREET, NEW YORK, N.Y.

Two Cuts at One Time

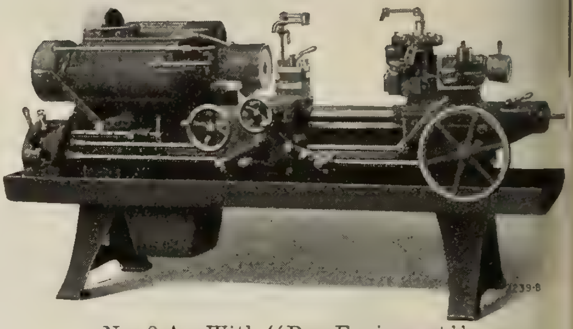
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

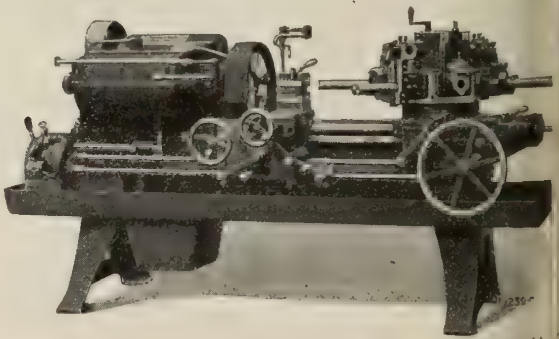
Universal Hollow-Hexagon Turret Lathes

Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.


No. 2-A—With "Bar Equipment"


No. 2-A—With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montre

60
RACINE
METAL CUTTERS

Cutting off 4.5-in. and 6-in. Billets "Somewhere in Montreal"

The "RACINE" is the ORIGINAL, AUTOMATIC, POSITIVE LIFE, DRAW CUT, METAL-CUTTING MACHINE—the World's STANDARD in metal cutting.

This machine is absolutely positive in every action; it will duplicate itself in every cut during the entire life of the machine.

All bearings are long, heavy and adjustable.

The "RACINE" is rapid, accurate, compact and RIGID.

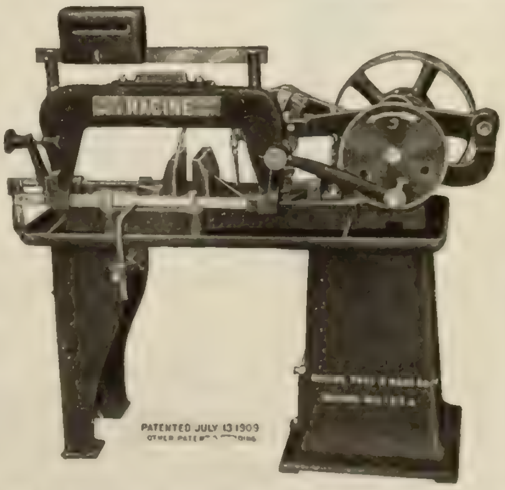
This machine is equipped with our Special THREE-SPEED TRANSMISSION, enabling you to cut all kinds of metal at the proper speed—PRACTICALLY THREE MACHINES in ONE.

Used extensively in Canadian Plants. One Canadian Steel Company is using 120.

Made in four sizes—6" x 6", 8" x 8", 12" x 12", and 12" x 15".

We'll gladly put you in touch with users and send full details.

A Machine Tool
Not a Hack Saw



Racine Tool & Machine Co.

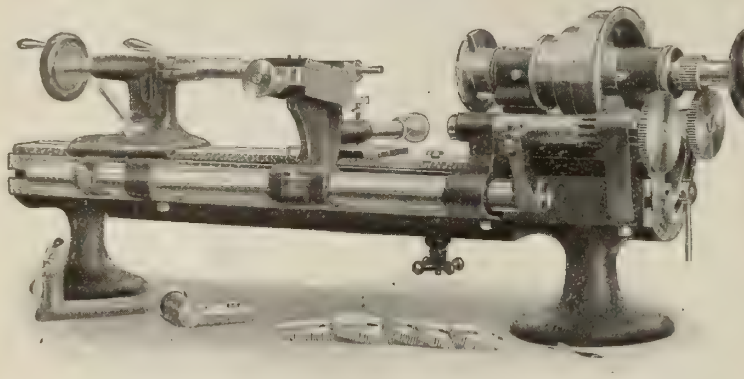
15 Melbourne Ave., Racine, Wisconsin, U.S.A.

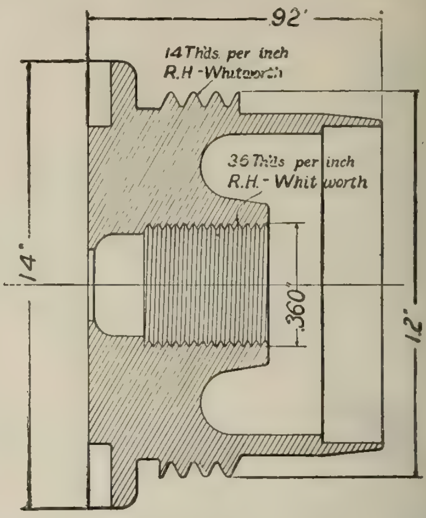
RAPID MASSIVE STRONG DURABLE

MORE SPEED

LESS BLADES

THE CATARACT BENCH LATHE WITH CHASING ATTACHMENTS





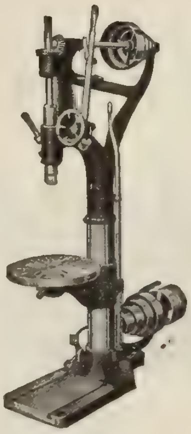
We have sold many of our lathes to Canadian concerns who are eminently satisfied with results. Will you be next?

For work requiring greatest accuracy and rapidity, THE HARDINGE CATARACT BENCH LATHE will not disappoint you. Machine equipped with Automatic Chuck Closer for rapid operation of chuck, and with chasing bar arranged with multiple point, chasing tool is producing from ten to twelve hundred 14-pitch Whitworth threads on primers in TEN HOURS. Prompt deliveries. Catalogue No. 15 is ready to mail TO YOU. You are invited to write for it to-day.

HARDINGE BROTHERS, Inc., 1770 Bertau Ave., CHICAGO, U.S.A.

The BARNES DRILLS

TRADE MARK W.F. AND J. Co.



Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

W. F. & JOHN BARNES CO.

104 Ruby Street - ROCKFORD, ILL.
Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal

FRONT COVERS—

WE have three front covers open in 1916. One in October, one in November and one in December.

ADVERTISERS wishing to run a spot-light message are invited to write us at once.

Canadian Machinery
143 University Ave., Toronto Can.

CELFOR

Celfor
TOOL
COMPANY

THIS IS OUR CATALOG No. 15

In it you will find listed and described a full line of splendid cutting tools backed by Celfor reputation.

The best part of it is—we have in stock or in process of manufacture every tool of every size shown in Catalog No. 15.

This means we can ship promptly from stock—or very soon after your order is received.

It is our constant aim to give you service when you buy —and service after you receive the tools.

Type "J" High-Speed Twist Drill—gives maximum speed—and the maximum number of holes per grind—and good, clear down to the shank.

Celfor Tool Company

Buchanan, Mich.

Canadian Agents: Rudel - Belnap Machinery Company, Toronto, Montreal

Touchin' On and Appertainin' to a

$1,000! One Thousand Dollar Challenge! $1,000!

Beware of
Entrance to a Quarrel, but being in,
Bear't that the Opposed may beware of thee
—Hamlet, Act I. Scene III.

The "Challenge"

" ——— Tool Holders were awarded The Grand Prize for Tool Holders at the Panama-Pacific Exposition under and in strict accordance with the Official 'Rules and Regulations Governing the System of Awards' under which our exhibit was **entered.** This was and is the First and Only Grand Prize for Tool Holders **so** awarded. We are prepared to Prove this statement of fact and have deposited One Thousand Dollars, etc.", the balance of the "challenge" consisting of provision for a stakeholder, a jury, their inevitable expenses, and a Beneficiary of Award!

THE FACTS IN THE CASE:

As the word "so" is the "53rd card" in this "challenge," and the word "entered" (instead of "re-entered") the 54th, the italics are ours. The "Rules and Regulations" read: "There shall be but one Grand Prize in each class." The class in which we and the "challengers" entered our exhibits and competed did not provide for a Grand Prize Award, the two highest awards to be competed for having been explained to us and to the Jury beforehand, as follows:

"The following scale of markings shall be used in determining the final merits of an exhibit and fixing the award that should be made, 100 being used as indicating perfection.

"Exhibits receiving markings ranging from 85 to 94 inclusive—Gold Medal.

"Exhibits receiving markings ranging from 95 to 100 inclusive—Medal of Honor."

The Jury for Group 90 which passed upon these particular exhibits was composed of the following gentlemen: Mr. George W. Dickie, Consulting Engineer, San Francisco, Cal., Chairman; Mr. J. C. Mengel, Master Mechanic, Pennsylvania R.R. Co., Altoona Shops, Altoona, Pa., Vice-Chairman; Mr. D. S. Watkins, Asst. Supt. of Shops, Southern Pacific Railroad, Sacramento, Cal.; Prof. John T. Faig, Head of Dept. of Mechanical Engineering, University of Cincinnati, O.; Mr. William H. Crosby, President, The Crosby Company, Manufacturers of Sheet Metal Stampings, Buffalo, N.Y.; Mr. F. J. Frank, Secretary of "Iron Age," New York City.

This jury was the **only jury that visited both booths,** or was charged with the duty of inspecting exhibits in our classification. Their decision in every essential part is quoted herewith from a letter written by their Chairman, Mr. Dickie, to the President of the Superior Jury:

"In Group 90 there were two Exhibits by Competing Exhibitors which received especial and careful consideration at the hands of the Jury: I refer to that of Williams & Co., and that of ——— Co., both of which firms are prominent in their lines of work. After a careful general examination of these Exhibits by the Group Jury, a special Report was made by Mr. J. C. Mengel, Vice-Chairman of the Jury, Master Mechanic Pennsylvania Railroad Company, with headquarters in the Altoona Shops, and Mr. D. S. Watkins, Assistant Superintendent of Shops, Southern Pacific Company, Sacramento, Cal. The Reports of these Jurors are attached to the Questionaires submitted with my Report.

"The Report on the Williams Co. Exhibit is as follows:

" '————Well worthy of the Medal of Honor award recommended.' "

"The Report on the ——— Co. Exhibit is as follows:

"————'The Award of a Gold Medal recommended is in line with the character of the Exhibit and the reputation of the machines and tools.' "

"The awards recommended by the Jury on Group 90 for these two Exhibits were carefully reviewed by the Jury for Department F, of which I was Chairman and the recommendation of the Group Jury was unanimously confirmed.

"A protest against the award was made by the ——— Company which was submitted to the Committee on Protests and Appeals and appears in the Report of that Committe dated June 21st, 1915, No. 36, and is as follows: 'The protest of the ——— Tool Company was carefully considered by our Sub-Committee who could find no reason to recommend any change from the Gold Medal recommended by the Department Jury.' "

Lest it be further claimed that our Tool Holders were "carried along" by our other goods, we quote the following from the same letter:

"The Group Jury laid special stress on the superior character of the tool holders exhibited by the Williams Company, in fact it was this superiority which in the opinion of the Jury, placed their exhibit above that of the ——— Co."

About four months afterward, however, and after the Inspecting and Visiting Juries (the only Juries which were composed largely of men of mechanical experience) had completed their work and had been discharged, the appeal was carried still further until the Superior Jury, unknown to us, created a special class not in the original competition, and without inviting us, or, as we believe, other Tool Holder manufacturers to compete, or even reviewing our Exhibit, awarded A Grand Prize for Tool Holders alone to the "challengers," thus conferring a higher award upon a class in which there was only **one entrant** than upon the one in which all similar exhibitors had competed, and also upon one of the very articles upon which our company had previously been declared the winner of "The Highest Award"! If others competed why was there no second, third or fourth prize in *this* class as provided in "The Rules and Regulations?"

Of course, the inconsistency of this result, effectually reversing the combined judgments of the Visiting Jury, the Jury for Department F and the Committe on Protests and Appeals, was soon recognized, with the result that our Award including Tool Holders was raised to that of Grand Prize, as the only adjustment then possible. This is indicated by the following letter from the Secretary of the Superior Jury, under date of Nov. 12, 1915, the italics being ours:

"Messrs. J. H. Williams & Co., Brooklyn, New York.
Gentlemen:

This is to notify you officially that the Superior Jury, after due consideration, has awarded you a Grand Prize, which is the highest award that can be conferred by the Jury.

This Grand Prize applies to the entire line which you have exhibited here and which was entered on your questionaire, **and to each part thereof.** Thus you are entitled to claim a highest award on wrenches, or vises, or crankshafts, or tool holders, or on any of the special forgings which you have exhibited.

It is but fair to inform you, however, that an award of Grand Prize on tool holders alone and specifically has been made to another firm at this Exposition, and that said firm is entitled to claim a highest award on tool holders **equally with you.** In the case of said firm, however, the remainder of its line has been granted a lower award than that of Grand Prize.

From the above you will readily see the latitude which is allowed you in whatever claim you may make, and also just what limitations might be imposed thereon.

Very truly yours.
(Signed) O. H. FERNBACH, Secretary of the Superior Jury."

An official letter to substantially the same effect from the same gentleman (the official spokesman of the Jury) was given to the "challengers" at the same time, which would have confirmed the above-mentioned equality of Tool Holder award if it had been published with the challenge!

In view of the above we repeat herewith that every important claim that we have publicly made with reference to our San Francisco Award in so far as Tool Holders are concerned since the award became final is more than justified by the facts.

J. H. Williams & CO. - Brooklyn, N.Y.

Touchin On and Appertainin' to a

$1,000! One Thousand Dollar Challenge! $1,000!

Of (Doubtful) Interest to Tool Holder Users in general, though apparently Vital to one "Challenger" in particular—The Remarkable Public Reception of WILLIAMS' "AGRIPPA" Tool Holders is Uniquely Reflected

As the only **other** winner of the Grand Prize Award for Tool Holders, we are indirectly invited by conspicuous advertisement to deposit **$1,000—One Thousand Dollars —$1,000**—in an effort to prove:

(1) That a worthy competitor came by a quite justified award at the Panama-Pacific International Exposition in a manner contrary to the "Rules and Regulations Governing the System of Awards," or

(2) That our own Grand Prize Award (of equal value as to Tool Holders and superior as to all other articles exhibited in common) is **not** tainted with the tint of Technicality!

(1) It is distinctly distasteful to us publicly to dispute the regularity of a competitor's success, and we will have none of it—especially when one's feeling is rather that of congratulation upon a recognition well earned by years of undoubted success in Accomplishment, Product and High Character of business dealings.

(2) We recognize no necessity to justify the technical propriety of our own Award, given as it was by the Superior Jury, and signed by the President and Secretary thereof and by the President of the Exposition.

Because, however, of the publicity given this "Challenge," following the frequent public attempts to create the impression that our award **in respect to Tool Holders** was based upon our other products, and was, in reality, inferior to our "challenger's" award, we finally feel obliged to publish on the opposite page the facts in the matter, content to let our readers (if any are sufficiently interested) judge for themselves as to the moderate character of our previous public claims.

We do this, neither claiming superiority nor admitting inferiority, of Award, and if in stating the facts necessary to disprove the limitations cast upon our own Award, the inference of comparative reference becomes unavoidable, it is with the more sincere regret that our efforts to avoid a trade paper controversy (by agreement upon the basis of equal recognition) repeatedly made since the Awards became final, have failed.

With this statement the matter is closed so far as this company is concerned. We have not asked for affidavits or testimonials of any kind, nor shall we do so; they are easily obtained by anyone if wanted sufficiently. We have, however, ample evidence to support every public statement we have made and shall be only too pleased to show it to our "challengers" at our office—without asking them to deposit **$1,000—One Thousand Dollars—$1,000.**

In our opinion the importance of the subject is greatly over-estimated—the defence of honest advertising is the only issue that justifies reply.

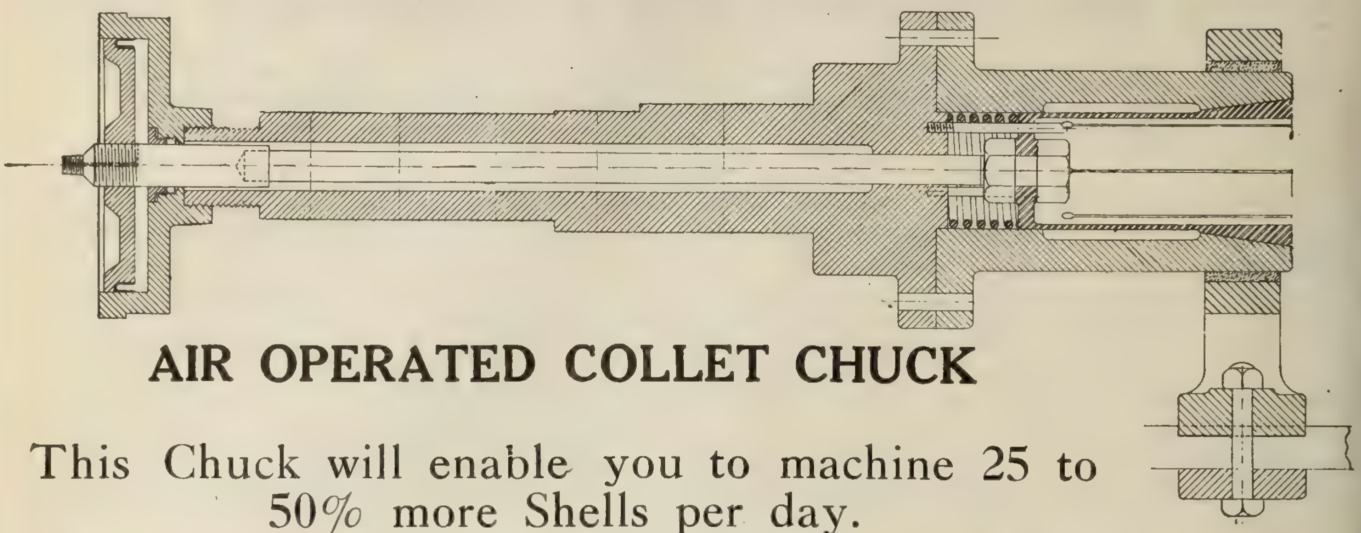
Meanwhile, Williams' "AGRIPPA" Tool Holders, despite their youth, are daily winning The Grandest Prize of all in the shops all over the world, while their makers are too busily engaged in extending this service to regret or dispute the technicalities of their competitors' legitimate successes.

THE WINNERS OF "THE HIGHEST AWARD" AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

J.H. WILLIAMS & CO.
BROOKLYN – BUFFALO – U.S.A.

"THE HOLDERS THAT HOLD"

INCREASE YOUR PRODUCTION



AIR OPERATED COLLET CHUCK

This Chuck will enable you to machine 25 to 50% more Shells per day.

MADE IN ALL SIZES. ADAPTABLE TO ANY HOLLOW SPINDLE LATHE.

Particulars on Application. ***Prompt Delivery.***

HYDE ENGINEERING WORKS

P.O. Box 1164

27 William St., MONTREAL

MURCHEY TAPS AND DIES

—very extensively used on 6-in., 8-in. and 9.2-in. shells.

The great advantage of using MURCHEY COLLAPSING TAPS AND DIES on large shells

Murchey Collapsible Tap.

MURCHEY Taps and Dies save the buying of extra machines. The time alone required to thread one of the large shells, together with rehandling, will more than pay for the tap in a very short time.

The largest American firms are doing all the threading on shells with Murchey Collapsing Taps and Murchey Self-opening Dies, and are getting most desirable results.

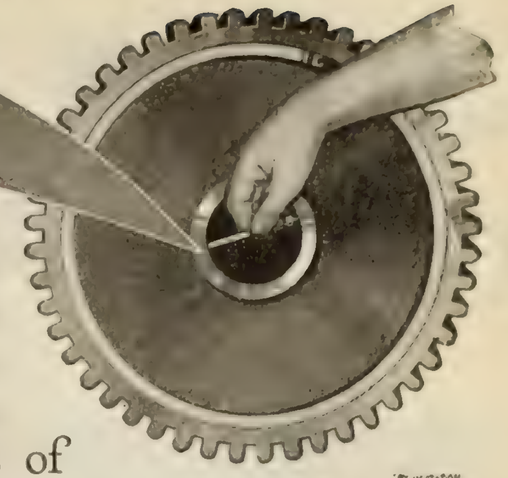
They save the time of rechucking and rehandling, the possibility of the shell getting out of center. By using a roughing and finishing tap they are able to tap the base and nose of these shells in about one-fifth of the time it requires on a thread miller and produce accurate work.

Send us Blue Prints of your requirements and we'll gladly quote you on the necessary tools.

Murchey Machine & Tool Company

75 Porter Street, Detroit, Mich.

Fits



THE best machinist is the one who can caliper his fits so accurately the jobs never come back for refitting. The limits of tolerance are so small that the greatest accuracy is required. In forced fits 1-1000 of an inch is the limit allowed in many cases. This means the machinist must place great dependence upon his instruments.

Starrett Tools

TRADE MARK REG. U.S. PAT. OFF.

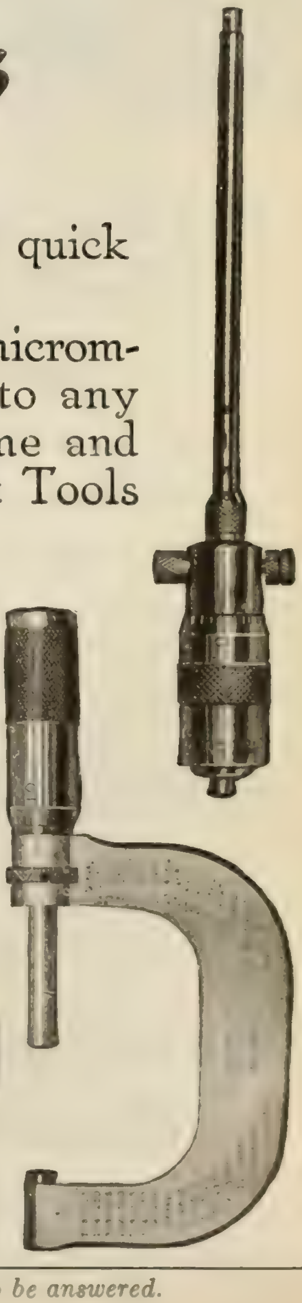
and Instruments of Precision

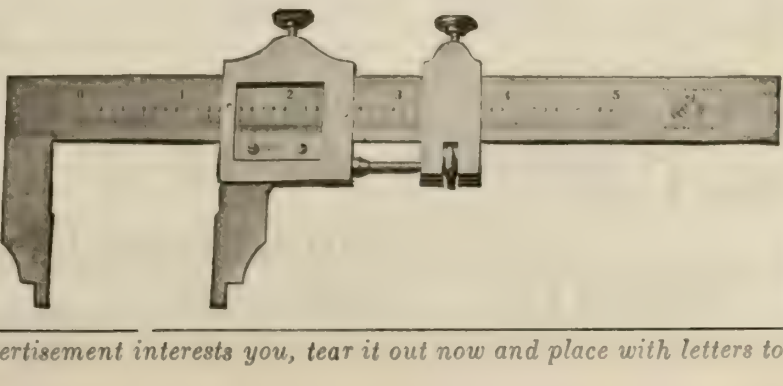
are absolutely true and are designed for quick easy adjustment.

For example—the Starrett quick adjusting micrometer can be instantly opened or closed to any point within its capacity. This saves time and combines speed with accuracy. Starrett Tools are well known as standard by all expert machinists and engineers.

2100 styles and sizes—including micrometers, vernier calipers, dividers, combination squares, steel tapes, hack saws. Write for free catalog No. 21-3

The L. S. STARRETT CO., Athol, Mass.
"The World's Greatest Tool Makers"
NEW YORK LONDON CHICAGO

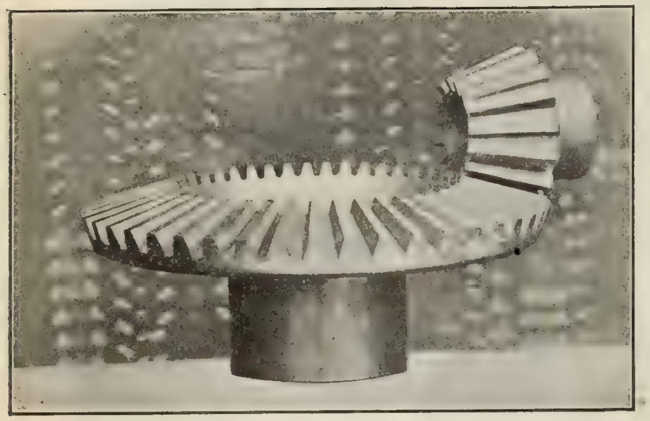




STARRETT TOOLS TRADE MARK REG. U.S. PAT. OFF.

CUT GEARS

CUT GEARS



This Shop Specializes in Good Cut Gears

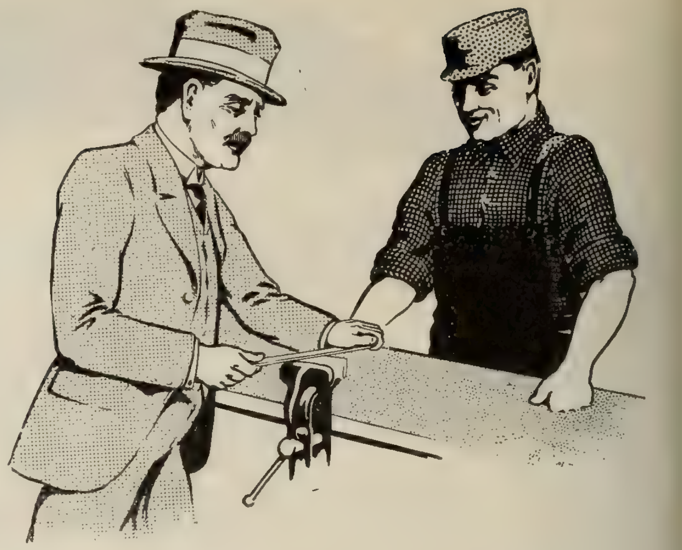
Note our Shop Capacities:—

Spur Gears up to	91 ins. diam.
Bevel Gears up to	62 ins. diam.
Worm Gears up to	108 ins. diam.
Helical or Herringbone up to	36 ins. diam.
Racks up to	10 ft. length

Write for Quotations.

Hamilton Gear & Machine Co.

COR. CONCORD & VAN HORNE **TORONTO**



Put Yourself in His Place

Here is a man at a bench, filing.

The file is worn.

He makes three strokes where, with a sharp file, he need make but one.

It takes him three times as long to do the job.

When it is finished, he is not as well satisfied with it as he would have been if he had a proper file.

The foreman thinks the man is slow or lazy. The man's time sheet does not give him as good a record as the man who is working at the next bench with a sharp file. The man gets irritated. So does the foreman and the employer who pays the bills.

But, throw away that file the minute it reaches its "inefficient point" and what do you get?

The new file costs a few cents. The man does his work in one-third of the time. He is more satisfied with his job. The foreman is pleased with the man—and the employer has saved money on the time sheet.

See to it that the first condition of affairs described is not common in your factory. Instruct your foremen to educate their workmen to turn in files the moment they reach their "inefficient point." Your investment in new files will more than pay for itself.

Nicholson File Company

PORT HOPE (Dealers Everywhere) ONTARIO

WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only

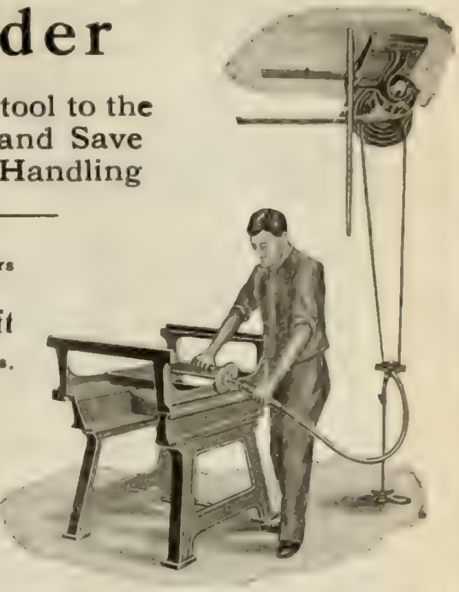
$60

Complete

The Blake & Johnson Co., Waterbury, Conn.

Portable Emery Grinder

Take the tool to the
Work and Save
Heavy Handling



We are inventors of the

Flexible Shaft

For all Purposes.

The oldest and largest manufacturers in the world.

CAN FURNISH MOTOR DRIVEN WHEN DESIRED

Write Us for Catalogue and Prices.

STOW MFG. CO. BINGHAMTON NEW YORK

Established 1875

Oldest Portable Tool Manufacturers in America.

General European Agents—Selson Engineering Co., Ltd.
85 Queen Victoria St., LONDON, ENG.

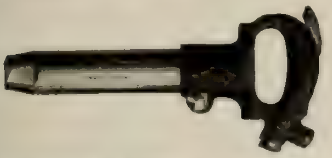
CLEVELAND SAND RAMMERS FOR GENERAL FOUNDRY WORK

Size No. 4F
For Floor Work
Size No. 1HF
For Flask Work

Size No. 1H
For Bench Work
Size No. 1H
For Core Work

Cleveland Rammers have high speed and little or no vibration. They are simple in construction, and have less parts than any similar type of Rammer. They require less frequent renewal of packing, which is adjustable, and excludes all dirt. They have no delicate parts to cause trouble, delay and expense. They are efficient and economical, and the cost of upkeep is very moderate. They are fitted with round or flat rod; the flat rod prevents them from turning.

CLEVELAND CHIPPING HAMMERS



The simplicity of construction of Cleveland Hammers make them "ideal" for Foundry Service. They are dirt-proof, have high speed and little or no vibration. Their fast cutting qualities appeal to the operator, as they increase the output.

CLEVELAND PORTABLE GRINDERS

Adapted to grinding grey iron or steel castings or for any work requiring a Portable Grinder. Made in two sizes, No. A and AA; speed 3,300 and 2,700 R.P.M. respectively. Wheel guards furnished with either size grinder.

BOWES AUTOMATIC AIR HOSE COUPLINGS

Over 1,000,000 in general use.

The Bowes is instantly connected or disconnected. They are Air-Tight under all pressures.

Adjoining cut shows the Hose attached to Bowes Coupling with Never-Slip Hose Clamp. No "blow-offs" can occur if the Never-Slip Clamp is used.

Cleveland Pneumatic Tool Co. of Canada, Ltd., 80 Duchess Street
Toronto, Ont.

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas XX	Carbon Tool Steel
High Speed Steel, Atlas X	"Deward" Oil Tempering, Non-Shrinking
Chrome Vanadium Steel	

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

YOUNG, CORLEY AND DOLAN, Inc.

149 BROADWAY, NEW YORK CITY, U.S.A.

EXTRA

Die Steel

is produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

You get extra service from "EXTRA" DIE STEEL. A trial is convincing.

STEEL

H-A-DRURY COMPANY LIMITED

MONTREAL TORONTO NEW YORK

Manufactured by SANDERSON BROTHERS & NEWBOULD Limited
SHEFFIELD, ENGLAND

Red Cut Superior High Speed Steel

Quality First

THE BEST FOR MACHINING ALL HARD MATERIALS

Are your tools made of Red Cut?

Send for folder

VANADIUM-ALLOYS STEEL COMPANY

PITTSBURGH, PA.

Works at Latrobe, Pa.

LEVIATHAN AND ANACONDA
ELEVATING
TRANSMITTING
CONVEYING
BELTING

Anaconda Belting

You combine economy and efficiency when you put Anaconda Belting to work on Lathes, Saws, Heavy Duty Drills, Grinder, etc., that use liquid cutting compositions.

Cutting liquids do not affect its performance of efficient service because it is filled with a composition that makes it heat, oil, water and acid proof.

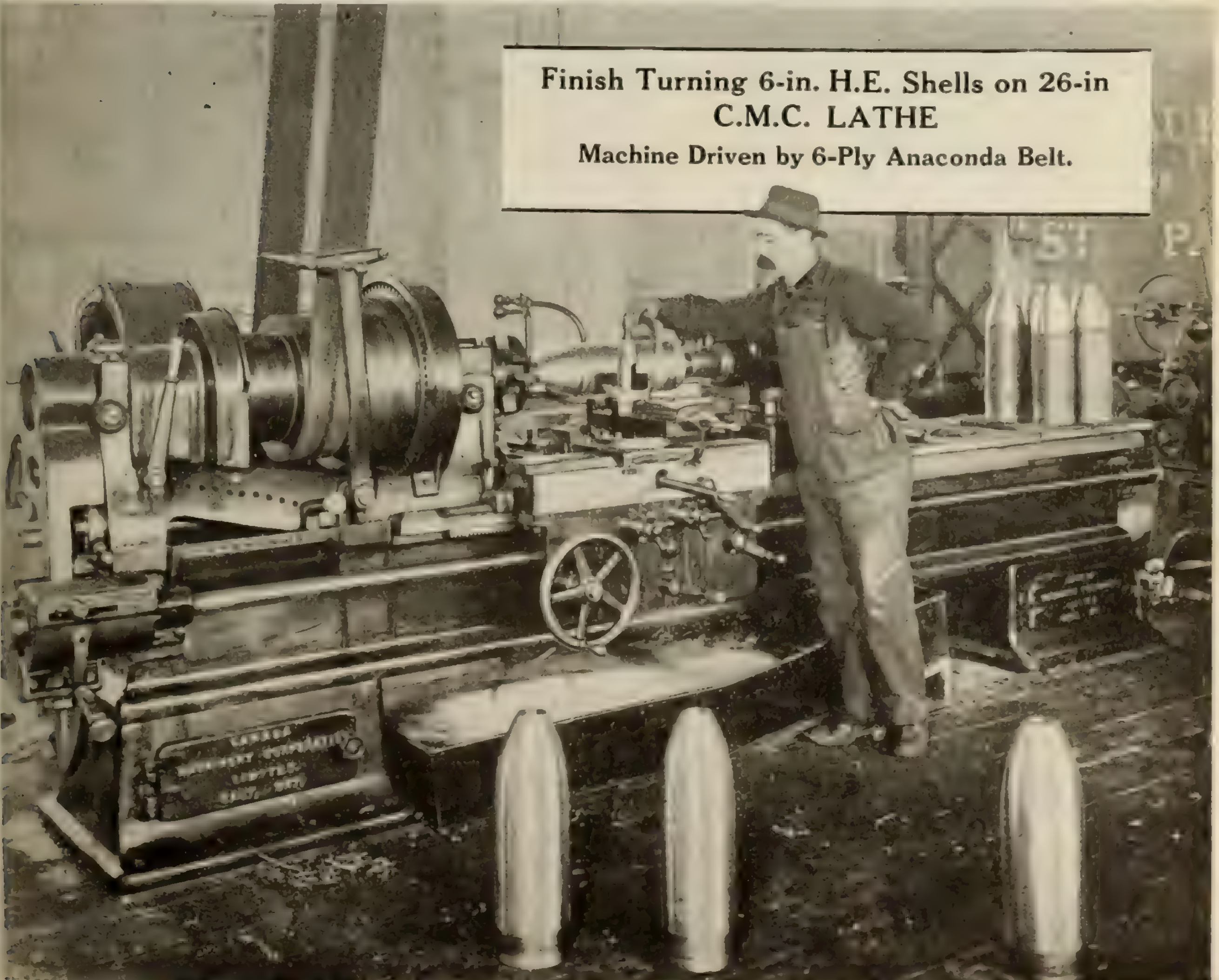
Anaconda is of greater general servivceability than any other belt—leather, rubber, balata or fabric, including canvas. It has unusual wearing qualities, and reduces power loss, repairs, "take-ups" and attention to a minimum.

And the cost is 50% less than leather.

Anaconda will convince you that with it you can obtain those belting qualities which are needed in your plant. TRY IT.

MAIN BELTING COMPANY OF CANADA

32 Front St. W., Toronto *LIMITED* **10½ St. Peter St., Montreal**

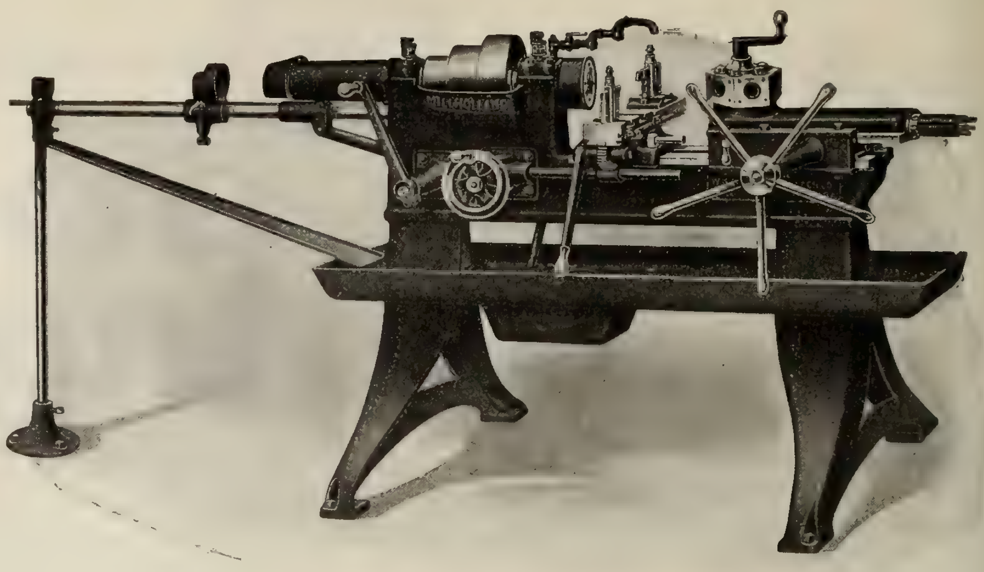


Finish Turning 6-in. H.E. Shells on 26-in C.M.C. LATHE

Machine Driven by 6-Ply Anaconda Belt.

Every Feature to secure strength and stiffness on the heavy cuts is embodied in

Millholland
1"x7"
Screw Machine



The Bed is of box construction well ribbed, and with the headstock cast solid.

The Headstock is made with plain head three-step cone. The steps of the cone pulley are of large diameter and wide face and are so proportioned as to transmit the maximum power with proper spindle speeds.

The Spindle, high-carbon steel with hardened and ground thrust washers.

The Cut-off Slide, with broad, flat, well-gibbed bearings.

The Turret is of heavy construction and mounted on a large steel stud.

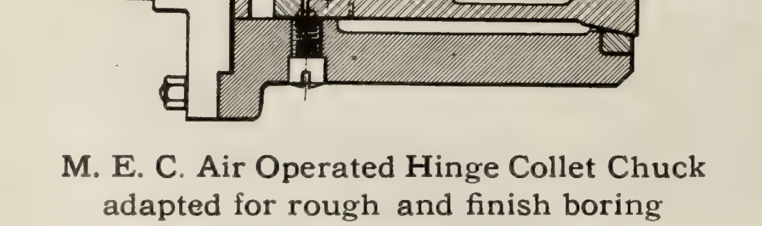
The Automatic Chuck and Bar Feed, operated by the long lever on the front of the bed, grips or releases the work instantly. The operator with one movement opens the chuck and feeds the bar without stopping the machine.

DROP A LINE FOR FULL DETAILS AND SPECIFICATIONS.

Manufactured by

W. K. Millholland
Machine Company
INDIANAPOLIS, IND.

You Can Produce More Shells Per Day



M. E. C. Air Operated Hinge Collet Chuck adapted for rough and finish boring operations.

If you are interested in Machining Fuse Plugs, Shells, Etc. the best Chuck and Taps are M. E. C.

These devices will increase your production from 25 to 40 per cent. over any other method now employed.

ONCE KNOWN—ALWAYS USED

It will pay you to investigate at once.

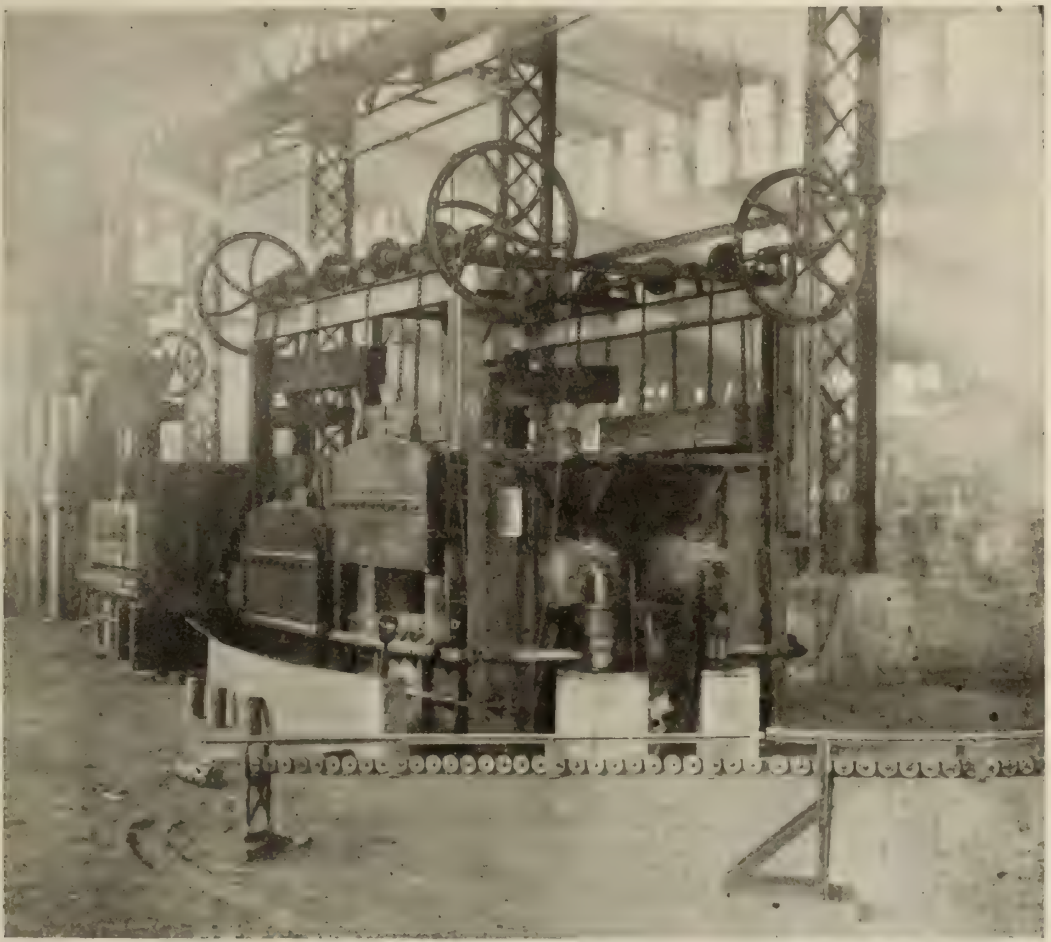
Manufacturers Equipment Company

175-179 North Jefferson St., CHICAGO, ILL.

FOREIGN AGENTS: C. W. Burton Griffiths & Co., Ludgate Circus, Ludgate Hill, London, England.
Louis Besse, Bureaux & Caisse, 39 Rue de Lappe, Paris, France; Geo. A. Todd, 152 Bay St., Toronto, Canada

"MECOL" Furnaces

especially designed for Shell Work



To secure accurate SHELL FORGINGS you must have properly heated Billets.
Shell, Howitzer and Cartridge Cases

HEATED TO THE DESIRED TEMPERATURE

are only possible in well-designed Furnaces. The largest manufacturers are using MECOL FURNACES. Full particulars on request.

All Furnaces designed and built under personal supervision of F. DITCHFIELD, "THE FURNACE MAN."

Mechanical Engineering Company, Limited

55; COTE STREET, MONTREAL, QUE.

PHONE—MAIN 3585

Good Threads Cost Less Than Poor Ones

The advent of the W.S.O.D. in his shop has opened the eyes of many a manufacturer producing screw threads to the fact that he can

Increase Production
Decrease Cost and
Cut Perfect Threads

all at one and the same time.

Do you want us to prove it? We are ready.

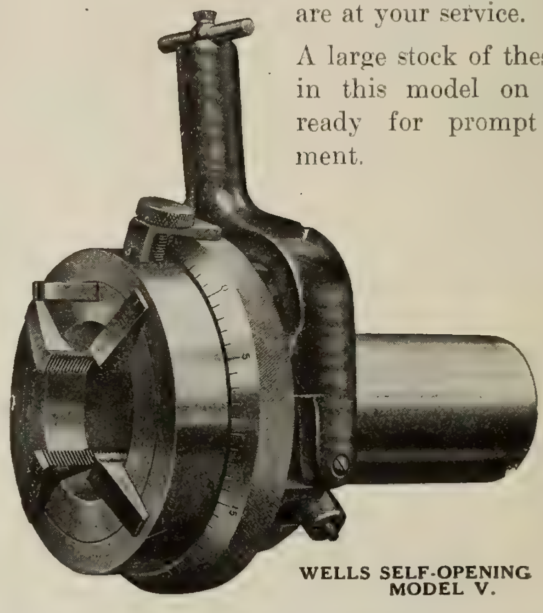
Our general catalog describes many other good tools for the machine shop. Send for it.

Wells Bros. Co. of Canada, Ltd.
GALT, ONTARIO

Sales Agents; The Canadian Fairbanks-Morse Company, Limited, Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary.

Have you a screw-cutting problem that baffles you? Our Mechanical Engineers are at your service.

A large stock of these dies in this model on hand, ready for prompt shipment.



WELLS SELF-OPENING IE.
MODEL V.

Don't make patterns for your Gears

We make

Machine Moulded Gears

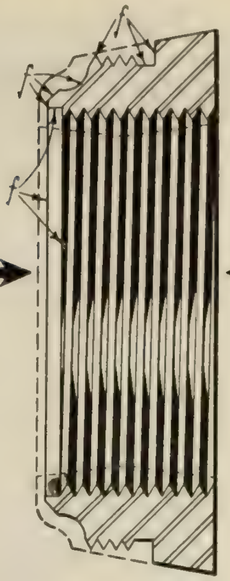
Any size up to 18 feet in diameter, in either steel, semi-steel or grey iron. No patterns required.

TRADE MARK

Also manufacturers of all parts pertaining to Cement Mill Machinery, Crushing, Mining and Dredging Plants in "Adamantine," Chrome, Manganese and Nickel Steel.

Let us figure on your requirements. Write

HULL IRON & STEEL FOUNDRIES, Limited
HULL, P.Q., CANADA



**40
SHRAPNEL HEAD
ADAPTERS
PER HOUR**

**ON
THE NEW SIZE 34
SINGLE HEAD AUTOMATIC
CHUCKING MACHINE**

JUST 90 SECONDS is the time required to transform one of these high-carbon steel drop forgings into a finished adapter ready to connect the shrapnel head and shell. When a brass forging is used the production time is, of course, greatly shortened.

OPERATIONS

1st spindle—Rough turned, rough bored and faced
2nd spindle—Finish turned, finished bored, counterbored and formed
3rd spindle—Necked back of thread
4th spindle—Threaded inside
5th spindle—Threaded outside

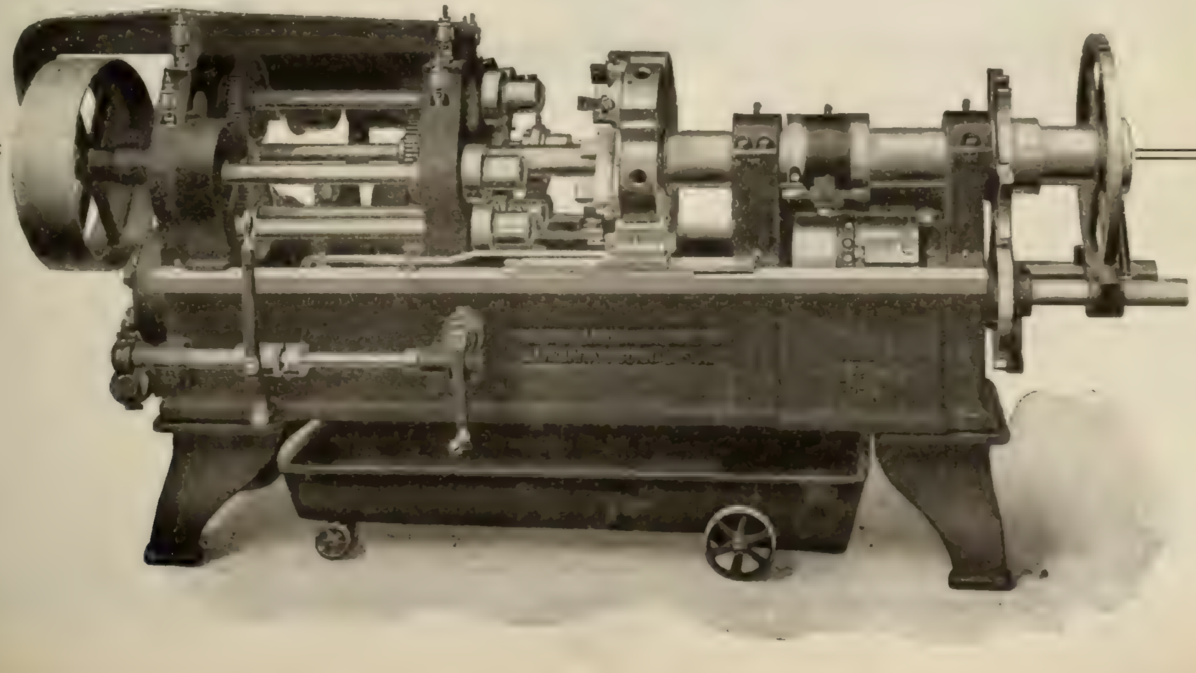
Advantages of "The New Britain Way":

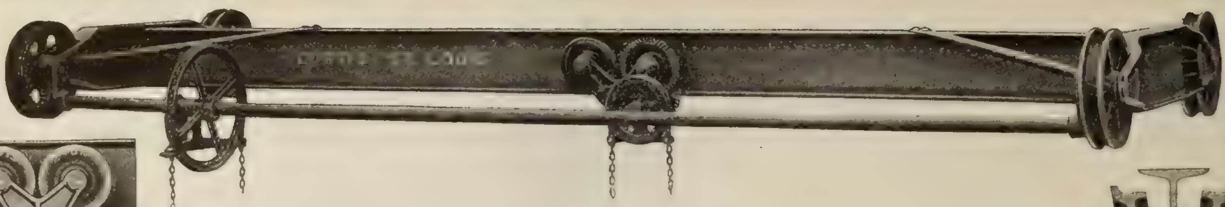
All operations performed at one setting—saves time and insures accuracy
All operations performed automatically—saves more time
All operations performed simultaneously—saves most time
Operator's only duty—insertion and removal of work
Result—3 to 5 times greater productions than by other methods

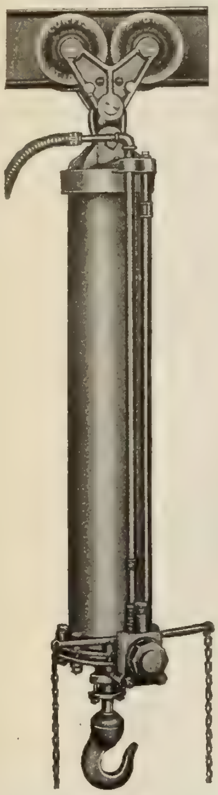
Are you enjoying these advantages on your chucking?

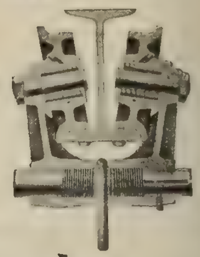
The New Britain Machine Co.

**—Automatic Screw and Chucking Machines—
New Britain, Conn., U.S.A.**









CURTIS, St. Louis, U.S.A.

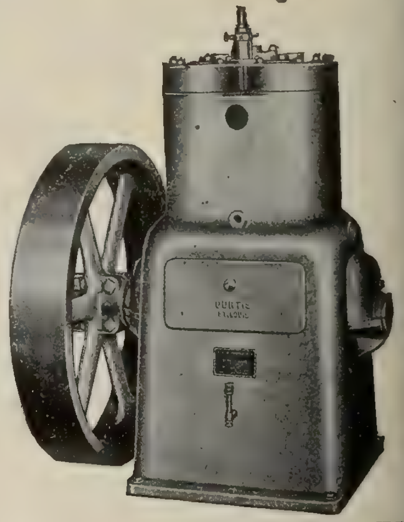
AIR COMPRESSORS — AIR HOISTS — TROLLEYS AND TROLLEY SYSTEMS—SAND BLASTS—PNEUMATIC AND HYDRO-PNEUMATIC ELEVATORS—JIB AND TRAVELING CRANES.

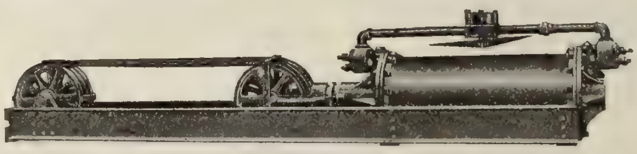
We have specialized for over 22 years on pneumatic machinery. We have developed the simple air cylinder into a straight line motor with wonderful speed control and dependability capable of the widest application to hoisting problems.

Our new controlled-splash oiling system with regulatable sight feed cylinder oiling is something entirely new in air compressor design.

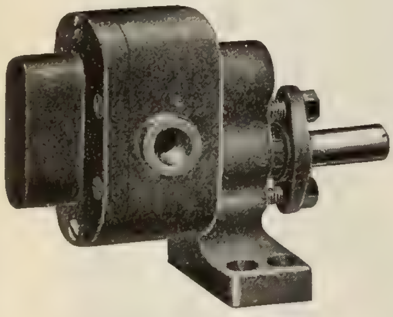
Complete catalogs and descriptive circulars on our entire line furnished on request.

Curtis Pneumatic Machinery Co.
1585 Keinlen Avenue - St. Louis, U.S.A.
New York Office - 532F Hudson Terminal

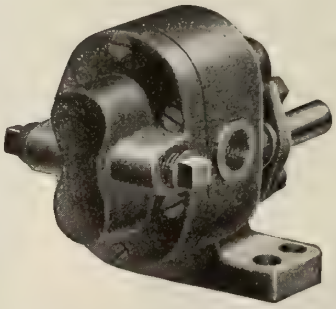




Positive in Action Simple in Construction



Type 1 One-way



Type 2 One-way

ROPER
Circulating
OIL PUMPS

Give a steady, non-pulsating stream delivered in proportion to the speed of the machine.

Type 1 One-way pump is especially designed for use on machines in which the cutting tools operate constantly in one direction, although by belting separately to the pump it may be used on a reversing machine.

In this form of pump a separate relief valve is used in the pipe line if it is desired to close the delivery pipe while the pump is running, or if the delivery is varied in quantity.

Where it is known that the delivery will be cut off or varied at times with the pump running, our Type 2 One-way pump provides the best as well as the cheapest way of accomplishing this result.

By using this form of pump, the piping is much simplified and the cost of installing is less while the appearance of the pump on the machine is much better.

It will pay you to investigate Roper oil pumps—they are saving money everywhere.

WRITE FOR FULL PARTICULARS.

C. F. ROPER & CO., HOPEDALE, MASS., U.S.A.

MISS ELLEN TERRY
As Portia in "The Merchant of Venice"

"Be merciful;
Take thrice thy money,
Bid me tear the bond."
—Merchant of Venice

Shakespeare Series—
"No. 2"

ELLEN TERRY is here depicted in one of her favorite characters, and one might almost think she is pleading in all sincerity for the life of her client.

Take Thrice Thy Money

reminds us forcibly of a large user of

HARRIS HEAVY PRESSURE

who recommended an engineer to send an order for a trial box. He stated it is worth

Three Times the Price

This is the experience of all. It is worth more because it gives **LONGER SERVICE.**

HARRISMETAL
HEAVY
PRESSURE
THE CANADA METAL CO. LIMITED
TORONTO

HARRIS HEAVY PRESSURE

THE BABBITT METAL WITHOUT A FAULT

IS BEST

For All General Machinery Bearings

We Guarantee Our Babbitt Metals to Give Excellent Service.

ORDER A TRIAL BOX FROM OUR NEAREST FACTORY.

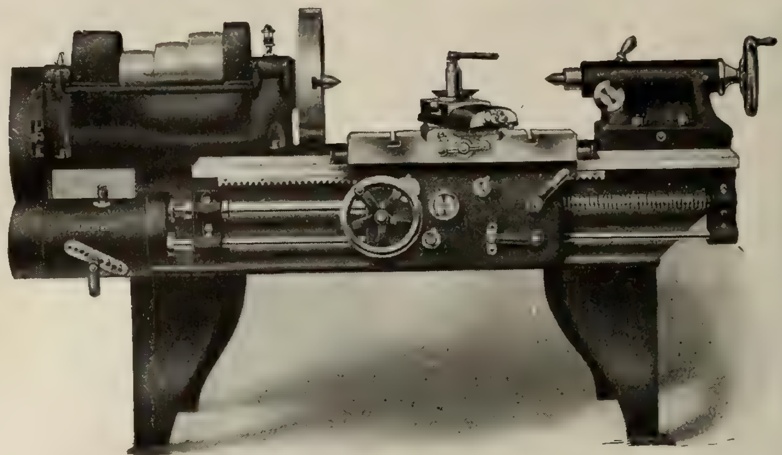
THE CANADA METAL CO., LIMITED

Head Office and Factory: Fraser Avenue, TORONTO

HAMILTON MONTREAL WINNIPEG VANCOUVER

SIDNEY ENGINE LATHE

A "Heavy Turning" Tool of Wonderful Accuracy



17-inch and 19-inch plain change engine lathe, all double back geared. Built 8, 10 and 12-foot lengths of bed.

Some of the important features

20 per cent. steel mixture in bed casting. Heavy carriage vee 2½ inches wide.

High carbon rack pinned and bolted to bed.

50-point carbon steel head stock spindle offset 1 inch off centres for heavy duty work.

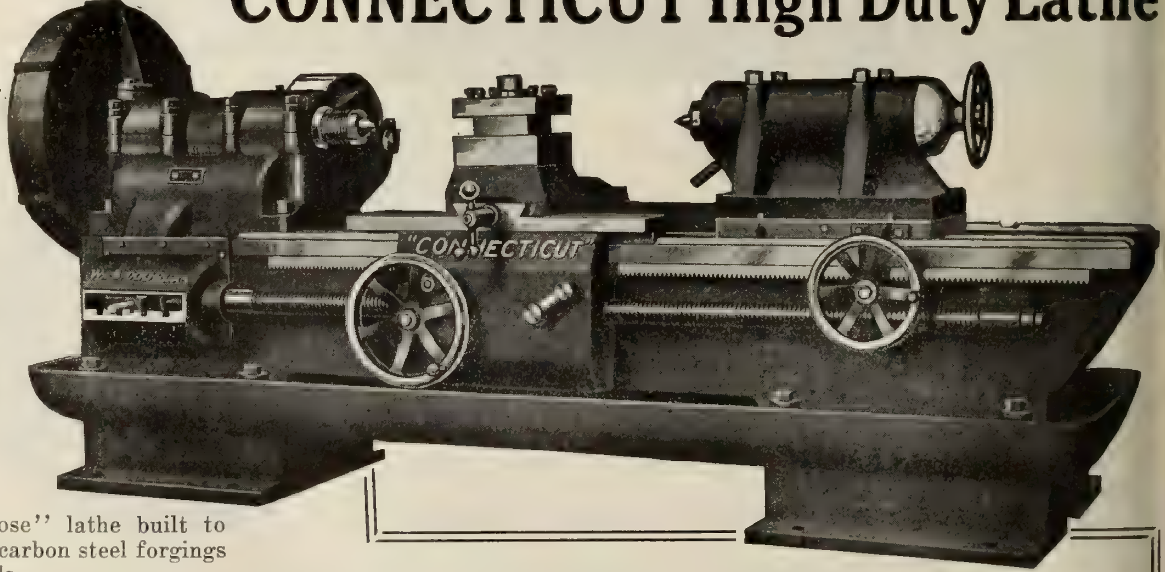
40-point carbon lead screw 17-16 inch diameter, 2 pitch thread.

Let us tell you of the many other interesting details. Write for full particulars.

THE SIDNEY TOOL COMPANY, Sidney, Ohio, U.S.A.

Canadian Agents: ONTARIO: The A. R. Williams Machinery Co., Toronto; QUEBEC: The Foss & Hill Machinery Co., Montreal

CONNECTICUT High Duty Lathe



Sets the pace on HEAVY WORK

A "Single Purpose" lathe built to turn or bore high carbon steel forgings at maximum speeds.

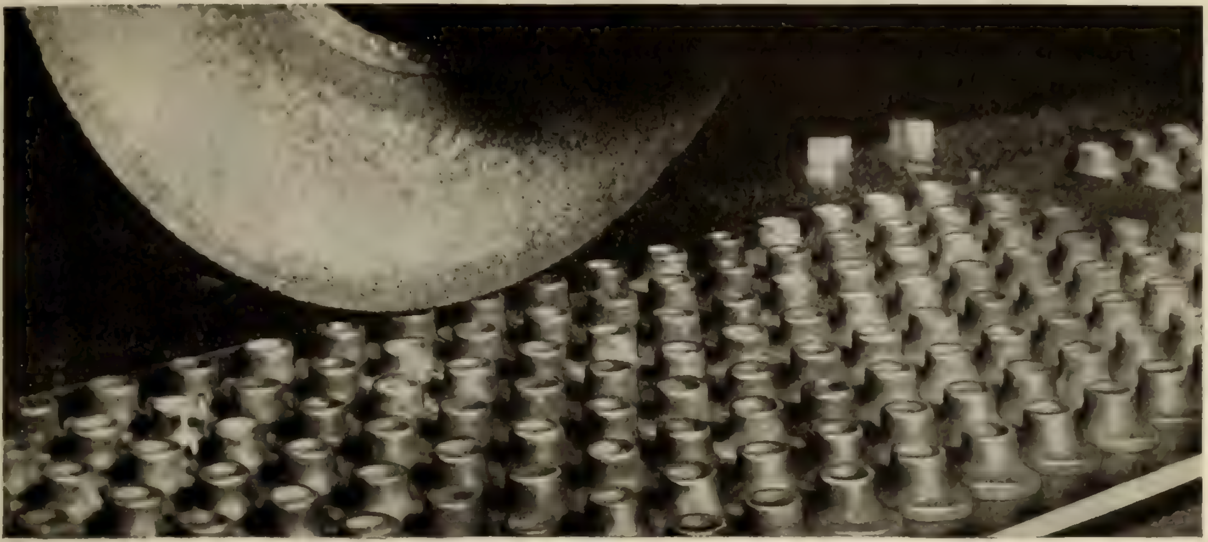
It is in all respects heavier and more rigid than standard 30-inch or even 36-inch lathes giving the same distance between centers.

The usual cutting speeds on shell work are 40 to 50 feet per minute on shells up to 8" diameter, 30 feet per minute on larger sizes. Depth of cut from ¼" to ⅝", depending upon the eccentricity of the piece. Our lathes will stand more than this.

We admit the **Big Gear** is not particularly handsome, but it eliminates the train of small gears, and adds greatly to the strength and wearing qualities.

Write for bulletin giving full details.

W. & B. DOUGLAS, ***Middletown, Conn.***



A 250% Increase in Production by the Use of Heald Magnetic Chucks

You often run across ads. in which a manufacturer boasts that his machine, his tool or his appliance has increased production from 10 per cent. to 50 per cent. But how often do you hear of an increase in production of from 200 per cent. to 250 per cent. brought about by the adoption of a new attachment?

Two standard 10 x 32 Heald Magnetic Chucks butted together end for end to make one continuous chuck accomplishes this, however, on the job illustrated here. Five hundred and twenty-eight cones ⅞″ diameter are placed as shown on the chucks in from 10 to 12 minutes. These cones are ground on the ends to .002″ limit, two cuts being taken; and the total time required for the job from start to finish is 1¾ hours. Previously this work required about 5 hours, and the operator had to be on the job all the time. Now it takes 1¾, and the operator can work at some other machine once the work is chucked.

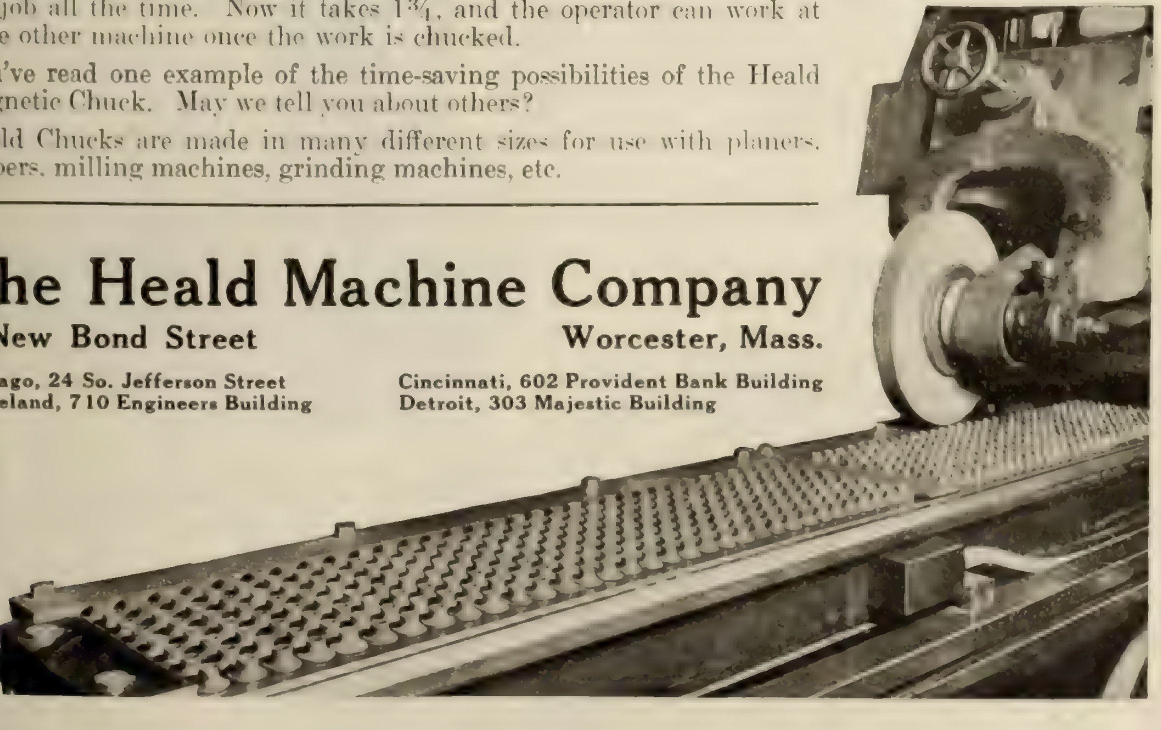
You've read one example of the time-saving possibilities of the Heald Magnetic Chuck. May we tell you about others?

Heald Chucks are made in many different sizes for use with planers, shapers, milling machines, grinding machines, etc.

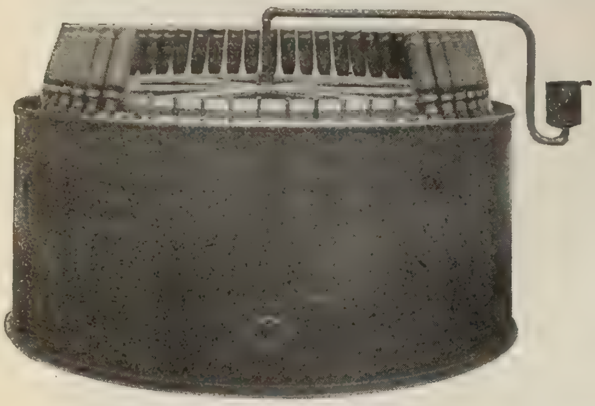
The Heald Machine Company

8 New Bond Street **Worcester, Mass.**

Chicago, 24 So. Jefferson Street
Cleveland, 710 Engineers Building
Cincinnati, 602 Provident Bank Building
Detroit, 303 Majestic Building



Shell Painting, Nosing and Banding Machines



PAINTING MACHINE

4.5 and 60 POUNDER SHELL
BANDING and STAMPING MACHINE

SIMPLICITY: That is the beauty of these machines; they are so simple that **a woman or even a child can control them.** This is an important feature in reducing operating expenses.

Banding Press is sold without stamping attachment if desired.

Painting Machine is operated with an ordinary air drill, and, if desired, a heating coil under table, enclosed in a sheet steel shell, can be supplied, as shown in cut.

Canadian Locomotive Company, Limited, Kingston, Ont.

SALES HANDLED EXCLUSIVELY BY

The John Bertram & Sons Company, Limited, Dundas, Ontario, our Agents for these machines

---

To the Shell Manufacturer:

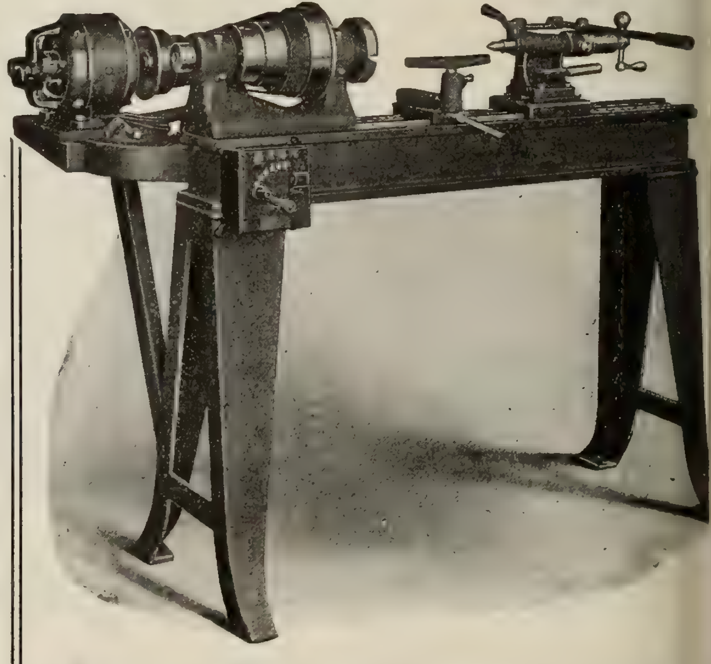
Use

Economic Shell Washer

If you wish to wash your shells quickly and cheaply; it will remove all grease, oil, lead, etc., and makes the shells easy to lacquer.

Made in Canada by

Canadian Economic Lubricant Company, Limited, Montreal

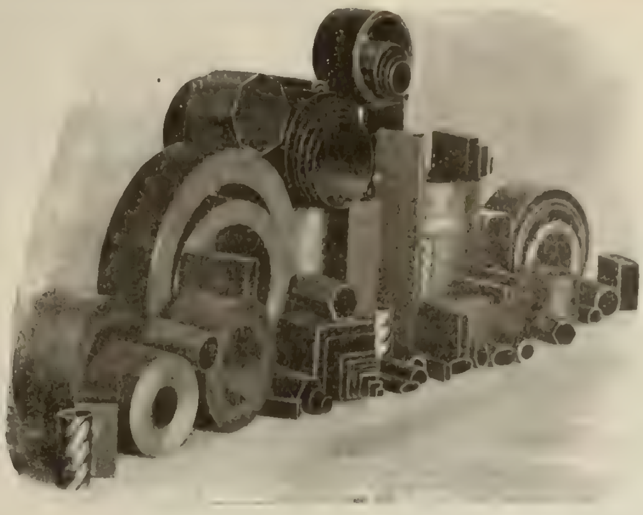


Motor Driven Speed Lathe

This style of motor drive employs a constant speed motor mounted on a plate having an extension arm to support a bearing for the outer end of the motor shaft. The motor plate is fitted to a slide on a shelf which is securely fastened to the back of the lathe bed. The motor plate is moved by means of a screw which tightens or loosens the belt. A four-step cone pulley on the motor shaft is belted to a four-step cone pulley on the spindle. This gives the same speed variation as when a countershaft is used, and by means of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is crossed-braced and all clamping levers are above the ways.

J. G. BLOUNT CO. - Everett, Mass., U.S.A.



READY TO SAVE YOU TIME

Why waste time turning and boring tubular shapes from solid stock? You wouldn't forge or machine merchant bars, because it wouldn't pay. And it doesn't pay to bore out bushings, or collars, or lathe-spindles, or several hundred other tubular articles, because Shelby Seamless Steel Tubing can be procured in almost countless sizes and thicknesses, hard, medium or soft, and in almost any length, READY for use, and cheaper than you can make an equivalent form in your own shop.

The WORKABILITY of Shelby Cold Drawn Tubing is remarkable; it is surprisingly tough and ductile, otherwise it could not be drawn cold. It is capable of many different anneals, and can be case-hardened. It machines readily, takes an excellent polish, can be brass or copper-plated, nickeled or oxidized, and withal is made in so many different sizes and thicknesses that it is simply old-fashioned and wasteful to neglect its many advantages.

Examine the range of sizes and shapes shown in this small group; think of the wasted labor in attempting to duplicate these excellent specimens in a machine-shop, and finally compare prices, which we quote on application.

We have the ONLY Stock in Canada of

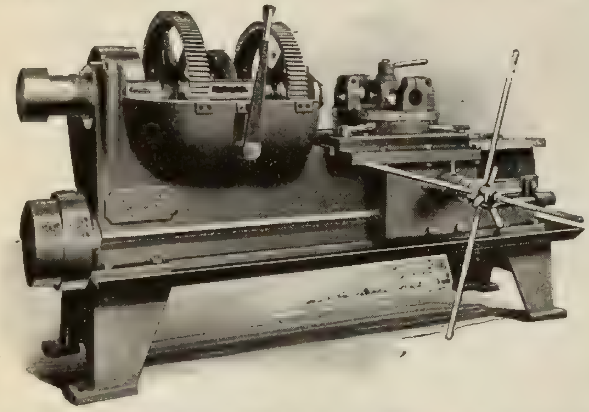
SHELBY SEAMLESS STEEL TUBING

OVER 350 SIZES—1/8 TO 5½ INCHES O.D.

Wire your order — we will ship the same day. Send for Price List and Descriptive Catalogue

Lyman Tube & Supply Co., Limited

Montreal, 323 St. James Street
Toronto, 33 Melinda Street



Unskilled Labor Can Produce High-Grade Work with the

CLEVELAND CHUCKING LATHE

This machine was designed for handling the various drilling, turning, boring and forming operations on 3" to 6" shrapnel and high-explosive shells. It is rugged, powerful, easy to handle, and will produce the same uniform, accurate results with unskilled labor as other machines with experienced mechanics. That's a big point to consider now that skilled men are hard to get. Let us show you the possibilities of these machines. We can make prompt deliveries of machines with solid turret, turret on cross slide, and with tail stock.

Circular on request.

CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE OHIO, U.S.A.

Charles F. Elmes Engineering Works
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Hydraulic Machinery

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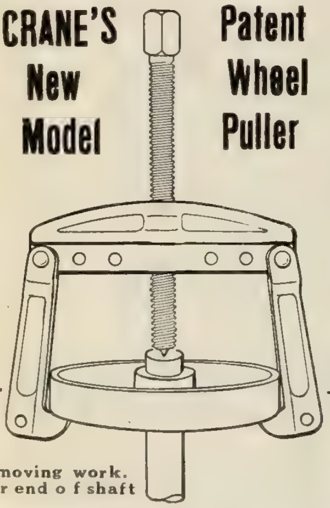

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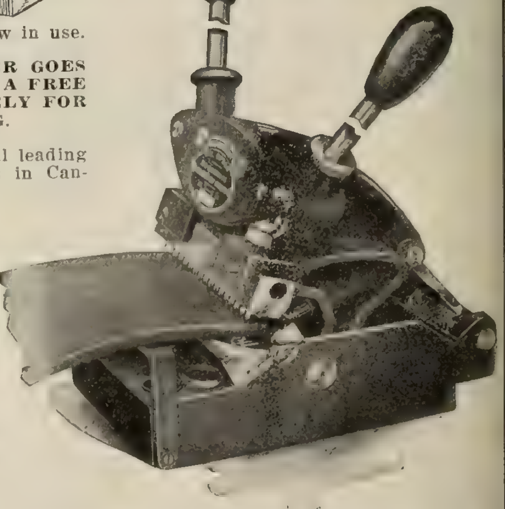

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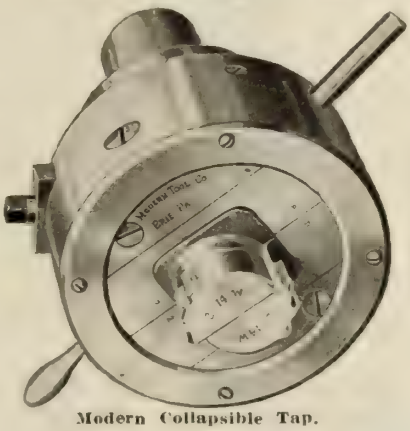

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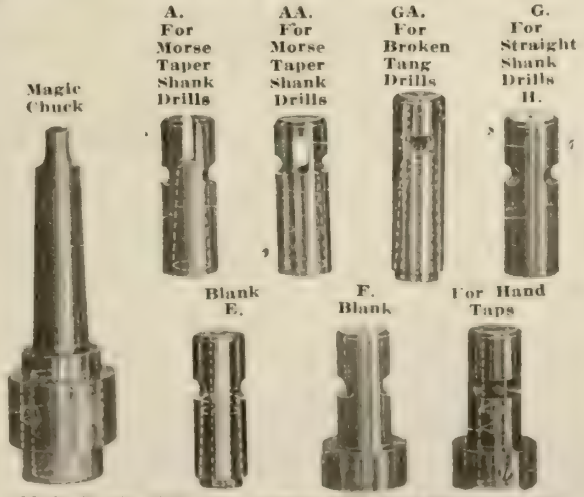
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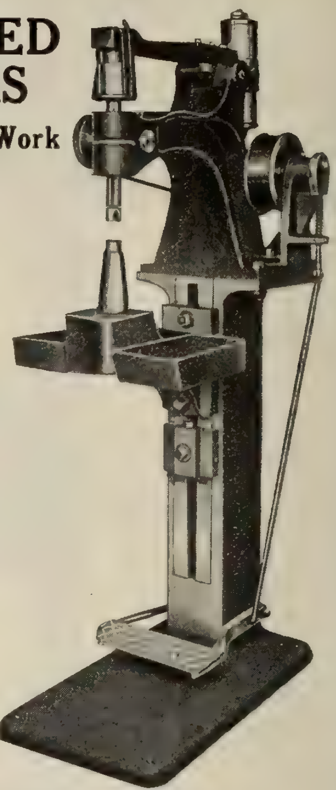

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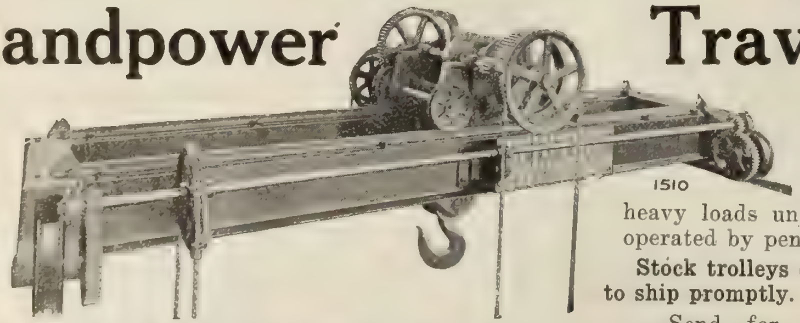

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Stock trolleys enable us to ship promptly.

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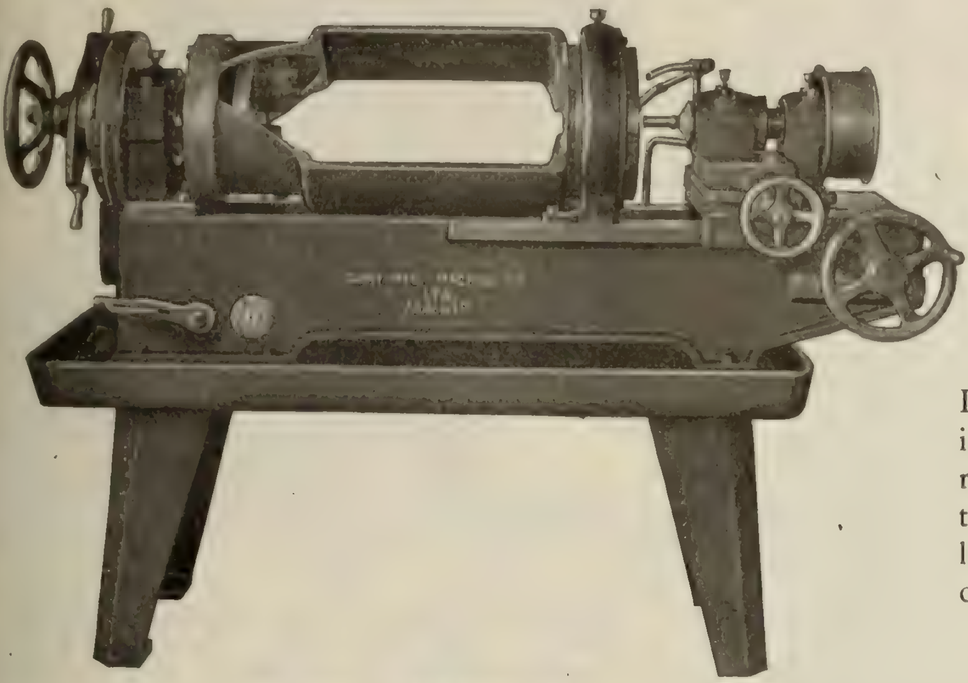

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Fastest and most Sensitive Tappers built

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ELEVATING TRUCK

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or any factory product where numerous operations are required.

All material is stacked on the platforms. To move material the truck is backed under the platform; the handle of the truck is then pushed down, keeping the button depressed, which raises the truck bed, and with it the loaded platform, at the same time automatically locking it in its raised position.

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Raising and lowering of the truck can be operated with one hand—can be raised or lowered at any angle. Specially designed ball-bearings throughout.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises and** PRESSES WITH ATTACHMENTS FOR PRESSING IN BAND — fixtures especially adapted for the manufacture of 18-pr. Shrapnel Shells.

You will profit by getting in touch with us now for prices and full information.

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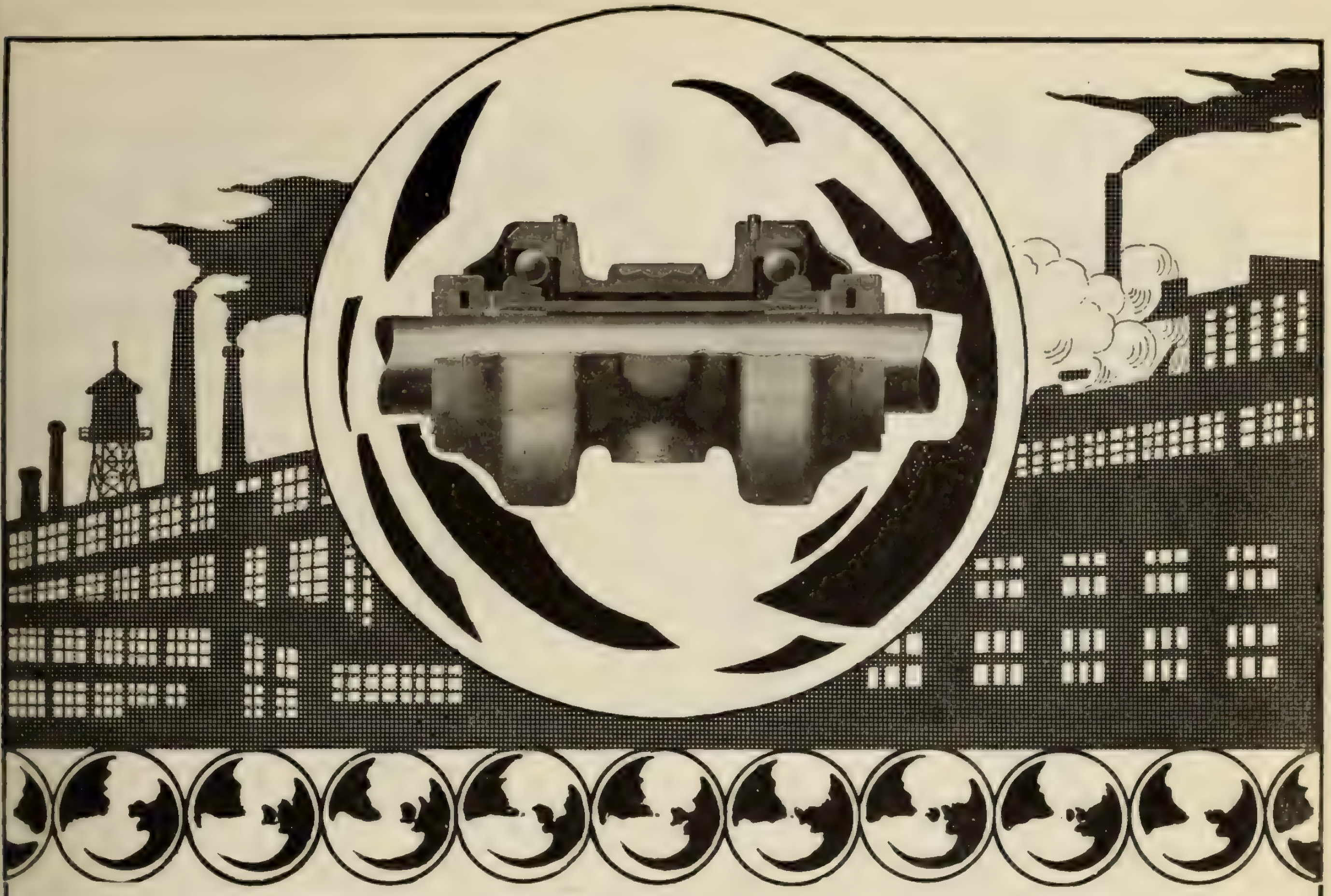

Run your plant on
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YOU'LL SAVE POWER

The ordinary line of shafting consumes and wastes from 15 to 60% of power developed.

But the line shafting that's equipped with Chapman Double Ball Bearings will save 75% of the friction loads, making an average total saving of power from 15% to 30%.

Chapman Double Ball Bearings will greatly reduce your power cost, or if you are in need of more power they will give it to you at the present cost. They often eliminate the necessity of increasing the size of the power plant.

Oiling and attention are reduced to a minimum. Lubrication is only required twice a year.

Chapman Double Ball Bearings fit any adjustable hanger, and the change can be made with but little delay to you.

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"W. & B." Drop FORGINGS

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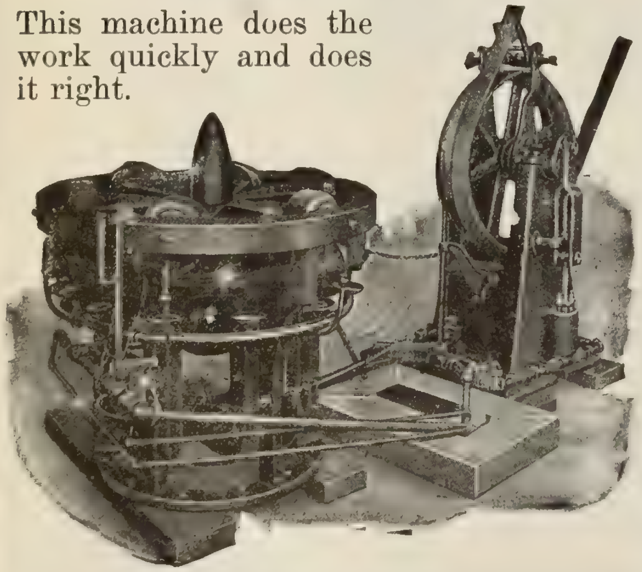
Send us Blue Prints on Special Forgings, three pounds and under in weight, and permit us to estimate on your requirements.

Hydraulic Banding Machine

For compressing bands on shrapnel shells and other projectiles

This machine does the work quickly and does it right.



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Machines for our Canadian Customers are built in Hamilton, Ont.

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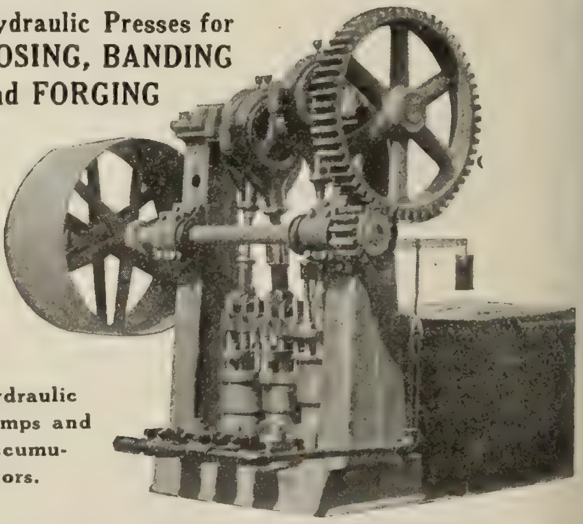

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Hydraulic Presses for all purposes.

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CHIPPING HAMMERS with Single Valve of the Latest Improved Design.

Made in five sizes, with piston diameter of 1 1/16" by strokes of from 1 to 5", designated as sizes A, B, C, D and E. **Shipped on Trial at Our Expense**

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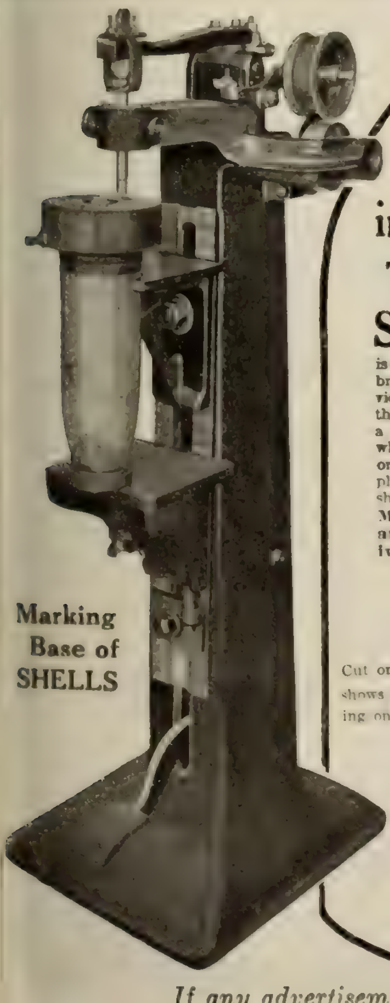


Marking Base of SHELLS

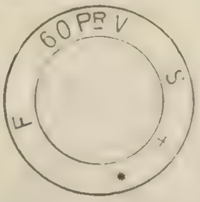
A PERFECT JOB in 15 Seconds

The "Grant" Shell Marker

is so arranged that the blow is brought to bear on each individual letter successively, while the blow can be adjusted to give a shallow or deep impression which is uniform for each letter or figure. The work is completed in one revolution of the shell, which is done by hand. Made for 18 pdr., 4.5 in., and 60 pdr. high explosive shells.

Drop a card for full particulars.

Cut on right shows marking on shell.



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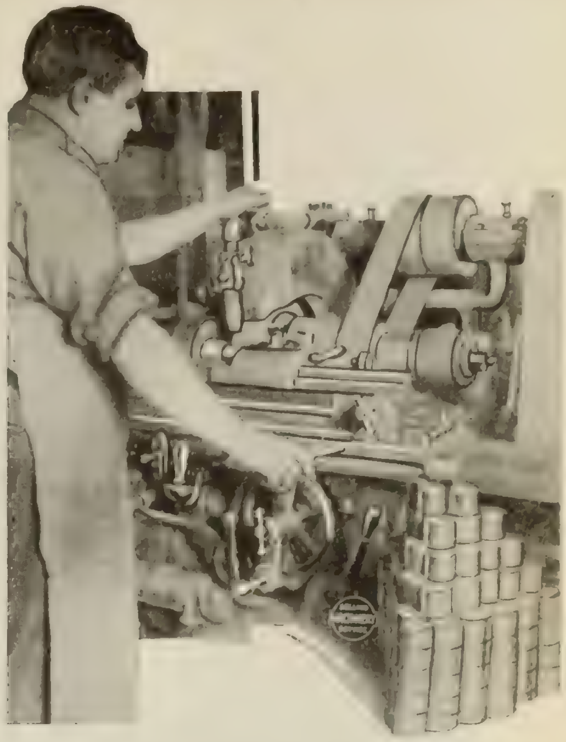

Grinding Steel Rolls for Railway Roller Bearings

Another example of wheel being fed straight into the work is the one shown here—grinding steel rolls for railway roller bearings. The rolls are $1\frac{3}{4}$ in. diameter by $1\frac{1}{4}$ in. long, are carried on centers and driven by a pin that engages a hole in one end. From 0.016 in. to 0.018 in. of hardened steel is removed from each roll and twenty pieces are ground at each truing of the grinding wheel. The table is not traversed, the wheel being fed straight into the work.

An output of 325 of these rolls in ten hours is average output; when put to the test, as high as forty pieces per hour are ground.

THE WHEEL IS ALUNDUM

NORTON COMPANY

WORCESTER, MASS.
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Alundum and Crystolon Plants, Chippawa, Ontario and Niagara Falls, N. Y.

Canadian Agents:

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED
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F. H. ANDREWS & SON,
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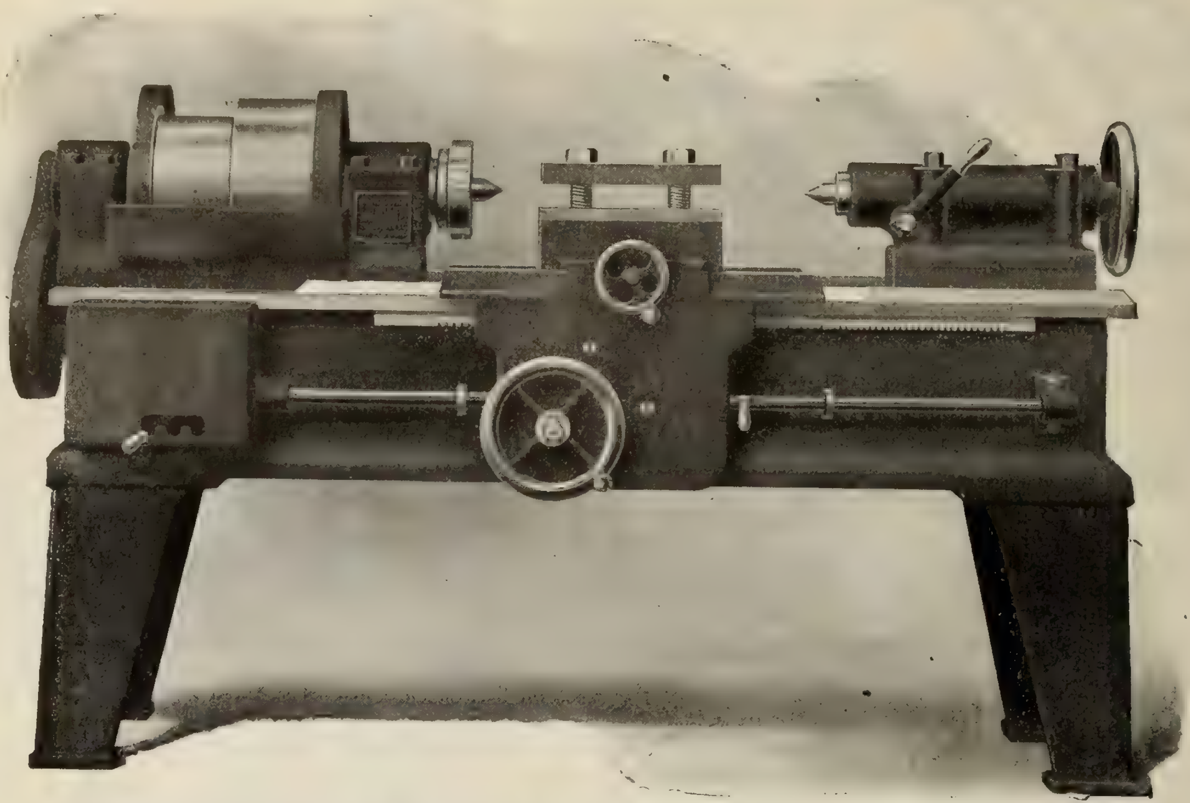

FAIRBANKS-MORSE SHELL LATHES

We have designed this machine to meet the demand for a plain, heavy standard lathe, void of frills, which can be easily handled by non-skilled labor. It is particularly suitable for various operations on High Explosive Shells. The quality of the material used throughout its construction is the very best obtainable and the workmanship is up to the standard required

The gearing is of steel cut from the solid. Headstock bearings are fitted with brass bushings and ring oiled. Spindle is bored for No. 5 Morse taper center, and will be solid unless otherwise ordered. Three changes of feed are obtainable by means of shifting lever in gear box and feeds of 1-8, 1-16 and 1-32 inch will be furnished.

The countershaft is a heavy, durable two-speed countershaft, having two 16 x 6 friction driving pulleys and a cone pulley. The carriage will be provided with power longitudinal feed, having automatic stop in both directions. Hand cross feed. The headstock, tailstock, carriage and apron are massive, at the same time not clumsy. We can also furnish lathe, with various attachments for different operations, at additional cost.

16-in. Fairbanks-Morse Lathe

Specifications

Dia. of Spindle	5"
Swing over bed	16"
Swing over carriage	10"
Distance between centres	21"
Ratio of back gearing	6.25 to 1
Dia. of tailstock spindle	3½"
Travel of tailstock spindle	8"

20-in. Fairbanks-Morse Lathe

Specifications

Dia. of Spindle	5"
Swing over bed	20"
Swing over carriage	14"
Distance between centres	40"
Ratio of back gearing	6.25 to 1
Dia. of tailstock spindle	3½"
Travel of tailstock spindle	8"

Large diameter Two-Step cone for 6" double belt steel gears.

The Canadian Fairbanks-Morse Co., Limited

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Fairbanks-Morse Service—From Coast to Coast

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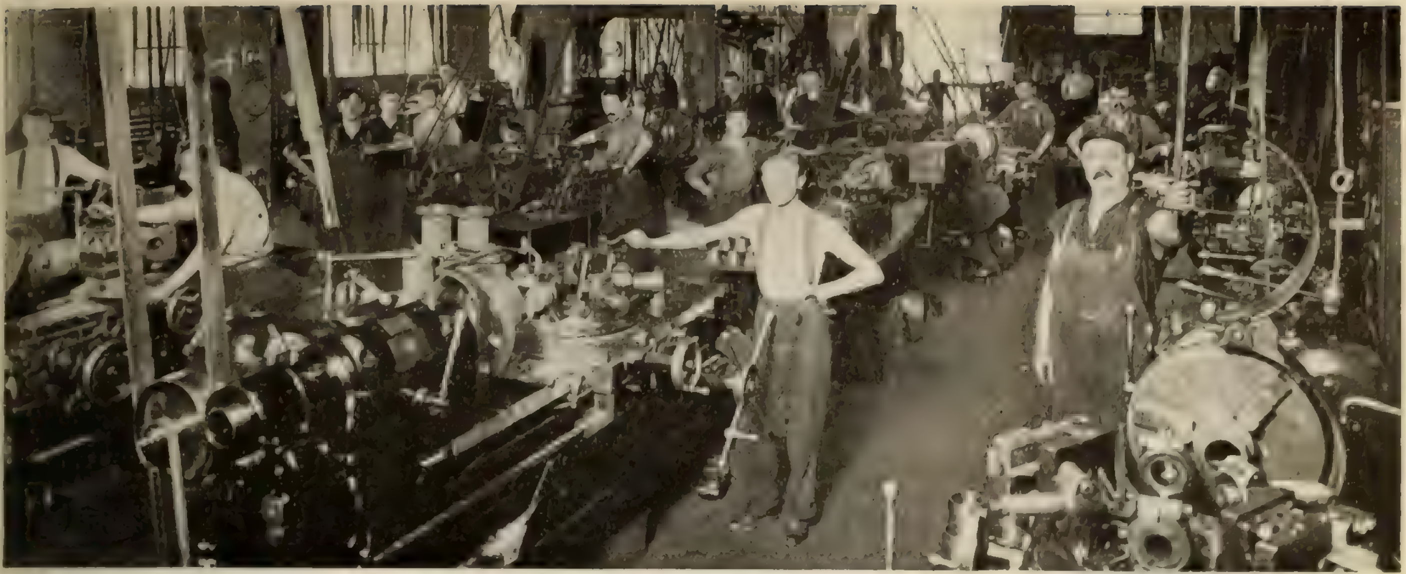

FIG. 1. PART OF MACHINE SHOP, SHOWING TYPES OF MACHINES ENGAGED IN FINISHING DETAIL PARTS OF BALL BEARINGS.

Ball Bearing Manufacture in a Specialized Canadian Plant

Staff Article

Conservation of energy through elimination of transmission losses is receiving increased attention from the engineers of to-day. It is rather anomalous, however, that hitherto the largest, most obvious, and most easily remedied of factory losses has been overlooked in efforts to perfect systems as a whole rather than improve familiar details in everyday use. The adoption of ball-bearings for line shaft work indicates the advance in general practice, the product dealt with here playing a large part in the inception of the ball-bearing era in Canada.

BALL bearings as a power-saving feature in transmission apparatus are an accepted fact in modern engineering circles. All progressive engineers are familiar with the evolution of the ball-bearing from the crude unreliable devices of the pioneer bicycle days to the product of highly specialized factories. With ever-rising costs of production in labor and material, manufacturers have, during recent years, been compelled to consider every possible means of obtaining economy, with the result that power transmission losses are now subject to continuous investigation in practically all lines of manufacturing.

Established in this country in 1902, the Chapman Double Ball Bearing Co. was formed to develop patents granted to C. A. Chapman, and since then have been continuously engaged in the production of various types of ball bearings for power transmission equipment, and special and general machinery. As now produced by the firm, Chapman ball bearings are unique in respect of the fact that they are made in the only factory of its kind in Canada. Their design and manufacture are based on the experience gained in equipping over 2,000 factories which has resulted in the entire elimination of any undesirable features, which may have existed in the original design years ago, and the evolution of an item of transmission equipment capable of meeting all demands so far as service is concerned, while effecting economies unobtainable with equipment of a conventional design.

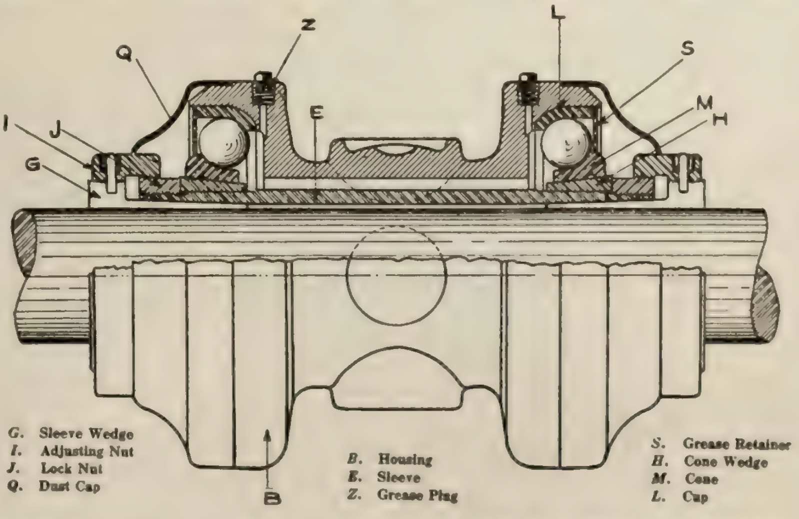

FIG. 2. SECTIONAL DRAWING OF BALL-BEARING SHOWING DETAILS CONSTRUCTION.

Constructional Features.

The Chapman ball bearing as adapted for the majority of general shafting work is of the cup and cone type, two double opposed ball assemblies being mounted in the ends of a cast iron housing. The details of construction are clearly shown in the sectional line drawing Fig. 2, while the external appearance of the bearing mounted in an ordinary shafting hanger is shown in Fig. 3.

A consideration of the features exhibited in these illustrations brings out two salient facts concerning this design of bearing—first, by using two sets of ball races in the manner shown, the dimensions of the housing are retained within limits which make the bearing completely interchangeable with existing self-oiling boxes of the same shaft sizes in any standard type of hanger frame; second, as a result of the first feature there is practically no limit to the size of ball or diameter of ball race which can be incorporated in any one size of bearing. Due to the latter fact, therefore, these bearings possess an exceedingly high carrying capacity largely in excess of any load which the corresponding size of shaft would be able to sustain continuously. Under all ordinary factory conditions, therefore, the factor of safety is more than ample to insure a very long period of service.

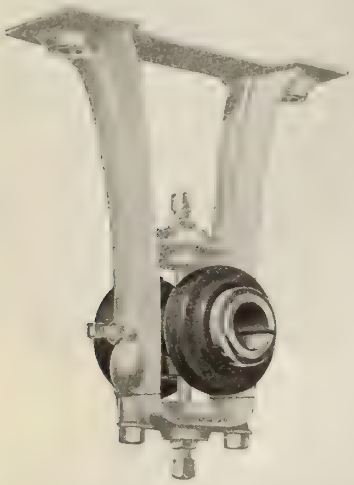

FIG. 3. STANDARD TYPE OF SHAFTING BEARING IN HANGER FRAME.

Large Balls Used.

Referring to Fig. 2, it will be seen that the two bearing units are composed of balls having a diameter approximately equal to one-third of the shaft diameter, the inner raceways or cones being so disposed in relation to the outer raceways or cups that the angle of ball contact is inclined inwardly at each end at an angle of 15 degrees, thus permitting a suitable percentage of thrust load in addition to the radial load. The main casting or housing B, which is held stationary in the hanger frame, is of cast iron, suitably proportioned to withstand stresses, and having its ends accurately machined to receive the cups or raceways L. These cups and the cones or inner raceways M, are of a special grade of steel, formed into shape in power presses and then heat treated so as to impart to the metal the degree of hardness which is necessary for the proper performance of its duty.

The inner or revolving unit of the bearing consists of a seamless steel sleeve E, which is secured in position on the shaft by means of split tapered bushings or sleeve wedges G, which fit into corresponding tapers formed in the ends of the sleeve.

Method of Fastening on Shaft

The pressure of the balls on the cone is distributed around the sleeve by the cone wedge H, these three pieces being assembled under pressure so as to give a body of solid metal between the balls and the shaft. This construction enables the cones to be accurately adjusted toward each other in order to eliminate play in the ball races, after which lock nuts J are tightened up on the threaded ends of sleeve and secured permanently in position by a rivet, the inner end of which has a square head which engages with the split in the sleeve wedge. The object of this becomes apparent when the manner of tightening the sleeve wedge is considered. The outside of lock nut J has a right hand thread, the outside of sleeve wedge G has a left hand thread, and the adjusting nut I has corresponding right and left hand threads so that when turned in a right hand direction, looking on the end of the bearing, the opposed threads cause the sleeve wedge to enter the tapered ends of the sleeve thus contracting the wedge which grips the shaft firmly without damage. The square rivet head prevents the sleeve wedge from turning on the shaft when the lock nut is being tightened.

By means of this method of fastening the bearing can be installed on shafting varying from .005 in. oversize to .005 in. undersize. Grease retainers insure the proper application of lubricant over extended periods while an efficient type of dust cap prevents the access of dust or grit under adverse conditions of working.

TABLE OF MAXIMUM LOADS.

Size of Bearings.	100	150	200	250	300	350	400	500	600	700	800	1000	1200
	MAXIMUM LOADS FOR THE ABOVE SPEEDS.												
1	2720	2400	2160	2000	1840	1760	1680	1600	1480	1400	1360	1280	1200
1½	3200	2800	2480	2320	2160	2080	2000	1840	1760	1680	1600		
2	4560	4000	3640	3360	3120	2960	2880	2720	2520	2400			
2½	6400	5680	5200	4800	4520	4280	4080	3800	3600				
3	8160	7120	6480	6000	5680	5360	5120	4800					
3½	10880	9520	8640	8000	7520	7200							

NOTE.—The loads cited above are for steady speeds and constant loads, evenly distributed on the bearings. Where the load is on one end of the bearing, only one-half of the above loads are permissible.

Capacity of Standard Sizes.

As indicating the carrying capacity of these bearings the above table gives the maximum loads for standard sizes of the cup and cone type at different speeds, while heavy duty bearings are also produced in which each size of bearing is suited for the load of the next bigger size of regular bearing.

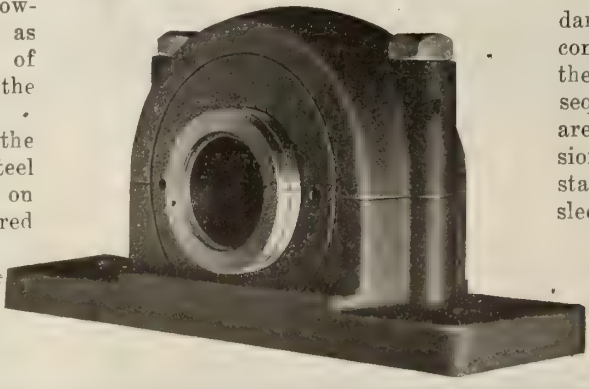

FIG. 4. BALL-BEARING PILLOW BLOCK WITH SELF-ALIGNING BALL AND SOCKET CONSTRUCTION.

The Chapman type of ball bearing construction has been developed so as to include pillow blocks and loose pulley bushings. A pillow block of the ball and socket type is shown in Fig 4, which, while taking care of either misalignment or spring shafts, has a very short distance between the base and the centre which permits its use in many situations where the ordinary adjustable pillow block could not be used.

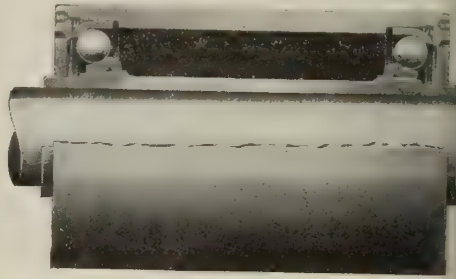

FIG. 5. BALL-BEARING BUSHING FOR LOOSE PULLEY.

Pulley and Clutch Applications.

Fig. 5, shows the interior arrangement of a loose pulley bearing or bushing, which has proven satisfactory in overcoming inherent troubles of ordinary loose pulleys. In addition to saving time and trouble through heating due to neglect or overload, these pulleys effect substantial economies in lubrication and necessary attention. The lubricant used is a high grade vaseline which does not leak like oil or get thrown around, increasing fire risks or damaging goods, and as the sleeve in contact with the shaft does not revolve there is no wear on the shaft with consequent depreciation. Clutch sleeves are a kindred item of power transmission equipment which have been also standardized in ball bearing types, the sleeve in this case being secured to the shaft with wedges in the same way as the shaft bearing.

The light shafting bearing shown in Fig. 6, is an interesting example of pressed steel manufacture, the cups, coned sleeve, housing and cages being low carbon steel stamping hardened and ground on all wearing surfaces. The size of shaft for which this bearing is made, 1 3-16 in. renders it particularly adapted for factories having small powered groups of machines, while quite apart from the power reduction, the cleanliness and freedom from attention are conspicuous features. The manner of installing this bearing is shown in Fig. 7 and 7a, where power table hangers of both two and three point support are illustrated. Suitable indentations are made on the housing to receive the points of the supporting screws.

That the successful application of ball bearings is not confined to small or ordinary sized shafts will be gathered from the photo of a main drive in a Canadian cotton mill where heavy duty bearings have transmitted 300 horse-power for five years with complete freedom from trouble of any kind. The smaller bearings on the right have been in service for nine years.

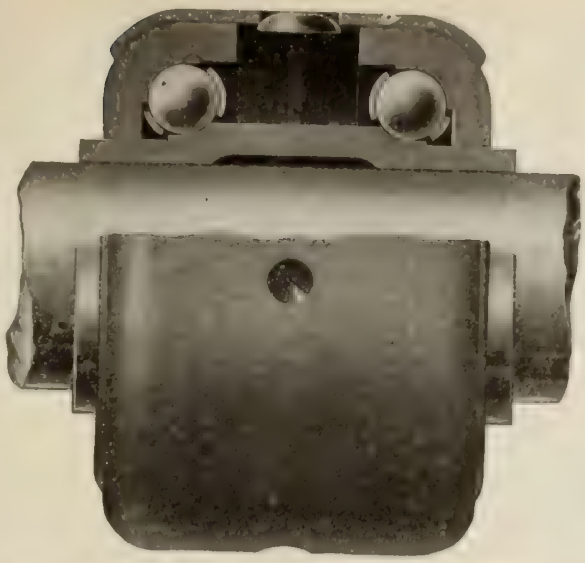

FIG. 6. LIGHT SHAFTING BEARING OF PRESSED STEEL CONSTRUCTION.

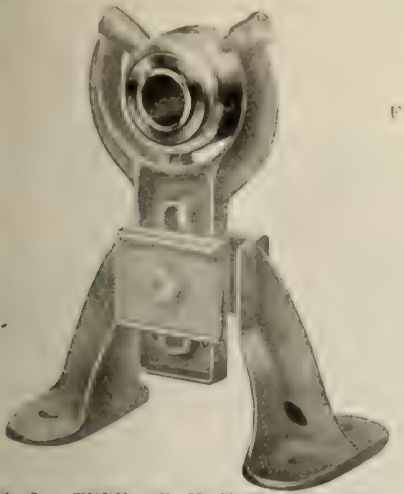

FIG. 7. TYPE OF HANGER FRAME OR FLOOR STAND FOR LIGHT SHAFTING BEARINGS

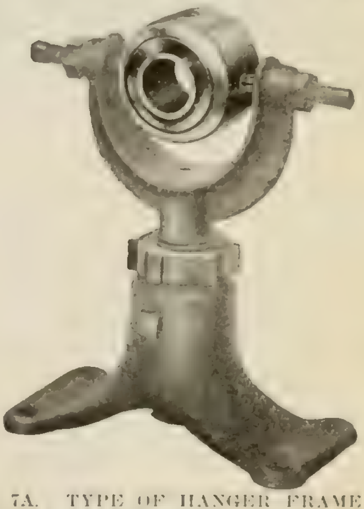

FIG. 7A. TYPE OF HANGER FRAME OR FLOOR STAND FOR LIGHT SHAFTING BEARINGS.

Manufacturing Features.

As will be understood by practical readers, the production of work of this nature calls for a high degree of skill, uniform material of a high grade, and accurate machinery. The production of steel stampings for ball cages, cups, cones, etc., is done in power-driven presses, one of which is capable of exerting a maximum pressure of 600 tons, another one 200 tons, while a number of small quick acting presses are employed on grease retainers and ball cage stampings.

The making of a ball cage is an interesting part of the press work and the various stages of a cage in the course of manufacture are shown in Fig. 10, each piece being numbered in rotation from the blank to the cage with assembled balls. No. 1 is punch-

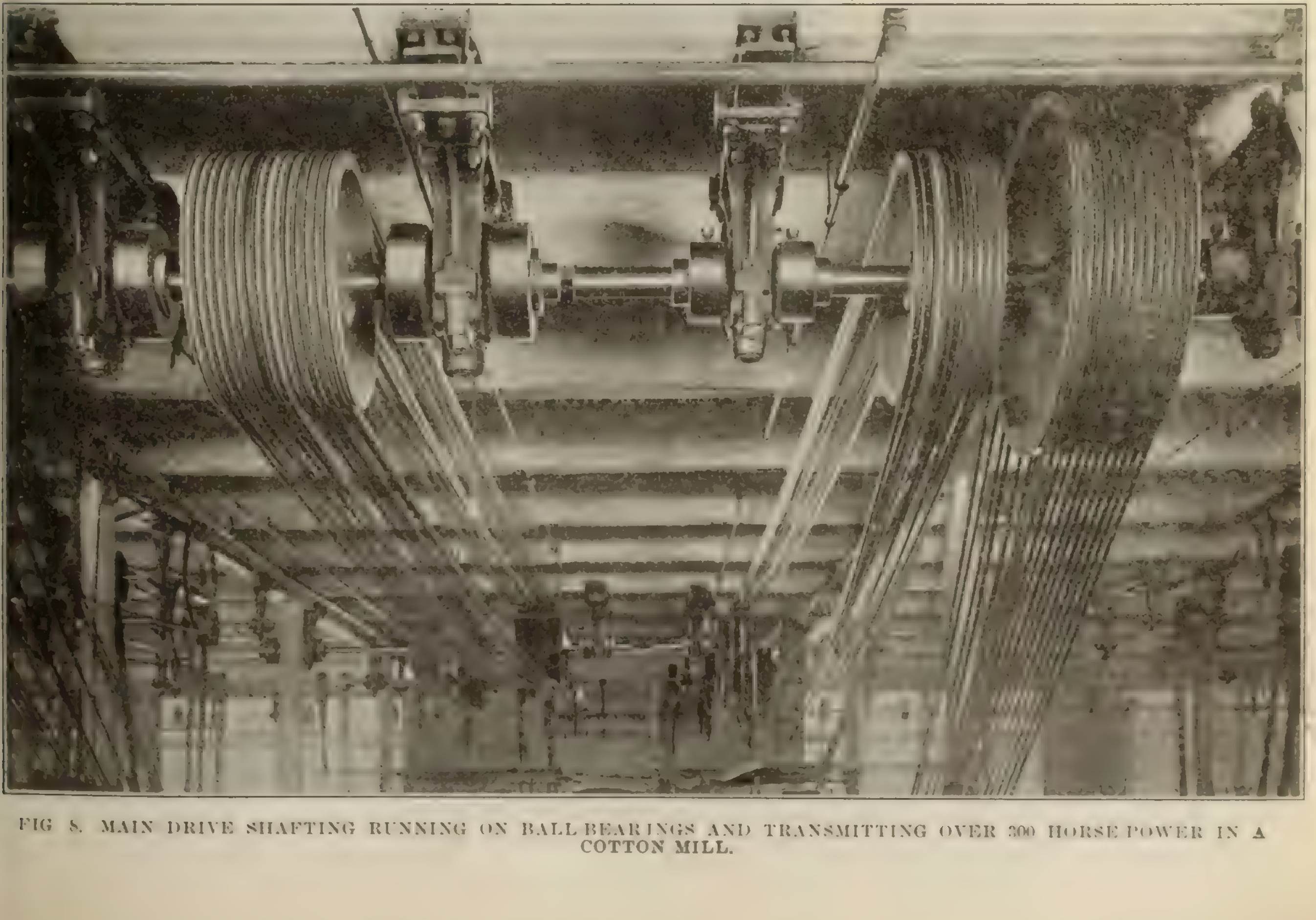

FIG. 8. MAIN DRIVE SHAFTING RUNNING ON BALL BEARINGS AND TRANSMITTING OVER 300 HORSE POWER IN A COTTON MILL.

ed from a flat strip of highly finished cold rolled steel. No. 2 is the blank formed to shape with spherical depressions to receive the balls and spaces between the balls to contain the spacers which retain the balls in position. No. 3 is the formed blank trimmed on the outside, and No. 4 is the same trimmed on the inside, either of these two operations being performed first. As shown in No. 5, the part is completely finished ready for assembling with another exactly the same. This is done by means of electric welding, the small surfaces just outside of the spacers being clamped between the points of a spot welder which fuses the two surfaces together inseparably. After being cleaned and thoroughly inspected, the balls are inserted in the pockets formed between the two stampings, as in No. 6, when the cage is ready for assembling in one end of the housing.

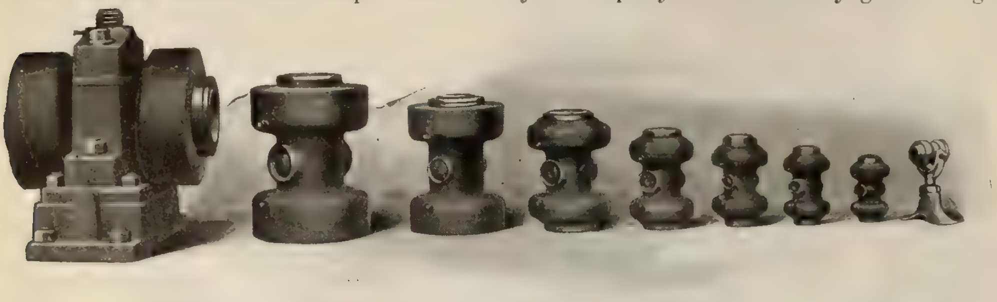

FIG. 9. GROUP OF LINE SHAFTING BEARINGS FROM 1 IN. TO 6½ IN. DIA. OF SHAFT.

Grinding the Ball Races.

In grinding the cups, they are mounted in batches on a mandrel, being supported and located by formed disc which are slipped on the mandrel between the cups, all of which face the one way. With ten or twelve cups on the mandrel, a nut at one end tightens both cups and discs against a shoulder at the other end so that the cups are centred from the rough interior, while they are rapidly and accurately ground to size on the outside. The interior curve of the race has to be of an exact radius and diameter so that when assembled with the balls and cone, the points of contact between the balls and raceways will be approximately 15 degrees from a vertical line at right angles to the shaft.

Accurate and economical grinding of this curve is accomplished in a Landis radius grinder shown in Fig. 11, and observable in the foreground of the view of grinding department, Fig. 12. The cup is held in an adapter on the oscillating head A, which is swung back and forth automatically, while the internal grinding wheel is adjusted longitudinally by the handwheel B in the operator's right hand and transversely by the feed wheel C on the upper part of the wheel slide.

The grinding of the cone is done in the reverse order, being located by the outer curved surface, resting in a hollow adapter while the tapered bore is ground to gauge. This operation is then followed by placing the cone on a tapered arbor and grinding the ball track with a formed wheel trimmed to the correct radius. The ground surface of the raceways are now polished to a mirror surface, the degree of finish obtained having considerable influence on the length of life of the bearing before wear begins to affect it.

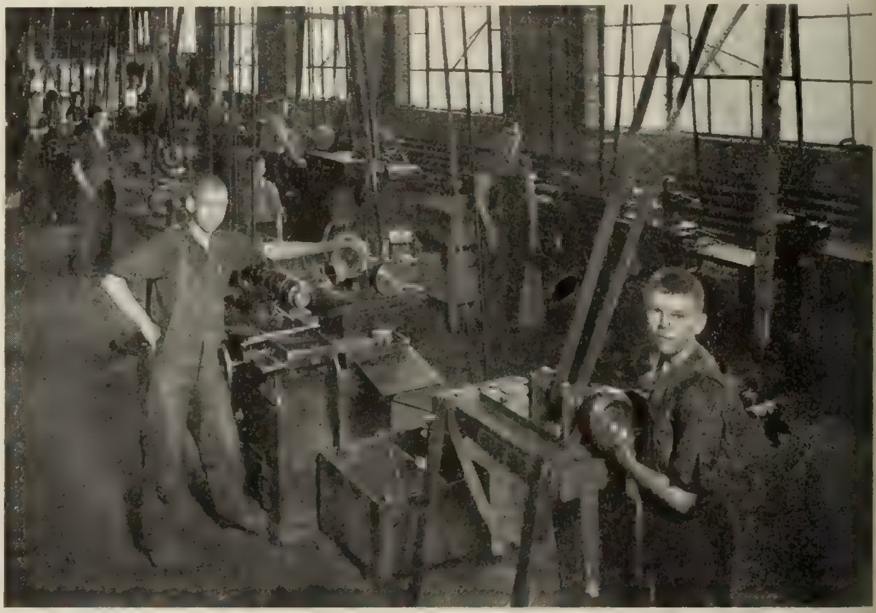

FIG. 12. GENERAL VIEW OF GRINDING DEPARTMENT, WHERE CUPS AND CONES ARE ACCURATELY GROUND TO SHAPE.

Machine Work and Testing.

The various details referred to in Fig. 2, are produced on machinery of the most modern type, part of the machine shop being shown in Fig. 1 Among the various machines may be noted heavy turret lathes by Pratt & Whitney, Steinle, Acme, and Libby engaged on housing and the larger parts while Jones & Lamson lathes are occupied with sleeve wedges, adjusting nuts

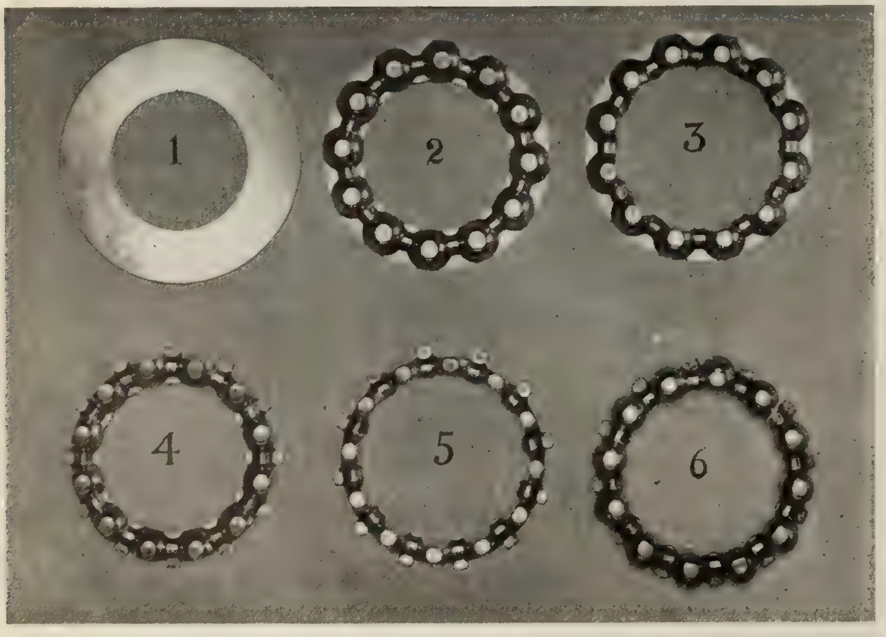

FIG. 10. STAMPED PARTS OF PRESSED STEEL BALL CAGE IN PROCESS OF MANUFACTURE.

and similar threaded parts. Three 60 in. Colburn boring mills enable large thrust bearings and special castings to be handled to advantage, one of these being fitted with a special grinding head for grinding ball races up to 36 in. diameter.

The assembly and testing department is shown in Fig. 13. Here the various units are tested individually before being finally assembled and shipped out. In the left foreground may be observed several stacks of ball cages, on the floor are wooden loose pulleys with ball bearing bushings also a group of clutch sleeves, while to the right are two testing stands with bearings under test. These stands each consist of two heavy frames carrying bearings of the size to be tested. On the shaft passing through these two bearings are mounted other two bearings which are subjected to load by hydraulic pressure from below. A certain scale of pressures and duration of tests is adhered to for the various sizes of bearings in excess of anything likely to be met with in practice. On the conclusion of the test each bearing is dismantled, when each individual ball and wearing part is scrupulously inspected for any developed flaws.

The balls, along with the raceways, are the vital parts of the bearing and upon the accuracy and quality of material depends the entire success of the ball bearing industry. Great advances in ball manufacture have been made in recent years, and the balls used in these bearings are accurate within a limit of 1-10,000th part of an inch both as regards sphericity of each individual ball, and uniformity in size. The balls are made of special alloy steel, being forged, rough ground, finish ground and finally polished to a mirror finish. The successful production of high grade balls in large quantities at a reasonable cost has contributed greatly to the increased use of ball bearings in many industries, and in conjunction with correct design and careful manufacture assure the permanent status of ball bearings as indispensible items in many branches of the world's industries.

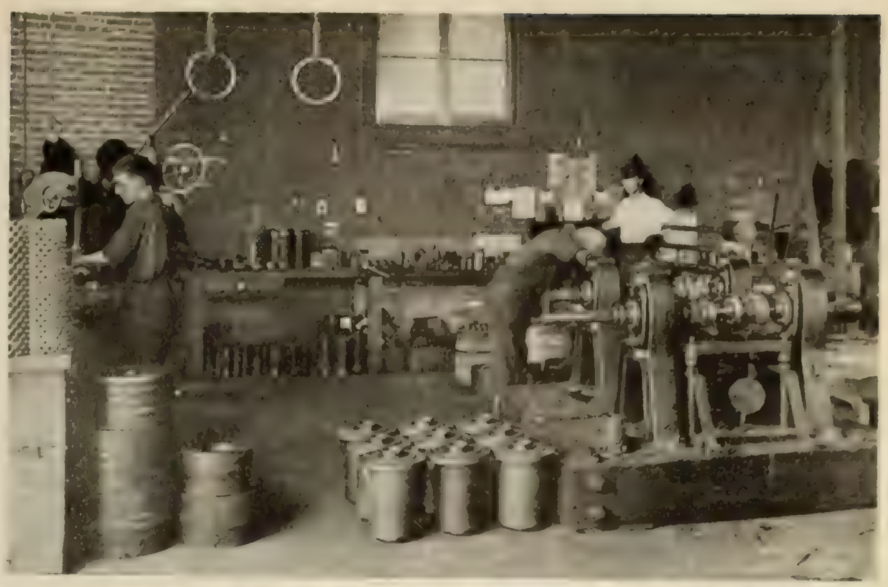

FIG. 13. ASSEMBLING DEPARTMENT, WHERE COMPONENT PARTS ARE TESTED

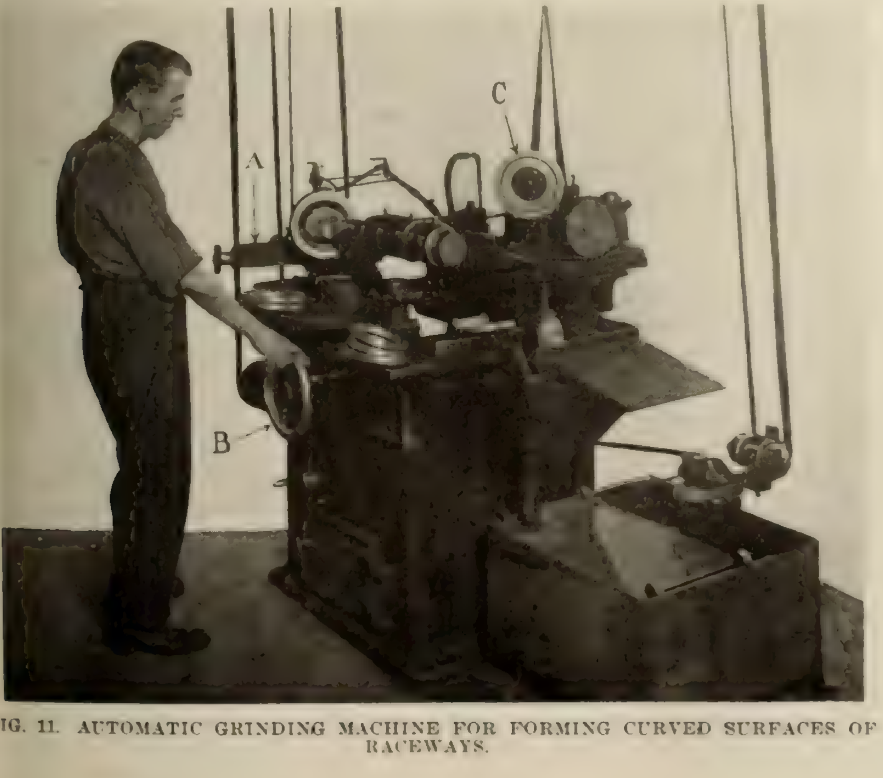

FIG. 11. AUTOMATIC GRINDING MACHINE FOR FORMING CURVED SURFACES OF RACEWAYS.

* * *

ENORMOUS ADVANCES IN CANADIAN TRADE.

ANOTHER record-breaking trade statement was issued on July 25 by the Department of Trade and Commerce, Ottawa. It shows an increase of more than 93 per cent. in the grand total of Canadian trade for three months of the fiscal year ending June 30. The volume of trade on that date had reached the imposing figure of $527,512,344, as against $272,646,868 for the first quarter of 1915. The increase has been pretty evenly divided as between the two branches of trade, the imports having risen from $98,017,187 to $186,245,480, and the exports from $113,578,221 to $245,381,035.

Foreign exports increased from $8,577,775 to $66,989,732, a jump which seems to be accounted for under metals, the exports of foreign mine products increasing in the three months from slightly less than two millions to sixty-two millions and a half. These exports in the month of June alone rose from $8,138 to $51,886,013.

The June trade contributed largely to the good showing for the financial quarter, the increase in the trade total being from $127,402,516 in June, 1915, to $243,953,544 in June of this year. Domestic imports increased from $35,324,739, to $66,399,838. Although the larger proportion of increase is shown under free goods, which jumped more than 100 per cent., there is a substantial increase shown in the amount of duty collected for the month. The total Customs receipts were $12,105,268 as against $7,409,238.

The exports for the month show very heavy increases in manufactures, in agricultural and in mineral products. From the mines the exports rose from $4,649,014 to $7,755,875, agricultural products from $14,269,748 to $38,744,527, and manufactures from $9,757,146 to $32,252,447.

* * *

Halifax, N. S.—The Nova Scotia Car Works were sold on July 26, to F. B. McCurdy, M. P., for $167,500.

Data Relative to Foreign Trade, Commerce and Transport

Compiled and Selected

Whether with a view to the prosecution of inter-Empire trade, or that with neutral or Ally countries on conclusion of the war, it is necessary that information of the most diversified and reliable nature be available. In this section it is endeavored to meet the latter need, while at the same time abstaining from all attempt to advise as to a course of action.

DEVELOPMENT OF ANGLO-RUSSIAN TRADE

THE following article from The Times Russian Supplement of April, 1916, should be of unusual interest to Canadians, showing as it does the preparations that have to be made in Great Britain, and which will have to be made in Canada preliminary to the development of Russian trade.

Development of German Trade

The remarkable development of Germany's commercial connections with Russia is due to many causes. The two countries, in the first place, are contiguous, which implies that numbers of Germany's citizens are reared in close proximity to the frontier, and therefore gain a practical knowledge of the Russian language in early life; this, for German commerce, removes the language difficulty. Moreover, the number of Germans resident in Russia is enormous —some localities are said, indeed, to contain more Germans than Russians, and these assist considerably, both by natural inclination and by reason of their knowledge of Germany and its industries, in fostering German trade with Russia. These circumstances, again, render comparatively simple the acquisition of a fundamental knowledge of Russian requirements and of the Russian markets, the conditions of which differ markedly from those of the rest of the world. Undoubtedly, the result is also consequent upon the thoroughness of German methods and the capacity for taking pains, qualifications which, however, are not a monopoly of the Teutonic race.

German Banks

Any of the foregoing advantages which Germany possesses, however, appear to be of minor importance compared with the aid given to German commerce by the banks. It is customary to talk of German "commercial" banks, but in practice banks there of the highest standing, the Deutsche Bank and the Dresdener Bank included, participate largely in this description of finance. Such participation may be roughly divided into direct and indirect. On the one hand, the German banks themselves directly own debentures or stock in industrial concerns both in Germany and elsewhere, or have a direct interest in syndicates controlling industrial concerns; on the other hand, they discount commercial paper freely and make advances to commercial and industrial houses, without raising difficulties, both for general purposes and against specific orders. German banks also, as is well known, have substantial holdings in Russian banks—another important factor in enabling the former to gain accurate knowledge of the standing of Russian firms to whom credit is given.

Long Credit

The importance of these operations of German banks, as regards Russia, is principally due to the fact that long credit must be given in that country. Whilst four to six months is usual in many branches of trade, it is by no means uncommon for credit to be granted, for certain articles, up to two and even two and a half years; though, be it added, losses on account of bad debts may, with ordinary care, be limited to an amount which will not prejudice the business. Clearly, the capital required to enter into such a market is out of all proportion to that which is needed in most of the larger countries where a comparatively speedy turnover may be expected; a Canadian house, capitalized on the basis of the customary requirements of this country, obviously has little spare capital wherewith to compete in Russia.

The question is pertinently asked how does it come about that Germany is capable of investing such enormous amounts in, and providing such large sums for, commercial and industrial enterprise both in Germany itself, in Russia, and elsewhere. The question leads to a further aspect of the pre-war situation which will be realized with very mixed feelings by the Canadian manufacturer and merchant. The position is largely summarized thus:—

The German merchant draws a bill, which his bank discounts; the bill goes to the London money market, where bearing as it does the endorsement of a German bank, it is sold as good paper. Thus it happens that the great London financial institutions, whilst looking askance at the commercial methods of those in Germany, provide the funds wherewith, in large measure, Germany industry is so generously supplied. The branches of the German banks in London appear to be established solely for the purpose of facilitating transactions of this nature, and thus extending the practice of borrowing British capital to further German commerce.

Position of British Banks

Why do not British banks employ a substantial portion of their funds similarly for developing British commerce? Briefly, they contend that it is not the function of a bank to take a direct share in industrial enterprises, and that a bank is not justified, in the interests of its depositors, in assuming the risks which such participation involves; that the wonderfully strong position of the leading British banks, unshaken by the tremendous upheaval caused by the war, is primarily due to the soundness of their system, whereas the financial position in Germany, where wider methods are employed, has long been open to question. London bankers, it is a matter of common knowledge, have expressed the opinion that a great financial crisis, affecting Germany, would amply justify their attitude, and it yet remains to be seen whether this view is correct.

The fact remains that Germany, by her financial manoeuvres, has reaped incredibly remunerative harvests in Russia, and has built up an enormous trade between the two countries; of this Great Britain and Canada must, by some means, obtain an increasing share. The relations between Russia and British banks must become more intimate in order to allow of greater assistance, discounting facilities, etc., being granted here. Already a number of Russian banks have opened offices in London, whilst the last decade has witnessed the organization of several Anglo-Russian banks. A commencement can, therefore, be made with a system by which, through the intermediary of Russian banks and their branches in the Russian provinces, British money may be employed in British, instead of German trade. It has been stated that German banks have special intelligence staffs to supervise the industries in which they are interested, and that they retain the services of leading experts—scientific, engineering, etc. —to advise on technical questions; by such means the risk involved in supporting commercial and manufacturing ventures is minimized.

Credit Bank Organization

If, in spite of what is now known of German methods, British banks refuse to follow the lead to any considerable extent, there is a further means of securing the desired result, i.e., the organization of commercial or credit banks. In this suggestion is to be found in the opinion of the committee, the true solution of the problem; it is one in which, as now appears, the joint-stock banks would be willing to participate indirectly. Even so, however, Government assistance in the way of guarantees or otherwise, will probably be a sine qua non, at any rate, at the outset. Apparently this was also the case in Germany.

After-war Conditions

It should be emphasized that the position must be rectified now, in readiness for normal conditions. For, whilst the animus created by the war will be, to a large extent, effective when international relations are resumed, it is idle to assume that Germany's trade with Russia must become a thing of the past. The Russian will find that he must provide at the lowest cost for the requirements of his customers, and the actual consumer is rarely in a position to know whether or not he is supplied with a German article. Further, Russia must have redit, will, indeed, require it more than ever after the present war, and if Great Britain fails to rise to the occasion, must eek other means of obtaining it. The war has afforded an extraordinary opportunity for British houses, aided by British financiers, to gain possession of far greater share of Russian trade, but e initial steps must be taken at once, therwise the opportunity will be gone, nd it is unlikely to recur for another eneration.

Alleged British Failings

While the question of credit is of the rst importance, there are other aspects the situation which require mention. omplaints are frequently made that e British manufacturer and the British erchant display an entire lack of ergy initiative, and cling tenaciously methods long superseded and, parularly, to the desire to force their oducts upon the foreigner rather than produce in the first place the article the foreigner demands. No doubt, oadly speaking, there are still conderable grounds for this accusation, the committee incline to the view the comparative impossibility in st branches of trade of obtaining any iderable hold upon the Russian mar-, owing principally to the credit dify, provides the real explanation of s attitude. In other words, the British nufacturer will not lay out capital re the possibility of any substantial cess is problematical. There are, of rse, minor reasons which merit ation, such, for example, as the diffiy of securing travellers and repretatives who speak the Russian guage, are conversant with the condins of the Russian market, and who, at e same time, know the articles in ich they deal. As already stated, these ficulties have been largely smoothed away by circumstances for the German firm.

The accusation frequently made that British firms often quote f.o.b. in English currency and forward to Russia catalogues in the English language and employing English prices, weights, and measures, whereas the German firm quotes in Russian currency, duty free, delivered on the spot, is undoubtedly true; the reports of the British Consuls in Russia provide conclusive evidence of this. In extenuation, however, it may be pointed out that the preparation of catalogues and price lists in Russian, an expensive process, is often not warranted by reason of the fact that, owing to the circumstances alluded to above, no great turnover is to be expected. The point should in spite of this be carefully considered.

Reference has been made to the language difficulty. Clearly time will be required to alleviate to any appreciable extent the existing situation. Education authorities are now, however, giving earnest attention to the matter, as is evidenced by correspondence which has recently passed between the Chamber and the Chief Education Officer of the London County Council, to whom the views of a number of members have been communicated. The teaching of Russian in England will, however, not wholly solve the problem; it is essential that young Englishmen should go to Russia to gain the required facility in the use of the language, a course which would at the same time afford opportunities of gaining a practical insight into Russian methods and requirements, and thereby acquiring much information which can only be obtained on the spot. No doubt the education authorities of the two countries could devise an interchangeable scheme which would go far towards effecting the desired result.

Fiscal Conditions

It will have been noted that no mention has been made in the foregoing report of fiscal conditions, the principal reason being that, up to the outbreak of the war, Great Britain and Germany were, as regards duties, on much the same basis, though it should be stated that the Russo-British Treaty of Commerce and Navigation (1859), except in so far as it confers upon Great Britain most-favored-nation treatment, is out of date and should be revised. Obviously Germany's commercial success in Russia was not due to any special advantages of this nature. It may safely be assumed that after the war Germany will be at a disadvantage, for the economic conference of the Allies in Paris is, as all hope, the first step towards an economic entente, the effect of which will demonstrate Germany's deplorable error of judgment in endeavoring to accelerate her peaceful penetration by the assumption of military domination.

Statistics

The following figures show the extent of Anglo-Russian commercial exchanges during the last few years and the principal articles of which they are composed:—

(a) Imports into the U. K. from Russia.

1910	£43,644,648
1911	43,154,411
1912	40,538,532
1913	40,270,539
1914	28,092,527
1915	21,429,333

(b)—Exports from the U. K. to Russia (including re-exports).

1910	£21,220,727
1911	22,316,679
1912	21,741,486
1913	21,792,186
1915	25,447,780

(c)—Principal articles exported to Russia from the United Kingdom, British produce or manufactures (in approximate order of importance):—Coal, machinery, fish (herrings), iron and steel and iron and steel goods, woollen yarn and woollen goods, cotton yarn and cotton goods, ships and boats, raw wool, tin implements and tools, machine belting (these goods represent 80 per cent. of the total). Re-exports of colonial and foreign merchandise:—Raw cotton, rubber, unrefined tallow, oilseeds and nuts, machinery and tea.

(d)—Principal articles imported from Russia into the United Kingdom:—Wood and timber, corn and grain, eggs, butter, flax and tow (these goods represent 60 per cent. of the total).

Some Recent Statistics

M. Alexander Bashmakov, of the Russian Official Messenger, who was one of the party of Russian journalists recently in England, has prepared a memorandum on the subject of Anglo-Russian trade. From this we take the following extracts:—

Russian trade has doubled in the last twenty years, the main growth being in the last five years. Exports for 1914 have fallen by 564,000,000 roubles (37 per cent.) and imports by 276,000,000 roubles (20 per cent. of the former year). The following are the figures:—

Imports.	Value (Roubles).
1913	1,374,000,000
1914	1,098,000,000
Exports	
1913	1,520,000,000
1914	956,000,000

The share of different countries in Russian imports is as follows:—

	Millions of Roubles.	
Country—	1913.	1914.
Germany	652	429
Great Britain	173	171

United States	79	80
China	84	89
Japan	4	12
Egypt	5	7

The shares of Germany, France, and Great Britain in the trade of the country is shown by the following percentages of value:—

	Imports, 1913. Per cent.	Exports, 1913. Per cent.
Germany	47	29
France	4	6.6
Great Gritain ...	12.6	17.6
Holland	—	11.7

Thus of a total value of Russian trade in 1913 of 2,894,100,000 roubles the share of Germany was 1,105,800,000 roubles, divided between imports 652,200,000 roubles and exports 543,600,000 roubles. These figures are taken from the Official Report of the Russian Department of Customs.

The total capital invested in industrial companies in Russia is (according to the Official Report of the "Imperial Board of Trade and Industry," 1914) 3,964,126,000 roubles, distributed as follows: (a)—Russian Societies, 3,376,780,000 roubles; (b)—Foreign Societies, 587,346,000 roubles. Foreign companies, represent 14 per cent. of the total value

British companies which have been established in Russia have a capital value of 156,581,000 roubles, while German companies have apparently only 67,969,000 roubles. At first sight, therefore, it would seem that British capital in Russian industry is about 4 per cent. of the total value (or 26 per cent. of the foreign capital), whilst German capital is only 2 per cent. of the total value (or 11 per cent. of the foreign capital); but this is really not so.

It is beyond doubt that about fifteen very big undertakings registered as "Russian" and having a capital amounting to 110,575,000 roubles, are in reality German companies, though designated as "Russian" undertakings, and, therefore, the true sum of German capital employed in Russian industry would be at least 178,544,000 roubles—that is to say, more than 4 per cent. of the total value (or 30 per cent. of the foreign capital.

Principal German Industries

Whilst British capital is invested only in some special undertakings, such as mines and, above all, in the petroleum industry, goldfields, and copper mining, the Germans are established in the machine, electrical, chemical, and metallic industries, as is shown by the following

Industry.	German Companies. Capital (rbls.)	British Companies. Capital (rbls.)
Electrical machinery ..	113,269,000	2,552,000
Chemical materials	24,900,000	....
Wood and timber	13,389,000	....
Metallic wares	13,658,000	....
Coal mines	10,595,000	11,353,000
Copper mines, gold and emeralds	....	43,463,000
Petroleum	....	95,010,000
Total of principal industries	175,811,000	152,377,000

The power of German capital in Russian industry is really much greater than these figures show, for two reasons: First, because Germany has control of so many of the industries concerned with the most useful and necessary products for human existence; and, secondly, because, as shown above, many companies, apparently Russian, are in reality of German origin and ownership.

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THE COMBINED RAILWAY AND STEAMER BILL OF LADING

OF all the objectionable shipping documents transmitted to Australian importers by Canadian exporters of goods and products, the "Combined Railway and Steamer Bill of Lading" easily takes first place. Prior to the war, the use of such documents was not general, but in recent months it has been the rule rather than the exception. So grievous is the discontent amongst importers of Made-in-Canada goods that representations have been made to the effect that the Canadian Government should be approached with the view of enacting legislation to make it an offence for the railways in the Dominion to issue a document so detrimental to the material interests of manufacturers and exporters, as the combined bill of lading.

The assumption is that manufacturers in Canada, especially those distant from the seaboard, are unaware of the serious reflection upon their lack of knowledge of oversea trade requirements by attaching a wholly incomplete bill of lading to their drafts upon Australian buyers, or covering purchases made under a letter of credit established in a Canadian bank. An occasional transaction of such character might be overlooked, but so common has the practice become that Australian merchants are refusing to accept drafts accompanied by the combined bill of lading, and Australian banks are instructing their respective agents in Canada not to negotiate drafts drawn against established credits unless they are supported by a clean steamer bill of lading.

Objection of Merchants

Some of the leading importers of Canadian goods and products have refused to accept or pay drafts supported by a combined railway and steamer bill of lading, as they claim that it is not a negotiable document because it absolutely gives no assurance when the goods will come to hand. Further, it is not a receipt from the steamship company, and the various lines invoiced may come forward in several steamers, thus entailing endless annoyance and trouble at the port of discharge.

In the case of iron and steel products shipped in bars or bundles, the combined bills of lading are endorsed by the railway company "shippers' load and count more or less," which gives the Australian consignee no grounds against the steamer for redress for any material short landed, as the shipping agents contend that such an endorsement frees them from any claim for the missing products. This combined bill of lading gives no guarantee whatever that the goods will ever be shipped intact from the seaboard.

On a copy of a combined bill of lading forwarded with this report, it was shown that 57,750 pounds of Canadian bar iron were shipped from an inland town, consigned to Melbourne, but if the purchasers receive only 50,000 pounds, or even less, they have no grounds for action in claiming upon the shipping company on account of the endorsement "shippers' load and count more or less."

Objection of Australian Banks

The opinion of a leading Melbourne banker upon the objection to the combined railway and steamer bill of lading was obtained, and is submitted for the information of Canadian banks, manufacturers and exporters:—"From a banker's point of view, the objection to the document is that it is not a legal security in Australia. The courts both in England and throughout the Commonwealth rule that a bill of lading is a valid instrument only when the goods are actually shipped. A bill of lading which does not show the name of the steamer is not a valid instrument, and is, therefore, not a legal security. In Australia, even though the name of the steamer be inserted, the document is not necessarily binding on a shipping company unless that particular steamer is in port at the time of date of issue of the bill of lading. My objections are as under:—

1.—A banker negotiating a draft supported by such a document has no tangible security.

2.—He runs the risk of the drawee in Australia declining to pay until arrival of the relative goods.

3.—No remedy is in the hands of the banker for goods short-shipped, and experience up to date shows that in connection with combined railway and steamer bills of lading irregularities in shipment have been almost chronic.

"It appears to me that an easy solution of the whole trouble could be achieved by the negotiating bank of Canada either declining to negotiate the draft until the goods were actually shipped, or offering to negotiate the draft on condition that interest during the period of delay between the date of negotiation and date of actual shipment should be paid by either the shipper in Canada or the consignee in Australia, or perhaps divide the interest equally between the two; but it should be a sine qua non that the draft must be retained by the negotiating bank in Canada until actual date of shipment is assured."—T. & C. Bulletin.

Review of the Timber Resources of British Columbia

Among Canada's natural resources, her forest territory occupies the very front rank. These great timber areas located all the way from the Atlantic to the Pacific, are, however, neither as fully comprehended by ourselves nor by buyers abroad as they might be, whether in the light of their vastness or of their money value. Through the courtesy of the British Exporter and the B.C. Lumber Commissioner, at Toronto, we are enabled to put before our readers data and illustrations relative to the timber resources of British Columbia, and in so doing, hazard the opinion that considerable enlightenment will accrue from their study.

ONE result of the war is that increased attention is being directed to the material resources of the Empire. These have been allowed to rest either dormant or only partly developed. Few seemed to be interested in making known their existence or in studying their possibilities. With the events of the war, however, a change has come about, and the world is brought to realize more and more how vast are the Empire's resources. Judging from the latest official statistics there is room, for instance, for a large extension in British imports of timber from British North America. The following table reproduces the figures relating to such imports into the United Kingdom in 1914:

Official Statistics of Timber Imports Into United Kingdom During 1914.

Nature and Class of Material.	Canada. Loads	Canada. Value. £	Russia. Loads.	Russia. Value. £	Sweden. Loads.	Sweden. Value. £
Hewn: Fir, Pine and Spruce	10,276	96,456	172,436	308,510	39,755	102,979
Fir, sawn or split, planed or dressed	785,289	2,579,992	1,707,992	5,005,000	1,045,038	3,089,395
Staves	244	1,791	38,693	237,848	21,514	68,345

IN A BRITISH COLUMBIA FOREST BEFORE LOGGING BEGINS.

The figures might be supplemented by those relating to railway sleepers, of which nearly 150,000 loads were imported from Russia and Sweden in 1914, compared with only 1,603 from British possessions. In furniture woods also, foreign countries supplied 138,000 tons as compared with only 87,000 tons from British possessions, Canada being represented by 12,600 tons. Furniture and cabinet ware was imported to the value of £304,000 from foreign countries, and to the value of only £5,000 from British possessions. Canada has also much leeway to make up in connection with house frames, fittings and joiners' work, which foreign countries supplied to the value of £144,800 compared with Canada's £8,300. The position is even worse as regards unenumerated wood ware and wood turnery, of which there was imported nearly £2,000,000 from foreign countries, and only £41,000 from British possessions.

A Great Forest Region

The Pacific Slope is the greatest forest region in the world. Extending along the Continent, north and south for over 2,000 miles, and from the Pacific Ocean to the Rocky Mountains, it contains over half the standing timber of North America. Here are the forest giants of the earth, the oldest and the largest, yielding the clearest timber and in the largest dimensions. The Pacific forests are composed almost entirely of soft wood, i,e., coniferous or evergreen species — the wood which, most useful for general purposes, comprises over three quarters of the world's consumption. The most important varieties are Douglas fir, western hemlock, western red cedar, sitka spruce, western white pine, western larch, mountain western pine, redwood and sugar pine.

All these, except the last two, are found, and reach prime development in British Columbia in the northern central section of the 2,000 mile forest belt. The stand of merchantable timber in the Province is estimated to reach the enormous total of four hundred billion feet, board measurement, and the annual cut is at present only about one to one-half billion feet board measure. Thus it will seem that these forests can supply indefinitely the world's requirements for this kind of wood,

Facilities for Shipments

Competition has necessitated the use of the latest machinery and methods. The extraordinary size of the timber, too, has compelled the adoption of the most powerful machinery and the best logging and saw milling; but, keen though competition is, enterprising firms, well seconded by the Provincial Government authorities, have been able to meet it, an important factor in their favor being the facilities present for export. The practically inexhaustable supplies in size and quality have led to the production of all kinds of dimension timber, lumber, shingles, piling, poles, posts, railway ties or sleepers, pulp, paper and other wood products.

To assist in the shipment of these there are numerous easily navigable inlets and channels indenting the coast and making the coast timber accessible. There are also many deep-water harbours suitable for mill sites, and for many other applications of water power, some of which are now in use. As these harbours never freeze, logging can be carried on all the year round. The mills whose capacity is much greater than their present output, have every appliance for shaping and finishing timber for final use. Dimension lumber is a specialty, and can be supplied in all sizes and of a quality obtainable from the Pacific Coast of North America alone.

DOUGLAS FIR TREE 500 YEARS OLD.

Leading Varieties—Douglas Fir

An interesting pamphlet dealing with "British Columbia Timber," issued by the British Columbia Government, gives intending purchasers much useful information with reference to the qualities and sizes of the principal export timber trees of the Province. Practically all the forest products at present exported by water are from the coast forests, the bulk being made up of four leading species — Douglas fir, western red cedar, western hemlock, and sitka or silver spruce. These are all giant timbers and are, perhaps, the most universally used woods obtainable in commercial quantities, one or another of them being suitable for practically every use to which wood can be put.

Douglas fir, also known as red fir, yellow fir, Oregon pine, Columbia pine or Douglas spruce, is recognized as the most important timber tree in the North American Continent. No other species exists in such great individual sizes, nor in such excellence of quality. It has been well described as the world's "All Utility" wood. The height of the tree is from 150 to 225 feet, with a diameter of 3 to 6 feet. Exceptional trees reach over 300 feet in height and 15 feet in diameter.

Though moderately hard, the wood is easy to work, straight grained, tough, resilient and durable. It varies in texture and color from fairly soft, fine grained, straw-yellow in narrow-ringed, slow growth trees, to a harder, coarse-grained reddish-brown in fast grown timber. When sawed tangentially the grain of the wood shows a beautiful figuring, rendering it very attractive for interior finish. It is the ideal building and structural timber, combining the requisites of great strength with light weight and ease in handling and working. Its high resistance to compression perpendicular to the grain, combined with its durability, has led to its adoption for railway cross ties or sleepers in Western America.

Western Hemlock

Western hemlock, also called gray fir, Alaska spruce and Western hemlock fir, or spruce, is found in four species in North America. The trees are from 125 to 150 feet in height, and from 2 to 5 feet in diameter. The wood contains no pitch or resin, and is usually light in color, but often reddish-brown in the interior of the tree. Its strength, ease of working and freedom from warp distinguish it sharply from the hemlock grown in Asia. Western hemlock is at present manufactured into the common forms of lumber and used for the same purposes as Douglas fir.

It is particularly suitable for inside joists, scantling, flooring and ceiling work, and wherever ease of working, with a handsome finish and lightness combined with a large degree of strength, are required. Thus it is also valuable for the manufacture of boxes, barrels, sash and door stock, furniture, wainscoting and panelling. For paper-making, large quantities are now being used in the Western pulp mills. These mills and the saw mills of the Province cut 65,000,000 board feet of this timber in 1914.

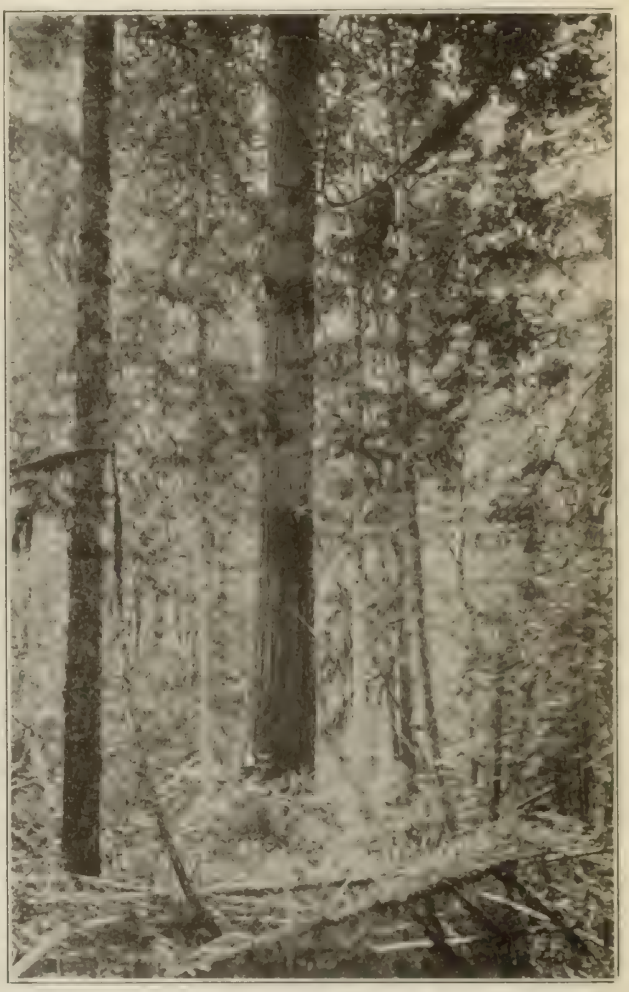
Western Red Cedar

This is by far the largest of all cedars. It is a variety known from ancient times, and has been famous for its durability and resistance to decay. Cedar trees in Asia which fell in damp woods centuries ago are found to-day still sound. Western red cedar trees range from 100 to 150 feet in height, with a diameter of 3 to 8 feet, although some are 15 feet in diameter. The wood is very durable and practically immune from decay. It is exceptionally light, soft, and of close, straight grain, making it easy to handle and to work, and rendering it remarkably free from warping, swelling or shrinking. Its slight aroma and freedom from pitch, make it especially suitable for moth-proof clothes chests, drawers, etc. It is the great source of supply for shingle wood, and is also used for exterior siding, flume construction, canoes, row boats, trellis work, hot-house frames, sash frames, and wherever wood is required which must be exposed to the weather or moisture.

Silver Spruce

The Sitka or silver spruce, called also giant spruce, tideland or Alaska spruce, is another valuable forest tree of the Northern hemisphere, yielding excellent timber and being unsurpassed for pulp manufacture. Mature trees average 150 feet in height, and 4 feet in diameter, while some grow to over 200 feet high, and 10 to 15 feet diameter. The tall straight poles with their moderate taper, furnish saw timber of the best quality in large dimensions and unusually clear and free from defects. The color varies from white to white-tinged with a very little brown. It is soft and light, but tough and very strong for its weight. It is even-grained, long fibered, easily worked, non-resinous, odorless, tasteless, flexible and resonant. It does not warp or split, and therefore makes excellent core stock for veneered articles. Its strength, lightness, and lack of taste and odor make it particularly suitable for box and cooperage manufacture, especially where foodstuffs are packed. Sitka spruce is also well adapted for the manufacture of large doors, for garages, freight sheds and dock buildings. It can be used for framing, shelving, sheathing, and sub-flooring, where such qualities as ease of working and painting or light weight and ability to take and hold nails are demanded.

IN THE FOREST.



IN THE FOREST.

Official Information

The Forest Branch at Victoria, issues a pamphlet entitled "British Columbia Timber for Export," also for the builder and architect there are illustrated booklets entitled "How to Finish British Columbia Wood," and "British

Columbia Red Cedar Shingles," in the latter of which the illustrations show the attractive architectural style to which buildings thus roofed lend themselves. Copies of these, also that referred to on the previous page and entitled British Columbia Timber can be obtained from the Chief Forester, Forest Branch, Lands Department, Victoria, British Columbia, or from the Canadian Trade Commissioners, and the Agent General of British Columbia. The Forest Branch is not only thus laudably endeavoring to improve the trade relations between the provinces and other parts of the Empire and wherever timber is required, but is incessant in its endeavors to conserve and extend the forest wealth of British Columbia.

Promising Markets

In due time the ravages of the war will have to be made good, and it may safely be concluded that large quantities of British Columbia timber will be needed to rebuild the destroyed towns, villages, churches and mansions of France, Belgium, Serbia and Poland. The general requirements will be for lumber suitable for buildings, common lumber for sheathing, studding, joists, rafters, cheap doors, sash, and timbers for the temporary reconstruction of railways, bridges, and other large works. Roofing will be in great demand. The competition will be between galvanized iron, prepared roofings and possibly shingles.

As regards railway ties or sleepers we may recall the fact that two Douglas fir and two red cedar railway ties were recently forwarded by the Forest Branch of the Department of Lands to the Great Eastern Railway Co. The latter selected two sleepers from its stock which had been obtained from the Baltic, and tested the lot under similar conditions. The results showed beyond doubt the superiority of British Columbia Douglas fir for railroad ties. It was found that under compression Douglas fir stands 5,695 pound per sq. inch, as against 3,950 pounds for Baltic timber. Tension tests were even more favorable to Douglas fir.

BEFORE THE ADVENT OF THE DONKEY ENGINE.

IMMIGRATION TO CANADA ON INCREASE

IMMIGRATION to Canada is again on the increase, but the greater volume of it comes from the United States. For April and May, the first two months of the fiscal year, the total immigration was 12,791, as against 11,330 in the corresponding period, an increase of 13 per cent. Of the aggregate 1,601 came from Great Britain, as against 2,697 a year ago, 10,279 from the United States compared with 7,877 in April and May of 1915, and 911 from other countries, compared with 756.

While the war largely stopped British and continental immigration, the influx from the United States to the western provinces has been steady, and promises to increase notably this year, owing to the demand for harvesters. Many of these come with the intention of permanently locating.

SHORT NOTICE CANCELLATION OF MUNITION ORDERS.

REPORTS from London that contracts recently placed in the United Stated for British shells have a cancellation clause effective any time after September 1, are characterized as ridiculous by men closely in touch with the placing of these contracts.

It is pointed out that deliveries in many cases will not have begun by September, nor, in fact, will the contracting concerns have had time to get in necessary machinery and supplies of metal. No company would make a contract involving a big outlay under such conditions.

The contracts for shells placed recently have not yet been signed ,although the companies which received them are making the commitments for metals, etc. The majority, if not all, war contracts have a cancellation clause of some kind, but these all give the contractors a time allowance, usually three months. Besides, the purchasers contract, in case of exercising this clause, to make good not only all expenses undertaken in connection with the contracts, but all commitments made against them. No company would accept a contract without such a guarantee. In some cases a forfeit is added.

Granted that even a cancellation clause effective without notice were inserted in a contract, the company would still have considerable time to make deliveries, as the purchaser would have to pay for all material in process of manufacture, and the immediate stoppage of work on the contract would put on his hands a mass of stuff of little value except as junk, while the cost of permitting it to be completed would be small. The contracts closed recently are all for delivery up to March 31, 1917. That every company able to complete the contract within that time will have deliveries accepted may be regarded as certain.

A fruitful source of trouble in the matter of making deliveries of shells already contracted for has been the difficulty in obtaining fuses. Negotiations are now going on, and are likely to eventuate successfully, for the shipment of shells without fuses. It has been practically decided that not only Great Britain and France, but Russia, will also take American shells without fuses and obtain the latter elsewhere.

In regard to the difficulties that have been encountered, a banker well informed as to a number of contracts said there has been no trouble whatever with Great Britain or France, but that with Russia there has been "hell to pay." A complete change of the Russian attitude is now looked for.

Synopsis of the Business Situation in Newfoundland

The Empire call for men, naval and military, such as perhaps only Newfoundland can produce, and the hearty and generous response which it evoked, has, together with the shutting-out of much of its export trade for war reasons, contributed to place this old British Colony in a more or less precarious position commercially for the time being at least. Newfoundland, unlike Canada, has a very limited manufacturing community, her enterprise being directed almost wholly to the fisheries industry. Revenue required directly and indirectly for administrative purposes may therefore be said to entirely depend on the latter.

THE Budget speech of the Finance Minister of Newfoundland, presented at the close of the last session of the Legislature, indicated a situation which meantime was most gratifying, yet nevertheless containing a revelation of a serious financial situation which is likely to become more acute if the war is prolonged.

Newfoundland has faced some marked vicissitudes of fortune during the past quarter century—a fire which destroyed the greater part of St. John's in 1892; a bank failure in 1895 which gravely menaced her solvent existence and caused a financial depression for some years thereafter; fishery disputes with France, which were fortunately ended in 1904, but revived with the United States a year later, being ultimately adjusted before The Hague Tribunal in 1910. Political complications through all this period added to the problems of those entrusted with the colony government. Then two years ago the war broke out and added to Newfoundland's perplexities by first threatening the continuance of her fish trade with foreign countries and more recently by jeopardizing the future of her industrial advance through inability to obtain shipping for her needs.

Meantime General Situation

Taking stock of the situation at the present time, the colony's position is as follows: Its public debt is about $32,000,000, or, roughly, $130 per head of the population. This, however, is not so serious by comparison with Canada, because there are no provincial, municipal, or other forms of subsidiary burdens such as have to be borne by the people there, for every public service is maintained in Newfoundland out of the general revenues, even the upkeep of schools, of the poor, the insane, and the sick, through asylums and hospitals. This burden is, however, increasing at the rate of, roundly, a million and a half dollars a year.

Newfoundland is maintaining on active service some 3,000 soldiers, in addition to 1,500 naval reservists, who are, however, financed by the British Admiralty as part of the Imperial naval organization. In addition, there is to be considered the question of pensions for incapacitated soldiers and for the dependents of those who die on active service, while the colony is also pledged to supplement the provision made by the Admiralty for the naval men by amounts sufficient to bring their pensions up to the same figure as those provided for the soldiers.

Hence Newfoundland is facing serious financial burdens and is threatened with more serious ones in the future; and when it is remembered that the country has but one industry to depend upon—the fisheries, and that this is influenced largely by considerations in foreign countries where most of the fishery products go, it can be realized that circumstances may become such as to seriously threaten the maintenance of Newfoundland's individuality.

Fat and Lean Years

Until comparatively recent years Newfoundland enjoyed periods of marked prosperity, due to high prices of fish, speculations in forest and mineral areas, and other industrial developments. These enabled her to accumulate substantial surplus revenues, with the result that in 1912 the latter amounted to $500,000. This was kept as a nest egg for the proverbial rainy day, which, be it regretted, was not long in coming. In 1913 conditions were so favorable that it was resolved to risk a substantial reduction in duties on imports, equivalent to about $400,000 a year, but the result was that in the ensuing budget a shortage of $300,000 was faced because this reduction synchronized with depression in foreign markets and consequent reduction in imports from which the revenues of the colony are mainly derived. This compelled the Government to take $300,000 from the cash reserve and apply it to liquidating this indebtedness.

Almost coincidentally with the opening of the fiscal year 1914-1915 on July 1 the war began. This proved crippling, because dealers imported as little as possible, not knowing how matters would develop, and the operations for that financial year, which ended on the 30th of June, 1915, showed a deficit of $750,000 on a gross revenue from all sources of, ordinarily, four million dollars. This deficit was met by taking the remaining $200,000 of the cash reserve and raising a loan of half a million dollars from the Bank of Montreal, carrying the remaining $50,000 as a debit balance into the account of the current fiscal year. At the same time, a special session of Parliament was held as soon as war broke out, extra duties were imposed, and for the current fiscal year, which ended on June 30 of the present year, a readjustment is assured, as everything points to the fact that enough revenue will be derived from the various sources of supply to meet all demands and yield a reasonable if not a generous surplus.

For the nine months ending March 31, the Customs revenue was about three million dollars, or within a few thousand dollars of the whole sum realized for the twelve months of the previous year, and huge imports are being made, so that altogether unexampled receipts are being recorded in the Customs department. Consequently, it is safe to conclude that at June 30 there would be enough cash in hand, not alone to meet all the year's obligations, but to leave something over as well.

Need of Revenue

Now a new complication is introduced. At the session of 1915, the Legislature, in response to numerous and insistent demands, decided to go in for a policy of total prohibition of the liquor traffic if a vote of the electors decided therefor, and arrangements were made for a plebiscite in November last which, when it took place, resulted in the country declaring for prohibition. The Act creating the plebiscite provided that the liquor traffic should cease on Dec. 31, 1916, and the country is now within four months of a termination of this business. Simple, however, as this outcome might be from some view points, it also brought financial embarrassments in its trail, because the duties obtained from liquor imports amounted to, roughly, $400,000 a year, and the effect of this will be felt almost immediately, as liquor dealers are now importing only enough for their requirements up to the end of the present year.

Beginning on January 1, 1917, the colony will have to devise ways and means whereby this shortage is to be met. No doubt it will be partly met by the increased purchases of duty-paying goods which will follow as a result of the betterment in the conditions of the families of the individuals who heretofore wasted their substance in dram drinking, but it would be absurd to suppose that this will, for some years at least, restore a financial equilibrium. In some quarters it is suggested that it can be met by extra taxation, but already there are many protests that taxation in the country is as heavy as people can stand.

Some method of taxation will, however, have to be devised, but the Government decided that, in view of the unsettled conditions resulting from the war and the fact that there seems to be a prospect of sufficient revenue being obtained in the meantime to meet requirements to postpone the consideration of this problem until the next session. In the meantime they will make a full study of the liquor problem in regard to its bearing on the revenue and call an early session of the Legislature in 1917 if necessary in order to adopt measures to cope with the problem, so that as soon as the liquor business ends other machinery will be put into operation to make up the shortage which would otherwise result.

A further complication will be introduced by the fact that if the war continues, additional financial provision will have to be made to meet requirements in this respect, and since the rate of interest on loans for the colony has gone up from 3½ per cent., which it was before the war, to 5½ per cent., it follows that from the viewpoint of interest charges the actual burden is relatively increased by 50 per cent. In other words, a given amount appropriated for interest will now only secure a loan of two-thirds the amount it would before the war, and hence, as borrowings annually are much greater each year now than they were before the struggle the weight of the burden is increased disproportionately as well. It must follow as a consequence that unless methods of taxation can be devised which will yield an amount far exceeding anything procurable in the past, through the normal agencies of imposing duties on imports, there will be a hiatus to be met which will defy the ingenuity of the colonial authorities and which may compel a turning to some other sources to assist out of the embarrassments.

War and Revenue

The situation is likely to be further complicated by the fact that owing to the war conditions, especially in Southern Europe, and the growing burdens upon the countries in that section of the world which take great quantities of Newfoundland codfish, prices are likely to fall, and thus the purchasing power will be reduced. The following series of figures for the past five years show the trend of exports, it being borne in mind that since 1911-12 the export of pulp and paper, a new industry, has represented two and a half million dollars annually:

1910-11	$11,975,747
1911-12	13,874,809
1912-13	14,572,889
1913-14	15,134,543
1914-15	13,136,880

A similar condition of things is shown by the totals of imports for the same period, from which it will be seen that in the first year of the war the colony's imports were reduced by virtually three million dollars as compared with the previous year:

1910-11	$13,383,910
1911-12	14,733,499
1912-13	16,012,365
1913-14	15,193,726
1914-15	12,350,786

The extent of the recovery of the past year has been such as to put it beyond all question that the decline last year was directly attributable to the war. For virtually every week of the fiscal year there has been a substantial increase in Customs revenue, totalling $757,788 up to March 31. The barometer of Customs revenue for the past five years tells the story as follows:

1910-11	$2,898,615
1911-12	3,184,633
1912-13	3,282,304
1913-14	3,089,627
1914-15	2,744,567

Customs Revenue

The actual Customs revenue for the nine months of this year was $2,712,000, or almost exactly the same amount as was received for the twelve months of last year. This clearly proves that when the war broke out importers, instead of renewing their stocks, abandoned importing in large measure and tried to utilize the goods they had on their shelves. Thus imports contracted largely in volume, and Customs receipts were diminished, until now, having sold out these goods, dealers are having to import largely, and as they have to pay a much increased price for the commodities over last year, the revenue is gaining in two ways—first, by the duty on the increased quantity of imports, and second, by the additional amount obtained from the increased cost of goods themselves.

The war has, of course, increased the price of all commodities, and in a country like Newfoundland, which imports nearly everything that is used except a small quantity of foodstuffs, the effect of this condition has been to greatly increase the first cost of all articles.

Imports

An analysis of imports under their four principal divisions, namely, from Britain, Canada, United States, and all other countries, shows the situation during the five-year period represented by the foregoing figures to have been that the decline was all embracing. Thus, whereas in 1910-11 the imports from Britain were about three million dollars, they increased in 1913 to nearly four and a half million dollars, and dropped again in 1914-15 to two and a third million dollars, the decline that year being exactly a million and a half dollars, as against only $600,000 the previous year.

With regard to Canada, the imports grew from $4,600,000 in 1910-11 to $5,200,000 in 1912-13, and declined again by $700,000 last year. So also with regard to the United States. Imports from that country advanced from $5,000,000 to $5,800,000 and dropped again last year to $5,000,000, while what was obtained from other countries advanced from $740,000 in 1910-11 to $820,000 in 1912, and declined again to $590,000 last year. These figures, showing the same trend in all cases, make it evident that Newfoundland's most prosperous year was 1912-13, that the depression throughout the world the following year reduced imports by a million dollars in round figures, and that then, the following year, as a result of the war, a decline of three times that amount materialized.

Exports

A similar analysis of exports to Britain, to Canada, to America, and to other countries discloses the following result: Exports to Britain increased in five years from $2,300,000 to $3,200,000, the figures remaining about constant for the last three years; the increase being due in great measure to shipments of pulp and paper. Exports to Canada increased from $1,750,000 in 1910-11 to $2,250,000 in 1912-13, dropped $250,000 the next year, and dropped a further $600,000 the past year, a fact ascribable to there having been exported comparatively no ore during the first year of the war. Exports to America increased from one and a quarter million dollars to nearly $1,700,000 in 1913-14, while the decline last year was only $150,000, showing that the articles sent to the United States are what may be described as absolute necessaries, and, therefore, not easily reduced in either volume or value. Exports to other countries grew from six and three-quarter million dollars to somewhat over eight million dollars the year before last, and then dropped again to seven million dollars in the last fiscal year, the exports of lobsters and iron ore to Germany contributing in a large degree to that falling of.

Moreover, it must not be forgotten that for the fiscal year 1914-15 there was exported only 1,094,244 quintals of fish against 1,247,314 quintals the previous year, a reduction of 153,070, which at slightly over $6 a quintal, represents a million dollars in itself, or one-half of the total decline in exports during the twelve months. The reduction in total trade, imports and exports, during the last fiscal year by over five million dollars or 20 per cent. of the whole effected itself in a decline in general revenue of $365,689, or an average of one thousand dollars a day for the whole twelve months.

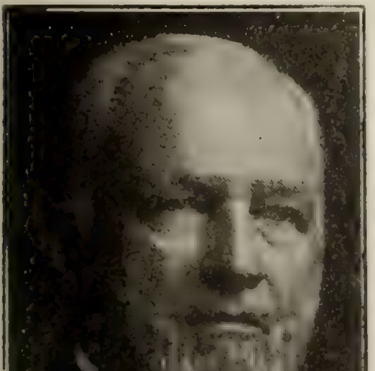
REVIEW OF OVERSEAS TROOPS BY DUKE OF CONNAUGHT, CANADIAN NATIONAL EXHIBITION

The Canadian National Exhibition, a Unique Enterprise

By C. T. R.

This is the 38th consecutive year of the Canadian National Exhibition, it having come into existence as long ago as 1879. On the coming occasion, bigger enterprise and bigger financial outlay are planned by the Executive, and evidences available at the moment point to the realization of an all-round success that may easily surpass the most spectacular of any hitherto achievement. The 1916 Exhibition opens on August 26, and closes September 11.

NO more fitting subject for feature in an export issue of Canadian Machinery could well be chosen than that of the Canadian National Exhibition held each year during the closing days of August and early September at Toronto, Ont. The reputation of the Exhibition is world-wide for the comprehensiveness of its display, and in its many-sided enterprise is reckoned to take first place among similar short-term undertakings on this or any other continent. Each year there is exemplified a fuller development of Canada's resources—mineral, agricultural and industrial, affording thereby an opportunity for business interests abroad to secure first hand and tangible data relative to the establishment of reciprocal trade relationships.



GEORGE BOOTH,
Only living original Director.

NOEL MARSHALL,
President, C.N.E., 1916.

The Canadian National Exhibition is always worth a visit; in war times it is doubly so. There is all the realism of great battles that have thrilled civilization, a fascinating touch of the world war being everywhere apparent. A model camp contains a large detachment of overseas troops, living under active service conditions; there are reviews by State, Government and military officials; an exemplification of trench warfare; destruction of battleships on the water-front by hidden mines; invasions by battleplanes and battles between the birdmen and land batteries of anti-aircraft guns; an immense munitions exhibit; bomb and hand grenade throwing; shells in process of manufacture; in short, Canada militant at a glance, real "preparedness" at its best.

The C. N. E. is world-famed for its superb pageants. This year all previous efforts will be eclipsed. The spectacle will symbolize and epitomize "Empire Federation," and will be of unusual magnificence, a gorgeous, satisfying, prophetic simile of Empire brotherhood.

JOSEPH OLIVER,
Past President, C.N.E.

It will include a majestic assemblage of troops from all sections of the British domains, and the reproduction on a mammoth scale of the British Houses of Parliament, Westminster Abbey, and a section of the War Office. This historic scenic setting from the "heart of London" lends itself to an unusual degree of brilliancy in costuming and general effects. A stage of 700 feet long is required; there will be a choir of 60 trained voices, 400 musicians, and 1,200 performers in all.

ON-SHORE VIEW OF WATER FRONT, CANADIAN NATIONAL EXHIBITION.

Some Leading Statistics

The accompanying general statistics reflect to some extent the importance of this National Institution, which in its every feature stands for Dominion-wide progress as well as for patriotic inspiration and preparedness:

Year.	Receipts.	Attendance.
1879	$ 57,296	101,794
1899	109,085	....
1909	249,603	752,000
1912	384,708	962,000
1913	459,238	1,009,000
1914	336,150	762,000
1915	356,502	864,000

Largest attendance on one day was Labor Day, 1913, 154,000 people; largest one day attendance, 1915, 141,000.

Annual distribution in prizes and special attractions, amounts to $200,000.

Has been held annually for 38 years.

Area of Exhibition park, 264 acres.

Extent of waterfront, 1½ miles.

Value of buildings, $2,500,000.

Floor space for exhibits, exclusive of live stock and outdoor area, square feet, 700,000.

Seating capacity of grand stand, sixteen thousand eight hundred people.

Permanent population of grounds during Exhibition, 10,000.

Average daily attendance, 1915, 72,000.

Average annual surplus paid to City of Toronto, 35,000.

Average paid in year 1915, 45,000.

Initiation Credit

The Exhibition was originally made possible by the liberality of the citizens of Toronto, and its later development to the unselfish efforts of public spirited men, leaders in agriculture, commerce, manufacturing, the professions and public life generally, who have unstintingly devoted themselves to the perfection of the undertaking, giving unsparingly of their time and best thought that the people might be instructed and amused, as well as being afforded an opportunity to realize the possibilities of their magnificent country and the extent of their national heritage in addition.

GOVERNMENT BUILDING, CANADIAN NATIONAL EXHIBITION, WHERE PROVINCIAL PRODUCTS ARE HOUSED.

After nearly forty years of cumulative effort everything that represents Canada's very best effort in all that goes to make a nation great is here centred and concentrated for the judgment of the people in such a way as to set up new standards of Canadian endeavor and stimulate energy and excite national ambitions The whole resources of Canada are levied upon to make it a truly Canadian enterprise, yet, while essentially national, the Exhibition is at the same time international and even universal in scope and appeal.

OFF-SHORE VIEW OF WATER FRONT, CANADIAN NATIONAL EXHIBITION.

The Exhibition is housed in and comprises a great natural park, 264 acres in extent, and constituting a veritable garden spot, with wide paved streets and walks, vistas of velvety green sward, enriched with a profusion of shrubs, trees and sub-tropical flowers blended into harmonious effects; stately permanent buildings, graceful and rich in architectural detail, valued in the aggregate at $2,500,000, and pleasure grounds valued at a similar sum, with their models of landscape artistry sloping picturesquely from the blue waters of Lake Ontario, along which they stretch for 1½ miles. This is the magnificent setting which adds so tremendously to the charm of the C. N. E., the greatest short time exhibition in the world. In this pleasant environment the people of Canada pause each autumn to take a national inventory, to see how they have progressed as a nation within an Empire, and prospered as a people during the year.

Exhibition City is a self-contained community with a permanent population during Exhibition time of 10,000 people. It has its own post office, telegraph and express offices, police station, fire department, hospital, bank, and an electrical plant to care for 60,000 lamps. When not in use for Exhibition purposes the grounds become an ideal recreation spot for the people of Toronto, offering exceptional facilities for all sports and pastimes. There are 73 buildings on the grounds used for Exhibition purposes. The main group numbers 12, all being permanent structures of steel, brick or concrete construction.. Particulars of the leading buildings follow:

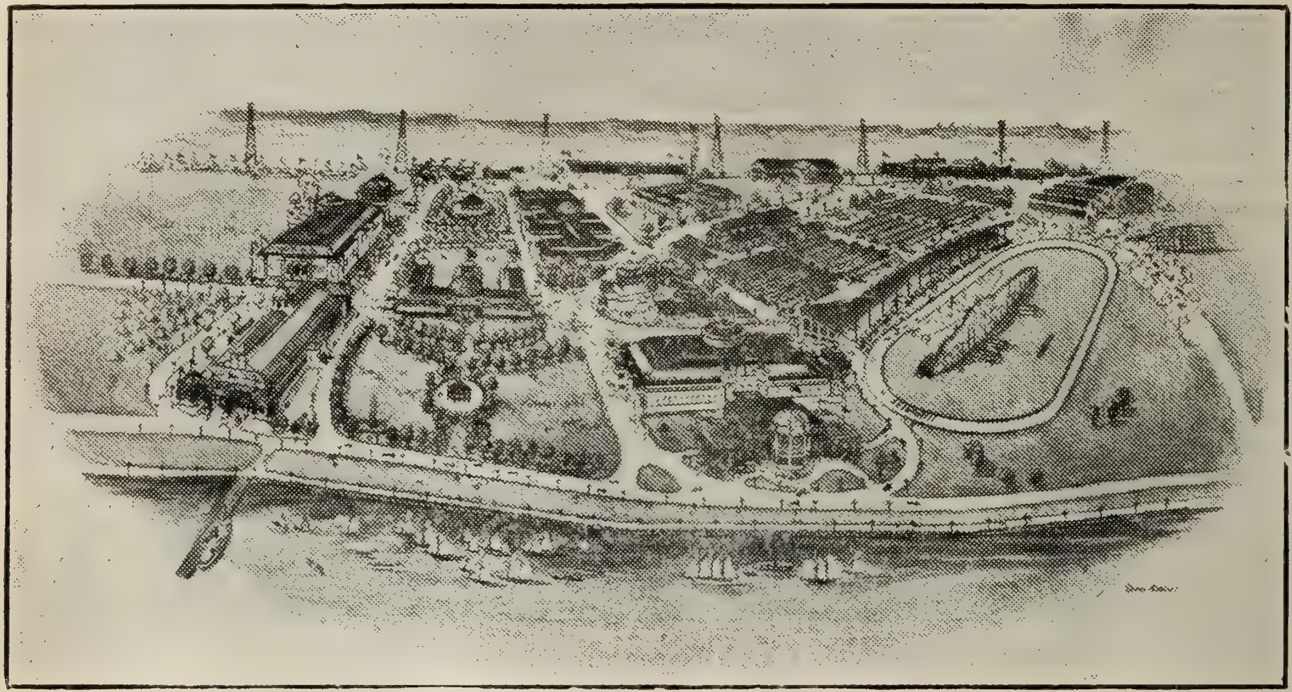
Manufactures No. 1 Building.—This magnificent palace of industrial arts and crafts has an imposing appearance and contains 72,500 square feet of exhibit space. It is ideally located in the centre of the grounds, facing upon the beautiful Grand Plaza. It is well lighted, and

THE GOODERHAM FOUNTAIN AT NIGHT, CANADIAN NATIONAL EXHIBITION. MANUFACTURERS' BUILDING IN BACKGROUND.

is designed to be an almost perfect exhibition structure. Here are displayed annually outstanding triumphs of human ingenuity and skill, an imposing array of Canadian scientific and industrial achievement and endeavor. Manufactures No. 2 Building has approximately the same exhibit space, making a total space in these two structures alone of 145,000 square feet for the exposition of our mechanical and commercial effort.

Government Building — This really graceful structure with its massive towers and commanding dome combines both utility and beauty. It is located near the main entrance to the park, and contains much that is typical of the enterprise and progress of the Dominion and Provincial Governments, epitomizing in an attractive and instructive way the possibilities of the country, developed and otherwise. It contains 48,400 square feet of exhibit space.

Horticultural Building—This is per-



BIRDS-EYE VIEW, CANADIAN NATIONAL EXHIBITION

GOVERNMENT BUILDING AT NIGHT, CANADIAN NATIONAL EXHIBITION.

haps the most attractive building architecturally on the grounds, its majestic dome towering to a great height, while its stately entrance lends it great dignity and beauty. It has a floor space of 30,000 square feet, and is utilized for the exhibit of fresh fruits, vegetables, palms, flowers and kindred branches of husbandry.

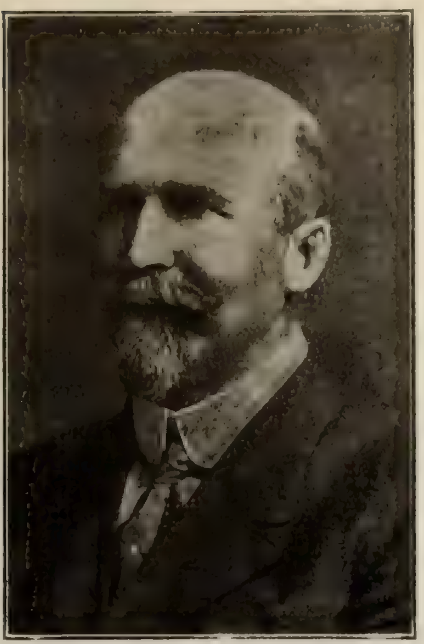
Transportation Building—For exhibition purposes this structure compares equally with those already mentioned. It is 337 feet long by 153 feet wide, and contains 50,000 feet of unobstructed floor space, every inch of which is laid out to the best advantage. Spacious aisles and exceptional facilities are, therefore, provided for demonstrating the selling points of automobiles, supplies, etc., which fill the structure to overflowing during the two weeks of the Exhibition each autumn.

G. H. GOODERHAM, M.P.P.,
Chairman Sports Committee

Industrial Building—This contains 76,500 square feet, and is devoted largely to the exposition of the heavier lines of manufacture, such as electrical equipment, stoves, etc. One wing is devoted exclusively to appliances and processes of manufacture, the latter contributing infinitely to the interest and educational value of the Exhibition as a whole.

Dairy Building—A floor area of 25,000 square feet gives ample room here for demonstrations on a broad and comprehensive scale of all that is modern and pertinent to the equipment and management of dairies and cream factories. Butter and cheese making are exemplified in a practical and instructive manner.

Fine Arts Gallery.—This handsome structure has housed many of the world's famous art treasures. A great variety of exhibits from home and abroad is each year to be found in the Fine Arts Gallery, and thus a wide constituency of visitors is appealed to. The building contains 7,000 square feet. Applied Arts have a beautiful building on the Plaza devoted exclusively to that feature.



DR. J. O. ORR.
General Manager, C.N.E.

Machinery Hall.—This contains the products—still and operating—of many of the great metal-working shops of Canada, and serves to reflect the wonderful development taking place in steam, electrical, hydraulic and mechanical engineering. The building has 35,000 square feet. Plans have been prepared for a much larger and more modern structure, and one more commensurate with our achievement.

JOHN G. KENT,
Past President, C.N.E.

In addition to the above, there are the Railways Building, with 18,500 square feet; Administration Building, Poultry Building, 30,000 square feet; Dog Building, pretentious stables for the accommodation of hundreds of horses under one roof, and over two score other buildings devoted to general live stock purposes.

Grand Stand—This is thoroughly fireproof, being of steel, reinforced concrete and pressed brick construction. It is over 700 feet long and seats 16,800 people. Thousands more can be accommodated on the lawn enclosure. In connection, there is a magnificent ¼-mile track and a mammoth outdoor stage.

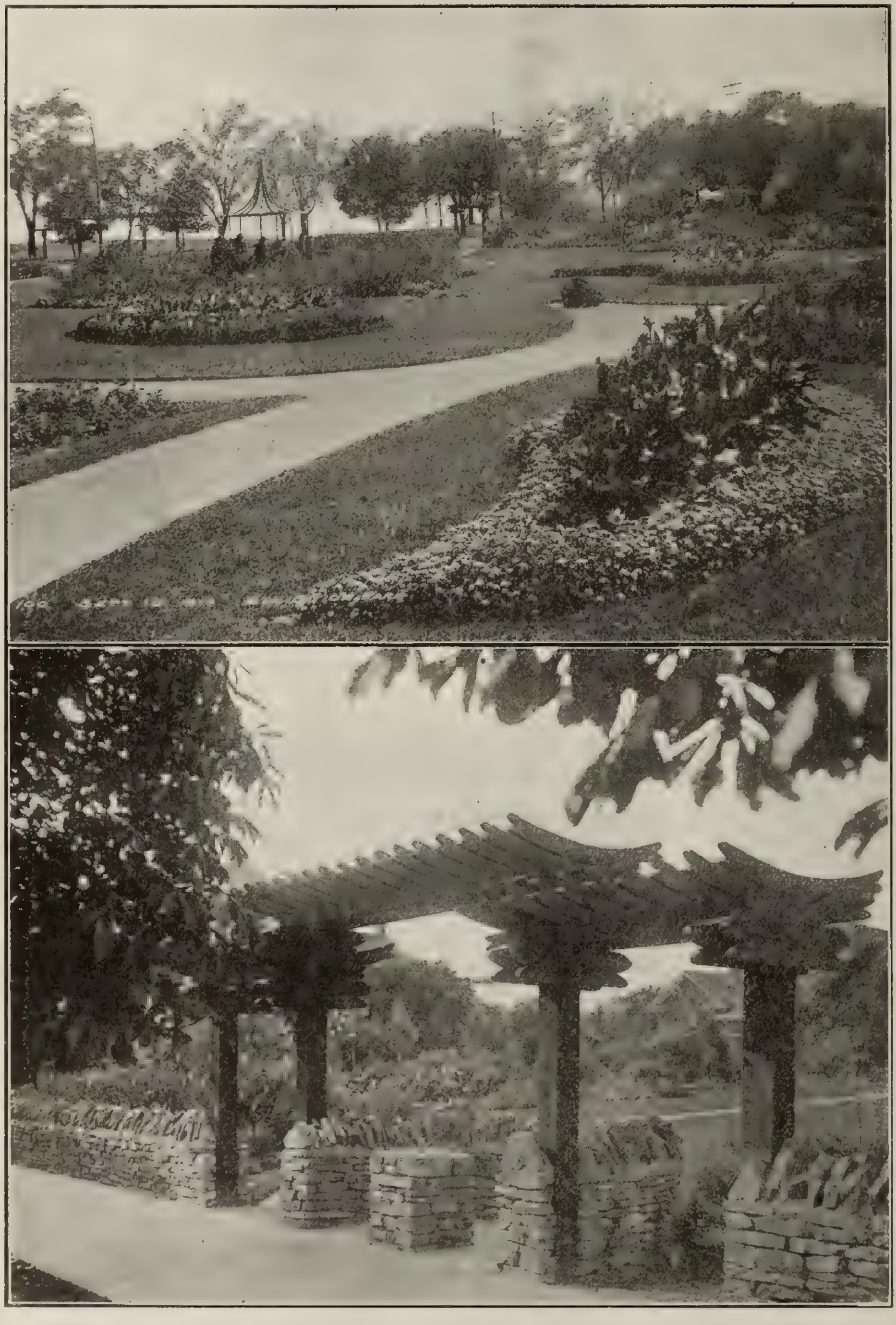
The Agricultural Side

Everything possible is done by the Canadian National Exhibition to exploit the science of farming and advanced animal husbandry, and to solve the problems of agricultural betterment. After the strenuous days of harvest is over, the Exhibition, therefore, proves an irresistible magnet for the farmer and the breeder. In the live stock department are found the most perfect specimens from the country's herd builders, and a C. N. E. prize-winner is the last word in Canadian cattle breeding.

COL. W. K. McNAUGHT, C.M.G.
Chairman Reception Committee

Liberal increases in cash prizes, more extensive accommodation as the years pass and convenience of time and place have made the display famous the world over. Handsome, costly stables for horses, cattle, sheep and swine, a beautiful poultry building, where thousands of the pick of the feathered kingdom are gathered annually are to be found erected and equipped. Elsewhere grains and other agricultural products are shown in profusion, marvellous evidence that Canada is the land of plenty and the C. N. E. her show window. A visit to the Canadian National Exhibition is equivalent to a short cut in Canadian agricultural education.

Abundant proofs that Canada is holding her own in industrial pursuits are on every hand. The very latest that mechanical skill and inventive genius have devised are here displayed in a manner worthy of their importance, and not a few manufacturers from other parts of the world seize the opportunity to bring their wares prominently before the Canadian people.


SEMI-TROPICAL SCENES, CANADIAN NATIONAL EXHIBITION GARDENS.

Educational Side

While much attention is devoted to the material phase of things, an equal spirit of enterprise and perfection of detail is noted on the educational and inspirational side. Proceeding on the theory that culture is most essential to counteract the materialistic tendencies of the age, art and musical programmes are arranged upon a scale of exceptional magnificence. Amidst the dazzling attractions and beauties of park environment will be found spacious band stands, where famed musical organizations give a score of concerts daily, while two beautiful buildings—the Fine Arts and Applied Arts—house famous works of several continents. This year the paintings will include over 200 masterpieces of French art, a contemporaneous exhibit representing the general trend of French art at the present time. The masters of all schools, from the old-established academic branch to the revolutionary leaders of the new modernist schools, are represented. Another building is devoted to other cultural and educational exhibits, including the work of the High, Public and Technical School pupils and University students. The agricultural colleges and the governments also contribute educational exhibits and give demonstrations relative thereto.

Amusement and Entertainment

In addition to the educational features, the amusement and entertainment ends are well looked after, each year furnishing a programme of attractions rich in wonder and variety, including a mammoth spectacle in front of the Grand Stand. This year the pageant will symbolize and epitomize "Empire Federation," and will be of unusual magnificence, a satisfying simile of Empire brotherhood and cohesion. It will include a majestic assemblage of troops representing all sections of the British Empire domain. There will also be reproductions on a large scale of the British Houses of Parliament, Westminster Abbey and a section of the British War Office. This historic setting from the very heart of London lends itself to an unusual degree of brilliancy in costuming and general effects. Some 1,200 performers, 400 musicians and a choir of 60 trained voices will take part in the display

Exhibition Date and Duration

The Exhibition is open two weeks each year—the last week in August and the first week of September, the total annual attendance approximating 1,000,000 people, equal to about one-eighth the entire population of Canada. People come from all over the continent each year, and railway men describe this annual Canadian festival as the greatest creator of traffic in North America. It attracts at a conservative estimate 400,000 visitors to Toronto annually, and what this means to business in actual dollars and cents is beyond computation. There is no line of business that does not feel the vivifying influences of such a great influx of temporary population, and the value of it as a trade factor is perhaps best described in the words of a prominent member of the Board of Trade, who declares that the City of Toronto could "profitably conduct the Exhibition on an annual deficit of $100,000." As a matter of fact, the Exhibition, instead of a deficit, pays over to the city a nice little nest egg each year, which helps keep down the tax rate.

A treasure house of enjoyment and

education, the colossal dimensions of the institution amaze the visitor here for the first time, while the magnitude of its undertakings and the inspiration and great impetus it imparts to Canadian industry generally make it the pride and boast of the whole Canadian people. It long since broke through local limitations, and is in every sense a national, even an Empire, asset.

CROWD SCENE AT REAR OF GRAND STAND, CANADIAN NATIONAL EXHIBITION.

Perhaps one of the best remembered indications of the enterprise and boldness of the C. N. E. were the exposition some years ago of the late Queen Victoria's Jubilee presents, valued at £1,000,000 sterling, and the gathering of Cadets from all over the Empire for an Imperial Review. Australia, New Zealand, Ireland, England, and Scotland contributing a number of contingents of boy soldiers to the event. For some years one of the leading British military bands was brought across to lead the musical programme, these including the bands of the various regiments of Guards. Plans were under way to extend the list, but unfortunately the war intervened.

Housing Foreign Exhibits

Before the European war cloud burst, negotiations were about completed for the erection of national buildings by France, Japan and a couple of the present enemy countries. The expectation now is that as a result of the war and the prospective closing of trade relations within the Empire that others of the Overseas Dominions will see the importance of having representation at the Canadian National for the exposition of the products in which they excel.

Such a proposition has often been talked of, and recent events may hasten it, thus fulfilling the prediction of Earl Grey, former Governor-General of Canada, who was a firm believer in the future of the C. N. E. In his address in 1911, the seventh Exhibition during his stay in Canada, his Excellency said: "Seven years ago its buildings were flimsy and unpretentious. There were no exhibits from outside Ontario. Now you have two millions invested in permanent buildings. These fine structures and the permanent staff connected with them have enabled your Toronto Exhibition to throw off the modest and provincial robes in which she was gowned when I first had the honor of making her acquaintance, and to garb herself in all the dignity and majesty of National and Imperial robes. I should like to congratulate Dr. Orr, the man-

ENTRANCE TO HORTICULTURAL BUILDING, CANADIAN NATIONAL EXHIBITION. TRANSPORTATION BUILDING ON LEFT.

ager, and the directors. It is my firm impression that they have builded better than they knew. I believe the Exhibition is destined to become not only a more and more important national exhibition of the Dominion of Canada, but also in time a world-embracing Exhibition of the while British Empire. You are peculiarly well situated for such an Exhibition. The wise and generous liberality of the City of Toronto, and the readiness with which your public-spirited citizens have placed their valuable and disinterested services at your disposal, have made it possible for you to contemplate developments, which, in proportion as they are realized, will have an influence of far-reaching effect on the life of the Canadian nation and on its place in the Empire of the Crown."

Winter Military Camp for Overseas Units

In 1914, when it grew too cold for the soldiers in training at the summer camps, the Government took over the Exhibition for military purposes, and thousands of men and horses were housed there. Last winter between 8,000 and 10,000 men were again accommodated. It proved an ideal mobilization camp, and no better trained men have been sent out of Canada than those who received all or part of their training at the Exhibition camp, the C. N. E. thus demonstrating its utility in war as well as in times of peace.

This Year's Munitions' Exhibit

One of the big educational attractions this year will be the exhibit of munitions. The whole process of shell manufacture will be shown from the rough forging to the finished projectile, and added interest will be lent to the display by the presence of various explosives and chemicals that enter into the manufacture of munitions. In all, thousands of shells with their constituent parts, including instructional sectional views, will be shown. One of the most interesting features will be contributed by the Dominion Arsenal at Quebec, which will send the model exhibit from which Col. Lafferty and his staff gave instructions to engineers from various Canadian firms just about to enter the shell trade. There will be two process exhibits showing the actual manufacture of shells, also a series of moving pictures taken in the factories with the permission of the Government and the Imperial Munitions Board. Among the firms which will contribute to the exhibit are the following:

Adapters No. 4, Toronto Plate Glass Co., Toronto.

Adapters, 8 in., Canadian Ingersoll Rand Co., Sherbrooke, Que.

Base plates, 18-pdr. H.E., Welland Vale Mfg. Co., St. Catharines.

Base plates, 4.5 howitzer, Whitman & Barnes, St. Catharines; Montreal Ammunition Co., Montreal; Canadian Locomotive Co., Kingston.

Base plates, 60-pdr. shells, Canadian Locomotive Co.

Shell blanks, 4.5 howitzers, Hull Iron & Steel Co., Hull, Que.

Shell blanks, 18-pdr. H.E., Steel Co. of Canada, Hamilton.

Shell blanks, 60-pdr. H.E., Dominion Steel Foundries, Hamilton.

Blanks and forgings, 8 in. H.E., Canadian Fairbanks-Morse Co., Toronto.

CROWDS PASSING THROUGH THE ENTRANCE GATES, CANADIAN NATIONAL EXHIBITION.

Bullets, Brandram-Henderson Co., Montreal.

Boxes, 4-round, Malcolm Suter Furniture Co., Hamilton.

25-round brass cartridge shipping cases, Lalley Lacrosse Mfg. Co., Cornwall.

Boxes, 2-round, 60-pdrs., Benson & Bray, Midland; Gold Medal Furniture Co., Toronto; Office Specialty Co., Newmarket.

Copper bands, 18-pdr., Metal Drawing Co., St. Catharines; Canadian Westinghouse Co., Hamilton.

Copper bands, 4.5, Rome Mfg. Co., Rome, N.Y.; Dominion Copper Products Co., Montreal.

Copper bands, 6 in., 8 in., 9.2 in.,

H.E., Seymour Mfg. Co., Seymour, Conn.

Cartridge cases, brass, 18-pdr., Canadian Cartridge Co., Hamilton, Ont.

Cordite powder, pellets, loading and fixing, Energite Explosives Co., Renfrew, Ont.

Brass discs for cartridge cases, Brown's Copper & Brass Rolling Mills, New Toronto; Buffalo Copper & Brass Rolling Mills, Buffalo, N.Y.

Steel discs, 18-pdr., Coghlin & Co., Montreal.

Fixing screw, 6 in., Morrow Screw & Nut Co., Ingersoll, Ont.

Steel gaines, Midland Engine Works, Midland, Ont.

Grub screws, Galt Machine Screw Co., Galt, Hamilton Brass Co., Hamilton.

GRAND PLAZA, CANADIAN NATIONAL EXHIBITION. LOOKING FROM APPLIED ARTS BUILDING

Leather Washers, Banfield & Sons, Toronto; Beardmore Belting Co., Toronto; Superior Leather Goods Co., Toronto.

Machining and assembling 18-pdr. H.E., Canadian Buffalo Forge Co., Berlin, Ont.; Electric Steel & Metals Co., Welland; Steel & Radiation Co., To-

Machining and assembling 60-pdrs., McGregor & McIntyre, Toronto.

Machining and assembling 6 in. shells, Taylor-Forbes Co., Guelph, Ont.; Dickson Bridge Works Co., Cambellford.

Machining and assembling 8 in. shells, Universal Tool Steel Co., Toronto.

Plugs, brass, 18-pdr., Canadian Yale & Towne Co., St. Catharines; McAvity & Sons, St. John, N.B.; Northern Electric Co., Montreal.

Resin, McArthur, Irwin & Co., Montreal.

Primers, Northern Electric Co., Montreal.

Sockets, brass, 18-pdr., Wallaceburg Brass Co., Wallaceburg, Ont.

Sockets, 4.5 H.E., Dunham & Co., Toronto.

Sockets, 6 in., Standard Brick Co., Toronto; Sheet Metal Products, Toronto.

Brass tubes, Empire Mfg. Co., London.

Other general munitions exhibitors are as follows:

Canadian Car & Foundry Co., Montreal.

P. W. Ellis & Co., Toronto.

Dominion Arsenal, Quebec.

The Ross Rifle Co., Quebec.

Consolidated Mining & Smelting Co. of Canada.

Canadian Toy Exhibit

Approximately 30,000 toys made in Canada by the forty firms now engaged in the work will be shown at the Exhibition, one whole wing of the Government building being devoted to the display. Watson Griffin, of the Department of Trade and Commerce, has returned to Ottawa after several days spent in Toronto arranging for the exhibit, which will be taken over and handled by the Government. An exhibit of German and Austrian toys, which the Canadian product is displacing, will also be on view for the purposes of comparison.

A unique section will be furnished by the C. P. R., which for some time past has had efficiency experts at work throughout the Dominion reporting on the practicability of using waste materials to manufacture various lines previously imported.

* * *

QUEBEC BRIDGE.

THE superstructure on the Levis side of the Quebec bridge will, it is expected, be completed very shortly, and the contractors hope that the central span, 640 feet in length and weighing 6,000 tons, will be placed in position some day between the tenth and fifteenth of September, the exact date and hour depending on the wind and tide factors.

In order to complete the plans for floating the immense central span into position, a close study had to be made of the tide in the vicinity of the bridge, and experts have done this in a very careful manner. The approaches and the cantilever were practically completed last year, while that of the Levis side is practically so, leaving the placing of the central span as the remaining unit yet to be accomplished. The large traveler used on the north side of the bridge was taken down last spring and re-erected just below Pointe aux Pizeau at Sillery, where it is to be used to place the central span on barges, the latter to be floated to the bridge side at the proper height of the tide.

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PUBLISHERS OF

CANADIAN MACHINERY
AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.
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THE 1916 CANADIAN NATIONAL EXHIBITION

THE forthcoming Canadian National Exhibition gives promise of recognizing to a greater extent than has any of its predecessors the place and part that our metal-working industries fill in our national progress, and in turn reflect on our international status. As will be noted from the general article covering the initiation, development and past accomplishment of the C.N.E., and from the programme of this year's now imminent annual display, there has been arranged to feature, in manner becoming our manufacturing enterprise and achievement, the production of shells and shell parts from their minutest detail right up to the stage of complete assembly for service in the field.

In arranging to recognize in this special manner what our metal-working plant executives and operators have, during these twenty months or more, accomplished on behalf of our Empire, the Exhibition management are to be congratulated. It goes to show that, although the machinery side of the Exhibition scheme of things has in the past been somewhat secondary in importance, if steps be taken—and the time never was more opportune, to erect a Machinery Hall commensurate with the scope of the metal-working industries and with the reputation of the Exhibition as an educative and nation-building enterprise, the myriad industries concerned—large and small, will be found ready and willing to annually tax such a building to its fullest capacity with worthy examples of craftsmanship.

The European War has opened up to us new fields of commercial endeavor, but back of commerce we must have industry, and the latter must needs have inspiration to keep it progressive. The Canadian National Exhibition as an annual institution may well provide the inspiration for our industries. Few of our manufacturers would now be disposed to rest on their oars to the extent of allowing exhibits of one year to remain publicly and be in a market sense outclassed by a competitor in the succeeding year. Whatever of that nature has prevailed in the past, the new vision of accomplishment and the new appreciation of capacity that have come to us, make repetition absolutely impossible.

Incidentally, we might say, that munitions manufacture in Canada, and the coming display at the C.N.E. constitute an inspiration to the Exhibition executive, and one which is perhaps more forcefully expressive of the need for a new Machinery Hall than the much urged action towards same to which they have become so well accustomed, particularly around Exhibition time in recent years.

OUR FAVORABLE TRADE BALANCE

THE piling up of bank deposits in Canada continues unabated, and, as a phase of national strength, may be said to augur well for our bearing somewhat comfortably the war-imposed burdens already effective and those yet to be enacted. It must be admitted, however, that our financial strength arises largely from the widespread production of munitions by our manufacturing plants to order of Great Britain and her Allies. Further, our reasonably satisfactory trade balance has its foundation and superstructure centred also about munitions. There is nothing, of course, undesirable about such a state of affairs, provided its maintenance had even some degree of permanency, for then, even with heavy imports against us, we might still easily keep "afloat," so to speak.

Fortunately, in the most desirable sense of the term, this munitions business is only temporary; but are we acting as if it were so. We have talked of new opportunities for export trade and the capturing of former German trade which is both domestic and export, yet seem to have accomplished little in either direction. Our imports are increasing by leaps and bounds, aside from raw material requirements for munitions, and just where we will ultimately land unless we call a halt and proceed to manufacture, instead of continuing to buy "ready for service," the "gods" alone can supply the answer.

The export opportunities for Canadian plants with organizations, equipment and product to take advantage of them are numerous, and not a few of our industrial enterprises are already and profitably thus engaged. The question naturally arises are our myriad other firms, unadapted for export business, doing their part in keeping imports at the absolute minimum. It appears to be fully established that they are not, particularly as far as Western Canada is concerned. From apparently reliable sources the manufacturers of Eastern Canada are not even recognized as competitors in the market for Western business.

Export opportunities, as already stated, were never so attractive and inviting. Offsetting imports by meeting their variety production with the new capacity that munitions manufacture has engendered is equally attractive and inviting, while at the same time never more necessary of becoming operative.

HONOR TO WHOM HONOR IS DUE

IN the Meredith-Duff Commission Report regarding the distribution of fuse contracts, etc., special mention was made of the part played by Col. Cantley in the initiation of shell manufacture in Canada. The work of that gentleman has, however, been largely obscured through the precipitation of our munitions activities into one more or less political melting pot. Some notice has, of course, been taken, in that Col. Cantley has been made an Honorary Colonel in the Canadian Militia.

To what extent, we ask, does such a distinction meet the situation. Col. Cantley is in the forefront of the "Builders of Canada," not as a soldier although equally effective, but as the "Man Behind the Gun," and in the broader sense, as an Empire defender and builder. Of the three most active and prominent members of the Shell Committee, Sir Alexander Bertram, Col. David Carnegie, and Col. Cantley, the two former have received more or less substantial Government recognition, although in their case little has been bestowed or given to brag about, when a full inventory is made of their achievement. That due to Col. Cantley still tarries.

INDUSTRIAL NOTABILITIES

JOHN CUNNINGHAM McLENNAN, B.A., Ph.D., F.A.A.S., F.R.S.C., F.R.S., Professor of Physics and Director of the Physical Laboratory, University of Toronto, was born at Ingersoll, Ont., April 14, 1867, the son of David and Barbara (Cunningham) McLennan. He was educated at the Clinton and Stratford Collegiate Institutes, the University of Toronto, and the University of Cambridge.

On completion of his university courses, Mr. McLennan became assistant demonstrator of physics at the University of Toronto, in 1892; demonstrator of physics in 1899; associate professor of physics in 1902; director, the Physical Laboratory in 1904; and professor of physics in 1907, which latter two appointments he still holds.

JOHN CUNNINGHAM McLENNAN.

Mr. McLennan is President, the Alumni Association of the University of Toronto; President, the Royal Canadian Institute, 1916; a bureau of scientific and industrial research, and a school of specific research having recently been added to the other spheres of that body. He is a Past President of Section III., Royal Society of Canada; Past Vice-President, B.A.A.S., and became a Fellow of the Royal Society of London, in 1915. Numerous papers on "Radio Activity," "Electrical Conduction in Gases," and "Spectroscopy," etc., have come from his pen.

Mr. McLennan married Elsi Monro Ramsay, daughter of William Ramsay, Bowland, Scotland, on September 15, 1910. His clubs are the York, Toronto Golf, and Faculty Union (University of Toronto), and his recreations golf and tennis.

In politics he is an Independent, in form of religion a Presbyterian. His residence is 88 Prince Arthur Avenue, Toronto, Ont.

—Photo, courtesy International Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh		$18 70
Lake Superior, charcoal, Chicago		19 75
Michigan Charcoal iron.		28 00
Ferro nickel pig iron (Soo)		25 00
	Montreal	**Toronto**
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain ..	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base, Toronto	3.25
Steel bars, 2 in. and larger, base..	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base ..	3.30
Bessemer rails, heavy, at mill....	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh....	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.25
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.10
Bars, 2 in. and up	4.00
Structural shapes	3.10
Plates	3.50

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carliod ..	$31 00	$29 00
Electrolytic copper	31 00	29 00
Castings, copper	30.00	28 50
Tin	43 00	44 00
Spelter	15 00	13 50
Lead	8 50	8 50
Antimony	19 00	19 00
Aluminum	68 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4.25	$4 25
Heads	4 50	4 50
Tank plates, 3-16 in.	4 75	4 75

WROUGHT IRON PIPE

Prices in effect April 26, 1916

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 06	5 31
½ in.	3 91	6 08
¾ in.	4 72	7 65
1 in.	6 97	11 31
1¼ in.	9 43	15 30
1½ in.	11 28	18 29
2 in.	15 17	24 61
2½ in.	23 99	38 90
3 in.	31 37	50 87
3½ in.	37 72	61 18
4 in.	44 69	72 49

Lapweld

2 in.	$17 02	$26 46
2½ in.	25 16	40 07
3 in.	32 90	52 40
3½ in.	39 56	63 02
4 in.	46 87	74 67
4½ in.	57 15	90 81
5 in.	66 60	105 82
6 in.	86 40	137 28
7 in.	116 62	179 70
8 in. x 25 lbs. per ft. ..	122 50	188 75
8 in. x 25 lbs. per ft. ..	141 12	217 44
9 in.	169 05	260 48
10 in. x 32 lbs. per ft.	156 80	241 60
10 in. x 40 lbs. per ft.	201 88	311 06

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$15 00	$15 00
Copper, crucible	18 00	18 00
Copper, heavy	18 00	18 00
Copper wire	18 00	18 00
No. 1 machine compos'n	14 00	14 00
No. 1 compos'n turnings	12 00	12 00
New brass clippings ..	13 50	13 50
No. 1 brass turnings ..	11 50	11 50
Heavy melting steel ..	9 00	9 00
Boiler plate	11 75	10 50
Axles, steel	13.00	15.00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	12 50
Shafting	16 50	16 00
Malleable scrap	10 00	11 00
Pipe, wrought iron....	10 00	9 00
Stove plate	10 00	10 50
Heavy lead	5 00	5 00
Tea lead	5 00	5 00
Scrap zinc	8 50	8 00
Aluminium	34 00	35 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	50
Stove bolts	62½
Plate washers	25
Machine bolts, ⅜ and less	40
Machine bolts, 7-16 and over ..	30
Blank bolts	30
Bolt ends	30
Machine screws, flat head, iron	06 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron....	25
Machine screws, fil. head, brass..	5
Nuts, hex., up to 1 in.	**$3.75 per lb. off**
Nuts hex., over 1 in.	**$2.00 per lb. off**
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$4.85
Structural rivets, as above	4.75
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent.
Sq. & Hex Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	.65
Coupling bolts	net
Planer head bolts, without fillet	.15
Planer head bolts, with fillet	net
Planer head bolt nuts up to 1 in. ..	.60
Planer head bolt nuts, over 1 in. ..	.55
Planer bolt washers	list plus 10
Hollow set screws	list plus .20
Collar screws	list plus.20
Thumb screws	.20
Thumb nuts	.75

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh ...	$42 00
Open-hearth billets, Pittsburgh..	45 00
O.-H. sheet bars, Pittsburgh....	45 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3 75	$3 70
Cut nails	3 40	3 40
Miscellaneous wire nails	65%	
Pressed spikes, ⅝ diam., 100 lbs.	$3 90	

MISCELLANEOUS

Solder, guaranteed	0.28½
Solder, strictly	0.26½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	13.95
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.32
Benzine, single bbls., per gal.	0.31½
Pure turpentine, single bbls., gal.	0.70
Linseed oil, raw, single bbls.	0.79
Linseed oil, boiled, single bbls.	0.82
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.11
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHING DRILL ROD

Discount off list, Montreal and Toronto 25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	55
Standard drills over 1½ in.	20
Fluted drills to 1½ in.	25
Fluted drills over 1½ in.	15
Bit stock	55
Ratchet drills	15
Machine bits for wood	20
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	30
Sockets	30
Sleeves	50
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	4 60	4 50
Canada plates, dull, 52 sheets	4 50	4 50
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 45	6 45
Premier, 10¾ oz.	6 75	6 75

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B B

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$19 55	....
1¼ in.	19 55	.....
1½ in.	19 55	14 00
1¾ in.	25 00	16 50
2 in.	25 00	16 10
2¼ in.	28 50	18 50
2½ in.	32 00	21 00
3 in.	40 00	25 00
3¼ in.	.....	27 00
3½ in.	45 00	29 00
4 in.	50 00	37 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.35 to .37
Tin	.55 to .58
Zinc	.20 to 23

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	1.75 to 1.90
Polishing wheels, bullneck.	.90
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14-.18
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, July 29, 1916.—Weather conditions are having a detrimental effect on the industrial situation. With the temperature at the high level of the past few weeks, and the impossibility of maintaining the high pressure of business, production has been greatly curtailed. However, activity throughout all lines of industry is still great. Munition plants are all fully engaged and little abatement is noticed. Considerable activity is being shown in the paper making industry; many plants enlarging their facilities to meet the rapidly increasing business.

Steel

All branches of the steel industry are comparatively quiet, but the market continues strong. The production has been somewhat curtailed, owing to the hot weather, and the output for July will likely be lighter than that of the previous month. The feeling appears general that the steel situation is very firm, and will remain so for some time. The demand for open-hearth billets and sheet bars is exceptionally heavy and Pittsburg prices have been advanced $3 per ton. The situation in plates is becoming more acute, as the demands for shipbuilding are constantly increasing, and the mills are already booked far in advance. Possibilities of an increase in price seem more than likely. The requirements of the trade for electrical sheets are very heavy, also for all gauges of blue annealed sheets. Black and galvanized sheets are in fair demand. The galvanized situation has been somewhat disturbed by the recent decline in the price of spelter, but the situation at present is showing improvement. Wire interests are comparatively quiet, but are preparing for an expected increase in fall business. No change is noted in quotations, but a re-adjustment of prices, especially in galvanized products, is anticipated. All other lines of steel and iron products remain unchanged, and may remain so, awaiting further developments.

Metals

The general tone of the metal situation shows little change. Prices have been fluctuating under uncertain conditions. Copper has become steadier, owing to the lack of second-hand metal, which has been affecting the market for some time. Tin is unsteady after a period of good inquiry. Spelter is again showing signs of a relapse, and domestic demand is weak. Lead is quiet and easier. Antimony remains very quiet under easier prices. Aluminum is a little stronger.

Copper.—During the past week the copper situation has shown improvement, owing largely to the gradual disappearance of re-sale metal. For the past few weeks the market has been gauged by the activity displayed in second-hand copper, and as it is apparently difficult to find sellers of second-hands at present, the situation is becoming steadier and prices firmer. The firm tone is additionally emphasized by the fact that futures are commanding full prices. The demand is not heavy, but inquiries are of sufficient volume to indicate the trend of the market. The strength of the London market is reflected in the quotations for the week, which show an advance of £14 on Standard spot and also on futures, the present price being £105 and £103 respectively. Electro copper, while not very active, is firm at £123, an advance on the week of £1. In response to the higher prices in foreign markets, and the evident shortage of prompt metal, New York reports an advance of 1c. on electrolytic and 1¼c on castings. Lake is firm at 25½, and current quotations on electro and castings are nominal at 26c and 24¼c per pound. Dealers here report a little more activity, but quotations are unchanged at 31c for lake and electrolytic, and 30c for castings.

Tin.—No developments have transpired during the week and the situation is practically unchanged. The only feature of interest is the better inquiry from small consumers, as the larger users of metal continue to manifest an attitude of indifference. From present conditions it would appear as though consumers were using up some of their safety stock, giving little thought to future conditions, or living in the expectation of an early settlement of hostilities opening the way to an easier situation. However, while tin may be in a safer position in this respect than some of the other methals, there is little to indicate that future conditions are free from some of the obstacles that have arisen in the past. In the absence of demand both here and abroad the market is inclined to weaken. London quotations have declined £2 10s. on Standard spot and Straits, and £2 5s. on Standard futures. Latest prices quoted are £165 15s. for Standard spot, is £168 10s., which is a decline of £1 10s. during the week. The New York market has fluctuated for the past week of 38c, being a decline of ½c on last week's quotation. The local situation shows little activity on a weak market. Prices are easier at 43c, a decline of 1c per pound.

Spelter. - The recent strength, which has developed after a comparatively long period of weakness, appears to have stopped, leaving a tone of uncertainty. A factor that bears on the present situation is that of wages and operating expenses. These have increased to such an extent that very little profit is to be derived by selling spelter under 9 or 10c. The activity shown by galvanizers, when spelter was selling around 9c, has fallen off and the domestic demand at present is very light. The London market, while showing an advance of £5 on spot and £3 on futures, is at present developing a weaker tendency; latest quotations are £59 for spot and £53 for futures. New York quotations seem to indicate that the recent strength may be of short duration, as a decline of ⅜c is noted in the latest report. Nominal quotations are 10.3c per pound. The local situation is quiet, but dealers intimate that a weakness may develop shortly; prices are nominal at 15c per pound, 1c lower than last week.

Lead.—The market is quiet and unchanged. Buying is light, but it is thought that consumers want lead, and an active movement would develop, if quotations were easier. Unless the volume of business increases, declines are expected. London cables show a closer margin between prompt and time delivery. Spot prices having declined and futures advanced slightly. The trust price is firm at 6½c, and outside interests are quoting 6¼c, a decline of over ⅛c per pound. Local conditions are unchanged, but a weakness is apparent, and dealers have reduced their price to 8½c per pound, a decline of ½c.

Antimony.— No new developments have arisen to change the stagnant condition of the market and dealers are unable to define the situation. New York reports another decline of ½c, the quotation of 13c being no key to the exact position, as sales of metal have been made at lower figures. Dealers here report a weak and quiet market, with quotations at 19c, a decline of 1c on the week.

Aluminum. — The market is slightly stronger owing to the scarcity at present and dealers are able to command better prices. Dealers here have advanced their quotations to 68c, an advance of 3c per pound.

Machine Tools and Supplies

The machine tool situation continues to reflect the activity throughout the metal working industry, but the volume of business is assuming more normal proportions. Recently placed orders for the larger shells have resulted in additional business, but in the majority of cases orders have gone to plants already equipped. Owing to many plants having finished their work on the lighter shells, the market is beginning to carry various lots of second-hand machinery. The delivery on new and standard equipment is much better. The situation as regards suppiies is unchanged.

Scrap

Slight improvement is reported in the old material market, but few price changes are reported. Chicago prices on heavy steel scrap have advanced, price quoted being now 15¼c. Price at Pittsburg is 16¼c, which is ¼c less than the previous week. The strength in copper is improving the scrap situation a little. Local dealers report slightly better conditions, with prices generally firm.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

Toronto, Ont., Aug. 1.—The general industrial situation continues very satisfactory. Factories working on war orders have as much business as they can conveniently take care of especially in view of the scarcity of skilled labor and, in many cases, shortage of raw materials. Munition plants have sufficient business on hand to keep them operating at capacity for many months and further contracts have been assured by the action of the Dominion Government in establishing additional credits on behalf of the British Government. These contracts will represent heavy tonnages of steel and result in considerable activity in the trade. The steel trade is exceedingly prosperous, due to the shell orders and also because of the large export business in shell steel, billets, wire rods, wire nails, barb wire, etc. Machine tool builders are also enjoying the greatest prosperity ever known in the history of the trade. One of the most interesting features has been the development of special tools for the production of shells and shell parts, while the general efficiency in machine shop practice has been considerably improved notwithstanding the scarcity of skilled labor.

A statement recently issued by the Department of Trade and Commerce reveals the big advance which has been made in Canadian trade during the first three months of the present fiscal year, April to June inclusive. The statement shows an increase of more than 93 per cent. in the grand total for the above mentioned three months. The volume of trade aggregated $527,512,344 as against $272,646,868 for the first quarter of the fiscal year of 1915. June was an exceptionally good month, the exports showing very heavy increases in manufactures, in agricultural and in mineral products. The figures in the report are very significant and prove conclusively that the country is enjoying an era of prosperity never before experienced.

Steel.

Domestic business is quieter and there are no developments of particular importance to note. Export demand continues heavy but the warm weather is generally affecting the steel trade. Prices of steel products are unchanged, but holding firm. Deliveries on boiler tubes continue backward, as makers are sold out for six to eight months. The wrought iron pipe situation is unchanged and prices of galvanized pipe have not been lowered yet, although there is a possibility of some action being taken in the near future. The situation in plates is steadily getting tighter and there is a possibility of higher prices due to increased demand from shipbuilding interests.

The market for black and blue annealed sheets is strong and prevailing quotations are being firmly held. An advance in black sheets is likely in the near future owing to the higher prices of sheet bars which are now in effect. The market for galvanized sheets is irregular owing to the spelter situation. The decline in quotations of galvanized sheets in the States has been followed by some makers advancing prices, while others have not done so. Quotations locally are steady at the decline announced last week.

Orders for large shells have been placed in the States by the Allies and negotiations for further orders, representing heavy steel tonnages are under way which is tending to stiffen the market. Export demand continues heavy for Bessemer and open-hearth billets and sheet bars, shell steel, wire products, structural steel, etc. The big demand for billets has caused an advance in prices and a scarcity of semi-finished steel. Bessemer billets have advanced $2. and are now quoted at $42 per ton. Open-hearth billets and sheet bars have advanced $3 and are now quoted at $45 per ton. Pittsburgh steel bars are unchanged at 2.50c, plates 3.50c, and shapes 2.50c Pittsburgh. The ferro-manganese situation is unchanged, prompt and forward metal continuing to be available in carload lots around $175. per ton, seaboard.

Pig Iron.

The market continues quieter and domestic demand comparatively light. The consumption of steel making grades continues heavy which is emphasized by the fact that the Steel Company of Canada will have shipped to Sarnia, Ont., during the present season of navigation 500,000 tons of iron ore from the ranges near Superior and Duluth.

Scrap.

The market for most old materials is quiet and there is little of interest to note, as the situation generally is practically the same as during the past week or two. Although prices are unchanged, there is a weaker tendency in some materials, notably zinc and lead.

Machine Tools.

Interest is still centered almost entirely on munitions contracts, and a good demand for tools for machining large shells is anticipated for some time to come. Large contracts for shells have recently been closed in the States by the Allies for delivery April 1917, which is an indication that further big orders will be placed in Canada for large calibre shells. The last order received by the Imperial Munitions Board amounts to $35,000,000, and covers shells ranging from 6 in. to 9.2 ins. calibre.

Supplies.

Business continues active for practically all machine shop supplies, including small tools, drills, chucks, taps and dies, belting, etc., while the demand for waste has been so heavy that manufacturers have been unable to supply all that was required. Some lines, particularly those composed of steel or brass are difficult to obtain promptly, and prices are still high. Prices generally are firm and steady with no change of importance to note.

Metals.

An improved tone has developed in the metal markets, and with the exception of lead and antimony there have been no further declines. The improvement in the situation is due to increased demand, and the markets generally, with the above exceptions, are more active. The copper market is stronger as a result of increased enquiry and the gradual absorption of resale metal. Tin is also in better demand and the market is more active. The downward movement in spelter has been checked and, although quotations are unchanged, the market has a better tone. The lead market continues weak and prices are lower. Antimony has also declined but aluminum is a little higher. Solders are unchanged .

Copper.—The market is firmer and more active but quotations are unchanged and entirely nominal. Resale copper is being gradually absorbed and there are indications of an improvement in demand which is tending to stiffen the market. On the other hand, producers who have been holding their prices are taking more interest in the market and are more inclined to sell. Local quotations are firm and unchanged at 29c per pound.

Tin.—The market is firm and unchanged with a better tone. The New York market is firm at advanced prices and supplies are coming forward in satisfactory volume both from England and from the Far East direct. Local quotations are unchanged at 44c per pound.

Lead.—The market is dull and easy with local quotations lower. The Trust are holding their prices at 6.50c New York, but the independent producers are quoting 6.25c. It is generally believed that present prices will not hold unless there is a considerable improvement in business, as it is well understood in the trade that production is exceeding consumption. Lead has declined ½c locally and is quoted at 8½c per pound.

Antimony.—The market continues extremely dull and the demand is light. Quotations are lower and nominal at 19c per pound.

Aluminium.—The market is a little more active and quotations are higher at 68c per pound.

⁂

NEWFOUNDLAND INDUSTRIAL CORPORATION PROMOTION.

SIR W. D. REID, president of the Reid Newfoundland Railway and allied companies, who returned to St. Johns a few days ago, is understood to have spent considerable time in New York in the past year promoting the financing of a big corporation for Newfoundland, which, if successful, would mean a tremendous industrial impetus for Ancient Colony.

Two or three months ago the prospectus was completed of a proposed $15,000,000 Cyanamid Corporation, and hopes are entertained that the necessary capital will be procured from American sources to proceed with the erection of the plant. Some days ago reports were current in St. John's that the necessary capital was assured, but this cannot be confirmed at present. Cyanamid is a patented fertilizer product for the manufacture of which the chief raw material is lime stone. There are also valuable by-products, which can be utilized in the production of calcium carbide and ammonia.

A primary essential is an abundance of cheap water power, and as regards the raw materials and the power the Reid interests are the fortunate owners of almost unlimited supplies capable of development in the same locality.

The limestone deposit towers over the Humber River, which flows into the Bay of Islands, on the south-west coast of the island colony, and the same river is capable of producing all the power necessary for an extensive plant such as is proposed. While coal, the third principal ingredient necessary, is not so close at hand, it can be cheaply handled from the mines in Cape Breton by water, only a few hours' sail away.

It is claimed that the cheap assembling of all the necessary elements will enable the company to manufacture cheaper than any other country in the world engaged in that business, Norway now having the credit of effecting the cheapest production. All the products it is aimed to turn out are standard commodities, and have a world-wide market.

⁂

LAKE STEAMSHIP DEAL IS RATIFIED.

THE purchase of St. Lawrence & Chicago Steam Navigation Co., by Canada Steamship Lines, already approved by the directors, has been formally ratified at a meeting of shareholders of the latter company.

It was explained by J. R. Norcross, vice-president, who presided in the absence of the president, Mr. James Carruthers, that the opportunity of purchasing the controlling interest in the company presented itself some time ago, but, because Canada Steamships was unable to secure complete control, the governors of the guarantee fund refused to sanction the purchase.

Later on a syndicate, made up of directors of the Canada Steamships Company, purchased the stock, and now proposed to turn over to the company 9,664 shares of the St. Lawrence & Chicago Steam Navigation Company at a price of $187.75 per share. In addition to this, which was the purchase price of the shares, the syndicate will receive an amount equal to the net earnings of the St. Lawrence Company during the period from April 20 to July 31, the period during which the property was in their hands.

The transaction, it was pointed out, would not involve new financing, nor yet constitute a charge on earnings. The funds required were already in hand in the fund made up of money received as insurance for vessels lost and further the company being acquired had some $400,000 cash in its treasury.

* * *

CHANGE IN SHELL STEEL

A HALT in the manufacture of shells in Canada for the Allies has, we understand temporarily been called, as a result of changes in the specifications of the steel required, which have just been made by the Imperial authorities.

The change is the requirement of steel of a higher tensile strength than had hitherto been specified. It will, of course, be quite possible to manufacture this steel in Canada as hitherto, but as large orders for steel of the quality formerly suitable have been given, and there is a large stock of manufactured shells on hand, some inconvenience may be caused.

Large orders for shells of 9.2 and other large calibres have recently been placed in the United States, and it is understood that others will be distributed in Canada.

The first samples of time fuses produced at the loading plant established in Montreal by the Munitions Board have successfully passed the tests. No shipments have yet been made, however, it is understood, and it is not altogether likely that the board's expectations as to early delivery, expressed during the fuse contracts inquiry, will be realized.

Hand grenades, the weapons which are proving so valuable and effective in the present war, are now being manufactured in Canada. They are being loaded, however, in Great Britain.

* * *

CANADIAN HOLIDAY RESORTS

The Lake of Bays, situated in the famed "Highlands of Ontario," has scenery rugged enough to be romantic and yet beautiful to the eye. The altitude is 1,000 feet above the sea, the air rare and invigorating, and skies usually clear and beautifully blue. It is easy of access by the luxurious trains of the Grand Trunk Railway system. Reasonable charges and first-class accommodation is to be had at the different hotels; just the place for a summer outing. Handsomely illustrated descriptive literature on request.

The Algonquin Provincial Park of Ontario is a region of expansive lakes abounding with the gamest of fish, of hurrying streams, primeval forests of pine, spruce and fir, where almost every species of fauna roams in freedom; cool winds; ideal camping spots and sylvan retreats everything, in fact, that is dear to the heart of the lover of outdoor life. It is situated 2,000 feet above sea level, 205 miles west of Montreal, 170 miles west of Ottawa, and 200 miles north of Toronto. This unspoiled tract of 1,754,473 acres is one of the most attractive playgrounds of Canada, having unlimited attractive canoe routes, splendid fishing, purest of air and great opportunities for the kodak operator. For those who desire city comforts in the wilderness there are hotels and log cabin camps. Illustrated descriptive matter sent free on application to any Grand Trunk agent, or Miss Jean Lindsay, manager, Highland Inn, Algonquin Park Station, Ontario.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia.

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Ploschad 9, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian

J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

St. John, N.B.—A power house will be built at the General Hospital here by the City Council.

Winnipeg, Man.—The Manitoba Power, Pulp & Paper Co., of this city, propose erecting a saw and paper mill at Grand Rapids.

Montreal, Que.—Announcement has been made that the G. T. R. will build extensive car shops at Port Huron, Mich., to cost $750,000.

St. Boniface, Man.—D. Blachensky proposes to build an abattoir and packing plant here, to cost $75,000. Plans have been prepared.

Tecumseh, Ont.—The Eau Claire Waterworks Co. has secured a site, 50 x 125 ft., and will shortly call for tenders for the erection of a plant to cost $20,000.

Stratford, Ont.—The Stratford Brass Co., manufacturers of brass fixtures, is building an addition to its plant, 42 x 42 ft., two storeys. Alfred Hahn is manager.

Montrose, Ont.—The Canadian Aloxite Co., a subsidiary of the Carborundum Co., Niagara Falls, N.Y., is erecting a plant on an 8-acre site near here. The main furnace building will be built 60 x 220 feet; the other buildings will be used for receiving and mixing ore and accommodating the crushing machines.

Winnipeg, Man.—D. B. McDonnell, of this city, is interested in a $150,000 hydro-electric project on the Saskatchewan River, at Grand Rapids, to operate a paper mill.

Cobalt, Ont.—The Dixon Creek (Cobalt) Silver Mining Co. has ordered a new 5-drill Ingersoll-Rand compressor plant and the machinery is expected to be on the ground early next month. H. Hollands-Hurst is mine manager.

Haileybury, Ont. — The School of Mines on which work has been started by the contractors Secord & Sons, of Brantford, Ont., will contain assay and balance rooms, mill room, forge, carpenter, and machine shops, stamp mill and crushing room. The school will be equipped with modern appliances and will be in charge of A. E. Flynn.

Renfrew, Ont.—Owing to the serious shortage of power here, it is proposed to develop 1,500 h.p. at the first chute of the Bonnechere River, or to enter into an agreement with M. J. O'Brien, of Renfrew, to take power from his proposed plant on the Madawaska River at Calabogie. Mr. O'Brien has offered to supply 3,000 h.p. almost immediately.

Port Arthur, Ont.—At the Western Dry Dock & Shipbuilding Company's plant, progress is being made with the two new shops being built to replace the pattern and electrical shops destroyed recently by fire. The brickwork on the electrical shop is nearly completed and the building is almost ready for roofing. The pattern shop is not so far advanced, but the concrete is being poured in for the foundations and piers, and this will be rushed to completion.

General Industrial

Toronto, Ont.—Bowles Lunch Co. will build a bakery at a cost of $30,000.

Hamilton, Ont. — The Appleford Counter Check Book Co. propose building an extension to their factory.

London, Ont.—The Canadian Cereal Mills Co., propose building an extension to their mill here to cost $10,000.

Regina, Sask.—The Prairie Biscuit Co. will build a factory here to cost about $25,000.

Ottawa, Ont.—Grant Holden & Graham, lumberman's supplies, will build a factory at Ottawa, to cost $30,000. James Mather, of Ottawa, is the architect.

Waterloo, Ont.—Considerable loss was sustained by Messrs. Wallace & Robinson through a fire which occurred at their plant on July 26. The damage has not yet been estimated, but it will amount to several thousand dollars, and is only partially covered by insurance.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL

Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE

Valparaiso, British Consul General.

COLOMBIA

Bagota, British Consul General.

ECUADOR

Quito, British Consul General.

EGYPT

Alexandria, British Consul General.

FRANCE

Havre, British Consul General.
Marseilles, British Consul General.

INDIA

Calcutta, Director General of Commercial Intelligence.

ITALY

Genoa, British Consul General.
Milan, British Consul.

MEXICO

Mexico, British Consul General.

NETHERLANDS

Amsterdam, British Consul.

PANAMA

Colon, British Consul.
Panama, British Vice-Consul.

PERU

Lima, British Vice-Consul.

PORTUGAL

Lisbon, British Consul.

RUSSIA

Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN

Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN

Stockholm, British Consul.

SWITZERLAND

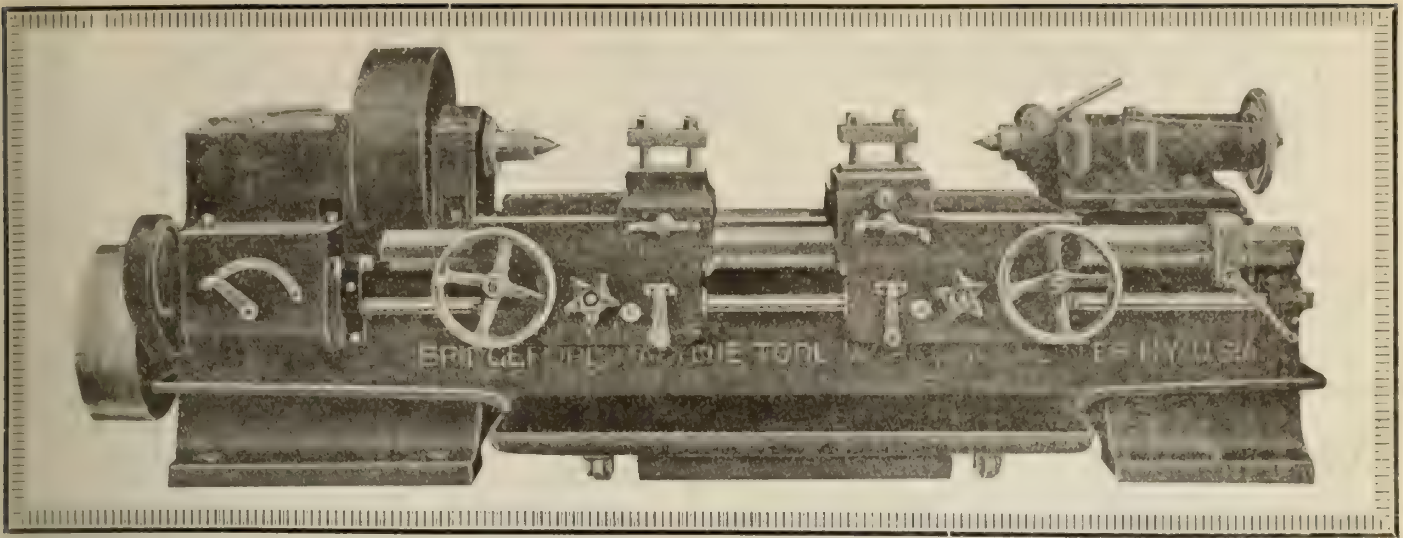
Geneva, British Consul.

URUGUAY

Monte Video, British Vice-Consul.

VENEZUELA

Caracas, British Vice-Consul.



For Rough Turning 8", 9.2" and 12" Shells

A study of this machine will show you what can be accomplished when a scientific knowledge of the requirements of heavy duty lathes is applied in practical form. This machine has withstood for years the acid tests of criticism and its record of deeds accomplished will inspire confidence in this big 16,000-lb. giant.

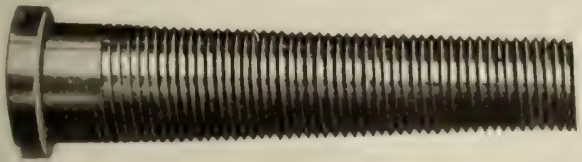
It is a powerful machine arranged for rough-turning 8", 9·2" and 12" shells. Power is transmitted through an 8" driving belt with three instantaneous speed changes through hardened steel gearing. 6½" face on main driving gear. Four instantaneous feed changes all through cut steel gearing running in oil.

The A. R. Williams Machinery Co., Ltd. **64-66 Front Street West, Toronto, Ont.**

Taper Threading With a Geometric Die Head is a Simple Matter

The chasers follow the taper of the work automatically, and release the work at the end of the cut. Head is withdrawn without touching the finished threads.

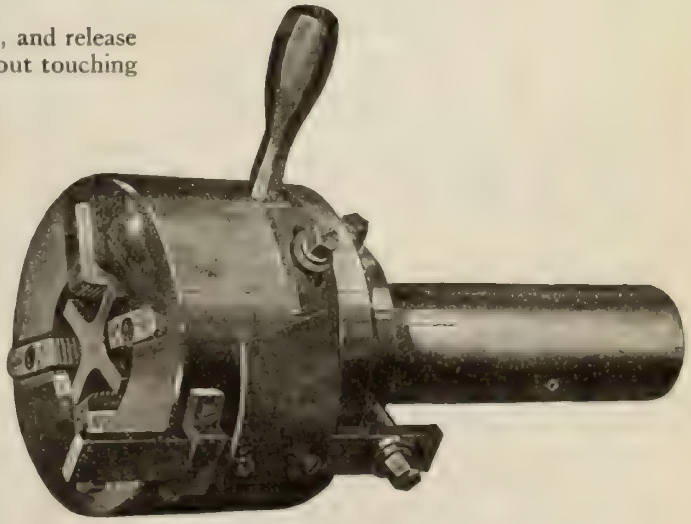
Geometric Taper Threading Die Heads are adapted to Screw Machines and Turret Lathes. When not cutting taper threads, the Head can be removed, leaving the machine free for other work.



Made to order, specially suited to requirements of machine and work.

Employed very generally at present on fuse work.

—Consult us about your taper threads—



A Geometric Taper Threading Die Head.

The Geometric Tool Company, New Haven, Conn., U.S.A.

Canadian Agents:

Williams & Wilson Ltd., Montreal. **The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.**

Winnipeg, Man.—The Western Canada Marble & Tile Co. has purchased a site at a cost of $100,000, and will build a finishing plant, 52 x 175 ft. W. B. Purtell is president.

Electrical

Pembroke, Ont.—The Pembroke Electric Light Co., will begin work in the near future on the erection of a substation.

Guelph, Ont.—The Light & Heat Commission will instal a 750-horse-power transformer in the Huskisson Street plant here.

Dundas, Ont.—An explosion followed by a fire did considerable damage to the Hydro transforming station here on July 30.

Municipal

Hamilton, Ont.—The city council propose building an extension to the Beach pumping station.

Lyall, Man.—It is proposed to instal an electric light and power plant at a cost of $8,000.

Vancouver, B.C.—The City Council will call new tenders for 6 in., 8 in. and 12 in. steel pipe.

Ridgetown, Ont.—The Town Council will spend $10,000 for additions to its waterworks plant and system. D. Cochrane is clerk.

Winnipeg, Man.—A new motor will be purchased for driving the 5,000,000-gallon pump at the McPhillips Street pumping station. W. P. Brereton is city engineer.

Chatham, Ont.—The Chatham Electric Light plant was destroyed by fire on July 22, all the machinery being badly damaged. The loss is estimated at $50,000 with $11,000 insurance.

Petrolea, Ont.—At a special meeting the town council adopted a report recommending the taking over of the natural gas distributing plant by the town as a public utility.

Toronto, Ont.—Fire Chief Smith has reported to the Board of Control in favor of purchasing six pieces of apparatus for the department from the La France Co. at an approximate cost of $50,000. The Canadian Seagrave Co. of Walkerville, also tendered. No award has been made yet.

Windsor, Ont.—City Engineer Edward Brian, of Windsor, has been chosen chairman of the Board of Engineers, which will prepare plans for a joint water and sewage system for Windsor, Walkerville, Ford City, Sandwich, Ojibway and Sandwich West. Leonard Rice, assistant engineer of Ojibway, was elected secretary. Complete plans, with the cost, will be placed before Essex Border Utilities Commission in time for the ratepayers of each municipality to pass on the proect at the January elections. Lake St. Clair may be the source of the new water supply, it is said, while a trunk sewer will be laid along the river front to a point near Amherstburg, where sewage will be treated before being sent to the river.

New Incorporations

The Snyder Desk & Table Co. has been incorporated at Ottawa, with a capital of $75,000, to manufacture furniture at Waterloo, Ont. Incorporators: H. M. Snyder, A. H. Snyder, and C. H. Snyder, all of Waterloo, Ont.

H. Kutschke & Son has been incorporated at Toronto, with a capital of $40,000, to manufacture wood products at Pembroke, Ont. Incorporators are: H. A. Kutschke, G. C. F. Kutschke and C. F. Kutschke, all of Pembroke, Ont.

The Chicago Construction Co. has been incorporated at Ottawa, with a capital of $40,000, to carry on the business of general contractors, with head office at Windsor, Ont. Incorporators: Morris Harris, F. T. Ranney and David Oppenheim, all of Detroit, Mich.

The Quebec Shipbuilding & Repair Co. has been incorporated at Ottawa, with a capital of $40,000, to build and repair ships of every description. Incorporators: W. R. L. Shanks, F. G. Bush and G. R. Drennan, all of Montreal, where the head office will be located.

The Dominion Steel Products Co. has been incorporated at Ottawa, with a capital of $500,000, to manufacture all kinds of machinery, tools, munitions, guns, etc., at Brantford, Ont. The incorporators are: W. S. Brewster, G. D. Heyd and R. T. McGraw, all of Brantford, Ont.

Tenders

Matheson, Ont.—Tenders will be received until August 8 for the construction of a waterworks system. Particulars may be obtained from McAuslan & Anderson, North Bay, Ont.

Drummondville, Que. — Tenders will be received August 15 for the construction of mechanical gravity filters, with a capacity of 500,000 U.S. gallons per day, also supplementary tenders for plant without machinery. Consulting engineers, M. M. Ouimet & Lesage, Montreal.

Seagrave, Ont. — Tenders will be received until August 8 for the construction of a 50-ft. bridge across the Nonquon River, near here. Full particulars may be obtained from the engineers, Bowman & Connor, 31 Queen street West, Toronto, or the county clerks at Lindsay and Whitby, Ont.

Lethbridge, Alta.—Tenders will be received up to August 5 for the complete installation of a filtration system, capacity three million Imperial gallons per twenty-four hours. Plan showing location of buildings and elevations can be had by making application to the Public Works Department. A. M. Grace, Commissioner of Public Works.

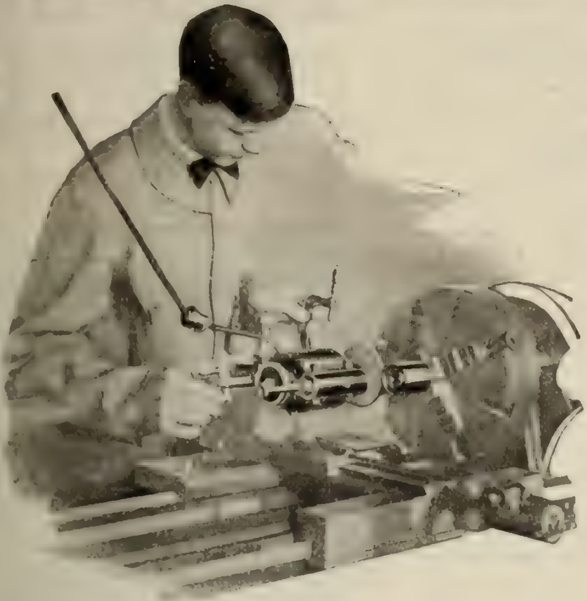
Winnipeg, Man.—Tenders will be received until August 21 for the various works required in the completion of the New Parliament Buildings, and not included in the general contract. The works include structural steel, heating and ventilation, electrical conduit and wiring. Particulars may be obtained from S. C. Oxton, Deputy Minister of Public Works, Winnipeg.

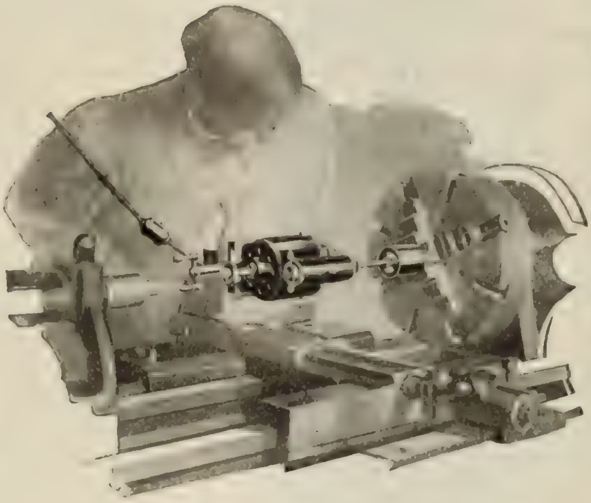
Ottawa, Ont.—Tenders addressed to J. W. Pugsley, secretary, Department of Railways and Canals, Ottawa, Ont., will be received up to August 7 for the construction and erection of passenger station at Halifax, N.S. Plans, specifications and blank form of contract may be seen at the offices of the following: Chief Engineer, Department of Railways and Canals, Ottawa, Ont.; Chief Engineer, Canadian Government Railways, Moncton, N.B. Superintending Engineer, Halifax Ocean Terminals, Halifax, N.S.; Ross & Macdonald, architects, Montreal and Toronto. Contractors who wish to obtain plans and specifications temporarily for their own use, may obtain same from Ross & Macdonald, Montreal, on depositing with them a certified bank cheque for $100, which will be refunded on the return of the plans and specifications to them.

Assiniboia, Sask.—Tenders will be received up to August 8, for the supply and delivery of the following machinery and materials: (A)—For the supply, delivery and erection of an 150 h.p. internal combustion engine; (B)—For the supply and delivery and erection of generator, exciter, switch board, and other apparatus; (C)—For the supply, relivery and erection of pumps, motors, piping and air compressor; (D)—For the supply and delivery of two pneumatic storage tanks; (E)—For the supply and delivery of one oil storage tank; (F)—For the supply and delivery of poles, wire and line material; (G)—For the supply and delivery of approximately 17,500 feet of 4 in., 6 in. and 8 in.

Aikenhead's DUMORE GRINDER

Correct Surface Speed





This picture speaks for itself and illustrates very forcibly the usefulness of the DUMORE Grinder.

Internal grinding. Another difficult job made easy by the use of the DUMORE. The above picture illustrates how the DUMORE Grinder simplifies difficult work. Think of the time of high-priced mechanics the DUMORE Grinder will save in your shop.

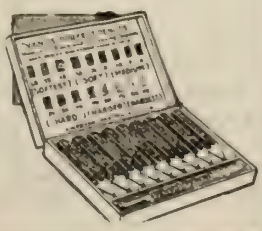
Aikenhead Hardware Limited
TORONTO 17, 19, 21 TEMPERANCE STREET CANADA

for technical men especially

VENUS 10¢ PENCIL

NO group of men demands more of a pencil than does the engineering profession. For very fine lines a very hard pencil is wanted; for blacking in, the very softest - and between these two extremes there are many gradations for which a special hardness is desirable. That is why **VENUS PENCILS** are made in 17 degrees from 6B softest to 9H hardest. These, with the hard and medium copying, will do whatever you want a pencil to do, and will do it perfectly.

FREE To technical users writing on their business letterheads a box of Venus drawing and copying pencils and a Venus Eraser will be sent *free*.



Write to-day for yours

American Lead Pencil Co.
238 Fifth Avenue, New York
and Clapton, London, England

James McKay Company
PITTSBURGH, PENN., U.S.A.

Manufacturers of

SHELL FORGINGS

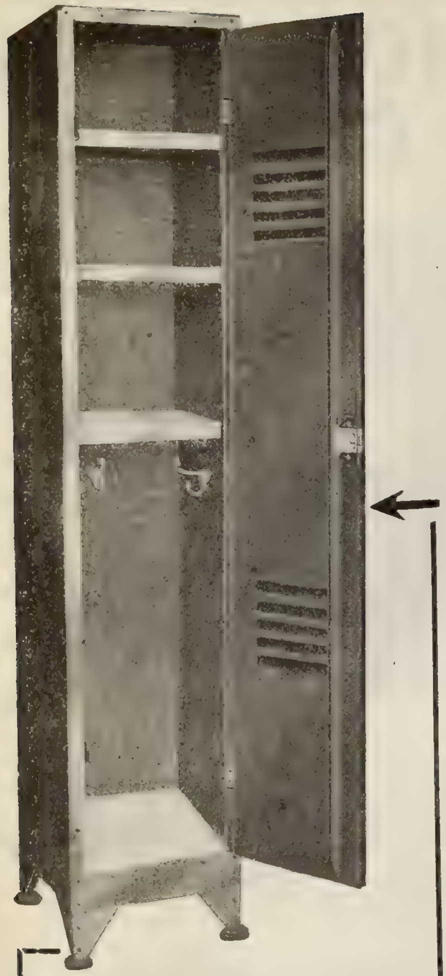
We have the Steel, Equipment and Experience and can execute orders for

SHELL SOCKETS
ADAPTER PLATES
BASE PLATES

for any size of shells.

Can make shipment of Nose Sockets, and Base Plates for British 6-in. H.E. Mark XVI soon as necessary inspections are authorized and executed.

Address Our Representative:
JOHN A. BUCHANAN
King Edward Hotel, Toronto



An Ideal Locker for Clothes and Personal Tools

This combination Tool and Clothes Locker will be very useful to the mechanic because it provides ample space for clothes and a safe place for his tools.

Built for life-time service. Supplied in unit or group construction.

We also manufacture **STEEL SHELVING FOR ALL PURPOSES.** Drop a line for full details.

CANADA WIRE & IRON GOODS CO.
HAMILTON · ONTARIO
Eastern Representative: H. E. O. Bull
184 Mance St. Montreal, P. Q.

HAVE YOU
read pages 88 and 89?
Turn to them now
and see for yourself
whether or not they
are of interest.

Canadian Machinery
Classified Advertising Section

steel pipe, or cast-iron pipe, and specials; (H)—For the supply and delivery of 20 hydrants, 29 gate valves and boxes; (J)—For the erection of power station; (K)—For the supply, delivery and installation of heating plant. Complete sets of plants and specifications may be seen at the office of the consulting engineers, Murphy & Underwood, Saskaoon, Assiniboia, Sask.

Personal

Thos. Geoffrey Leith, manager of the Canadian head office of the British Aluminum Co., has joined the Imperial Air Service.

E. R. Wood, of Toronto, was elected president of the Buffalo, Lockport and Rochester Railway Co., at a special meeting of the Board of Directors of that concern, recently held in Syracuse, N.Y.

Sir W. D. Reid is at the head of the proposed $15,000,000 Cyanamid Corporation which is being organized to establish a plant for making a patent fertilizer.

Frank W. Baillie, president of the Canadian Cartridge, Co., Hamilton, Ont., has returned to the Government $750.000, the firm's profits on war orders to date .The money returned is to be used for patriotic purposes.

John H. Allen, president of the John F. Allen Co., New York, makers of the original "Allen" riveting machines, died recently at Kattskill Bay, N.Y. The deceased, who was in his 58th year, had been president of the company for the last 15 years, succeeding his father, who founded the business 45 years ago.

John Conway, for over forty years lock-master at No. 2 Lock of the Lachine Canal and a well-known figure in the port of Montreal, died recently, in his 80th year. For the greater part of his long life he was to be found at his post at No. 2 Lock and as a result he was known to, and a friend of, all the crews of the boats passing through the canal.

Trade Gossip

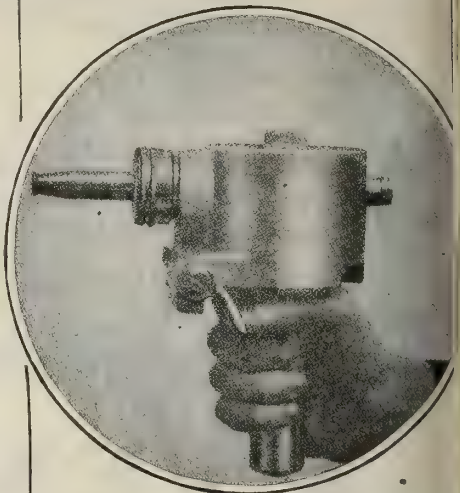
Brockville, Ont.—The Canadian Briscoe Motor Co., are establishing a plant here for making drop forgings and other automobile parts.

Two Russian Ports.—In 1915, more than half of Russia's exports, and nearly half of her imports, passed through the port of Archangel, on the White Sea. Imports at Vladivostok rose from 19 million rubles in 1913 to 301 millions in 1915.

MORTON MANUFACTURING CO
PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R.R SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE AND WORKS: MUSKEGON HEIGHTS.USA

We are qualified Tool, Die, Jig, Gauge and Fixture Makers.
WRITE US.
Windsor Machine & Tool Works.
WINDSOR, ONT.

The Metals Coating Co. of Canada, Ltd.
Versailles Building, 90 James St.
MONTREAL, CANADA



A machine gun making its ammunition from Reeled Wire, and coating objects by bombarding with minute plastic particles of metal. The **Schoop method** of Metallic deposition, any object and any size coated with a positive adhesive and homogeneous coating with any metal for any desired thickness.

Solves one of the greatest problems heretofore confronting the structural engineer, because it produces on iron or steel a permanent coating not susceptible to corrosion.

Carbons can be coated with copper, etc.

For full information write for booklet "D".

Stampings and Metal Specialties

We have the plant and equipment for turning out stampings of the highest quality in brass, copper, aluminum, tin and steel, and are prepared to undertake the manufacture of metal specialties of any description.

PUNCHES, DIES, TOOLS.

COLEMAN FARE BOX COMPANY, LTD.
70 Bond St., Toronto

"HAWK"D CHROME VANADIUM STEEL

Will Give You Exceptional

Shell Forging Production

WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

There are many cases where each punch has turned out over 2,000 shells.

It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

Hawkridge Brothers Company
303 Congress St., BOSTON, MASS.
U.S.A.

Sarnia.—The Mueller Mfg. Co., Sarnia, Ont., has received a contract from a big munition firm in the States to supply them with brass forgings for time fuses.

Ottawa, Ont.—The International Nickel Co. has authorized the incorporation of a Canadian subsidiary company, designed to construct and operate a plant for refining nickel in Canada.

Montreal, Que.—Shareholders of the Canada Steamship Lines, at a special meeting held here on July 27, approved the regulation recently passed by the Board of Directors authorizing the purchase of the St. Lawrence & Chicago Steam Navigation Co.

Marine Insurance Revenue.—Twenty-three British Insurance companies in 1915 received $63,500,000 in marine insurance premiums, and paid claims amounting to $36,300,000, the loss ratio thus being about 57 per cent., against a ratio the previous year of 61½ per cent.

Great Copper Find.—It is reported that a sensational find of copper running $100 to the ton, has been made northwest of The Pas in the Beaver Lake district. The Hayden-Stone company of New York, has taken an option on it at $3,500,000. Ten million tons have been blocked out by diamond drill tests. A great mining industry in expected in that region.

Ottawa, Ont.—It is reported here that the International Nickel Refining Co., of New Jersey has practically abandoned the idea of establishing its Canadian refining plant on the Atlantic seaboard or elsewhere in the Maritime Provinces, after making a thorough canvass of the eastern situation, and that the plant will be erected almost immediately, probably somewhere in Ontario, close to the fields of ore production.

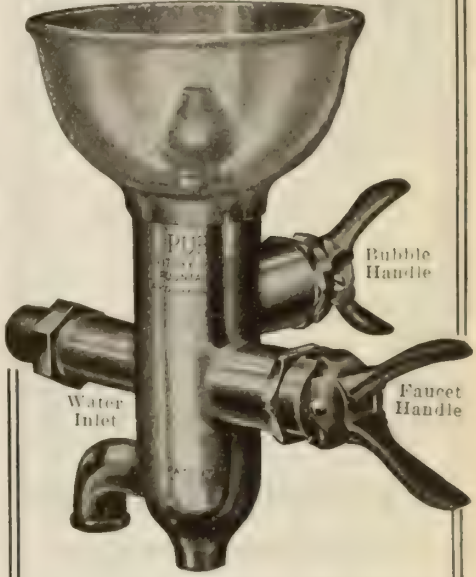
Welland, Ont.—Welland was recently visited by four representatives of the International Nickel Co., who are seeking a location for a Canadian plant to refine nickel ore. The visitors were Frank Ludlan, general purchasing agent; W. L. Wotherspoon, consulting engineer, R. C. Stanley, general superintendent, and C. Bradigan, chief engineer They require fifty acres of land and 500 electrical horse-power. Hamilton was also visited.

Canadian Ore Shipments.—The Steel Co. of Canada, Hamilton, Ont., will have shipped to Sarnia, One., during the season of navigation upwards of 500,000 tons of iron ore from the ranges near Superior and Duluth. This is the greatest tonnage ever ordered to be shipped via Sarnia and will consist of nearly a hundred ship loads. The ore

PURO
(MADE IN CANADA)

Saves Dollars

Why let that old-fashioned faucet go on, year after year wasting water MONEY? Why more drinking cups and glasses each to become unsanitary, lost, broken or carried away? Puro Sanitary Drinking Fountain stops all this needless waste. Puro saves over [illegible] on the water bill alone. Puro saves you all that money you spend for cups. YET Puro is always ready with a clear, cool drink with dollars in the bank.



Puro Pays for Itself

You don't have to wait years to get back the small investment you have tied up in Puro equipment—
You start cashing in at once not only on your water bill saving but on the increased efficiency of your workers as well.
Men like PURO—it's clean. No horde of deadly germs lurking in its sparkling fountain.
Write us, tell how many men, how many departments, and we'll tell you how much the cost will be to

"PURO-FY"
YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

"Barnes-made" SPRINGS

are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

Write for booklet No. 7-T.

Established 1857
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U.S.A.

Man'f'rs of "Barnes-made" Products
Springs Screw Machine Products Cold Rolled Steel and Wire

METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

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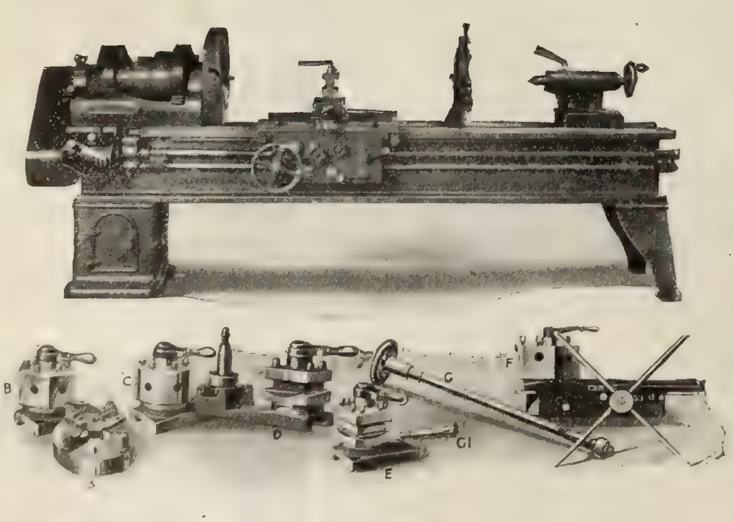
THE NAME THE DESCRIPTION



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Grand Central Terminal Building NEW YORK, N.Y., U.S.A.

Prices lower than any other lathe of same specifications because of volume of manufacture and fixed low percentage of profit over actual cost of production.

will be loaded in cars at Point Edward had hauled to Hamilton.

Trade Committee Successful.—Word has been received in Ottawa that the commission of Canadian business men which, accompanied by Sir George Foster, has been touring Great Britain and France investigating trade conditions, has met with every success. It will not be through, however, with its work before the end of August.

Brantford, Ont.—Officials of the Dominion Steel Products' Co. met officials of the Manufacturers Committee of the City Council last Friday with a view to locating a large plant here. The company, for which a charter has been secured, with capital of $500,000, has been incorporated for the primary purpose of manufacturing munitions. After the war another line of industry is projected.

Ross Rifle Changes.—The Ross Rifle Co. is negotiating with the Government for an amended contract looking to the manufacture of the Enfield rifle now that the Ross type of arm has been abandoned as the Canadian service rifle. Sir Charles Ross and Wallace Nesbitt, K.C., counsel for the company, have been in Ottawa in connection with the matter. The plant at Quebec will have to undergo extensive reinstallation to adapt it to making the new rifle, but this can be done. An arrangement has yet to be concluded finally, but the company plans to go ahead and manufacture the arm which replaces the one abandoned by the British authorities as unsuitable to service conditions. What to do with the thousands of Ross rifles which have been discarded is still an open question.

Nickel Refining Company Formed.—The Canadian branch of the International Nickel Co., which is to undertake the manufacture of nickel in Canada, has been incorporated at Ottawa by letters patented under the name of the International Nickel Co., of Canada. The new company is empowered to produce, refine, smelt, etc., nickel, copper, iron, steel, cobalt and other minerals, and to occupy and develop lands and concessions relating to or containing nickel, copper, iron, etc. The incorporators of the new company are Britton Osler, K. C., Toronto; W. A. J. Case, and the usual number of office employees. A meeting of representatives of the Ontario Government will be held in Ottawa very shortly, when the plans of the company and the question of the selection of a site will be taken up. The new plant will probably be built in units, and will provide a production of 12,000,000 to 15,000,000 pounds a year at the beginning.

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YOUR
MONEY

FOR THE

DOMINION WAR LOAN

TO BE ISSUED IN SEPTEMBER.

By purchasing a bond you will help to WIN THE WAR and obtain for yourself an investment of the highest class yielding a most attractive rate of interest.

DEPARTMENT OF FINANCE
OTTAWA.

KEYSEATER
for Milling Internal Keyseats

This tool is an attachment for the drilling machine, and is regularly made with straight shank for gripping in the drill chuck; taper shank can be had if desired. The tool is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. To complete a keyseat it is only required to pass the tool through the hole just once. Innumerable inexpensive eccentric bushings are supplied whereby the tool may be bushed to meet any diameter above its own.

Write for Catalog C for full detail.

NATIONAL MACHINE TOOL CO.
2270-2272 Spring Grove Avenue,
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Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria.

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Engineers, Manufacturers and Erectors of Steel Structures such as

Bridges, Buildings, Tanks, Penstocks, Smoke Flues, Stacks, Coal Bins, Refuse Burners, Air Receivers and other **Miscellaneous Steel Plate and Structural Steel Work.**

Write us for prices.

Steel Shell Forgings or Billets of any size or weight will move any distance or about curves upon our specially constructed Gravity Carriers and Incline or Horizontal power devices. No labor required.

Canadian Mathews Gravity Carrier Co., Toronto

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Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Five cents each insertion when box number is required. Each figure counts as one word. Display rates on application.

FOR SALE

HORIZONTAL GAS ENGINE 25 H.P. IN SERvice at present time, $375.00 cash. Write Penberthy Injector Co., Limited, Windsor, Ontario. (5)

FOR SALE OR RENT — MACHINE SHOP with railroad siding. Box 208, Canadian Machinery. (4)

A SNAP IN TURRET LATHES SLIGHTLY used on shell work. Fourteen splendid machines at bargain prices. Do you need these machines? If so, drop a line to Box 953, Woodstock, Ont.

LATHE FOR SALE—ONE 39 x 17-FOOT Pond engine lathe, suitable for heavy shells; in good condition; $1,500.00. A. B. Ormsby Company, Limited, Toronto. (2)

A BARGAIN FOR QUICK SALE—30 H.P. 10 x 14 engine; guaranteed in first-class working condition; drive belt included. Hamilton Whip Co., Hamilton.

FOR SALE—SCREW-CUTTING LATHE, 14 FT. bed, 16-inch Imperial chuck, 24-inch Swing Countershaft. Apply Thos. H. Ruth, 314 Pearl Ave., Peterboro. (1)

FOR SALE—ONE DAVIS 4½" CUTTING-OFF machine; practically new; been used less than three months; very reasonable. Canadian Linderman Co., Ltd., Woodstock, Ont. (tf)

12-INCH HEAVY DUTY (CANADIAN CORporation) moulder; just used six months; also band saw, shaper, buzz planer, used two years. Apply W. A. Rumney, 36 Fuller Ave., Toronto. (28)

20,000 LBS. ⅝ GALVANIZED STEEL GUY wire. We can offer this wire at very attractive prices. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (25)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make. used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

DROP PRESS FOR SALE—NO. 9 MINER & Peck drop press; anvil 2,000 lbs.; base 30,000 lbs.; 36" between uprights; 40" x 35" between poppets; 34" x 29" top of anvil; guaranteed as good as new. Can be shown in operation to any genuine prospective buyer. The Metallic Roofing Co., Limited, Toronto. (4)

FOR SALE — THREE HOLDEN-MORGAN threading millers; one arranged for nose threading; two for base threading. One base threader can be changed to 4.5, as it was reduced from this size. Also two Bertram wavers and groovers, and one Martin, all used for 3.3 shells. Canadian Linderman Co., Ltd., Woodstock, Ont. (27)

FOR SALE—5 CARLOADS MACHINERY steel, consisting of rounds from ¼" to 5", squares, flats, angles and channels. Also tire sections. Slightly rusted through being outside. Will move this entire stock at great sacrifice in price to someone who can take delivery of entire quantity at once. This is an exceptional offer. Box 210, Canadian Machinery. (1)

FOR SALE

Fox Monitor Lathe, 18" x 5' 6", 9-hole turret, cross feed, hollow spindle, 5-step cone; good as new.
Plating dynamo, 6 volts, 250 amp.; used only a short time.

PENDRITH MACHINERY COMPANY
970 Queen St. West, Toronto

FOR SALE—NEW HAVEN, 60-INCH SWING Standard Engine Lathe—triple geared. 15 ft. bed, hollow spindle, cuts threads 1 to 12. Compound rest, countershaft, steady rest, wrenches, etc. This tool is in excellent shape and owner offers special bargain. Particulars from Winnipeg Machinery Exchange, Sutherland and Gladstone Streets, Winnipeg, Man. (24)

FOR SALE — AT ALEXANDRIA, ONT. — Machine shop in two buildings; 10,500 sq. feet concrete floor space; equipped with lathes, shaper, plainer, miller and variety of other iron-working machines and tools; good foundry in connection. Inventory of buildings, machinery and stock, $64,272. Practically new plant, in good condition. F. T. Costello, Assignee, Schell F. & M. Co., Ltd., Alexandria, Ont.

FOR SALE—McDOUGALL ENGINE LATHE 20" swing, 10' bed, complete with 20" 4-jaw chuck, countershaft, steady rest, face plate, gears, etc. This tool, we understand, has never been used; has been lying crated for about 5 years. We are having it cleaned and offer a decided bargain for quick sale. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg. (3)

SITUATIONS WANTED

MECHANICAL AND ELECTRICAL ENgineer, 16 years' experience, plant layout and maintenance; expert draftsman; wishes change. Box 207, Canadian Machinery. (26)

POSITION WANTED AS SALESMAN, agent, or traveler, for mechanical goods, or machinery, by Chief Engineer, (Marine), thoroughly reliable, of good education and appearance. Box 209. Canadian Machinery. (3)

MECHANICAL ENGINEER OPEN FOR POSItion of shop superintendent. Wide experience in mining machinery and electric motors, hot water boilers and radiation. Experienced in tool-making, designer, and a keen cost observer. Has had seven years' foundry experience, familiar with moulding machines and a post-graduate of McLain's system of mixing iron. Familiar with shell work. Can give the best of references. Box 211 Canadian Machinery (4)

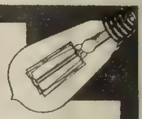
REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

WANTED

WANTED—ELECTRIC TRAVELLING GANTry crane, span about 57 ft., clearance 50 ft., overhanging at one end; load 15 tons. State full particulars and price. Thor Iron Works, Limited, Toronto, Ont. (27)

WANTED



Burned out Tungsten Lamps, late type, drawn wire, 25, 40, 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN LAMP FACTORY
ST. CATHARINES, ONTARIO

FOR SALE

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Two 24-inch standard Gisholt Turret Lathes, completely tooled for boring 4.5" H.E. Shells.

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Box 212
Canadian Machinery
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A SNAP

For Sale—Boiler Repair and Sheet Iron Works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars.

Box 213
Canadian Machinery

For Sale Cheap

- 1—Box Girder Type Overhead Hand Power Crane, 48′ 6″ span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.
- 1—12″ Single "I" Beam Overhead Hand Power Crane, 30′ 10″ span, 3 tons capacity; complete, less the Hoist.
- 1—10″ Single "I" Beam Overhead Hand Power Crane, 23′ 0″ span, 2 tons capacity; complete, less the Hoist.
- 1—Brantford (Gas) Bake Oven and 4 Racks.
- 2—Baker Type Vises.
- 1—Linderman 2-Spindle Boring Machine.
- 1—24″ Drill, Bertram Company.
- 1—26″ Drill, London Machine Tool Company.
- 1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

M. BEATTY & SONS,
Limited
Welland, Ont.

FOR SALE

Two 96-horse-power Gas Engines.

Complete with producers.

Made by the largest English manufacturers.

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London, Ontario.

H. W. Petrie of Montreal, Ltd.

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Machine Tools in Stock. Immediate Shipment.

Number **DRILLS**

2823 1—16″ Avey Ball Bearing Sensitive.
2929 1—16″ Sipp Ball-Bearing Sensitive; new.
2935 1—14″ Foote-Burt 4 spindle Sensitive.
165 1—20″ Mechanics' Upright; new.
2923 1—20″ Rego Upright, B.G., P.F.
2726 1—3′ Dreses Plain Radial, Gear Box; new.

ENGINE LATHES.

2897 1—13″ x 6′ South Bend; new.
2899 1—13″ x 6′ South Bend; new.
2931 1—16″ x 7′ Oliver D.B.G., Q.C.G., Oil Pump and Pan; new.
2932 1—16″ x 7′ Oliver D.B.G., Q.C.G., Oil Pump and Pan; new.
2877 1—17″ x 8′ Greaves Klusman.
2878 1—18″ x 8′ Lodge & Davis, Taper Attachment.
2879 1—18″ x 8′ Mueller.
2957 1—18″ x 8′ Mueller, D.B.G., Q.C.G.; new.
2863 1—18″ x 8′ South Bend; new.
2865 1—18″ x 8′ South Bend; new.
2866 1—18″ x 8′ South Bend; new.
2867 1—18″ x 8′ South Bend; new.
2891 1—20″ x 10′ Flather.
2880 1—21″ x 5′ Reed.
2904 1—22″ x 10′ Milwaukee D.B.G., G.F.; new.
2905 1—22″ x 10′ Milwaukee, D.B.G., G.F.; new.
2794 1—22″ x 10′ Blaisdell.
2906 1—24″ x 12′ Milwaukee, D.B.G., G.F.; new.
2907 1—24″ x 12′ Milwaukee, D.B.G., G.F.; new.
2686 1—24″ x 16′ Putman
2725 1—24″ x 16′ Putman
2789 1—36″ x 10′ Fay & Scott.

TURRET LATHES.

2820 1—30″ Vilter with Heavy Power Feed Bed Turret.

Write or wire for full information on any of the above.

New Machines at Second-Hand Prices

1 only Foster, No. 1 Hand Screw Machine, with plain head, automatic chuck, wire feed, capacity 9/16, ...$500.00

1 only Hendy Type 18″ stop Friction shaper, with Countershaft, with swivel vise, SECOND-HAND $300.00

1 only Puttnam Speed Lathe, 14″ swing, 6-foot bed, 5-step cone, countershaft, SECOND-HAND (as good as new) $150.00

1 only Fox Monitor Lathe, No. 4, with Chaser attachment and standard equipment, SECOND-HAND $150.00

1 only 10 H.P. BRAND NEW Lincoln Motor, with Starting box, Pulley, etc., complete 25-cycle, 3-phase, 550 volts, 1,500 R.P.M. $250.00

1 only 1″ Bolt Cutter, BRAND NEW, with lead screw, countershaft, no dies, National make.. ....$450.00

Ontario Metal Products Co., Ltd.
119 Adelaide St. W., Toronto

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3½″ Gridley Automatic
10″ x 16′ Conradson, heavy duty
40″ x 12′ New Haven
24″ x 5′ Davis
24″ x 10′ LeBlonde
24″ x 8′ Lodge & Shipley
21″ x 8′ Gisholt
25″ x 10′ American (2)
20″ x 7′ Fay & Scott
17″ x 6′ Garvin
16″ x 6′ Pratt & Whitney
16″ x 5½′ Warner & Swasey
16″ x 5′ Windsor, wire feed
15″ x 5½′ fox, American
2″ x 24″ Jones & Lamson flat turret
No. 22½ Garvin, wire feed
8″ x 31″ Brown & Sharpe
6″ x 28″ Brown & Sharpe

Engine Lathes

36″ x 15′ Putnam
32″ x 22′ London D.B G.
30″ x 10½′ Pond
26″ x 11′ Hamilton, D.B.G. (4)
26″ x 11′ Gleason, D B.G. (2)
24″ x 10′ Peerless
24″ x 10′ Lodge & Shipley, patent head
22″ x 8′ Bertram, D.B.G.
21″ x 12′ Peerless
21″ x 8′ Back geared single purpose (12)
20″ x 12′ Lodge & Shipley, patent head (2
20″ x 8′ Hercules, heavy duty
20″ x 8′ Bullard
20″ x 8′ Ames
19″ x 8′ LeBlonde
18″ x 8′ New Haven
18″ x 8′ Lodge & Davis
18″ x 6′ New Haven
17″ x 8′ Blaisdell
16″ x 8′ Back-geared single purpose (16
16″ x 6′ Porter
16″ x 24″ x 10′ South Bend Gap
14″ x 6′ Hendey, taper attachment

Upright Drills

D4 Colburn, heavy duty
24″ Bickford, shaft-driven (2)
24″ Foote-Burt
20″ Canedy-Otto, back geared (2)
20″ Bertram, power feed
16″ Avey, high speed, ball bearing, sensitiv
16″ Avey, high speed, 4-spindle, sensitive
14″ Excelsior
14″ Garvin, 4 spindle
10″ Baines, friction (2)
60″ Bertram Semi universal Radial
48″ Gang, plain radial, tapping attachmen
36″ New Century, plain radial
32″ Fosdick Plain Radial
32″ Canedy-Otto wall radial

Iron Planers

30″ x 30″ x 17′ Wheeler
25″ x 25″ x 12′ Lodge & Davis
24″ x 24″ x 6½′ Dundas
24″ x 24″ x 6′ American
24″ x 24″ x 6′ Bertram
20″ x 20″ x 5′ Bertram

Milling Machines

No. 5 Becker-Brainard, plain
No. 25 Becker, plain
No. 12 Brown & Sharpe plain
No. 2A Owen Universal
No. 1½ Brown & Sharpe Universal
Enneking & Trautman Universal
24″ Bertram, plain
Lees Bradner Thread Miller
Hobden-Morgan Thread Miller

Presses

No 12 Geared Rhodes, roller feed
No 4½ Bliss
No 5 Waterbury
No. 150 Brown Boggs

Miscellaneous

No. 1 Racine Hack Saws (10)
Lo Swing Lathes (2)
No. 14 Besly Grinder
32″ x 9′ Special Facing and Tapping Machine
40″ Binsse Horizontal Boring Mill
No. 60 Heald Cylinder Grinder
No. 2 Garvin Automatic Tapping Machine
No. 1 Garvin Automatic tapping attachment
¼″ Shuster Riveters (3)
1″ Rock River Punch and Shear
9½′ Bertram Bending Rolls
4½″ Davis Cutting-off Machine

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.
Front St. W., - - Toronto, Ont.

Machine Tools in Stock

BORING MILLS.

62" Baush Vertical, two heads.
60" Bement-Miles Vertical, two heads.
60" Bement Vertical, one head.
50" Bement-Miles Car Wheel Mill.
36" Bridgeport Vertical, two heads.
30" Baush Vertical, turret head.
Barrett Horizontal, 5" bar.
Binsse Horizontal, 3" bar.
Beaman & Smith 2-Spindle.
Underwood New Cylinder Mill, 3⅝" bar.

MILLING MACHINES.

No. 2 Cincinnati Universal.
Ingersoll Slab, adjustable rail, platen 3 ft. x 12 ft., three heads.
No. 3 Becker-Brainard New Model Plain.
No. 1-B Milwaukee Late Type Plain, Universal dividing head, chuck, vise.
76" Newton Heavy Duty Vertical, 48" circular table.
Newton Slab, platen 18" wide, 10 ft. long.
No. 1 Cincinnati Plain.
No. 2 Kempsmith Plain.
No. 9 Kempsmith Plain.
No. 12 Brown & Sharpe Manufacturing.
No. 1 Brainard Plain.
Detrick & Harvey Milling, Drilling and Boring.
Garvin Plain, No. 4½, No. 4, No. 3.
Newton Plain, table 7¼" x 36".

RADIAL DRILLS.

6' Pond Plain.
5' Bickford Semi-Universal.
3' Bickford Plain.
3' Fosdick Plain, tapping attachment.

KEYSEATERS.

Baker Bros., 24" stroke.
Baker Bros. Colburn, 20" stroke.
No. 2 Mitts & Merrill, 13" stroke.
No. 0 Mitts & Merrill, 7" stroke.
No. 2 Davis, 4" stroke (2).

SHAPERS.

30" Morton Draw Cut Shaper.
24" Smith & Mills Crank, b.g.
24" Gould & Eberhardt Crank, b.g.
16" Ohio Crank, b.g. (new).
15" Gould & Eberhardt Crank, b.g.
14" Sellers, traveling head.

PLANERS.

62" x 60" x 15' Sellers, four heads.
60" x 30" x 13' Pond, two heads.
55" x 46" x 14' Lincoln Stone Planer, four heads.
45" x 44" x 12' Niles, two heads.
44" x 44" x 16' Niles, one head.
42" x 39" x 12' 6" Sellers, two heads.
42" x 42" x 10' New Haven, one head.
30" x 30" x 16' Harrington, one head.
28" x 28" x 7' 6" Putnam, one head.
26" x 26" x 8' Gould & Eberhardt, one head.
24" x 24" x 6' Fitchburg, one head.
24" x 24" x 6' Powell, one head.
24" x 24" x 6' Wood-Light, one head.
22" x 22" x 5' Whitcomb, one head.
18" x 18" x 36' Wheeler, one head.

PRESSES.

DG-56 Ferracute, 4" stroke.
No. 1 Bliss, 8" stroke.
No. 4 Bliss Geared Double Crank, 3" stroke.
No. 2 Bliss Double Crank, 2" stroke.
Farrell Press, 2" stroke.
PG-6 Ferracute, 1½" stroke.
No. 4 Farrell, 1½" stroke.
Bliss Pillar Press, 1½" stroke.
Fowler, 1¼" stroke.
No. 3 Manville Stamping, 1" stroke.
350-ton Hoe Hydraulic.
200-ton Robertson Hydraulic.
100-ton Sellers Hydraulic Wheel Press.

PUNCHES AND SHEARS.

Sellers Double Angle Shear, capacity 8" x 8" x 1".
8' Lennox Rotary Splitting Shear, split 16' plates.
Lennox Rotary Splitting Shear, split 12' plates.
Cleveland D. E. Punch and Shear, 26" throats.
Bement Plate Iron Shear, 26" throat.
Bement Punch, 31" gap.
Cockburn & Barrow Punch, capacity 1" in 1".
Kling Bros. Punch, 24" throat.
Reed Cleveland Punch, 22" throat.
Bass D. E. Punch and Shear, 20" throats.
Wilson Kalamazoo D. E. Punch and Shear, throats 6".
Style D Long & Alstatter Shear, capacity 3½" round stock.
No. 10½ Badger State Punch and Shear.

New York Machinery Exchange
50 Church St., NEW YORK CITY

NEW AND USED MACHINERY

Why buy these tools from Commission Houses? We own every tool that we advertise and guarantee each and every one to be as represented. You can secure immediate shipments by buying direct from us and save the middleman's profits.

NEW MACHINES

2—13" swing x 6' bed South Bend Lathes, H.S., C.R., P.C.F.; complete	$ 215
2—11" swing x 5' bed Meyers Lathes, H.S., C.R., P.C.F.	235
2—16" swing x 8' bed South Bend Lathes, H.S., C.R., power cross feed; complete	390
1—14" swing x 6' bed Neat Lathe, D.B.G., C.R., H.S., P.C.F.; complete	535
1—19" swing x 8' bed, Sidney, D.B.G., H.S., C.R.; complete	860
2—21" swing x 8' bed, Sidney, D.B.G., H.S., C.R.; complete	925
1—No. 24 Oesterlin Heavy Plain Miller	1,070
1—20" Ohio Back-geared Shaper, complete	650
1—25" Smith-Mills Back-geared Shaper, complete	900
1—16" American High Duty Shaper, motor drive, 220-440 volt, 60 cycle, 3 phase	850
1—Wilmarth Morman Drill Grinder, style J.B.P.T.	100
No. 6 Standard Universal Cutter-Reamer Grinders	450
2—No. 28 Canedy-Otto Sensitive Drills	25

USED MACHINERY.

1—12" swing x 5½' bed Barnes, H.S., swivel rest, screw cutting, steady rest, turret on shears	200
1—18" swing x 8' bed, Porter Lathe, C.R., P.C.F., C.K.	400
1—30" swing x 16' bed, New Haven, P.R., P.C.F., chuck, 5" belt; complete	450
1—30" swing x 9' bed, New Haven, turret tool post, chuck, taper attachment; complete	460
1—20" swing x 8' bed, Pond, C.R., P.C.F., H.S., chuck	550
2—16" swing x 6' bed, Lodge-Shipley Lathes, 5-step cone, 2" belt, C.R., P.C.F., H.S., Q.C.G., countershaft	500
1—Potter & Johnson Semi-Automatic Turret Lathe, complete with 3" hollow spindle	650
1—14" swing x 6' bed, Lodge-Shipley, Patent Head, Q.C.G., H.S., C.R., chuck, complete; in excellent condition	600
1—34" swing x 22' bed, New Haven Lathe, block to 44", C.R., 34" chuck; complete	800
1—2 x 24 Jones-Lamson, geared head	1,285
1—14" swing x 6' bed, Lodge & Shipley Tool Room Lathe, with pan bed, Q.C.G., taper attachment, releaving attachment; complete	950
12—22" swing x 8' bed, American, Q.C.G., D.B.G., four-sided turret tool post, complete; used three months	1,050
1—66" swing x 16' bed, Pond, C.R., P.C.F., H.S., 4½" hole, 5" belt; complete	2,000
1—No. 2 Kempsmith Plain Millers, perfect condition.	875
1—No. 1 Ohio Plain Miller, complete; perfect condition	900
1—No. 2 Cincinnati Universal Miller, latest type, complete; two months old	1,550
1—36" Fellows Gear Shaper, practically new, serial number 784; complete	1,300
1—24 x 24 x 6 Lathe Morse Planer with Adams Universal Milling Head with Milling Cutter; complete with chuck	600
1—24 x 24 x 6 Gray Planer; excellent condition	675
1—30 x 30 x 16 Bement, extra heavy; perfect condition	750
1—24 x 24 x 8 Cincinnati Planer; good as new; 1 head	1 000
1—20" Canedy-Otto Power Drill, tapping attachment.	105
1—Four-spindle Dwight Slate, 14" Drill	120
1—No. 51 Canedy-Otto Drill with 3½" arm	240
1—36" Semi-Universal Radial, complete; perfect	750
1—No. 68-N Bliss Press, double acting; good as new.	550
1—31-S Bliss Press, back-geared	700
9—No. 52 National Acme, 4-spindle, 1¼-inch hole; used three months	1,800

Prices Quoted are F.O.B. Albany.

Simmons Machine Company, Inc.
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Guaranteed Machinery for Immediate Delivery

TURRET LATHES

12" Windsor, plain head.
16" Lodge & Shipley, plain head.
No. 2 Warner & Swasey, hollow hex.
24" Niles, friction head.
16" Foster, ring turret.
24" Garvin Turret Boring Lathe, back-geared.
28" Gisholt, with taper attachment.

ENGINE LATHES.

14" x 6' Davis, q.c.g.
14" x 6' Fairbanks, c.r. and taper.
14" x 6' Prentice, c.r.
16" x 6' Robbins, c.r
16" x 6' Sebastian, p.r.
16" x 8' Lodge & Shipley, pat. head.
16" x 10' Greaves & Klusman, c.r.
18" x 6' Bradford, c.r.
18" x 8' Lodge & Shipley, pat. head.
18" x 10' Bradford, c.r. and taper.
18" x 12' Barker, c.r.
18" x 12' American, q.c.g.
18" x 12' Greaves & Klusman, c.r.
20" x 10' Flather, c.r.
21" x 12' Bradford, c.r.
21" x 12' New Haven, c.r.
24"-40" x 12' McCabe, two-spindle.
24" x 16' Schumacher & Boye, c.r.
32" x 12' Pond, c.r.
30" x 14' Reed, c.r.
36" x 12' Hamilton, c.r.
34" x 16' Blaisdell, c.r.
36" x 28' American, c.r.
42" x 24' Fifield, c.r.

SCREW MACHINES.

Pratt & Whitney No. 1 friction gear.
1 3 16" Hartford Automatic.
2" Cleveland Automatic.
2¾" Cleveland Automatic.

BORING MILLS.

52" Niles, car wheel.
48" Colburn, two heads.
60" Colburn, vertical, two heads.
51" Bullard, two swivel heads with motor drive and motor.

PLANERS

Morton Portable.
17" x 17" x 12' Whitcomb, crank.
22" x 22" x 6' Gray, one head.
24" x 24" x 4' New Haven, one head.
24" x 24" x 6' Pond, one head.
24" x 24" x 6' Gray, one head.
30" x 30" x 8' Woodward & Powell, one head.
36" x 36" x 10' Powell, one head.
36" x 36" x 12' Powell, two heads.
36" x 36" x 16' Sellers, one head.
39" x 39" x 12' New Haven, one head.
40" 40" x 12' New Haven, one head, one side head.
54" x 54" x 14' Pond, two heads, arranged for motor drive.

MILLING MACHINES.

No. 12 B. & S., plain.
No. 2 Cincinnati, plain.
No. 2 P. & W., Lincoln Type.
No. 23 Fox Miller.
No. 13 P. & W., Lincoln Type.
Garvin No. 1½ Universal
No. 3 LeBlond, plain

GEAR CUTTERS.

24" x 7" Gould & Eberhardt, for spur gears.
24" x 9" Gould & Eberhardt, for spur, bevel and face gears.
36" Walcott.

SHAPERS.

15" Hendey, friction.
16" Niles, back-geared.
18" Barker & Chard, back-geared.

HAMMERS.

100-lb. American, steam post.
100-lb. Pittsburg, single frame, steam.
200-lb. Bliss, drop.
300-lb. Bliss, drop.
800-lb. Morgan, single frame, steam.

PRESSES.

No. 77A Toledo, o.b., straight side.
No. 3 Delivouk & George, o.b., inclinable.
No. 3 Toledo, o.b.
No. 430 McDonald, double crank.
No. 133 Ferracute, double action.
No. 95 Bliss, double crank.
No. 77A Toledo, o.b.

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5' Dreses Full Universal Radial.
3' Economic Plain Radial.
2½' Dreses Radial.
No. 30-C Baush, 12-spindle.

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High-Grade Used Machinery

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1 16" x 8' Greaves & Klusman Quick-Change Gear Lathe, single back geared.
1 18" x 10' Lodge & Shipley Quick-Change Gear Engine Lathe, single pulley drive, variable speed countershaft, plain block rest.
1 18" x 8' Rahn Carpenter, plain screw cutting; rebuilt.
1 18" x 10' Bradford, plain screw cutting.
1 24" x 12' American Quick change, double back geared; nearly new.
10 20" x 10' Milwaukee, double back geared plain screw cutting comp rest; new machines. Write or wire for circular and prices.
1 30" x 14" James, raised to swing 38" plain screw cutting.

SCREW MACHINES

5 1½" Milwaukee Screw Machines complete. Write for circular.
1 1¼" Dreses Geared Friction Head Screw Machine, complete.
1 1½" x 9" Acme Turret Screw Machine, friction geared head, complete: excellent shape.
1 -No. 2 Brown & Sharpe Semi-Automatic Wire Feed Screw Machine; rebuilt.
2 -⅝" Cleveland Automatics.
1 1" Cleveland Automatic.
1—2" x 24" Jones & Lamson Flat Turret Lathe, cone drive, rebuilt; excellent condition.

MILLING MACHINES.

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1—No. 3-H Becker-Brainard Profiler; rebuilt; first-class shape.
1—LeBlond Heavy Design Worm Cutting Attachment for use on No. 2 LeBlond Miller.

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1—12" x 42" Landis Universal Tool Room Grinder; rebuilt.

SHAPERS.

1—24" Lutter & Gies "Milwaukee" Back-geared Crank Shaper; fine shape.
1—20" x 50" Walker Traveling Head Open Side Planer or Shaper.

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1—30" Mueller Radial Drill.
1—No. 1 26" Diamond Automatic Face Grinder.
1—2" Bignall & Keeler P.D.Q.C. Pipe Machine.
1—No. ½ Schuchardt & Schutte Gear Hobber.
1—32" x 32" x 6' Pond Heavy Pattern Planer, one head.
1—48" x 48" x 14' Pond Planer, one head
1—48" x 48" x 16' Pond Planer, one head.
1—No. 3½ A Bliss Toggle Drawing Press nearly new.
1—60" Stevens Pulley Lathe.
1—48" Brainard Automatic Gear Cutter.
1—17-G New Doty Single End Punch or Shear, 12" throat, capacity 2" in 1".

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12 26"-48" x 14' new style McCabe Double Spindle Heavy Pattern New Lathes.
2 26"-48" x 18' new style McCabe Double Spindle Heavy Pattern New Lathes.
24" x 10' Putnam, H.S., C.R
20" x 8' Prentice, H.S., C.R., T.A.
3 -19" x 8 Sidney New Lathes, swing 21"
2 19" x 8' Sidney New Lathes, Quick Change, swing 21"
2 17" x 8' Sidney New Lathes, Quick Change, swing 19".
2 18" x 10' Rahn Mayer, H.S., C.R.
18" x 10' Cincinnati, H.S., C.R.
18" x 10' Hendey, New Taper Attachment
9--17" x 8' National, New, Quick Change
14" x 10' Prentice, Taper Attachment.
2 13" x 7½' Carroll, Jamieson, New.
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No. 00 B. & S. Automatic Screw Machine, with slotting attachment.
⅝" Pratt & Whitney Screw Machine
36" Baker Bros. Tapping and Boring Drill.
36" Currie & Snyder Sliding Head Drill
30" Hamilton Sliding Head Drill.
No. 3½ Fox Miller, Vertical Attachment, Index Head.
Pedrick & Ayre Back geared Miller, table swivels 42" x 9", 3 power feeds.
No. 210 Heald Wet Ring Grinder.
16" Steptoe New B.G. Shaper.
20" Steptoe New S.G. Shaper.
24" American B.G. Shaper.
18 x 18 x 5' Pond Planer.

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Two (2) No. 5 Rivet, each	550
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No. 7 Geo. Gorton, double end disc grinder with wheel chuck on one end, steel discs and tilting table	300
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Two No. 3 Garvin, each	175
Six Pratt & Whitney, No. 1½, each	175
Two Pratt & Whitney Hand Millers	...
Reed	150
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48 x 48 x 20' Putnam, 2 heads on rail; excellent condition.	3500
36 x 36 x 14' Powell, 2 heads on rail	1750
32 x 32 x 10' Gleason, single head; good as new	700

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60 x 28' Fifield, raising blocks to swing 75", double back-geared, face plate drive, dia. of face plate 56" x 8"; good as new	5000
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52 x 16' Gleason, heavy triple-geared, faced plate drive	2500
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No. 11 Pratt & Whitney 15 spindle	325
Two 14" Barr 3 spindle Sensitive, each	90
No. 11 Pratt & Whitney, 10 spindle	325
2 spindle Barr	60
Bausch 16 spindle	750
Three 4 spindle Fenn Sensitive, adjustable heads, each	150
Allen 4 spindle	200
Henry & Wright 3 spindle	200

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1	10" x 20" Landis Plain Grinder.
2	12" x 24" Modern Plain Grinders (nearly new).
1	14" x 50" Norton Plain Grinder (nearly new).
2	18" - 30" x 96" Norton Gap Grinders (nearly new).
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1	No. 70 Heald Internal Grinder.
2	No. 60 Heald Cylinder Grinders (nearly new).
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2	14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1	New Yankee, style L, Drill Grinder (new).
1	No. 6M Besley Double Disc Grinder.
1	No. 300 Safety Emery Wheel Ring Wheel Grinder.

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8	Potter & Johnson No. 5-A Automatic (nearly new).
12	13" Gisholt Semi-Automatic (12 mos. old).
20	21" Gisholt Semi-Automatic (12 mos. old).
5	J & L two spindle (new).
1	J & L 2 x 24 with bar equipment, motor driven (fine condition).

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1	No. 8 Becker Duplex (new).
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3	No. 0 Bristol Hand Millers.
1	Newton Duplex with 72" table feed.
1	No. 3½ Becker Vertical with Dividing Head.
1	Small Duplex Miller.
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1	12" Spindle Garden ½" capacity.
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1	24" Hoefer Sliding Head (new).
4	Henry & Wright No. 1 style K (nearly new).
12	Colburn Heavy Duty, size D-2 (new).
27	Colburn Heavy Duty, size D-4 (new).
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3	4-spindle Dwight slate, 14" swing, ¾" capacity.
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1	20" Mechanics (new).
1	20" Buffalo (new).
1	28" Hamilton Sliding Head.
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1	18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
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1	12" x 6' American.
1	28" x 14' Fifield.
1	14" x 4' Blaisdell.
1	No. 4½ Barnes.
1	54" x 21' Detrick & Harvey.
1	26" x 10' Bradford.

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1	30" x 30" x 10' Ohio with two heads (new).
1	44" x 44" x 12' L W Pond with three heads.
1	40" x 40" x 12' New Haven, with one or two heads.
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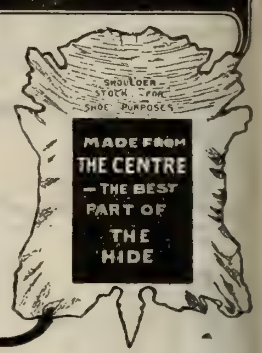
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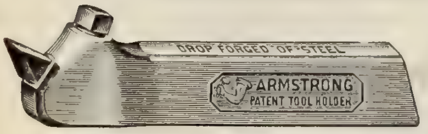

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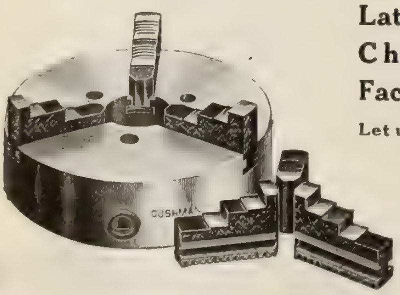

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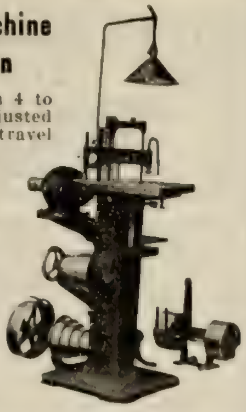

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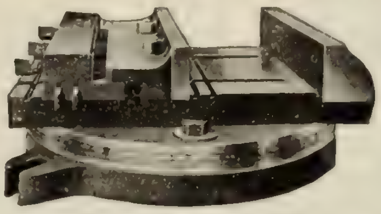

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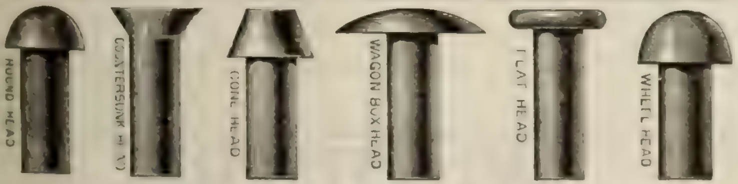

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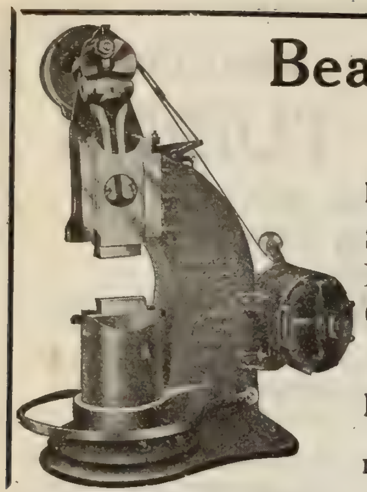

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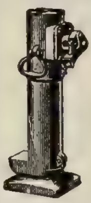

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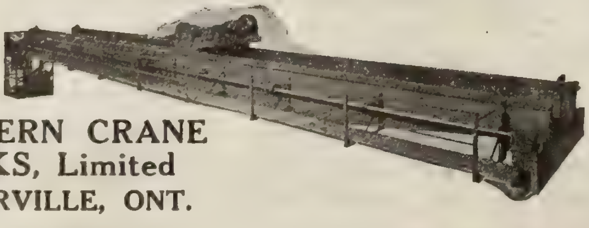

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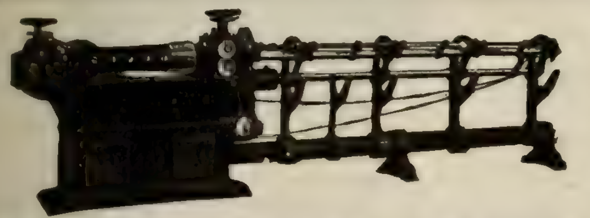

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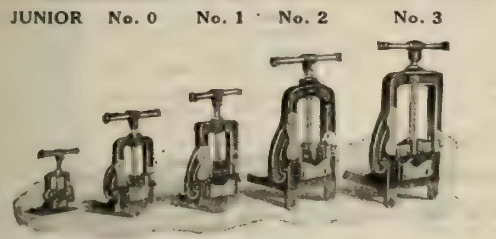

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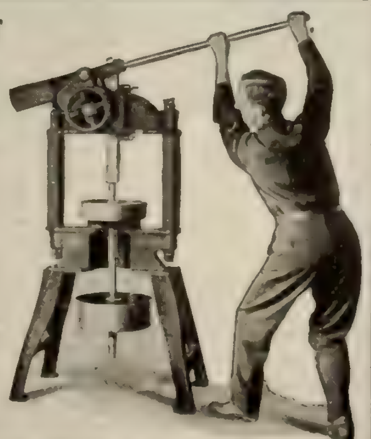

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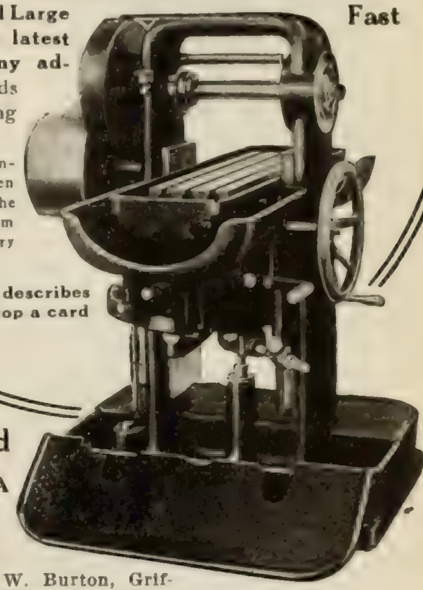

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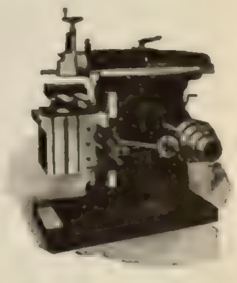

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Ridout & Maybee, Toronto.
Ross Thomson & Co., Ottawa, Ont.

PATTERNS
Galt Malleable Iron Co., Galt.

PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton.

PIG IRON
Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PIPE CUTTING AND THREADING MACHINES
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.

PIPE CUTTERS, ROLLING
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
John H. Hall & Sons, Ltd., Brantford, Ont.

PIPE, RIVETED STEEL
Toronto Iron Works, Ltd., Toronto.

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Oliver Machy. Co., Grand Rapids, Mich.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.

PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

PLANING MILL EXHAUSTERS
Can. Blower & Forge Co., Berlin, Canada.
Sheldons, Ltd., Galt, Ont.

PLIERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Billings & Spencer, Ltd., Welland.

PLUG MILLERS
Banfield, Edwin J., Toronto.

PORTABLE VISE STANDS
New Britain Machine Co., New Britain, Conn.

PRESSES, ARBOR
Atlas Press Co., Kalamazoo, Mich.

PRESSES, BANDING
Chapman Double Ball-Bearing Co., Toronto, Ont.
Perrin, Wm. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

PRESSES, HAND FORCING
Atlas Press Co., Kalamazoo, Mich.

PRESSES, BROACHING
E. W. Bliss Co., Brooklyn, N.Y.
Toledo Machine & Tool Co., Toledo.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo, O.

PRESSES FOR SHELLS
Atlas Press Co., Kalamazoo, Mich.
Can. Boomer & Boschert Press Co., Montreal.
Can. Locomotive Co., Kingston, Ont.
Charles F. Elmes Eng. Works, Chicago.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

PRESSES, DROP
W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can Boomer & Boschert Press Co., Montreal.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Toledo Machine & Tool Co., Toledo.

PRESSES, FILTER
Lymburner, Ltd., Montreal.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, FORGING
Can. Boomer & Boschert Press Co., Montreal.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago, Ill.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
Wm. R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

PRESSES, HYDRAULIC
Bawden Machine Co., Toronto, Ont.
Can. Boomer & Boschert Press Co., Montreal.
John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, PNEUMATIC
Toledo Machine & Tool Co., Toledo.

PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
Can. Boomer & Boschert Press Co., Montreal.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
Geo. Gorton Machine Co., Racine.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, BALING
Can. Boomer & Boschert Press Co., Montreal.
William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

PRESSES, SCREW
Barnes, W. F. & John, Co., Rockford, Ill.
Can. Boomer & Boschert Press Co., Montreal
Wm. R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Erie Foundry Co., Erie, Pa.

PRESSURE REGULATORS
Can. Fairbanks-Morse Co., Montreal.

PULLERS, WHEEL
The Crane Puller Co., Arlington, Mass.

PULLEYS
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Dodge Mfg. Co., Toronto, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Ltd., Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PULLEY MACHINERY, DRILLING AND TAPPING
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.

PUMPS, AIR
Bawden Machine Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
Jenckes Mach. Co., Sherbrooke, Que.
Peacock Bros., Montreal, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL
Can. Blower & Forge Co., Berlin, Canada.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Darling Bros., Ltd., Montreal, Que.
D'Olier Centrifugal Pump & Machine Co., Philadelphia, Pa.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

PUMPS, HIGH PRESSURE
Charles F. Elmes Eng. Works, Chicago.
Darling Bros., Ltd., Montreal, Que.
Peacock Bros., Montreal, Que.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

PUMPS, ALL KINDS
Bawden Machine Co., Toronto, Ont.
Can. Blower & Forge Co., Berlin, Canada.
Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PUMPS, HYDRAULIC
Can. Boomer & Boschert Press Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill
Darling Brothers, Montreal.
Peacock Bros., Montreal, Que.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto.

PUMPS, LUBRICANT AND OIL
Cincinnati Lubricant Pump Co., Cincinnati, Ohio
Roper, C. F., Co., Hopedale, Mass.

PUMP LEATHERS
Graton & Knight Mfg. Co., Montreal.

PUNCHES AND DIES
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Coleman Fare Box Co., Toronto, Ont.
Scott Bros., Halifax, Eng.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

PUNCHES, PNEUMATIC
Jno. F. Allen Co., New York.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Peacock Bros., Montreal, Que.
Niles-Bement-Pond Co., New York.

PYROMETERS
Canadian Hoskins, Limited, Walkerville, Ont.
Peacock Bros., Montreal, Que.
Shore Instrument & Mfg. Co., New York City.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES
John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS (SEE GUARDS)

RAIL BENDERS
Niles-Bement-Pond Co., New York.

RAILROAD TOOLS
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

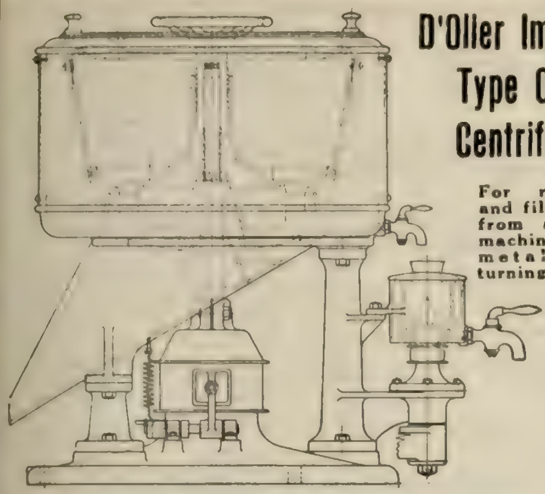
RAW HIDE PINIONS (SEE GEARS)

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMERS, ADJUSTABLE
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McKenna Bros. Brass Co., Pittsburgh.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.



D'Olier Improved Type Chip Centrifugal

For recovering and filtering oil from automatic machined parts, metal chips, turnings, scrap, etc.

A large capacity, extremely efficient machine, especially designed and built to care for the "rush" character of work and the increasing volume of shop output now prevailing.

SPECIAL FEATURES

Weston type, self-balancing basket, 30 in. diameter, motor driven.

Bottom chute discharge and conical unloading valve.

Centrifugal oil filter attachment.

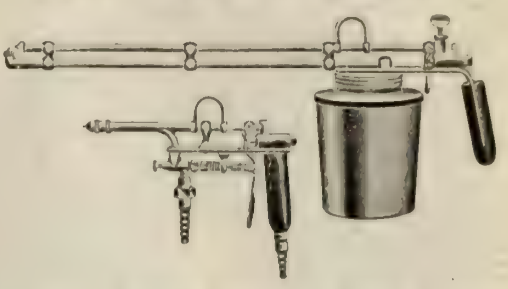
The 30" Weston type self-balancing basket, which is the largest capacity for this service, is of the non-removable type. No service (removable) baskets are required for this machine, the load being dumped into the operating basket and discharged by means of our special conical unloading valve and chute, which is a great time-saving feature.

The centrifugal oil filter, with which the machine is equipped, is operated by the main driving belt, the complete unit being therefore self-contained, simultaneously recovering and filtering the oil from the chips, turnings, etc.

D'Olier Centrifugal Pump and Machine Co.

Morris Building, Philadelphia, U.S.A.

AMMUNITION SPRAYERS



For Lining Shells, Spraying Paint, Lacquer, Oil. Etc., on all classes of ammunition

THE ONLY PRACTICAL SPRAYER

E. W. BLISS COMPANY,
Borough of Brooklyn, New York,
August 23, 1915.

Eureka Pneumatic Spray Co.
62 Ninth Avenue, New York City.

Gentlemen,—Replying to your letter of August 17th, would say that No. 135 Sprayer has proven very satisfactory, and has eliminated various troubles experienced with Sprayers of other manufacturers.

In regard to the number of shells being sprayed, would state that each operator sprays on the average 450 3" shells per hour.

Trusting that the above will put you in possession of the information you require, we are

Yours very truly, E. W. BLISS COMPANY,
(Signed) H. E. Norwood.

EUREKA PNEUMATIC SPRAY CO.

62-64 NINTH AVENUE NEW YORK, U.S.A.

FRED'K CRANE CHEMICAL CO., Sole Agents for Great Britain, Birmingham, England

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The selection of metals and the necessary treatments are governed by the purpose for which each casting is required

The quality is always of the highest standard.

Our castings "stand up" to service where others fall down.

Try them and you'll be convinced.

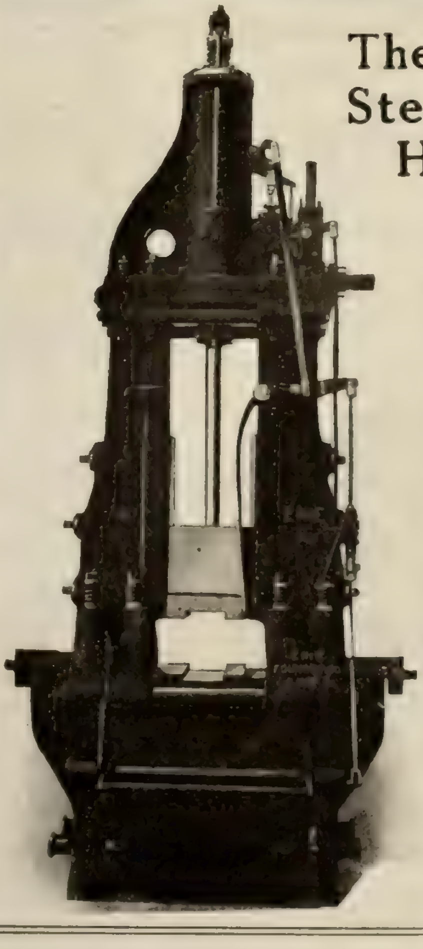
The Galt Malleable Iron Co., Limited

GALT, ONTARIO, CANADA

RIVETED STEEL TANKS FOR EVERY PURPOSE

THE TORONTO IRON WORKS
LIMITED
TORONTO ONT.

OIL STORAGE – GASOLINE TANKS – AIR RECEIVERS
PNEUMATIC WATER SUPPLY TANKS – SMOKE STACKS
BOILER BREECHING – RIVETED STEEL PIPE – BINS & HOPPERS



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A list will be supplied upon request.

We also build Trimming Presses.

Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

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Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont
Wilt Twist Drill Co., of Canada, Ltd., Walkerville, Ont.

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Cleveland Pneumatic Tool Co., of Canada, Toronto.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Lachapelle, J. D., & Co., Montreal, Que.
Peacock Bros., Montreal, Que.

RIVET MACHINES
Can. Blower & Forge Co., Berlin, Canada.
Cook, Asa S., Co., Hartford, Conn.
National Machinery Co., Tiffin, O.

RIVETS, TUBULAR, BIFURCATED
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
Jno. F. Allen Co., New York.
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.

RIVETING MACHINES, ELASTIC ROTARY BLOW
Grant Mfg. & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.

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John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.

ROLLS, CRUSHING
Jenckes Mach. Co., Sherbrooke, Que.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
L. S. Starrett Co., Athol, Mass

SAND BLASTS
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Gray Mfg. & Machy. Co., Toronto, Ont.

SAND BLAST SYSTEMS
Whiting Foundry Equipment Co., Harvey Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt. & Son, Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

SAWS, CIRCULAR METAL
H. A Drury Co., Montreal.
Hunter Saw & Machine Co., Pittsburg, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)

SAWS, INSERTED TOOTH
Tabor Mfg. Co., Philadelphia, Pa.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

SCRAP IRON
Lovitz, Louis, Toronto, Ont.
L. S. Tarshis & Sons, Montreal.

SCREW MACHINE PRODUCTS
Milholland, W. K., Co., Indianapolis.

SCREW MACHINES, HAND, AUTOMATIC
Bawden Machine Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Garvin Machine Co., New York.
A. B Jardine & Co., Hespeler.
Milholland, W. K., Co., Indianapolis, Ind.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

SCREW MACHINES, MULTIPLE SPINDLE
New Britain Machine Co., New Britain, Conn.
Windsor Machine Co., Windsor, Vt.

SCREWS
Galt Machine Screw Co., Galt, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
Can. Tap & Die Co., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
Wells Bros. Co. of Canada, Galt, Ont.

SCREW SLOTTERS
Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY
Dominion Machinery Co., Toronto.
Essley Machinery Co., Chicago, Ill.
Foss & Hill Machy. Co., Montreal.
New York Machinery Co., New York.
H. W. Petrie, Toronto.
Simmons Machine Co., Albany, N.Y.
H. A. Stocker Co., Chicago, Ill.

SET SCREWS, SAFETY
Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Hendey Machine Co., Torrington, Conn.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.

SHAFTING
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Dodge Mfg. Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
A. R. Williams Machy. Co., Toronto.

SHARPENING STONES
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

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Can. Blower & Forge Co., Berlin, Canada.
Sheldons, Ltd., Galt, Ont.

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John Bertram & Sons Co., Dundas.
Bertrams, Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Niles-Bement-Pond Co., New York.
Scott Bros., Halifax, England.
Toledo Machine & Tool Co., Toledo.

SHEARS, POWER
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Berlin, Canada.
Canada Machinery Corp., Galt, Ont
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Scott Bros., Halifax, England.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

SHEARS, PNEUMATIC
John F. Allen Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada.

SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Fisher, A.D., Mfg. Co., Toronto, Ont.
Steel Bending Brake Works, Ltd., Chatham, Ont.

SHEET METAL STAMPINGS
Coleman Fare Box Co., Toronto, Ont.
Dominion Forge & Stamping Co., Walkerville, Ont.

SHELL BANDING MACHINES, HYDRAULIC
Can. Locomotive Co., Kingston, Ont.
Lymburner, Ltd., Montreal.
Perrin, Wm. R., Toronto.
West Tire Setter Co., Rochester, N.Y.

SHELL PAINTING MACHINE
Can. Blower & Forge Co., Berlin, Canada.
Can. Locomotive Co., Kingston, Ont

SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.

SHRAPNEL SHELL MARKER
Brown-Boggs Co., Hamilton, Ont.
Noble & Westbrook Mfg. Co., Hartford, Conn.

SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.

SILVER SOLDER
Geo. H. Lees & Co., Hamilton, Ont.

SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

SLOTTERS
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.

SMOKESTACKS.
MacKinnon, Holmes Co., Sherbrooke, Que.

SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
J. H. Williams Co., Brooklyn, N.Y.

SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Can.

SOLDERS
Aikenhead Hardware Co., Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.

SPECIAL MACHINERY
Acton Tool & Stamping Co., Toronto, Ont.
Armstrong Bros., Toronto.
Baird Machine Co., Bridgeport, Conn.
Banfield, Edwin J., Toronto.
W. H. Banfield & Sons, Toronto.
John Bertram & Sons Co., Dundas.
Baird Machine Co., Bridgeport, Conn.
Bawden Machine Co., Toronto, Ont.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Brown Engineering Corp., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Coleman Fare Box Co., Toronto, Ont.
Cunningham & Sons, St. Catharines, Ont.
Charles F. Elmes Eng. Works, Chicago.
Fisher, A.D., Mfg. Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
Grant Mfg. & Machy. Co., Bridgeport, Conn
John H. Hall & Sons, Brantford.
Himoff Machine Co., New York, N.Y.
Jardine, A. B., & Co., Hespeler.
Jenckes Mach. Co., Sherbrooke, Que.
D. McKenzie Machinery Co., Guelph, Ont.
Peacock Bros., Montreal, Que.
Root & Van Dervoort Engineering Co., East Moline, Ill.
Smart-Turner Machine Co., Hamilton, Ont.
William R. Perrin, Ltd., Toronto.

SPIKE MACHINES
The Smart-Turner Machine Co., Hamilton.

SPIRAL CONVEYORS
Can. Matthews Gravity Carrier Co., Toronto, Ont.

SPRING COILERS
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn

SPRINGS, MACHINERY
Barnes, Wallace, Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Jas. Steele, Ltd., Guelph, Ont.

SPROCKETS, CHAIN
Grant Gear Works, Boston, Mass.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.

SPROCKET WHEELS, CAST
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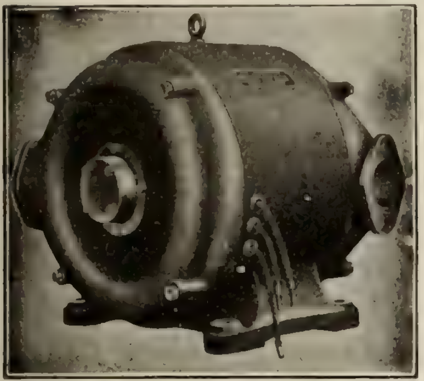

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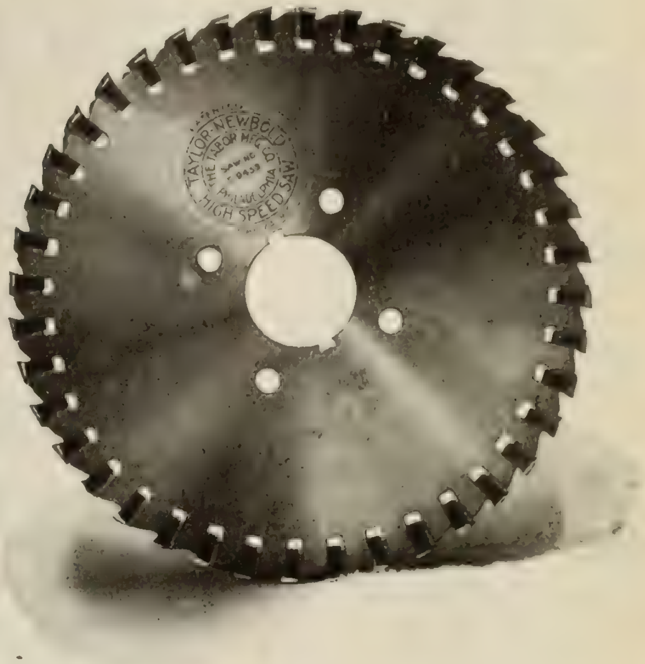

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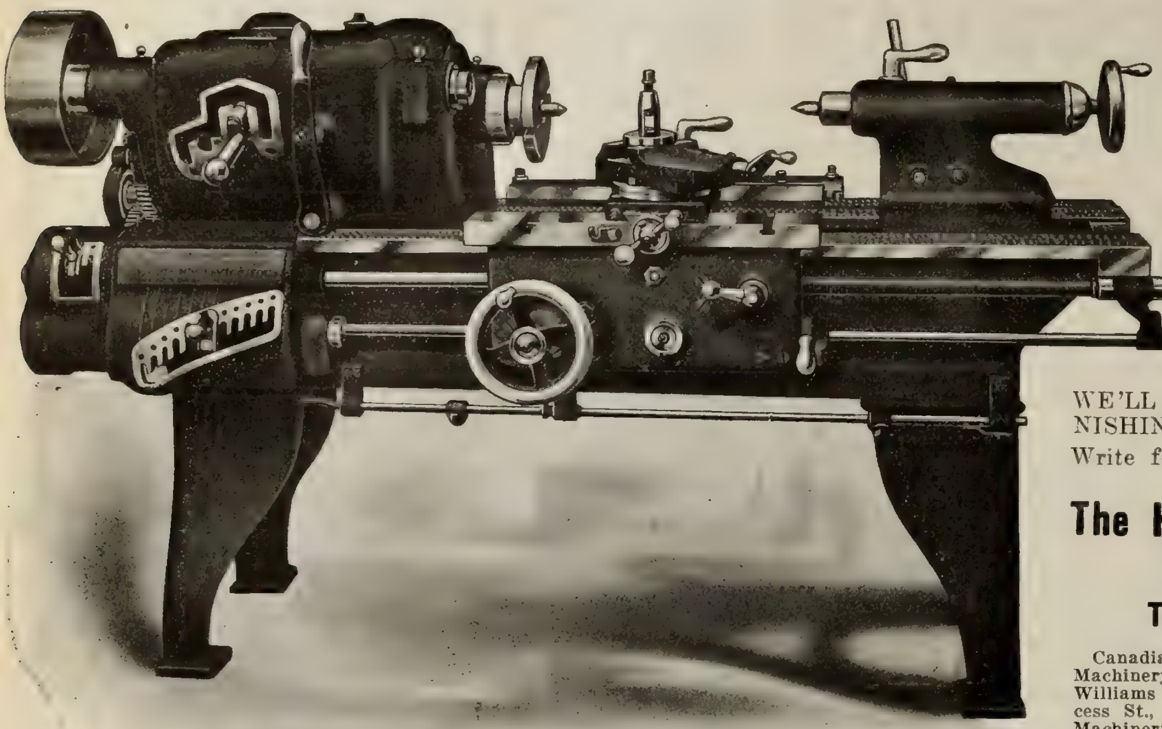

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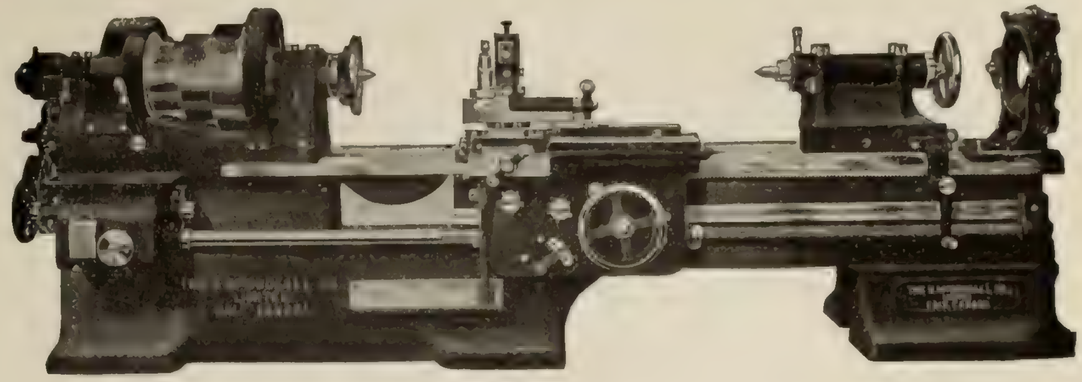
McDougall Gap Lathes



—

Strength
Accuracy
Quality

Take a look at the next money you intend to invest in a Lathe. Then, take a look at the money's worth we offer you in our machine. Your money will soon come back to you in increased production and we will have the pleasure of having a satisfied user. Our machines are just as good as they look and they look good too.

We invite the closest inspection.

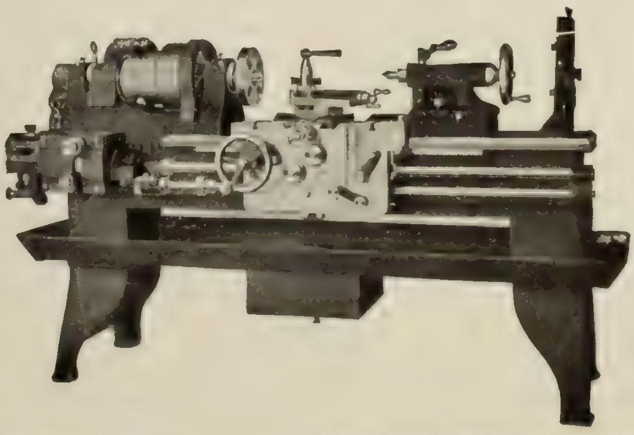
ARE-MAC-DEE IS A GUARANTEE

Particulars on request.

The R. McDougall Company Limited

Manufacturers
GALT, Ont., Canada
The Canadian Fairbanks-Morse Co., Limited, Sales Agents.

In Stock for Immediate Delivery



2 No. 6 20 x 8 Foster Geared Friction Head Turret Lathes.
[illegible] x 8 Sidney Standard Engine Lathes.
1 1" [illegible] Turret Screw Machine, power feed.
1 8" Rivett Lathe, back geared, power feed, draw-in collets, grinding and milling attachments.
1 16 x 10 Bradford Std. Engine Lathe, complete with chuck and taper attachments.
[illegible] x 8 South Bend Screw Cutting Lathes.
1 [illegible] x 8 C.M.C. Turret Lathe, three-step cone, double back-geared, power feed to turret.
1 18 x 8 Flather Tool Room Lathe, compound rest and draw-in attachment and collets.
2 26 x 12 Putnam Quick Change Gear Lathes, three-step cone, double back gear.
[illegible] 24 x 8 [illegible] Heavy Duty Lathes for turning 4.5, 5 and 6" shells.
[illegible] 24 x 8 [illegible] Heavy Duty Turret Lathe for boring 4.5, 5 and 6" shells.
[illegible] 4' [illegible] Sliding Head Drill Presses.

2 26" Champion Back-geared Drill Presses.
1 [illegible] Barnes Back-geared Drill Press.
1 14" 4-spindle [illegible] Sensitive Drill Press.
2 14" 3-spindle Woodward & Rogers Sensitive Drill Presses.
1 20" [illegible] Reed Sensitive Drill Press.
1 14" Single Spindle Reed Sensitive Drill Press.
1 14" Single Spindle Perfect Sensitive Drill Press.
1 No. 2 29 x 10 x 15 Oesterlein Full Automatic Miller, complete with vise and index centres.
1 Rockford Plain Miller, back-geared, complete with vertical attachment, slotting attachment, etc.
1 Ford Smith Plain Milling Machine, with vise and dividing head.
1 No. 1 Oesterlein Universal Grinder, with regular equipment.
1 No. 1 [illegible] Surface Grinder, 12 x 24 x 9.
1 Fay & Scott Ball Turret for 24 or 26" lathes.
1 No. 12 Wells Bolt Cutter.

THE FOSS & HILL MACHINERY CO.

305 ST. JAMES STREET - - - - MONTREAL, QUE.

The Mark of Distinction in Machine Tools

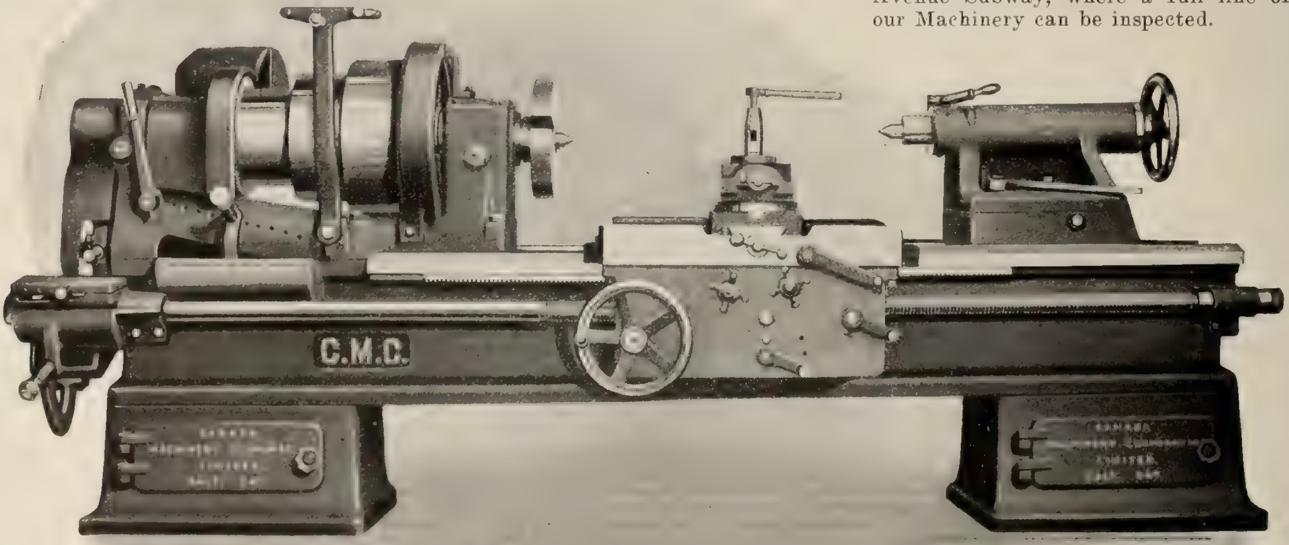
C.M.C.

Registered Trade-Mark of the Canada Machinery Corporation, Limited

All machine tools (wood or iron-working) bearing this trade-mark are guaranteed to be of the best standard in quality and workmanship.

C.M.C. regular machine tools are performing a great service on munitions which proves that power, rigidity and accuracy are not lacking in our tools.

For convenience of the trade we have opened Showrooms in Toronto at Brock Avenue Subway, where a full line of our Machinery can be inspected.



CANADA MACHINERY CORPORATION
LIMITED

GALT, ONTARIO

Builders of Machine Tools and Woodworking Machinery

CANADIAN MACHINERY
AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

ol. XVI—No. 6 Publication Office: Toronto, Aug. 10, 1916 Subscription Price $3.00 per Year

"Red Cut Superior"
High Speed Steel
The Best for All Machine Work
nnealed Bar Stock; Rounds, Flats & Squares.
lso Treated Bits (hardened ready for use) for Tool Holders

A Giant for Efficiency

VANADIUM-ALLOYS STEEL COMPANY
General Sales Offices: Pittsburgh, Pa. Works at Latrobe, Pa.

WHY P. & W. Taps WIN

It's in the Design

One-third of the land from the cutting edge is concentric.

The remaining two-thirds has eccentric relief.

The taper-tap has a cylindrical pilot.

The taper and plug-taps have an eccentrically-relieved chamfer relieved clear from the cutting edge. The highest grade of steel obtainable is used.

What it Means to You

Taps can be sharpened at the only correct point—on the face of the cutting edge.

Sharpening in no way affects their size.

Can be sharpened long after other so-called eccentrically relieved taps are rendered useless.

We obtain the freest cutting tap with the longest life—an exclusive combination.

Accuracy nowhere else obtainable is secured together with a degree of finish and refinement heretofore thought impossible with a commercial tool.

For a number of years we have made taps with this style of relief. They have won out steadily and consistently on merit alone.

The Tap with the

(Trade-Mark)

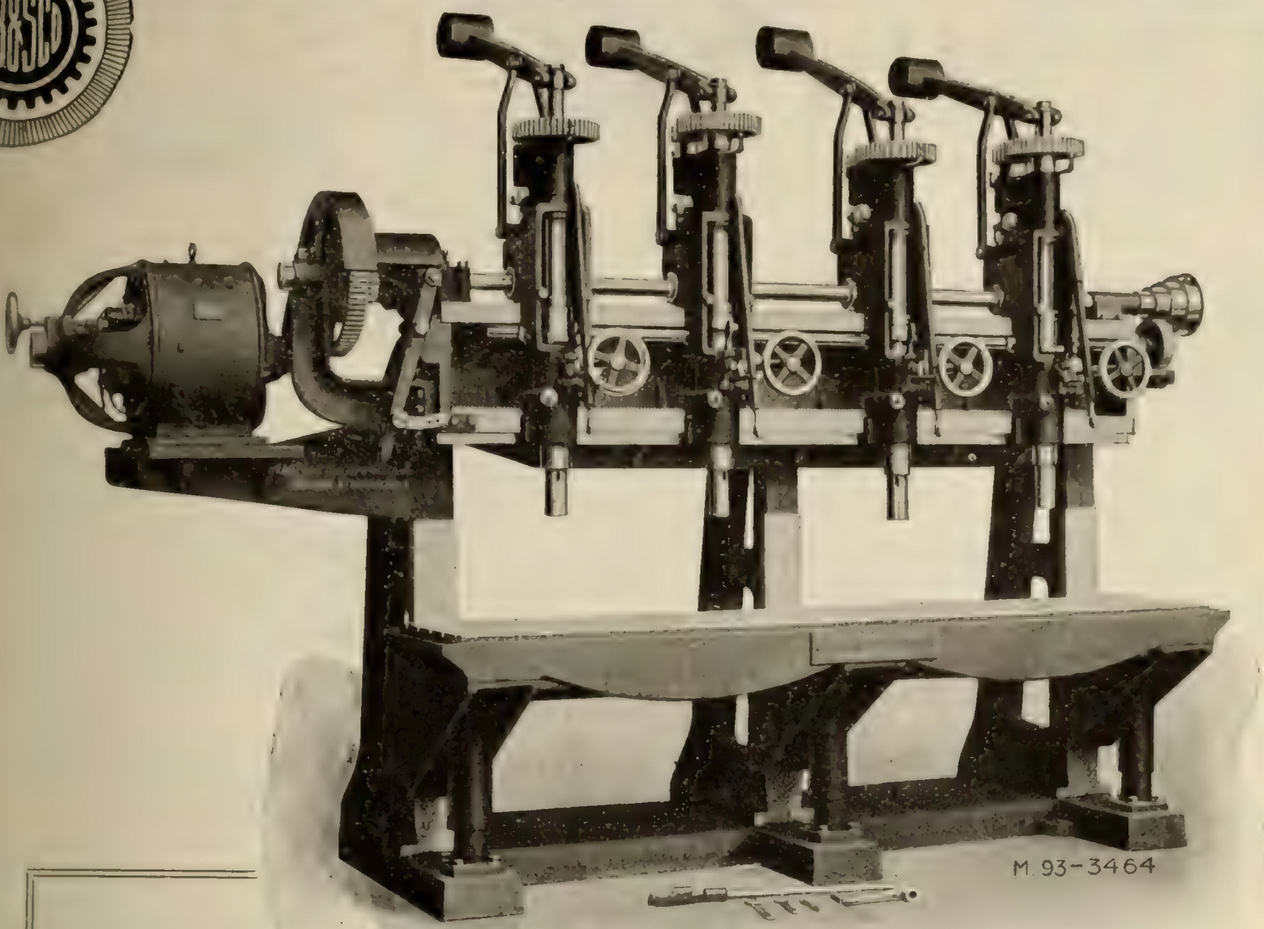
Con-eccentric Land

(Registered U.S. Patent Office)

Pratt & Whitney Company of Canada
Limited

DUNDAS	MONTREAL	WINNIPEG	VANCOUVER
Ontario	723 Drummond Bldg.	1205 McArthur Bldg.	B.C Equipment Co.

P. & W. CO.
HARTFORD
CONN.
U.S.A.



Multiple Drills

OF EVERY DESCRIPTION

Bertram Four-Spindle Multiple Drilling Machine for Locomotive and Other Work

SIMULTANEOUS OR INDEPENDENT FEEDS WITH INDEPENDENT KNOCK-OFF FOR EACH HEAD AND CLUTCH DRIVE FOR EACH SPINDLE. CAPACITY, FOUR 2-INCH HOLES IN STEEL.

Drop us a line for photographs and full particulars.

The John Bertram & Sons Company
Limited

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

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609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO August 10, 1916

A List of Shell Manufacturers

WE were recently able to obtain a revised list of shell manufacturers in Canada. As a matter of interest, we checked it up with our subscription list, and while not surprised, we were, nevertheless, gratified with results, which follow:

¶ Eighty per cent. of ***firms*** manufacturing munitions are subscribers to CANADIAN MACHINERY.

¶ Five per cent. are advertisers and thus entitled to copies on their contracts.

¶ From records in our office, we were able to determine that ninety-nine per cent. of all munition plants are represented on our subscription list, either through the firms themselves or some one or several of their business executives or through their superintendents, works' managers, foremen, engineers, etc.

¶ The remaining one per cent. remains in doubt—but not for long.

¶ Let it be known that the list referred to was supplied in confidence, and cannot be given out.

Canadian Machinery and Manufacturing News
143-153 UNIVERSITY AVENUE - - - TORONTO, CANADA

Quality Service

The Steel Company of Canada, Limited

PRODUCTS

"HAMILTON" PIG IRON
BASIC, MALLEABLE AND FOUNDRY

IRON AND STEEL
BLOOMS, BILLETS, BARS, WIRE RODS, ANGLES, CHANNELS, PLOW BEAMS, ETC.

FORGINGS

Car Axles, Shape and Drop Forgings, Horse Shoes, Carriage and Automobile Hardware. Top Goods, Etc.

WIRE, ETC.

Steel, Brass, Copper and Bronze, Heavy and Fine, Bright Annealed, Coppered Liquor Bright, Galvanized and Tinned. Stranded, Steel and Copper Cable, Clothes Line, Wire Nails, Staples, Barb Wire, Woven Wire Fencing, Fence Gates.

RAILWAY FASTENINGS

Angle Bars, Track Bolts, Tie Plates, Spikes, Tie Rods, Etc.

NAILS, SPIKES, RIVETS, ETC.

Wire, Cut, Boat and Horse Shoe Nails, Railway, Pressed and Drift Spikes. Tacks and Shoe Nails, Steel and Copper Rivets, and Burrs, Iron, Brass and Copper.

POLE LINE HARDWARE

Pole Steps, Cross Arm Braces, Guy Clamps and Guy Rods, Etc., Black and Galvanized.

BOLTS, NUTS AND WASHERS

Machine, Carriage, Elevator, Stove, Tire and Sleigh Shoe Bolts, Blank, Tapped Nuts, and Washers.

WROUGHT PIPE

Black and Galvanized Nipples and Couplings.

SCREWS

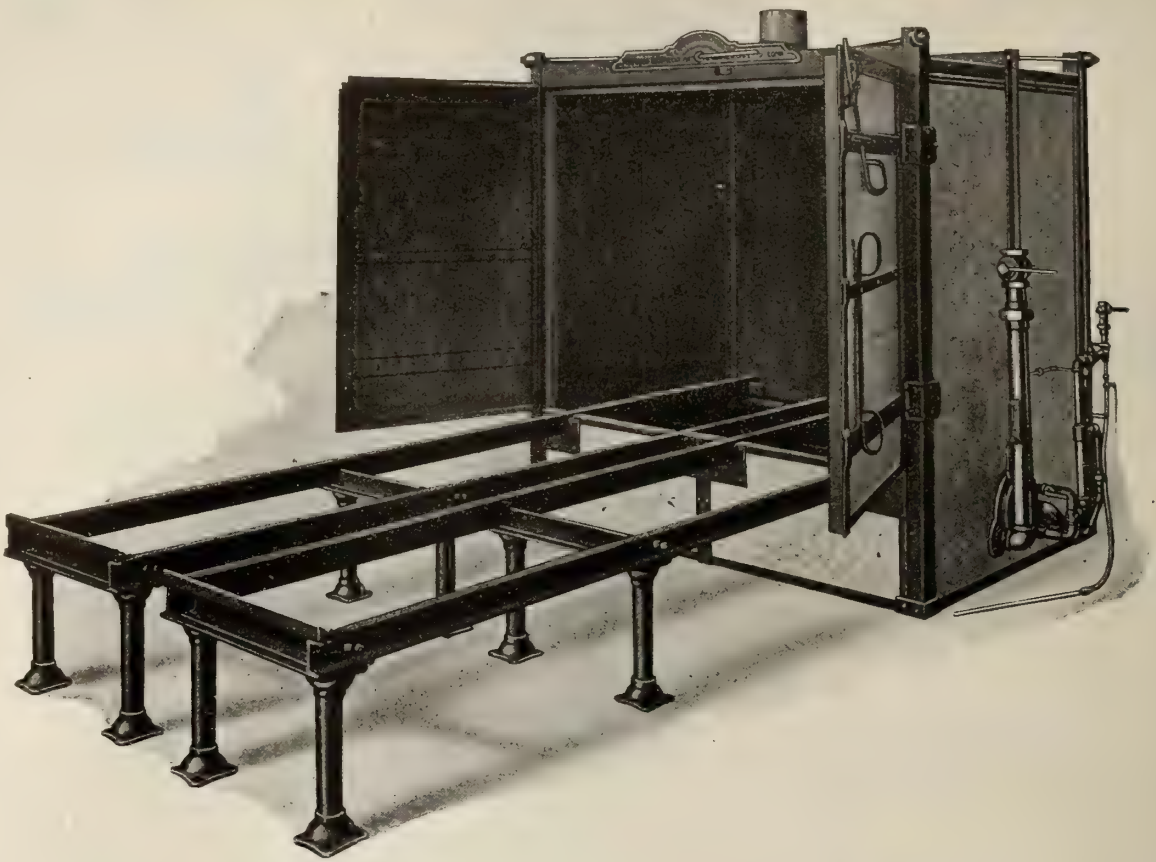
Wood and Machine Steel, Brass and Bronze.

LEAD PRODUCTS

Lead Pipe, White Lead, Shot and Putty.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG



A convenient type of Crawford Sectional Oven largely used by manufacturers turning out Shells up to twenty-eight pounds each.

The method of heating explained in previous issues is the same with all types of Crawford Ovens—no direct flame coming in contact with the material in the oven.

Either city, natural, gasoline or producer gas can be used with either type of oven.

Ovens and trucks built for baking the varnish or finish on any number or size of shells required at a time.

The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN., U. S. A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA

Nova Scotia Steel & Coal Company

Limited

New Glasgow, Nova Scotia, Canada

FINISHED COUPLING SHAFT, 18 IN. DIAMETER BY 21 FT. LONG

Heavy Marine Engine Forgings in the Rough or Finish Machined

Our Steel Plant at Sydney Mines, N.S., together with our Steam Hydraulic Forge Shop and modernly equipped Machine Shop at New Glasgow, N.S., place us in position to supply promptly Marine Engine Crank and Propeller Shafting, Piston and Connecting Rods; also Marine and Stationary Steam Turbine Shafting of all diameters and lengths, either as forgings or complete ready for installation, and equal to the best on the American Continent.

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas XX	Carbon Tool Steel
High Speed Steel, Atlas X	"Deward" Oil Tempering, Non-Shrinking
Chrome Vanadium Steel	

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

YOUNG, CORLEY AND DOLAN, Inc.

149 BROADWAY, NEW YORK CITY, U.S.A.

WOLFRAM
MADE IN THE U.S.A.
HIGH SPEED STEEL
TRADE MARK

Wolfram Cobalt High-Speed Steel, BEST FOR TURNING SHRAPNEL. Vulcan Hot Piercing Steel, FOR ALL KINDS OF HOT WORK. Vulcan Regal No. 2 Steel, FOR BRASS FINISHINGS. Vulcan Special "W" Steel, For Special Taps and Dies. Vulcan Non-Shrinkable Steel, For Intricate Dies. Vulcan Special Vanadium Steel Does Twice the Work of Regular Carbon Steels.

VULCAN CRUCIBLE STEEL COMPANY
ALIQUIPPA, PA.

ECONOMY

Rapid production is dependent on the use of

Economical Tools and Steel.

It is safer NOT to specify High Speed Steel but

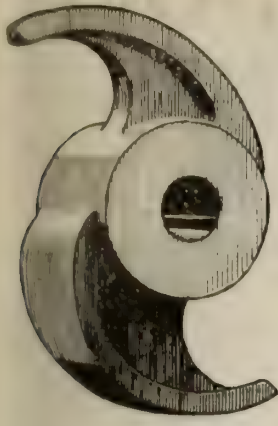
Demand "TYR," the Economy Steel.

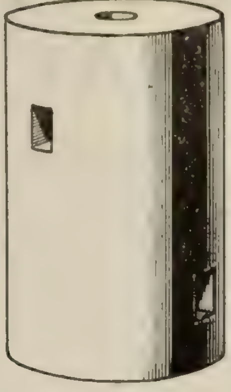
(MADE IN CANADA)

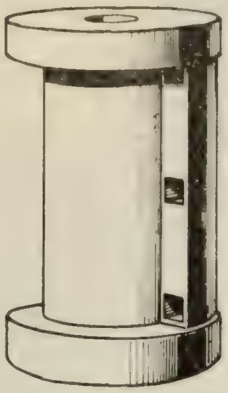
Armstrong, Whitworth of Canada, Limited

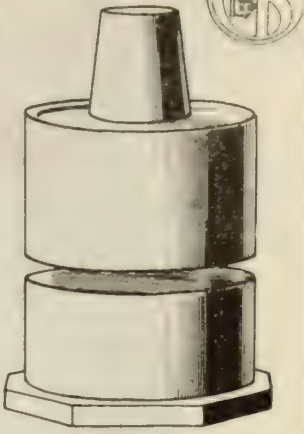
OFFICES: 22 Victoria Square, Montreal, P. Q.
Dominion Bank Building, Toronto, Ont.
WORKS: Longueuil, P. Q.

Stamp Mill Requirements







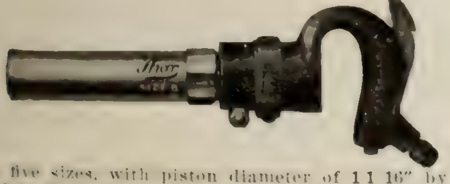


Cams, Heads, Tappets, Shoes and Dies
SUPERIOR QUALITY & QUICK DELIVERY

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

Thor

CHIPPING HAMMERS with Single Valve of the Latest Improved Design.



Made in five sizes, with piston diameter of 1 1 16" by strokes of from 1 to 5", designated as sizes A, B, C, D and E. **Shipped on Trial at Our Expense**

Independent Pneumatic Tool Co.
CANADIAN OFFICE:
334 St. James St., MONTREAL, QUE.
General Offices: Thor Building, Chicago, U.S.A.
Branches: New York, Pittsburgh, Detroit, San Francisco, Birmingham

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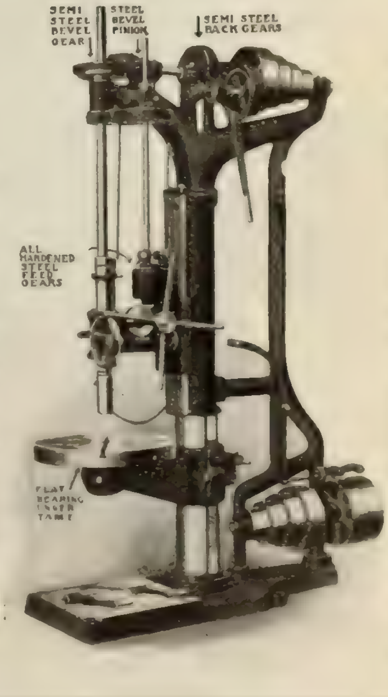
"AURORA"
Drilling Machines

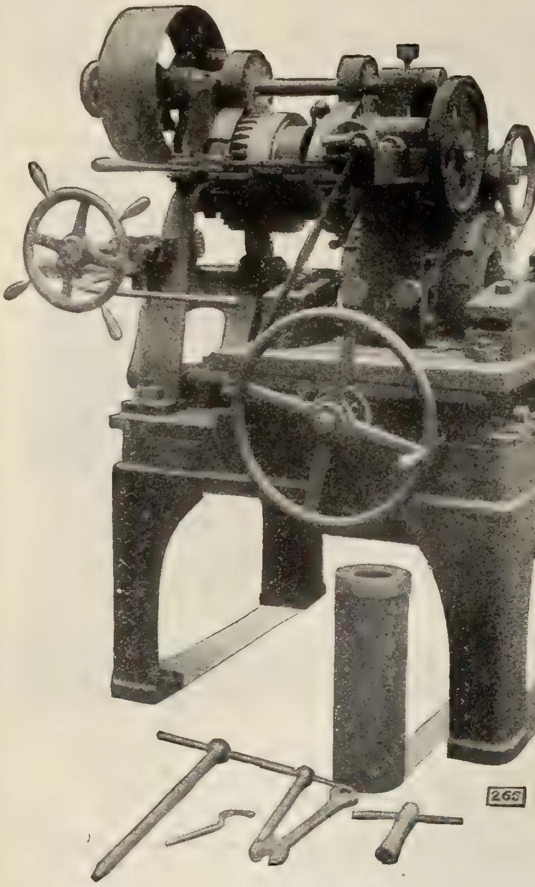
STRENGTH
ACCURACY
DURABILITY
RELIABILITY

are the cardinal virtues of the "Aurora" product, combined with modernity. Down to the smallest detail they do their work day after day and month after month faithfully.
Not only do Aurora Machines cover an exceptionally wide range of work, but every provision is made for handling this work within closest time limits and at lowest labor costs.

Ask us for details.
Stationary Head.
Sizes 20"-24
Sliding Head.
Sizes 22"-44

The Aurora Tool Works
AURORA - IND.





CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal

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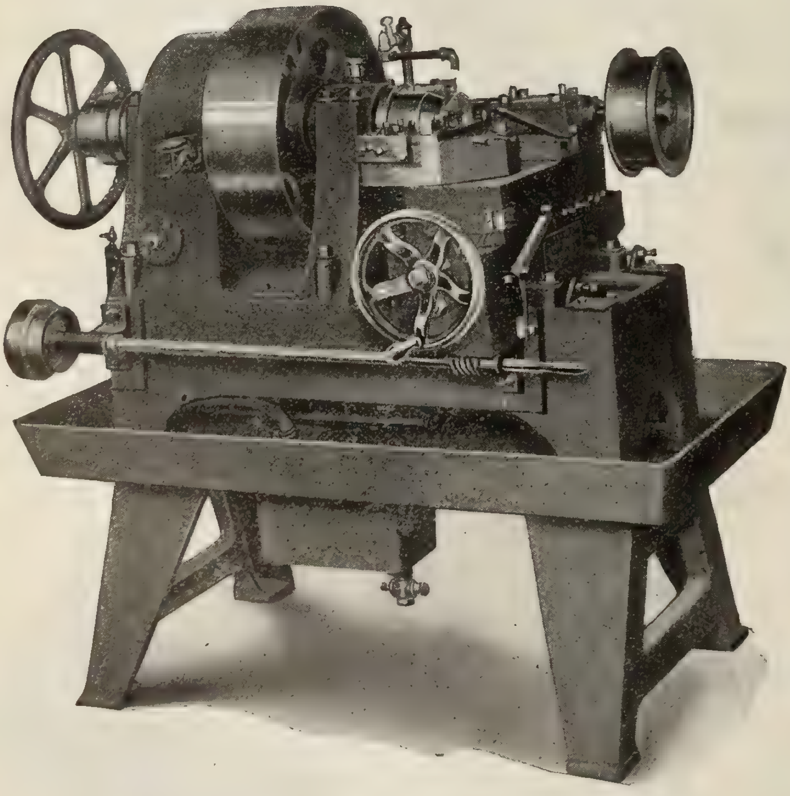


For Turning, Facing and Milling the Thread on Gas Check Plugs for 6-inch High-Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

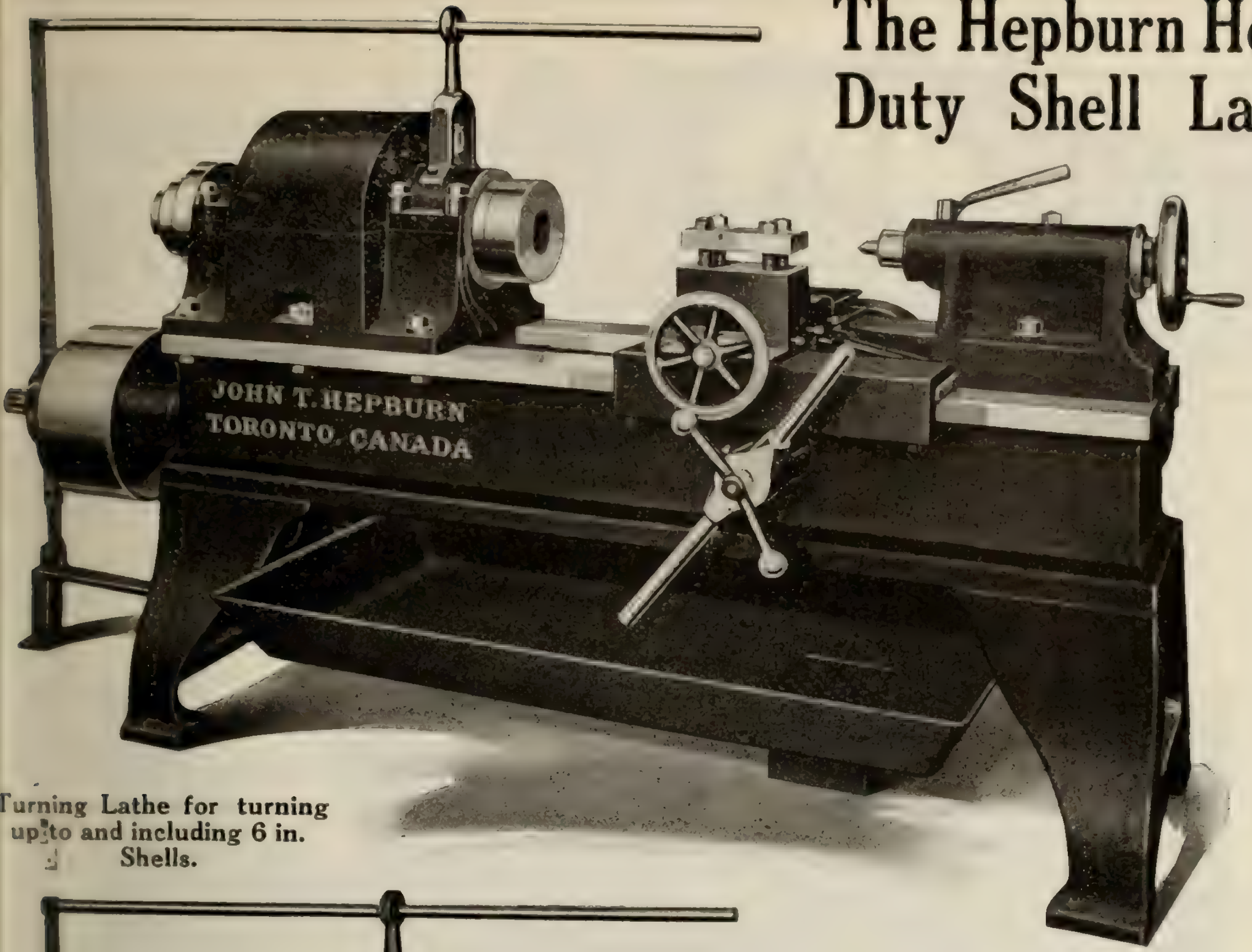
For 18 pdr., 4.5 and 60 pdr. High Explosive Shells, Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

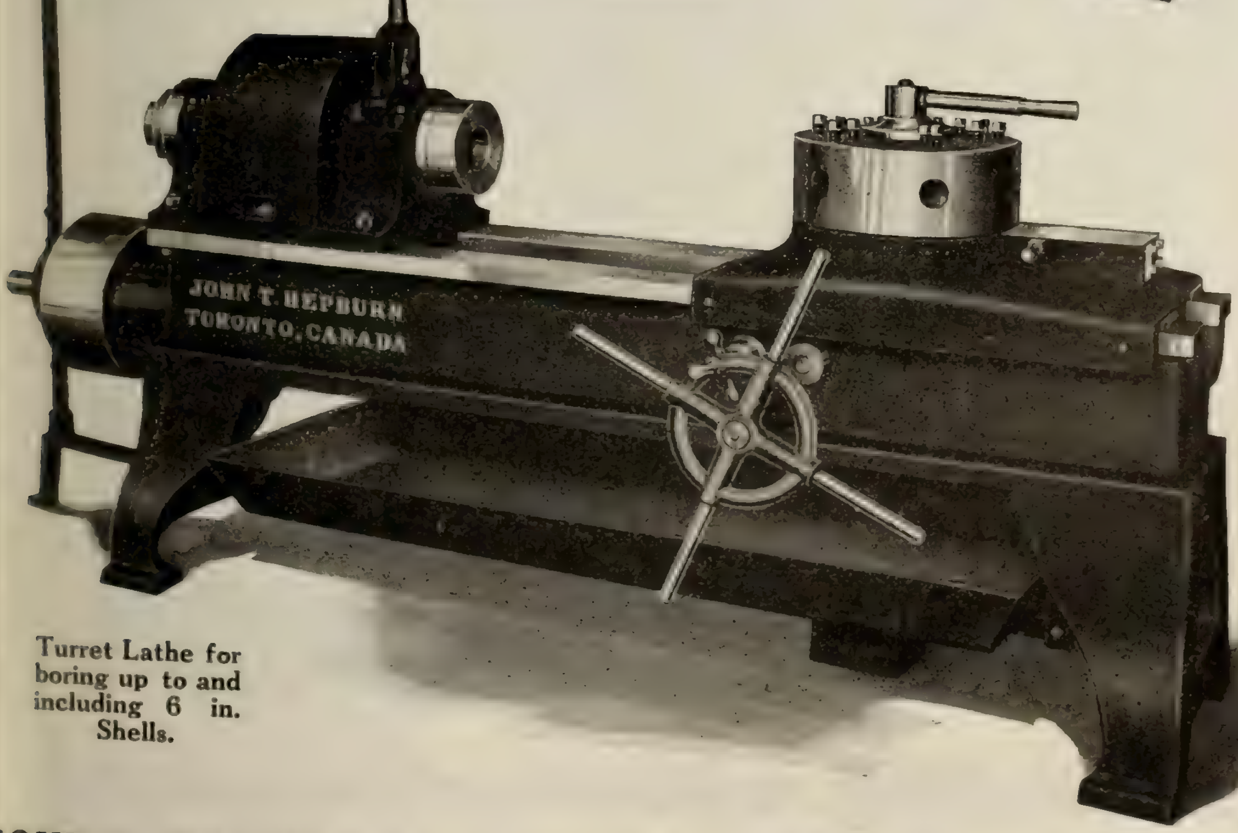
Write for prices and deliveries.

Prompt Shipment
BUILT EXCLUSIVELY BY
Edwin J. Banfield
STAIR BUILDING, TORONTO, ONT.

The Hepburn Heavy Duty Shell Lathes


JOHN T. HEPBURN
TORONTO, CANADA

Turning Lathe for turning up to and including 6 in. Shells.


JOHN T. HEPBURN
TORONTO, CANADA

Turret Lathe for boring up to and including 6 in. Shells.

JOHN T. HEPBURN, Limited, 18 to 60 Van Horne St., Toronto, Can.

SPECIAL LATHES

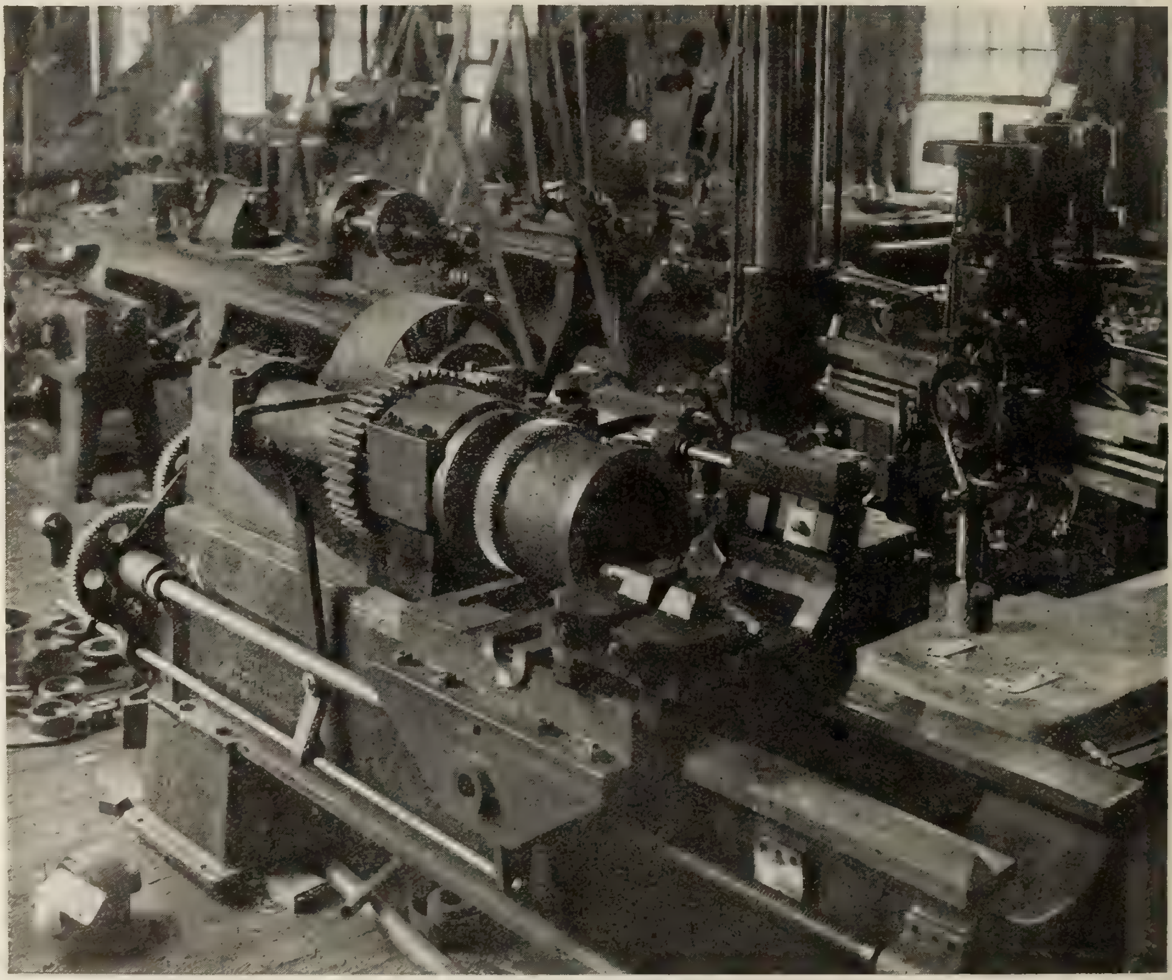
Equipped for various operations on shells and READY TO USE.

PROMPT DELIVERY

Designed and built for heavy duty and continuous service.

Drive is capable of exerting 30 H.P., all other parts in proportion.

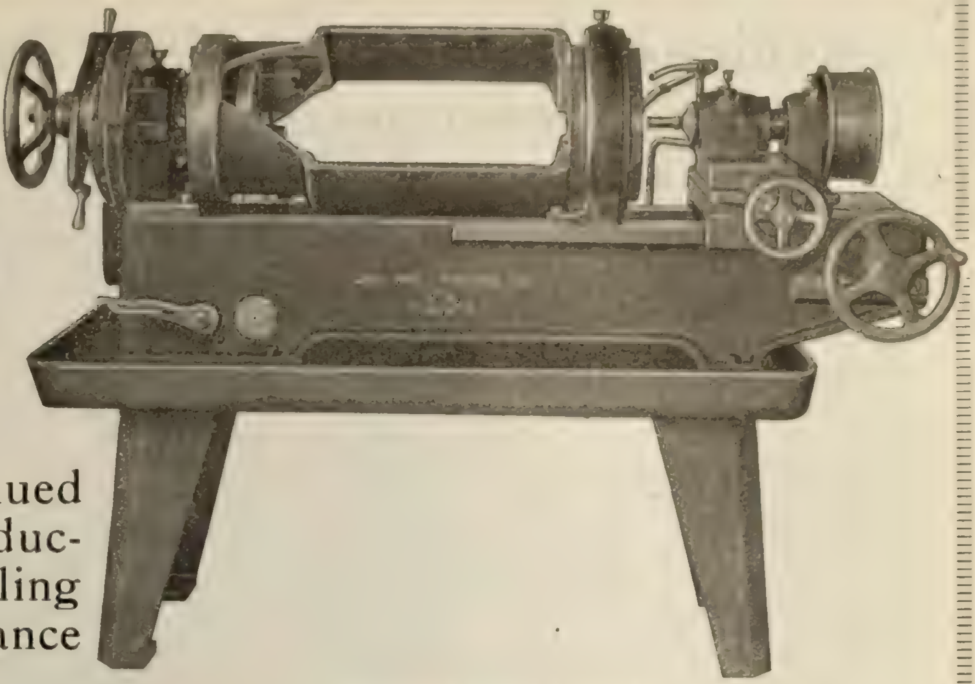
20-In. Swing 8-Ft. Bed



The Gray Mfg. & Machine Co., Limited

Toronto, Canada

Thread Millers



MACHINE FOR 9.2 SHELLS

The design and build of these machines are insurance of continued accuracy, high production, ease of handling and low maintenance cost.

Two speeds for Threading and Facing all sizes from 4.5 to 9.2 Shells, Sockets and Plugs.

Prompt Delivery

Gray's Sand Blasts and Dust Arresters

GRAY MFG & MACHINE CO.
TORONTO

Are performing a service in the manufacture of shells that is making them a necessity for this work.

They cut off the scale after nosing in.

They smooth away the boring tool marks.

They work either with sand, shot or steel grit.

Our Dust Arresters can be used with any standard make of Sand Blast.

The Gray Mfg. & Machine Co.
LIMITED
686-692 St. Clarens Avenue, Toronto

Machines that put a New Speed to Shell Banding Operations

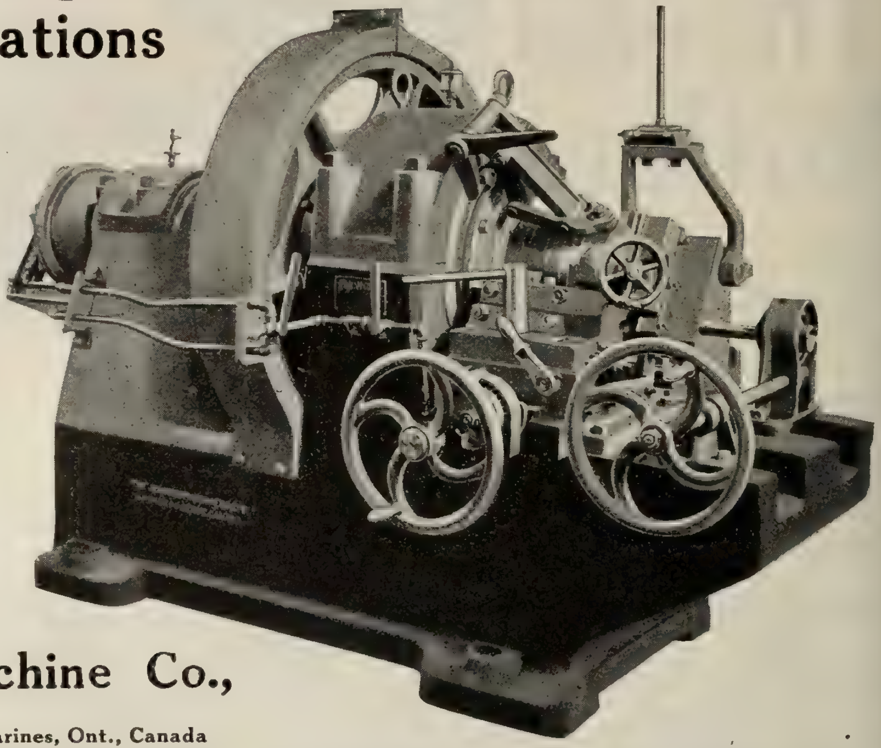
Jenckes Banding Lathes will give the best production of anything in shell banding tools yet designed.

You can clearly see by the liberal proportions of these machines that they are built for long, heavy service.

We manufacture banding machines for 18 pdr., 4.5", 5", 6", 8", and 9.2" shells.

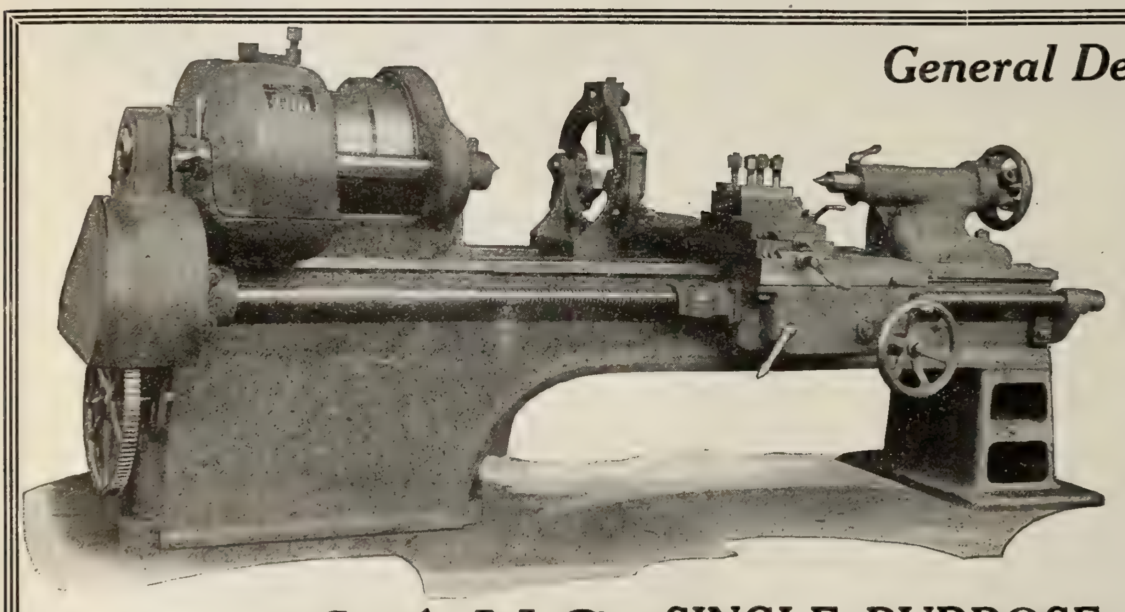
These machines are also tooled when required for the mm. sizes corresponding to Russian and French ammunition.

Single Purpose Lathe for turning copper band on 9.2" British Shell. Illustration shows spindle enlarged to adapt this machine for finishing the bands on the 12" British Shell. Air chuck and friction.



For turning the bands on 9.2" and 12" British shells.

The Jenckes Machine Co.,
LIMITED
Works: Sherbrooke, Que.; St. Catharines, Ont., Canada
CANADIAN SALES OFFICES: 727 Traders Bank Bldg., Toronto; 908 E. T. Bank Bldg., Montreal; West Chester Ave., St. Catharines; Cobalt, Ont.; Exchange Bldg., Vancouver; Nelson, B.C.



General Descriptiom:

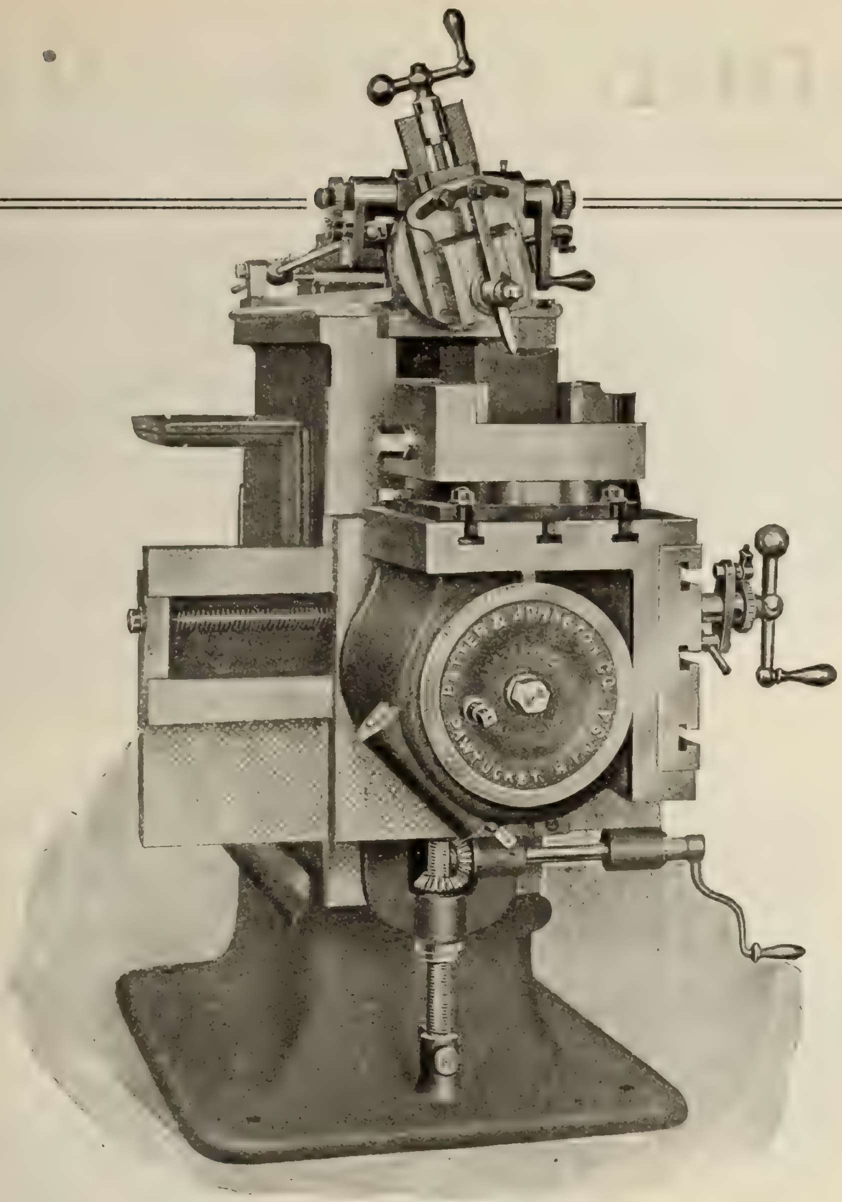
20" double back gear, three - step cone, Lang Lathes, with 10 ft. bed, with tailstock, lead-screw feed for outside turning, equipped with former brackets at rear. Special centre rest and special thimble clutch. Approximate weight 7500 lbs.

LANG SINGLE PURPOSE LATHE

Has the reputation of being the highest class lathe, and is known throughout the world. It is made to specifications of British Government, and under its strict supervision. It is supplied to all Allied Governments as well as Neutrals, making Shells. *Lang Lathes are extremely rugged and designed for special work—not adapted.*

IMMEDIATE DELIVERY.

59 BEAVER HALL HILL **PEACOCK BROTHERS** **MONTREAL, QUE.**



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

A GOOD INVESTMENT

A "B.B." STEEL BRAKE

FOR a Cheap Brake the "B.B." Steel Plate Machine is the best investment you can make. It is especially designed for rapid forming of sheets, and is suitable for a large variety of work, such as can be accomplished on an ordinary Cornice Brake. We can furnish these Brakes for bending all sizes and gauges of metal.

Write for Catalogue if Interested.

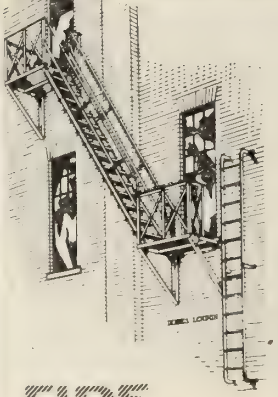
"ALWAYS, EVERYWHERE, SPECIFY 'B.B.' QUALITY."

The Brown-Boggs Co., Limited, Hamilton, Canada

Tinsmiths' Tools, Sheet Metal Working Machinery, Dies, etc.

Western Representatives: MESSRS. BISSETT & WEBB, LIMITED, WINNIPEG AND EDMONTON

D QUALITY



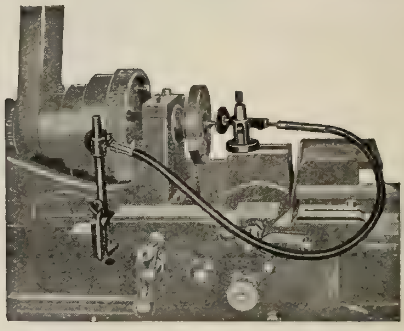
IS YOUR plant properly equipped with fire escapes? Would a big fire mean heavy loss of life? Are you open to the blame that always attaches to employers who fail to provide ample safeguards? We construct and erect the majority of fire escapes all over Canada.

FIRE ESCAPES

Write for literature.

Dennis Wire & Iron Works Co., Limited,
London, Canada.

DENNIS-LONDON



CENTER GRINDER

(Improved)

CHEAP! PRACTICAL! DURABLE!

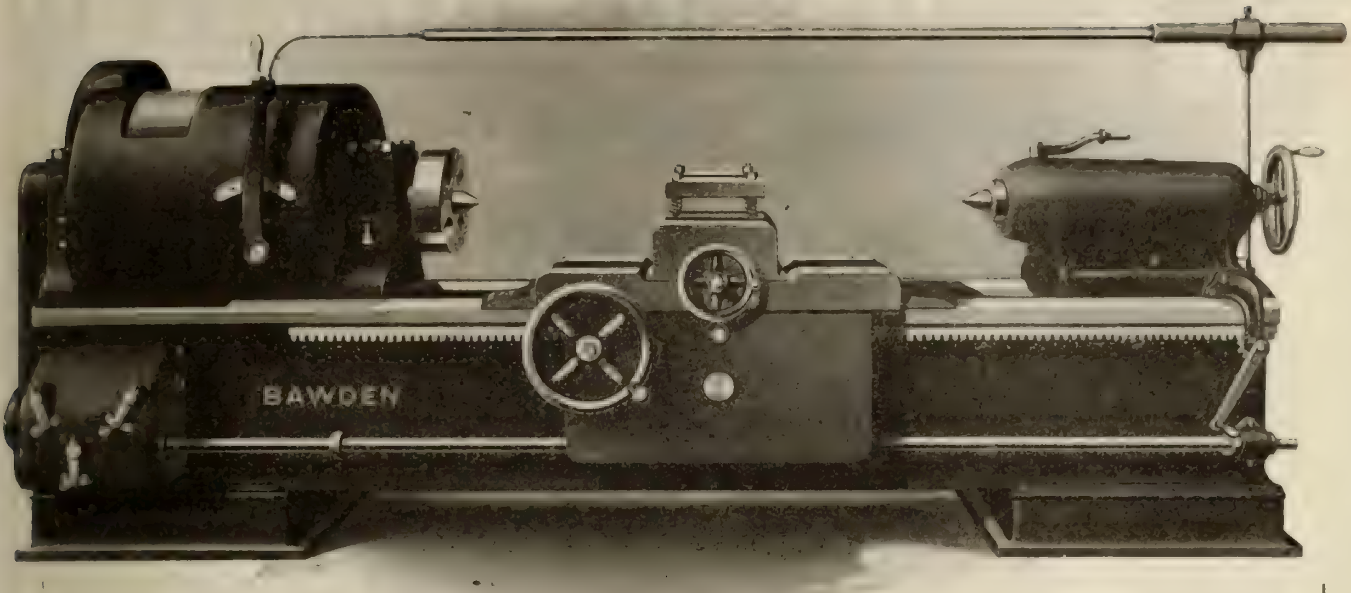
The most popular tool of its kind on the market. Adjusted in a moment.

An occasional use will keep your Lathe centers in perfect order.

Stow Mfg. Co.

Binghamton, N.Y., U.S.A.

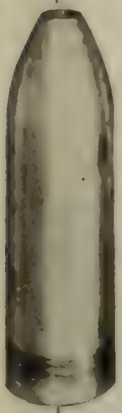
London, Eng., Stock, 85 Queen Victoria Street.
Oldest Portable Tool Manufacturers in America.



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

BAWDEN

Heavy Duty Shell Lathes



An unusual degreee of accuracy, rigidity and power is prevalent in these Bawden Tools.

The Speed is another feature which you will recognize as of great value to your shop.

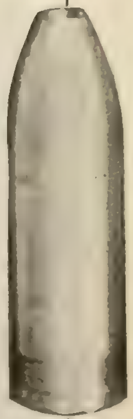
Very useful after shell contracts are finished.

For all sizes shrapnel and high explosive shells.

You will not have elephants on your hands after the war is over, but machine tools that will stand up to quality and quantity production of big jobs for years and years.

Bawden Tools have a fine record. It will pay to investigate now.

We manufacture a full line of gauges for all sizes of British, Russian and French Shells and component parts.



The Bawden Machine Co., Limited

TORONTO, CANADA

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO. LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Heavy Machine Tools for

8-inch, 9.2-inch and 12-inch Shells

18" and 20" Engine Lathes for Tool Room Equipment.

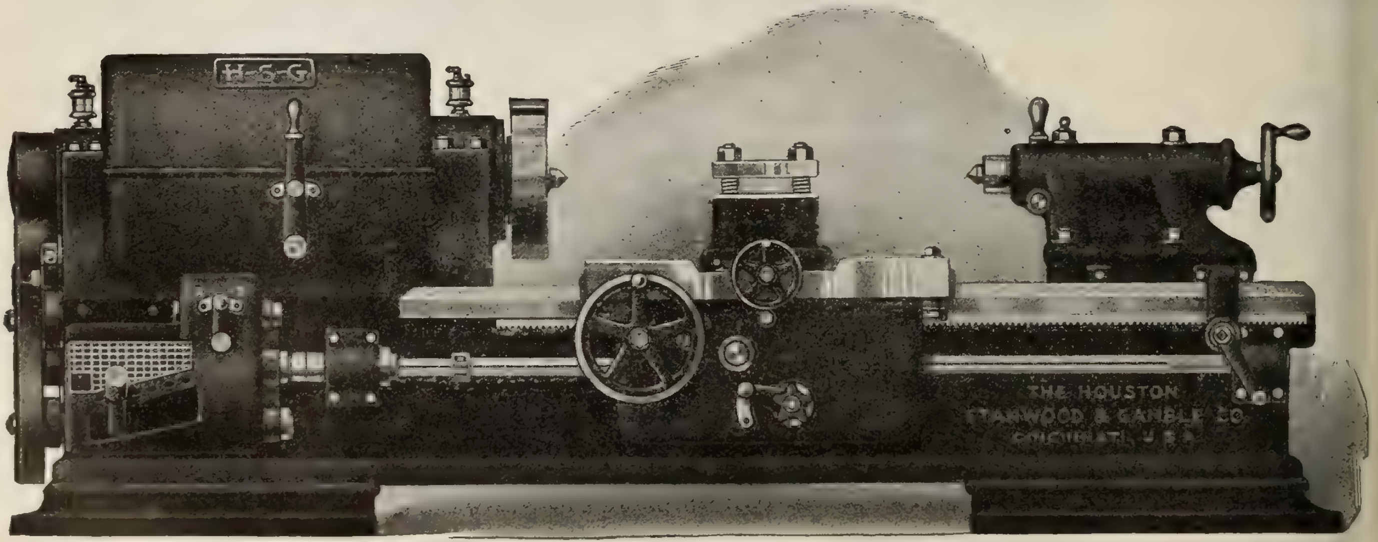
Single Purpose Turret and Turning Lathes for 6" Shells and under.

Write us for prices and deliveries on anything in the way of Iron or Wood Working Tools.

GARLOCK-WALKER MACHINERY CO., Limited, Telephone Main 5346 **32 Front St. West, TORONTO**

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds



H-S-G TRADE MARK single-pulley, high-powered, all-geared engine lathe which can be shipped promptly in three sizes, 26", 30" and 36" swing.

This is a heavy duty lathe. For instance, the 30" swing lathe has 7" face drive pulley, 8" x 10" front spindle bearing and other parts of correspondingly liberal dimensions. The net weight with 12 ft. long bed is 15,000 pounds. Weight with profiling attachment and pot chuck for boring 18,000 pounds. All gears without exception are of steel. The design and workmanship are excellent.

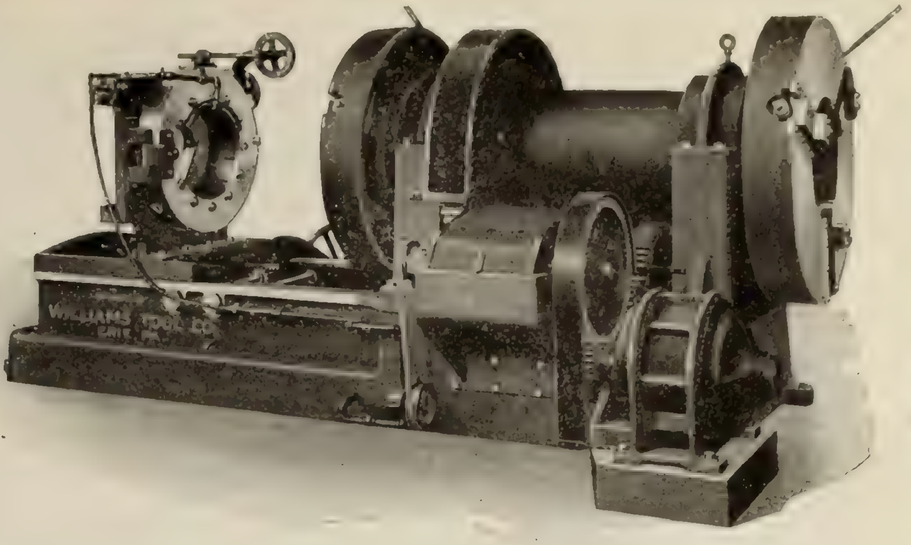
The Houston, Stanwood & Gamble Co.

CINCINNATI, U.S.A.

Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto

WILLIAMS PIPE MACHINES

Received Highest Award at Panama Exposition



The Following Letter Explains Why:

Williams Tool Co., Erie, Pa.: Rochester, N.Y., 12-3-14.

Gentlemen:—We are so pleased with our No. 3 Pipe Machine, and it is doing such splendid work for us at a minimum of expense that we are now considering the advisability of displacing two smaller machines for one of your No. 1½ or No. 2 motor drive.

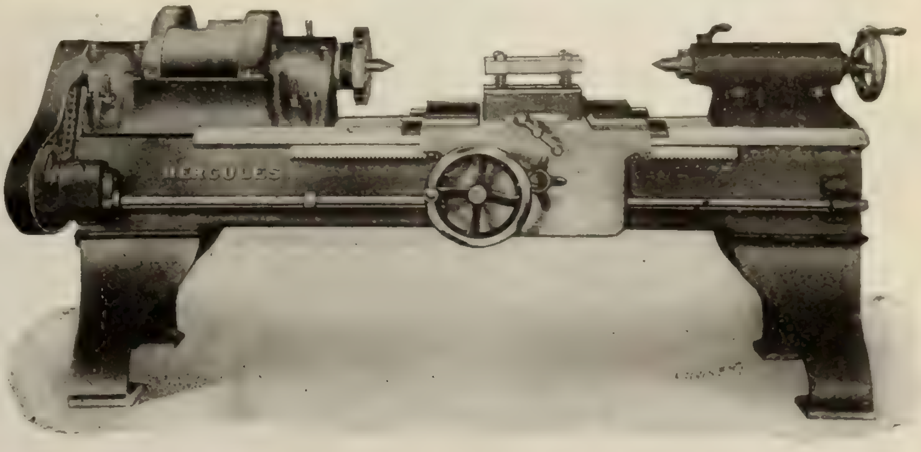
The machines which we would displace, if we make a change, are belt drive, are (names of two of the oldest and best known machines on the market) equipped with nipple holders, extra dies, etc. Both of these machines are still in fairly good condition. On what basis could we make an exchange with you?

Yours very truly, SAMUEL SLOAN & CO.

WILLIAMS TOOL CO. - - - ERIE, PA.

How Lathe Simplicity Solves Labor Problems

The great simplicity, the compact, convenient design, make the Hercules Lathe an ideal single-purpose machine. To train an unskilled laborer to perform accurately one or two operations on this machine requires but a short time. The rugged, powerful construction then enables that laborer to turn out precise work continuously at the maximum speed.

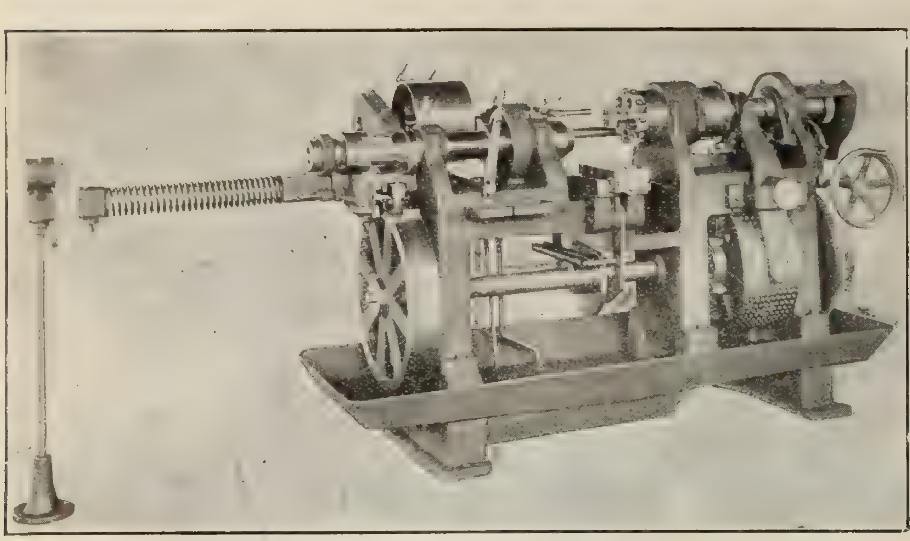


Where skilled mechanics are not always available — the Hercules Single-Purpose Lathe is the logical machine tool.

At the present time, we can still make early deliveries. Write — at once—for full details.

HIMOFF MACHINE COMPANY, INC.

128 MOTT STREET, NEW YORK CITY



No complicated mechanism or a system of cams that are difficult to determine and arrange on this machine

The rigidity of the machine has not been sacrificed for the flexible features which are embodied in the Chicago Automatic. Alignment is correct and there are no parts where excessive wear takes place—therefore, **accurate production** is assured during the long life of the machine.

In less than six weeks we can place Chicagos in your plant ready for production

The Chicago Automatic Screw Machine

Spindle speeds suitable to different sizes and kinds of stock within the capacity of the machine are obtained by changing two gears on the spindle head.

TEN YEARS OF EXTENSIVE MANUFACTURE OF ONE PRODUCT—AUTOMATICS—STAND BEHIND EVERY MACHINE.

They must satisfy you before we consider them sold.

Write us about all the features now.

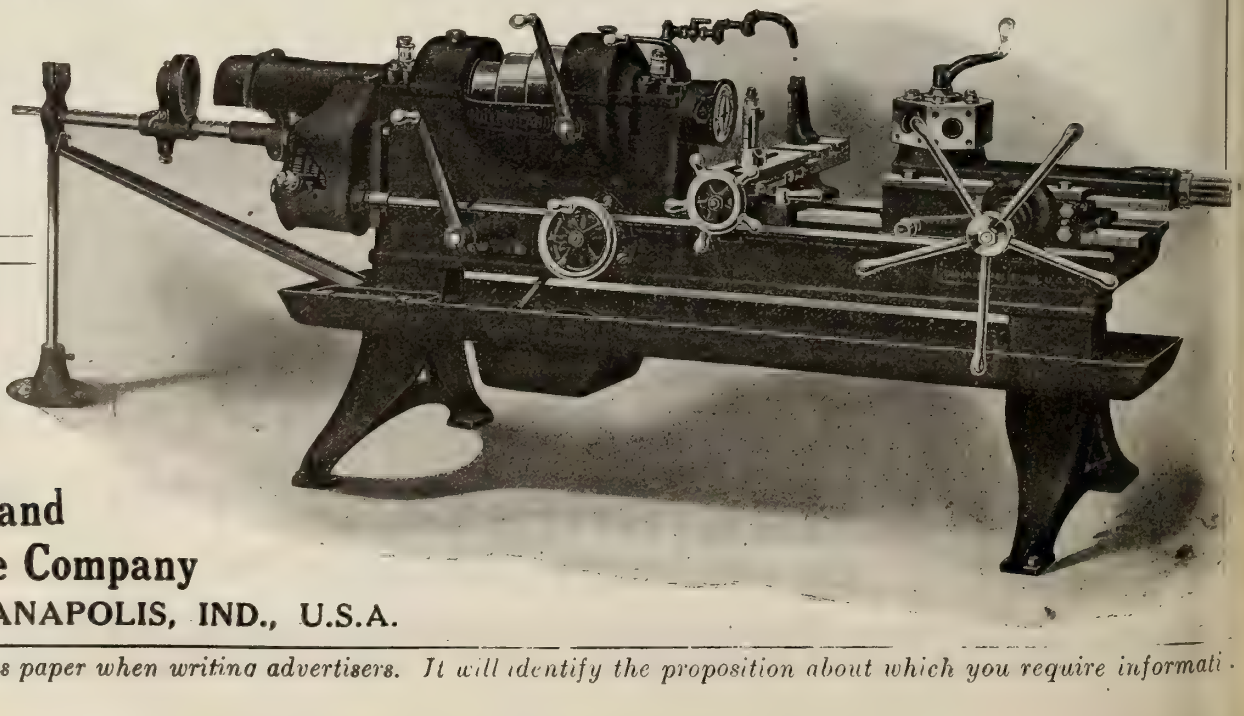
THE JOHN MACNAB MACHINERY COMPANY
NEW YORK CITY, U.S.A.
European Representatives : John Macnab, Hyde, England.

Millholland $1\frac{5}{8}$ x 10 Turret Screw Machine

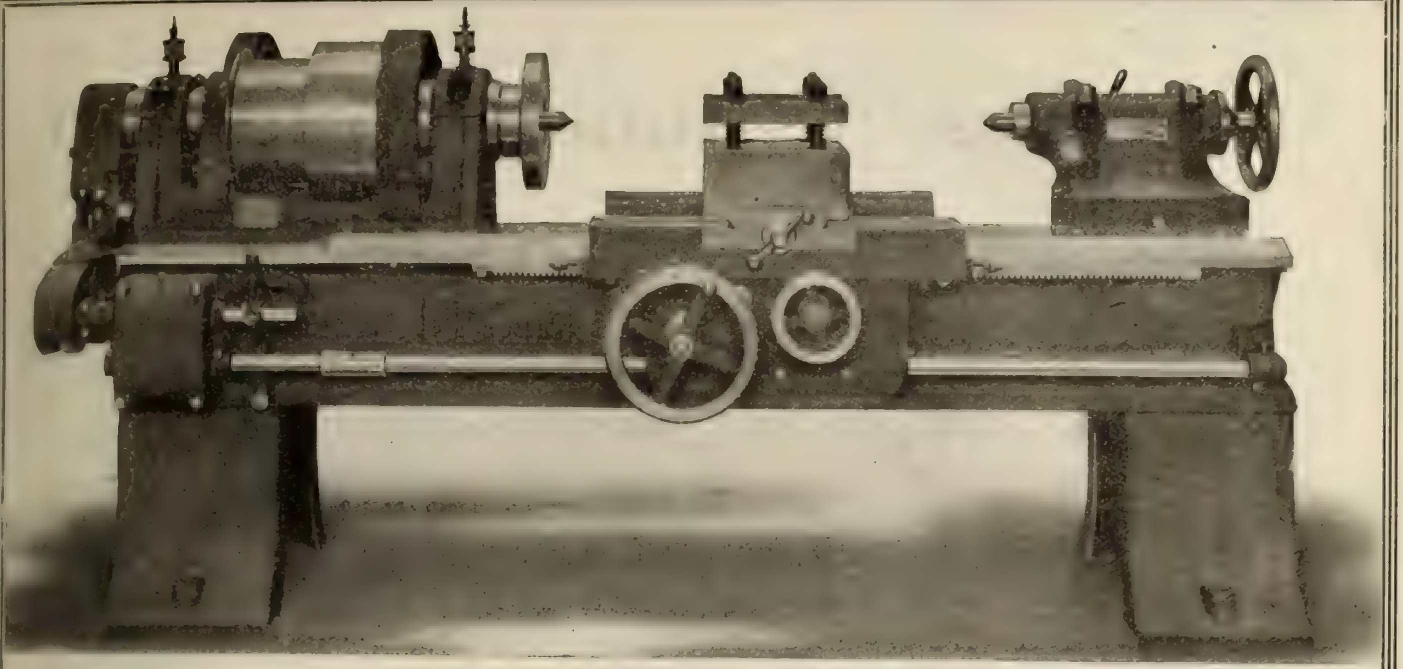
The combined result of two generations of engineering and mechanical experience. While, as a whole, it is no radical departure from established lines of the turret lathe, it has many original features, and with these features are combined well-known devices.

Safety, rigidity, convenience, production and durability are the ideas behind every step in their construction.

Your request will get you full details and specifications by early mail. Make it.



**W. K.
Millholland
Machine Company
INDIANAPOLIS, IND., U.S.A.**



Petrie 20-inch Heavy Duty Manufacturing Lathe

A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

Made in Canada **Reasonable Price** **Prompt Deliveries**

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.

KEMPSMITH

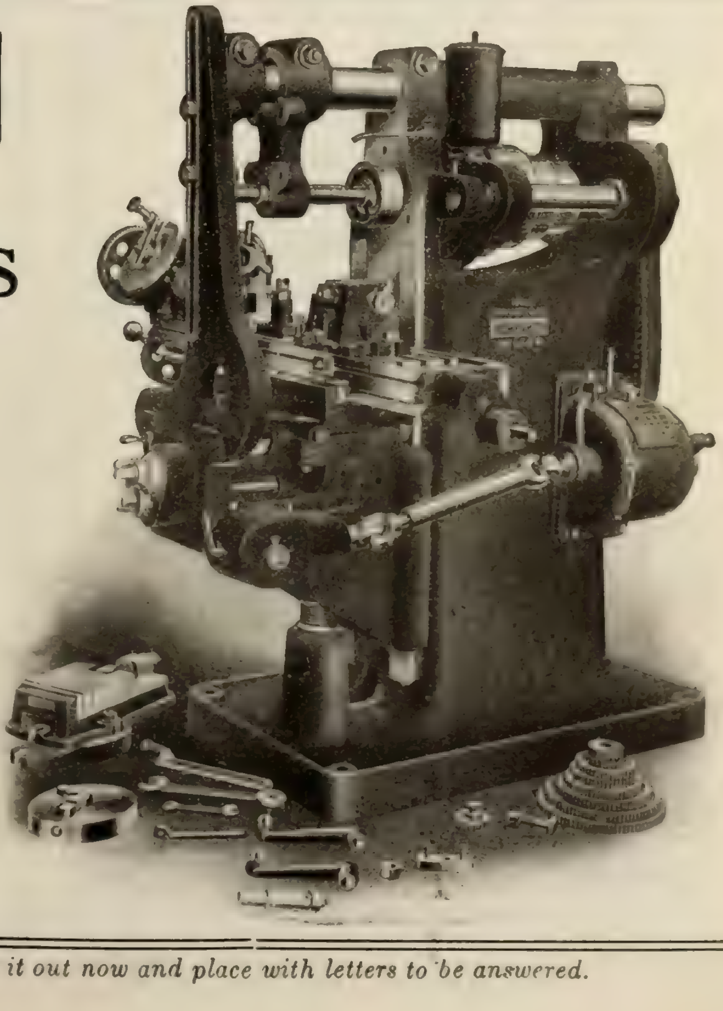
UNIVERSAL MILLING MACHINES

Are built in three standard sizes. They embody every worth-while feature to be found on a tool room Milling Machine.

We call especial attention to the Dividing Head which is part of the regular equipment of every Universal Miller.

The Kempsmith Dividing Head is compact and rigid, unusually convenient in operation and so constructed as to maintain its accuracy under heavy service.

We publish a thirty-two page book elaborately illustrating and describing this Dividing Head. A copy will be sent free on request. Just ask for "Dividing Head Book."



Kempsmith Manufacturing Co.

MILWAUKEE, U. S. A.

Agents:—Foss & Hill Machinery Co., Montreal
General Supply Company, Toronto and Ottawa
Western Supply and Equipment Co., Calgary

If any advertisement interests you, tear it out now and place with letters to be answered.

Canadian National Exhibition

Aug. 26—TORONTO—Sept. 11

"A little bigger; a little better."

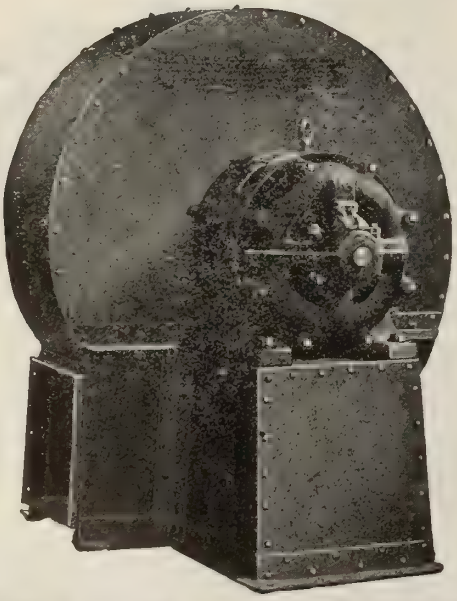
Federation of the Empire. 1,200 Performers. 400 Musicians.

Gorgeous spectacle, symbolizing and epitomizing Imperial solidarity, power and cohesion. Mammoth scenic reproduction of British Houses of Parliament, Westminster Abbey and the War Office.

WAR—on land, in the air, on and under sea.

Scenes that have thrilled the world, re-enacted by Overseas troops. Model camp; trench warfare.

Anmer, the King's horse. Acres of manufactures. Glorious agricultural exhibits. Government exhibits and practical farm demonstrations.



BUFFALO SLOW SPEED EXHAUSTERS REQUIRE LEAST POWER

Direct connected installations require accurate estimate of friction, definite speed and power requirements.

All necessary data for designing exhaust systems, given in Catalog No. 256-77, sent on request.

CANADIAN BLOWER & FORGE COMPANY
BERLIN, ONTARIO
New York, Philadelphia, Atlanta, St. Louis, Detroit, Boston, Pittsburgh

"STERLING" HACK SAWS

Sterling
POWER HACK
SAW MACHINE

MANUFACTURED BY
DIAMOND SAW & STAMPING WORKS
BUFFALO, N.Y., U.S.A.

You Could Read a Whole Book

of advertisements describing the PEERLESS HIGH SPEED, and yet you could not fully comprehend its many exclusive features. Why not try one of these machines out under your own cutting conditions and satisfy yourselves that it is a real high speed steel cutter and time saver.

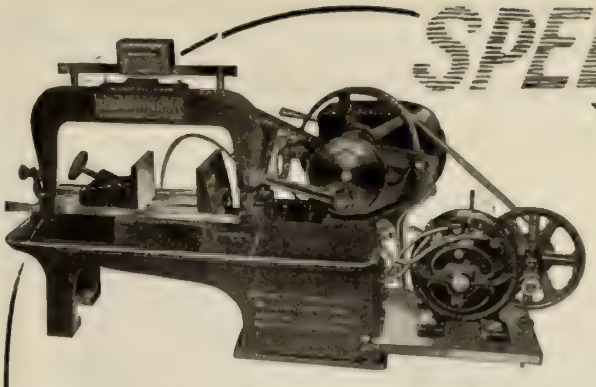
A wonderful improvement in the PEERLESS HIGH SPEED is the feeding mechanism, which is very essential in securing the highest efficiency from a blade. Instead of piling a lot of weights on top of the saw frame, a little coiled spring, weighing less than one pound, produces a uniform feed pressure on the blade of 175 lbs. Any feed pressure can be had instantly by manipulating the feed lever, yet the feed has the same action as gravity.

The saw frame on the PEERLESS can never drop in case the blade breaks which often causes great damage to the machine. Neither can the saw frame drop on to the work and break the blade in case the machine is started before lowering the frame. The saw frame automatically raises when cut is finished, which saves the operator handling a heavy cumbersome weighted saw frame.

The PEERLESS is fool proof in construction, and a boy can operate it with one hand.

PEERLESS MACHINE COMPANY
1607 Racine Street RACINE, WISCONSIN

SPEED



and a clean, straight cut

If you're interested in speed and accuracy you'll be interested in the

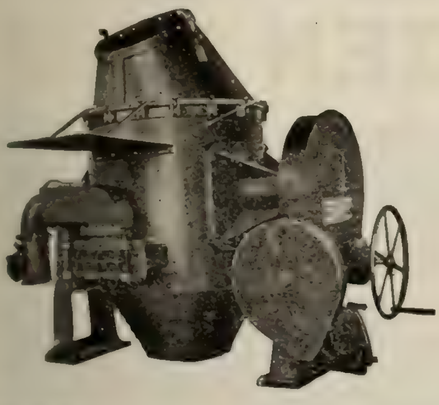
Racine Metal Cutter

It goes through angle irons, channels, I-beams, die blocks, pipe, tubing, heavy bars, etc., in a way that wins the enthusiastic endorsement of all users. It is in use in many Canadian shops. One Canadian Steel Company purchased 120 Racine Metal Cutters and has effected a saving of $11,019.50, full particulars of which will be given interested parties.

Write for list of Canadian users, and specifications.

Racine Tool & Machine Co.

15 Melbourne Ave., Racine, Wisconsin, U.S.A.



The Whiting Converter

enables any foundry to make its own steel castings of whatever grade or analysis desired.

A uniform product, reduced pattern expense and castings when wanted are only some of the big advantages gained.

Write to-day for catalog No. 106.

Complete Foundry Equipments

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB.

Cranes of all Kinds

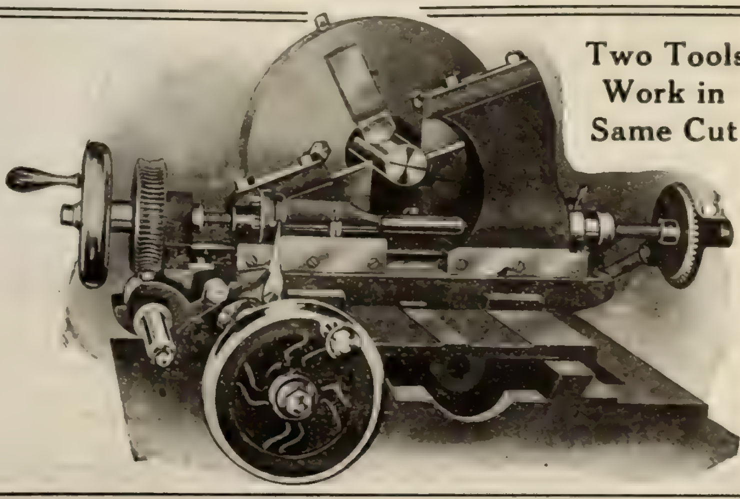
Double-Quick Cutting-Off

THE HURLBUT-ROGERS CUTTING-OFF AND CENTERING MACHINE has the advantage of two cutting tools.

Each tool is rigidly supported in a stationary block at an angle which permits a strong shearing cut.

WITH THIS MACHINE PRODUCTION CAN BE NEARLY DOUBLED, and the utmost accuracy maintained under the hardest of work.

Read full details. Write for catalogue.



Two Tools Work in Same Cut

Hurlbut-Rogers Machinery Company

South Sudbury, Mass., U. S. A.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow, Newcastle-on-Tyne.
H. W. Petrie, Toronto, Canada.

If any advertisement interests you, tear it out now and place with letters to be answered.

The Davis-Bournonville Apparatus Leads the World

Portable Outfits from $130 to $13,000.

All kinds of Welding and Cutting Plants and Supplies.

Medal of Honor—Highest Award at Panama Exposition.

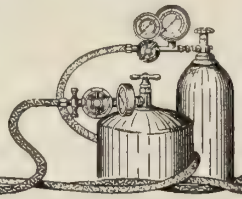
Agents for Electrolytic Oxygen, 99.80% pure.

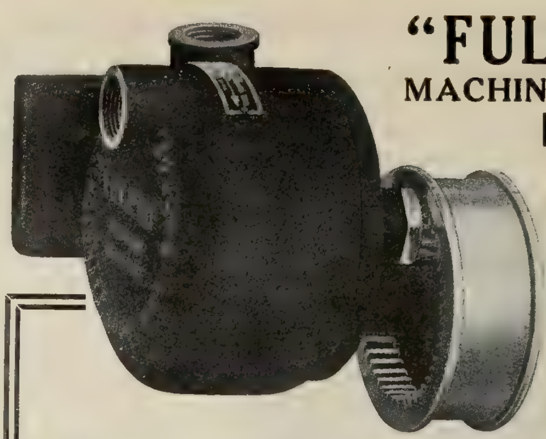
We also do repair work of all descriptions.

Write us for price list.

Carter Welding Company
561 King Street West, Toronto
Tel. Ade. 893

Canadian Agents for
The Davis-Bournonville
Apparatus





"FULFLO" MACHINE TOOL Lubricant PUMP

You can drive your machines faster

but your cutting tools won't stand it — the speed burns them up.

A cutting tool will stand up to higher speed and heavier feeds, providing it is kept cool.

The "FULFLO" Machine Tool Lubricant Pump supplies a good "HEAVY" stream of compound sufficient to carry away all the heat.

No gears or other close-fitting parts to be affected by the grit, dirt, or small chips that are always present in the coolant. No clogging.

The only working part is the impellor. Since no check valve, reverse valve or any other kind of valve is present in the pump or pipe, other than the stop cock, the usual valve troubles are eliminated.

Easily attached to any machine. **Insist that the new machines you buy be equipped with the "FULFLO."**

The Cincinnati Lubricant Pump Co.
126 Opera Place **Cincinnati, U.S.A.**

"CLAUDE" OXYGEN MADE FROM LIQUID AIR

The Most Efficient—Absolutely Safe—in Purest Form—Full Measure—at Low Price—
—Delivered the day your order arrives—

OXY-ACETYLENE
Welding and Cutting Plants
—(Made in Canada)—
as well as
Pure Dissolved Acetylene
supplied by

L'AIR LIQUIDE SOCIETY

—Three Canadian Distributing Stations—

26 Boler St.
WEST TORONTO

Maisonneuve
MONTREAL

325 William Ave.
WINNIPEG

—Branches the World Over—

L'Air Liquide Society, Maisonneuve,
MONTREAL, P.Q.

Gentlemen,—Will you please send, without obligation to me, postpaid, your New Booklet?

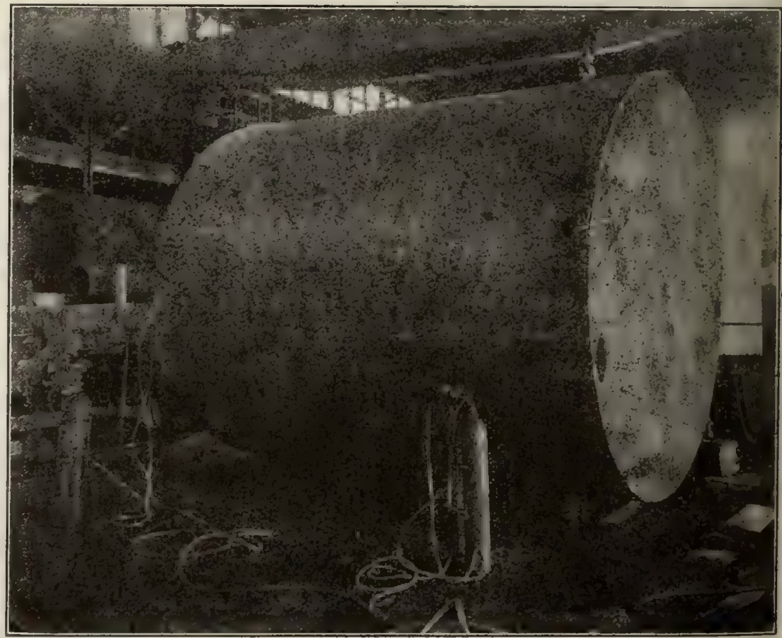
Name ....

Address ....

Province .... Date ....

Business ....

C.M.



Steel Tank—10 ft. x 8 ft.—ALL WELDED—Made in Canada

BOILER and TANK MAKERS:— **WRITE US for MORE DETAILS.**

← **THIS COUPON will bring you much information.**
Do not postpone. **Send Coupon NOW.**

--Good Files Promote Efficiency

You cannot get away from the fact that when a man is working with a good tool his pride in his work increases. A file worn smooth irritates the most even-tempered workman, while the high-strung, skilled mechanic who works with a bad file for half an hour costs his employer more in wasted mental and physical energy than possibly a dozen files may cost him—in the final results.

Educate your men to throw away their files when they reach their "inefficient point." It is economy. It is efficiency. It promotes good temper at the bench.

The Famous Five Are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(Made in Canada)

GT. WESTERN
AMERICAN

NICHOLSON FILE CO.
PORT HOPE
ONTARIO

Oxy-Acetylene Welding and Cutting

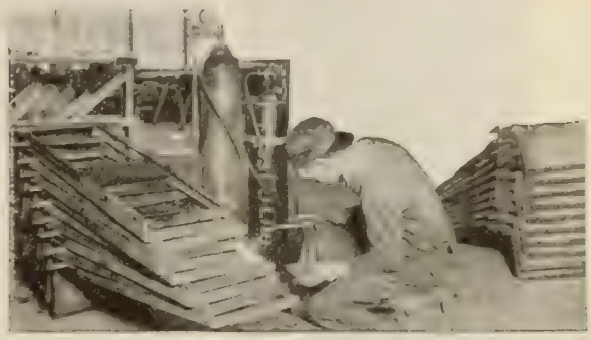


Illustration shows operator welding the corners on steel truck frames, using the Prest-O-Lite Process.

Prest-O-Lite Process Welding Speeds Up Production

By welding the corners on the frames of a series of trucks a number of welds are made without moving the welding outfit. When this pile is completed, the apparatus is quickly and easily moved to another pile similarly arranged.

This is a typical example of how oxy-acetylene welding is simplifying and lowering costs in manufacturing operations. **Better than complicated and expensive riveting and threading.** Hundreds of other routine manufacturing operations are handled better and at lower cost by oxy-acetylene welding.

You secure all the advantages of welding in the simplest, most efficient and most economical form by adopting the

Prest-O-Lite PROCESS

Employs both gases (acetylene and oxygen) in **portable cylinders. Prest-O-Lite Dissolved Acetylene** (ready-made gas) is backed by Prest-O-Lite Service, **which provides dry, purified gas, insuring better** welds, quicker work, and lower cost, and also avoids **the large initial outlay and heavy depreciation in**curred in making crude acetylene in a carbide generator.

Necessary equipment is not expensive. We furnish high-grade welding apparatus for $75; acetylene service at additional cost. Adaptable for oxy-acetylene cutting by the addition of special cutting blow-pipe. Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene any average workman who understands metals can learn the process quickly and easily

The Prest-O-Lite Literature is thoroughly illustrated, and is full of helpful suggestions to progressive manufacturers designing and production engineers. **Ask for it.**

The Prest-O-Lite Company, Inc.
Dept. F.
The World's Largest Makers of Dissolved Acetylene.
Canadian Main Office and Factory
MERRITTON, ONTARIO
Factory Branch: Winnipeg, Man.
53 Branches and Charging Plants

Keep Canadian Factories Going. Insist on Buying Goods MADE IN CANADA.

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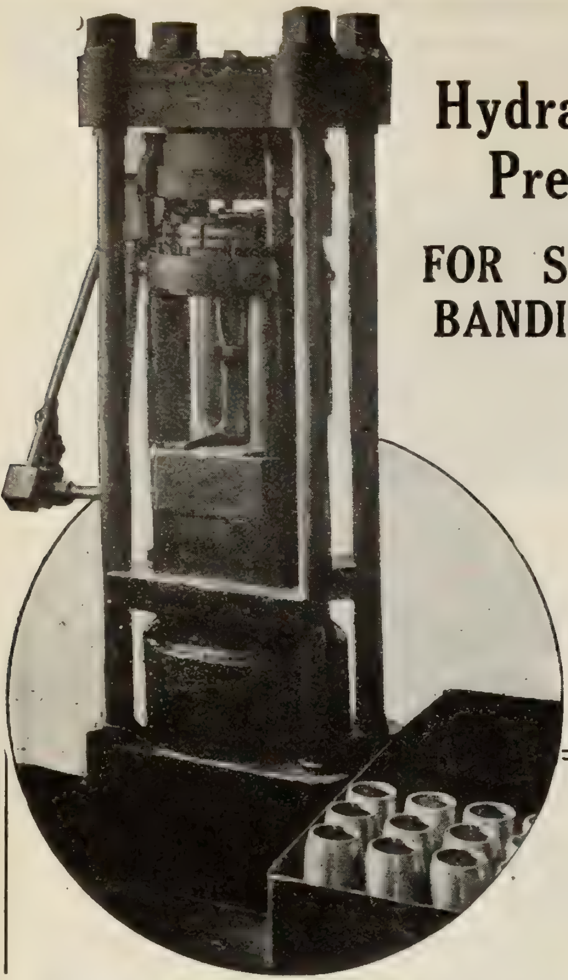


Hydraulic Press

FOR SHELL BANDING

Simple, Strong, Reliable, Low Cost

Power is obtained from continuous running belt-driven pump located near the press and is applied to the ram underneath the table.

Table Rises and Forces Steel Taper Wedges, eight in number, up into the Hollow Steel Forging at the top, the wedges conforming to the shape of the shell and are thus pressed in equally against the copper band; pressure is then released, the shell is readily taken out.

Operates by lever shown on the left-hand side. Pressure gauge behind.

As this machine is a standard Hydraulic Press, it can be used in any other capacity.

SEE OUR BIG TIME AND LABOR-SAVING ELEVATING TRUCK in next week's ad. It is proving indispensable everywhere.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises.**

We shall be pleased to submit prices and give any particulars required.

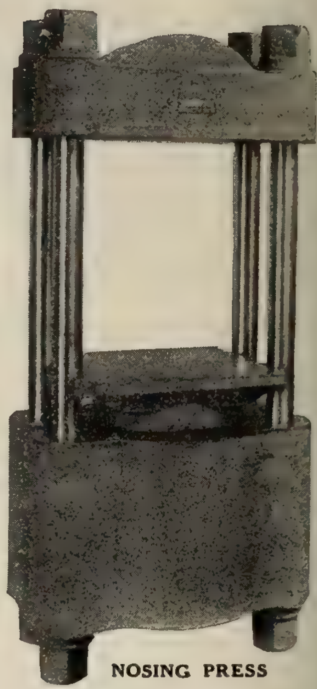
THE CHAPMAN DOUBLE BALL BEARING CO. OF CANADA
LIMITED
330-351 Sorauren Avenue, TORONTO, CANADA
TRANSMISSION BALL BEARING CO. Inc.
1407 West Avenue, Buffalo, N.Y.

PRESSES

Pumps and Accumulators

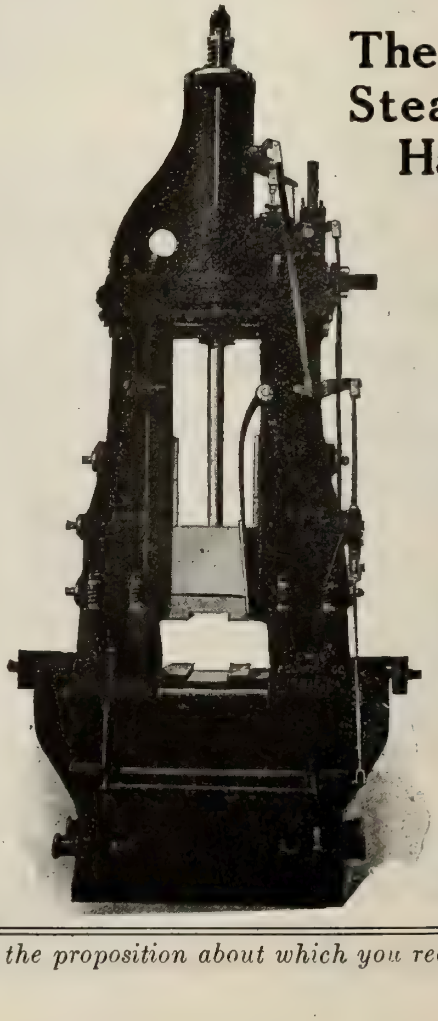
FOR ALL PURPOSES

Made in Canada



NOSING PRESS

WILLIAM R. PERRIN, Limited
TORONTO



The "ERIE" Steam Drop Hammer

is the last word in Hammer construction. Ask any user.

A list will be supplied upon request.

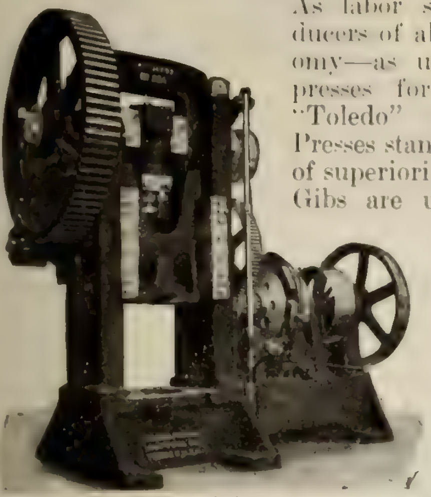
We also build Trimming Presses.

Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

Erie Foundry Co.
ERIE, PA.

"TOLEDO"

Sets the Standard for Press Progress



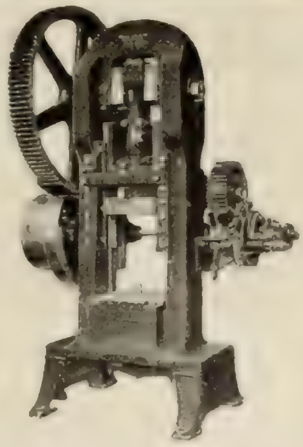
As labor savers—as producers of all around economy—as unusually rigid presses for hard service "Toledo" straight sided Presses stand as an exhibit of superiority.

Gibs are unusually long to insure rigid support for slide. Large diameter crank shaft and unusually heavy connection screw hammer forged from special steel.

Twenty sizes with dimensions to suit requirements. Adapted to hot or cold trimming; combination cutting and drawing, reducing, punching, piercing, shaping, stamping and embossing.

A Press for Every Purpose.

The Toledo Machine & Tool Co.
Toledo, Ohio



Presses Reduce Your Up-Keep Costs

Bliss Straight-Side Presses

embody a strength and rigidity that minimize maintenance cost of both machine and tools.

They are adapted for heavy punching, piercing, shaping, drawing and stamping. Built in ten standard sizes, there is a particular size to meet your needs. Write to-day for descriptive matter stating requirements.

E. W. BLISS CO.
20 ADAMS STREET - BUFFALO, N.Y., U.S.A.
Chicago Office - 622 West Washington Boulevard
Detroit Office - - - - Dime Bank Building

Elmes Hydraulic Press No. 676

With ¾-in. Automatic Lever Operating Valve No. 677-A

This press is of steel and semi-steel construction, and the stands which support the press are threaded at the ends to receive the steel columns and have holes for fastening to the floor. The platen is guided by the columns.

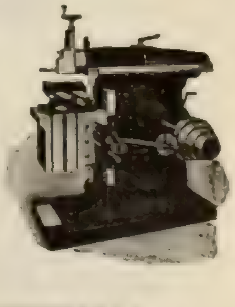
The operating valve is attached to the cylinder, and is designed with a weight to be set for the pressure desired, and releases automatically. To start the ram up, the lever is pushed down; upon the ram reaching the desired pressure, the lever automatically releases (acting as a safety valve as well), causing the ram to descend. Valve body is made of bronze, and other parts are made of tool steel and machine steel. If desired a hydraulic gauge can be attached to show the various pressures, although with this valve it is not necessary.

Write for our Hydraulic Machinery Catalogue.

Charles F. Elmes Engineering Works 217 N. Morgan St
Chicago, U.S.A

Over 50 years' experience building hydraulic machinery.

Cut Your Shop Costs



Nobody would think of putting 16-inch lathe work on a 30-inch lathe, then why leave small parts on a large Milling Machine?

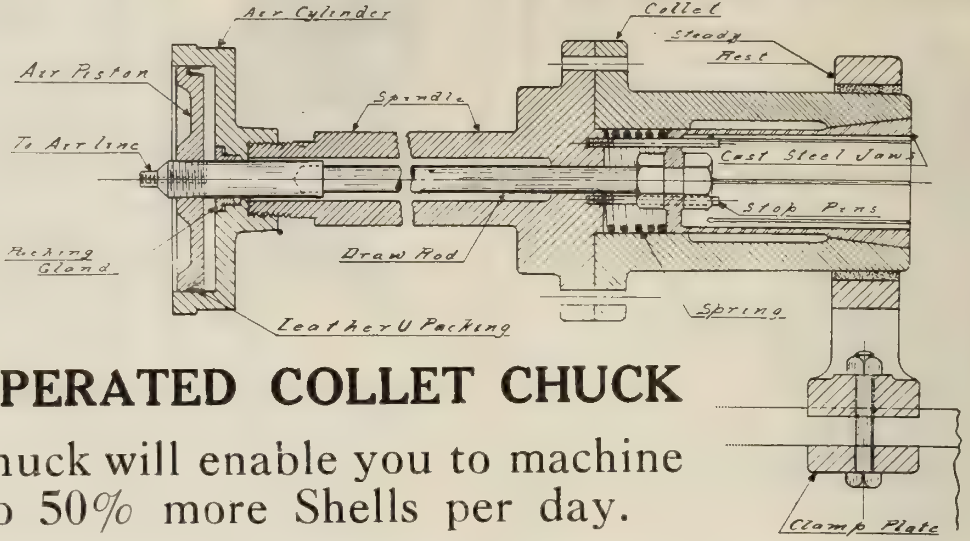
A Steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

That same principle applied to your small planer work will cut the cost of planer work.

A Steptoe Shaper will do the work faster because it can be handled quicker.

The John Steptoe Company, CUMMINSVILLE,
CINCINNATI, OHIO, U.S.A.

INCREASE YOUR PRODUCTION


Air Cylinder
Collet
Steady Rest
Air Piston
Spindle
To Air line
Cast Steel Jaws
Stop Pins
Packing Gland
Draw Rod
Spring
Leather U Packing
Clamp Plate

AIR OPERATED COLLET CHUCK

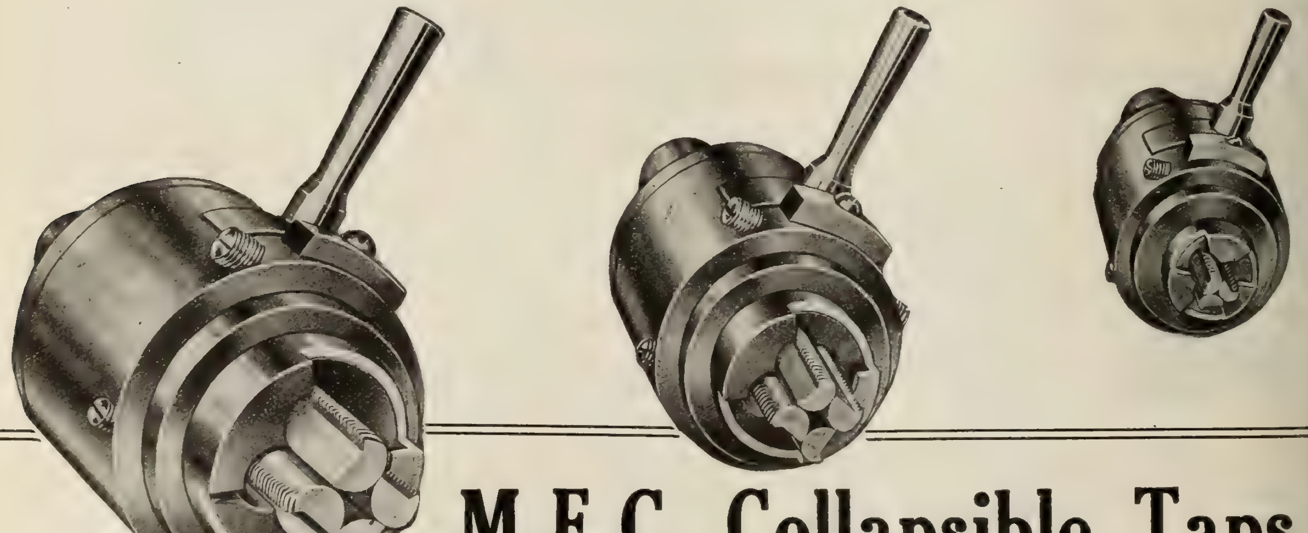
This Chuck will enable you to machine 25 to 50% more Shells per day.

MADE IN ALL SIZES. ADAPTABLE TO ANY HOLLOW SPINDLE LATHE.

Particulars on Application. *Prompt Delivery.*

HYDE ENGINEERING WORKS

P.O. Box 1164 **27 William St., MONTREAL**



M.E.C. Collapsible Taps

Big Favorites of Shell Makers

Manufacturers of shrapnel shell parts find them invaluable because of their convenience, rigidity and accuracy. Many of Canada's largest manufacturers of munitions have adopted them as **a practical way of reducing cost and increasing output,** after putting them to a severe test.

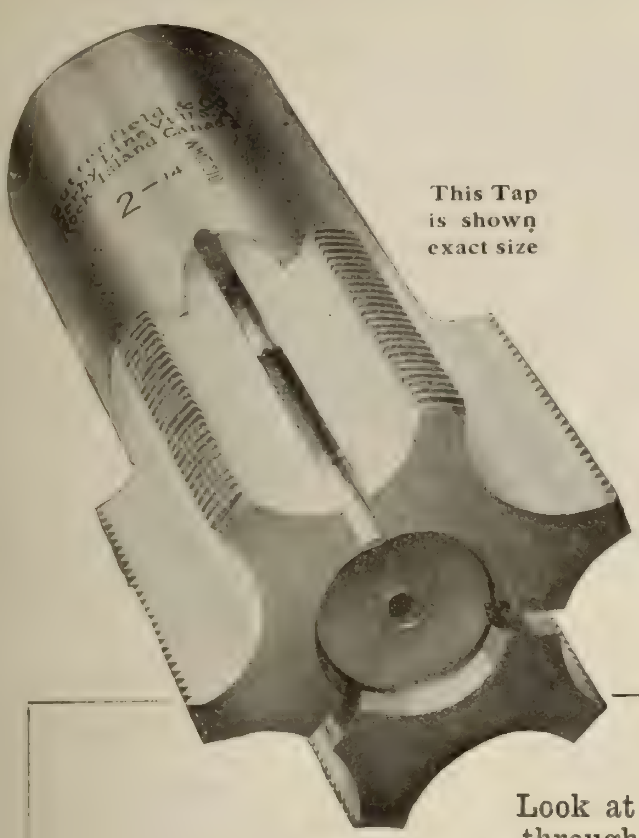
Would you like to hear what users have to say? We'll be glad to put you in touch with our Canadian customers.

Drop us a line now for our proposition—it's a liberal one that's sure to appeal to you.

MANUFACTURERS EQUIPMENT COMPANY

175-179 North Jefferson Street, CHICAGO

FOREIGN AGENTS: C. W. Burton Griffiths & Co., Ludgate Circus, Ludgate Hill, London, England. Bureaux & Caisse, 39 Rue de Lappe, Paris, France. Geo. A. Todd, 826 Traders Bank Building, Toronto.



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Look at that solid strength through the shank of this tap — it means power that will stand up under the heavy strain of exceptional production.

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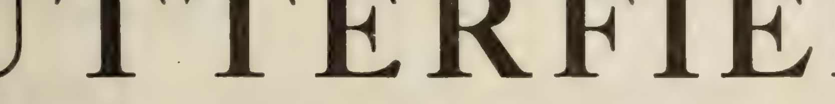
Taps, Dies



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MURCHEY
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—very extensively used on 6-in., 8-in. and 9.2-in. shells.

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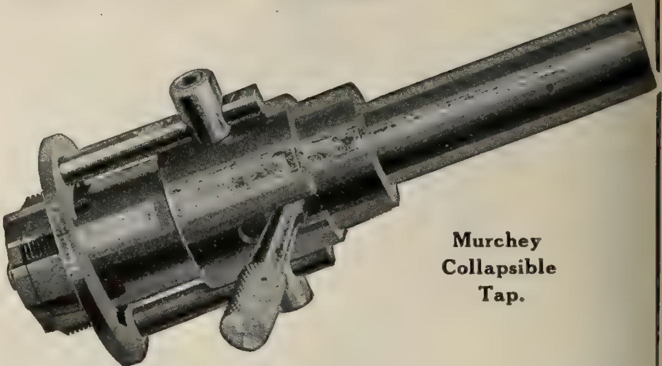

Murchey Collapsible Tap.

MURCHEY Taps and Dies save the buying of extra machines. The time alone required to thread one of the large shells, together with rehandling, will more than pay for the tap in a very short time.

The largest American firms are doing all the threading on shells with Murchey Collapsing Taps and Murchey Self-opening Dies, and are getting most desirable results.

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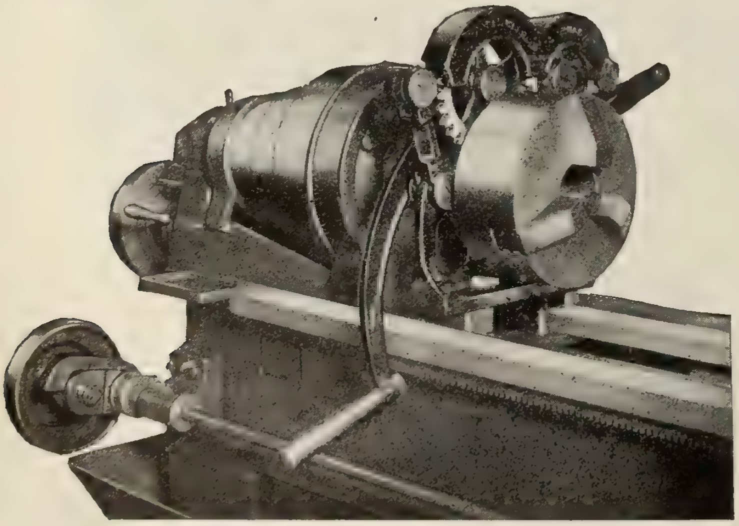

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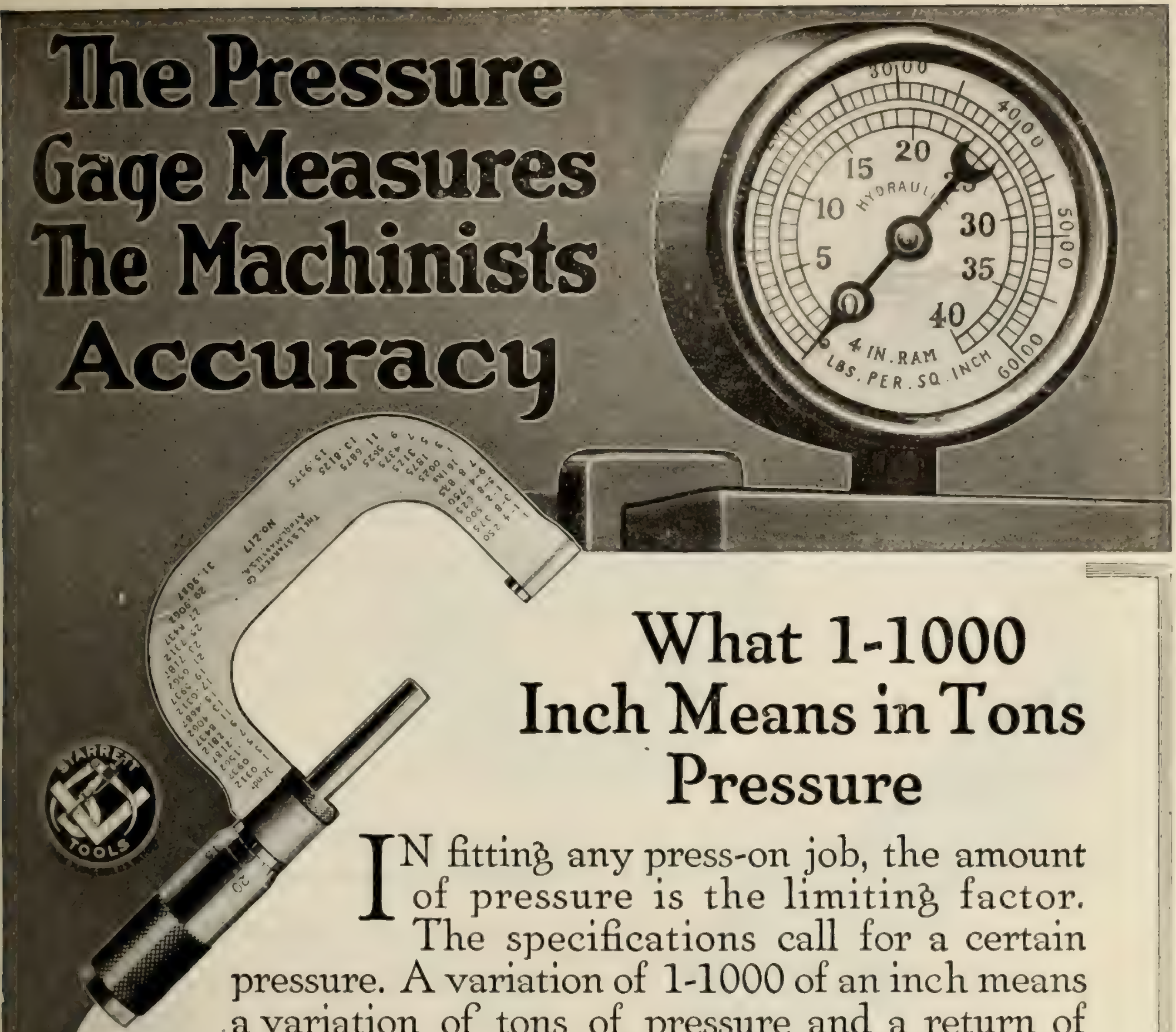
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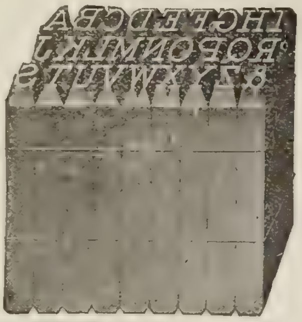

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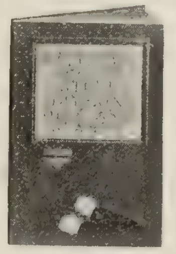

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Can make shipment of Nose Sockets, and Base Plates for British 6-in. H.E. Mark XVI soon as necessary inspections are authorized and executed.

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Does its work with speed and thoroughness.

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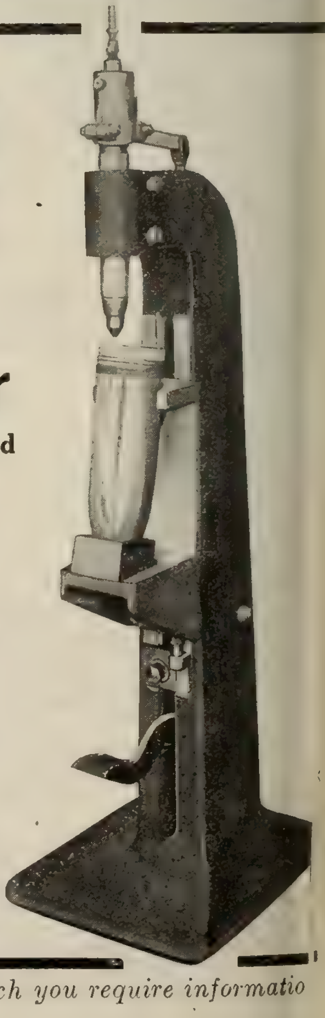

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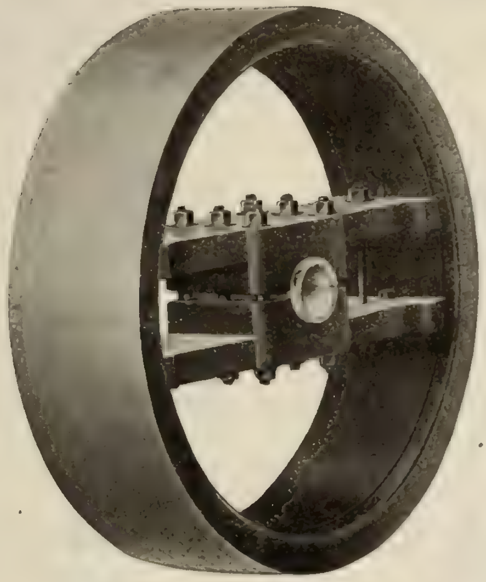

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The Dodge Standard Wood Split Pulley

The Wood Split Pulley is better than either cast iron split pulleys or steel split pulleys for the following reasons—

The wood pulley is lighter, stronger, better balanced, and provides a very much better belt surface. It costs 33 1-3% less money and provides 50% more returns in horse-power value. It may be run at very much higher speeds with no danger of bursting—also it may be had quicker and in a greater range of sizes.

It costs less to get—less to put on—and less to keep.

We make approximately 300 Dodge pulleys every day—everybody uses them.

There are more Dodge pulleys making ammunition than any other kind—you can get them quick.

Every pulley is thoroughly nailed. Every pulley is guaranteed for Double Belts.

We are Canada's greatest pulley makers.

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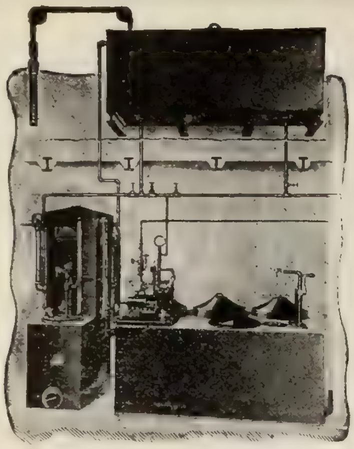

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Will cut your oil bill 65% or more. Will reduce the fire hazard to a minimum. Will promote cleanliness throughout the plant. Will mechanically do its work 24 hours a day, 365 days in the year, better than it is possible to do it by hand.

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ANACONDA BELTING

It is made of stitched canvas for the reason that this material, processed the ANACONDA way, makes belts more waterproof, with less slip, less stretch and of greater general serviceability than any other belts of any kind—leather, rubber, balata, or fabric, including canvas.

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Write us now about your particular belt troubles.

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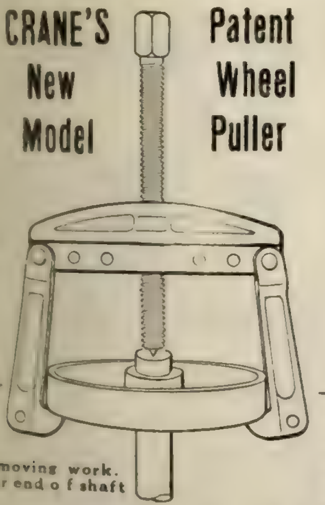

Patent Wheel Puller

Removing work. near end o f shaft

For Removing

Transmission and Cam Shaft Gears, Auto Wheels, Fly-Wheels, Sprockets, Collars, Couplings, Propellers, Universal Joints.

For straightening Shaft, Bending Pipe, etc.

The Screw has a flat end with inserted tempered tool steel point that will not spread centres. Makes its own centre on work that has none. The strain is taken on the flat end of the screw. Grease to keep from cutting. The screws are made of high carbon steel and case-hardened all over. All Pullers are furnished with two sets of new combination hook extension arms.

The Pipe Bending Attachment is indispensible in a repair shop for straightening propeller and jack shafts, bending exhaust pipes, and removing universal joint yokes, etc. **Drop a line for full particulars.**

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Canadian Distributors: Canadian Fairbanks-Morse Co., Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary. John Millen & Son, Montreal, Toronto, Winnipeg, Vancouver.

Tighten the Grip of the Main Belt

This cork inset pulley in every other respect exactly like the standard, smooth-faced American Steel Split Pulley—insures absolute grip at that "one time out of a thousand" when other pulleys **might** slip.

It is made to take the load of the main drive belt and transmit **all of it.** So the cork insets are put in. They **hold** the belt. It **can't** slip. The belt would tear first.

The insets will wear almost as long as the pulley.

These pulleys have been on the market several years, and we don't know of any that have actually **worn out** in service.

AMERICAN STEEL SPLIT PULLEY —with Cork Insets

Over 60,000 pulleys—3 inches to 120 inches in diameter—stocked at centres named below, and additional thousands stocked by over 200 dealers insure prompt deliveries. Write for quotations and delivery dates.

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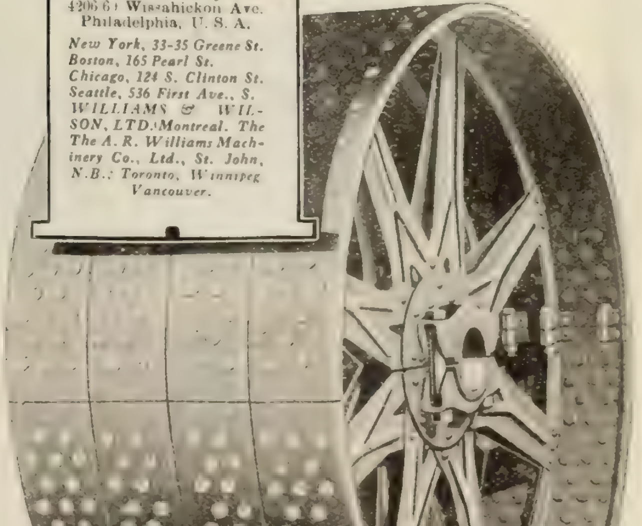

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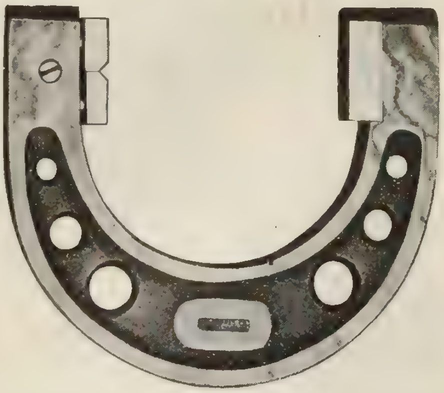

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The Improved type of Crescent Gage with broad, flat bearing surfaces has proved to be a most efficient gage for many kinds of external, particularly cylindrical measuring. The use of the generous bearing surfaces has eliminated the uncertainty experienced with the small points.

SCREW THREAD GAGING

The Limit System, as shown above in the Fork Gage, is the efficient, economical way of checking threaded parts that are turned out in quantity. The cone-shaped points are set to predetermined limits, and may be sealed by the chief inspector to prevent tampering. There can be no guesswork about it. The work must be uniform.

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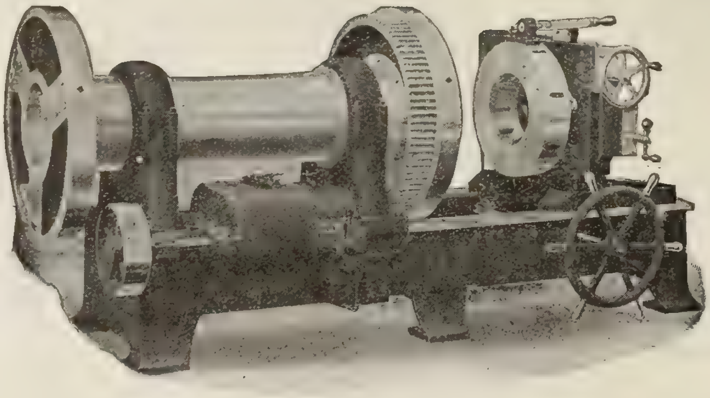

Cut Your Threads
on a
B & K
and remove the
frown

Frowns have no place around a Bignall & Keeler Pipe Machine. When a machine satisfies both the owner and the user, frowns are unknown. "Satisfies" is a big word when applied to pipe threading. There is the owner of the machine; the man who operates the machine, and the man who makes up the threaded joints. B&K machines satisfy all along the line.

What size are you interested in?

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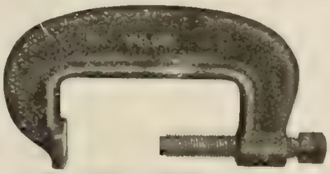

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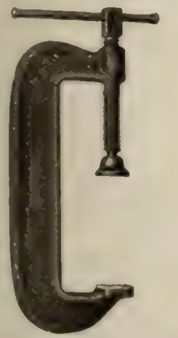
Williams "VULCAN" and "AGRIPPA" Clamps AFFORD ABUNDANT VARIETY FOR ALL WORK



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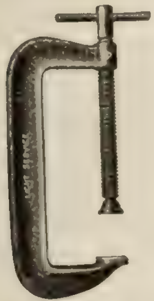

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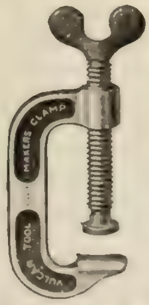

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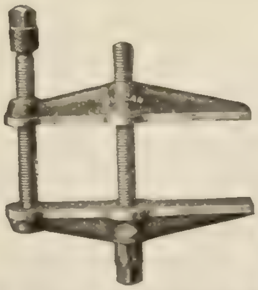

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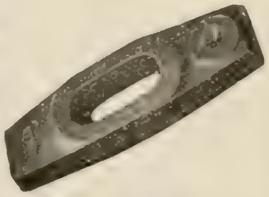

Strap Clamps Six Classes

Maximum toughness, strength and rigidity with minimum weight are procured only by our specialized heat treatment, drop-forged refinement and most approved design.

The first two inimitable! The last endorsed by imitation, the sincerest form of flattery.

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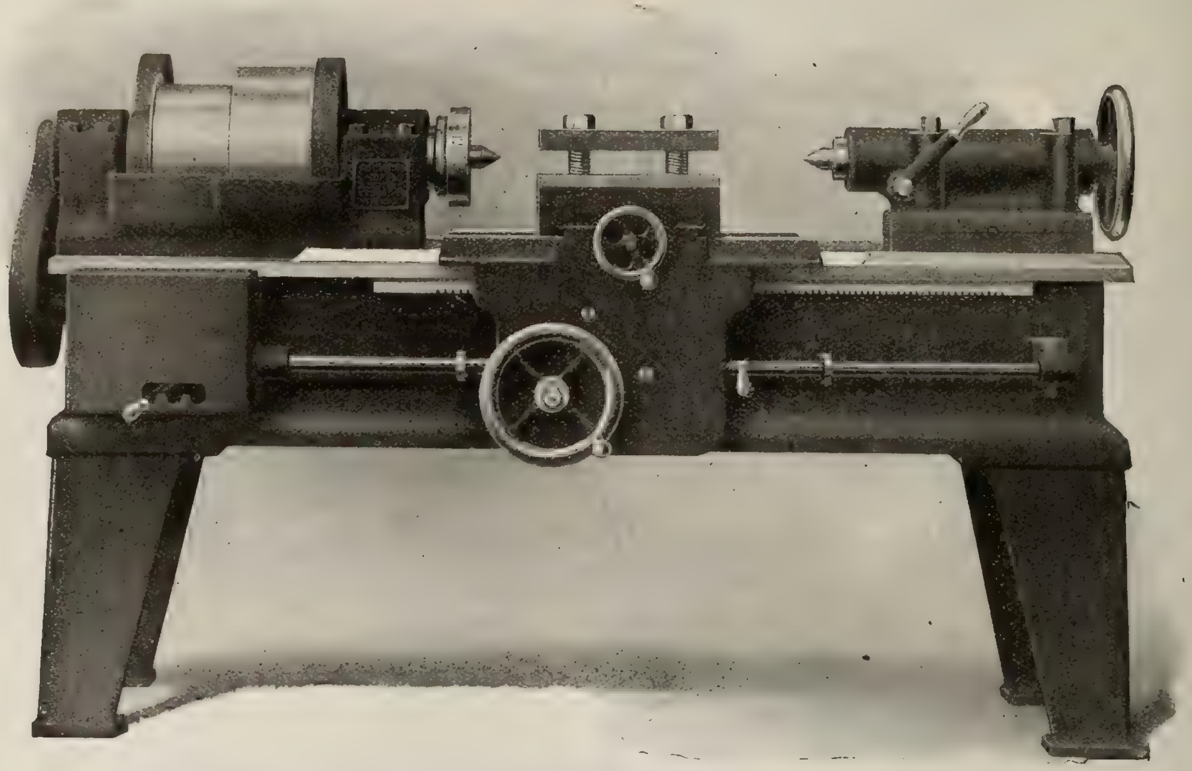
If any advertisement interests you, tear it out now and place with letters to be answered.



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WE have designed this machine to meet the demand for a plain, heavy standard lathe, void of frills, which can be easily handled by non-skilled labor. It is particularly suitable for various operations on High Explosive Shells. The quality of the material used throughout its construction is the very best obtainable and the workmanship is up to the standard required.

The gearing is of steel cut from the solid. Headstock bearings are fitted with brass bushings and ring oiled. Spindle is bored for No. 5 Morse taper center, and will be solid unless otherwise ordered. Three changes of feed are obtainable by means of shifting lever in gear box and feeds of 1-8, 1-16 and 1-32 inch will be furnished.

The countershaft is a heavy, durable two-speed countershaft, having two 16 x 6 friction driving pulleys and a cone pulley. The carriage will be provided with power longitudinal feed, having automatic stop in both directions. Hand cross feed. The headstock, tailstock, carriage and apron are massive, at the same time not clumsy. We can also furnish lathe, with various attachments for different operations, at additional cost.

16-in. Fairbanks-Morse Lathe

Specifications

Dia. of Spindle	5"
Swing over bed	16"
Swing over carriage	10"
Distance between centres	21"
Ratio of back gearing	6.25 to 1
Dia. of tailstock spindle	3½"
Travel of tailstock spindle	8"

20-in. Fairbanks-Morse Lathe

Specifications

Dia. of Spindle	5"
Swing over bed	20"
Swing over carriage	14"
Distance between centres	40"
Ratio of back gearing	6.25 to 1
Dia. of tailstock spindle	3½"
Travel of tailstock spindle	8"

Large diameter Two-Step cone for 6" double belt steel gears.

The Canadian Fairbanks-Morse Co., Limited

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CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

Some Scientific Aspects of Steel Founding Practice*

By W. A. Naish, A.R.S.M., A.I.M.M.

The following resumé of facts concerning steel is not put forward as representing new information, but rather with the idea of its being somewhat of an educational message to foundrymen and metal-working operatives whose sphere of activity does not permit of their becoming familiar with the essentials of steel production in specially equipped plants.

UNDER the name "Steel" are now included so many varieties of iron that it is impossible to give a good definition of the term. Until the introduction of mild steel, the term steel was always defined as being iron containing from 0.5 per cent. to 1.5 per cent. carbon, with small quantities of other impurities, and which, when heated and quenched in water, became sensibly harder. Now, however, we have steels containing much less than 0.5 per cent. of carbon, and which do not sensibly harden on quenching. A definition now perhaps more accurate is "any form of iron other than malleable iron, containing 2 per cent. of carbon or less, with small amounts of other impurities."

Classification.

There are many classifications, the most general, perhaps, being "hard steel" and "mild steel," the dividing line being taken at about 0.5 per cent. carbon. The two forms pass gradually into one another, and the hardening on quenching becomes less as the percentage of carbon decreases. Another classification is "high," "medium" and "low carbon steels." The high-carbon steels are used for tools, and the low-carbon for structural purposes.

Another classification is based on the method of manufacture:—(a)—Puddled steel, made from pig-iron which has not been fused, but welded up from a pasty mass. (b)—Cement steel, made from malleable iron. (c)—Crucible cast steel. (d)—Bessemer steel. (e)—Open-hearth steel. (f)—Basic steel. The American Society of Mechanic Engineers in 1876 introduced the terms:—Weld iron, weld steel, ingot iron, ingot steel.

Chemical Composition of Steel.

Steel is essentially a compound of iron and carbon, other constituents being regarded as accidental impurities, except in so far as they are introduced to confer special properties.

Carbon—The carbon content of a steel may vary between 0.1 per cent. and [illegible] per cent. or more. The grade of the steel is usually determined by the quantity of carbon present. Graphitic carbon is never present except, perhaps, occasionally in high-carbon steels. A variety of uncombined carbon known as graphitic temper carbon sometimes separates when high-carbon steels are slowly cooled. The combined carbon exists in at least two forms:—(a)—As a definite carbide disseminated through the metal called "carbide carbon." (b)—Distributed evenly through the mass either in combination with the whole of the iron, or in solution with it. This variety is chiefly present in hardened steel, and is called "temper carbon."

Silicon.—The general effect of this constituent is to harden and strengthen the steel, but to a much less extent than carbon. Turner says that "the increased strength due to 0.2 per cent. silicon is about 1.8 tons." Campbell states that "silicon cannot be classed among the highly injurious elements, and small quantities cannot exert a very deleterious effect, but when the percentage is very high the metal becomes very hard and brittle."

Phosphorus is universally regarded as the greatest enemy of the steelmaker. Up to 0.1 per cent. it increases the tensile strength, but if the metal is subjected to shock it is liable to break readily. The effect of phosphorus seems to be greater in higher-carbon than in low-carbon steels. It produces a typical coarsely-crystalline structure and it lowers the maximum temperature to which the steel may be heated in working.

Sulphur produces "red shortness" and gives a coarsely-crystalline fracture. The metal also tends to crack during rolling and welds badly. If manganese is present in the steel a larger quantity of sulphur is permissible.

Manganese counteracts the effect of sulphur, increases the tensile strength, but also increases the tendency to crack when suddenly cooled. Up to 1 per cent. it has little injurious effect on mild steel, but in larger quantities it tends to make the metal brittle under shock. The effects of nickel, tungsten, chromium, etc., are briefly considered under "Special Steels" later. The compositions of high-, medium- and low-carbon steels are as follows:—

	High carbon %	Medium carbon %	Low carbon %
Carbon	1.2	0.5	0.15
Silicon	0.29	0.2	0.08
Sulphur	0.01	0.04	0.03
Phosphorus	0.01	0.04	0.03
Manganese	1.0	0.85	0.4

Methods of Steel Making.

The method of making steel directly from the ore is now obsolete except in the special case of the Stassano electric furnace. The process of steel-making from malleable iron is one of cementation, and depends upon the fact that if bar iron is heated for a long time at a welding temperature in contact with carbon the latter travels into the iron and the metal becomes carburised. We have to account for two changes in the material: (a) The transmission of the carbon into the iron. (b)—The formation of "blisters."

There probably is a very slow diffusion of the solid carbon into the iron, but the usually accepted theory is that at the high temperature, and in the presence of excess of carbon, carbon monoxide is produced, $C + O = CO$. This penetrates into the pores of the iron, and is decomposed on contact, carbon being deposited, and carbon dioxide being produced $2CO = CO_2 + O$. This carbon dioxide diffuses out, and is reconverted into carbon monoxide. At welding temperature the carbon combines with the iron, and steel is produced. The "blisters" are probably due to the presence of minute specks of solid impurities, such as oxide of iron. Carbon is deposited in contact with these, carbon monoxide is evolved, and the oxide reduced, the gas attempts to diffuse, and if near the surface the metal cannot resist the pressure and a "blister" is formed.

Crucible Cast Steel.

The process of making crucible cast steel is essentially one of melting, but certain chemical changes also take place. There is always some oxide of iron in the metal and air in the pot, therefore, there is at first, at any rate, a basic silicate formed. As the action proceeds this becomes more and more acid. The composition of the metal may change somewhat, as it will pick up a little silicon from the pot and carbon from the fuel; also the mere fact of the metal being molten for some time will give opportunity for a slight oxidising out of carbon and silicon. The presence of manganese tends to prevent the removal of silicon by oxidising first, and thus using up the available oxygen. The result of melting, then, is almost always to increase the percentage of carbon and silicon and to reduce the manganese. The amount of sulphur also increases slightly, either from the pyrites in the clay or from the furnace gases.

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*From a paper read before the London Branch of the British Foundrymen's Association.

As is well known, the freshly-melted metal teems fiery and yields an unsound casting, due to evolution of gas during cooling. The "killed" metal teems quietly. According to Howe, killing probably acts chiefly by enabling the metal to absorb silicon from the walls of the crucible, thus increasing its solvent power for gas and enabling it to retain in solution during solidification the gas which it occludes when molten. The common belief is that killing expels the gas present, so that less remains to escape on pouring; but we find that silicon is rapidly absorbed during killing, and when conditions are such that the metal cannot absorb silicon, holding the metal molten does not kill.

The production of sound castings by "medicines," automatic stirring and by presses is briefly discussed later under "Casting of Steel." The most generally used "medicines" or improvers for steel are manganese peroxide, common salt, salammoniac, fluorspar, potassium chlorate, and, in the case of large ingots, aluminium and silicon. The processes of making steel from pig-iron may next be considered.

Acid Bessemer Process.

The theory of this process is the oxidising out of the impurities by blowing air through the molten metal. The plant is well known. The removal of carbon commences immediately, also silicon is similarly removed, but in the acid process sulphur and phosphorus are not removed. This fact makes it impossible to use a phosphoric iron in this process. The percentage of silicon must be at least 2.25 to 2.5 per cent., as it is the principal source of heat during the operation; but at the same time it should not exceed 3 per cent., as the metal may become too hot and too much iron may be carried away as silicate of iron. A suitable pig would be:—Graphitic carbon, 3.42 per cent.; combined carbon, 0.46 per cent.; silicon, 2.5 per cent.; sulphur, 0.05 per cent.; phosphorus, 0.03 per cent.; manganese, 0.5 per cent. Recarburising by means of spiegel for ferro-manganese fulfils two purposes:—(1)—Adding the requisite amount of carbon. (2)—Improving the metal by removing occluded oxygen.

Basic Bessemer Process.

As mentioned above, the acid process will not remove phosphorus. In order to do this, a basic lining is necessary, and lime is also thrown into the converter. Phosphorus is very little removed until the carbon has gone, that is, during the "after blow." The phosphorus is removed as calcium phosphate in the slag, and an important point is that the basic slag must be poured off before recarburising, or some of the phosphorus will be reduced back again, and re-enter the iron. It is the phosphorus which provides the heat of reaction in the basic process, and the silicon should be low. A suitable pig would be:—Graphitic carbon, 0.82 per cent.; combined carbon, 2.83 per cent.; silicon, 0.63 per cent.; sulphur, 0.07 per cent.; phosphorus, 2.75 per cent.; manganese, 1 per cent. The steel can be made milder than in the acid process, but it is not considered so reliable by some engineers.

As a passing reference to the modification of the Bessemer process, such as the Clapp-Griffiths, the Tropenas, Walrand-Roberts and the Swedish, it may be said the chief difference is merely that of alteration in size and shape of the converter and the matters of side versus bottom blowing, and fixed versus rotating vessels. Small converters can never become general, but at the same time there are obviously cases where their use is advantageous. There is an increased loss of 4 per cent. in side blowing, and less uniform mixing of the metal. As to fixed converters, the time is longer, as the charge must be tapped. They do not permit of bottom blowing, and it is impossible to recarburise in the converter.

Open-Hearth Process.

In this process the oxidising out of the impurities is effected by means of oxide of iron. Recarburising is effected by means of ferro-manganese or carbon (the Darby process). As in the Bessemer process, the phosphorus is not removed in the acid open-hearth. In the basic process lime is added, and the lining is of dolomite, but it is not necessary to use basic bricks above the slag line. As the source of heat is external, the amount of silicon and phosphorus is not so important as in the Bessemer process.

The modifications of the open-hearth process are chiefly mechanical. The Wellman and Campbell tilting furnaces ensure, amongst other things, quicker working. The Bertrand-Thiel process consists of working two furnaces together, nearly purifying in the "primary," and finishing off in the "secondary" furnace. The Talbot process is a continuous one, part of the finished charge being tapped and fresh pig added.

The removal of sulphur by the Saniter process is effected by bringing molten steel into contact with lime and calcium sulphide, whether in the furnace or in the ladle, the sulphur passing into the slag as calcium sulphide. Sulphur is also removed to a certain extent by the use of a mixer, which may be regarded as a reservoir for molten metal previous to steel making.

Electric Smelting.

Extravagant claims have been made for electric smelting, but there is no doubt that high-class steel can be made and cheap materials used, as phosphorus, sulphur, etc., are removed to a trace. Probably it will come into operation for refining materials, and in connection with open-hearth and Bessemer steel. Electric furnaces are used for making high-class steel from pure materials and from rail ends and scrap; for making special steels from open-hearth and Bessemer steel; for making ferro-chrome and ferro-silicon; for the direct production of steel from ore.

The high quality of the steel produced by electric smelting is probably due to the absence of occluded gases, the absence of over-oxidation and less segregation. Steels of highest quality, equal to the best crucible steel, can be made at a lower cost. For special steels for guns it can compete with the open-hearth furnace. For ordinary rail or structural steel it is too costly unless water-power is available. It is highly recommended for refining Bessemer and open-hearth metal. If molten metal is used, the extra cost over the open-hearth is small, and is more than compensated by the low price of the materials used.

Casting of Steel.

In the casting of steel there are four defects to be considered:—

(1) Blowholes.—These are due to occluded gases, carbon monoxide, hydrogen and nitrogen produced from the moisture in the air and in the materials, oxygen from the air, carbon and the constituents of the air itself. These gases cannot completely escape and are mechanically entangled in the pasty metal. An approximate analysis of a gas of this nature is as follows:—Carbon dioxide, 0.48 per cent.; hydrogen, 49.8 per cent.; carbon monoxide, 48.23 per cent.; methane, 0.40 per cent.; nitrogen, 1.40 per cent.

It is a known fact that steels of practically the same composition vary greatly in hardness, tensile strength, etc., when manufactured in different ways. This may possibly be attributable to the presence of nitrogen. Nitrogen is particularly injurious to special steels. Nitrogen and oxygen tend to produce blowholes, and sometimes they produce a peculiar kind of brittleness, due to pickling. This can be removed by annealing. The deleterious effect of these gases should be more widely recognised

(2) Piping.—This is due to the solidification of the metal nearest the side o the mold, and its consequent contraction. The pipe is formed as an interna

cavity, usually at the top of the ingot.

(3) Segregation. By segregation is meant the separation of the metal into portions of different composition during solidification. Steel is not a definite chemical compound, and therefore the less fusible constituents solidify first. There is a tendency for pure or nearly pure iron to separate first. In ordinary ingot casting the segregation is not large. In a plate ingot 10 in. thick the carbon may vary from 0.18 per cent. at the top to 0.15 per cent. three inches from the bottom, and the phosphorus from 0.075 per cent. to 0.058 per cent. in the same limits.

(4) Cracks. These are produced by the expansion of the mold and its drawing away from the metal. If not sufficiently plastic to follow, the metal will crack. The unequal contraction of the external and the internal portions of the ingot may also produce a fracture.

Prevention of Defects in Cast Steel.

Mechanical Pressure. This involves the use of a press, such as the Whitworth, Illingsworth, or Harmet. In these the contraction of the metal is followed up. It is really casting under pressure.

Agitation and Centrifugal Force is another method which has been tried.

Chemical Methods.—The two substances usually employed to prevent defects are aluminum and silicon. The action of silicon is very marked, and entirely removes blowholes, the explanation probably being the same as that given under "killing" of crucible cast steel. The action of aluminum is quite as marked, but the rationale of the action is less understood. It may be due to the fact that aluminium removes oxygen, and as oxygen diminishes the solubility of the gases in iron, the aluminium may thus indirectly raise the solvent power.

Special Molds.—The principle involved in the use of special molds to prevent the defects mentioned is to make the lower 70 to 80 per cent. of the mold thicker, and therefore of greater heat absorptive capacity than the upper 30 per cent.

Special Steels.

There has been a great advance made of late years in the manufacture of special steels. The following notes relate to the effects of the special constituents introduced:

Nickel Steel.—The tensile strength increases with the percentage of nickel. Thus 0.3 per cent. nickel gives a tensile strength of 31 tons, whilst with 11.4 per cent. it is 65 tons. The elastic limit increases more rapidly than the ultimate strength. Nickel steel has a high vibrating strength, and is more rigid and tough than ordinary carbon steels. The recalescence point is lower, the annealing temperature is lower, and the metal hardens when quenched from a lower temperature. It resists corrosion, and possesses a high electrical resistance. It loses its magnetism when heated, but regains it when cooled. Nickel 3.5 per cent. has about the same effect on tensile strength as 0.2 per cent. carbon. Other constituents being constant, 0.8 per cent. and from 3 to 5 per cent. nickel gives a good tool steel.

Manganese Steel.—The effect of manganese is to harden the metal as the percentage of manganese increases. Up to about 5 per cent. manganese the metal is very hard, while over 7.5 per cent. it becomes hard and tough. Hadfield's manganese steel has a tensile strength of 67 tons, and the metal is ductile. The electrical resistance is very high, and it is non-magnetisable.

Chrome Steel.—The chief property that chromium confers on steel is that of hardness; hence its use in armour plate and projectiles. Five per cent. chromium will give a tensile strength of 74 tons unannealed .

Tungsten Steel.—Tungsten makes the steel intensely hard, and this hardness is not reduced by slow cooling. Tungsten steels are not hardened by heating and quenching, hence the name, "self-hardening steels." These steels are much in favour as tool steels. An average composition is 1.5 per cent. carbon and from 6 per cent. to 9 per cent. tungsten, although lower percentages are now common. Under this heading may be mentioned a special steel the composition of which is as follows:—Carbon, 0.55 per cent.; chromium, 3.5 per cent.; tungsten, 13.5 per cent.

Molybdenum and Vanadium are used in special steels, the latter especially in some American tool steels. They have a still greater proportionate effect than those elements mentioned previously. A typical analysis of an American molybdenum steel is:—Molybdenum, 9.65 per cent.; carbon, 0.66 per cent.; manganese, 0.22 per cent.; phosphorus, 0.02 per cent; silicon, 0.05 per cent. Many molybdenum steels have a lower percentage of Mo. From 0.5 to 3 per cent. of molybdenum in a high tungsten steel slightly increases the cutting efficiency.

Vanadium Steel.—Vanadium raises the elastic limit and tensile strength, but slightly reduces elongation; 0.2 per cent. vanadium added to a low-carbon steel raises the elastic limit and tensile strength 50 per cent. or more. This steel is valuable for engine parts and details subjected to alternating stress. It hammers and welds well. A steel containing 0.24 per cent. carbon, 0.28 per cent. vanadium, and 3.38 per cent. nickel gave the following results:—Elastic limit, 50.3 tons; tensile strength, 68.2 tons; elongation, 17 per cent.

It must be pointed out that the foregoing figures are general and are much affected by the percentage of carbon and by the heat treatment.

Hardening of Steel.

When a steel containing more than about 0.2 per cent carbon is heated to redness and quenched it becomes hard. The degree of hardness depends on the rapidity of the cooling, temperature of cooling and percentage of carbon. The changes observable are:—Pure iron heated to about 900 deg. C. and cooled slowly shows three distinct retardations, viz., at 825 deg. C. (Ar$_3$); 720 deg. C. (Ar$_2$); and 650 deg. C. (Ar$_1$). If much carbon is present there is only one point discernible, viz., at 670 deg. C. (Ar.$_1$). If iron is heated, three corresponding points are got, about 30 deg. C. above the Ar points, namely, Ac$_1$, and Ac$_2$, and Ac$_3$. The retardation at Ar$_1$, is accompanied by a change in the condition of the carbon from hardening carbon as it exists in hardened steels to cement carbon (Fe_3C), which is present in normal and annealed steels. To convert cement carbon into hardening carbon it is necessary to heat above the critical Ac$_1$.

If the steel is heated above Ac$_1$ (700 deg. C. for 12 per cent. steel), and quenched, the carbon is retained as hardening carbon. When a steel is heated to AC$_1$ and quickly or slowly cooled, the finest grain it is capable of assuming is produced. If heated above Ac$_1$ the grain becomes coarser and coarser. The best temperature to quench from is that temperature which gives the finest grain and the greatest strength, and this depends on the percentage of carbon.

Annealing.

The object of annealing is to diminish the abnormal qualities the metal acquires through hardening and mechanical working. The metal should be annealed by heating to the Ac$_1$, critical temperature, and keeping at that temperature a sufficient time to change a certain amount of the hardening carbon into cement carbon or the hard into the soft allotropic variety of iron. It is immaterial whether it is quickly or slowly cooled. The heating should be slow, and the steel throughout the operation should be shut off practically from the air. The time occupied in actual practice is variable, and whilst there can be no doubt that excessive annealing does no good, and may do harm, a good proportion of the unsatisfactory steel castings is accounted for by erring on the other side.

The typical structure of a normalised steel of 0.5 per cent. carbon consists of ferrite and pearlite. (Pearlite is Fe_3C. in intimate association with Fe and contains 0.9 per cent. carbon.) The amount of each constituent depends on the percentage of carbon. The structure is typical of a mild steel, which after being heated to full redness is allowed to cool in the air. A saturated steel contains 0.9 per cent. carbon, and the structure is all pearlite. As the percentage of carbon increases beyond this point, a new constituent appears, viz., cementite, Fe_3C., which is typical of super-saturated steels.

In a hardened steel there occurs a new constituent, hardenite, accompanied by ferrite in mild steel, and cementite in super-saturated steels. Hardenite is probably pearlite altered by heating and quenching. If a steel is suddenly quenched from 1,000 deg. C. the typical needle structure of martensite is got. Annealed steels show the granular pearlite altered into parallel layers. This banded structure is true pearlite and is typical of slowly-cooled steels.

Defects Produced by Hardening.

Water Cracks.—These are the direct result of enormous stresses produced by contraction. The only remedy is to exercise the greatest care and to have a good quality steel. The steel should be low in phosphorus and manganese; 0.025 per cent. phosphorus is permissible, 0.4 to 0.5 per cent. manganese in mild steel, and 0.2 per cent. manganese in 1 per cent. carbon steels. The whole of the tool should be at a uniform temperature, and the temperature should be the correct one for the percentage of carbon present.

Special Methods of Hardening.

The Barium Chloride Bath is used for taps, etc. The bath is heated to 1,200 deg. C. by gas, and the tool is soaked for a few minutes only, so as to heat up the edges. The tool should then be withdrawn. Electric Furnace methods employ as the heating medium barium chloride for high-speed steels, barium chloride and potassium chloride for carbon steels, and sodium chloride and potassium chloride for lower temperatures. The current is alternating, and iron electrodes are used. The table given below may be interesting to show the effect of annealing and hardening and tempering on gun steel of different carbon contents:—

	Unannealed		Annealed	
Carbon %	Tensile strength Tons	Elongation %	Tensile strength Tons	Elongation %
0.37	28	8.2	36.7	21.8
0.5	44.4	2.0	44.0	12.0

	Annealed			Hardened and Tempered		
Carbon %	Tensile strength Tons	Elastic limit Tons	Elongation %	Tensile strength Tons	Elastic limit Tons	Elongation %
0.35	34.4	17.6	27.0	48.9	29.1	16.5

Case Hardening.

The ordinary methods of case-hardening are too well known to need description, but perhaps one or two points may be of interest. The best carburising steels are those containing from 0.1 to 0.2 per cent. carbon. Manganese has the tendency to make the carburising surface brittle. The outer skin will usually come up to about 0.9 per cent carbon. As a general rule, anneal after carbonising to destroy crystallisation in the core. The limit for the requisite temperature during this operation is about 925 deg. C. Carbon begins to penetrate at about 700 deg. C.

There are many special case-hardening mixtures. Guillet used 60 parts of wood charcoal to 40 of barium carbonate. Heathcote mentions wood charcoal soaked in a 5 per cent. solution of sodium carbonate. The annealing of the castings should be at a cherry red. To ensure refining of grain, the heavy sections will require a longer time for annealing, but they may be cooled quickly if high-tensile strength and elastic limit is required.

POWER TRANSMISSION BY LEATHER BELTING

By R. T. Kent.

THE most satisfactory belt drive is that which will at all times transmit the necessary amount of power and at the same time cost the least for repairs and maintenance, and cause the least possible loss by machine shut-downs for the purpose of making belt repairs in working hours.

To have a satisfactory belt drive the following considerations must be taken into account when the drive is laid out: The conditions of use of the belt, whether it is readily accessible or not; the velocity at which the belt will travel; the arc of the pulley with which the belt is in contact; the tension per sq. in. of cross section under which it is first placed on the pulleys; the tension per square inch of cross section to which the belt may be allowed to fall in service before it is taken down and retightened.

PLACE OF SCIENCE IN EDUCATION

IN considering "The Place of Science in Education," Dr. J. A. Fleming, Professor of Electrical Engineering in University College, London, recently remarked that in some schools a great show is made with carpenters' or engineering workshops. "This," he said, "impresses parents and attracts boys with a mechanical turn of mind, but there is little or no real scientific training in it. The making of a model steam engine is an amusement for leisure hours or wet half-holidays, but is perfectly useless as a means of scientific education for boys. The school work should be confined to imparting a really practical and thorough knowledge of elementary principles of science.

"Of course, in all this the quality and kind of teaching given is the important factor. The mode in which a subject is taught is even of more importance than the subject itself. Chemistry can be so imperfectly taught as to be of little use as a mind-training. It is possible to give a very scientific lesson on a Greek verb, and also to give a lesson on an electrical machine which is not scientific teaching at all. Hence here, as elsewhere, the man counts for more than the machine or apparatus. Nevertheless, the good teacher is wasted unless he has the necessary appliances."

SMALL FIRMS AFTER THE WAR.

IN the course of a recent discussion before the Birmingham Section of the Institute of Metals on the "Future of the Metallurgical Industries," Professor T. Turner remarked that Birmingham was not a smelting centre; it was particularly a metal-using centre. There were in the city and district 20 metal workers to every one metal maker, and perhaps the proportion was much larger. The business had grown up from very small beginnings, the result being that at the present time there were in the city 350 brass-casting firms. The consequence of having so many had been that organization was defective; there had been a great deal of competition, and the amount of scientific knowledge and guidance had been nil. He could not recall a single firm in the Birmingham district that dealt in brass casting alone that had a scientific adviser or even an analyst.

In the future, he considered, big concerns would be the rule. The small firm could not make a big gun, nor undertake the manufacture of aeroplanes nor the construction of a battleship There would be a combination of the small firms, or they would be squeezed out. It must be through big firms tha some of the work that was absolutely essential for the country would be done and it was firms like those that could afford to pay adequate salaries to thei officials, obtain scientific advice, and conduct researches. It was by the combination of organization and scientifi knowledge that success could be obtained. It seemed to him we must provid for the smaller firms, for, if we did not obviously we could not have the bi firms. The smaller firms would pay attention to specialties, but it would b by big firms that the greater part of th work of the nation would be done.

Machine Tool Building in a General Manufacturing Plant

Staff Article

The past two years have been full of opportunities for the machine shop proprietor, but in order to derive the full benefit it has been necessary to fore-see to a great extent just what the impending requirements of the situation would be. The successive manner, in which the types of machines referred to have been produced, bears evidence of that wide knowledge of supply and demand which is a pre-requisite to success in any line of business.

IN days to come, when the efforts of the Dominion are viewed with a true perspective, the value of the assistance rendered by the smaller machine shops to munitions manufacturers will become more apparent. There are few shops indeed throughout the country but what have been more or less affected by events, and while the nature of things pointed to large establishments with unlimited facilities and resources as the best ultimate producers of shells, it must not be forgotten that many of the special machines now assisting so ably in manufacturing the output of munitions were evolved and built by firms of more or less modest pretensions. One of the outstanding examples of this class is the Gray Mfg. & Machine Co., Toronto, who have up till now developed no less than four separate types of special shell machines and such supplementary apparatus as sand blast equipment, etc. Taken in order of evolution, these machines produced by this firm form an interesting record of the development of munitions machines, the order of their origination, and gradual growth in capacity paralleling the various developments of shell manufacture during the past eighteen months. The whole course of the firm's activity is evidence of close attention to, and careful analysis of the numerous problems of shell manufacture.

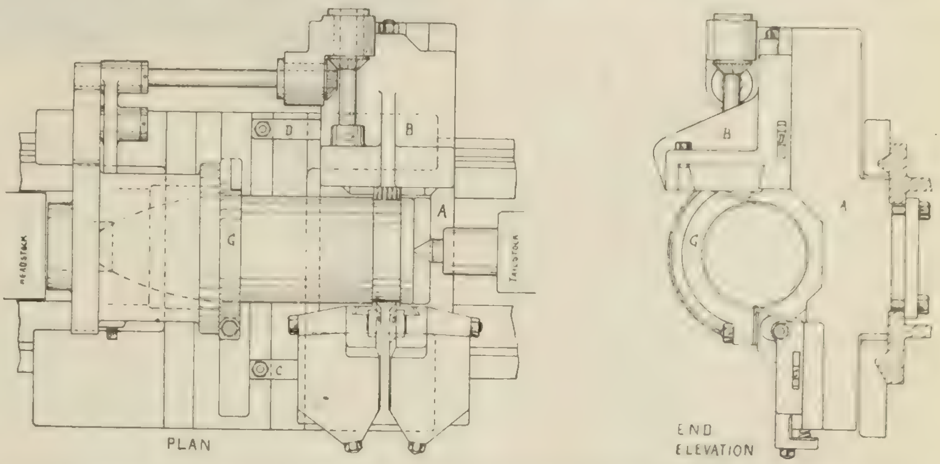


FIG. 2. DETAILS OF GROOVE FORMING ATTACHMENT FOR SPECIAL SHELL LATHE

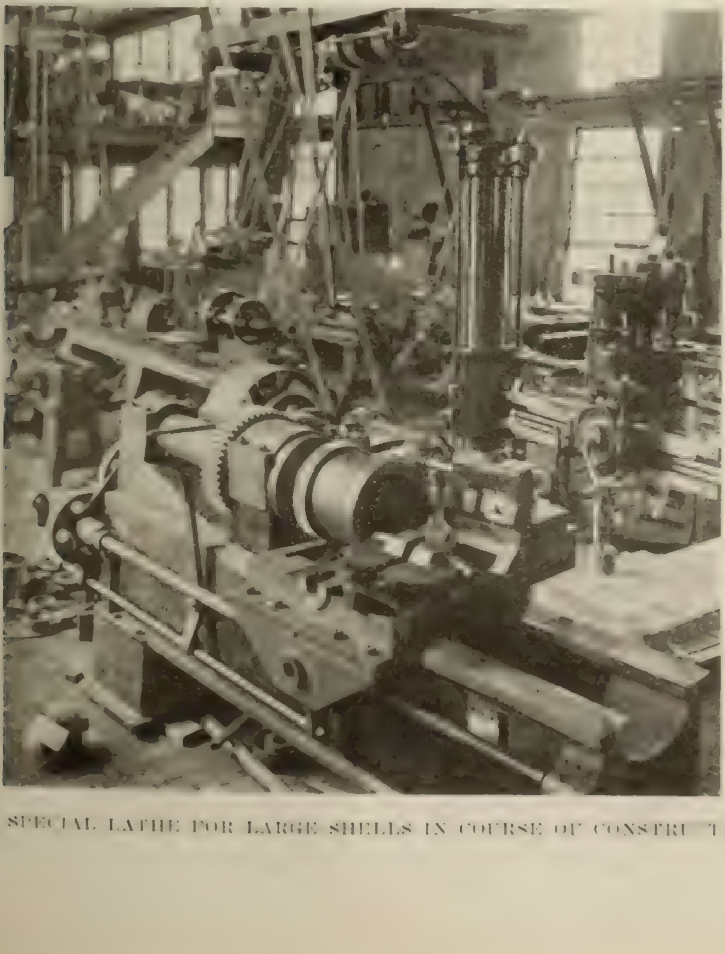


FIG. 1. SPECIAL LATHE FOR LARGE SHELLS IN COURSE OF CONSTRUCTION.

War-Time Product.

Commencing with cutting off machines and proceeding through the entire range of machining operations the attention of the firm was consecutively devoted to cutting-off machines, thread millers for small shells, thread millers for large shells, and a special shell lathe adapted to perform all the principal operations on shells up to 9.2 in. dia. By thus confining their activity principally to straight machine building, the immediate no less than the ultimate effect of their efforts, was of much greater benefit to munitions output than if actual shell making had been undertaken, especially at a time when machine tools were scarce.

With the gradual completion of equipment by shell shops, production of machines for preliminary operations has to some extent declined hence the present demand for later operation machines such as thread millers and lathes for various operations.

A Special Lathe.

The special shell lathe shown in course of construction in Fig. 1, is designed to handle large shells up to 9.2 in. diameter, and by means of various attachments will do work as follows: 1st., cut off and turn; 2nd, bore out the interior; 3rd., finish turn the parallel body and form the nose profile; 4th. band groove forming. The belt drive is direct from line shaft to a 20 in. dia. by 9 in. face pulley mounted on a friction clutch capable of transmitting 30 horse-power. Double reduction gears with a ratio of 9 to 1 transmit the power from the pulley shaft to the spindle, the spindle gear having 4-in. width of face and located directly behind the front bearing. The headstock is cast integral with the bed, and has adjustable babbitted bearings, the front one being 9½ in. diameter by 9½ in long and the rear 6 in. diameter by 8 in. long, sight feed oil cups being provided on both bearings.

The front way of the bed is of heavy Vee section, the rear way being flat, while the carriage is of liberal proportions and simple construction. The carriage is fed by a $1\frac{3}{4}$ in. 4 pitch screw working through a long nut in the apron and having a ball thrust bearing. Hand traverse is by handwheel in the centre of apron, this not being assembled yet in the illustration. At the far end of the feed screw may be seen a bracket projecting from the bed. An extension of the feed screw shaft is carried in this boss, and has mounted on it a clutch and pulley. The pulley is belted to the line shaft and the clutch which is operated by a sliding shaft and hand lever seen on front of the headstock, may be engaged alternatively with the pulley or the feed gear. In the case of the pulley, a quick return of the carriage to its starting position is obtained, the feed gear being inoperative during this time and until the clutch is engaged with it. The sliding clutch shaft is extended to the carriage and is provided with knock-out stops for automatically stopping the carriage travel at either end.

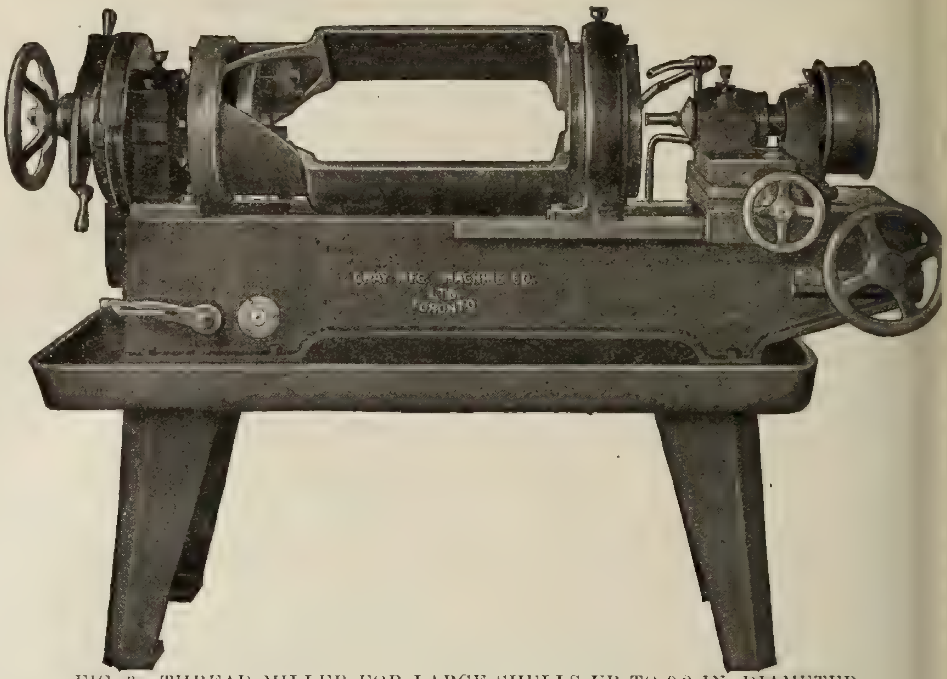


FIG. 3. THREAD MILLER FOR LARGE SHELLS UP TO 9.2 IN. DIAMETER.

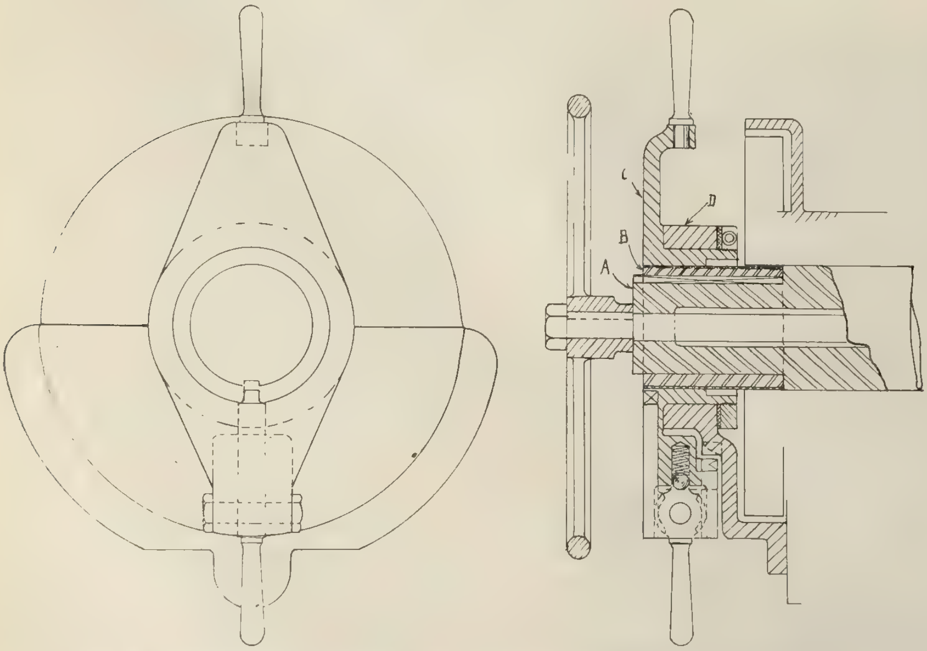


FIG. 4. DETAILS OF THREAD LEAD DEVICE ON THREAD MILLERS.

Variety of Equipment.

As already mentioned suitable equipment is provided for various operations. Thus for cutting off and rough turning the shell forging, a heavy duty tool rest of the European type is provided for the turning operation, while overarms, operated by a cam on the carriage carry the parting and facing tools. The shell is supported on an arbor and tail centre, being located from the inside of the base and driven by automatic dogs in the arbor.

When being bored, the shell is held in a suitable chuck while a turret with 24 in. diameter of base carries the boring bars, a sensitive hand feed with star wheel being provided.

Profile turning is accomplished by using two tool rests, one operating on the parallel portion while the other i controlled by a profile cam mounted o the back of the lathe bed, each tool being separately adjustable by a fee screw with graduated collar.

Grooving and Waving.

The band groove forming operatio is performed by the attachment show mounted on the bed in Fig. 1, and als in detail in Fig. 2. A stationary too carriage A is clamped to the bed, clearance on the underside allowing the regular carriage to approach closely. O the front of this stationary carriage ar two divergent slides carrying the under cutting tools, while at the rear is th waving tool reciprocating horizontall in a slide formed in bracket B, whic in turn is fed into the work along slide on the stationary carriage. Fee motion to the various tools is derive from cam rods C and D attached to sliding carriage.

A positive gear drive conveys motio from the spindle to the waving tool i the ratio of 8 reciprocations per revolution. The shell bodies, with the groov previously roughed out are inserted nos first in chuck F, the nose being centre in a spring supported socket or bushing while the outer end is supported b the tail centre. The spring allows th shell to be adjusted with the groov opposite the tools, being then driven b a floating driver G on the outer end o the chuck. The back end of the chuc has a gear rim, driving through gear and shafting as shown to the cam actuated block in slide B. The shafts ar feathered in the small level gears to allow longitudinal adjustment to all of th tools, and a liberal feed travel to th waning tool, independent adjustment o course being provided for each tool. A heavy tailstock of standard type with No. 5 Morse taper centre is part of the equipment which includes pump, gear covers, etc.

Thread Miller.

Illustrated in Fig. 3 is the larger of two designs of thread milling machines capable of handling all sizes of shells, sockets and plugs, up to 9.2 in. The larger machine as shown is equipped for threading 8 in. shells, and in common with the smaller machine it consists of a work carrying headstock with lead screw device for controlling the pitch of the thread, while the cutter-head is mounted on an adjustable carriage gibbed to the warp on the bed.

When it is considered desirable, as is frequently the case, to face the work in addition to threading, a cutter holder is mounted on the carriage in front of the milling cutter, the carriage then being used in the same way as an ordinary lathe carriage using the two handwheels for controlling the tool. By the addition of suitable chuck parts, this machine will thread bases as well as other parts.

In order to handle the large shells the construction of the spindle is as shown in Fig. 3. This consists of an extension which embraces the outer end of the shell and is supported in a suitable bearing, the other end resting in the rear bearing, on the outside of which is assembled the driving gear and the lead screw device. Underneath the headstock is located the driving gear which provides two separate speeds for milling and facing, the ratio being [illegible] to 1. Considerable interest attaches to these two devices the lead screw device being shown in Fig. 4 and the two-speed gear in Fig. 5.

Thread Lead Device.

Referring to the former, A is the tail end of the spindle on which is keyed a sleeve B, threaded on the outside to fit the threaded bore of yoke C. Yoke C is retained in position by bearing D attached to the end of the bed, a thrust washer and lock nut being provided as shown. When the yoke C is held stationary it acts as a nut, causing sleeve B and thereby the spindle to travel through and give a lead to the thread being milled in the work. If, however, it be desired to do facing on the work, the yoke C must be locked to the spindle and revolve with it, the thrust bearing referred to preventing any lengthwise movement of the spindle.

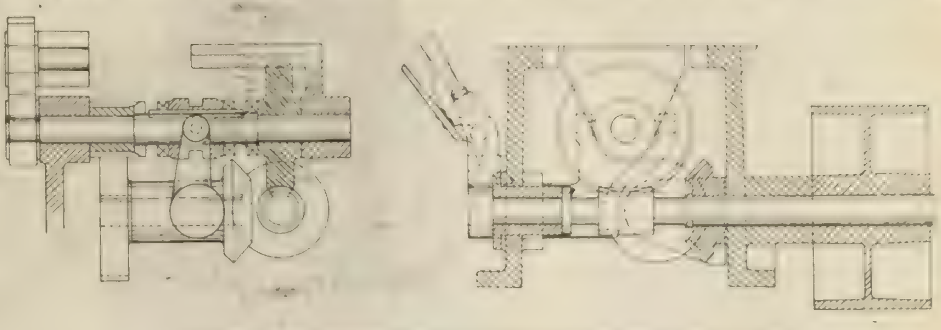


FIG. 5. TWO-SPEED GEAR DRIVE ON THREAD MILLERS.

The locking of the yoke as described is accomplished by the handle on the lower end. This handle is attached to a small gear, on opposite sides of which are two locking pins with rack portions meshing with the pinion. When moved to the right side the short pin engages with bearing D and holds the yoke stationary. When moved to the left side it disengages the short pin and engages the long pin with the sleeve thus locking the yoke to the sleeve. When in the neutral position, both pins are disengaged so that the yoke may be turned around backwards by hand and the spindle travelled along till the sleeve is backed through the yoke again. The length of travel provided on the sleeve is sufficient to allow of a considerable number of shells being threaded before returning the spindle to the starting point.

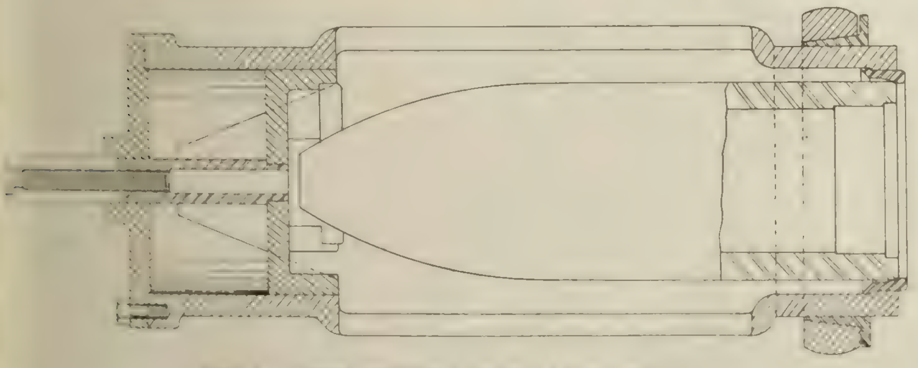


FIG. 6. OPEN SPINDLE FOR LARGE SHELLS

Two-Speed Spindle Drive.

The arrangement of the two speed gear is simple and compact and of substantial proportions for the work it has to perform. Fig. 5 shows the front and end elevations the belt pulley on the worm shaft being behind the headstock and not seen in Fig. 3. The portion of the driving shaft inside the bed carries a worm and a bevel gear. The worm gear is above the worm. It is loose on its shaft and revolves continuously, and imparts motion to the shaft when the clutch is engaged by the hand lever on the outside of the head. Through the medium of a bevel and spur gear, motion is imparted to a pinion at the left-hand end of the clutch shaft, which also revolves continuously and is engaged with the opposite side of the clutch when the facing speed is wanted. The low speed is used when milling the thread. From the clutch shaft, the drive is conveyed by a suitable train of spur gearing to the rear end of the spindle.

Chucking Large Shells.

The method of inserting shells in the large machine is rather novel and possesses the merit of simplicity combined with accuracy and reliability. As shown in sketch Fig. 6 the extended spindle is cut away on two sides leaving a space through which the shell is lowered. When moved to the right, the base of the shell comes in contact with a hardened steel ring, the bore of which is slightly coned so as to centre the shell at this end. The opposite end of the spindle is bored out parallel to receive a flanged disc, fastened to a hollow stem which fits in a hole through the spindle. The stem is threaded on the inside, forming a nut which fits on the threaded end of a rod operated by a handwheel at the tail end of the spindle. By this means the flanged disc is drawn back into the spindle when inserting the shell, after which it is moved forward till three formed jaws on it come in contact with the shell nose and locate it centrally thus insuring a concentric and parallel thread being milled in the base end. The outer bearing is adjustable for wear, a split taper bushing being provided for this purpose.

Regular Output.

The normal products of the Co. include several types of power pumps suitable for boiler feeding, fire, hydraulic-elevator and general service. They include piston and centrifugal pumps and also duplex and triplex power pumps are suitable for a working pressure of 150 lbs. per sq. in. the former machine being illustrated in Fig. 7. Four sizes of this pump are marketed from 4 in. x 6 in. to 6 in. x 10 in., the capacities varying from 100 to 275 gals. per minute, and either direct motor drive or belt drive as shown.

A ball bearing duplex power pump for water supply systems is shown in Fig. 8, the pump having a capacity of 400 gals per hour against 80 lbs pressure. They are equally well adapted for motor or engine drive and being equipped with ball bearings require a minimum amount of attention and power.

Grinding and polishing machinery for foundry and general use forms another branch of activity, one of the latest types of buffing and polishing lathe being shown in Fig. 9. This is a double spindle lathe, each spindle being independently driven so as to allow of two workmen obtaining the maximum output without delay due to stoppage of either spindle. The drive is from the floor, allowing the frame to be completely enclosed so as to give maximum protection to belts and bearings. It is built for severe service and weighs 900 lbs.

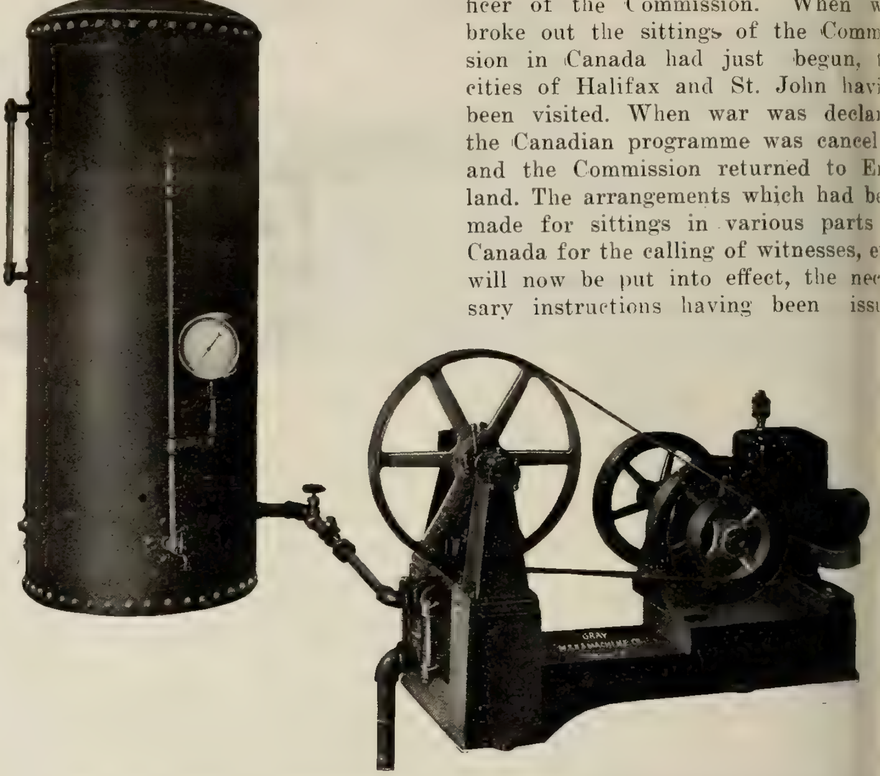


FIG. 8. BALL-BEARING DUPLEX POWER PUMP AND WATER SUPPLY SYSTEM.

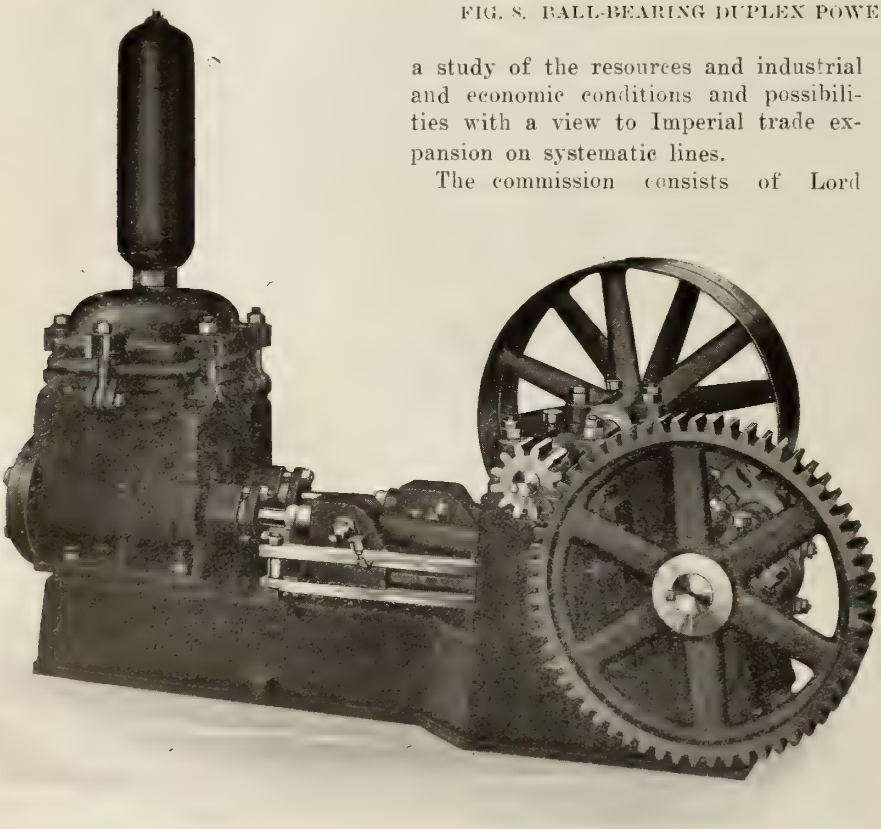


FIG. 7. DUPLEX POWER PUMP ARRANGED FOR BELT DRIVE.

DOMINIONS ROYAL COMMISSION.

THE Dominions Royal Commission will meet in Canada on September 21 next. Word to this effect has reached the Government by cable. This is the commission which, immediately prior to the outbreak of war, was completing a tour of the Overseas Dominions and making a study of the resources and industrial and economic conditions and possibilities with a view to Imperial trade expansion on systematic lines.

The commission consists of Lord D'Abernon, chairman; Sir Alfred Bateman, Sir Rider Haggard and Messrs. Lorimer, Garnet, Tatlow, of the United Kingdom; Sir George Foster, of Canada; Mr. Sinclair, of New Zealand; Sir Jan Langerman, South Africa; Sir Ed Bowring, Newfoundland.

F. C. T. O'Hara, Deputy Minister Trade and Commerce, is the local ficer of the Commission. When w broke out the sittings of the Comm sion in Canada had just begun, cities of Halifax and St. John havi been visited. When war was decla the Canadian programme was cancel and the Commission returned to E land. The arrangements which had b made for sittings in various parts Canada for the calling of witnesses, e will now be put into effect, the nec sary instructions having been issu this afternoon. The Commission will gin its sittings on the Pacific coast.

* * *

FRIENDSHIP IN BUSINESS

AN open friendship between emplo and employee—the individual friends between a manager or superintend and each of his men—is of great va to a business. It begets a loyalty t nothing else can. A man once said me, "Whenever I feel a little blue I and have a talk with Mr. Smith, manager, and I come out feeling fi We may not talk about what I had mind, but I feel encouraged just same."

I had often heard of Mr. Smit success with his business and with men, and this seemed a fair explanat of that success. Such an intercha of friendly confidence brings out best there is in the men—or shows w they lack. It enables a manager to in touch with the ruling motives of men, and to learn how each individ should be treated in order to get best results.

* * *

A WOMEN'S ENGINEERING WOR

AN experiment of a quite novel kind about to be tried in Scotland. Every has heard of the excellent work wh women have done during the last year munition works and elsewhere, but t work has been done, largely at all even in factories in which there was a great or less admixture of men workers. In the present experiment, which we understand is to be financed by two of the directors of a well-known controlled firm, all the workers are to be women, and the establishment is not destined only to be run during the continuance of the war, but to continue permanently.

The actual site of the works has not, as far as we are aware, been as yet publicly announced, but it is understood that it will be "somewhere on the West Coast of Scotland." The works themselves, which are to be run on novel and interesting lines, will be open only to well-educated women between the ages of twenty and thirty-five, who show a bent for mechanics, and in choosing the workers, preference will be given to widows and daughters of officers in the army and navy.

One feature of the working of the scheme is that the amount of remuneration given will be decided by means of examinations. The first six weeks are to be regarded as a probationary period, during which payment will be at the rate of $5 per week. At the conclusion of that time those who have shown that they have not got the necessary mechanical instinct will be told that they cannot remain at the works, and with those who have shown evidence of possessing this attribute, agreements will be made for them to work for certain periods. The examinations are to be held at the end of each six months, and on the result of these the wages are to be gauged. The actual amounts to be paid are not yet definitely settled, but it is apparently probable that the lowest will not be less than 25s. per week, and that as much as £250 a year may be reached.

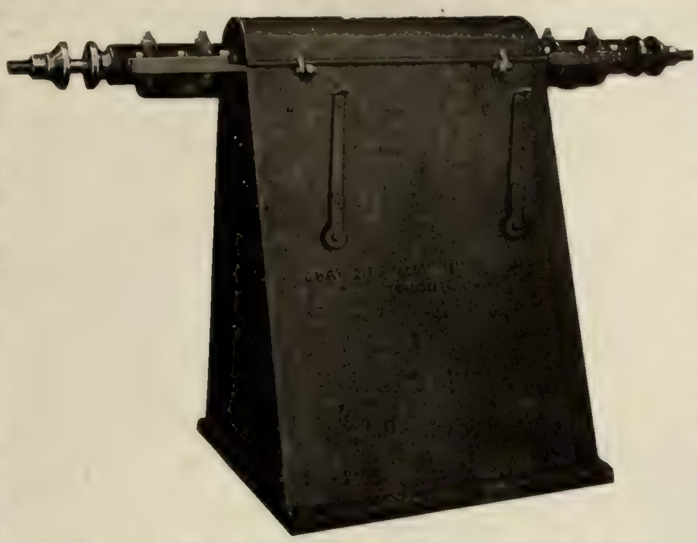


FIG. 8. DOUBLE SPINDLE POLISHING LATHE WITH FLOOR DRIVE TO SPINDLES.

Another feature of the scheme is the arrangement of the working day. There will be a night and day shift, each shift being divided into two periods of four hours each. The interval between the two halves of the day shift will be two hours long and during one quarter of it technical instruction will be given in classes which will have to be attended by those in their probationary period, though attendance will be optional for those who have passed it.

The factory will, we believe, be in operation in the early autumn, and, at first, it is intended that the work undertaken shall be the production of parts for aeroplane engines. Later on it is hoped to turn out complete aeroplane engines.

◆

MILLING FIXTURES FOR H.E. SHELLS

IN the latest designs of high explosive shells, there are three nicks cut in the fuse seat, the object of these being to provide a means of holding the fuse in position by burring over the edge of the fuse into the nicks. In consequence of this, the ¼-inch grub screw which previously served this purpose is now dispensed with. These nicks can be cut either by filing, by shaping, or by milling, but undoubtedly the greatest production will be obtained by the last method.

As the work is not heavy, it can be done on a comparatively light horizontal milling machine, the only difficulty being the provision of a suitable fixture. One of three types of fixtures will be required, for nicks may be cut in the brass fuse which is sometimes used for bottled shells; alternatively, they may be in the loose steel heads which occur in some designs; or lastly, they may be in the shell itself when this is of the bottled type and no loose bush is employed. To handle this work economically, Alfred Herbert, Coventry, England, have designed a line of fix-

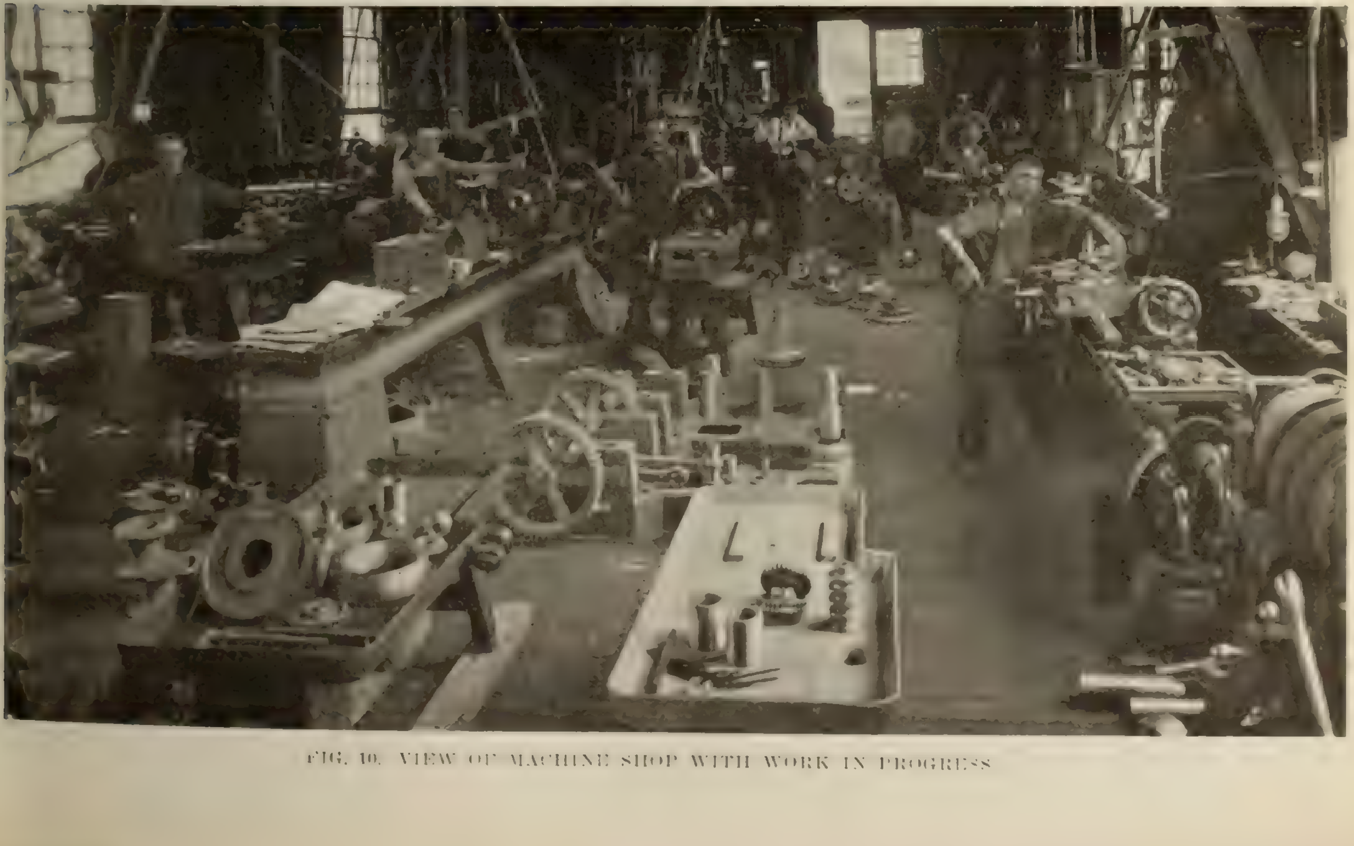


FIG. 10. VIEW OF MACHINE SHOP WITH WORK IN PROGRESS

tures for use on horizontal milling machines, these being indicated in outline by Figs. 1-2-3.

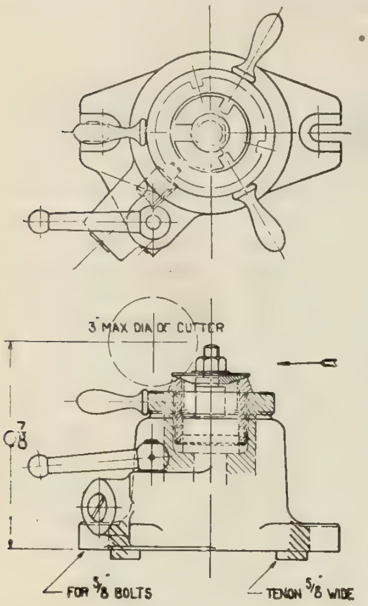


FIG. 1. TYPE "A" FIXTURE FOR 4.5 IN. SHELLS.

Type "A" Fixture.

This fixture, Fig. 1, is used for the brass bushes. It is a vertical dividing fixture provided with a curved-in index plate and plunger. The bush is located by a vertical stud, fitting into the plain bore, and is clamped by a washer and nut. The washer has three slots cut in it to clear the milling cutter ,one of these slots going right through to the centre to make the washer easily removable. The part of the stud which fits into the washer is formed to a special shape, so as to ensure the slots coming in the correct position in relation to the index plate. In cutting the nicks, the work is fed in the direction of the arrow up against the milling cutter, the fixture being indexed into three successive positions. The heights of the milling cutter is so arranged that the tangent at the point of contact with the work gives the correct inclination to the nick, and it will be seen that the nicks cut in this way have a slight radius left at the bottom. This point was taken up with the authorities when these fixtures were being designed, and they state that no objection will be taken to this slight curvature. A fixture to produce a straight bottom would have to be inclined at the correct angle, in order to traverse the nick completely, and this would entail a much more awkward fixture than is necessary by the method described.

Type "B" Fixture.

This fixture, Fig. 2, is used for the loose steel heads, and is very similar to the type A fixture, except that it is of course larger. The method of locating and clamping is the same.

Type "C" Fixture.

When the nicks have to be cut in the shell itself, a horizontal fixture must be used, as shown in Fig. 3. This fixture consists of a hollow spindle in which the shell is clamped by a set screw, the part to be nicked being pushed on to a fixed locating peg cut away on one side to clear the milling cutter. The spindle is provided with an index plate and plunger, the shell revolving on the locating plug during the indexing. This type of fixture is again designed so that the nicks have a slight curvature at the bottom, and the arrangement is very compact, for a fixture designed to cut a straight bottomed nick would be of considerable height.

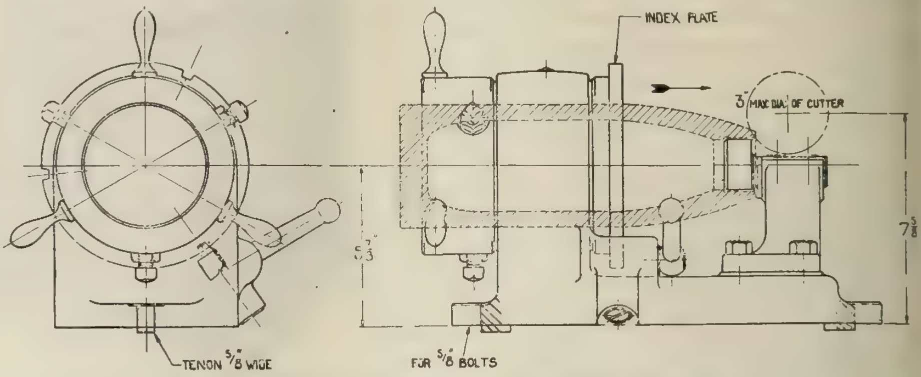


FIG. 3. TYPE "C" FIXTURE FOR 4.5-INCH SHELLS.

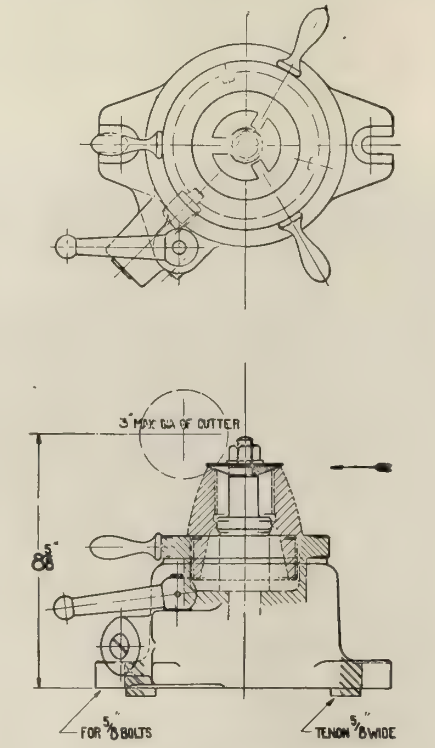


FIG. 2. TYPE "B" FIXTURE FOR 4.5 IN. SHELLS.

In all three cases the stop on the machine table should be set to limit the travel of the work, so that all nicks will be the same depth.

These fixtures are applicable to shaping machines provided they are mounted on suitable angle plates, and can also be used on lathes by mounting on the cross slide, the milling cutter being run on a mandril between centres

* * *

FEAR OF DISMISSAL

THOUSANDS of men and women are living in constant fear of losing their positions. It is good to know that, in most instances this fear is groundless, but until this fact is known to the worker he is just as unhappy as if the danger were real—perhaps more so than if he actually had been dismissed.

This fear is so blighting in its effects, so detrimental to good work, that employers and managers and all with any degree of authority in business should take every reasonable precaution to remove it from the minds of employees. When necessary to quiet the thought of a fearful employee, it is sometimes well for the superior to come right out with the assurance and say, "Don't be afraid of losing your position with us; we need you and are depending on you to help us carry on this business." Such an assurance is of untold value to a worker, not only to his peace of mind but also to his work itself.

Some employers and managers try to rule their men by purposely keeping them in fear of losing their positions. Such a policy is nothing short of cruelty. A manager who knowingly does that, has no moral right to hold authority at all. This policy should be utterly condemned wherever found. It may sometimes be done ignorantly, but the effect is the same as if done from cruel motives.

Let every sincere worker feel the satisfaction of knowing that his efforts are appreciated, and that he is not to be cast aside at the whim of any man.

* * *

The Dominion Copper Products Co. has increased its capital stock to $1,000,000.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

GATE VALVE RESEATING MACHINE

TO maintain the highest operation efficiency in any make of valve, the latter must have a perfect bearing on its seat to reduce to a minimum any possibility of leakage. Owing to the peculiar construction of gate valves, it is very difficult -without the aid of special equipment—to maintain them in good condition. To remove the seats from their fixed position requires considerable time and dexterity, often necessitating delay in the operation of the plant. However, mechanical appliances are constantly being designed and constructed which are gradually eliminating the difficulties incidental to water and steam valve operation.

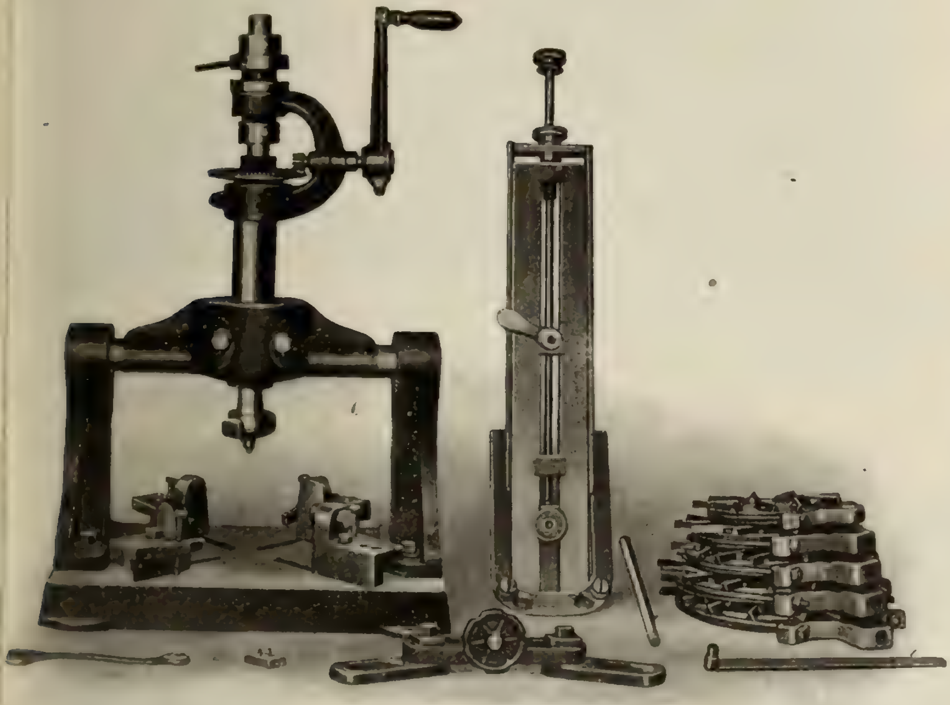


FIG. 1. COMPLETE GATE VALVE REFACING OUTFIT.

The accompanying illustrations show the Dexter Gate Valve Re-seating Machine, as recently improved, for the more efficient handling of gate valve repairs. Fig. 1 shows a complete re-facing outfit. The part to the left indicates the rigid construction of the valve disc facing device; the base plate being supplied with four adjustable jaws for holding the work, while the facing tool is carried on the end of a revolving spindle. This spindle, as well as the device in which it operates, is similar to those used in the globe valve facing attachment. The section in the centre of the cut is the portion secured to the body of the valve while the cutters are operating on the interior valve seats. Fig. 2 is a view of the machine, in position, facing off a gate valve seat, while Fig. 3 illustrates the disc cutting device in operation. The various cutters are placed at different angles in relation to their travel, thus practically eliminating the possibiilty of chatter when cutting. The circular head which carries the cutters is operated by means of a flexible cable that grips the outer surface when moved in one direction, and releases when moved back again. By this method the cutters are forced to move continually in one direction, and can be operated successfully even when the lever has only a short travel.

◆

D. C. MOTORS OF LOW HORSE POWERS

TO meet a demand for direct current motors of the smaller horse powers for direct connection to and driving all kinds of industrial machinery, machine tools and other applications requiring a low-power compact machine, the C & C Electric & Mfg. Co., of Garwood, N.J., has developed a new line of specially designed motors.

They are known as Type IB, are bipolar with interpoles, and can be furnished in ratings up to 10 h.p., either shunt or compound wound. For a general manufacturing drive, such as for machine tools and other industrial machinery, the characteristics of the shunt wound motor are the most desirable. It is essentially a constant speed machine, having close speed regulation from no load to full load, and is recommended for all purposes where the torque required for starting and accelerating does not greatly exceed full load torque. The compound wound motor is desirable for drives where the starting torque is

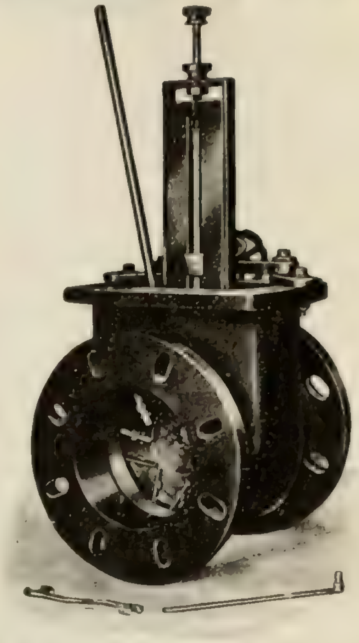


FIG. 2. FACING-OFF GATE VALVE SEAT.

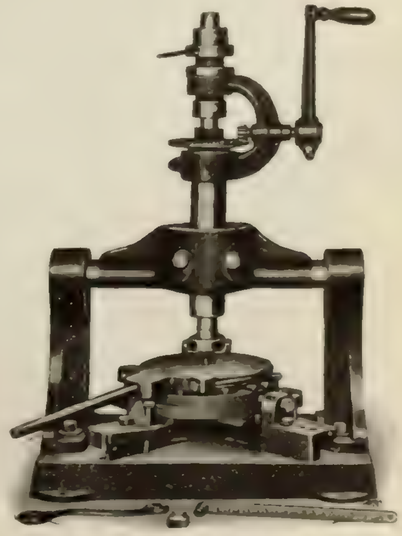
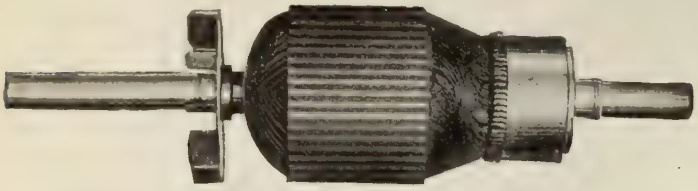


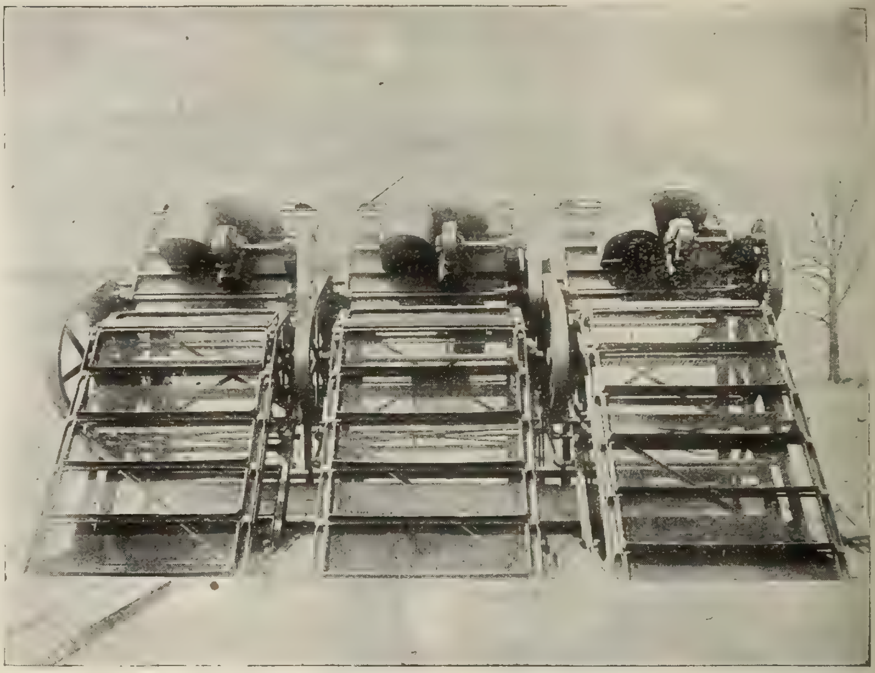
FIG. 3. DISC CUTTING DEVICE IN OPERATION.

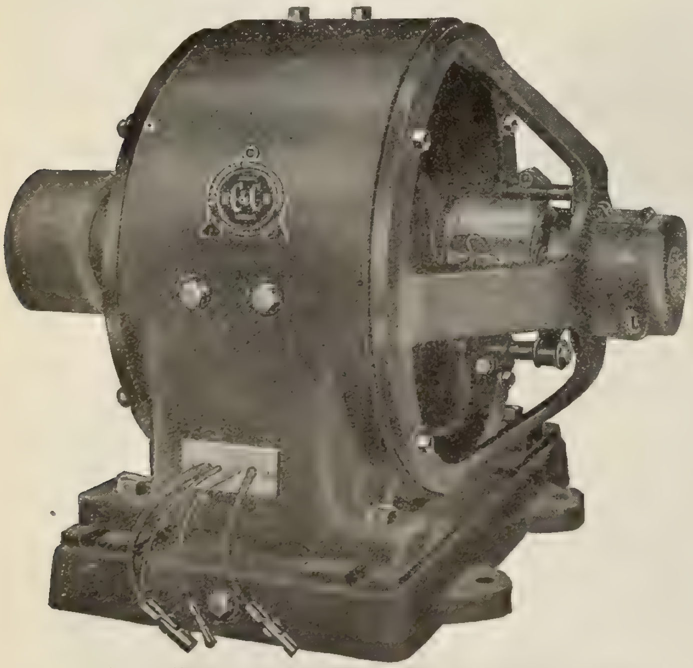
much heavier than the full load torque. This motor starts at a much heavier load than does the other, and any degree of compounding can be furnished to meet conditions.

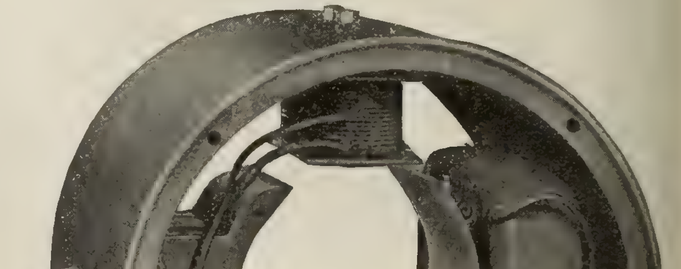

THE I. B. ARMATURE

The materials entering into the manufacture of these motors and their design are such as to make a compact machine, sturdy both electrically and mechanically. The main frame and supporting feet are cast integral, the pole pieces being separate. The main pole pieces and pole shoes are laminated. The interpole pieces are separately cast and the coils are all form wound. The pulley side bearing bracket is provided with a wide apron to protect the winding from mechanical injury, and the bearing supported by four arms with large openings between, makes a rigid open bracket, permitting free and ample ventilation. The commutator side bearing bracket has four arms, giving also a rigid bracket and free access to the commutator and brushes. Both brackets fit in a recess in the main frame, insuring thorough and rigid alignment.

The armatures are of standard design with laminated core. An air agitating fan is placed on the pulley side of the shaft next to the armature winding to furnish the high degree of ventilation and cooling so necessary in motors of small compact frame, guaranteeing severe service and heavy overloads. The addition of interior commutating poles forms another desirable feature. In continuous operation for long periods, these motors have been found to run cool and without attention. The interpoles make possible sparkless commutation through the full range of load without changing the brush position.


SELF-CLEANING TRAVELING WATER SCREENS


C & C TYPE I. B. MOTOR WITH UNIVERSAL BASE


MAIN FRAME WITH FIELD AND COMMUTATING POLES

This new line of motors is furnished in the open type, or with perforated or totally enclosing covers for protection against dust, metal chips, dampness, etc. For belt drive the motors can be furnished with either a universal slide rail base or a belt tightener idler pulley.

SELF - CLEANING TRAVELING WATER SCREENS

THE necessity for clean circulating and boiler water in power plants has become so much of an accepted fact to-day that it is not necessary to make explanation of it in order to introduce the subject of screens for screening this water. Ever since water has been used for this purpose there have been various devices for screening it and removing at least the larger pieces of foreign matter. These devices have ranged from an ordinary grating placed in the pipe or channel to quite elaborate and finished machines.

In all of the known methods of screening the water, however, the screens themselves require attention sooner or later. This attention meant, in some cases, a great amount of labor and difficulty, and the screening of some of the devices was more or less ineffective, principally at times when cleaning was in progress.

Every engineer is familiar with the fact that no matter how many sliding screens are placed in an intake one after the other, when each screen is raised a certain amount of sediment drops down and passes under it and on to the next one. This process repeats itself until the last screen is raised and then the droppings enter the intake to the power plant and are carried into the pumps and condenser tubes where they hasten the necessity for cleaning these auxiliaries.

It was with a view to improving the conditions outlined above that a few years ago the Chain Belt Co., built three machines known as the "Chain Belt Self Cleaning Traveling Water Screens." These were installed at the south-west plant of the Commonwealth Edison Co. in Chicago.

The accompanying illustration shows the original three screens which have been in continuous operation since their installation.

The early experience of the Chain Belt Company has enabled them to make many improvements and developments in the mechanical design so that the screens built at present are quite different from the original installations. The machines consist essentially of wire screening baskets mounted on two strands of steel chain belt. These chain belts and screens form a continuous screening apron which passes over sprockets at top and bottom of the device, and are mounted on a structural steel supporting frame. There are lips on the baskets and as this screening apron moves through the water slowly and in an upward direction it carries with it particles screened from the water. After turning over the head sprockets it deposits them in a trough from which they are flushed into the river on the down stream side. The cleaning of the screen baskets is effected by having a spray pipe running back of the screen baskets which forces a continuous spray of water through the screens from the back.

In the majority of installations these screens have been placed on an incline as shown on the cut, but there are several installations which have been built in a vertical position.

PATTERNS BROUGHT FROM STORAGE.

EVEN when castings are wanted without alteration from a pattern which it is certain has never been altered, it is seldom that the latter can be taken from the stores and sent into the foundry without requiring anything done to it in the pattern-shop. A pattern in regular use can be relied on, but one which has been out of use for a long time cannot. Wood is liable to shrink and warp, especially in a new pattern which has had time for this to occur, and has not received attention since being made. Shrinkage may affect important dimensions, but more frequently it causes overlapping joints which tear up sand in being drawn from the mold. The pattern must be examined for this and tested for truth on surfaces liable to warp, besides being measured and examined for breakage or possible missing details.

A warped surface may be planed true if sufficient material can be removed without reducing too much the thickness of metal or over-all measurements. Sometimes battens are screwed on to pull the surface true, and are stopped off in the mold. In other cases a concave surface can be straightened by wetting the central part and causing it to swell, and so regain its original form. A part originally circular may become elliptical through shrinkage, and this has to be rectified, often by inserting a piece.

Shrinkage in some places can be made good by putting pieces on. Sometimes the shrinkage may be in a place where it does not matter, or it may be so small in amount that it can be ignored. Damaged corners or other parts may have to be made good by letting pieces in. Fillets are often broken or missing and require replacement. Varnish wears off when a pattern has been molded from a good many times, and more varnish must be put on, preceded by thorough glass-papering and scraping where necessary to remove roughness. Work of this kind has to be done on old patterns before they go into the foundry even when the castings required are similar to previous ones.

FILES AND THEIR NAMES

THE Cadillac Motor Car Co., of Detroit, recently came to the conclusion that many of the men in its shops were working at low efficiency, owing to lack of knowledge concerning the names of different types of files. In many cases it was thought probable that the man knew what kind of file he wanted for his work, but in ordering it from the tool supply room, wrote the wrong name on his requisition slip. Then when the file was given him, he did not wish to admit his error and so took it out to the shop and did the best work he could with it. To overcome this difficulty, a sample board has been placed outside the window of each tool supply room on which there is a complete set of files with the proper name under each file. With this system in use, the workman comes to the tool supply room, and looks at the board to determine the right name of the file that he wants before handing in a requisition slip. As a result, he is sure to get the proper file for his work.

BREAKING-IN NEW MEN

WHEN a new man begins work in an office or a department he is often left to shift for himself without an outline of his duties or an introduction to those around him. It is good to hear what a young man told me once, says a writer in The Dodge Idea.

"When I began here," he said, "the manager of this department talked things over with me for nearly an hour. He told me the names of all the officers of the firm, and what they did, the names of all the heads of the departments I would come in contact with, the names of the other people in the office, the name of the leading houses we did business with, and gave me a good, general idea of the work of the whole office, and special outline of my duties and possibilities. Then he took me around and introduced me to many of the people.

The result was that I quickly got my bearings, felt at home from the first, and soon settled down to hard work. In my previous position with another firm my experience was different. There were no introductions, and no outline, and no general information. My first three months were practically spent learning what the manager could have told me in an hour if he had taken the trouble to do it. The work here is twice as complicated as it was there, but I got the general plan of it well in mind the first day."

Every manager should, for the moment, put himself in the place of the new employee and realize what a confused sense he must have of a large and unfamiliar business, and how easily that confusion could be taken away by a good talk about the work in general.

* * *

Great Lakes Record.—Great Lakes ore carriers established a new record in the month of July, loading 9,750,157 tons, which exceeds by 242,581 tons the movement in June, which at that time was thought to have set a mark that could stand for the year. Up to August 1, ore shipments for the season aggregated 29,365,724 tons, a gain of more than 5,000,000 tons over 1913, the banner year of the trade. Detroit vessel men predict that the year's movement will approximate 59,000,000 tons.

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DELIVERY OF MUNITIONS MANUFACTURING EQUIPMENT

IN munitions production we have, it is generally believed, got past the stage of belated equipment shipment, in other words, machine tool manufacturers are for the most part in a position to fill expeditiously both urgent and quantity requirements. Machine tools and attachments for the production of a varied size and type shell in Canada have been largely imported from the United States, either direct by our munitions plants or through our numerous machinery agencies. Although, as indicated, shipments are again more or less normal, comparatively speaking, deliveries are little if any improved. Both munitions plants and machinery dealers find the delivery feature equally acute to that existent over a year ago, and unhesitatingly attribute it to the incapacity of our railroads with regard to freight handling. Delays of from one to two weeks are, we understand, not unusual in railroad deliveries of munitions equipment, both local and U.S. border terminals being involved.

There are, of course, two sides to this matter, and the other or railroad version while not seeking to deny the allegations of the machinery people, pleads more or less abnormal circumstances to be sufficient justification. The railroads claim that there is a shortage of freight handlers; that those meantime employed are in large percentage unaccustomed to the work, and in consequence are slow and inefficient. They also claim that the unusual amount of general freight moving is aggravating the situation.

We are sufficiently in touch with the labor situation to know that railroad help of every kind has come under the spell of the War in one direction or another, and to be more specific has responded in large numbers to either the call to the colors or to the allurement of higher remuneration offered by munitions plants. Again, railroad revenues during the past months quite bear out the contention that unusual freight traffic is passing and must needs be cared for. Canada's munitions output, maintenance and increase is however, suffering as a result of delays by our railroads in making delivery after shipment, and just so long as individual firms affect to adjust the special disabilities under which they labor, correspondingly will an all-round improvement be delayed and munitions production continue to be curtailed.

While the railroads have made the suggestion that shipments be specially marked "For Munitions," we are of opinion that the Imperial Munitions Board, as the authoritative and governing body, should promptly call a conference of our leading machinery importers and of the railroad executives concerned to devise ways and means whereby the general irksomeness of present conditions may be minimized if not altogether eliminated. Our metal-working plants have lost none of their enthusiasm for munitions production, but find it dampened by delays in receiving equipment, especially when the latter can by a little adjustment be avoided. They were reconciled in the early days to abnormal periods between the placing of machine tool contracts and the completion and shipment of same, but now that they know that these have been eliminated, rapid transit and prompt delivery by the railroads is not unreasonably expected.

It appears to be no secret that, while Canadian manufacturers have all the shell orders they can take care of, production continues away below the expected total. Although in the returns available, the net shortage is not stated and varies considerably, in many cases both the weekly and monthly outputs are understood to be less than half what they should be. Lack of co-operation, and sections of the industry being held back through failure of ine or more supplementary sections to perform their obligations promptly are presumed to be responsible for the failure to maintain the desired output. While it has been said that many of our manufacturers have apparently trusted to luck as to their ability to fill orders which they have received, we are disposed to think that such may be reckoned as isolated instances and that what is lacking more than anything is the co-operative element.

There seems to be asserting itself the pre-war tendency to "individualism," on the part of some of our munitions plants—in other words, to keep "the other fellow" and the public as much as possible in the dark; when everything is going well, of course. While the war lasts, at any rate, let us have patriotism, and let us keep individualism buried. The delayed delivery by our railroads to our munitions plants of shell-making equipment is indicative at least of the need of co-operative effort, and no time should be lost in getting rid of the disability.

WOMEN'S WAR WORK.

THE employment of women in the manufacture of munitions in Canada has for some time now been an accomplished fact. In common with many other war developments, the probability of the ultimate adoption of such help had become a more or less familiar topic of discussion in manufacturing circles, which, combined with the wide-spread existence of such labor in Britain, had familiarized the general public with the idea.

That conditions in Britain are liberal and successful were evidenced some time ago by Sir Wm. Beardmore, who emphasized the whole-heartedness with which girls and women were working machine tools, and the stimulating effects of the knowledge their efforts were successful beyond expectation has doubtless much to do with the wonderful growth of munitions output on Britain.

In their utilization of women workers as in many other things, our enemies have betrayed a peculiar lack of common sense, not to mention consideration, and advices from a reliable authority indicate that the Central Empires are sacrificing their women on the altar of industry in a manner paralleling that of their men in battle. The number of women now employed in German engineering works is frequently as high as 80 per cent. and the question of compulsory service is being actively agitated in Germany, the claim being made that every woman should be obliged to serve her country in one way or another.

INDUSTRIAL NOTABILITIES

FRANK WILTON BAILLIE, of Baillie, Wood & Croft, Financial Brokers, Toronto; president, Canadian Cartridge Co., Hamilton; president, Bankers' Bond Co., Toronto; president, Burlington Steel Co., Hamilton; vice-president, Dominion Steel Foundry Co., Hamilton, was born at Toronto, Aug. 9, 1875, the son of John and Marian Baillie.

He commenced his business career as clerk and private secretary to the late Senator Cox, Toronto; became secretary of the Central Canada Loan Co.; and, later, was general manager of the Metropolitan Bank, Toronto. He formed the firm of Baillie, Wood & Croft, 1903; organized Bankers' Bond Co., 1912; Burlington Steel Co., 1911, and Dominion Steel Foundry Co. in 1912. At the commencement of the European War in 1914, he formed the Canadian Cartridge Co. to manufacture brass cartridge cases for the British Government at Hamilton, Ont.

FRANK WILTON BAILLIE

Mr. Baillie married Edith J. White, daughter of the late Aubrey White, Minister of Lands and Mines, Toronto; there being two sons and two daughters of the union.

His clubs are the Toronto, Albany, National, R.C.Y.C., Lambton Golf and Hamilton, and his recreations golf and motoring.

Mr Baillie has been much in the limelight recently, through his donation of a cheque for $750,000 to the Imperial Munitions Board, this sum constituting the profit on the manufacture of a certain quantity of brass cartridge cases, and which he obligated himself to so place.

In politics Mr. Baillie is independent, and in religion he is Anglican. His residence is 146 Crescent Road, Toronto, Ont.

—Photo, courtesy International Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh		$18 70
Lake Superior, charcoal, Chicago		19 75
Michigan Charcoal iron		28 00
Ferro nickel pig iron (Soo)		25 00
	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base, Toronto	3.25
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.25
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.10
Bars, 2 in. and up	4.00
Structural shapes	3.10
Plates	3.50

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$29 00
Electrolytic copper	31 00	29 00
Castings, copper	30 00	28 50
Tin	43 00	44 00
Spelter	14 00	13 50
Lead	8 25	8 25
Antimony	16 00	19 00
Aluminum	68 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4.25	$4 25
Heads	4 50	4 50
Tank plates, 3-16 in.	4 75	4 75

WROUGHT IRON PIPE

Prices in effect April 26, 1916

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 66	5 25
½ in.	3 91	5 57
¾ in.	4 72	6 96
1 in.	6 97	10 29
1¼ in.	9 43	13 92
1½ in.	11 28	16 64
2 in.	15 17	22 39
2½ in.	23 99	35 39
3 in.	31 37	46 28
3¼ in.	37 72	55 66
4 in.	44 69	65 95

Lapweld

	Black	Galv.
2 in.	$17 02	$24 24
2½ in.	25 16	36 56
3 in.	32 90	47 81
3½ in.	39 56	57 50
4 in.	46 87	68 13
4½ in.	57 15	83 19
5 in.	66 60	96 94
6 in.	86 40	125 80
7 in.	116 62	165 40
8 in. x 25 lbs. per ft	122 50	173 80
8 in. x 25 lbs. per ft.	141 12	200 20
9 in.	169 05	239 80
10 in. x 32 lbs. per ft.	156 80	322 40
10 in. x 40 lbs. per ft.	201 88	286 30

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$15 00	$15 00
Copper, crucible	18 00	18 00
Copper, heavy	18 00	18 00
Copper wire	18 00	18 00
No. 1 machine compos'n	14 00	14 00
No. 1 compos'n turnings	12 00	12 00
New brass clippings	13 00	13 50
No. 1 brass turnings	11 50	11 50
Heavy melting steel	9 00	9 00
Boiler plate	11 75	10 50
Axles, steel	13.00	15.00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	12 50
Shafting	16 50	16 00
Malleable scrap	10 00	11 00
Pipe, wrought iron	10 00	9 00
Stove plate	10 00	10 50
Heavy lead	5 00	5 00
Tea lead	5 00	5 00
Scrap zinc	8 00	8 00
Aluminium	34 00	35 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	50
Stove bolts	62½
Plate washers	25
Machine bolts, ⅜ and less	40
Machine bolts, 7-16 and over	30
Blank bolts	30
Bolt ends	30
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$4.85
Structural rivets, as above	4.75
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent.
Sq. & Hex Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	.65
Coupling bolts	net
Planer head bolts, without fillet	.15
Planer head bolts, with fillet	net
Planer head bolt nuts up to 1 in.	.60
Planer head bolt nuts, over 1 in.	.55
Planer bolt washers	list plus 10
Hollow set screws	list plus .20
Collar screws	list plus .20
Thumb screws	.20
Thumb nuts	.75

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$43 00
Open-hearth billets, Pittsburgh	45 00
O.-H. sheet bars, Pittsburgh	45 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

andard steel wire nails,

ase	$3 75	$3 70
t nails	3 40	3 40
scellaneous wire nails	65%	
essed spikes, ⅝ diam., 100 lbs.	$3 90	

MISCELLANEOUS

lder, guaranteed	0.28½
lder, strictly	0.26½
abbitt metals	**.11 to .60**
oldering coppers, per lb.	**.53**
tty, 100 lb. drums	3.00
hite lead, pure, per cwt.	13.95
ed dry lead, 100-lb. kegs, per cwt.	**13.87**
ue, French medals, per lb.	0.20
arred slaters' paper, per roll	**0.95**
otor gasoline, single bbls., gal.	**0.32**
nzine, single bbls., per gal.	0.31½
re turpentine, single bbls., gal.	0.69
seed oil, raw, single bbls.	0.90
nseed oil, boiled, single bbls.	0.93
laster of Paris, per bbl.	**2.50**
lumbers' oakum, per 100 lbs.	**7.00**
cking, square headed	0.25
acking, No. 1 Italian	0.30
acking, No. 2, Italian	0.23
ck wool, per lb.	0.11
re Manila rope	0.22½
ansmission rope, Manila	0.26½
ling cables, Manila	0.24½

POLISHED DRILL ROD

iscount off list, Montreal and Toronto	**25%**

CARBON DRILLS AND REAMERS

	Per Cent.
andard drills to 1½ in.	55
andard drills over 1½ in.	20
luted drills to 1½ in.	25
luted drills over 1½ in.	15
t stock	55
chet drills	15
ger bits for wood	20
s drills for wood	45
ood boring brace drills	35
ectricians	30
ckets	30
leeves	**50**
per pin and taper reamers	30
"Premier" and "Leader" chucks	10
bors for above	net
ts and countersinks	list plus 30
idge **reamers**	55
re reamers	10
king reamers	10
d reamers	15

High-speed drills up to 1½ in. and er 1½ in. are now double list.

COLD ROLLED SHAFTING

t mill	list plus 40%
t warehouse	list plus 50%

iscounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	4 60	4 50
Canada plates, dull, 52 sheets	4 50	4 50
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 45	6 45
Premier, 10¾ oz.	6 75	6 75

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES

Size	Seamless	Lapwelded
1 in.	$19 55	.....
1¼ in.	19 55	.....
1½ in.	19 55	14 00
1¾ in.	25 00	16 50
2 in.	25 00	16 10
2¼ in.	28 50	18 50
2½ in.	32 00	21 00
3 in.	40 00	25 00
3¼ in.	.....	27 00
3½ in.	45 00	29 00
4 in.	50 00	37 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.35 to .37
Tin	.55 to .58
Zinc	.20 to 23

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	1.75 to 1.90
Polishing wheels, bullneck.	.90
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.

Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14-.18
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Aug. 5.—The general state of industrial affairs has not undergone any marked change, although the continuance of extreme weather conditions, the shortage of labor and recent happenings in munitions work have rather tended to aggravate previous conditions. Little activity is reported in the scrap market.

Steel

The steel situation continues strong, and prospects of possible relief in prices were somewhat destroyed by the action of the leading makers in Pittsburgh, who advanced prices $2 a ton to 2.60c, which price has become general. Steel bands are expected to attain a similar level, while 3c is being asked for hoops. The plate market has stiffened, and inquiry from foreign and domestic sources continues good. An advance of $1 per ton is expected on structural shapes, which have remained at 2.50 for some months. Shell steel buying for 1917 has become a prominent feature of the market. Some makers report this product as being sold up to the end of the year, new sales being for next year's delivery. Billets and sheet bars are quoted at $42 to $45 Pittsburgh, wire rods being $55 and higher. Galvanized sheet prices show a slight decrease in sympathy with the spelter market, being quoted 4.25 Youngstown, while blue annealed sheets are still in fair demand.

Metals

The situation in metals, while showing little material change, is nevertheless a little more active than for some time. Copper is a little stronger owing to the absorption of second-hands. Tin is quiet and unchanged. Spelter has shown a relapse to its previous weakness, with a relative decline in prices. Lead has become quite active following a decline in Trust quotations. Antimony continues to decline.

Copper.—No new developments are noted in the copper situation. Odd lots of second-hand metal are gradually being absorbed, which is giving the general market a little better tone. No big business has been reported, and the producers are confining their activity to the filling of placed contracts. Reliable information as to what the producers are getting for metal is lacking, and current quotations are still nominal, based on the prices received for resale metal. The London market advanced considerably earlier in the week, but the present quotations are very little changed from that of last week; an advance of £1 on the week is shown in standard spot and £2 in electro, the latest quotations being £106 for standard spot, £103 for futures, and £125 for spot electro. New York market is quiet, with slight advance in the nominal quotations; prime lake at 26c show a ½c advance; electrolytic is 1c stronger at 27c, and castings at 24⅜ shows an advance of ⅛c per pound. Local dealers report a quiet market, with quotations firm and unchanged; lake, 31c; electrolytic, 31c, and 30c for castings.

Tin.—The arrival of fair-sized lots of tin, in addition to the quiet tone prevailing, has had a tendency to weaken the market. The present demand is light, and in view of the well-supplied market, metal is being offered at slight concessions on prices quoted. The London market is a little stronger, and advances are reported; standard spot shows an advance of £1 15s.; futures are £2 stronger; Straits spot has advanced £1 15s., and the Eastern price is up £2 10s.; the current quotations being £167 10s, £168 10s, £168 10s., and £171 respectively. The inactivity in the New York market has resulted in a decline of 2-10c per pound, the nominal price being 37 8-10c per pound. Local conditions are unchanged, and prices firm at 43c per pound.

Spelter.—Another reaction in the spelter situation has developed a very weak market. This is partly owing to the lack of interest shown by the brass trade. The scarcity of metal which seemed apparent a short time ago resulted in a comparatively sharp advance; but during the past few days considerable metal has become available, which has made the market very weak. Latest cables from London show a break in the market, spot having declined £12 and futures £11, leaving the quoted prices at £47 and £42 respectively. The American market has fallen off 1½c per pound, and the nominal quotation for prompt metal is 8 8-10c per pound. Local dealers have declined 1c on a quiet and weakening market, the current quotation being 14c per pound.

Lead.—Considerable activity has developed as a result of a decline in the Trust price of lead. With the drop recently made, it is expected that consumers will renew their interest in the market, as it is generally supposed that many of them are coming to the end of their reserve supply. The decline does not indicate a weakness in the general situation, but the leading interests have done this to get hold of some of the business that has been going to independents. Heavy buying by consumers may result in a return, in some measure, to former prices. The London situation is unchanged, with the exception of a slight advance in spot metal. In an effort to stimulate buying, the Trust has declined ½c on last week's price, and the outside price has declined ¼c, which puts both interests on the same basis of 6c per pound. Dealers here report a fair market and a decline of ¼c per pound; current quotations being 8¼c.

Antimony.—This metal is in very light demand and inquiries are almost nil. In many cases stocks are held by dealers that cost them over twice what they could get for it to-day. With labor conditions as they are at present, it is believed that the production of antimony at current prices must be carried on at a loss. The nominal price in New York is now 12½c, and it is thought that metal could be bought even cheaper. Dealers here report a dull market on declining prices. a drop of 3c during the week putting antimony at the low figure of 16c per pound.

Aluminum. — Conditions are unchanged and prices are firm at 68c per pound.

Toronto, Ont., Aug. 8.—The continued warm weather while being decidedly beneficial to the crops is affecting the steel trade by causing a reduction in output. Incidentally the crop prospects are very favorable and as a result an optimistic feeling prevails in business circles regarding the industrial situation. While great progress has been made in the manufacture of munitions, the daily deliveries being valued at nearly $1,000,000, production is considerably less than was hoped for or expected. Lack of co-operation is responsible for this unfortunate state of affairs, which has resulted in a shortage of some parts thus delaying the completion of the finished shells. Orders for shells placed by the British Government in Canada now total nearly $500,000,000 of which amount $200,000,000 have already been delivered. It will thus be seen that there is no lack of orders and that there is enough business in sight to keep the shell plants fully occupied for many months. After a long period of quiet the Allies are again placing large contracts for munitions with manufacturers in the United States. Three things have marked the new buying movement; the size of shells, the rapidity with which orders are being closed and the extension of delivery periods until May 1917. This indicates that enormous demand for munitions and also that further large orders are assured for Canadian manufacturers if deliveries can be maintained at the desired amount.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

Steel

Conditions in the steel trade continue very active although the output of the mills has been somewhat curtailed owing to the hot weather. The domestic demand is light as is usually the case at this time of the year, but export business continues heavy with no indication of falling off. The demand for munitions being as insistent as ever, the steel companies are making a big effort to supply the necessary steel, consequently the production of rails has been affected. On this account rails are being imported from the States by Canadian railways. The C.P.R. has placed at Chicago a contract for 14,000 tons against its rail enquiry for 25,000 tons. A considerable quantity of barb wire has also been imported into Canada from mills in the States. As was expected, galvanized pipe has declined due to cheaper spelter, but black pipe is unchanged. The situation in boiler plates is getting worse and prices are very firm with a possibility of an advance at no distant date. Boiler tubes are unchanged and the market quiet. Both domestic and export demand are only fairly active on bolts and nuts and prices are unchanged. Wood screws however are in good demand and may advance.

Galvanized sheets are firmer but the situation is unchanged and the market is steady. Spelter has not declined any further and black sheets continue firm. Prices on galvanized sheets are a little firmer in the U.S. market but unchanged locally. Black sheets are in rather light demand at present, but the mills are well filled on old contracts on which they have a good accumulation of specifications, enough to run them three months or more, on an average. Blue annealed sheets are quite firm with a good tonnage demand for both nearby and far off deliveries. Prices on sheets continue to be rather irregular in the primary market but local quotations are unchanged.

In the United States the export demand for steel products is heavier and continues to sustain the market as domestic enquiry has quieted down although more activity is looked for next month. The chief feature of the market continues to be the very heavy demand for semi-finished steel in the form of billets, sheet bars and ingots while there is also a big export demand for barb wire and structural material. Steel bars are unchanged at 2.50c, plates 3.50c and shapes 2.50c Pittsburgh. Bessemer billets have advanced $1 and are now quoted at $43.00 per ton Pittsburgh. Open hearth billets and sheet bars, and forging billets are unchanged. The Carnegie Steel Co. has announced an advance of $2. a ton on steel bars. The company is reported to be filled up on bars for ten months production but the other mills can hardly be considered, on the whole, as filled up so far ahead. The above advance will probably be followed by increases in other lines and it is expected a similar increase in wire prices will be announced soon.

Pig Iron

The hot weather is having the effect of reducing the production of pig iron but otherwise the situation is unchanged. The market continues quiet and prices are unchanged.

Machine Tools

The demand for machine tools for munitions plants continues to occupy the attention of dealers to the exclusion of practically everything else. There are indications that a great many more shells will be required than was anticipated, even a short time ago, and considerable activity in the machine tool market is thus assured for some time to come. The shells now required are mostly of the high explosive type and of large calibre. The tools principally required are heavy duty lathes having a swing from 24 in. to 30 in. Deliveries on such equipment are fairly good now, but prices have an upward tendency. With regard to deliveries local dealers are complaining about shipments being held up in the freight yards, the delays ranging from one to two weeks. It is believed that some arrangement will be made to relieve the situation as it is of the greatest importance that machine tools, destined for munitions plants, should be delivered as soon as possible.

Supplies

The demand for machine shop supplies continues brisk and prices continue very firm. The market is very steady and there are very few price changes to note. A sharp advance has been made in linseed oil which is now quoted at 90c for raw and 93c for boiled oil. Turpentine has declined 1c and is quoted at 69c one gallon. A break in the price of Pennsylvania crude oil has unsettled the market as it will probably affect the refined situation. No change however has been made in gasoline in the meantime although later on in the year prices may be easier.

Metals

The general situation in the metal market is unchanged and prices have been maintained at last week's levels with the exception of lead which has declined. A good demand for metals for munitions continues but ordinary business is quieter on account of the usual summer dullness. Copper quotations are still nominal but conditions in the market are improving because of the gradual absorption of metal in second hands. The tin market is dull and easy, at unchanged quotations. Spelter is dull with comparatively little interest being shown by consumers. The Trust has reduced its price on lead to the same level as the independents. Antimony continues weak and quotations nominal, while Aluminum is also unchanged.

Copper.—The buying movement which has been so long expected in the copper market has not developed yet but prices are unchanged and nominal. Comparatively little copper has been available recently as many refiners sold nearly all their production some time ago. If consumers can hold out until the end of September without heavy buying, prices may decline, but if they are obliged to buy heavily soon, an advance in prices is expected. Quotations are unchanged at 29c per pound.

Tin.—The market is quiet and dull at unchanged quotations. The demand for tin is light as consumers are not taking much interest in the market for either spot or futures. Tin is quoted locally at 44c per pound.

Spelter.—The demand for spelter continues light particularly from the brass mills although galvanizers are buying more metal. The market is steadier but quiet and unchanged at 13½c per pound.

Lead.—The Trust have reduced their price ½c per pound to the basis of 6.00c New York, bringing the price to the same level as the outside market. The independents however are cutting prices which indicates continued weakness in the market. Buyers who have been holding back in anticipation of this reduction are expected to come into the market now, but the buying movement has not started yet. Lead had declined locally and is now being quoted at 8¼c per pound.

Antimony. — The market continues weak with prices nominal and unchanged at 19c per pound.

Aluminum.—There is nothing of particular interest to note in the market and quotations are unchanged at 68c per pound.

WORLD-WIDE BLACKLIST

SYREN AND SHIPPING, in the course of an article protesting against American criticism of the British blacklist on certain commercial houses, says the total number of blacklisted firms in all countries exceeds 1,500 as follows; Spain, 167; Brazil, 140; Netherlands, 120; Argentina and Uruguay, 95; Morocco, 88; Portuguese East and West Africa; Guinea and Rio Muni, 87; Japan, 86; United States, 85; Norway, 83; Portugal, 79; Sweden, 72; Netherlands and East Indies, 70; Ecuador, 69; Persia, 56; Greece, 50; Philippines, 44; Peru, 41; Chile, 35; Bolivia, 22; Cuba, 10; Central America, 5 Paraguay, 3; Columbia, 1.

Syren and Shipping asks: What has America to protest about? Japan does not talk of remonstrances and protests, and she is our Ally. Neither, so far, has Brazil nor other countries concerned, except Argentina."

CANADIAN RAILROAD EARNINGS

GROSS earnings of the three big railroad systems of Canada in July were the largest for any month of the current year to date and, with the exception of last October, the largest for any month since the recovery from the 1914 slump. The aggregate of $20,956, 091 was approximately a million dollars higher than the May total, and $1,110,000 higher than the June total. As compared with the same month a year ago there was a gain of $7,040.445, or 50.6 per cent. For the seven months of the current calendar year the gross earnings of the three systems aggregate $125,559,779, a gain of no less than $36,819,066, or 41.5 per cent.

A fair indication that the volume of traffic handled by the roads in July was quite exceptional for a midsummer month is afforded in a comparison with the returns for last October, when every available car was being pressed into service to handle the record-breaking crop in the West. In October, 1915, the total gross was $21,656,191, or only $700,100 greater than the July, 1916, total.

The C. P. R. gross figures for the month give a total slightly less than that of July for either 1912 or 1913, but apart from those months it was the best July in the company's history in point of volume of business, and will probably be the best in point of net profits. The C. N. R., with new branch lines linked up, makes a spectacular showing with a 95.5 per cent. gain for the month, while the Grand Trunk improved on its average monthly gain since the beginning of the year.

Gross earnings for the month compiled from the completed weekly returns with those for the last ten days of July, and the increases over a year ago follow:

Road.	July gross.	Inc.	P.C.
C. P. R. ..	$11,795,000	$4,348,000	58.4
G. T. R...	5,326,891	819,945	18.2
C. N. R...	3,834,200	1,872,500	95.5
Totals..	$20,956,091	$7,040,445	50.6

The returns for the last ten days of July follow:

Road.	Earnings.	Inc.	P.C.
C. P. R. ..	$3,800,000	$1,324.000	53.5
G. T. R. ..	1,810,713	273,572	17.8
C. N. R. ..	1,207,300	572,400	90.1
Totals ..	$6,818,013	$2,169.972	46.6

Aggregate gross earnings of the three system by months so far this year, and the increases over 1915, follow::

Month.	Earnings	Inc.	P.C.
Jan.	$14,724,216	$3,966,003	36.9
Feb.	14.667,915	3,237,879	28.3
March ..	17,344,243	3,731,539	27.4
April ...	18,077.805	4.959,127	37.8
May	19,959,336	7.224.934	56.7
June	19,840,173	6 659,139	50.5
July	20,956.091	7,040,445	50.6

* * *

Selection of Coal.—The proper selection of coal for each plant is essential to secure the maximum economy. Some plants will find screenings to be the most economical, while a plant in the same block may fine run-of-mine to be the best. Still another plant might find nut, pea and screenings the best. Local conditions must be considered, and tests are the only way in which the best kind of coal can be determined. What your neighbor finds to be the best may be the worst for your plant. Price per ton has very little to do with this matter; it is purely a case of the cost of fuel per pound of steam.

U.S. FIRMS AND INDIVIDUAL BLACKLIST

THE Official Gazette of the British Government has published the following names of American individuals and firms placed on the blacklist under the Trading with the Enemy Act:

Philip Bauer Co., 68 Broad street, New York.

Beer, Sondheimer & Co., New York.

Simon R. Blumenthal, of Zimmerman &. Forshay, New York.

Herman Botzow, of O. C. Kanzow & Co., New York.

Brasch & Rothenstein, 32 Broadway, New York.

Maurice Bunge, of MacLaren & Gentles, New York.

Alf. Burun, of Brasch & Rothenstein, New York.

Goldschmidt Chemical Company, 60 Wall street, New York.

Goldschmidt Detinning Company, 60 Wall street, New York.

Goldschmidt Thermit Company, 90 West street, New York.

Gravenhorst & Co., 96 Wall street, New York.

Carl Grubnau & Son, 144 Arch street, Philadelphia, 74 Wall street, New York and Boston.

Oscar L. Gutelman, of Knauth, Nachod & Kuhne, New York.

Charles Hardy, 50 Church street, New York.

Hasenclever & Co., 24 State street, New York.

Bernhardt, Hasenclever & Soehne, 21 State street, New York.

Maryan H. Hauser, of Zimmerman & Forshay, New York.

Alfredo Hirsch, of MacLaren & Gentles, New York.

Franz H. Hirschland, of Goldschmidt Thermit Co., New York.

Robert W. Howe, of Brasch & Rothenstein.

William E. Hamburg, 25 Beaver street, New York.

International Hide & Skin Company, 59 Frankfort street, New York.

International Import and Export Company, 136 South Fourth street, Philadelphia.

J. Isaacs, of John Simon & Bros.

Max Jaffe, 15 William street, New York.

J. A. Kahl, 82 Beaver street, New York.

Kanzon & Co., 11 Broadway, New York .

Otto C. Kanzon, of Kanzon & Co., New York.

H. Kempner, Cotton Exchange, Galveston, Texas.

Knauth, Nachod & Kuhne, 15 William street, New York.

Mary I. Knauth, of Knauth, Nachod & Kuhne, New York.

Wilhelm Knauth, of Knauth, Nachod of Kuhne, New York.

Hermann C. Kupper, 52 Murray street and 536 111th street, New York.

MacLaren & Gentles, 222 Produce Exchange, San Francisco.

George W. McNear, 433 California st., San Francisco.

A. Magenheimer, 68 Broad street, New York.

Marx Maier, 200 Fifth avenue, New York.

Merchants Colonial Corporation, 45 William street, New York.

Carl Muller, of Muller, Schall & Co.

Ernest Muller, of Schuchardt & Schutte .

Muller, Schall & Co., 45 William street, New York.

Frederick Muller-Schall, of Muller, Schall & Co., New York.

Maris Nachod, 15 William street, New York.

National Zinc Corporation, New York.

Richard Neuhaus, of the Electro Bleaching Gas Company, New York.

K. & E. Neumond, 25 Broad street, New York .

Rolin C. Newton, 15 William street, New York.

Norfolk Refining & Smelting Company, of Virginia.

Orenstein & Kopper, of Pennsylvania.

Edmund Pavenstedt, of Muller, Schall & Co., New York .

Leopold Pelatz, 17 Battery Place, New York.

Petroleum Products Company of California, San Francisco.

Louis J. Rees, of Zimmerman & Forshay, New York.

Reuter, Broeckelman & Co., 59 Pearl street, New York .

Alfred Richter, of Reuter, Broeckelman & Co., New York.

Roessler and Hasslacher Chemical Company, 100 William street, New York.

Rubber and Guayule Agency, 108 Water street, New York.

Townsend Rushmore, 82 Beaver street, New York.

William Schall, Jr., of Muller, Schall & Co., New York.

Schenker & Co., 17 Battery Place, New York.

G. F. Schloetelborg, 318 Globe Building, Seattle.

Paul Schmidt, of Rubber and Guayule Agency, New York.

Schenker & Co., 17 Battery Place, New York.

Schuttle, Bunemann & Co., 15 William street, New York.

John S. Scully, of Zimmerman & Forshay, New York.

Siemssen Company, 82 Beaver street, New York.

John Simon & Bros., 15 William street, New York.

L. Sonneborn Sons, 262 Pearl street, New York.

Southern Products Trading Company, 15 William street, New York.

Edward Stegemann, Jr., of Brasch & Rothenstein, New York.

Superior Export Company, 90 West street, New York.

Texas Export and Import Company, Galveston.

Ernest Ulrich, 15 William street, New York.

Edward Weber, of Rubber and Guayule Agency, New York.

Otto Wehrenberg, of Philip Bauer & Co., New York.

Arend H. Weingardt, 15 William street, New York.

Zimmerman & Forshay, 9 Wall street, New York.

Carlowitz & Co., 82 Beaver street, New York.

Charles Cullen, Ocala, Florida.

Armin Czech, of International Import and Export Company.

Eugene Dittzgen Co., 166 West Monroe street, Chicago, and 218 East 23rd street, New York.

Electro Bleaching Gas Company, Buffalo avenue, and Union street, Niagara Falls, and 25 Madison Square avenue, New York.

E. H. Erlanger, 60 Wall street.

Carlos Falk, of MacLaren & Gentles.

GUN ABOARD DOES NOT AFFECT STATUS.

THE fact that a merchant ship is armed with a gun with which to defend itself does not change its character so as to permit men engaged as crew to refuse to go on board and serve, even though the contract they have signed are the ordinary pre-war Articles relating to merchant ships.

This was the effect of a judgment handed down recently by Judge Leet in the case of five firemen who refused to board a ship sailing from Montreal to England. The men were sentenced to ten days each in jail, His Honor remarking that he wished to be lenient under the circumstances, and that he believed that the men had probably acted in good faith. The men were engaged in New York through agents of the steamship company, it having been found impossible to get the necessary complement here. This is the first case of this kind which has been tried in Canada, and the judgment establishes, therefore an important precedent.

Judge's Summing Up.

His Honor remarked at the outset that the charge of desertion against the men could not stand, for it had been shown that they were under surveillance from the time of their arrival here. The other charge was of refusing to go on board the ship. The judge reviewed the facts of the case, the hiring of the men in the United States, their arrival here, the non-arrival of their baggage, and its subsequent appearance as a result of efforts on the part of the shipping company.

"The only question was to decide whether the fact that the ship was armed makes any difference," he continued. "I have no experience in marine matters, and do not know much about the law regarding the arming of a merchant ship for defensive purposes. It is a question whether the carrying of this gun would change the nature of the boat, or make such a difference in the condition of affairs as would allow the men to refuse to carry out their contract. Certain facts connected with the case are matters of common knowledge. These men knew, must have known, that there was war between Great Britain and Germany, and that every vessel leaving a Canadian port was in danger, that it might be overhauled by a German cruiser or submarine, captured or sunk. That is a fact that is so public that everybody must know of it. If they were willing to come and take service on a merchant ship, then the fact that it was sailing from a Canadian port would make no difference.

"From the evidence given, and the authorities cited," continued His Honor, "I do not think that it does make any difference that the ship carried this gun." He remarked on the means of protection which would be afforded the ship across to England.

"I, therefore, come to the conclusion that because it carried one gun for the purpose of defence is not a reason for declining to go on board. They knew, when engaged in New York, that Canada was a British country, and that the ship was going to England and return. All the risks of the trip were appreciated, and I cannot see that the fact that the ship carried a gun made any difference in the agreement, or added to the risk, or allows a pretension to claim that the engagement was made under false pretences. I have, therefore, to find that you are guilty."

In regard to the penalty, the court pointed out that the ship had sailed short five of its crew because of the action of the accused, and the result would perhaps be serious to the ship, and in any case mean more work for those on board. However he felt that the men had acted in good faith, and their side of the case had been put by their spokesman in a sincere manner, and under the circumstances he would not be severe. Sentence of 10 days followed.

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SAFETY WORK POSSIBILITIES

SAFETY work enables not only the employee to get a clearer and better understanding of what the management is trying to do, thereby creating a kindlier feeling on the part of the employee toward the employer, but it also enables the employer to get a closer insight, perhaps a more sympathetic understanding of the worker's attitude. After all, the distance between the top of the heap and the bottom, does not change human nature very much. Both top and bottom are usually cast in pretty much the same mold. Boss and bossed—God made them both.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia.

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Ploschad 9, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Thorold, Ont.—The Ontario Power Co. will build an addition to its machine room here.

Shipsaw, Que.—Price Bros. & Co., will install a 5,000 h. p. turbine and generator at their plant here .

Sherbrooke, Que.—H. G. James proposes making an addition to his machine shop to cost $7,000.

St. Catherines, Ont.—The McKinnon Dash & Hardware Co., will build an extension to their power plant.

Thorold, Ont. — The Toronto-Niagara Power Co., is building a transformer house at a cost of $100,000.

Nelson, B.C. — The West Kootenay Power & Light Co., is installing an 8,000 h.p. unit in their No. 2 plant.

Osaquan, Ont.—The Indian Lake Lumber Co., will develop a water power here. F. F. Wilson is superintendent.

Bothwell, Ont. — Crotty & Elliott, are having plans prepared for an oil power plant to be erected at a cost of $5,000.

Pembroke, Ont.—The Pembroke Electric Light Co., will build a brick and reinforced concrete sub-station at a cost of $303,000.

Porcupine, Ont.—The Northern Power Co., will install a 4000-h.p. water turbine and generator in its power plant at Wawaitin, Ont.

Orillia, Ont.—The E. Long Co. has taken over the Tudhope-Anderson Co's. wheel works building and will equip it for a machine shop.

Walkerville, Ont.—The Motor products Corporation in which W. C. Rand of the Rand Mfg. Co. of Detroit is interested, will build a plant here.

Thorold, Ont. — The Ontario Paper Co., will erect a sulphite mill adjoining their plant here. W. T. Trimble care of the company has charge of the work.

Fredericton, N. B.—The C. P. R. will erect four concrete buildings at Mc-Adam Junction to be used as a power house, coaling plant, storage building, and blacksmith shop.

Ottawa, Ont.—J. Sutherland of this city has received the contract for the erection of a power plant on Slater Street for the Imperial Realty Co., Ottawa, to cost $30,000.

Montreal, Que.—William Hood & Son, are in the market for a 10 or 15-h.p. electric motor, a heavy Bliss trimming on punching press, a power hacksaw, and a 1000 to 2000-lb. drop forging hammer.

Renfrew, Ont. — M. J. O'Brien will proceed with his development scheme at Calabogie, where 5,000 h.p. can be had. A power plant will be erected there and a transmission line installed between that point and Renfrew.

Port Colborne, Ont.—The International Nickel Co. has secured an option on a site here for a nickel refinery. No definite decision has been arrived at regarding the location of the plant, but it is probable that this town will be selected.

Sudbury, Ont.—The British-American Nickel Co. will commence operations at once on the construction of its refinery near here. The concern is controlled by Canadians, but financed in the Old Country. It will sell its product for the present entirely to the British Government. It is supposed to be controlled by the Mackenzie & Mann interests.

The Nova Scotia Steel & Coal Co., New Glasgow, N.S., contemplates making considerable extensions at its iron mines, Wabana, Newfoundland. These extensions include new hoisting equipment, boilers, pumps, compressed air plant, power lines, cables, ventilating plant, industrial railroad track, hauling cable, etc. R. E. Chambers, is manager of ore mines and quarries.

Dartmouth, N.S.—Involving an expenditure of $2,000,000, work is now going forward on the Imperial Oil Co.'s new refinery on the Dartmouth shore of Halifax harbor. Over 400 acres of land have been purchased, and the plant, as originally planned, will cover 40 or 50 acres, the remainder of land being for expansion purposes. There will be storage tanks, machine shops, warehouses, and all the other equipment that goes with a modern oil refining plant. S. S. Shatford is manager.

General Industrial

The Noble Mfg. Co., St. Thomas, Ont., has been purchased by Peter Klob, of Toronto, for $45,000.

Penetang, Ont.—Fire destroyed the Furnace Co's. brick plant and machine shop. The loss which is heavy is partly covered by insurance.

Doon, Ont.—The plant of the Doon Fibre Co., owned by James Huber recently totally destroyed by fire, will be rebuilt and new equipment installed.

Brantford, Ont.—The Brantford Carriage Co. has purchased the business and plant of the Baynes Carriage Co., Hamilton, Ont. The latter concern will be closed up.

Toronto, Ont.—A well known chewing gum manufacturing firm, contemplate erecting a big factory in the east end at a cost of $165,000. A building permit has been applied for.

Chatham, Ont.—Work has now been commenced on the $45,000 addition to the American Pad & Textile Co., plant on Queen and Richmond street. Wells & Gray, Toronto, are the contractors.

Winnipeg, Man.—The Dyson Co., manufacturers of pickles, etc., are looking for a new site on which to erect a factory. This is necessary on account of the heavy demand during the past year.

Winnipeg, Man.—The mill and boiler-house of the Winnipeg Paint & Glass Co. factory, corner of Gertrude and Scott streets, Fort Rouge, are a total loss as the result of a fire which broke out on August 2. The loss is estimated at $100,000, fully covered by insurance.

Toronto, Ont.—A. S. White, of White & Co., brokers, New York, and president of the Federal Dyestuff & Chemical Corporation, spent a day recently in the city with R. R. Bongard, in consultation regarding the plans for establishing a branch of the Federal Company in Canada. The parent corporation operates at Kingsport, Tennessee.

Collingwood, Ont.—The buildings and plant of the Collingwood Packing Co. was totally destroyed by fire on Sunday night. The plant has not been in operation since the company became insolvent about three years ago. The building and plant was valued at about $150,000. Amount of insurance is not known.

Municipal

Hamilton, Ont.—A steam-driven turbine pump will probably be installed at the Beach pumping station at a cost of $100,000.

Petrolia, Ont.—A by-law to grant concessions and a site of 25 acres to the Lambton Flax Co., was carried on July 31 by a large majority.

Hamilton, Ont—The City Council, is having plans prepared for an addition to the waterworks pumping plant to cost $70,000. James Bain is the engineer.

Port Moody, B. C City Engineer Kilmer has arranged for the purchase of 11,000 feet of fire hose for fire protection in view of the recent installation of water service .

Renfrew, Ont. — The Town Council have decided to proceed with the development of power at the first chute of the Bonnechere River, where 1,500 h.p. is available. The cost of the development is estimated at $140,000.

Tenders

Drummondville, Que.—Tenders will be received August 15 for the construction of mechanical gravity filters, with a capacity of 500,000 U.S. gallons per day, also supplementary tenders for plant without machinery. W. A. Moisan, town clerk.

Toronto, Ont.—Tenders will be received by the Chairman, Board of Control, up to August 15, for the supply and delivery of one 5-ton travelling beam. Specifications and forms of tender may be obtained at the Works Department, Room 12, City Hall.

Carberry, Man.—Tenders will be received up to August 25, for the purchase of the following oil tanks and outfits: Two complete steel oil tanks, capacity 12,000 American gallons each with two pumps, piping, fittings and all connections. Apply W. D. Card.

New Toronto, Ont.—Tenders will be received by the Village Council until August 14, for the construction of sanitary sewers and a sewage pumping station. Forms of Tender may be obtained and plans and specifications seen at the office of the Engineer, T. Lowes, Mimico, Ont.

The Pas, Man.—Tenders will be received up to August 16 for all trades in connection with the erection of a public building at The Pas. Plans and specifications may be seen at the office of the architect, G. Nelson Taylor, The Pas, Man., or at the Winnipeg Builders Exchange, Winnipeg.

Winnipeg, Man.—Tenders, addressed to the Chairman, Board of Control, will be received up to August 14 for the supply and delivery of 4,500 Imperial gallons of transformer oil to the City Light and Power Terminal Station. Instructions to bidders, specification and form of tender may be obtained at the office of the City Light and Power Department, 54 King Street.

Winnipeg, Man—Tenders will be received until August 21 for the various works required in the completion of the New Parliament Buildings, and not included in the general contract. The works include structural steel, heating and ventilation, electrical conduit and wiring. Particulars may be obtained from S. C. Oxton, Deputy Minister of Public Works, Winnipeg.

Ottawa, Ont.—Tenders will be received until Friday, August 18, 1916, for the supply of filing cabinets for Dominion public buildings generally. Plans, specifications and forms of contract can be seen and forms of tender obtained on application to the office of Edwin Francis, caretaker, Post Office, London, Ont.; R. L. Deschamps, overseer of Dominion Buildings, Post Office, Montreal; Thos. A. Hastings, clerk of works, Postal Station "F," Toronto, and at the Department of Public Works, Ottawa.

Ottawa, Ont—Sealed tenders, addressed to the undersigned and endorsed "Tender for Burleigh," will be received up to noon on 14th August, for the purchase, as she lies, of the schooner Burleigh, length 101 feet, breadth 25 ft. 6 in., depth 10 ft. 8 in., gross tonnage 148.81, registered tons 129.88, built in Shelburne, N.S., in 1904. The Burleigh is a three-masted schooner and is equipped with a 40 h.p. auxiliary gasoline engine, built by the Sterling Engine Co. Permission to examine the vessel may be obtained on application to the Captain Superintendent, H.M.C. Dockyard, Halifax, N.S., from whom further particulars may be obtained. G. J. Desbarats, Deputy Minister of the Nvaal Service. Department of the Noval Service, Ottawa, July 22, 1916.

Assiniboia, Sask.—Tenders will be received up to August 15 for the supply and delivery of the following machinery and materials:—(A)—For the supply, delivery and erection of an 150 h.p. internal combustion engine; (B)—For the supply and delivery and erection of generator, exciter, switch board, and other

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department is able to present the following list of the moreimportant British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL
Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE
Valparaiso, British Consul General.

COLOMBIA
Bagota, British Consul General.

ECUADOR
Quito, British Consul General.

EGYPT
Alexandria, British Consul General.

FRANCE
Havre, British Consul General.
Marseilles, British Consul General.

INDIA
Calcutta, Director General of Commercial Intelligence.

ITALY
Genoa, British Consul General.
Milan, British Consul.

MEXICO
Mexico, British Consul General.

NETHERLANDS
Amsterdam, British Consul.

PANAMA
Colon, British Consul.
Panama, British Vice-Consul.

PERU
Lima, British Vice-Consul.

PORTUGAL
Lisbon, British Consul.

RUSSIA
Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN
Barcelona, British Consul General.
Madrid, British Consul.

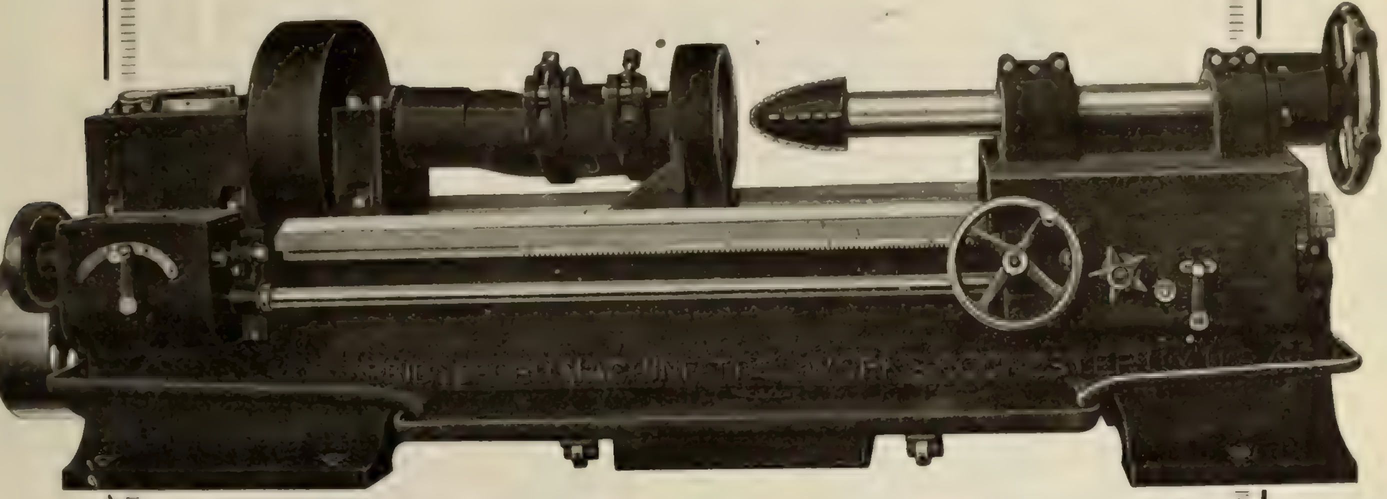
SWEDEN
Stockholm, British Consul.

SWITZERLAND
Geneva, British Consul.

URUGUAY
Monte Video, British Vice-Consul.

VENEZUELA
Caracas, British Vice-Consul.

BRIDGEFORD 9.2" BORING LATHE



Massive strength. Superior workmanship. These features are so prominent that a mere glance at the illustration will reveal them to you. It is a machine of the heavy duty, low swing type, having a specially designed carriage with auxilliary for internal profile. Carries a 6" steel bar with male taper, allowing for light design of cutter heads; 3 automobile style speed changes, all hardened and running in oil bath. A chip tray is attached and used in conjunction with stationary lubricant tank. Regular equipment comprises everything except chuck, steady rest and cutter.

THE A. R. WILLIAMS MACHINERY COMPANY, LTD.
64-66 FRONT STREET WEST, TORONTO

If It's
Machinery
Write
Williams

Don't Depend on Somebody Else
For Your Small Threaded Parts

THREAD THEM YOURSELF

A GEOMETRIC THREADING MACHINE
SOON PAYS FOR ITSELF

Takes floor space 2 ft. x 3 ft. and is complete with countershaft, change speed gear, adjustable stop for gauging length of thread.

No rough threads with the Geometric. They are as true and clean as can be produced on any Screw Machine.

From 1/8-inch pipe thread to 1-inch diameter is the usual range of the machine, but where fine pitch threads are to be cut on larger diameters, it can be fitted with a Die Head that will take care of the work.

Submit Your Threading Proposition to Us.

THE GEOMETRIC TOOL COMPANY
NEW HAVEN, CONN., U.S.A.

Canadian Agents: Williams & Wilson, Ltd., Montreal; The
A. R. Williams Machinery Co., Ltd., Toronto,
Winnipeg, and St. John, N.B.

apparatus; (C)—For the supply, delivery and erection of pumps, motors, piping and air compressor; (D)—For the supply and delivery of two pneumatic storage tanks; (E)—For the supply and delivery of one oil storage tank; (F)—For the supply and delivery of poles, wire and line material; (G)—For the supply and delivery of approximately 17,500 feet of 4 in., 6 in. and 8 in. steel pipe, or cast-iron pipe, and specials; (H)—For the supply and delivery of 20 hydrants, 29 gate valves and boxes; (J)—For the erection of power station; (K)—For the supply, delivery and installation of heating plant. Complete sets of plants and specifications may be seen at the office of the consulting engineers, Murphy & Underwood, Saskatoon, Assiniboia, Sask.

Personal

Samuel Grover Veary, late chief mechanical engineer Montreal Waterworks, died in Montreal on August 2, aged 75.

C. H. Speer has been appointed chief engineer of the Algoma Steel Corporation, in succession to J. D. Jones, who has resigned.

G. M. Smith, formerly of Lytle, Smith & Co., Montreal, has recently taken over the managership of the Precision Tool Co., 1665 St. James Street.

Captain Hiram Rowe, a retired mariner of the Great Lakes, passed away at his residence in Collingwood, Ont., on August 5, aged 72 years.

A. E. Griffin, of Wingham, Ont., is going to Russia in the interests of the Forley, Walsh & Stewart Railway Construction Co., of Vancouver, and expects to secure a contract for his company in that country.

J. A. Kilpatrick, president and manager of the Dominion Wheel & Foundry Co., of Toronto, and formerly of St. Thomas, has been appointed by the Imperial Munitions Board at Ottawa to take charge of the production of forgings.

Thomas J. Drummond, a prominent business man of Montreal, and a member of the Drummond, McCall Co., died at his summer residence at Castine, Me., on August 6. Mr. Drummond was born at Tawley, County Leitrim, Ireland, on September 26, 1860.

C. Stendol has been appointed manager of the steel department of the Canada Cement Co., Montreal, in succession to C. H. McMillan, who has resigned. Mr. Stendol was formerly with the Dominion Steel Corporation, and previously held an important managerial position with the Algoma Steel Co., Sault Ste. Marie, Ont.

Captain F. Ross Newman has been invalided to England, suffering from trench fever. He has been at the front for some fifteen months, having gone there with a Toronto battalion which formed a unit of the 2nd Canadian Overseas Contingent. Previous to enlistment, Captain Newman was sales manager at Toronto for the Canadian Fairbanks-Morse Co.

John D. McEachren, a former well known manufacturer of Galt, Ont., died recently at Indianapolis, Ind. The late John D. McEachren was in his 81st year and was born in St. Croix, Quebec. He came to Galt from Harriston and after being engaged in various pursuits for several years, founded the McEachren Heating and Ventilating Co., now Sheldons, one of the largest plants manufacturing heating and ventilating machinery in Canada.

Brig.-Gen. Sir Alexander Bertram, deputy chairman of the Imperial Munitions Board, will visit the West during the next few weeks in connection with the output of munitions, and particularly the production of certain raw materials, such as copper. He will visit copper mines in British Columbia with a view to expediting shipments. After returning from the West, General Bertram will in all likelihood accept an invitation to cross the ocean and visit the battle front.

Contracts Awarded

Quebec, Que.—The City Council have awarded a contract for batteries for the fire alarm telegraph system to Goulet & Belanger at $3,041.

The Boving Hydraulic & Engineering Co., Lindsay, Ont., have been awarded a contract for water turbines by the City of Sherbrooke, Que.

Quebec, Que.—Goulet & Belanger, of this city, have been awarded the contract for the Quebec Exhibition lighting system. Estimated cost, $11,000.

Hamilton, Ont.—The United Gas & Fuel Co. have awarded a contract for the equipment of their new plant here to the Gas Machinery Co., Cleveland, Ohio.

Iroquois, Ont.—The Village Council have awarded a contract to the Swedish General Electric Co., Toronto, for a 125 kw. generator with exciter and switchboard.

Toronto, Ont.—Witchall & Son, Toronto, has received the contract for the erection of an ice plant for the William Davies Co., Front Street East, to cost $50,000.

Edmonton, Alta.—Nesbitt & Co., Edmonton, have been awarded the contract for the erection of a machine shop at Edmonton for the C. N. R. at a cost of $19.500.

Chatham, Ont.—Wells & Gray, Toronto, have been awarded the contracts for the addition to the American Pad & Textile Co. factory here.

Prince Rupert, B.C.—The City Council have awarded a contract for pumping equipment to the Canadian Fairbanks-Morse Co., and for steel pipe to Campbell Gordon & Co., Vanvouver, B.C.

New Toronto, Ont.—The general contract for the erection of a factory for the Goodyear Tire and Rubber Co., has been let to the Dominion Construction Co., Toronto. Approximate cost, $750,000.

Niagara Falls, Ont.—The Town Council has awarded the contract to the Electro Bleaching Gas Co. of New York, for the installation of a liquid chlorine to cost $900. The plant of this company is in Niagara Falls, N. Y.

Port Arthur, Ont.—The Thunder Bay Contracting Co. of Port Arthur was recently awarded the contract for the basement and cement work on the new Canadian Government railway elevator to be erected at Transcona, Man.

Ottawa, Ont.—The contract for the construction of the new Customs house and examining warehouse at Toronto has been awarded to the Fuller Construction Co. The buildings will cost about $1,500,000, and are to be started at once.

Arnprior, Ont.—The Galetta Electric Power & Milling Co. have awarded a contract for a turbine to the Boving Hydraulic & Engineering Co., Lindsay, Ont. A 400 kw. generator and additional switchboard equipment will be supplied by the Canadian Westinghouse Co., Hamilton, Ont.

Victoria, B.C.—The contract for the 450 or 500 tons of steel to be used in the construction of the three ships being built in the local shipyards of the Cameron- Genoa Mills Shipbuilders, has been secured by the Victoria firm of Messrs. F. G. Prior & Co. The steel which will be required under the contract will consist of bars, bolts, rings, rivets, etc., and the whole order for the three ships will be delivered on the ground within six weeks' time.

Trade Gossip

Laurie & Lamb, Montreal, have received an order for a 500 h.p. Belliss & Morcom engine for the Belgo-Canadian Pulp & Paper Co., Shawinigan Falls, Que.

CELFOR

Our Competitor's Argument

One of our competitors—one for whom we have much respect—one who manufactures both high-speed and carbon drills—in some recent advertising shows conclusively that it is profitable to use high-speed rather than carbon drills, *even at ten times the cost.*

Our Competitor's Figures

High-speed drills cost ten times carbon drills, with present high prices of steel.

High-speed drills will do five times the work of carbon drills—a very conservative comparison.

But assume they will do only four times the work—ultra conservatism—

Cost of Drilling 10,000 Holes

WITH CARBON DRILLS		WITH HIGH-SPEED DRILLS	
20 Carbon Drills @ $1.00	$ 20.00	5 H. S. Drills @ $10.00	$ 50.00
20 Men @ $2.50 per day	50.00	5 Men @ $2.50 per day	12.50
100% *Machine Expense	50.00	100% *Machine Expense	12.50
Total Cost	$120.00	Total Cost	$ 75.00

*Machine expense includes taxes, insurance, depreciation, repairs, power, etc.

Our Competitor's Conclusion

"When you are using drills of ⅜" or over, if your equipment is favorable, we sincerely recommend the high-speed drill."

Our Conclusion

We heartily endorse our competitor's conclusion—and we sincerely hope he will not take offense at our use of his argument.

This sounds like humor—but it is not—it is fact.

We Manufacture High Speed Drills

CELFOR TOOL COMPANY

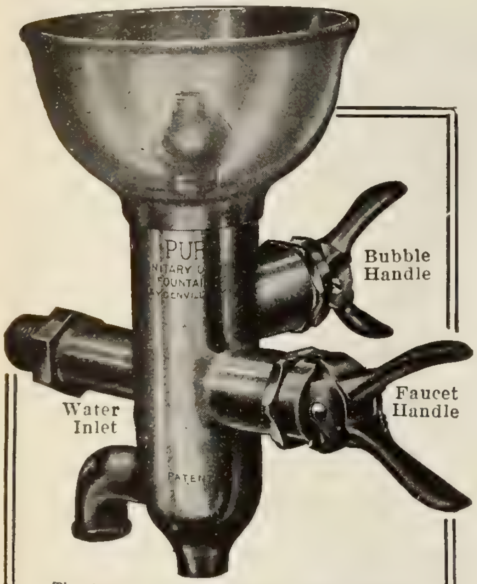
BUCHANAN, MICHIGAN

I BELIEVE

In Safety First and always.
In providing for the Health of my Fellow Workmen.
In Light and Air and sanitary Working Conditions.
In clean, fresh drinking water for everybody.
In the Safety, Economy and Man-betterment.

PURO SANITARY DRINKING FOUNTAIN

(MADE IN CANADA)



The loss of a man through impure drinking water is a crime that "the front office" must bear.

An ugly statement, isn't it? But true, absolutely.

When a man comes to work in your factory he puts his health in your keeping.

Are you willing to take chances on such a trust?

Impure drinking conditions are responsible for more tragedies than any machine ever built.

Apply the "Safety First" Principles to your water supply; don't deny your men a clean, fresh drink of water.

Conserve their health and they will improve your profits; make yourself as worthy of the name of "employer."

Install the Gold Medal winner Puro in your plant, office and shop alike.

The only Sanitary Drinking Fountain that is safe, sanitary, simple, automatic in control and easily attached.

Let us tell you just what it will cost you to

"PURO-FY"

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

Stampings and Metal Specialties

We have the plant and equipment for turning out stampings of the highest quality in brass, copper, aluminum, tin and steel, and are prepared to undertake the manufacture of metal specialties of any description.

PUNCHES, DIES, TOOLS.

COLEMAN FARE BOX COMPANY, LTD.
70 Bond St., Toronto

Galt, Ont.—The annual excursion of the Mutual Benefit Society of the Canada Machinery Corporation Works to Burlington Beach on July 29 was a decided success.

The Canadian General Electric Co., Toronto, have been awarded a contract for a 5,000 k.v.a. turbine and generator, condenser and pumps, etc., by the Acadia Coal Co., Stellarton, N.S.

The Canadian Westinghouse Co., of Hamilton, Ont., have been awarded a contract by the Great Lakes Power Co., of Sault Ste. Marie, Ont., for the electrical equipment for their new power plant.

The International Time Recording Co. has been incorporated at Ottawa, with a capital stock of $500,000, to manufacture time clocks, etc., at Toronto. Incorporators: E. B. Ryckman, A. L. Reid and S. G. Wharin, all of Toronto.

Ottawa, Ont.—The corner-stone of the new Parliament Buildings will be laid by his Royal Highness the Duke of Connaught on September 1 next. This date was fixed by the Parliamentary Reconstruction Committee owing to the fact that it was on September 1, 1860, that the corner-stone of the old building was laid by the late King Edward.

The Smithsonian Institution, Washington, D. C., announces that it has made an appropriation to further experiments in the dissipation of fog by electricity and that the investigations will be carried out under the general direction of Dr. F. G. Cottrell, who has already done much toward the practical precipitation of dust, smoke and chemical fumes in large industrial establishments.

Saguenay Railway Taken Over.—The agreement between the Government and the owners of the Quebec & Saguenay, Quebec, Montmorency & Charlevoix, and Lotbiniere & Megantic Railways for the taking over of the three roads was finally signed up at a meeting of the Cabinet Council on August 2. The agreement is along the lines of the legislation passed last session. The total amount to be paid over amounts to about $7,000,000. The Government will proceed as soon as possible with the completion of the Quebec and Saguenay road.

Canadian Munitions Plant for Women.—The Gooderham & Worts Distillery at Toronto is being turned into a munitions plant for women operators, through the generosity and patriotism of Col. A. E. Gooderham. In the reconstruction and equipment arrangements every possible comfort has been provided for the women employees. The latter will operate on three shifts of eight hours each. Motors will call to

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ESTAB. 1877.
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Patent Solicitors. Head Office, Royal Bank Bldg., Toronto. Ottawa Office, 5 Elgin St. Send for our Plain Practical Pointers. Copy of National Progress, in which our patents are advertised, mailed free.

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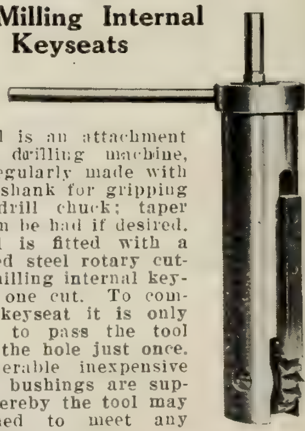
MARION & MARION, 364 University St.
Merchants Bank Building, corner St. Catherine St., MONTREAL, Phone Up. 6474 and Washington, D.C., U.S.A.

KEYSEATER

for Milling Internal Keyseats



This tool is an attachment for the drilling machine, and is regularly made with straight shank for gripping in the drill chuck; taper shank can be had if desired. The tool is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. To complete a keyseat it is only required to pass the tool through the hole just once. Innumerable inexpensive eccentric bushings are supplied whereby the tool may be bushed to meet any diameter above its own.
Write for Catalog C for full detail.

NATIONAL MACHINE TOOL CO.
2270-2272 Spring Grove Avenue, Cincinnati, Ohio, U.S.A.

Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria.

KINDLY MENTION THIS PAPER WHEN WRITING TO ADVERTISERS.

take them to their employment, while gas ranges will stand ready to produce cups of tea and other sustenance; in short, nothing will be left undone to make the work as easy and as congenial as possible. The matron appointed has been given carte blanche to carry out such ideas as occur to her along this line.

Building Notes

Barrie, Ont.—The Bell Telephone Co. will erect a new exchange building here. Contracts will be awarded shortly.

Toronto, Ont.—Mongee & Co. have been granted a permit for an addition to their premises at 334 Parliament Street to cost $4,000.

Toronto, Ont.—The Harry Webb Co. has received a permit for the erection of a bakery to cost $78,000, at the corner of Kendal Avenue and Davenport Road.

Toronto, Ont.—The city architect has approved the plans and issued a permit for the erection of a twelve-storey factory building by the T. Eaton Co., on Alice Street, to cost $625,000. The building will be of reinforced concrete fireproof construction.

Toronto, Ont.—A new moving picture theatre will be built at 141 and 143 Yonge street by L. J. Applegath & Sons for His Majesty's Theatre Co., and will cost $100,000. Plans are being prepared by F. W. Lamb, a New York architect. It will be absolutely fireproof and will have a seating capacity of 1000.

Toronto, Ont.—The Toronto Hydro-Electric Commission are having plans prepared for the erection of a large stores building at the corner of Murray Street and Caer Howell, to cost between $200,000 and $250,000. When the need arises the building will be enlarged, and it is expected that when complete it will be worth $400,000.

Halifax, N. S.—The French Cable Co., of Paris, has awarded to the Standard Construction Co., of Halifax, the contract for construction of one of the finest cable buildings in America, to be erected on the North Dartmouth shore. The contract calls for construction of wharf and building, involving an expenditure of $70,000. The building will be three stories in height, and 260 feet by 140 feet.

Wood-Working

Fesserton, Ont.—The stave and saw mills of the Fesserton Timber Co. here were totally destroyed by a fire on Saturday night.

WEBBER BROS. MACHINE COMPANY

Gear Blanks, Shell Punches, Boring Bars, Special Tools.

Machinery of all kinds built to your specifications.

Better Work. Reasonable Prices.
848 Dupont St., Toronto.
Phone Hill. 2746

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SPRINGS

are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

Write for booklet No. 7-T.

Established 1857.
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U.S.A.

Man'frs of "Barnes-made" Products
Springs Screw Machine Products Cold Rolled Steel and Wire

SAVE
YOUR
MONEY
FOR THE
DOMINION WAR LOAN
TO BE ISSUED IN SEPTEMBER.

By purchasing a bond you will help to WIN THE WAR and obtain for yourself an investment of the highest class yielding a most attractive rate of interest.

DEPARTMENT OF FINANCE
OTTAWA.

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Five cents each insertion when box number is required. Each figure counts as one word. Display rates on application.

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HORIZONTAL GAS ENGINE 25 H.P. IN SERVICE at present time, $375.00 cash. Write Penberthy Injector Co., Limited, Windsor, Ontario. (5)

FOR SALE OR RENT — MACHINE SHOP with railroad siding. Box 208, Canadian Machinery. (4)

A SNAP IN TURRET LATHES SLIGHTLY used on shell work. Fourteen splendid machines at bargain prices. Do you need these machines? If so, drop a line to Box 953, Woodstock, Ont.

LATHE FOR SALE—ONE 39 x 17-FOOT Pond engine lathe, suitable for heavy shells; in good condition; $1,500.00. A. B. Ormsby Company, Limited, Toronto. (2)

A BARGAIN FOR QUICK SALE—30 H.P. 10 x 14 engine; guaranteed in first-class working condition; drive belt included. Hamilton Whip Co., Hamilton.

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make. used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

DROP PRESS FOR SALE—NO. 9 MINER & Peck drop press; anvil 2,000 lbs.; base 30,000 lbs.; 36" between uprights; 40" x 35" between poppets; 34" x 29" top of anvil; guaranteed as good as new. Can be shown in operation to any genuine prospective buyer. The Metallic Roofing Co., Limited, Toronto. (4)

FOR SALE

Two 24-inch standard Gisholt Turret Lathes, completely tooled for boring 4.5" H.E. Shells.

Box 212
Canadian Machinery
t.f.

FOR SALE

Fox Monitor Lathe, 18" x 5' 6", 9-hole turret, cross feed, hollow spindle, 5-step cone; good as new. Plating dynamo, 6 volts, 250 amp.; used only a short time.

PENDRITH MACHINERY COMPANY
970 Queen St. West, Toronto

FOR SALE—ONE DAVIS 4½" CUTTING-OFF machine; practically new; been used less than three months; very reasonable. Canadian Linderman Co., Ltd., Woodstock, Ont. (tf)

12-INCH HEAVY DUTY (CANADIAN CORporation) moulder; just used six months; also band saw, shaper, buzz planer, used two years. Apply W. A. Rumney, 36 Fuller Ave., Toronto. (28)

FOR SALE — AT ALEXANDRIA, ONT. — Machine shop in two buildings; 10,500 sq. feet concrete floor space; equipped with lathes, shaper, plainer, miller and variety of other iron-working machines and tools; good foundry in connection. Inventory of buildings, machinery and stock, $64,272. Practically new plant, in good condition. F. T. Costello, Assignee, Schell F. & M. Co., Ltd., Alexandria, Ont.

FOR SALE—McDOUGALL ENGINE LATHE 20" swing, 10' bed, complete with 20" 4-jaw chuck, countershaft, steady rest, face plate, gears, etc. This tool, we understand, has never been used; has been lying crated for about 5 years. We are having it cleaned and offer a decided bargain for quick sale. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg. (3)

SITUATIONS VACANT

TWO EXPERIENCED DIE SETTERS, TWO good die makers, and one experienced screw machine operator. Box 216, Canadian Machinery. (8)

SUPERINTENDENT FOR FACTORY EMploying 150 men. Must be graduate mechanical engineer with practical experience in factory management. We have a modern plant and a growing business. None but Canadians or Americans with Canadian experience need apply. Address Box 214, Canadian Machinery. (tf)

SITUATIONS WANTED

MECHANICAL AND ELECTRICAL ENgineer, 16 years' experience, plant layout and maintenance; expert draftsman; wishes change. Box 207, Canadian Machinery. (26)

POSITION WANTED AS SALESMAN, agent, or traveler, for mechanical goods, or machinery, by Chief Engineer, (Marine), thoroughly reliable, of good education and appearance. Box 209, Canadian Machinery. (3)

MECHANICAL ENGINEER OPEN FOR POSITION of shop superintendent. Wide experience in mining machinery and electric motors, hot water boilers and radiation. Experienced in tool-making, designer, and a keen cost observer. Has had seven years' foundry experience, familiar with moulding machines and a post-graduate of McLain's system of mixing iron. Familiar with shell work. Can give the best of references. Box 211 Canadian Machinery (4)

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 40, 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN
LAMP FACTORY
ST. CATHARINES, ONTARIO

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

WANTED

WANTED—ELECTRIC TRAVELLING GANtry crane, span about 57 ft., clearance 50 ft., overhanging at one end; load 15 tons. State full particulars and price. Thor Iron Works, Limited, Toronto, Ont. (27)

WANTED — 250-VOLT D.C. GENERATOR — 75 to 150 k.w., direct connected to steam engine; must be in good condition. Write to The Kaufman Rubber Co., Berlin, Ont. (13)

FOR SALE

Two 96-horse-power Gas Engines.

Complete with producers.

Made by the largest English manufacturers.

WILL SELL CHEAP

Empire Mfg. Co., Ltd.
London, Ontario.

A SNAP

For Sale Boiler Repair and Sheet Iron Works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars.

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IN THE STATES
in whole or part

COMPLETE WOOL HOSIERY PLANT

One unit consists of 5 sets of woolen cards, 48 x 48; iron frames, 3 cards to set, with S J. & B. mules, 2 inch gauge, 280, 340 and 300 spindles; 2 double shoddy cards, Kitson rag picker, 36-in. Fearnaught mixing picker, wool duster, grinders, etc. In first class shape, ready for immediate use.

Second unit Ribbers, winders, loopers and footers sufficient for daily output of 800 doz. in misses' and boys' cashmere hose, and cashmere and wool merino half hose. Exactly suited for the Canadian market.

Also complete dye plant.

All the machines are in A-1 shape, ready to run, and can be purchased for less than one-quarter cost of new, and arrangements made whereby the General Manager, who has been connected with the concern for several years and is thoroughly practical, would become interested and take active part in new company. Excellent reasons for selling. Address Box 215, Canadian Machinery. (8)

FOR SALE

We are offering, subject to prior sale, all or any portion of the following:

No. 1—1—2 x 24 Jones & Lamson Cone-Driven Turret Lathe, complete with Countershaft, 1 Cut off Slide, 3 Tool Holders, 1 12" Cushman 4-Jaw Universal Chuck No. 2098. $670.00.

No. 2—1—2 x 24 Jones & Lamson Cone-Driven Turret Lathe, complete with Countershaft, 1 Cut off Slide, 3 Boring Tool Holders, 1 12" 4-Jaw Universal Chuck No. 2914. $670.00.

No. 3—1—14" Davis Plain Cone-Driven Turret Lathe, with Countershaft, No. 13. $250.00.

No. 4—3—2" Murchey Die Heads; 1 with 2½" shank, 1 with 1⅝" Shank; 1 with 1½" Shank. $50.00 each net.

No. 5—1—2" Wells Die Head with 3½" Shank. $50.00 each net.

No. 6—1 Generator, 36 Amp., 1800 Speed, 15 K.W. $250.00.

No. 7—1 New Varnishing Baking Oven, built by Brantford Oven Co.; total space inside 5' 10"; height from floor 6 ft. $400.00. This could also be used for Japanning.

Items 1, 2 and 3 are used Tools, having been in service making small Munition Plugs, but are in splendid condition.

Items 4 and 5 were in use not more than one month.

Item No. 6 was in use about three months. Item No. 7 is absolutely new; never used.

Taylor-Forbes Co., Limited
Guelph, Ontario

Wanted to buy or sell Scrap Iron, Metals, etc.

At the present time we are paying the following prices:

No. 1 Scrap Wrought Iron, $13.75 gross ton.
Heavy Scrap Copper, $20.00 per cwt.
Mixed Heavy Scrap Brass, $13.00 per cwt.
Heavy Scrap Lead, $5.75 per cwt.
Scrap Aluminum, $32.00 per cwt.
Scrap Babbitt, $8.00 per cwt.

Our Motto: Honest dealings and prompt settlements. Make us a trial shipment.

L. S. TARSHIS & SON
88-98 Wellington Street, Montreal

New Machines at Second-Hand Prices

1 only Foster, No. 1 Hand Screw Machine, with plain head, automatic chuck, wire feed, capacity 9/16, ...$500.00

1 only Hendy Type 18" stop Friction shaper, with Countershaft, with swivel vise, SECOND-HAND $300.00

1 only Puttnam Speed Lathe, 14" swing, 6-foot bed, 5-step cone, countershaft, SECOND-HAND (as good as new) $150.00

1 only Fox Monitor Lathe, No. 4, with Chaser attachment and standard equipment, SECOND-HAND $150.00

1 only 10 H.P. BRAND NEW Lincoln Motor, with Starting box, Pulley, etc., complete 25-cycle, 3-phase, 550 volts, 1,500 R.P.M. $250.00

1 only 1" Bolt Cutter, BRAND NEW, with lead screw, countershaft, no dies, National make.. ....$450.00

Ontario Metal Products Co., Ltd.
119 Adelaide St. W., Toronto

For Sale Cheap

1—Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.
1—12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 3 tons capacity; complete, less the Hoist.
1—10" Single "I" Beam Overhead Hand Power Crane, 23' 0" span, 2 tons capacity; complete, less the Hoist.
1—Brantford (Gas) Bake Oven and 4 Racks.
2—Baker Type Vises.
1—Linderman 2 Spindle Boring Machine.
1—24" Drill Bertram Company.
1—26" Drill London Machine Tool Company.
1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

M. BEATTY & SONS,
Limited
Welland, Ont.

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3¼" Gridley Automatic
40" x 16' Conradson, heavy duty
40" x 12' New Haven
26" x 8' Davis
24" x 10' LeBlonde
24" x 8' Lodge & Shipley
24" x 8' Gisholt
2[illegible]" x 10' American (2)
2[illegible]" x 7' Fay & Scott
17" x 6' Garvin
16" x 6' Pratt & Whitney
16" x 5½' Warner & Swasey
16" x 5' Windsor, wire feed
15" x 5½' fox, American
2" x 24" Jones & Lamson flat turret
No. 22½ Garvin, wire feed
8" x 31" Brown & Sharpe

Engine Lathes

36" x 15' Putnam
3[illegible]" x 16½' Pond
26" x 14' Hamilton, D.B.G. (4)
26" x 14' Gleason, D.B.G. (2)
24" x 10' Peerless
24" x 10' Lodge & Shipley, patent head
21" x 12' Peerless
21" x 8' Back-geared single purpose (2)
20" x 12' Lodge & Shipley, patent head (2)
20" x 8' Hercules, heavy duty
20" x 8' Bullard
20" x 8' Ames
19" x 8' LeBlonde
18" x 8' New Haven
18" x 8' Lodge & Davis
18" x 6' New Haven
17" x 8' Blaisdell
16" x 1[illegible]' MacGregor Gourlay, D.B.G
16" x 8' Back-geared single purpose (8)
2[illegible]" x 40" x 20' London Gap
16" x 6' Porter
16" x 24" x 10' South Bend Gap
14" x 6' Hendey, taper attachment

Upright Drills

D4 Colburn, heavy duty
D3 Colburn, heavy duty (2)
24" Rockford, shaft driven
21" Foote-Burt
20" Canedy Otto, back geared (2)
20" Bertram, power feed
16" Avey, high speed, ball bearing, sensitive
16" Avey, high speed, 4 spindle, sensitive
14" Excelsior
14" Garvin, 4-spindle
1[illegible]" Barnes, friction (2)
60" Bertram Semi universal Radial
48" Gang, plain radial, tapping attachment
[illegible]" New Century plain radial
36" Fosdick, plain radial
32" Canedy-Otto wall radial

Iron Planers

3[illegible]" x 3[illegible]" x 1[illegible]' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
24" x 24" x 6' American
24" x 24" x 6' Bertram
20" x 20" x 5' Bertram

Milling Machines

No. 5 Becker-Brainard, plain
No. 2[illegible] Becker, plain
No. 12 Brown & Sharpe plain
No. 2A Owen Universal
No. 1½ Brown & Sharpe Universal
[illegible] & Trautman Universal
24" Bertram plain
Lees-Bradner Thread Miller
Holden-Morgan Thread Miller

Presses

No. 12 Geared Rhodes, roller feed
No. 4½ Bliss
No. 5 Waterbury
No. 150 Brown Boggs

Miscellaneous

24" MacGregor Gourlay B.G. [illegible] Shaper
No. 1 Racine Hack Saws (10)
Lo-Swing Lathes (2)
No. 14 Besly Grinder
32" x 9' Special Facing and Tapping Machine
40" Binsse Horizontal Boring Mill
No. 60 Heald Cylinder Grinder
No. 2 Garvin Automatic Tapping Machine
No. 1 Garvin Automatic, tapping attachment
½" Shuster Riveters (3)
6¼' Bertram Bending Rolls
4½" Davis Cutting-off Machine

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.
Front St. W., - - Toronto, Ont.

FOR SALE

GRINDING MACHINES

1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16" x 66" Landis Crank Shaft Grinder (18 months old).
2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES

58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13" Gisholt Semi-Automatic (12 mos. old).
20 21" Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES

1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES

1 8-spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.
2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS

1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES

38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES

2 Noble & Westbrook No. 1 (new).

PROFILERS

1 No. 3H Becker (new).

PLANERS

1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 40" x 40" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS

1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES

1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES

1 12" Jackson (new).

KEY SEATERS

1 No. 1 Catlin (new).

SCREW MACHINES

1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2" x 24" Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼" capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES

1 No. 3 La Pointe (nearly new).

BOLT CUTTERS

1 2" Landis Double Head (nearly new).

BORING AND TURNING MACHINES

1 4' Bickford Boring & Turning Mill (nearly new).
1 20" swing 4-Spindle Moline Vertical Boring Machine with 18" x 36" table.

BULLDOZERS

1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES

1 Large Filing and Sawing Machine with 12" stroke.

PUNCHES AND SHEARS

1 No. 3 Walsh Punch Press.
1 Moser 1½" stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8" throat capacity ¼" x ¼".
1 27½" throat lever punch ½" capacity 1¼" stroke.
1 Thompson Bevel Shear ½" capacity.

PIPE MACHINES

1 6" Saunders.

SHAPERS

1 14" Hendey Geared Friction.
1 20" Hendey Geared Friction.

TAPPING MACHINES

1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2" collapsible taps (new).

THREAD ROLLING MACHINES

1 Waterbury Farrell ⅜" capacity (nearly new).

THREADING MACHINES

5 Special Threading Machines for threading 3" steel shells (nearly new).

SPOT WELDERS

1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

Write us what you want new or second-hand.

32 North Clinton Street, Chicago

W. F. Davis Machine Tool Co.

403 Singer Building, New York City

USED MACHINE TOOLS ALL KINDS

THE MOTCH AND MERRYWEATHER MACHINERY Co

CLEVELAND OHIO

EACH PIECE OVERHAULED GUARANTEED

High-Grade Used Machinery

ENGINE LATHES

1—16" x 8' Greaves & Klusman Quick-Change Gear Lathe, single back geared.
1—18" x 10' Lodge & Shipley Quick-Change Gear Engine Lathe, single pulley drive, variable speed countershaft, plain block rest.
1—18" x 8' Rahn-Carpenter, plain screw cutting; rebuilt.
1—18" x 10' Bradford, plain screw cutting.
1—24" x 12' American Quick-change, double back-geared; nearly new.
10—22" x 10' Milwaukee, double back-geared, plain screw cutting, comp. rest; new machines. Write or wire for circular and prices.
1—30" x 14" James, raised to swing 38", plain screw cutting.

SCREW MACHINES

5—1½" Milwaukee Screw Machines, complete. Write for circular.
1—1½" Dreses Geared Friction Head Screw Machine, complete.
1—1½" x 9" Acme Turret Screw Machine, friction geared head, complete; excellent shape.
1—No. 2 Brown & Sharpe Semi-Automatic Wire Feed Screw Machine; rebuilt.
2—⅝" Cleveland Automatics.
1—1" Cleveland Automatic.
1—2" x 24" Jones & Lamson Flat Turret Lathe, cone drive, rebuilt; excellent condition.

MILLING MACHINES.

1—No. 0 Owen Plain Milling Machine; rebuilt.
1—No. 3-H Becker-Brainard Profiler; rebuilt; first-class shape.
1—LeBlond Heavy Design Worm Cutting Attachment for use on No. 2 LeBlond Miller.

GRINDERS

1—No. 60 Heald Cylinder Grinder; rebuilt; 20" table.
1—4" x 30" Pratt & Whitney Automatic Sizing Grinder; rebuilt.
1—12" x 42" Landis Universal Tool Room Grinder; rebuilt.

SHAPERS.

1—24" Lutter & Gies "Milwaukee" Back-geared Crank Shaper; fine shape.
1—20" x 50" Walker Traveling Head Open Side Planer or Shaper.

MISCELLANEOUS.

1—30" Mueller Radial Drill.
1—No. 1 26" Diamond Automatic Face Grinder.
1—2" Bignall & Keeler P.D.Q.C. Pipe Machine.
1—No. ½ Schuchardt & Schutte Gear Hobber.
1—32" x 32" x 6' Pond Heavy Pattern Planer, one head.
1—48" x 48" x 14' Pond Planer, one head.
1—48" x 48" x 16' Pond Planer, one head.
1—No. 3½-A Bliss Toggle Drawing Press; nearly new.
1—60" Stevens Pulley Lathe.
1—48" Brainard Automatic Gear Cutter.
1—17-G New Doty Single End Punch or Shear, 12" throat, capacity 2" in 1".

The E. L. Essley Machinery Co.

551-557 Washington Blvd., Chicago

Guaranteed Machinery for Immediate Delivery

TURRET LATHES

12" Windsor, plain head.
16" Lodge & Shipley, plain head.
No. 2 Warner & Swasey, hollow hex.
24" Niles, friction head.
16" Foster, ring turret.
24" Garvin Turret Boring Lathe, back-geared.
28" Gisholt, with taper attachment.

ENGINE LATHES.

14" x 6' Davis, q.c.g.
14" x 6' Fairbanks, c.r. and taper.
14" x 6' Prentice, c.r.
16" x 6' Robbins, c.r
16" x 6' Sebastian, p.r.
16" x 8' Lodge & Shipley, pat. head.
16" x 10' Greaves & Klusman, c.r.
18" x 6' Bradford, c.r.
18" x 8' Lodge & Shipley, pat. head.
18" x 10' Bradford, c.r. and taper.
18" x 12' Barker, c.r.
18" x 12' American, q.c.g.
18" x 12' Greaves & Klusman, c.r.
20" x 10' Flather, c.r.
21" x 12' Bradford, c.r.
21" x 12' New Haven, c.r.
24"-40" x 12' McCabe, two-spindle.
24" x 16' Schumacher & Boye, c.r.
32" x 12' Pond, c.r.
30" x 14' Reed, c.r.
36" x 12' Hamilton, c.r.
34" x 16' Blaisdell, c.r.
36" x 28' American, c.r.
42" x 24' Fifield, c.r.

SCREW MACHINES.

Pratt & Whitney No. 1 friction gear.
1 3-16" Hartford Automatic.
2" Cleveland Automatic.
2¾" Cleveland Automatic.

BORING MILLS.

52" Niles, car wheel.
48" Colburn, two heads.
60" Colburn, vertical, two heads.
51" Bullard, two swivel heads with motor drive and motor.

PLANERS

Morton Portable.
17" x 17" x 12' Whitcomb, crank.
22" x 22" x 6' Gray, one head.
24" x 24" x 4' New Haven, one head.
24" x 24" x 6' Pond, one head.
24" x 24" x 6' Gray, one head.
30" x 30" x 8' Woodward & Powell, one head.
36" x 36" x 10' Powell, one head.
36" x 36" x 12' Powell, two heads.
36" x 36" x 16' Sellers, one head.
39" x 39" x 12' New Haven, one head.
40" x 40" x 12' New Haven, one head, one side head.
54" x 54" x 14' Pond, two heads, arranged for motor drive.

MILLING MACHINES.

No. 12 B. & S., plain.
No. 2 Cincinnati, plain.
No. 2 P. & W., Lincoln Type.
No. 23 Fox Miller.
No. 13 P. & W., Lincoln Type.
Garvin No. 1½ Universal.
No. 3 LeBlond, plain

GEAR CUTTERS.

24" x 7" Gould & Eberhardt, for spur gears.
24" x 9" Gould & Eberhardt, for spur, bevel and face gears.
36" Walcott.

SHAPERS.

15" Hendey, friction.
16" Niles, back-geared.
18" Barker & Chard, back-geared.

HAMMERS.

100-lb. American, steam post.
100-lb. Pittsburg, single frame, steam.
200-lb. Bliss, drop.
300-lb. Bliss, drop.
800-lb. Morgan, single frame, steam.

PRESSES.

No. 77A Toledo, o.b., straight side.
No. 3 Bellvouk & George, o.b., inclinable.
No. 3 Toledo, o.b.
No. 430 McDonald, double crank.
No. 133 Ferracute, double action.
No. 95 Bliss, double crank.
No. 77A Toledo, o.b.

DRILLS.

5' Dreses Full Universal Radial.
3' Economic Plain Radial.
2½' Dreses Radial.
No. 30-C Baush, 12-spindle.

Advise us what you contemplate purchasing and we will keep you posted on our stock.

The H. A. Stocker Machinery Company, 566-572 W Randolph St., CHICAGO, ILL.

MACHINE TOOLS - THE VERY BEST

GRINDERS.

Two (2) 14 x 72 Norton, plain, excellent condition, modern type, each	$2500
Two (2) 10 x 72 Norton, plain, excellent condition, modern type, each	2200
12 x 36 Cincinnati Universal	1250
No. 3 Brown & Sharpe Universal 12 x 50	2000
No 60 Heald Cylinder	1000
Landis plain, 8 x 38	1400
Springfield Universal, 16 x 40	850
Two (2) No. 5 Rivet, each	750
No 3 Brown & Sharpe Cutter Grinder	300
No. 7 Geo. Gorton, double end disc grinder with wheel chuck on one end, steel discs and tilting table	300
Diamond Side Type Shop Face Grinder, working surface of table 9" wide x 2' long, cup wheel 14" dia.	300
Wells Cutter Grinder	75
No. 1 Peerless Surfacing Machine, 10" belt	75
Plain Grinders, Wet Tool Grinders, Polishing Machines, large and small.	

HAND MILLING MACHINES.

Two Chicago, each	200
Pratt & Whitney No 2	175
Four Pratt & Whitney No 1, each	125
Two No. 2 Garvin, each	150
Two No 3 Garvin, each	175
Six Pratt & Whitney, No. 1½, each	175
Two Pratt & Whitney Hand Millers	[illegible]
Reed	150
Pratt & Whitney	150
Pratt & Whitney, with vise	150
Two Pratt & Whitney	[illegible]

HORIZONTAL BORING MACHINES.

No 2 Beaman & Smith Combination Boring, Drilling and Milling Machine; good as new	5000

HORIZONTAL BORING MACHINES (Continued)

Beaman & Smith No. 8, 5" spindle	$3500
Bement & Dougherty No. 3, Knee Type, 3¾" bar	1450

PLANERS.

48 x 48 x 20' Putnam, 2 heads on rail; excellent condition.	3500
36 x 36 x 14' Powell, 2 heads on rail	1750
32 x 32 x 10' Gleason, single head; good as new	700

LATHES.

60 x 28' Fifield, raising blocks to swing 75", double back-geared, face plate drive, dia. of face plate 56" x 8'; good as new	[illegible]
50 x 20' Fifield, Massive Pattern, 48" four-jawed chuck....	2750
52 x 16' Gleason, heavy triple-geared, faced plate drive	2500
24 x 18' Lodge & Shipley, quick change gear, taper, motor driven, carriage control	2000
16 x 8' Pratt & Whitney, quick change gear, taper attachment, H.S., C.R.; good as new; latest type	1000

MULTIPLE SPINDLE DRILLS.

Baush 8 spindle, 1¼" points	1150
Foote Burt 8 spindle, spindles adjustable on rail, center to center outside spindle 6 max	800
Snyder 28" 4 spindle, back geared, sliding head, table 30" long, 16½" wide	300
Five (5) Cardan 4 spindle, each	250
No. 11 Pratt & Whitney 15 spindle	325
Two 14" Barr 3 spindle Sensitive, each	[illegible]
No 11 Pratt & Whitney, 10 spindle	225
2 spindle Barr	60
Baush 16 spindle	750
Three 4 spindle Fenn Sensitive, adjustable heads, each	150
Allen 4 spindle	250
Henry & Wright 3 spindle	200

REMEMBER, THESE ARE ONLY SAMPLES ! ! ! WRITE FOR OUR STOCK LIST.

THE CO-OPERATIVE USED MACHINERY COMPANY

50 Church St., Suite 482, Telephone Cortlandt 665, New York **Warehouse, 408 Claremont Ave., Jersey City, N.J.**

MACHINE TOOLS

In Stock

SHAPERS.

30" Merton Draw Cut
24" Smith & Mills Crank
24" Gould & Eberhardt Crank
20" Heavy Duty American Crank
16" New Ohio Crank
15" Gould & Eberhardt Crank
14" Sellers, traveling head.

BORING MILLS.

62" Baush Vertical, two heads.
60" Bement-Miles Vertical, two heads.
60" Bement Vertical, one head.
50" Bement-Miles Car Wheel Mill.
36" Bridgeport Vertical, two heads.
30" Baush Vertical, turret head.
Barrett Horizontal, 3" bar
Beaman & Smith 2-Spindle.
Underwood New Cylinder Mill, 3⅝" bar.

MILLING MACHINES.

No. 2 Cincinnati Universal.
Ingersoll Slab, adjustable rail, platen 3 ft. x 12 ft., three heads.
No. 1-B Milwaukee Late Type Plain, Universal dividing head, chuck, vise.
76" Newton Heavy Duty Vertical, 48" circular table.
Newton Slab, platen 18" wide, 10 ft. long.
No. 1 Cincinnati Plain.
No. 2 Kempsmith Plain.
No. 9 Kempsmith Plain.
No. 1 Brainard Plain.
Detrick & Harvey Milling, Drilling and Boring.
Garvin Plain, No. 4½, No. 4, No. 3.
Newton Plain, table 7¼" x 36".

RADIAL DRILLS.

6' Pond Plain.
5' Bickford Semi-Universal.
3' Bickford Plain.
3' Fosdick Plain, tapping attachment.

KEYSEATERS.

Baker Bros., 24" stroke.
Baker Bros. Colburn, 20" stroke.
No. 2 Mitts & Merrill, 13" stroke.
No. 0 Mitts & Merrill, 7" stroke.
No. 2 Davis, 4" stroke (2).

PRESSES.

DG-56 Ferracute, 4" stroke.
No. 1 Bliss, 8" stroke.
No. 4 Bliss Geared Double Crank, 3" stroke.
No. 2 Bliss Double Crank, 2" stroke.
Farrell Press, 2" stroke.
PG-6 Ferracute, 1½" stroke.
No. 4 Farrell, 1½" stroke.
Bliss Pillar Press, 1½" stroke.
Fowler, 1¼" stroke.
No. 3 Manville Stamping, 1" stroke.
350-ton Hoe Hydraulic.
200-ton Robertson Hydraulic.
100-ton Sellers Hydraulic Wheel Press.

PUNCHES AND SHEARS.

Sellers Double Angle Shear, capacity 8" x 8" x 1".
8' Lennox Rotary Splitting Shear, split 16' plates.
Lennox Rotary Splitting Shear, split 12' plates.
Cleveland D. E. Punch and Shear, 26" throats.
Bement Plate Iron Shear, 26" throat.
Bement Punch, 31" gap.
Cockburn & Barrow Punch, capacity 1" in 1".
Kling Bros. Punch, 24" throat.
Reed Cleveland Punch, 22" throat.
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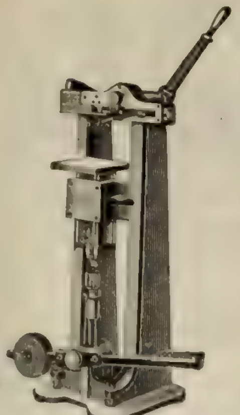

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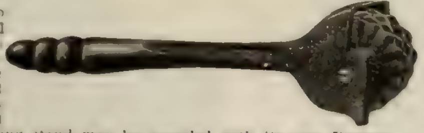

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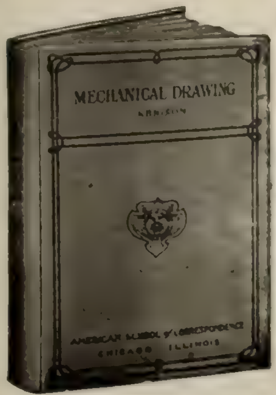

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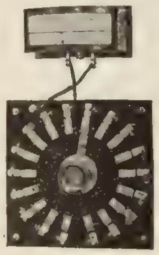

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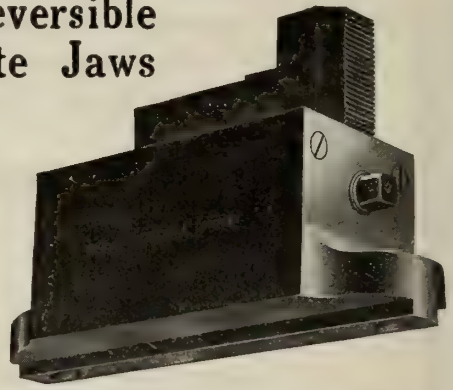

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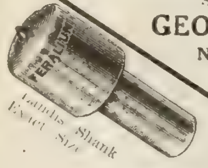

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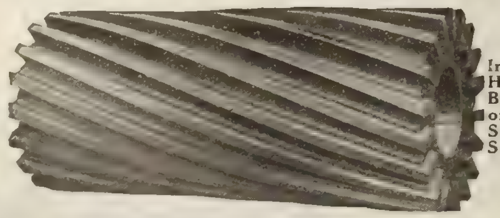

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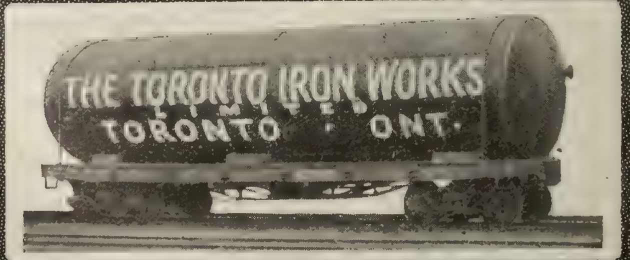

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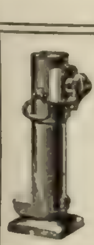

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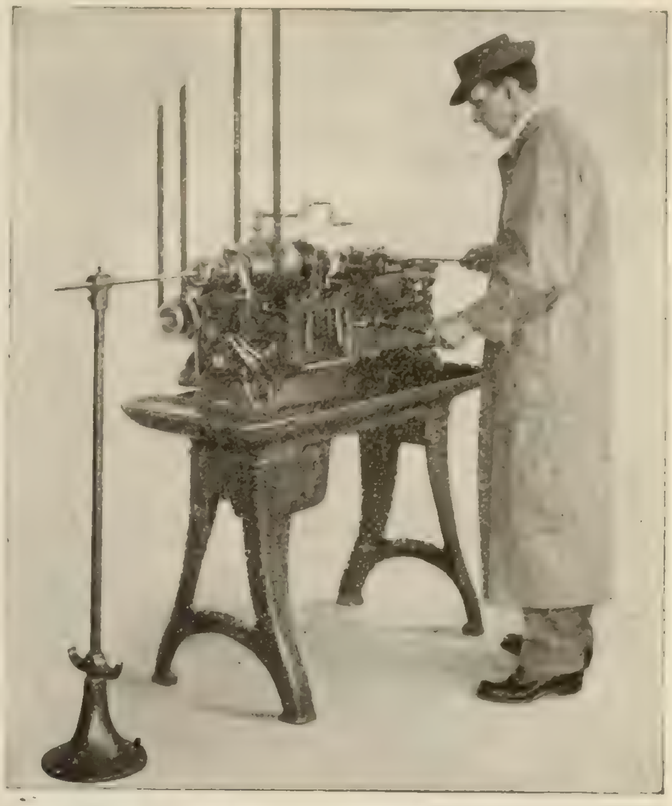

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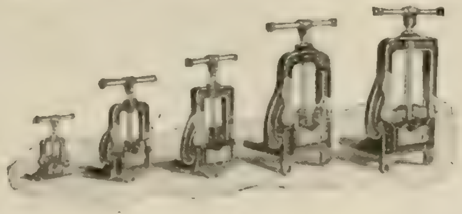

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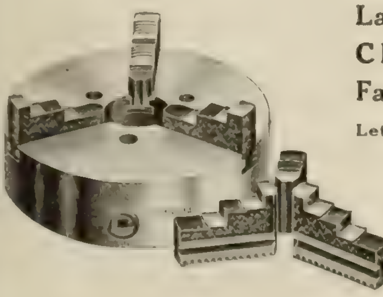

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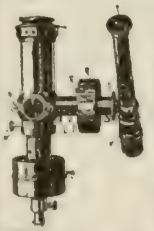

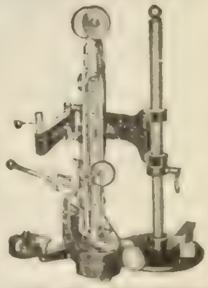

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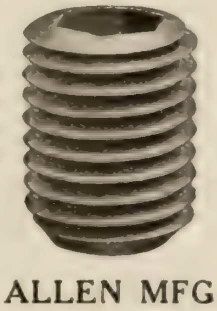

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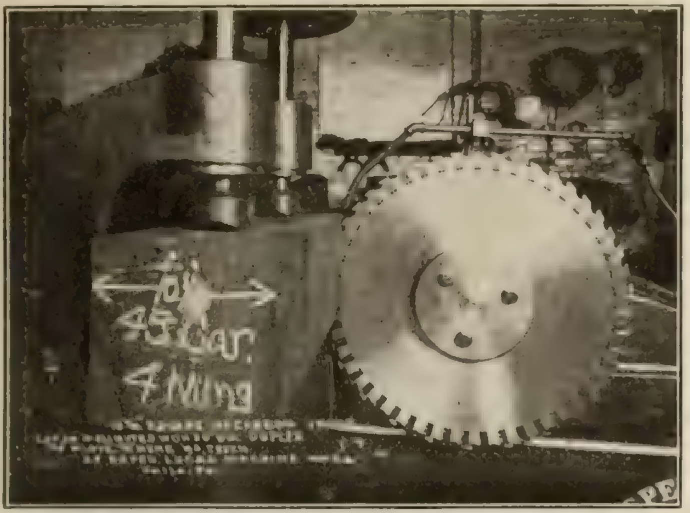

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New York Machinery Co., New York.
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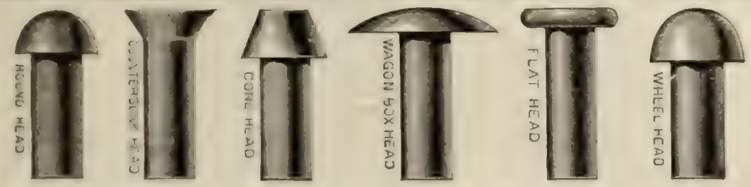

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CANADIAN MACHINERY

AND MANUFACTURING NEWS

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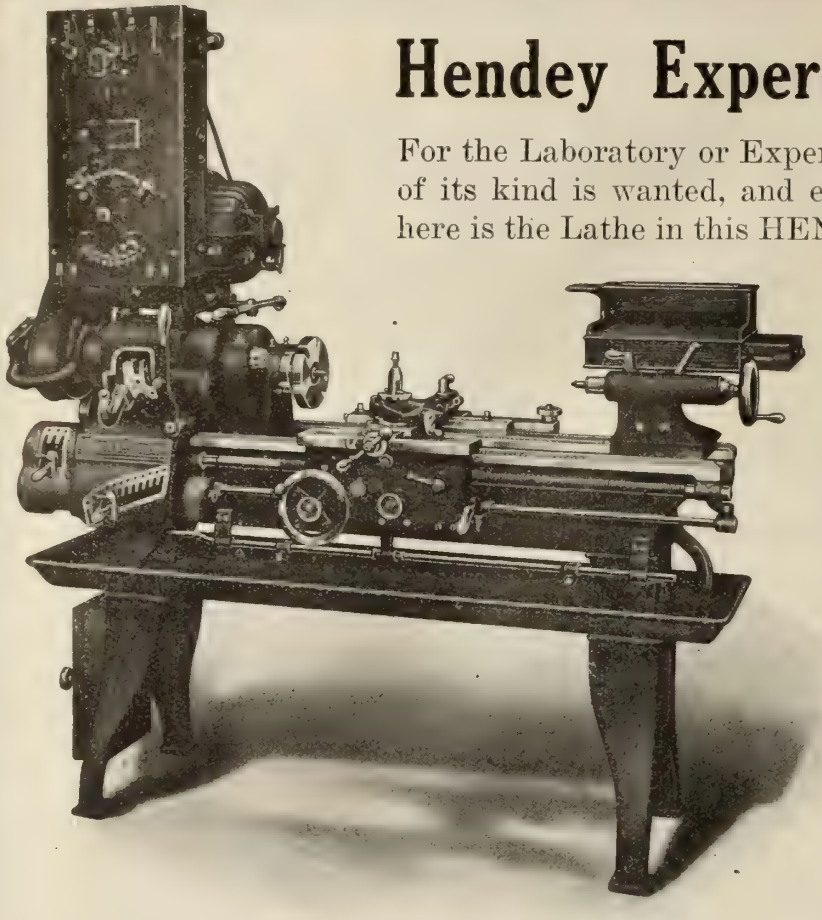
CANADA—Montreal, 701-702 Eastern Townships Building; Toronto, 143-153 University Ave., Telephone Main 7324; Winnipeg, 22 Royal Bank Building, Telephone Garry 2313.

GREAT BRITAIN—LONDON, The MacLean Company of Great Britain, Limited, 88 Fleet Street, E.C., E. J. Dodd, Director. Telephone Central 12960. Cable Address: Atabek, London, England.

UNITED STATES—New York, R. B. Huestis, 115 Broadway, N.Y., Telephone Rector 8971; Boston, C. L. Morton, Room 733, Old South Building, Telephone Main 1024. A. H. Byrne, 1104-5-6-7 Fort Dearborn Bldg., 105 W. Monroe St., Chicago, Telephone Randolph 3234. Mr. R. G. Langrill, 3112 Euclid Ave., Cleveland, Ohio, Tel Prospect 1026R.

SUBSCRIPTION PRICE—Canada, Great Britain, South Africa and the West Indies, $3.00 a year; United States, $3.50 a year; other countries, $4.00 a year; Single Copies, 15 cents. Invariably in advance.



Hendey Experimental 12" Lathe

For the Laboratory or Experimental Department where the best of its kind is wanted, and each machine must be motor-driven, here is the Lathe in this HENDEY 12".

In addition to its complete regular equipment it has Small Tool Cabinet for operators' fine tools, also gear closet for extra gears to cut special threads.

Write for Descriptive Matter.

The Hendey Machine Co.

Torrington, Conn., U.S.A.

Canadian Agents: A. R. Williams Machinery Co., Toronto, Ont.; A. R. Williams Machinery Co., 260 Princess St., Winnipeg; A. R. Williams Machinery Co., Vancouver; A. R. Williams Machinery Co., St. John, N.B.; Williams & Wilson, Montreal.

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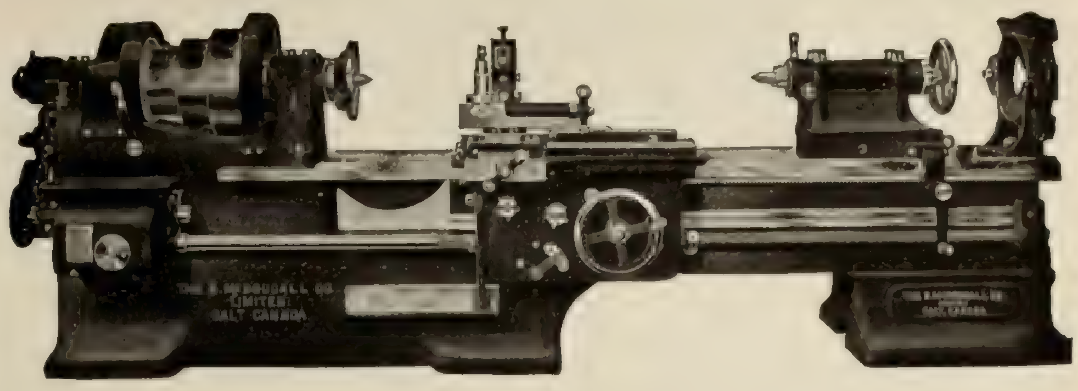
McDougall Gap Lathes

Strength
Accuracy
Quality



Take a look at the next money you intend to invest in a Lathe. Then, take a look at the money's worth we offer you in our machine. Your money will soon come back to you in increased production and we will have the pleasure of having a satisfied user. Our machines are just as good as they look and they look good too.

We invite the closest inspection.

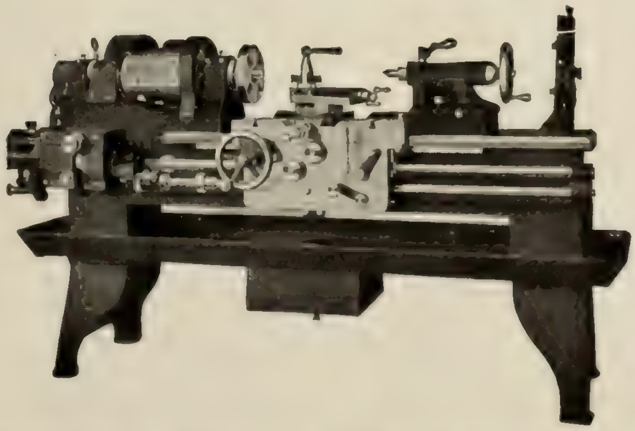
ARE-MAC-DEE IS A GUARANTEE

Particulars on request.

The R. McDougall Company Limited

Manufacturers
GALT, Ont., Canada
The Canadian Fairbanks-Morse Co., Limited, Sales Agents.

In Stock for Immediate Delivery



- [illegible] x 8 [illegible] Heavy Duty Lathes, with turret on carriage, for 4.5 and 6" shells.
- [illegible] x [illegible] Cincinnati Lathes, 5-step cone, double back gear.
- 1 [illegible] x 14 [illegible] Turret Lathe, for 8, 9 or 12" shells.
- [illegible] x 10 American Quick Change Gear.
- [illegible] x [illegible] [illegible] Tool Room Lathe, complete with draw-in collets and taper attachment.
- [illegible] x 8 [illegible] All-geared Turret Lathe.
- [illegible] x 20 Lodge & Shipley Quick Change Gear Lathe.
- [illegible] x 8 [illegible] Screw Cutting Lathes.
- 1 8" [illegible] Lathe, back-geared, power feed, draw-in collets, grinding and milling attachment.
- [illegible] No. 1 [illegible] Turret Screw Machine, power feed.
- [illegible] x 8 Sidney [illegible] Engine Lathes.
- [illegible] x 8 Foster Geared Friction Head Turret Lathes.
- 1 [illegible] Sibley Drill, back-geared, sliding head.
- 6 24" [illegible] Drill Presses, back-geared, sliding head.
- 5 30" Back Geared Drill Presses.
- 1 14" [illegible] 4 Spindle Sensitive Drill Press.
- [illegible] 18" Woodward & Rogers [illegible] Spindle Sensitive Drill Presses.
- 1 [illegible] [illegible] Sensitive Drill Press.
- [illegible] 14" Perfect Sensitive Drill Presses.
- 1 20" Oesterlein Plain Automatic Milling Machine, complete with vertical and slotting attachment.
- [illegible] Rockford Plain Milling Machine, complete with vise, index centers, slotting and vertical attachment.
- 2 Ford Smith Plain Milling Machines, with vise.
- 1 12" Kempsmith dividing head.
- 1 No. [illegible] Oesterlein Universal Grinder, complete with regular equipment.
- 1 No. 1 Diamond Surface Grinder, 12" x 24" x 9".
- [illegible] No. 2 Diamond Surface Grinder, 6" x 12" x 9".

THE FOSS & HILL MACHINERY CO.

305 ST. JAMES STREET - - - - MONTREAL, QUE.

C.M.C.

Registered Trade-Mark of the Canada Machinery Corporation, Ltd.

The Mark of Distinction in Machine Tools

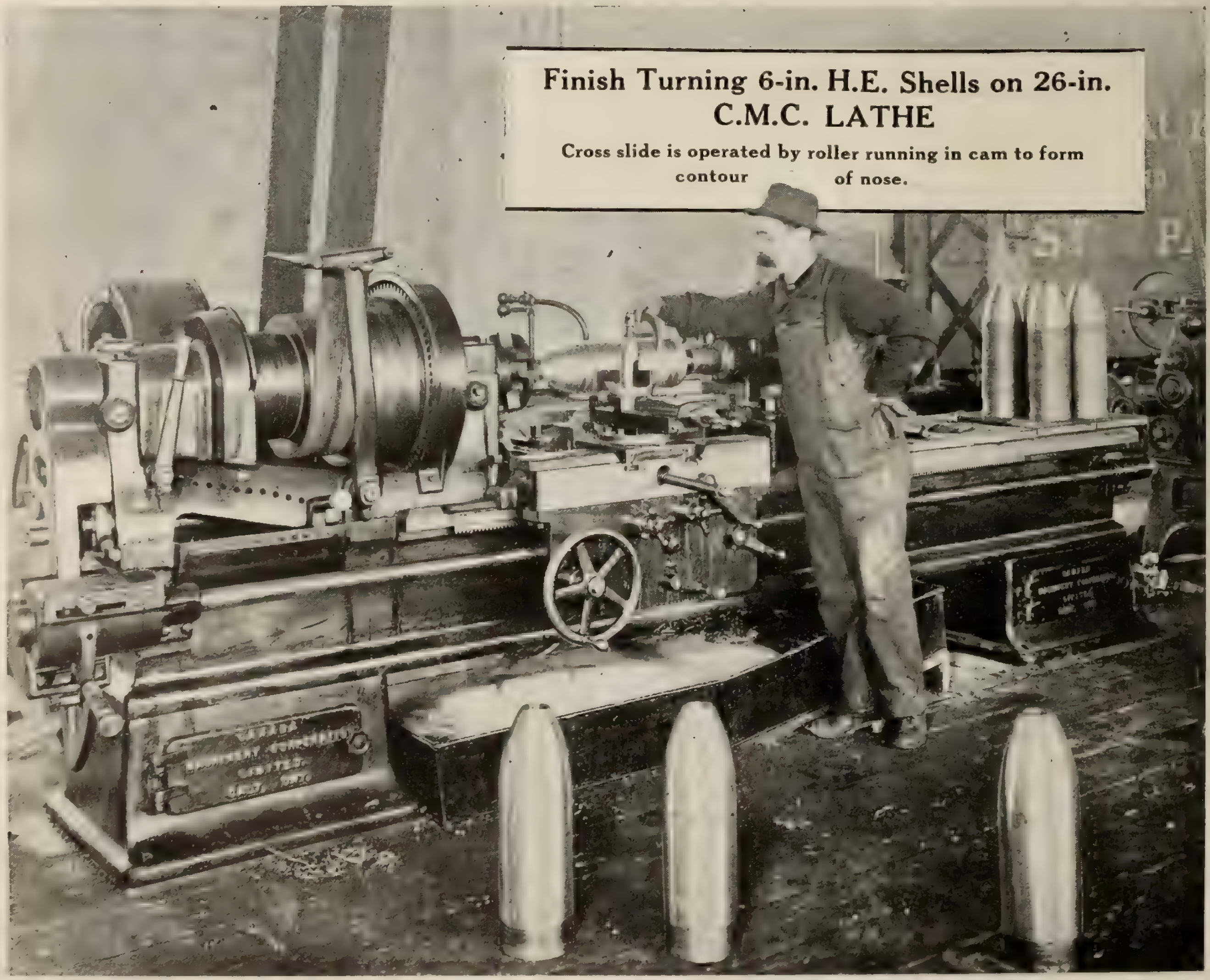
YOU will find "C.M.C." lathes in practically every munition plant in Canada. Their power, rigidity and accuracy have made them general favorites.

LONG experience, high-grade workmanship and the best materials are represented in all machine tools (iron or woodworking) bearing the trade-mark shown above.

CANADA MACHINERY CORPORATION, Limited

Galt, Ontario

For convenience of the trade we have opened Showrooms in Toronto at Brock Avenue Subway, where a full line of our Machinery can be inspected.



Finish Turning 6-in. H.E. Shells on 26-in. C.M.C. LATHE

Cross slide is operated by roller running in cam to form contour of nose.

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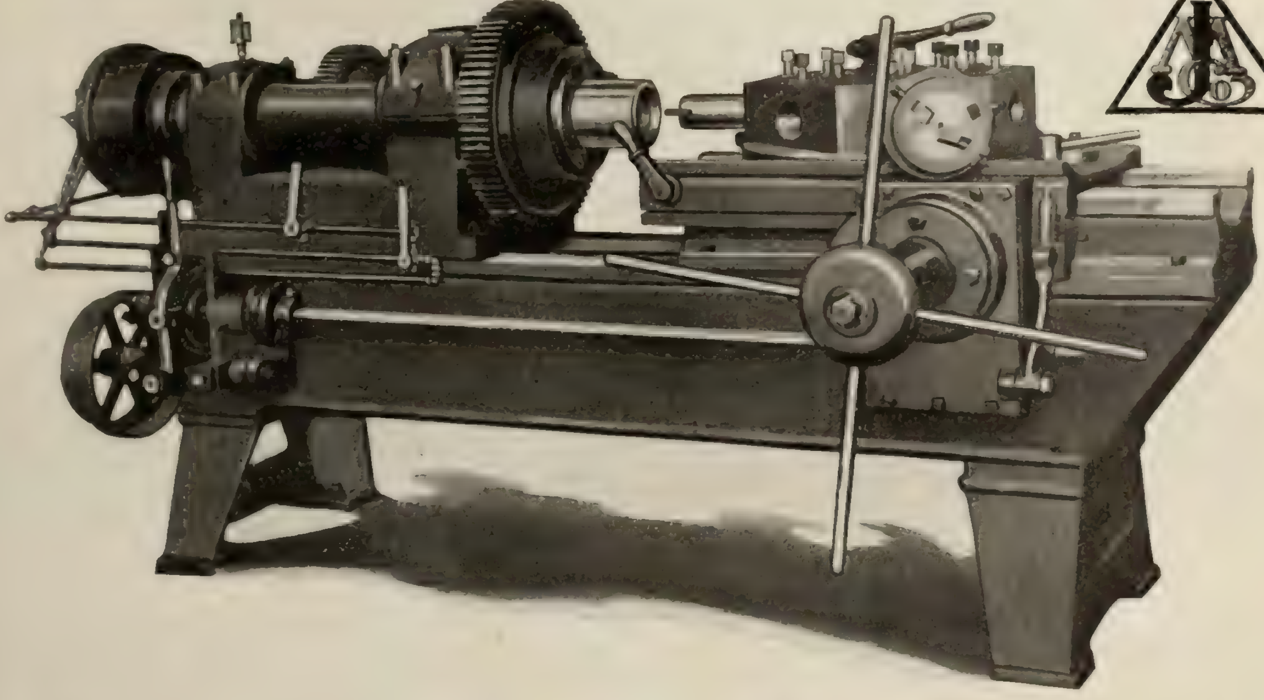
CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XVI—No. 7 Publication Office: Toronto, Aug. 17, 1916 Subscription Price $3.00 per Year



This machine is built for base facing, or boring the 6" shell. It is made with a 6 side turret and being compound geared has a very powerful drive.

Very rapid, making possible heavy production, the feed is by means of a worm and gearing in the apron.

Write for Deliveries

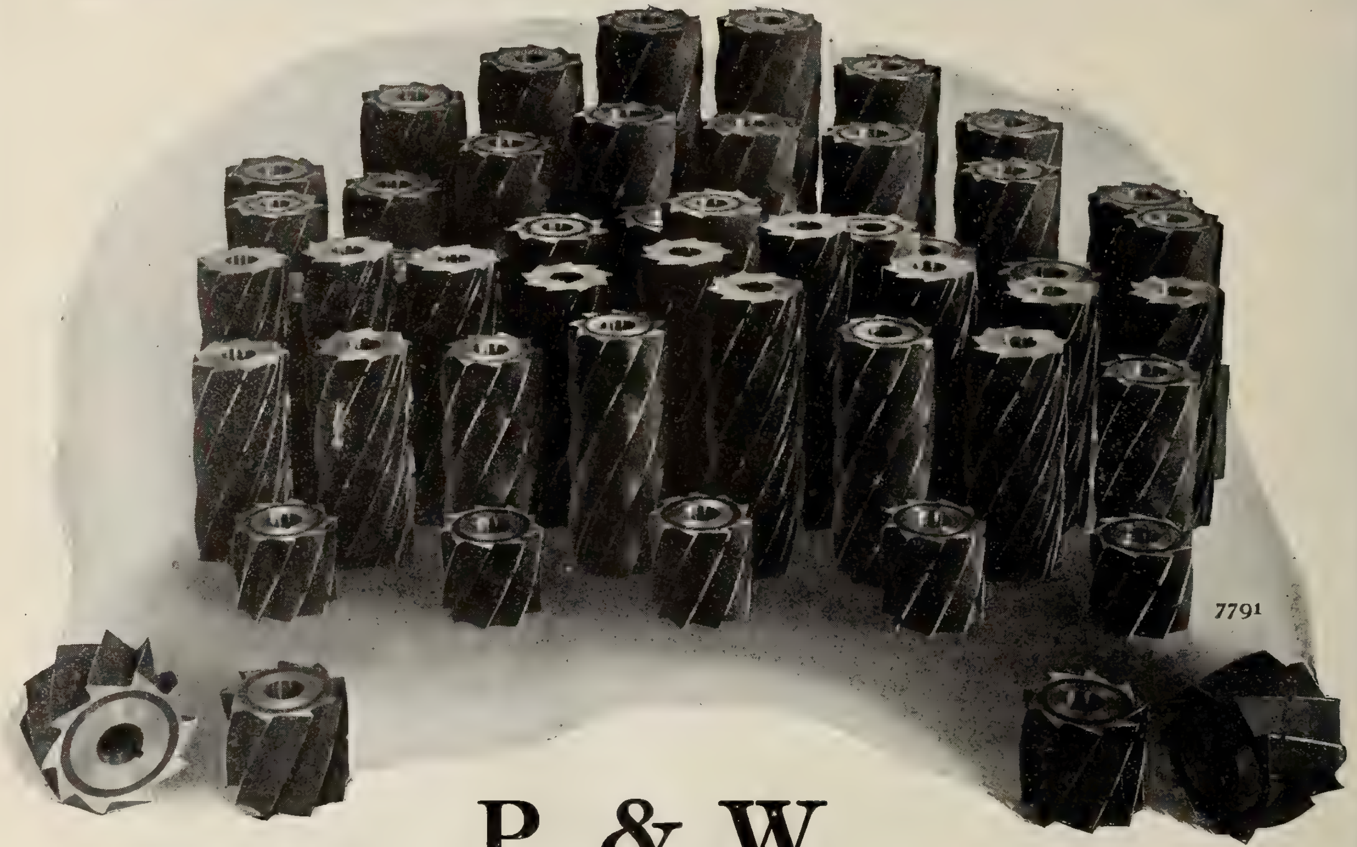
Boring and Turning Lathe for Shell Work

THE JENCKES MACHINE COMPANY, LIMITED

Works: SHERBROOKE, QUE.; ST. CATHARINES, ONT.

SALES OFFICES: 727 Traders Bank Buildipg, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

The Answer to Your
Heavy Duty Cutter Problem



P. & W.

Coarse-Tooth High-Speed Milling Cutters

We are prepared to furnish promptly coarse-tooth milling cutters of High Speed Steel adapted primarily to the heavier class of milling.

Long Life. Such cutters have the advantage of long life as the large teeth permit of more grindings. It will also be seen that less time is required to sharpen.

Increased Production. The ample chip room insures a remarkably free cutting action and will increase production by a high percentage with less power required to drive.

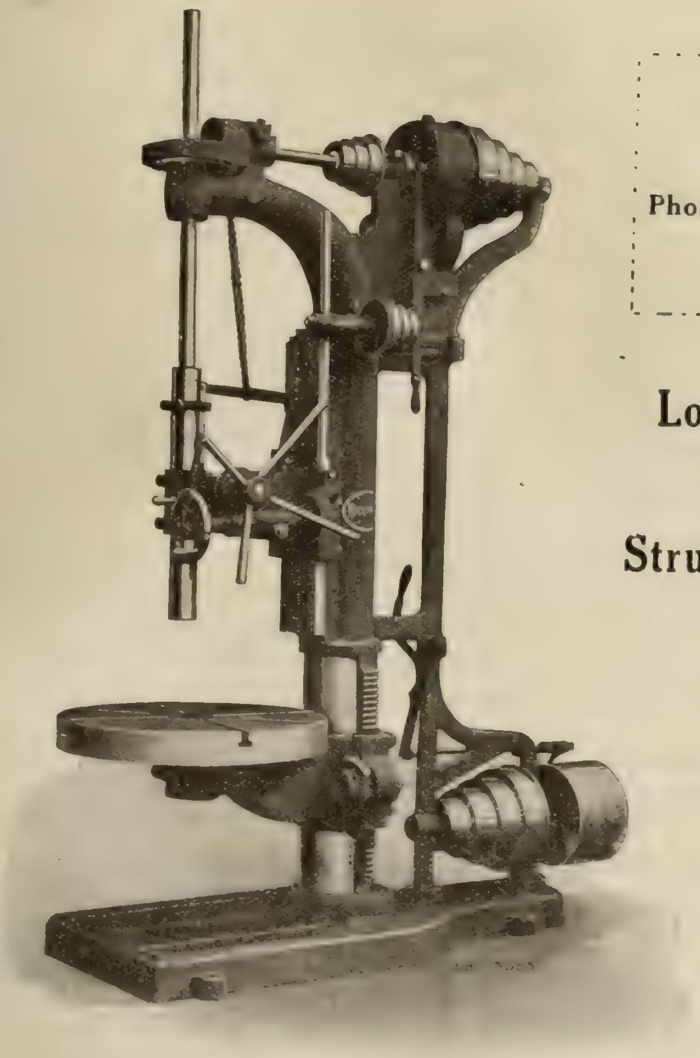
Strong Teeth. The teeth being larger are exceptionally strong and will easily stand the heaviest feeds without breaking.

Place a trial order with our nearest store.

Pratt & Whitney Company of Canada, Limited

DUNDAS	MONTREAL	WINNIPEG	VANCOUVER
Ontario	723 Drummond Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS



30-inch Vertical Drilling Machine

Photographs and full particulars gladly mailed upon request.

WRITE US NOW

Locomotive and Car Shop Equipment

Structural and Bridge Shop Machinery

Repair Shop Machinery

General Machine Shop Equipment

The John Bertram & Sons Company Limited

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO August 17, 1916

Advertising Machine Tools

By "Publicity" Manager in *Page's Engineering Weekly*

DURING the last ten years it has been my privilege to study the results obtained from various forms of advertising Machine Tools, and as far as it is possible to do so, collect data to form a basis of future propaganda.

¶ As far as advertising in the recognized Trade Organs is concerned, this is absolutely essential, no matter what additional system may be carried out, as it is now the general practice of Works Managers and buyers to carefully peruse the advertising columns of the leading engineering journals; and, as I do myself, to preserve in a "Folder" the actual advertisements of special or new tools.

¶ In trade paper advertising a good half-tone illustration, as large as the space will permit, is essential. No amount of "copy," even if cleverly laid out, is of much value without a picture, which really is the "eye catcher." The value of a good descriptive illustration was brought vividly to my notice some years ago by the receipt of an order for a machine tool costing almost £1,000 from an Overseas government department, the machine having actually been decided upon from the illustration and copy in the advertisement.

¶ I have also noted good results from the "series" form of advertising, i.e., running a particular Machine for a number of insertions instead of changing the copy and illustration every insertion. The continuity of an illustration tends to impress the Machine on the mind of the prospective purchaser, and results in increased sales.

¶ A fault which many firms are liable to is to make "General" claims in their advertising copy. One quite commonly comes across such a statement as this in an advertisement:

> ¶ "A first-class machine, built on good lines, with many labour-saving movements."

¶ This, of course, conveys nothing to the mind of the buyer, and compares badly with copy such as I have before me at present, reading:

> ¶ "This machine, operating with a 2 in. drill at 200 r.p.m., has been tested to drill a 5½ in. diam. hole in mild steel block at 4.16 in. per minute."

¶ Here we have something which increases the value of the advertisement twofold, as it enables those interested to determine whether the capabilities of the Tool justify further enquiry.

¶ I am a firm believer in weekly or fortnightly insertions as against monthly; the latter tending to lose their value owing to the long break.

¶ A form of advertising next in favour to trade paper announcements is the "personal" letter. The idea is to select a machine suitable for a certain trade and address a letter, accompanied by an illustration, to each firm, stating the capacity of the Tool, giving a few tests, and stating where it can be seen in operation, naming, if possible, a firm in a similar line of business. It is really wonderful the interest displayed in a machine which has been bought by a competitor, and a good crop of enquiries often result from such a system.

Canadian Machinery and Manufacturing News

143-153 UNIVERSITY AVENUE - - - TORONTO, CANADA

Quality **Service**

The Steel Company of Canada, Limited

PRODUCTS

"HAMILTON" PIG IRON

BASIC, MALLEABLE AND FOUNDRY

IRON AND STEEL

BLOOMS, BILLETS, BARS, WIRE RODS, ANGLES, CHANNELS, PLOW BEAMS, ETC.

FORGINGS

Car Axles, Shape and Drop Forgings, Horse Shoes, Carriage and Automobile Hardware, Top Goods, Etc.

WIRE, ETC.

Steel, Brass, Copper and Bronze, Heavy and Fine, Bright Annealed, Coppered Liquor Bright, Galvanized and Tinned. Stranded, Steel and Copper Cable, Clothes Line, Wire Nails, Staples, Barb Wire, Woven Wire Fencing, Fence Gates.

RAILWAY FASTENINGS

Angle Bars, Track Bolts, Tie Plates, Spikes, Tie Rods, Etc.

NAILS, SPIKES, RIVETS, ETC.

Wire, Cut, Boat and Horse Shoe Nails, Railway, Pressed and Drift Spikes. Tacks and Shoe Nails, Steel and Copper Rivets, and Burrs, Iron, Brass and Copper.

POLE LINE HARDWARE

Pole Steps, Cross Arm Braces, Guy Clamps and Guy Rods, Etc., Black and Galvanized.

BOLTS, NUTS AND WASHERS

Machine, Carriage, Elevator, Stove, Tire and Sleigh Shoe Bolts, Blank, Tapped Nuts, and Washers.

WROUGHT PIPE

Black and Galvanized Nipples and Couplings.

SCREWS

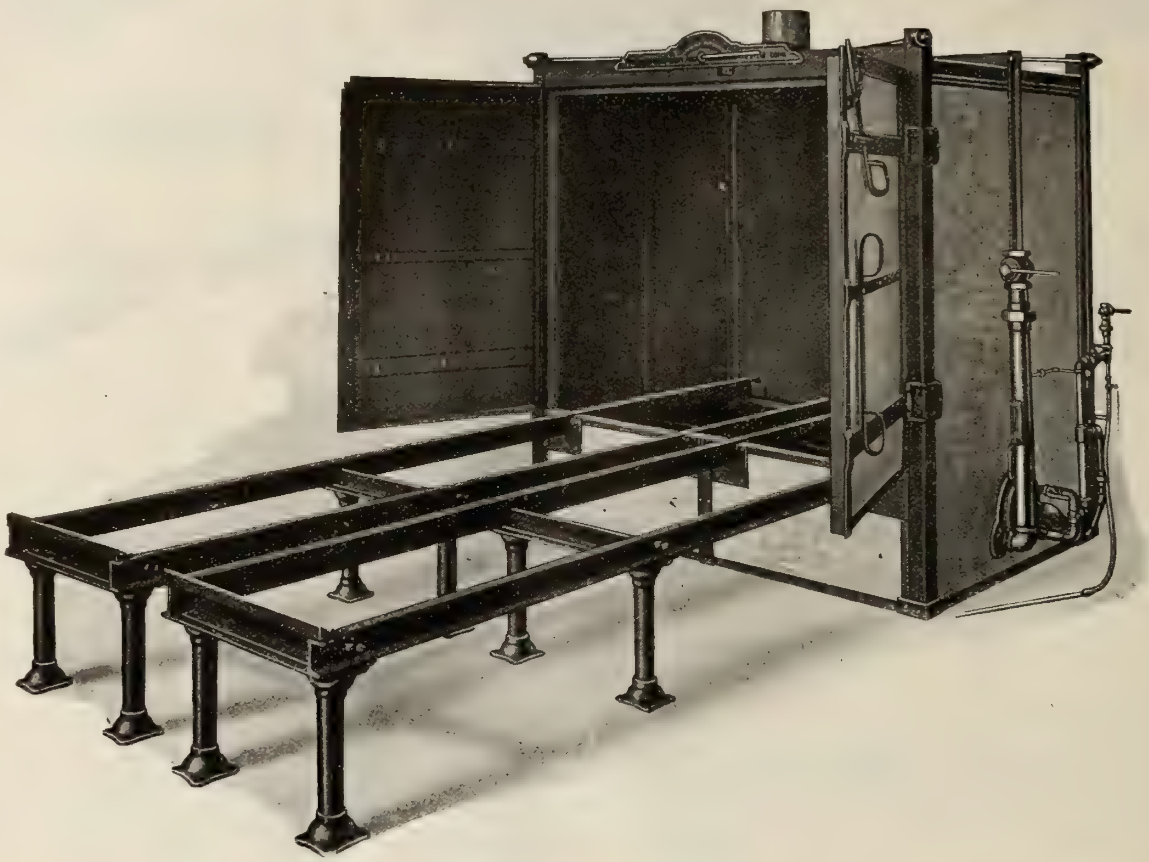
Wood and Machine Steel, Brass and Bronze.

LEAD PRODUCTS

Lead Pipe, White Lead, Shot and Putty.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG



A convenient type of Crawford Sectional Oven largely used by manufacturers turning out Shells up to twenty-eight pounds each.

The method of heating explained in previous issues is the same with all types of Crawford Ovens—no direct flame coming in contact with the material in the oven.

Either city, natural, gasoline or producer gas can be used with either type of oven.

Ovens and trucks built for baking the varnish or finish on any number or size of shells required at a time.

The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN., U. S. A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA

It's the grip that counts.

"Lincona"

Balata Belting

Manufactured by
James Dawson & Son
Limited
Lincoln, England

The Belt with a Grip and which gives the maximum transmission of power.

DAWSON'S
LINCORA-BALATA
970 FEET 42 INCHES

Is used and is giving every satisfaction in all parts of the world — in **Engineering Shops** for **Machines,** Dynamos, Fans and Main Drives; in **Laundries, Sawmills, Dye Works, Cotton** and **Woollen Mills, Flour Mills** and **Warehouses** as **Elevators** and Conveyors for gain, coal, sand, rock, ore, etc.

North, South, East and **West** will be found this well-known brand. Output capacity 60,000 feet weekly, and more to follow. The quality cannot be surpassed because the materials used are the best—best cotton, best balata, and in every way

BRITAIN'S BEST

production of its kind.

Linccna Balata Belting is the strongest belt made. Breaking strain 11,700 pounds per square inch.

What Balata is:

A natural gum product which is of exceptional strength and durability, being the most powerful adhesive substance. It is thoroughly waterproof and can be used and exposed under every condition of weather, and, if necessary, can be run in water without trouble or injury.

Avoid imitations—there are other so-called Balata Beltings, but **Lincona** is in a class by itself.

Lincona improves with age.

The Canadian B. K. Morton Co., Ltd.

49 Common Street
MONTREAL

86 Richmond St. E.
TORONTO

Austen Bros., Ltd., Halifax, N.S. Sherwood & Fraser, Ltd., Winnipeg, Man. Western Oil & Supply Co., Vancouver, B.C.

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas XX	Carbon Tool Steel
High Speed Steel, Atlas X	"Deward" Oil Tempering, Non-Shrinking
Chrome Vanadium Steel	

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

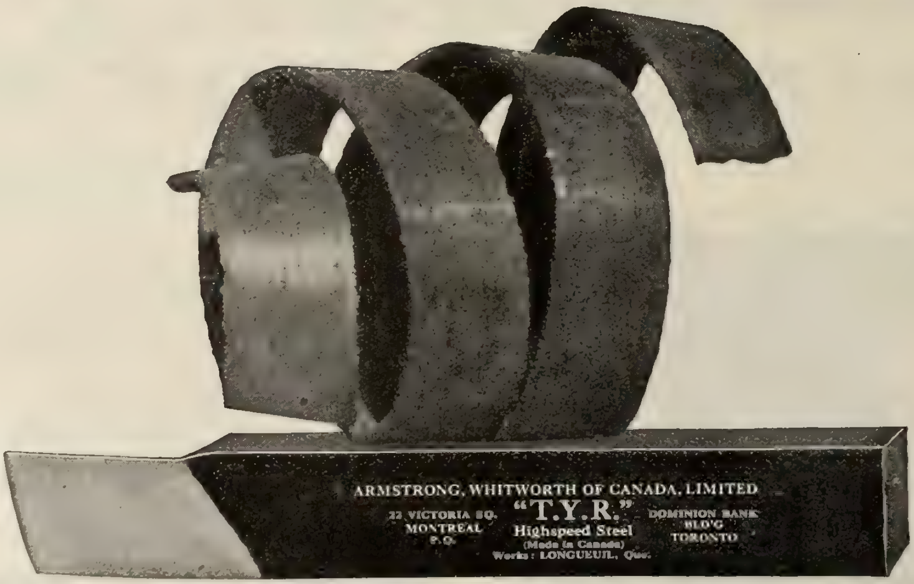
"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

YOUNG, CORLEY AND DOLAN, Inc.

149 BROADWAY, NEW YORK CITY, U.S.A.

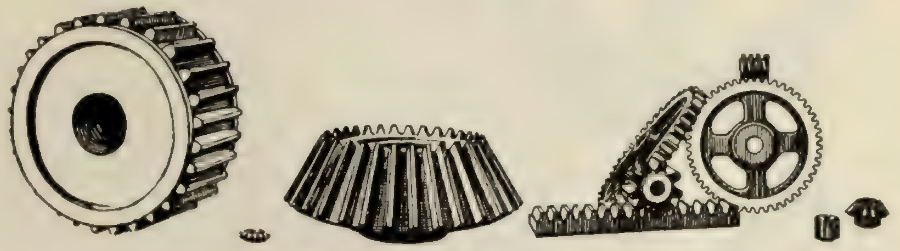

ARMSTRONG, WHITWORTH OF CANADA, LIMITED
22 VICTORIA SQ. MONTREAL P.Q.
"T.Y.R."
Highspeed Steel
(Made in Canada)
Works: LONGUEUIL, Que.
DOMINION BANK BLD'G TORONTO

Immediate shipment of all standard sizes and shell-turning sizes can be made from stock.

MADE IN CANADA

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL & WELLAND.

Machine - moulded Gears made without the use of patterns, insuring quick delivery in case of breakdown.

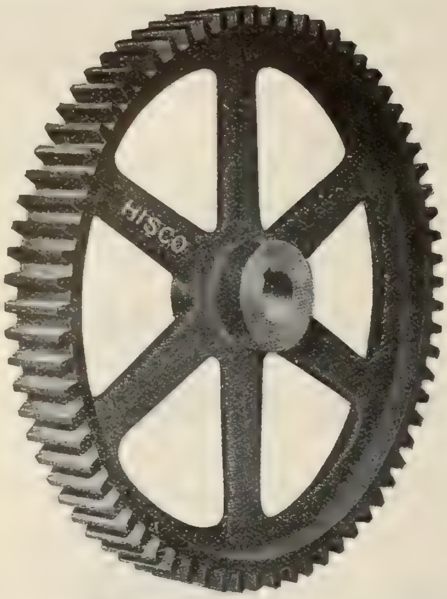


TO SHELL MAKERS
WE MAKE
WIRE SOLDER ALL SIZES

Imperial Soldering Paste

Headquarters for Pig Lead

ALL INGOT METALS
The Canada Metal Co., Limited, Fraser Ave., Toronto
HAMILTON - MONTREAL - WINNIPEG - VANCOUVER



Don't make patterns for your Gears

We make

Machine Moulded Gears

Any size up to 18 feet in diameter, in either steel, semi-steel or grey iron. No patterns required.

TRADE MARK

Also manufacturers of all parts pertaining to Cement Mill Machinery, Crushing, Mining and Dredging Plants in "Adamantine," Chrome, Manganese and Nickel Steel.

Let us figure on your requirements. Write

HULL IRON & STEEL FOUNDRIES, Limited
HULL, P.Q., CANADA

EXTRA
Die Steel

is produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

You get extra service from "EXTRA" DIE STEEL. A trial is convincing.

H-A-DRURY COMPANY LIMITED
STEEL
MONTREAL TORONTO NEW YORK

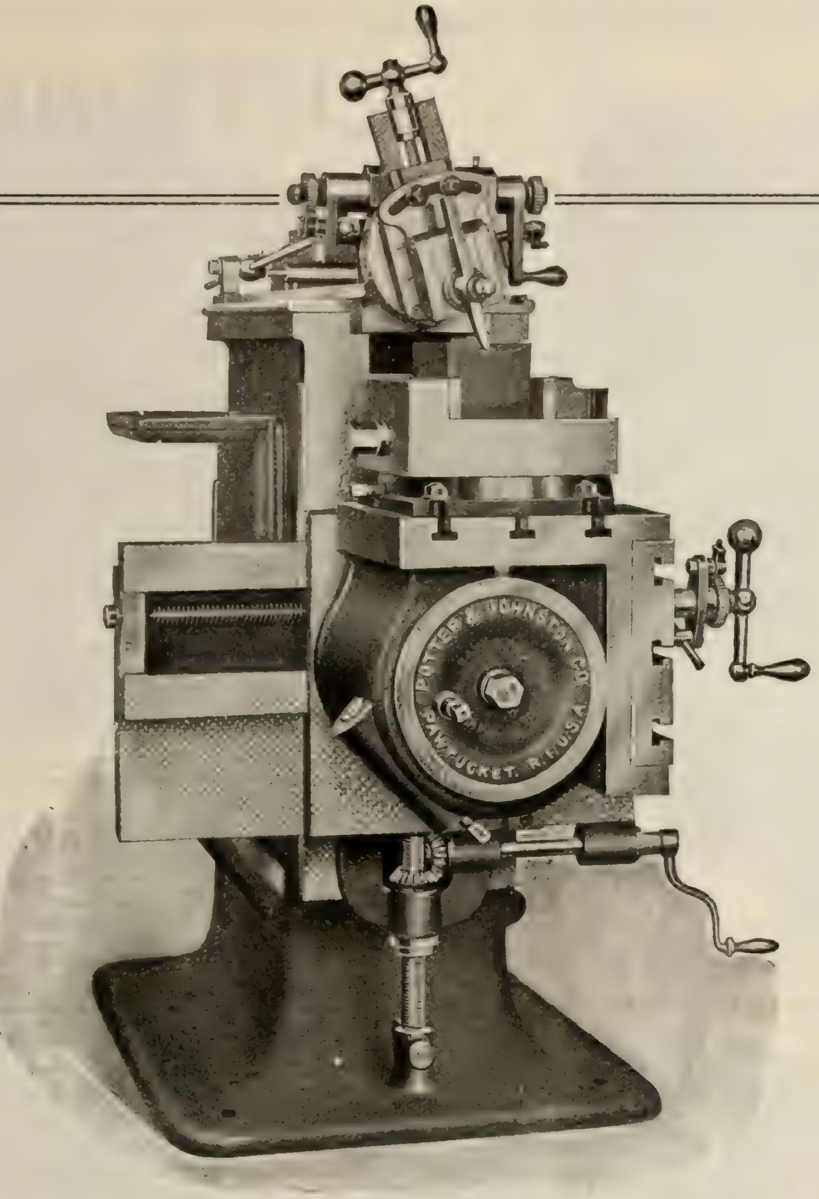
Manufactured by SANDERSON BROTHERS & NEWBOULD Limited
SHEFFIELD, ENGLAND

Red Cut Superior High Speed Steel

Quality First
THE BEST FOR MACHINING ALL HARD MATERIALS

Are your tools made of **Red Cut**?
Send for folder

VANADIUM-ALLOYS STEEL COMPANY
PITTSBURGH, PA.
Works at Latrobe, Pa.



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

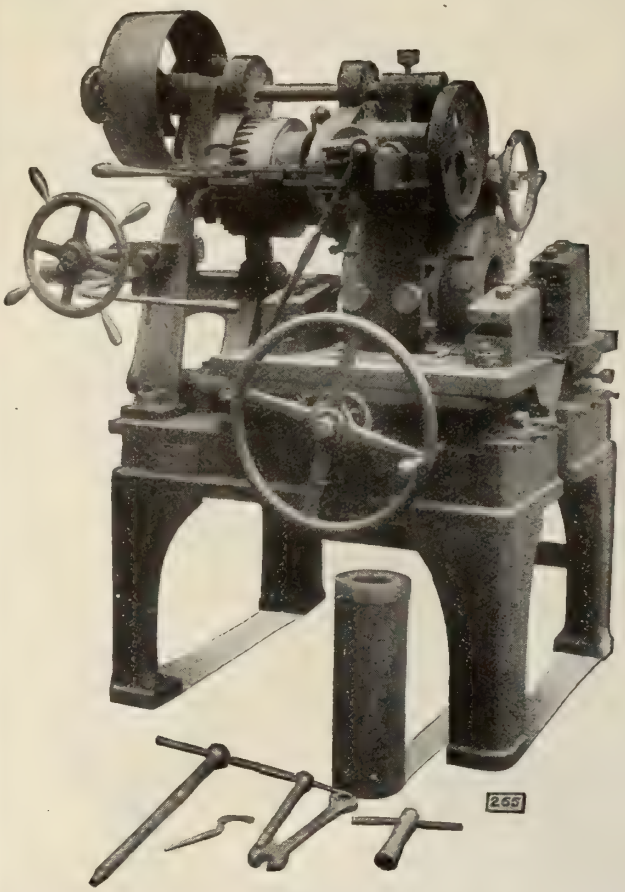
WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA

Works: GALT, ONT., CANADA



CUTTING-OFF MACHINES

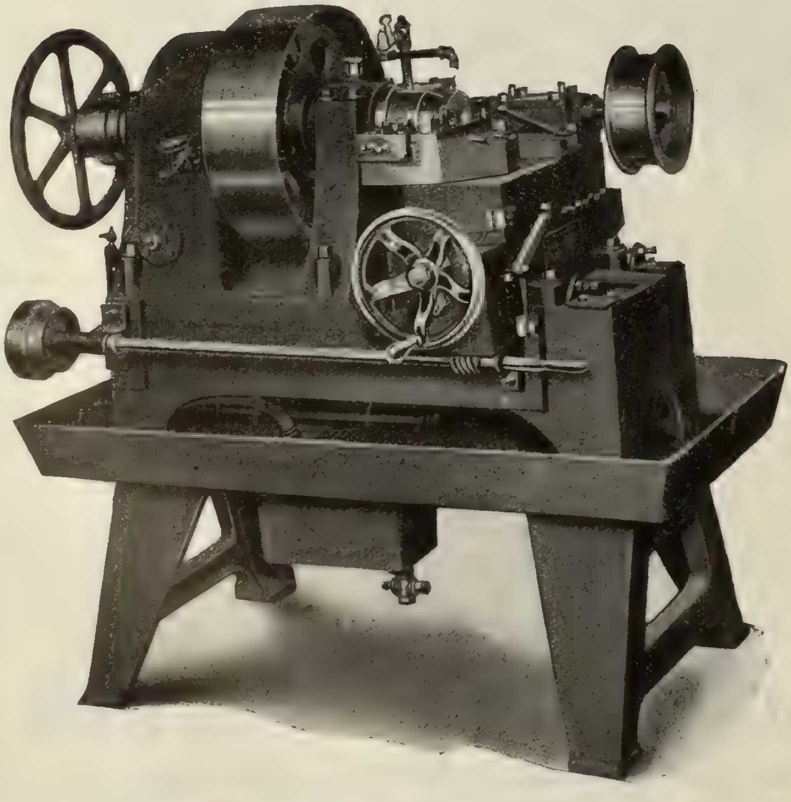
Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal



For Turning, Facing and Milling the Thread on Gas Check Plugs for 6-inch High-Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft)**. Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

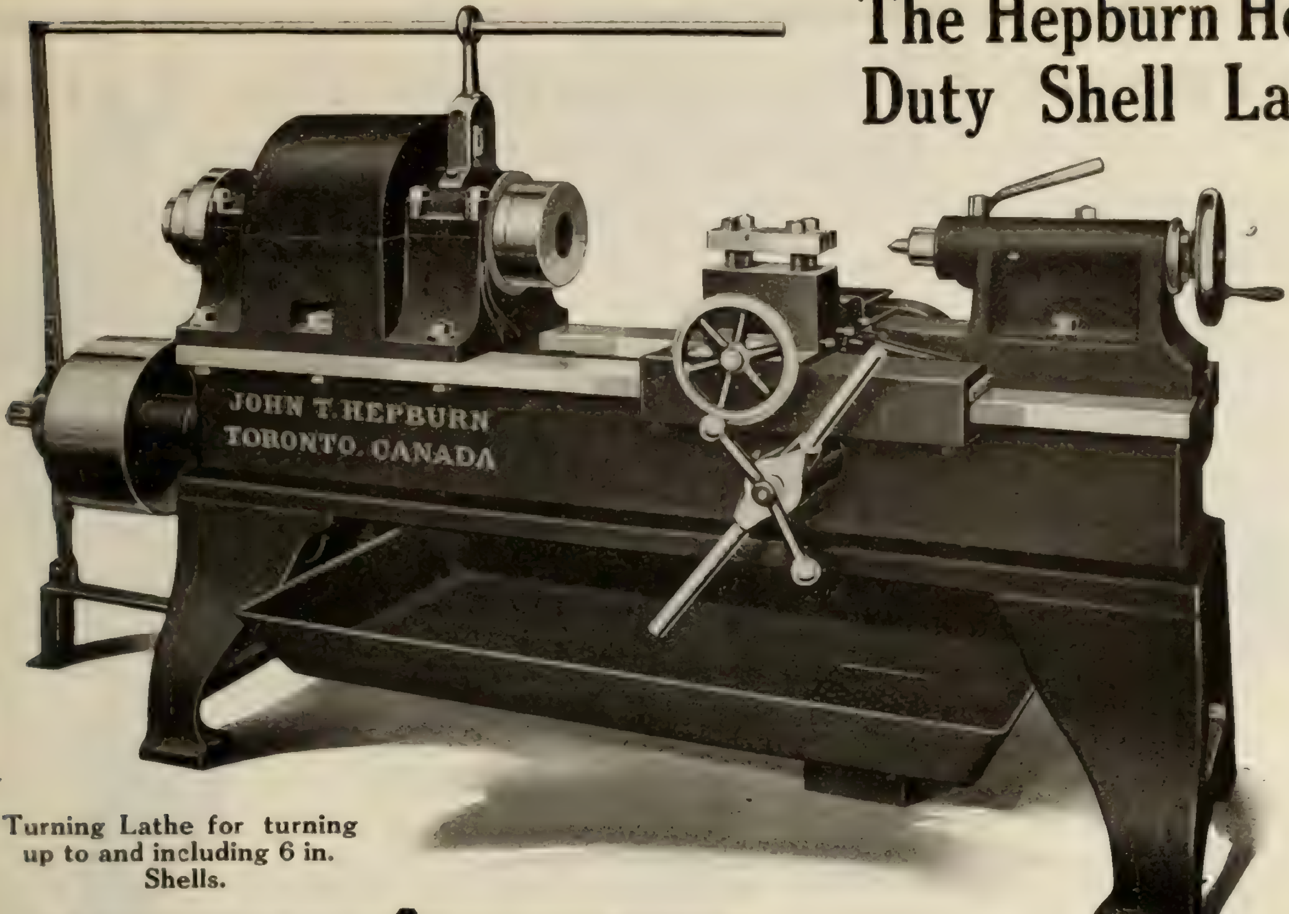
For 18 pdr., 4.5 and 60 pdr. High Explosive Shells, Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

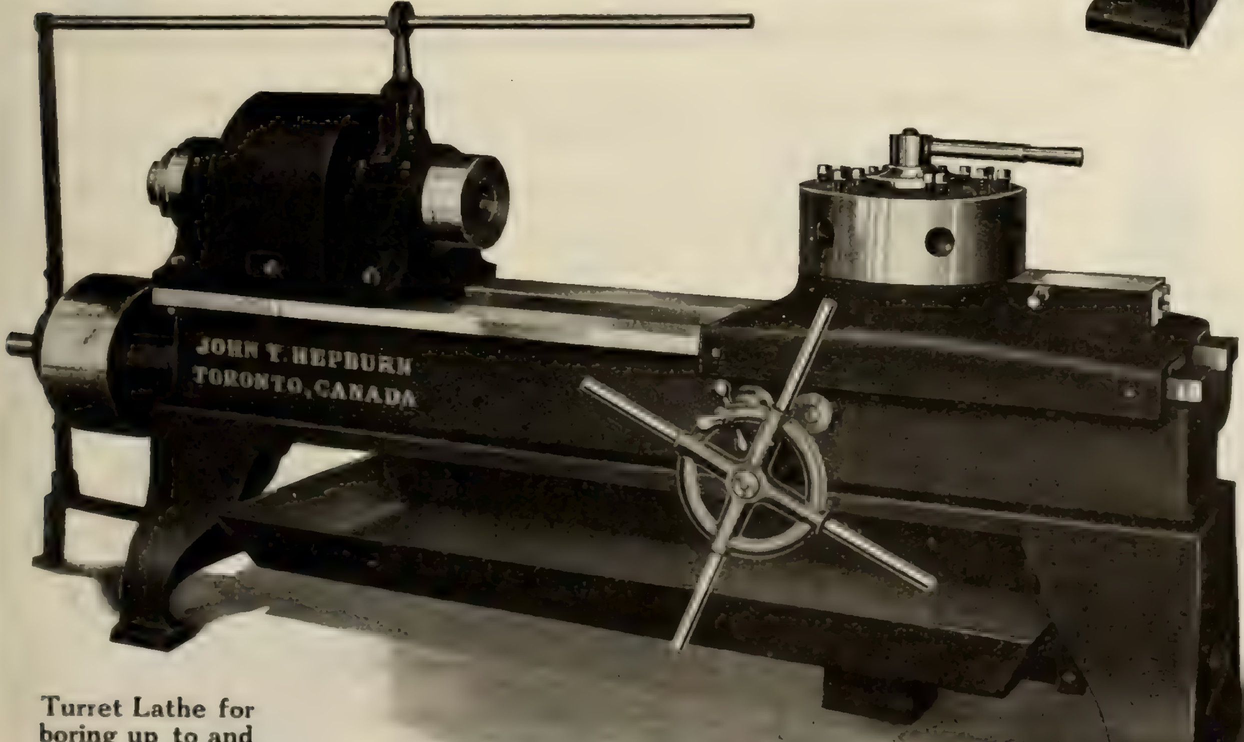
Write for prices and deliveries.

Prompt Shipment
BUILT EXCLUSIVELY BY
Edwin J. Banfield
STAIR BUILDING, TORONTO, ONT.

The Hepburn Heavy Duty Shell Lathes


JOHN T. HEPBURN
TORONTO, CANADA

Turning Lathe for turning up to and including 6 in. Shells.


JOHN T. HEPBURN
TORONTO, CANADA

Turret Lathe for boring up to and including 6 in. Shells.

JOHN T. HEPBURN, Limited, 18 to 60 Van Horne St., Toronto, Can.

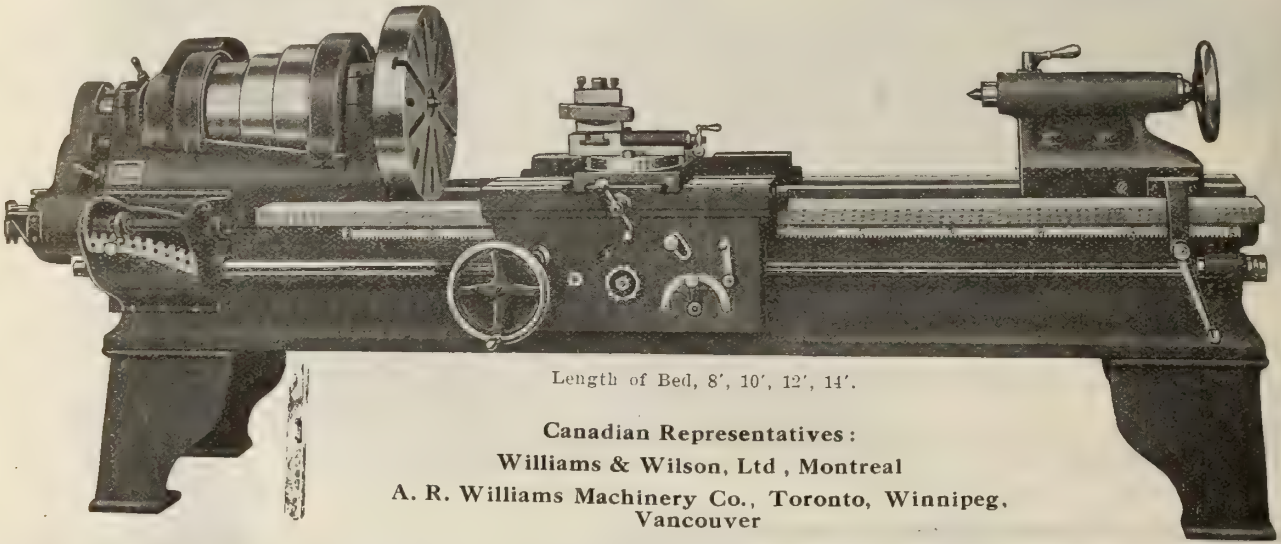
Davenport 22-Inch Lathe — For Extra Heavy Service

These lathes are built exceptionally rigid and heavy. No feature has been omitted, to secure great strength and power. The bed, the headstock, the tailstock, the carriage—every detail has been designed and constructed with a view to driving the heaviest cut that any tool will stand up against. At present we can make quick deliveries on this machine.

Built with ordinary change gears unless otherwise specified.

Write at once for Bulletin. It gives full details of construction.

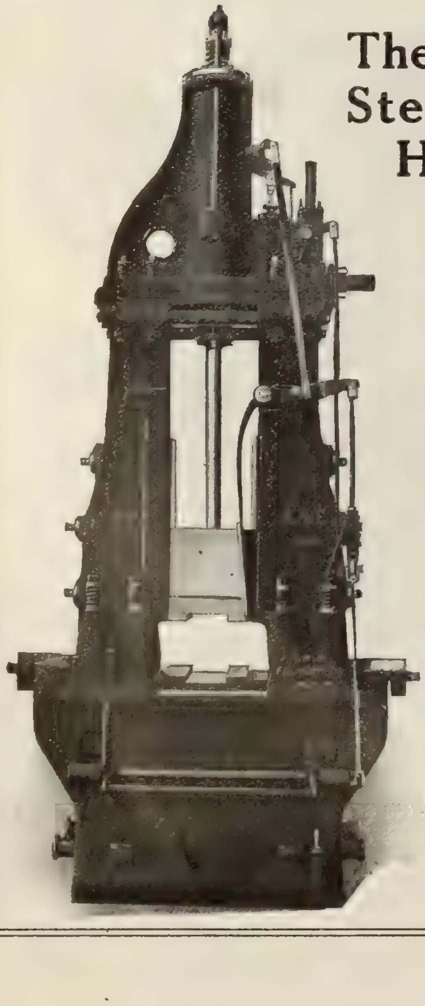
DAVENPORT LOCOMOTIVE WORKS
DAVENPORT, IOWA



Length of Bed, 8', 10', 12', 14'.

Canadian Representatives:
Williams & Wilson, Ltd, Montreal
A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver

The "ERIE" Steam Drop Hammer



is the last word in Hammer construction. Ask any user.

A list will be supplied upon request.

We also build Trimming Presses.

Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

Erie Foundry Co.

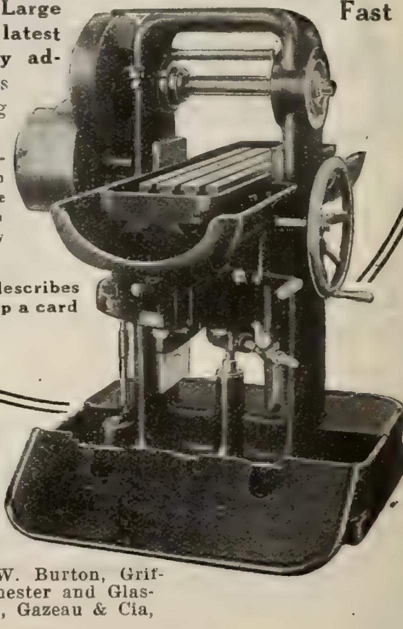
ERIE, PA.

For Rapid Production and Accurate Work

USE THE

"BRIGGS"

The Briggs Miller handles work no other machine of its size can touch. It is a manufacturing machine. On account of its rigid construction it will produce accurate work when running at a high rate of speed and feed.



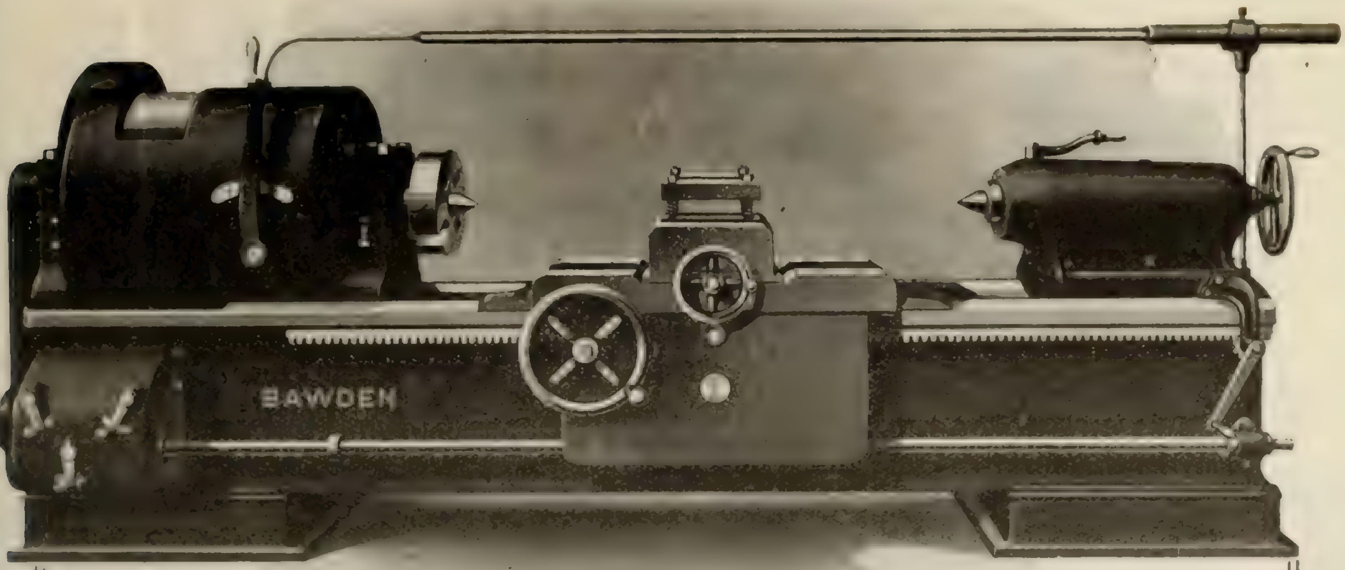
The Base Tank and Large Gear Pump is the latest addition to its many advantages. Tank holds 20 gallons of cutting lubricant.

Pump never requires priming and will deliver ten gallons per minute to the cutters, keeping them cool when run at very high speed.

Our booklet describes fully. Drop a card for it.

Gooley & Edlund
Inc.
Cortland, N.Y., U.S.A

Foreign Agents: Allied Machinery Company of America, France, Belgium, Italy, Switzerland, Russia, Scandinavia, C. W. Burton, Griffiths & Co., London, Manchester and Glasgow, Barandiaran, Metivier, Gazeau & Cia, San Sebastian, Spain.



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

You will not have "elephants" on your hands after the war

is over, but machine tools that will stand up to quality and quantity production of big jobs for years and years, if you buy

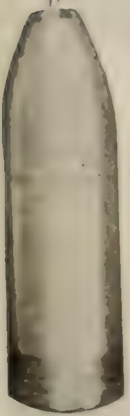
BAWDEN

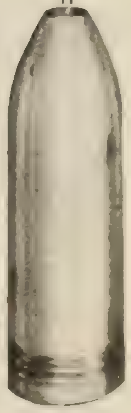
Heavy Duty Shell Lathes

Their accuracy, rigidity, power and speed make them really wonderful tools.

Users speak highly of them. It will pay you to investigate.

We manufacture a full line of gauges for all sizes of British, Russian and French Shells and component parts.





The Bawden Machine Co., Limited

TORONTO, CANADA

CRITICISM

We invite criticism, suggestions or any hints of betterment for our Lathes. We feel that we have a good machine now; one well worth the money and one that will compare favorably with any Lathe on the market, but if there is any chance for improvement, we are going to grab it.

The Best Lathe Built

That's what CISCO is going to be and we inspect every one as carefully as a watch. Before completion we chase a screw on each machine to test its accuracy, and when you buy

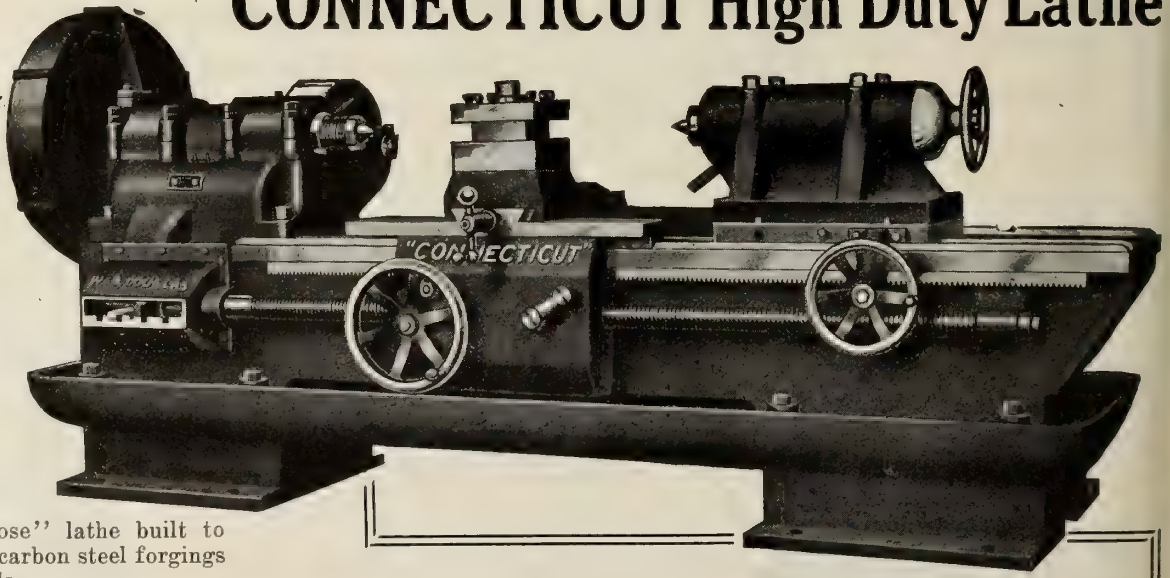
The Lathe With the Pull

You are going to be satisfied. Enough said.

THE CINCINNATI IRON & STEEL COMPANY
CINCINNATI, U. S. A.

Cisco Lathes sold in Canada by Williams **Makers of Engine Lathes 14", 16," 18", 24"**

CONNECTICUT High Duty Lathe



Sets the pace on HEAVY WORK

A "Single Purpose" lathe built to turn or bore high carbon steel forgings at maximum speeds.

It is in all respects heavier and more rigid than standard 30-inch or even 36-inch lathes giving the same distance between centers.

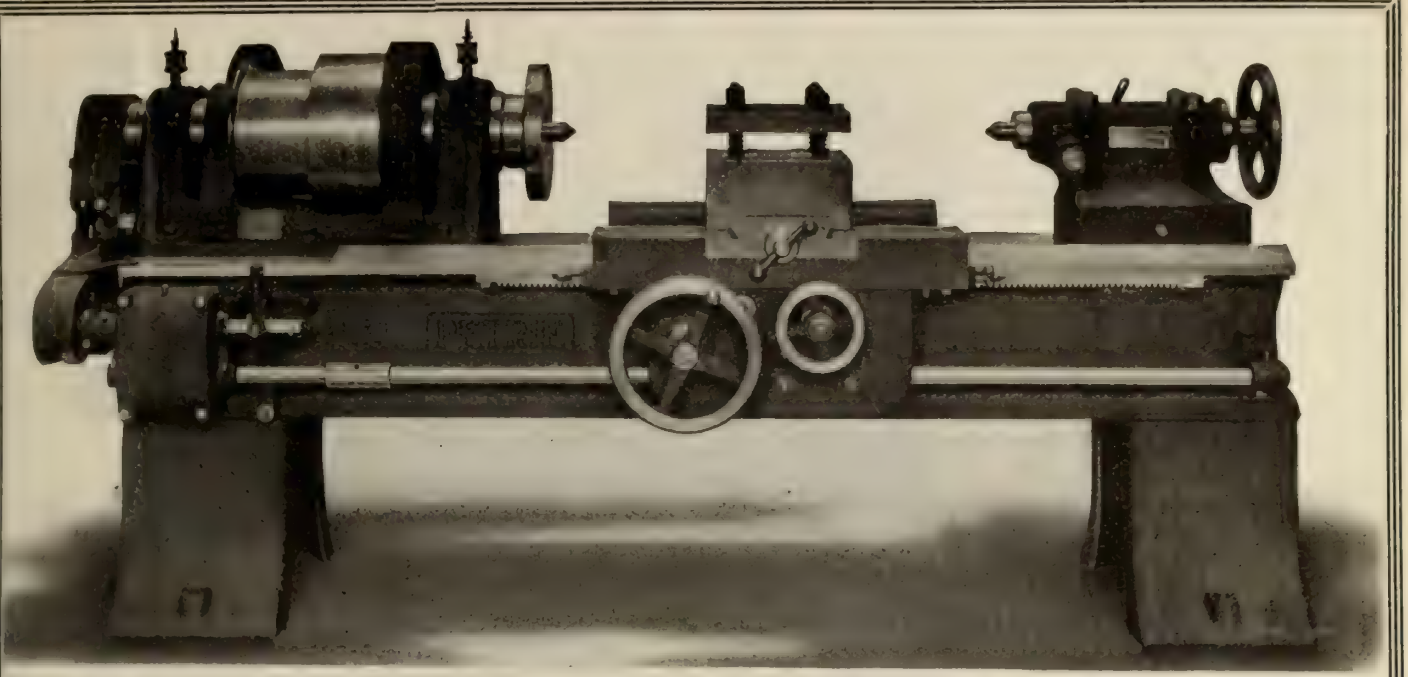
The usual cutting speeds on shell work are 40 to 50 feet per minute on shells up to 8" diameter, 30 feet per minute on larger sizes. Depth of cut from ¼" to ⅝", depending upon the eccentricity of the piece. Our lathes will stand more than this.

We admit the **Big Gear** is not particularly handsome, but it eliminates the train of small gears, and adds greatly to the strength and wearing qualities.

Write for bulletin giving full details.

W. & B. DOUGLAS, ***Middletown, Conn.***

Mention this paper when writing advertisers. It will identify the proposition about which you require information.



Petrie 20-inch Heavy Duty Manufacturing Lathe

A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

Made in Canada **Reasonable Price** **Prompt Deliveries**

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.

Two Cuts at One Time

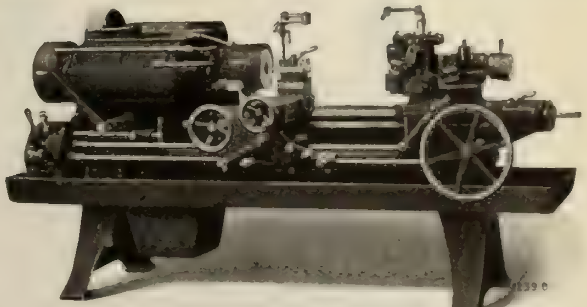
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

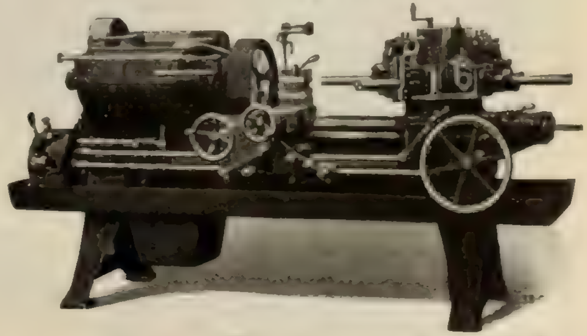
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



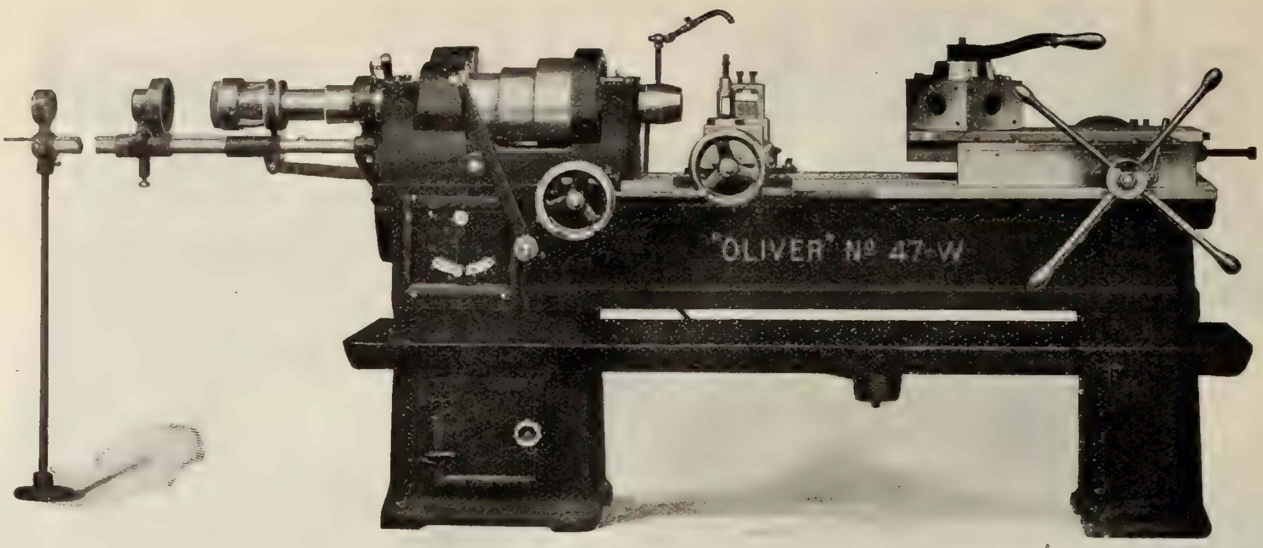
No. 2-A—With "Bar Equipment"



No. 2-A—With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

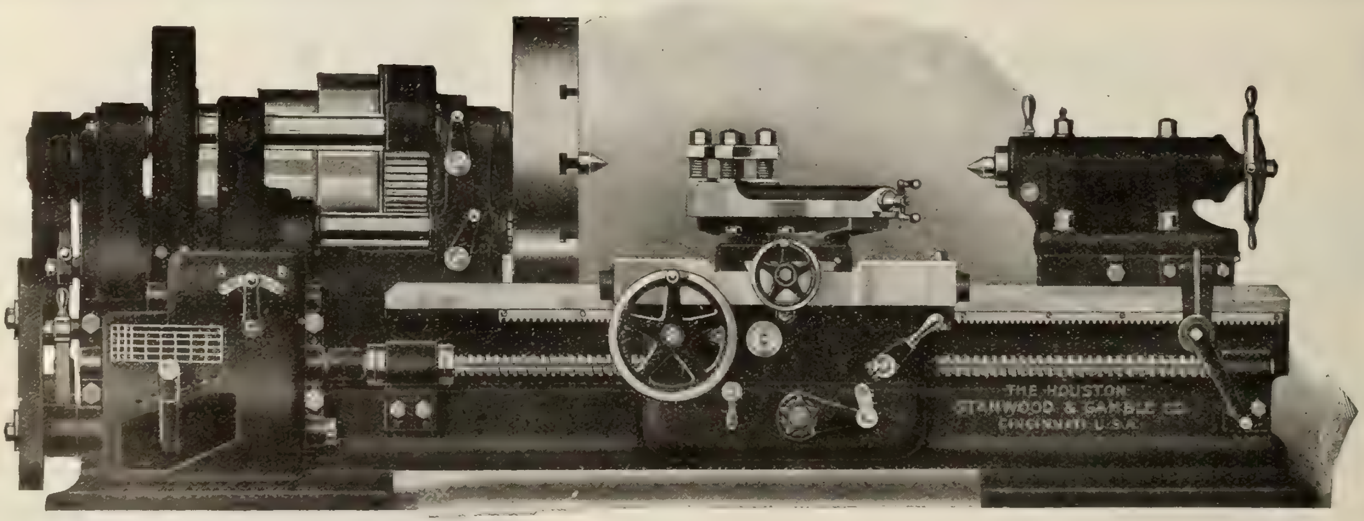
Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal



"OLIVER" NO. 47-W HEAVY DUTY SCREW MACHINE 2¼"—SWING 16".

A HEAVY TOOL FOR HEAVY WORK—A MODERN MACHINE—OLIVER QUALITY—
PROMPT DELIVERIES.
WRITE FOR FULL INFORMATION.

OLIVER MACHINERY COMPANY, Grand Rapids, Mich.



H-S-G TRADE MARK

Heavy Duty Engine Lathe, triple-geared into internal gear on face plate. Prompt shipment in 30″ and 36″ sizes.

This is a well-designed lathe. The cone has 7″ face for 6″ belt. Spindle has 8″ x 10″ front bearing. All parts are of correspondingly liberal proportions. Absolutely all gears are of steel. The net weight of the 30″ lathe with 14′ length of bed is 16,500 pounds. The design, materials and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

CINCINNATI, U.S.A.

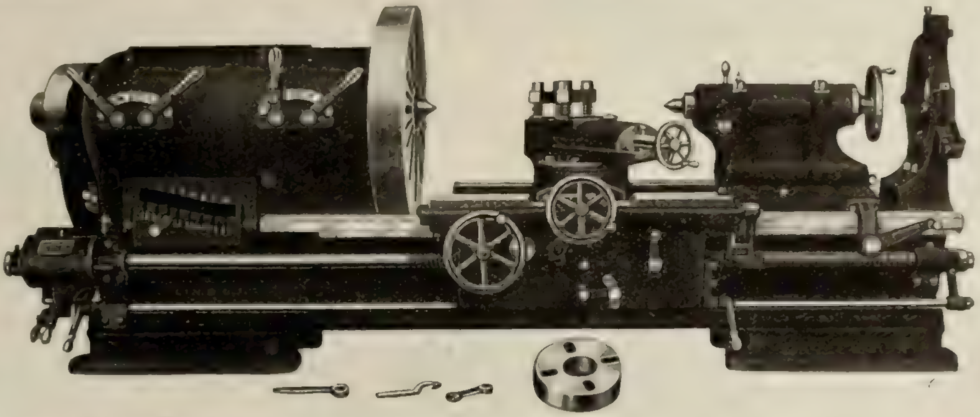
Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO.
LIMITED

32 FRONT ST. WEST, TORONTO TELEPHONE MAIN 5346

Lodge and Shipley—Selective Head—Triple Gear 36" Lathe—Good Delivery



Strong, speedy, accurate Machines for all operations on 6-in., 8 in., 9.2-in. and 12-in. Projectiles.

Unexcelled 18 in. and 20 in. Engine Lathes for Tool Room Equipment

Send us a list of machines required, and full particulars will come by return mail.

GARLOCK-WALKER MACHINERY CO., Limited, Telephone Main 5346 **32 Front St. West, TORONTO**

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

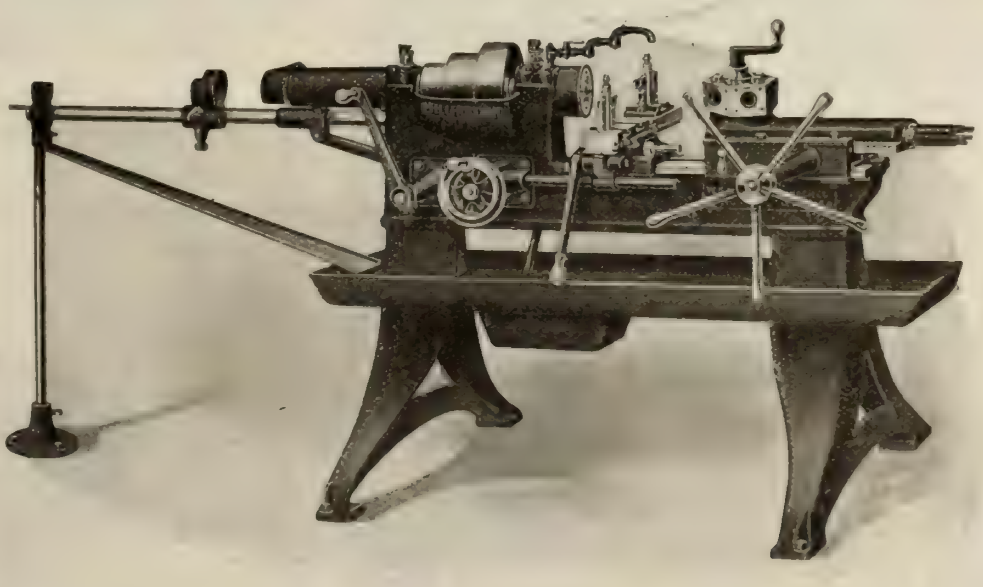
METAL and WOODWORKING MACHINERY of all Kinds

Every Feature to secure strength and stiffness on the heavy cuts is embodied in

Millholland

1"x7"

Screw Machine



The Bed is of box construction well ribbed, and with the headstock cast solid.

The Headstock is made with plain head three-step cone. The steps of the cone pulley are of large diameter and wide face and are so proportioned as to transmit the maximum power with proper spindle speeds.

The Spindle, high-carbon steel with hardened and ground thrust washers.

The Cut-off Slide, with broad, flat, well gibbed bearings.

The Turret is of heavy construction and mounted on a large steel stud

The Automatic Chuck and Bar Feed, operated by the long lever on the front of the bed, grips or releases the work instantly. The operator with one movement opens the chuck and feeds the bar without stopping the machine.

DROP A LINE FOR FULL DETAILS AND SPECIFICATIONS.

Manufactured by
W. K. Millholland
Machine Company
INDIANAPOLIS, IND.

The Story of an Increased Production

WITH a certain make of wheel they were grinding 2,100 large gray iron castings in a Syracuse plant.

A Carborundum service man studied the grinding conditions and specified a Carborundum wheel of a definite grit and grade.

Now, with the right wheel in the right place, they are grinding 3,900 castings under the same conditions.

The Carborundum Wheel cuts faster, cleaner, shows longer life.

Carborundum Service will help you to better bigger grinding results

THE CARBORUNDUM COMPANY
Niagara Falls, N. Y.

New York Chicago Boston Philadelphia Cleveland
Pittsburgh Cincinnati Milwaukee Grand Rapids
Manchester, Eng.

WE BUILD THEM BY HUNDREDS

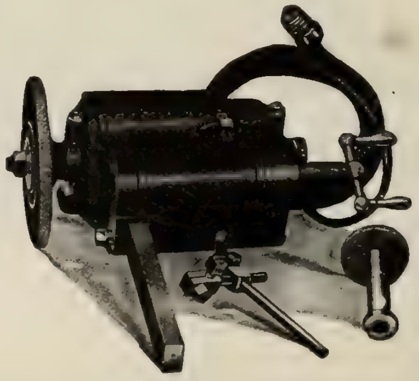
Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only $60 Complete

The Blake & Johnson Co., Waterbury, Conn

Stow Tool Post Grinder

Does the most accurate of work—patent bearings, for Internal and Surface Grinding—A.C. or D.C. Immediate shipment from stock. Plain or with slide.

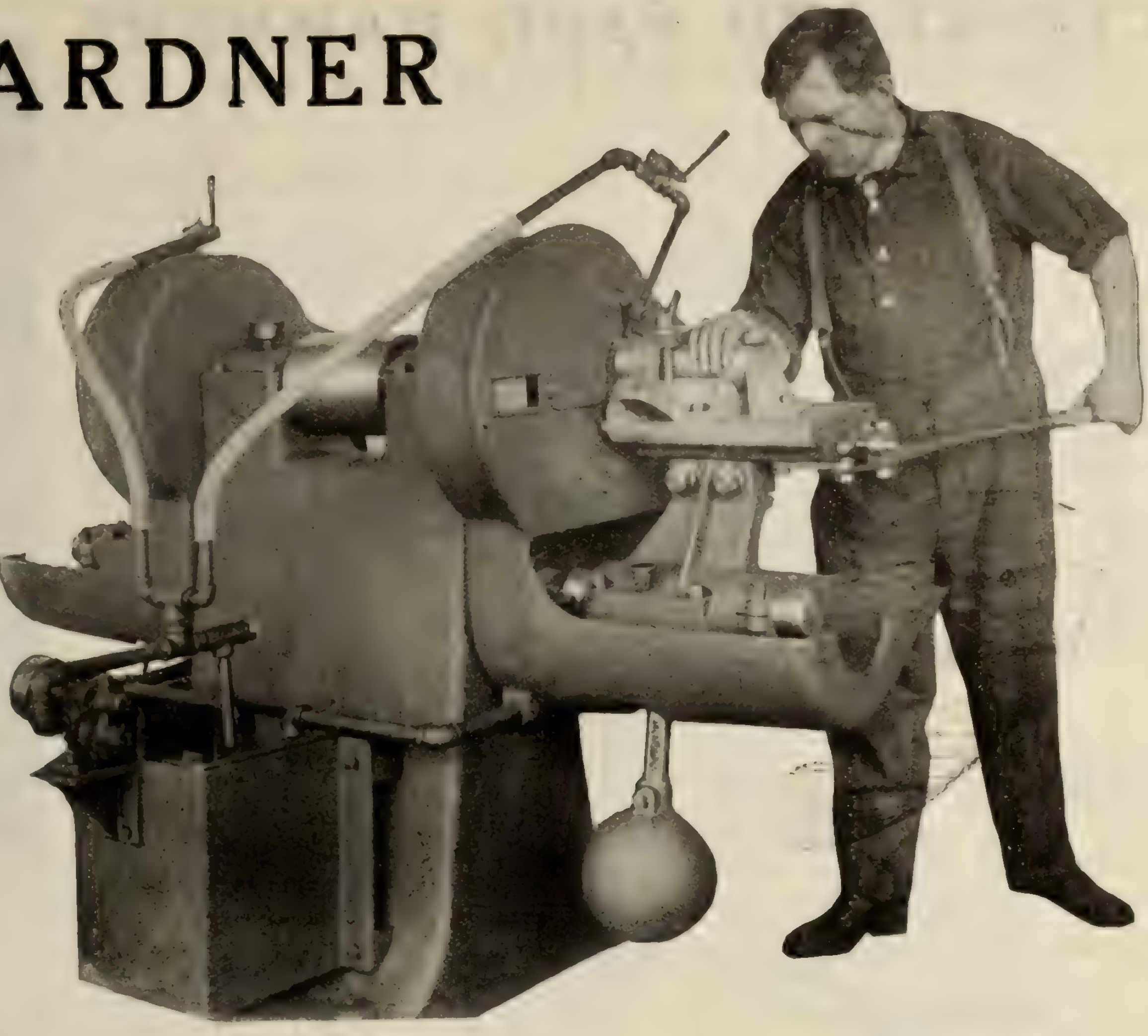


One of the many electric portable tools built by

Stow Manufacturing Co.
Binghamton, N.Y.

Oldest portable tool manufacturers in America.
London Stock, 85 Queen Victoria St.

GARDNER GRINDERS



For Grinding Ends of Shells

We have developed a Special Grinding Machine for removing the hub or centre projection from the ends of shells. This grinder is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates.

We build as well a much heavier and more Powerful Grinder to be used for these same operations on 6" Shells.

FEATURES

- High-Grade Babbitt Bearings and Lever Feed.
- Rapid clamping of Shell into "V" fixture.
- Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.
- Can be equipped and operated at both ends for double output.
- Output, according to size of projection to be removed, from 40 to 100 per hour.
- Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments.
- Weight, 4,500 lbs.

For further particulars write

The Gardner Machine Company, Beloit, Wis., U.S.A.

CLEVELAND SAND RAMMERS

FOR FLOOR, BENCH, PEIN AND FLASK RAMMING

Cleveland Sand Rammers are made in several sizes and weights, and are adapted for all kinds of Ramming in general foundry service.

The Piston Rods are packed with a resilient packing that conforms to the shape of Rod without retarding its free action, and prevents any dirt from entering piston chamber and working parts— Rammers are fitted with either Round or Flat Rods as required. Cleveland Rammers are light in weight, have high speed and practically no vibration, making them ideal foundry tools.

Sand Rammer in operation.

CLEVELAND CHIPPING HAMMERS

For General Foundry Work. Are furnished in any required size or weight for grey iron or steel castings; they have high speed, and are particularly adapted for fast chipping now required by piece-work operators.

BOWES AIR HOSE COUPLINGS

Over 1,000,000, in General Use

Bowes Couplings are instantly connected or disconnected.

Bowes Couplings are absolutely air tight under all pressures.

Above cut shows the Never-Slip Clamp attached to Bowes Coupling.

In Stock :—RIVETING HAMMERS, DRILLS, REAMING, TAPPING AND FLUE-ROLLING MACHINES, CORNER DRILLS, PORTABLE AND BENCH GRINDERS, ETC.

Catalog No. 12 mailed on request.

CLEVELAND PNEUMATIC TOOL CO. OF CANADA, LIMITED

80 DUCHESS STREET, TORONTO, ONT.

Agents: A. R. WILLIAMS MACHINERY CO., TORONTO   WILLIAMS & WILSON, MONTREAL

Thor

CHIPPING HAMMERS with Single Valve of the Latest Improved Design.

Made in five sizes, with piston diameter of 11/16" by strokes of from 1 to 5", designated as sizes A, B, C, D and E. **Shipped on Trial at Our Expense**

Independent Pneumatic Tool Co.

CANADIAN OFFICE:

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General Offices: Thor Building, Chicago, U.S.A.
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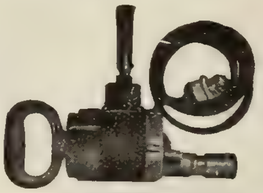
U. S. Electric Drills and Grinders

Save Time, Labor and Money

They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.



3 SIZES
3-16 inch, W.G.T. 6 lbs.
¼ inch, W.G.T. 9 lbs.
⅜ inch, W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.

½ inch—2 SPEED.
Speed, 400-750 R.P.M.

For Sale By
The Canadian Fairbanks-Morse Co., Limited

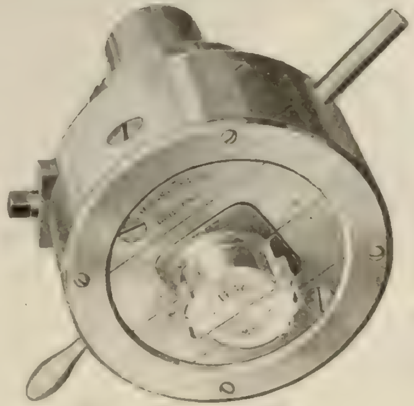
Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver.

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO

Modern Self-Opening Adjustable Die Heads and Collapsible Taps

Modern Self-Opening Die Head.

"Modern," Self-Opening Die Heads and Collapsible Taps in your thread-cutting department mean efficiency and accuracy. With "Modern" Dies and Taps it is not necessary to take a roughing cut—a single cut gives a finished thread of absolute accuracy in diameter, form, lead and pitch. They are properly supported to insure the cutting of a perfectly straight thread of full size and accurate lead, and will not clog with chips, necessitating frequent cleaning. Cuts close to a shoulder.

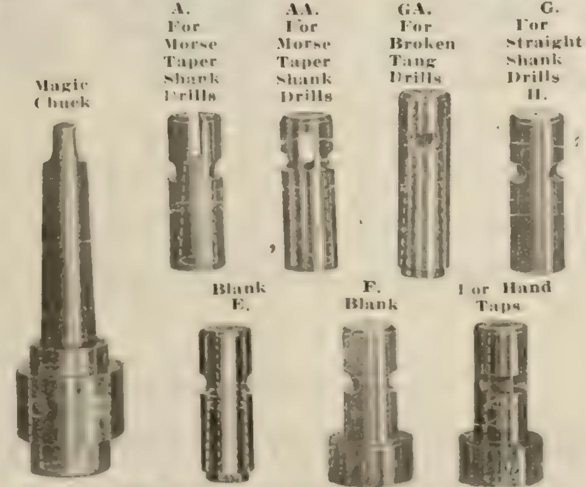


Modern Collapsible Tap.

"Modern" Die Heads and Collapsible Taps are used on all styles of Hand and Automatic Screw Machines, Turret Lathes, Chucking Machines, Drill Presses, in fact on any Machine that is used for thread-cutting.

Magic Chuck Equipment

The simplest, safest, easiest to operate and most adaptable chuck on the market. For use on Drill Press, Lathe, Screw Machines and other Revolving Spindle Machines.


Magic Chuck
A. For Morse Taper Shank Drills
AA. For Morse Taper Shank Drills
GA. For Broken Tang Drills
G. For Straight Shank Drills
H.
Blank E.
F. Blank
For Hand Taps

Made in six sizes—the largest with capacity up to 5% diam. drills.

Handles such operations as Drilling, Reaming, End Milling, Counter Boring, Tapping, in fact any operation that can be done on a Drill Press, increasing the output from 20% to 100%.

MODERN TOOL COMPANY

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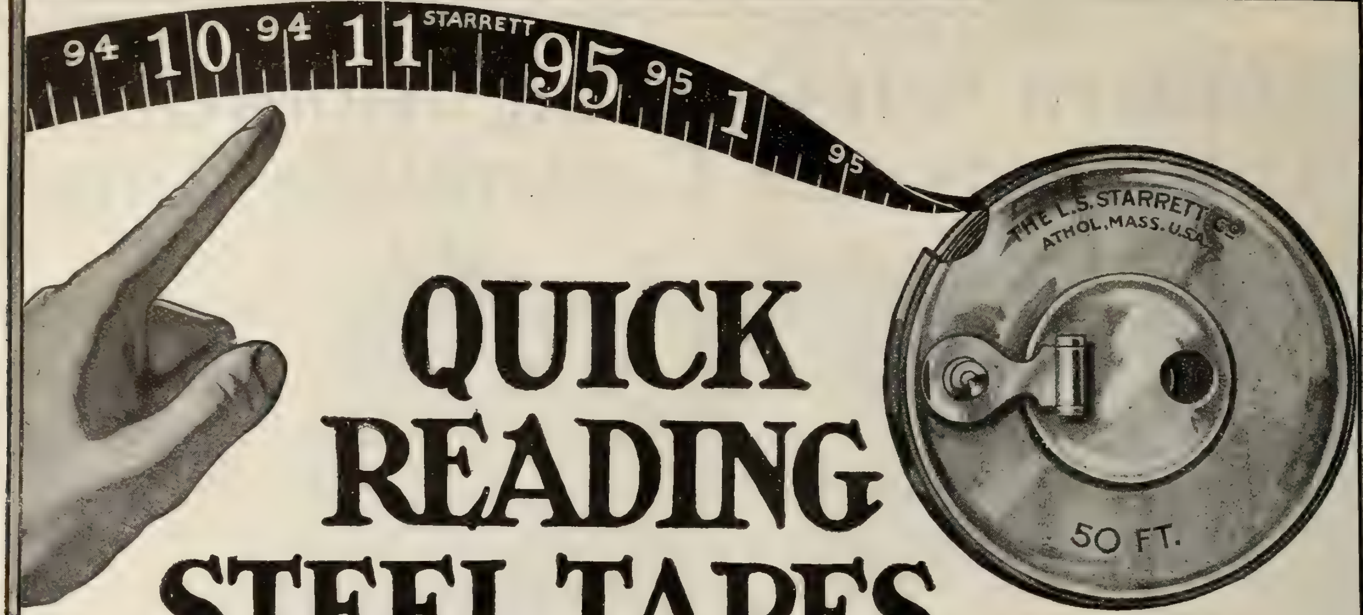
Canadian Agents: Rudel-Belnap Machinery Co., Toronto and Montreal
New York Office: 50 Church Street
Chicago Office: 32 N. Clinton Street


94 10 94 11 STARRETT 95 95 1 95
THE L.S. STARRETT CO ATHOL, MASS. U.S.A.
50 FT.

QUICK READING STEEL TAPES

AN important improvement in the Starrett Steel Tapes consists in placing the foot figures before each inch mark, as shown above. By this method of marking, the tape can be read in an instant and the possibility of error removed.

TRADE MARK
Starrett Tools
REG. U.S. PAT. OFF.

owe a great measure of their popularity to the perfection of just such details as this as well as to their permanent accuracy, quality and workmanship.

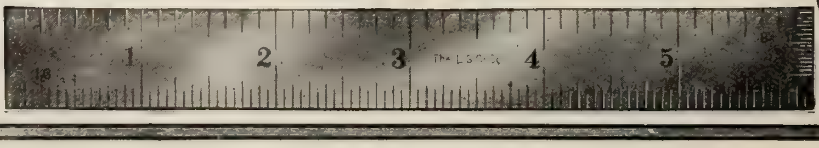
OTHER STARRETT TOOLS:

- Micrometers
- Vernier Calipers
- Combination Squares
- Steel Rules
- Protractors
- Levels
- Calipers
- Dividers
- Hack Saws
- Wrench Sets
- Speed Indicators

Write for the New Starrett Catalog No. 21-3

THE L. S. STARRETT COMPANY
"The World's Greatest Tool Makers"
ATHOL, MASS.
New York Chicago London

STARRETT TOOLS
TRADE MARK REG. U.S. PAT. OFF.



INVITATION MEMBER OF
NEW YORK U.S.A.

"Yes Sir, That Grinder Makes 30,000 R.P.M"

THE Big Chief was skeptical until he saw the DUMORE Grinder at work, then he was convinced that 30,000 R.P.M. was not a dream, but a fact.

He watched one of the

DUMORE PORTABLE ELECTRIC GRINDERS

at work for a moment and asked: "Direct or alternating?" "Both," replied the superintendent, "it has a universal motor."

"And it is dynamically balanced. That means durability and accurate work. It's a world beater," he continued. "Our men find a dozen uses for the DUMORE every day. It weighs only 17 pounds and they carry it from one job to another. It grinds cutters right on the miller—no need to tear down and set up again—some time-saver.

"Yes, sir, the DUMORE does all kinds of grinding; longitudinal, cylindrical, external and internal. It saves so much time—and you know what time means to us, particularly just now. I don't know how we ever got along without it."

That's what you will say, too, when you have put a DUMORE on the job. Let us ship you one on approval—try it on **your own** work. Order now—quick deliveries.

Wisconsin Electric Co., 1704 Dumore Bldg., **Racine, Wis., U.S.A.**

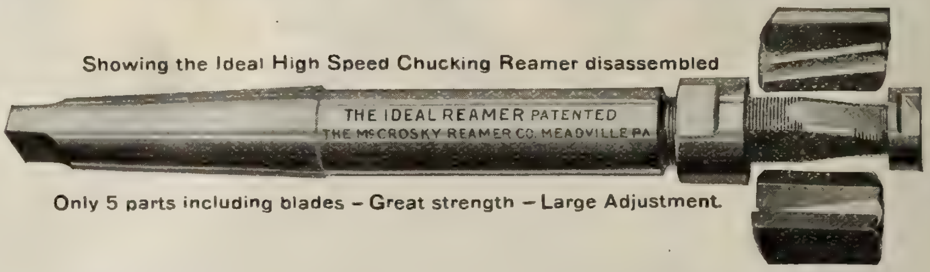
Toronto Office: R. E. T. PRINGLE, LIMITED, 95 King St. East, Toronto.
Complete stock carried by Aikenhead Hardware Company, 17 Temperance Street, Toronto

The Toughest, Hardest and Most Fibrous Metals
ARE REAMED WITH EASE WITH
THE "IDEAL" ADJUSTABLE REAMER

Every hole is reamed true, smooth, and round. There is no binding, heating up nor clogging with chips. It is without equal in most classes of machine reaming.

We recommend **THE IDEAL** for any job in phosphor bronze, steel tubing, steel castings, steel forgings, aluminum or any job you may have where other reamers have failed.

Showing the Ideal High Speed Chucking Reamer disassembled


THE IDEAL REAMER PATENTED
THE McCROSKY REAMER CO. MEADVILLE PA

Only 5 parts including blades – Great strength – Large Adjustment.

A 2" **IDEAL** Reamer will adjust 3/32" and other sizes in proportion. Thus one Ideal will outwear a dozen or more solid reamers, and then it is only necessary to buy a new set of blades.

THE IDEAL is radically different in design from all other types of adjustable reamers. Two solid blocks of High Speed Steel held on an arbor by two powerful collars—nothing more. No screws or small parts. There are four left-hand spiral cutting edges, and every tooth is milled in the solid head—no inserted teeth. Greater simplicity and strength is impossible in an adjustable reamer.

Adjustment is effected by loosening rear collar and tightening front collar, which forces the two halves of the reamer head up the inclined surfaces of the arbor. No shimming under the blades.

Assembled

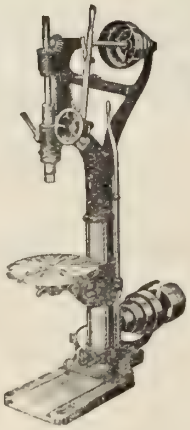
THE IDEAL REAMER PATENTED
THE McCROSKY REAMER CO. MEADVILLE PA

TRY IT ONCE AND YOU'LL USE IT ALWAYS.

THE McCROSKY REAMER COMPANY, MEADVILLE, PA., U.S.A.
EXPORT AGENT, BENJAMIN WHITTAKER, 21 STATE STREET, NEW YORK, N.Y.

The

BARNES DRILLS



Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

W. F. & JOHN BARNES CO.
104 Ruby Street - ROCKFORD, ILL.
Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal

---

16 in. Lever
POST DRILL

A Giant Little Machine For Light Drilling.

Will drill up to 7/8 inch.

The Feed Lever Socket is adjustable on the feed shaft, to provide for setting the lever in the most convenient position for the operator.

An adjustable friction is provided for the feed shaft, which acts as a balance to the weight of the spindle.

Bevel Gears, Feed Pinion and Rack are all machine cut, working smoothly and without noise.

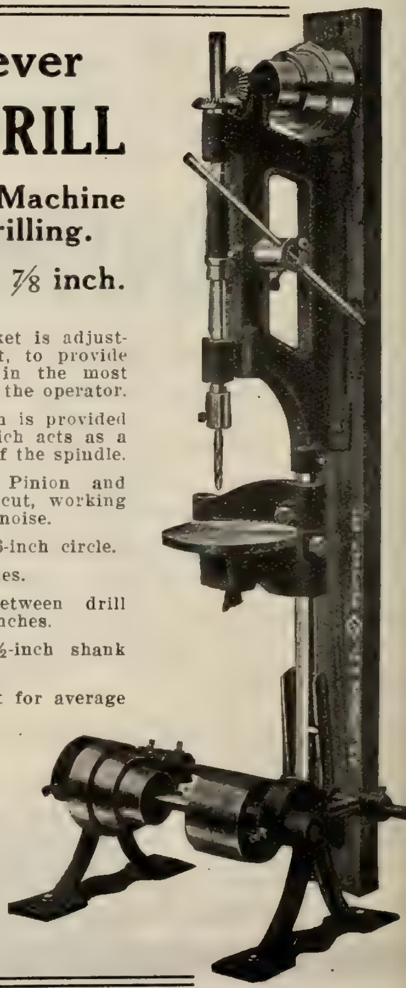
Drills to centre of 16-inch circle.

Run of feed 5¼ inches.

Greatest distance between drill spindle and table, 22 inches.

Spindle bored for ½-inch shank twist drills.

Speed of countershaft for average work, 300 per minute.



A. B. Jardine & Co.
Hespeler, Ontario

One Paragraph From A Machinery Dealer's Letter:-

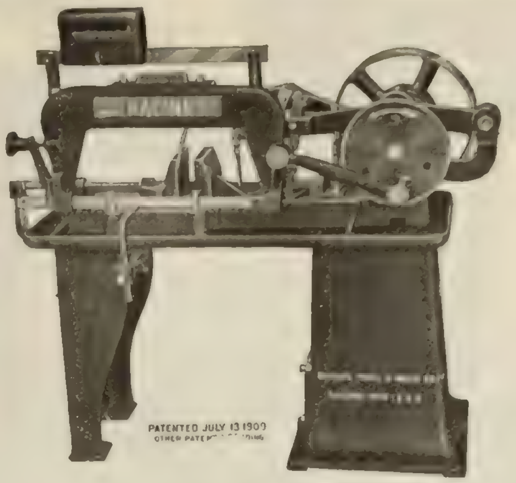
PEERLESS
PEERLESS MACHINE CO. RACINE, WIS. U.S.A.

"One of our customers has recently purchased from us two of your 6" PEERLESS High Speed Power Hack Saws and they now wish to install several more, providing we can take some of their old hack saws in exchange. They claim these old machines are as good as new, but they consider the PEERLESS so far superior to the others that they would like to fully equip their factory with PEERLESS Machines."

The principle of construction in the PEERLESS High Speed Heavy Duty Cutting-off Machine admits of a cutting speed which cannot be approached by the ordinary type of machine. The output of the machine is controlled by the efficiency of the blade. At the maximum speed at which this machine is guaranteed to operate it cuts off a 3 in. round, cold rolled bar in 1½ minutes.

Bearings are extra large. The ones that are subject to excessive wear are made of tool steel, hardened and ground, which eliminates the continuous [illegible] and repairing that ordinarily is the case when a machine is worked to its utmost.

PEERLESS MACHINE COMPANY
1607 Racine Street **RACINE, WISCONSIN**



No. 1—Eats Steel

WHY IS IT

That so many Canadian shops are now equipped and being equipped with

The Newly Improved Racine High Speed, Metal-Cutting Machine?

FOR MANY GOOD REASONS among others because for speed, accuracy, economy and ease of operation THE RACINE cannot be surpassed. You MAY NEED ONE NOW. We will send a RACINE on any trial basis that is fair. WRITE US or any good Canadian dealer.

Racine Tool & Machine Company
15 Melbourne Ave., Racine, Wisconsin, U.S.A.

Cut Your Shop Costs

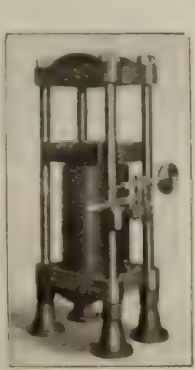
Nobody would think of putting 16-inch lathe work on a 30-inch lathe, then why leave small parts on a large Milling Machine?

A Steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

That same principle applied to your small planer work will cut the cost of planer work.

A Steptoe Shaper will do the work faster because it can be handled quicker.

The John Steptoe Company, **CUMMINSVILLE, CINCINNATI, OHIO, U.S.A.**



Elmes Hydraulic Press No. 676

With ¾-in. Automatic Lever Operating Valve No. 677-A

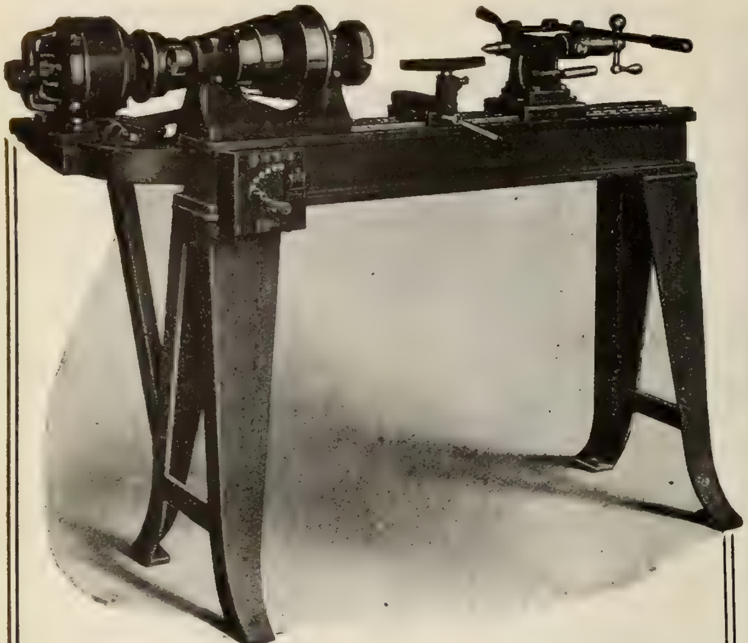
This press is of steel and semi-steel construction, and the stands which support the press are threaded at the ends to receive the steel columns and have holes for fastening to the floor. The platen is guided by the columns.

The operating valve is attached to the cylinder, and is designed with a weight to be set for the pressure desired and releases automatically. To start the ram up, the lever is pushed down; upon the ram reaching the desired pressure, the lever automatically releases (acting as a safety valve as well), causing the ram to descend. Valve body is made of bronze, and other parts are made of tool steel and machine steel. If desired a hydraulic gauge can be attached to show the various pressures, although with this valve it is not necessary.

Write for our Hydraulic Machinery Catalogue.

Charles F. Elmes Engineering Works **217 N. Morgan St. Chicago, U.S.A.**

Over 50 years' experience building hydraulic machinery.

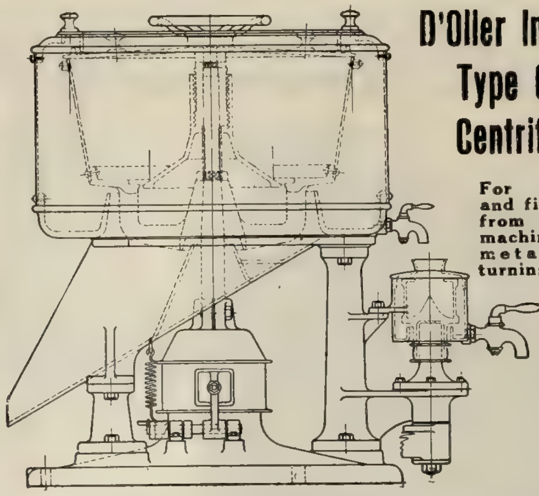


Motor Driven Speed Lathe

This style of motor drive employs a constant speed motor mounted on a plate having an extension arm to support a bearing for the outer end of the motor shaft. The motor plate is fitted to a slide on a shelf which is securely fastened to the back of the lathe bed. The motor plate is moved by means of a screw which tightens or loosens the belt. A four-step cone pulley on the motor shaft is belted to a four-step cone pulley on the spindle. This gives the same speed variation as when a countershaft is used, and by means of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is crossed-braced and all clamping levers are above the ways.

J. G. BLOUNT CO. - Everett, Mass., U.S.A.



D'Oller Improved Type Chip Centrifugal

For recovering and filtering oil from automatic machined parts, metal chips, turnings. scrap, etc

A large capacity, extremely efficient machine, especially designed and built to care for the "rush" character of work and the increasing volume of shop output now prevailing.

SPECIAL FEATURES

Weston type, self-balancing basket, 30 in. diameter, motor driven.

Bottom chute discharge and conical unloading valve.

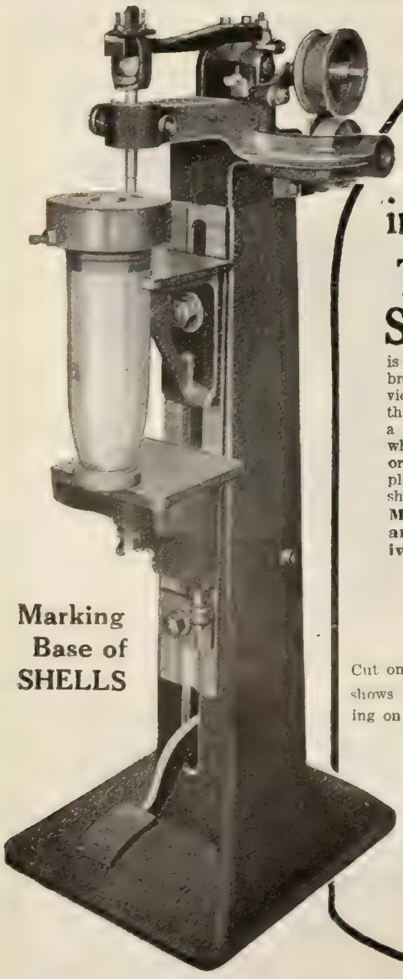
Centrifugal oil filter attachment.

The 30" Weston type self-balancing basket, which is the largest capacity for this service, is of the non-removable type. No service (removable) baskets are required for this machine, the load being dumped into the operating basket and discharged by means of our special conical unloading valve and chute, which is a great time-saving feature.

The centrifugal oil filter, with which the machine is equipped, is operated by the main driving belt, the complete unit being therefore self-contained, simultaneously recovering and filtering the oil from the chips, turnings, etc.

D'Olier Centrifugal Pump and Machine Co.

Morris Building, Philadelphia, U.S.A.



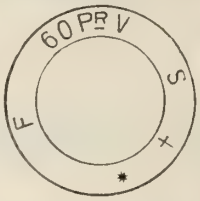
Marking Base of SHELLS

A PERFECT JOB in 15 Seconds

The "Grant" Shell Marker

is so arranged that the blow is brought to bear on each individual letter successively, while the blow can be adjusted to give a shallow or deep impression which is uniform for each letter or figure. The work is completed in one revolution of the shell, which is done by hand. **Made for 18 pdr., 4.5 in., and 60 pdr. high explosive shells.**

Drop a card for full particulars.



Cut on right shows marking on shell.

THE GRANT MFG. & MACHINE CO.
Holland Ave.
BRIDGEPORT, CONN.
U.S.A.

HIGH SPEED HAMMERS

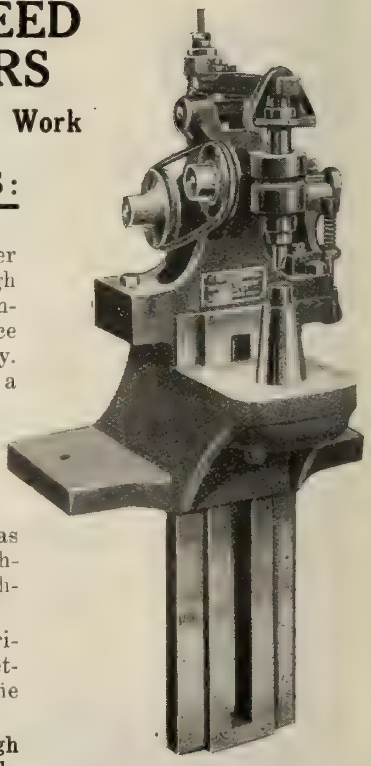
For High Speed Work

FEATURES:

Our Bench Hammer can be adjusted high or low, and spells another economy in space and handy utility. With it you have a guaranteed saving of from 15% to 20% on any class of work. The life of the machine is practically indefinite as phosphor bronze bushings are used throughout.

No riveting too intricate for us; no riveting which our machine cannot accomplish.

Send for our **High Speed Hammer Book.**



THE HIGH SPEED HAMMER CO.
Rochester, N.Y.

Sales Agents : The A. R. Williams Machinery Company, Limited, Toronto, Ontario.

"W. & B." Drop FORGINGS

¶ We make a specialty of the highest grade Drop Forgings. Our exceptional capacity and equipment insure accurate forgings and prompt delivery.

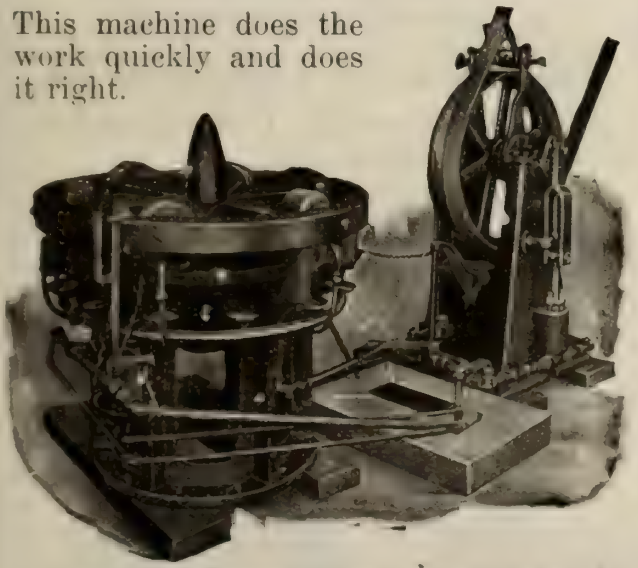
The
Whitman & Barnes Manufacturing Co.
Established 1854
St. Catharines, Ontario

Send us Blue Prints on Special Forgings, three pounds and under in weight, and permit us to estimate on your requirements.

Hydraulic Banding Machine

For compressing bands on shrapnel shells and other projectiles

This machine does the work quickly and does it right.



In writing for information or quotation please advise width and thickness of bands and diameter of shells to be handled.

Machines for our Canadian Customers are built in Hamilton, Ont.

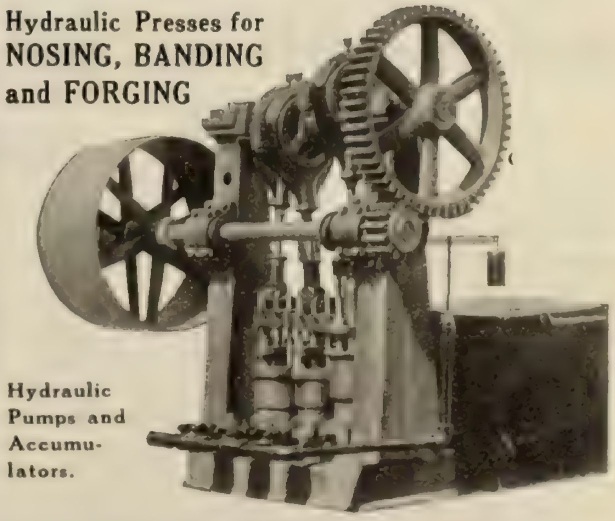
We also manufacture machines for setting wagon and carriage tires, cold.

Please address all communications to our Rochester Office

THE WEST TIRE SETTER COMPANY
ROCHESTER, NEW YORK, U.S.A.

PRESSES FOR SHELLS

Hydraulic Presses for
NOSING, BANDING and FORGING



Hydraulic Pumps and Accumulators.

Hydraulic Presses for all purposes.

WRITE FOR FULL DETAILS NOW.

William R. Perrin, Limited
TORONTO, ONTARIO

The New "Murchey" Adjustable TAP

MURCHEY MCH. & TOOL CO
DETROIT, MICH.
2"-14
WHITWORTH

POSITIVELY ACCURATE

10 times the life of the ordinary tap

With the Murchey Tap and chasers can be ground any number of times and adjusted each time to compensate for wear. **One set of chasers will last ten times as long as a solid tap,** and new chasers can be replaced at low cost.

Now with the solid tap it is an entirely different matter. Just as soon as you begin to sharpen a solid tap, it loses size and accuracy, and after one or two sharpenings the tool is of no further use.

This new Murchey Adjustable Tap is working finely and we are receiving a great number of orders for it. Send in yours to-day—the price is of no consequence considering the remarkable results and economies shown in length of service.

FULL PARTICULARS ON REQUEST.

Murchey Machine & Tool Co.
34 Porter Street, DETROIT, MICH.

Once Known— Always Used

M. E. C. Collapsible Taps

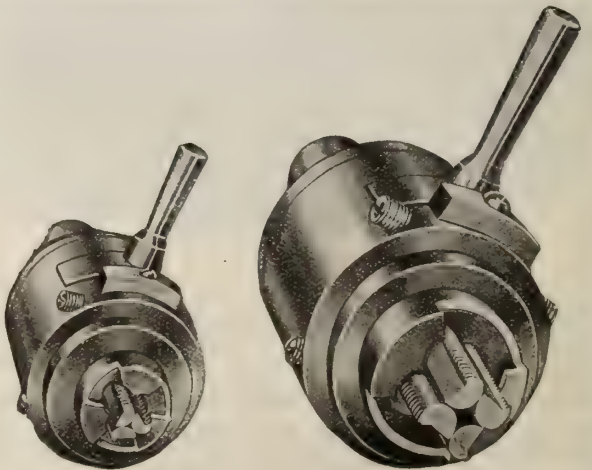
are giving extraordinary service on Shrapnel and Cartridge SHELL work.

It will be Greatly to your interest to get a line on the value of this tap. WRITE SOME USERS—we'll gladly send names and addresses.

Full particulars and details of our liberal proposition on request.

Manufacturers Equipment Co.
175 North Jefferson St., CHICAGO, U.S.A.

Canadian Agents:
FOSS & HILL MACHINERY CO., Montreal
A. R. WILLIAMS MACHINERY CO., Winnipeg
GEO. A. TODD, 826 Traders Bank Bldg., Toronto

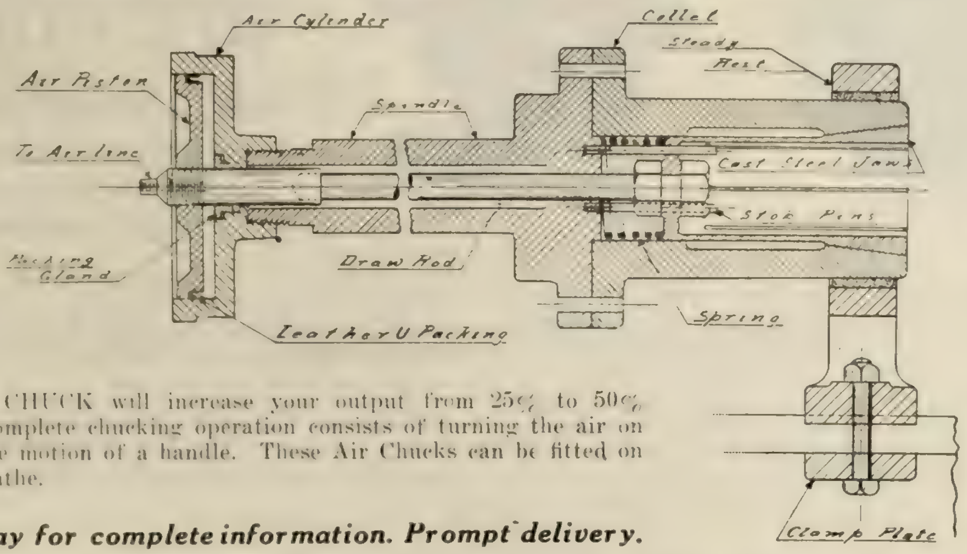


Get Out Your Watch and Time Your Chucking

With most screw chucks you have to use brute force or the hammer to tighten, and even then your shell is not always rigid.

H.E.W. AIR COLLET CHUCK IS RIGID

Saves Time


Air Cylinder
Collet
Steady Rest
Air Piston
Spindle
To Air line
Cast Steel Jaws
Stop Pins
Packing Gland
Draw Rod
Spring
Leather U Packing
Clamp Plate

Saves Money

H.E.W. AIR CHUCK will increase your output from 25% to 50% because the complete chucking operation consists of turning the air on and off, by the motion of a handle. These Air Chucks can be fitted on almost any Lathe.

Write to-day for complete information. Prompt delivery.

HYDE ENGINEERING WORKS

P.O. Box 1164 **27 William St., MONTREAL**

You Won't Waste Time

trying to remove your work from a magnetic chuck if you use

HEALD MAGNETIC CHUCKS

BECAUSE THEY

ABSOLUTELY DEMAGNETIZE

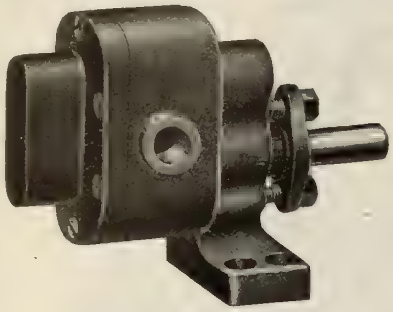
when the current is turned out of them.

This is another of the many points of superiority of the Heald Magnetic Chuck, that make it the most efficient and long lasting, work holding device on the market. Don't put off. Write Now for Full Details.

THE HEALD MACHINE CO., **8 New Bond Street, Worcester, Mass.**

BRANCH OFFICES: CHICAGO, 24 So. Jefferson St.
CINCINNATI, 602 Provident Bank Bldg.
CLEVELAND, 710 Engineers Bldg.
DETROIT, 303 Majestic Bldg.

Positive in Action Simple in Construction



Type 1 One-way

Type 2 One-way

ROPER

Circulating OIL PUMPS

Give a steady, non-pulsating stream delivered in proportion to the speed of the machine.

Type 1 One-way pump is especially designed for use on machines in which the cutting tools operate constantly in one direction, although by belting separately to the pump it may be used on a reversing machine.

In this form of pump a separate relief valve is used in the pipe line if it is desired to close the delivery pipe while the pump is running, or if the delivery is varied in quantity.

Where it is known that the delivery will be cut off or varied at times with the pump running, our **Type 2 One-way pump** provides the best as well as the cheapest way of accomplishing this result.

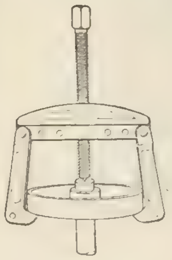
By using this form of pump, the piping is much simplified and the cost of installing is less while the appearance of the pump on the machine is much better.

It will pay you to investigate Roper oil pumps—they are saving money everywhere.

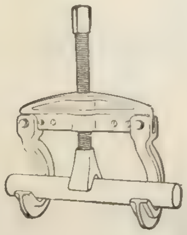
WRITE FOR FULL PARTICULARS.

C. F. ROPER & CO., HOPEDALE, MASS., U.S.A.

Crane's New Model Patent Wheel Puller



Removing Work Near End of Shaft



Pipe Bending and Shaft Straightening Attachment

The screw has a flat end with inserted tempered tool steel point that will not spread cutters. Makes its own centre on work that has none. The strain is taken on the flat end of the screw. Grease to keep from cutting. The screws are made of high carbon steel and case-hardened all over.

The pipe-bending attachment consists of a pair of arms and forked end for the screw. Two sizes to fit the No. 2 and No. 3 Two-Arm Puller. **It is indispensable in a repair shop** for straightening propeller and jack shafts, banding exhaust pipes, and removing universal joint yokes, etc.

We absolutely guarantee the workmanship and material in our tools.

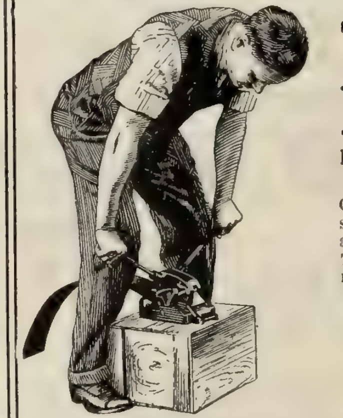
Write for full particulars.

The Crane Puller Co.

54 Lake Street

ARLINGTON, MASS., U. S. A.

Canadian Distributors: Canadian Fairbanks-Morse Co., Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary; John Millen & Son, Montreal, Toronto, Winnipeg, Vancouver.



The CLIPPER Lacer Belt

Makes belt lacing easy, quick and durable.

Can be carried to the broken or stretched belt, set on the floor or a box and the lacing done in **THREE MINUTES** without removing belt from shaft.

Laces any width or thickness. Each hook will stand a pulling strain of 60 lbs., equal to 400 lbs. per inch belt.

Over 23,000 now in use.

THE CLIPPER GOES TO YOU FOR A FREE TRIAL MERELY FOR THE ASKING.

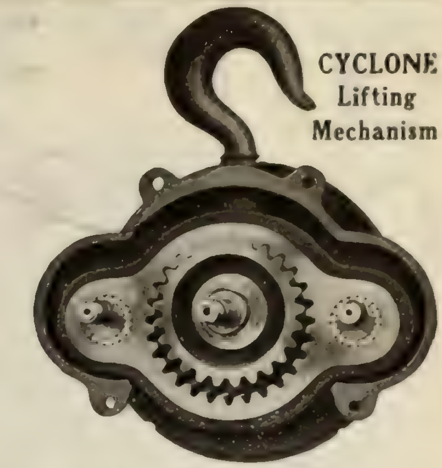
For sale by all leading supply houses in Canada.

Clipper Belt Lacer Co.

**1 Front Ave.,
Grand Rapids,
Mich.**

Safe and Smooth in Operation

Note how many teeth are always in contact in the patented gyrating reducing gear of the



CYCLONE
Lifting
Mechanism

Chisholm-Moore "CYCLONE" High-Speed Chain Hoist

Instead of one or two teeth bearing the strain and friction of the load, as in ordinary hoists, in the CYCLONE at least 5 teeth, always in contact, share and distribute the weight. As a natural result, CYCLONE Hoists outwear all others.

Chisholm-Moore Hoisting Equipment

including "Cyclone" Chain Hoists, "Matchless" Trolleys and Hand Travelling Cranes, is made to suit every purpose, in sizes from ½ to 40 tons capacity. We carry a complete stock of Hoists and Trolleys in Montreal and Toronto.

Write for catalogue to

LYMAN TUBE & SUPPLY CO. LIMITED

MONTREAL
323 St. James St.

TORONTO
33 Melinda St.

BOUND BROOK BUSHINGS

Run Without Oil or Grease

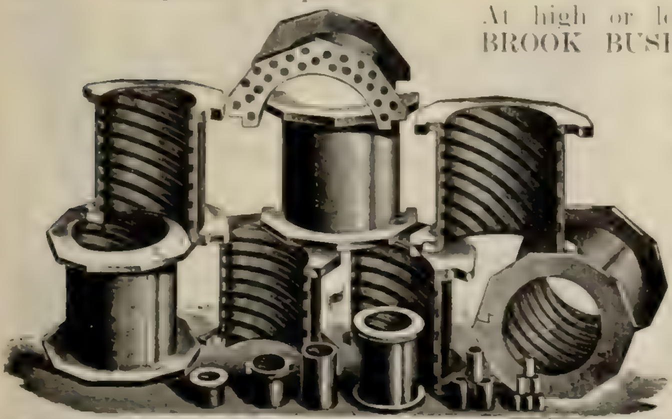
For many years these Graphite Bushings have been used with complete success for various classes of work. They are especially suitable for:

Bearings difficult to oil, or liable to neglect, such as those of Trolley Wheels, Wind Mills, Electric Fans, Chain Hoists, Pulley Blocks of all kinds, and inaccessible parts of automobiles and machinery generally.

Bearings where overflow or drip of oil is objectionable, as in textile mills.

Bearings where perfect and never-failing lubrication is essential, as in the machinery of battleships and aeroplanes.

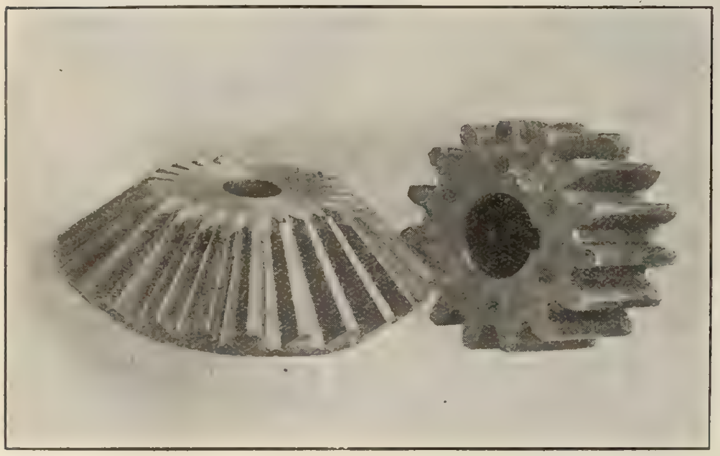
At high or low speeds, under light or heavy loads, BOUND BROOK BUSHINGS give lasting and complete satisfaction. Bushings, Bearings and Washers are made in sizes to meet the requirements of each purchaser. Write us for particulars and quotations on your needs.



LYMAN TUBE & SUPPLY CO. Limited

323 St. James St., MONTREAL
33 Melinda St., TORONTO

CUT GEARS



Rawhide is suitable for Bevel
as well as Spur Pinions

The only Gear Shop in Canada for Specialized Work in a large range of sizes.

Write for Quotations.

Hamilton Gear & Machine Co.

COR. CONCORD
& VAN HORNE

TORONTO

Promote Friction at the Bench

Not mental—physical friction. Do not ask a workman to turn out a good job with a poor file.

When a file reaches its "inefficient point" it reduces physical friction but creates mental friction.

A man working with a poor file knows that he is not doing his best, knows that he is taking twice, or three times, as long to do the job and will surely be irritated if he is called to account for the result.

It is cheaper to supply a new file than it is to have a workman irritated for half an hour using an old one.

Have your factory superintendent and shop foreman see that their men turn in their files for new ones the moment they reach their "inefficient point."

The Famous Five Are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(Made in Canada)

GLOBE
ARCADE
GT. WESTERN
AMERICAN
NICHOLSON FILE CO.

PORT HOPE
ONTARIO

To the Shell Manufacturer:

Use

Economic Shell Washer

If you wish to wash your shells quickly and cheaply; it will remove all grease, oil, lead, etc., and makes the shells easy to lacquer.

Made in Canada by

Canadian Economic Lubricant Company, Limited, Montreal

Belting Service Per Dollar

LEVIATHAN AND ANACONDA
ELEVATING
TRANSMITTING
CONVEYING
BELTING

Should be your deciding factor in choosing a belt.

We guarantee that

LEVIATHAN
AND
ANACONDA

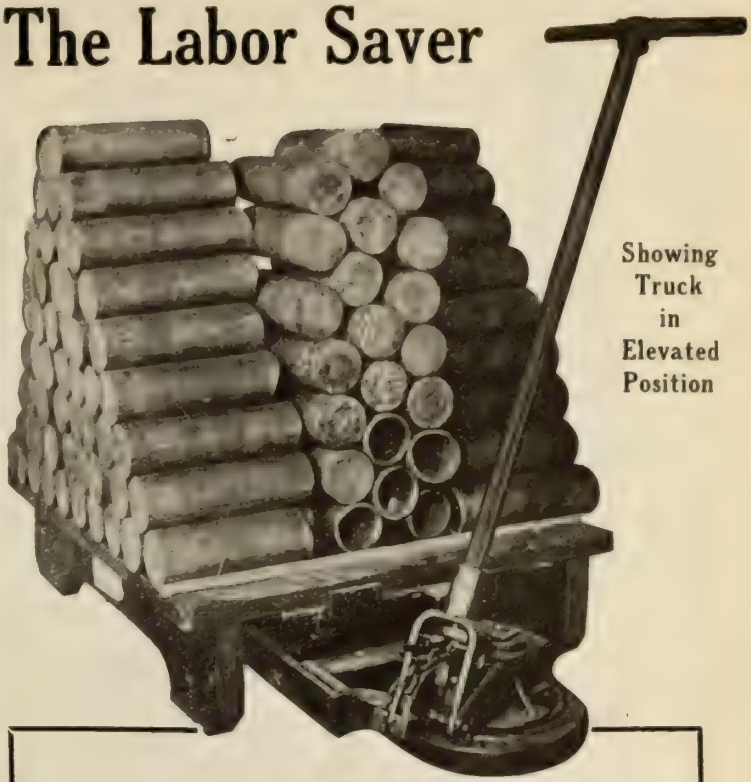
will deliver more service per dollar than any other type of belt made.

It will pay you to investigate. Write us now about your particular belt troubles.

MAIN BELTING COMPANY OF CANADA LIMITED
10½ St. Peter St., Montreal

WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE.

The Labor Saver



Showing Truck in Elevated Position

THIS

ELEVATING TRUCK

greatly reduces cost of producing

SHELLS

or any factory product where numerous operations are required.

All material is stacked on the platforms. To move material the truck is backed under the platform; the handle of the truck is then pushed down, keeping the button depressed, which raises the truck bed, and with it the loaded platform, at the same time automatically locking it in its raised position.

When hauled to the desired position the button is pressed and the handle raised, lowering the platform to the floor. The truck is then drawn from underneath and is ready to move another platform

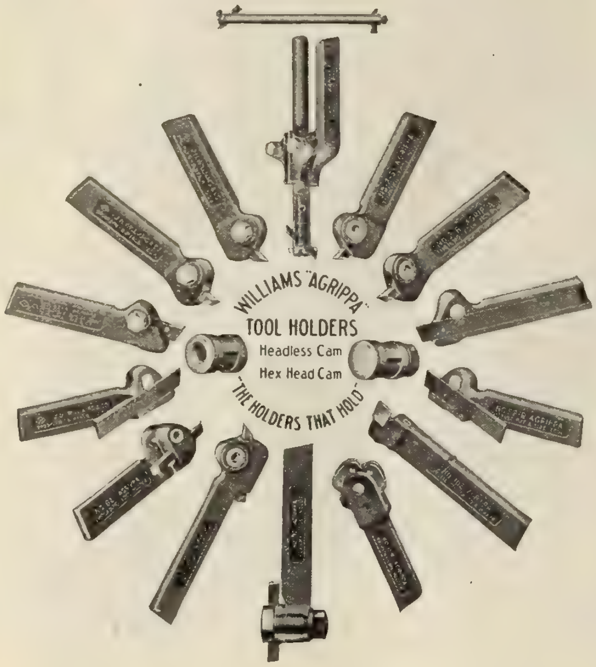
Raising and lowering of the truck can be operated with one hand— can be raised or lowered at any angle. Specially designed ball-bearings throughout.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises and** PRESSES WITH ATTACHMENTS FOR PRESSING IN BAND — fixtures especially adapted for the manufacture of 18-pr. Shrapnel Shells.

You will profit by getting in touch with us now for prices and full information.

THE CHAPMAN DOUBLE BALL BEARING CO. OF CANADA
LIMITED
339-351 Sorauren Ave. - TORONTO, CANADA
TRANSMISSION BALL BEARING CO., INC.
32 Wells Street, Buffalo. N.Y.

Would They?



Would successful manufacturers squander time and money introducing a new line of tool holders for the dealers and consumers who market and use their older products if uncertain of superior mechanical design?

Unless convinced of increased future demand, would the competition for the small volume of tool holder renewals warrant such effort?

Would you afterwards demand other Williams tools if the tool holders they endorsed failed to succeed?

Do stable companies risk their past reputation and their future prospects on untried or unproven innovations?

No, there is a reason, and their trial proves

Williams' "AGRIPPA" Tool Holders

"THE HOLDERS THAT HOLD"

excel and endure

We guarantee all "AGRIPPA" Tool Holders

J. H. WILLIAMS & CO.
45 Richards Street BROOKLYN, N.Y. CITY
The Wrench People

Western Office and Warehouse:
40 So. Clinton Street, CHICAGO, ILL.

Descriptive circulars upon request.

ACCURACY

Good screws must have good threads — in both fit and finish.

When nuts are added and drawn up tight, the contact is even. "**GALT**" Cap and Set Screws are always accurate.

Specialists in Cap and Set Screws.

THE
GALT MACHINE SCREW CO.,
LIMITED
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company, Limited, 49 Common St., Montreal, Que.

FRONT COVERS—

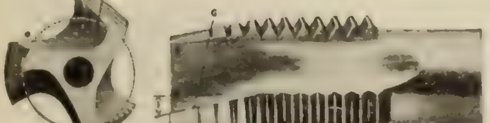
WE have two front covers open in 1916, one in November and one in December.

OVER one-half of our 1917 covers are sold.

ADVERTISERS wishing to run a spot-light message are invited to write us at once.

Canadian Machinery
143 University Ave., Toronto, Can.

Introducing The "GUN" TAP



"It Shears"

WHY IT IS CALLED "THE SHEAR CUTTING TAP."

The cutting edges at the point are ground at an angle to the axis (see illustration, F). This enables the Tap to cut with a shearing action and the angle deflects the chips, so that they curl out and **ahead** of the Tap and do not break up and collect in the flutes.

EASE OF CUTTING.

Note the hook on the cutting edge (G). This, combined with the shear cutting action, makes the "Gun" Tap the easiest cutting Tap on the market.

On especially tough jobs through layers of material of varying hardness it cuts hole after hole with perfect ease.

STRENGTH.

The flutes of the "Gun" Tap are less in number and shallower then those of the ordinary Tap therefore, in itself is almost as strong as solid stock. Couple with this its easy-cutting qualities and you have a Tap that practically never breaks.

PRODUCTION.

In number of holes tapped in a given time the "Gun" Tap excels, not only because of the easy cutting qualities and strength already described, but because there is no lost time due to removing broken Taps or frequently backing out the Tap from deep holes to clean collected chips from the flutes.

There will be a tremendous saving in your tapping costs if you let the "Gun" Tap do your work.

Send to-day for the illustrated bulletin which goes into details regarding this remarkable Tap.

Three Fluted Tap

Exactly the way chips are produced

Wells Brothers Company of Canada, Limited

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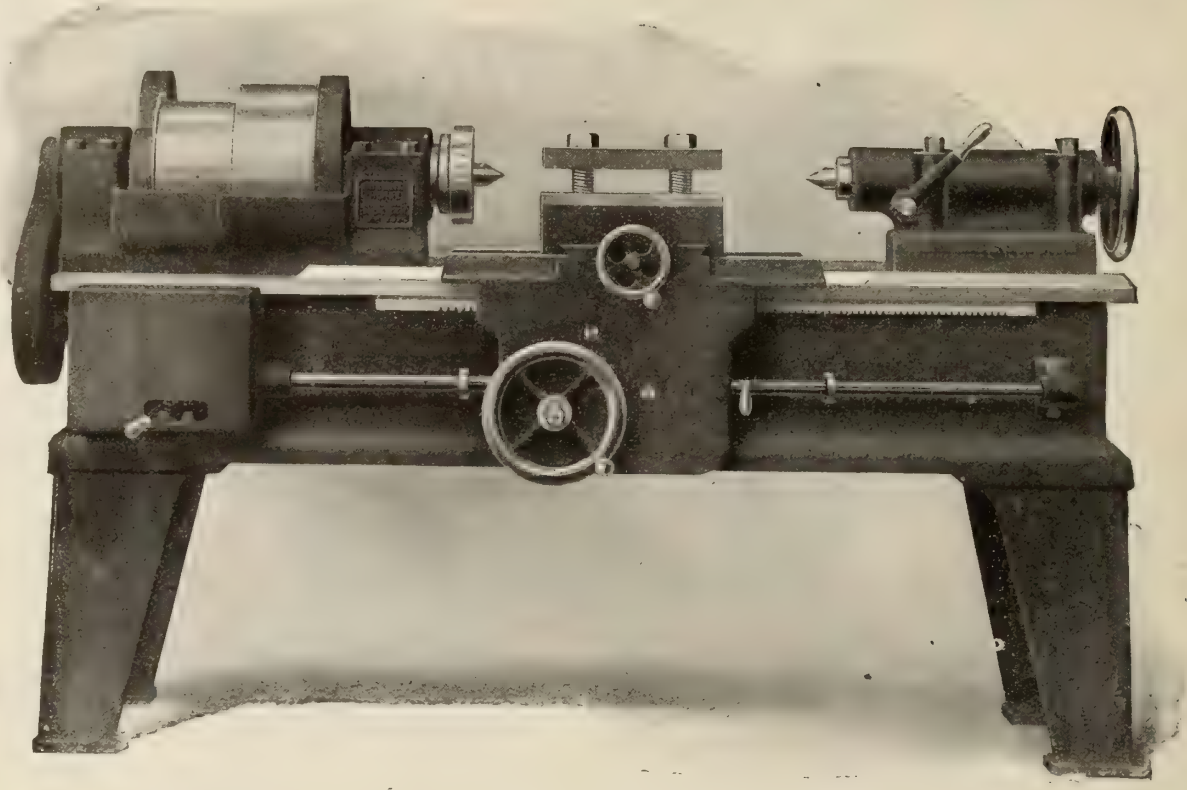

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Mechanical Applications of Oxy-Acetylene Welding Apparatus

Staff Article

In few fields of industrial effort have the applications of scientific research had so much influence on the welfare of mankind as in the utilization of high temperatures. Methods of obtaining, controlling and applying intense heat are in a state of constant evolution, and in variety of applications, economies effected, and future possibilites as a heat generator oxy-acetylene gas already occupies an important position in the industrial world.

FEW industrial processes have undergone such rapid and extensive development, or become so indissolubly linked to existing industries by virtue of their merits as the use of oxy-acetylene gas in connection with iron, steel, and metal manufacture. In the short space of ten years the applications of this process have increased enormously, and with the development of new apparatus and the improvement of methods as indicated by experience, the results to be obtained in many lines of manufacture are such that a forced return to pre-oxy-acetylene days would be little short of an industrial calamity.

The rapidity with which scientific inventions are adapted to the requirements of industry is well indicated by the work of the Davis-Bournonville Co., which in 1906 began to develop the patent rights for the independent positive-pressure type of welding torch, the basic principles of which have been amply justified during the past decade. During the early years of development much of the work was confined to repair and reclamation, but although originally more or less of a salvage process, the application of oxy-acetylene welding and cutting to straight manufacturing operations soon began to receive attention until as the result of proven merit, it occupies a recognized place in the equipment of certain industries.

Five distinct types of machines have been envolved by the firm referred to, special apparatus to meet particular requirements being produced when necessary. The machines include the Oxygraph illustrated in Fig. 1. This apparatus consists of a pantograph frame on the tracing end of which is mounted a tracing roller propelled by a small electric motor. Mounted on the frame is a special cutting torch, which can thus be moved over the surface of the work as desired and any shape, regular or irregular can be cut out of the metal, the cut being started and stopped at any desired point without cutting through the side of the work. The frame cuts very rapidly, an average travel of 12 in. per min., being easily maintained. As shown in the illustration, the self propelled tracing wheel is guided along the outline of any desired shape so that exact duplicates can be produced at any time the amount of reduction between the drawing and the work being one-half.

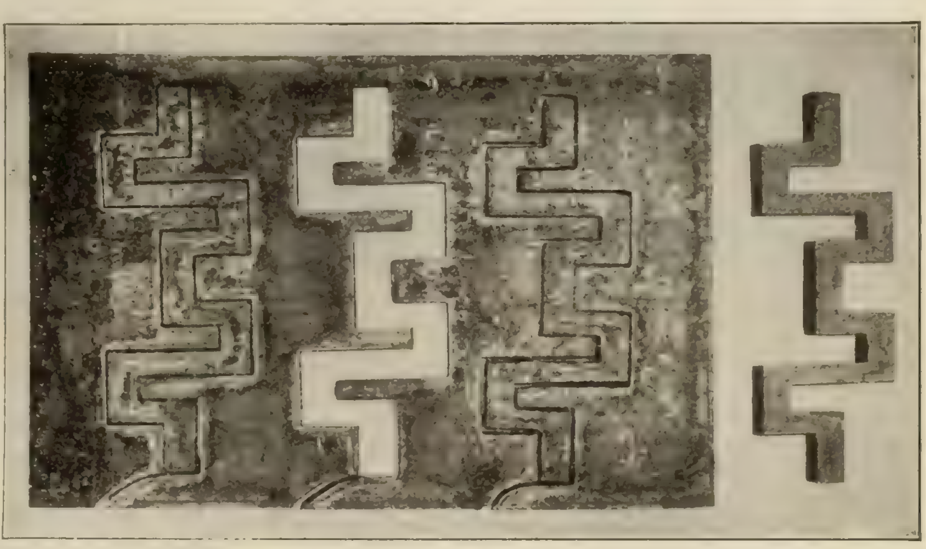


FIG. 2. CRANKSHAFT BLANKS CUT FROM THE COLD SLAB BY THE OXYGRAPH APPARATUS.

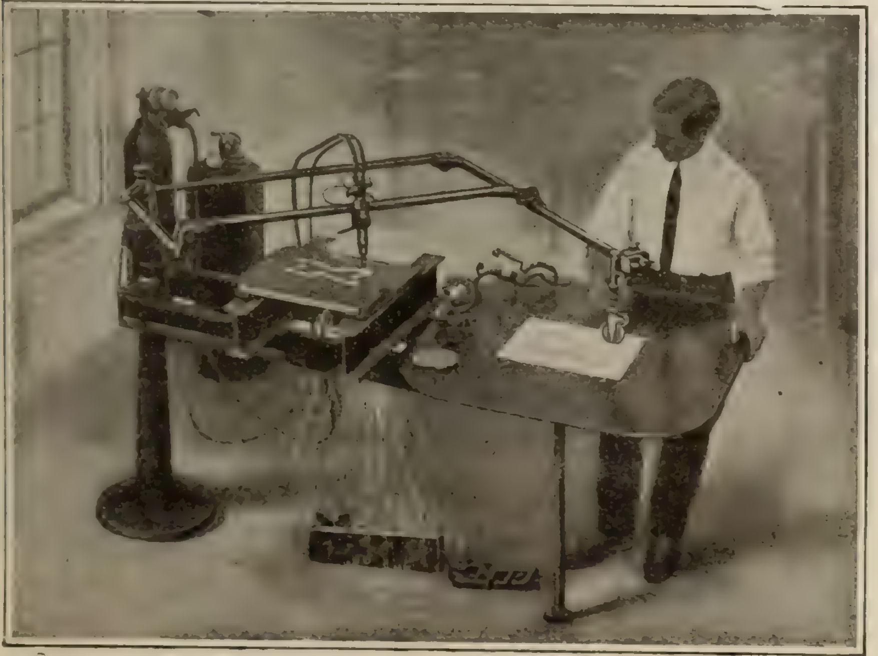


FIG. 1. CUTTING OUT BLANKING DIES WITH THE OXYGRAPH APPARATUS.

That such a machine has valuable manufacturing applications can be seen from Fig. 2, where crank shafts in the rough are cut from the solid rolled slab. Such cutting, however, is not confined to moderate weights of metal as a cutting torch of the type shown has been successfully used in trimming slabs of armor plate to shape, cutting a slice 1 in. thick or more from the end of a block 16 in. deep, at the rate of 1 sq. in. of section cut per minute.

Kindred mechanical devices include the Holograph for cutting holes in the web of rails or in structural iron; the Radiagraph for the purpose of cutting plates or sheets into round oval or irregular forms; the Railagraph, for cutting the rails of steam or electric railways, or all kinds of forms in structural work.

Automatic welding machines have likewise been developed, such as tube welding machines for the welding of commercial steel tube and barrel welding machines which enable comparatively unskilled labor to produce entirely reliable work. The barrel welding machine is illustrated in Figs. 3 and 4, and consists of a work holder and a torch holder, the former consisting of a short column which carries two radial arms on which the barrel bodies are supported in a horizontal position, the arms swinging round in a horizontal plane so that each body is brought into line with the torch frame in turn.

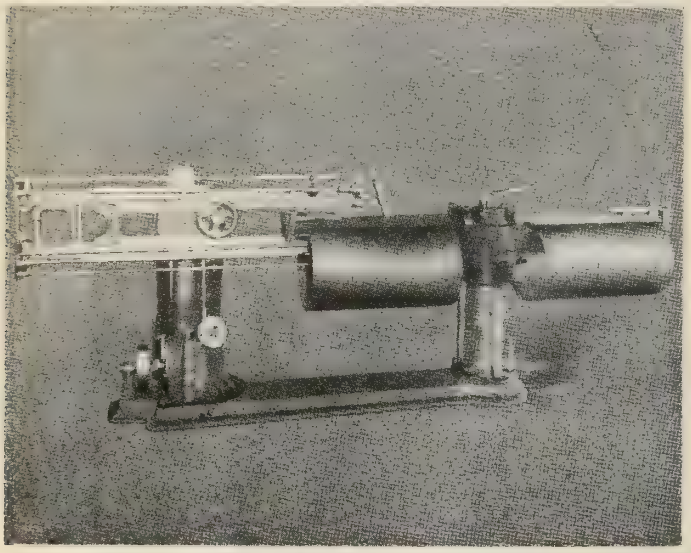


FIG. 3. MACHINE FOR WELDING BARREL BODIES, USING OXY-ACETYLENE FLAME ON BOTH SIDES OF JOINT.

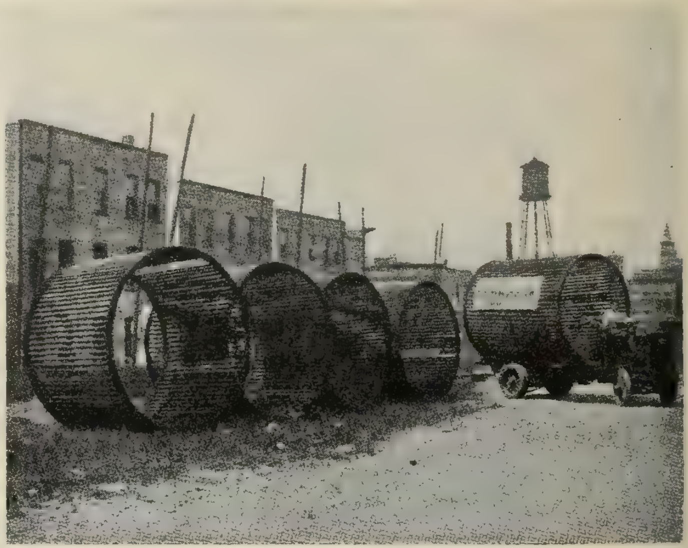


FIG. 6. COMPLETED HEATER UNITS WITH WELDED JOINTS THROUGHOUT.

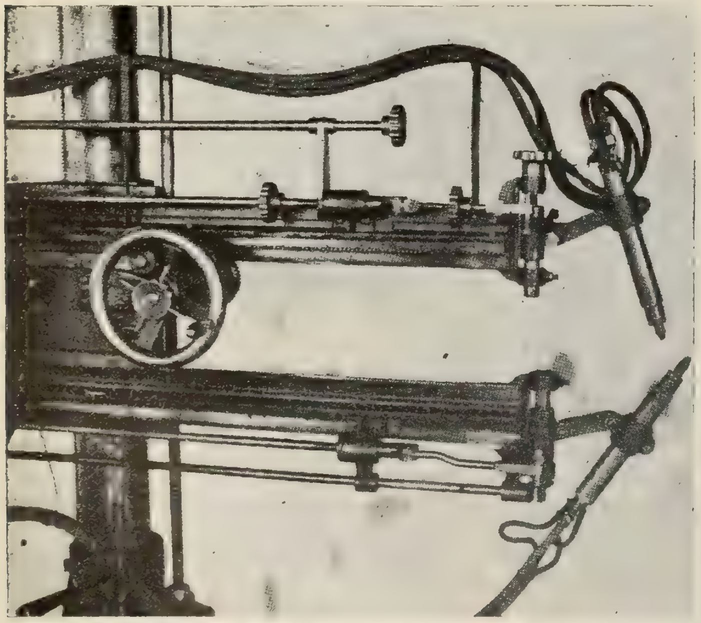


FIG. 4. DETAIL VIEW OF TORCH CARRYING APPARATUS ON BARREL-WELDING MACHINE.

The torch frame, Fig. 4, consists of a U-shaped member supported horizontally and working in slides on the side of a column, so placed that one arm of the frame passes inside the barrel body while the other one is on the outside, the flames from the two torches rapidly bringing the metal to a welding temperature. Variable power feed is provided for the torch frame, changes in speed being necessary to suit a variety of weights of sheet metal. When the body on one arm has been welded, the double arm is swung around a half circle when welding proceeds on the second body, the first body being removed and a fresh one placed in position. In this way continuous operation is assured. A typical barrel body will be a sheet of steel 3-32nd in. thick bent to form a hollow cylinder. The edges are previously prepared by being upsea so that when brought together there will be an excess of metal on both sides. This excess, while slight is necessary to enable the machine to work without the use of welding rods and solves what promised to be a difficult problem. These machines are now in actual use accomplishing efficient welding at a speed of from 12 to 20 in. per minute, using two standard water-cooled torches.

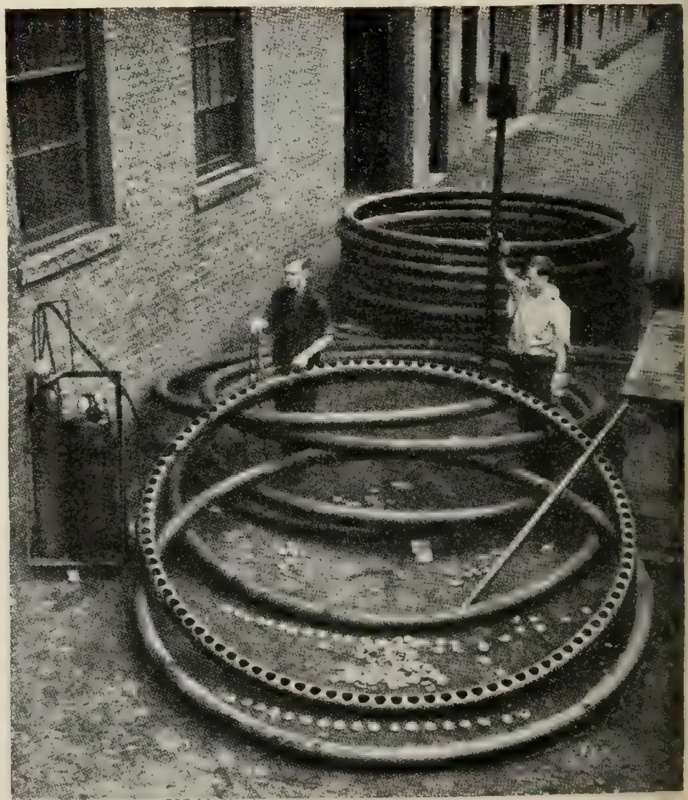


FIG. 5. USING CIRCULAR CUTTING TORCH FOR MAKING TUBE HOLES IN HEADER.

A considerable departure from the ordinary run of welding work is shown in Figs. 5 and 6, the job here shown being large steam heater coils, a number of which were constructed by the company for use in oil refining. These heaters were about 10 ft. in diameter by 7 ft. high, and consisted of a 4-in. heater top and bottom connected by numerous 2-in. tubes. The holes in the 4-in. headers were all cut with an oxy-acetylene circular cutting torch, the total number of holes being 1,488. Fig. 5 shows the cutting of the holes in the headers, and Fig. 6 shows the complete heaters.

The assembling of the heaters was done by suspending the upper head from a crane when the 2-in. pipes were placed in position and several of them tacked to both headers with the welding torch to maintain position and alignment. The welding of the pipes to the bottom header was first completed after which the coil was inverted and the opposite ends of the pipes welded to the other header.

The time and gas consumed were as follows: Cutting time, each 2-in. hole, 1 min.; oxygen for ditto, 1.25 cu. ft.; acetylene for ditto, 2 cu. ft.; welding time, each 2-in. pipe, 10 min.; oxygen for ditto, 6.2 cu. ft.; acetylene for ditto, 5.4 cu. ft. The circular cutting torch used oxygen under 20 pounds pressure and the weighing torch used acetylene under 6 pounds and oxygen under 14 pounds pressure per sq. in.

FOUNDRYMEN'S CONVENTION AND EXHIBITION

CONCURRENT with the Annual Meeting of the American Foundrymen's Association and its affiliated Exhibition at Cleveland, Ohio, from September 11 to 15, the American Institute of Metals will hold its annual sessions at the same time and place. The following tentative business programme has been arranged by the latter:—

"Reclamation of Metallics from the By-products of Foundry and Manufacturing Plants," by A. F. Taggart, Hammond Laboratory, Yale University, New Haven, Conn.

"Method of Selling Non-ferrous Scrap, as Pursued by a Large Producer," by J. M. Bateman, Western Electric Co., Cleveland, Ohio.

"The Results of Joint Work of Casting and Testing the 88-10-2 Alloy by Five Foundries. Report of the Use of the Deoxidizers of Bronzes, and eRport on the Aspects of Bronze Failures," by various experts affiliated with the U.S. Bureau of Standards, Washington, D.C.

"Copper-Aluminum-Iron Alloys." By W. M. Corse, Tatanium Alloy Mfg. Co., Co., Niagara Falls, N.Y.

"Tests on Rolled Brass Sheets Taken in the Direction of Rolling and at Right Angles to These Directions." By W. B. Price and P. H. Davidson, Scovill Mfg. Co., Waterbury, Conn.

"The Application of Oxy-Acetylene Welding Process in the Repair of Defective Non-Ferrous Castings." By S. W. Miller, Rochester Welding Co., Rochester, N.Y.

"Continuation of Discussion in Connection With Defective Bronze Castings In Use By the Board of Water Supply of New York City." By A. D. Flinn, Board of Water Supply, New York City.

"Evolution of Die Casting Process." By Chas. Pack, Doehler Die Casting Co., Brooklyn, N.Y.

"Disclosure of Blow Holes by Means of X-Ray Apparatus." To be reported by testing engineers employed in laboratory D of the General Electric Co., Schenectady, N.Y.

"Aluminum Castings and Forgings." By P. E. McKinney, U.S. Navy Yard, Washington, D.C.

"Annealing Properties of Copper." By G. W. Ceasor and G. C. Corner, Hammond Laboratory, Yale University, New Haven, Ct.

"Metallography as Applied to Non-Ferrous Metals." By W. W. Arthur, Frankford Arsenal, Frankford, Philadelphia.

"Heat Treatment of German Silver." By. C. C. Holder, American Optical Co.

S. D. Sleeth of the Westinghouse Air Brake Co., Wilmerdene, Pa., and Mr. Barnes of the Fort Wayne Electric Co., Ft. Wayne, Ind., will present papers at the session to be devoted exclusively to the discussion of brass foundry practice and papers also will be read by F. L. Antisell, Rariton Copper Works, Perth Amboy, N.J., and by Mr. Bragg, Ohio Brass Co., Mansfield, O.

Entertainment Features

These will consist of a trip to the ball park, Tuesday afternoon Sept. 12, to witness the game between Cleveland and Detroit; a trip to Euclid Beach Park, Tuesday evening, Sept. 12 in special cars where tickets to all concessions will be furnished; an inspection tour to the Cleveland Furnace Co. plant, Wednesday afternoon, Sept. 13, and a theatre party at Keith's Hippodrome, the evening of Wednesday, September 13. The ladies will be tendered a luncheon at the Hotel Statler, and also will be given an automobile ride. The annual banquet will be held Thursday evening at the Hotel Statler, and Irving Bacheller, the noted humorist, will be one of the speakers. Plant visitation will be limited to Thursday and Friday, Sept. 14, and 15, arrangements having been made for the inspection of the plants of the Ferro Machine & Foundry Co., the Allyne-Ryan Foundry Co., and the Westinghouse Electric & Mfg. Co.

PLACE AND PURPOSE OF INSPECTION DEPARTMENT

IN the majority of factories, says F. B. Corey, in the Dodge Idea, the inspection department is under the authority of the factory manager or superintendent, in other words, that branch of the organization which builds the apparatus, and decides whether that apparatus is properly built. It is unnecessary to point out the inherent weakness of this arrangement.

Liability to Biased Judgment

The judgment of the inspector may continually be biased by the fact that he is a part of factory orginazation and is responsible to the factory management. It is, therefore, evident that the highest standards of quality and workmanship can hardly be maintained continuously if the members of the inspection department are in any degree subject to the control of a factory superintendent or any other executive who is directly responsible for the factory production and has no connection with the engineering or sales organizations. This statement should not be understood as expressing a doubt in regard to the loyalty or honesty of purpose of any factory official. We must recognize the fact, however, that defects, due to drawings or specifications, are often disregarded by inspectors if they know that no criticism can be attached to them by their superiors on account of the latter's approval of the apparatus, especially when a rejection would prevent meeting a promised date of delivery.

In a smaller number of shops, the inspection department is under the control of the chief engineer. With this arrangement, the judgment of the inspector is likely to be biased by the fact that any defects in the finished product, due to improper specification of materials or any failure of the apparatus to function properly, might be considered as reflecting on the abilities of the engineering department. The inspector will often hesitate to reject a device if he thinks that the objectionable feature may be attributable to his superior officer, as it would imply a difference of opinion that might reflect discredit on the inspector's judgment. Moreover, there is often a tendency among young and subordinate engineers to refuse to recognize slight defects in a design for which they are personally responsible, and to severely criticize an inspector who points out what he considers a defect in such apparatus. Therefore, it will be seen that in most cases the executive head of the inspection department should be as free from control of the engineering department as from the manufacturing department.

Inspection Head Responsibility

The only logical plan of organization is that in which the head of the inspection department, whatever may be his title, is responsible directly to the general manager of the company or the chief executive in control of the factory output. He should report to the same officer as the works manager or the chief engineer. At the same time, he must be in full sympathy with all other departments. He must command the respect of the other department heads and be ready to co-operate with them to further the interests of his company.

The executive head should exercise a most thorough control over all the activities of the department. To that end, there should be no recognized paths of communication betwen this department and the heads of the other departments, except through his office. The strict enforcement of this rule is essential to the efficient working of the department and to the avoidance of misunderstandings and duplication of effort. This requirement, if rightly understood, will not be interpreted as limiting the useful activity of any member of the department, but will be recognized as a necessary feature in the conduct of inter-department business.

Chief Inspector's Qualifications

The executive head of the inspection department should be thoroughly familiar with general engineering practice and standards. He should be well informed on all shop methods, including foundry and machine shop practice, and be thoroughly versed in the use of testing machines and gauges. He should, if possible, be conversant with chemical laboratory methods and apparatus, so as to be able to direct intelligently that part of his organization. Moreover, he should be familiar with the uses of the factory product and the conditions under which it is to operate after it has passed beyond the control of the factory. He must have absolute control of every inspector in the plant, and be held responsible for the quality of material and workmanship of all that the plant produces.

Customers' Complaints

In the majority of manufacturing corporations, all dealings with the customers are conducted by the sales department exclusively, which is the logical arrangement. For this reason, complaints on the part of the customer are made directly to the sales department and usually reach the shop through a more or less tortuous channel. There is sometimes a tendency on the part of the sales department to assume that all of these complaints are justified, to criticize the shop for turning out an unsatisfactory product, and especially to blame the inspection department for failure to prevent the issuance of the material in question.

In justice to all concerned, including the sales department, all such complaints should be referred to the executive head of the inspection department for a personal investigation and report, and action on the part of the sales department, except so far as it relates to the replacement of material urgently needed, should be deferred until the report is in hand. This report may entirely change the attitude of the customer with relation to the alleged defective material, as it may clearly show that its failure to meet his expectations was due to no fault of the manufacturer or of the apparatus involved.

The trouble may have been due to injury in shipment, rough handling after receipt, failure to install or to apply it properly, lack of proper maintenance on the part of the customer or his employees, or to a misconception of the capacity or function of the apparatus itself. Any errors on the part of the factory or inspection department must be freely acknowledged and any steps to prevent their recurrence should be fully explained. An unbiased report, based on all the available facts, rendered by the head of the inspection department to the head of the sales department, may be invaluable to the salesman in his negotiations with the customer.

The inspection department exists for the mutual protection of the manufacturer and the customer. The salesman should be informed in regard to the methods and practice of the inspection department, as this knowledge may be of great service in promoting friendly relations with a prospective or actual customer. The customer is often much interested in the means employed to ensure accuracy in the manufacture of the apparatus he proposes to use. The head of the inspection department should, therefore, make it his duty to advise the sales department of any change in procedure or equipment that might be of interest to that department in its dealings.

The relations of the inspection department to the engineering department are most important, especially in the influence that may be exerted on the designs for new apparatus and the improvement of the old. In many places, new drawings, when completed and before their final approval, are submitted to a committee (variously known as "mechanical design committee," "limit committee," "standard committee," etc.), to determine if the limits set by the designers are such as can be met commercially in the factory, and to decide if any changes are desirable on account of methods to be used in the foundry, machine shop or elsewhere.

The head of the inspection department should be one of the most important members of this committee; in some instances he is chairman. His principal duty in connection with this committee is to advise if the dimensions, tolerances and limits called for on the drawings are satisfactory for the various fits, and if the quality of finish called for will be satisfactory to the inspection department. Thus the work of the inspection department should begin even before the designs are approved for manufacture.

Inspection Department Organization

The internal organization of the inspection department and the means and methods best adapted to carry out the details of its work are matters that will depend to a great extent on the management and operation of the larger manufacturing organization of which it forms a part. A plan of organization that may be highly efficient in one factory may be deficient in meeting the needs of another shop producing a different product or producing a similar product by widely different methods. The organization of inspectors that is perfectly suited to a factory having a large output of a few well standardized articles would be wholly unable to cope with the situation arising in a smaller factory producing a great variety of articles, but making each in comparatively small number. It is obviously absurd to try to apply big-shop methods to a small shop, and the converse application, while far more usual, is no more logical. Such matters must, therefore, be subjects of careful investigation and study in each individual plant.

CONTRACTION CAVITIES IN SPUR WHEEL BLANKS

THE following query appearing in a British contemporary is of more or less interest to readers of our journal, some of whom may have been up against a like trouble; on the other hand, there may be those who are prepared to suggest a solution.

I am having trouble with certain Government work which is really very simple from a moulding point of view, namely, spur-wheel blanks. The teeth of these are cut, of course, after they are turned and I find in many of them liquid contraction or gas holes at the rim where the arms join. (These are mostly of H section.) To get rid of contraction I introduced "chills," at the corners of the arms, and found that for a while I quite got over the trouble at that point, although it seemed then to move midway between the arms.

The larger wheels (some exceed 1 ton) are moulded in the floor and the arms are cored out in the usual way. The mould is made of dry sand and is dried in the floor; the smaller ones are taken to the oven and dried, cast from the hub, with four risers on the rims. The wheels generally have six arms. A feeding rod is placed in the hub, and also in the risers. The metal we use taps out at:—Carbon, 3.40; silicon, 1.9 to 2.5; sulphur, 0.6; manganese, 0.6 to 0.8; phosphorus, 0.80 to 1.2.

I have tried green sand also, but the percentage of wasters is about the same. I would be pleased to have a suggestion for a solution of the difficulty.

PRODUCTION METHODS AND DEVICES

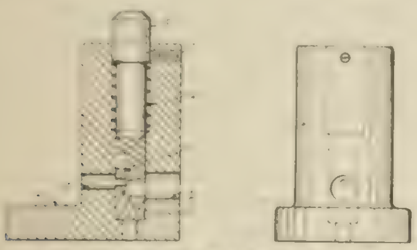
A Department for the Interchange and Distribution of Shop and Office Data
and Ideas Evolved from Actual Practical Application and Experience

FIXTURE FOR SHEARING PINS.

By F. M.

HAVING a large number of pins to cut-off and nothing suitable for doing the job, the fixture shown in the accompanying illustration was devised. It is practically a shearing punch and die in a suitable holder which can readily be adapted for various sizes of wire. This tool consists of the base A drilled out at C and D to allow the wire to pass through; the bushing B is to guide the wire and is of steel hardened to form a die; the long plunger E is the punch, and the die and punch are both flatted at F where they come in contact for shearing.

In operation, the plunger E is struck with a hammer which shears the wire off against the die when the plunger is returned to its original position by spring G. The plunger is prevented from springing out of the hole by screw H. This makes a very rapid method of cutting off pins and does not wear the hands as would a pair of heavy shears.



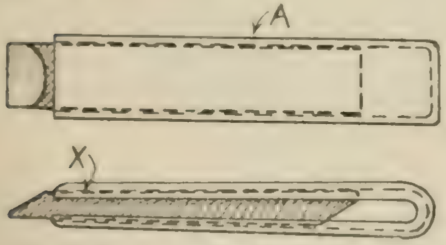
FIXTURE FOR SHEARING PINS

* * *

HOLDER WHICH SAVES ERASERS.

By H. Scriber.

A HOLDER which proves very economical in the use of erasers especially for drawing is shown in the accompanying illustration. The idea of this holder is to permit the eraser to be cut in half lengthwise, then taking one half of the eraser, place it in the sheet metal holder A, which is steel, spring tempered, thus binding eraser at X. The holder securely grips the rubber at the end. The eraser being narrower and stiffer than an ordinary rubber without the holder, it permits of more pressure being placed on the eraser, and also allows the user to better see the lines being erased.



HOLDER WHICH SAVES ERASERS.

* * *

CHART FOR FINDING WEIGHT OF CAST IRON PIPE.

By N. G. Near.

THE accompanying chart will be found useful for determining the weight of cast iron pipe or cast iron columns. It is not necessary to do any computing at all. For example, what would be the weight of a cast iron pipe 30 ft. long, with a dimension D of 24 inches, and a thickness of one inch? The dotted lines drawn across the chart show how it is done. First connect the 30 (column A) with the 1 (column D) and locate the intersection with column B. From this point of intersection run straight to the 24 (column E) and the result is found in column C. The weight is practically 7,000 pounds.

It will be noted that the range of the chart is very wide and will give the weight of a total length of all ordinary sizes up to 1000 feet. For rough estimating work this chart will be found hard to equal.

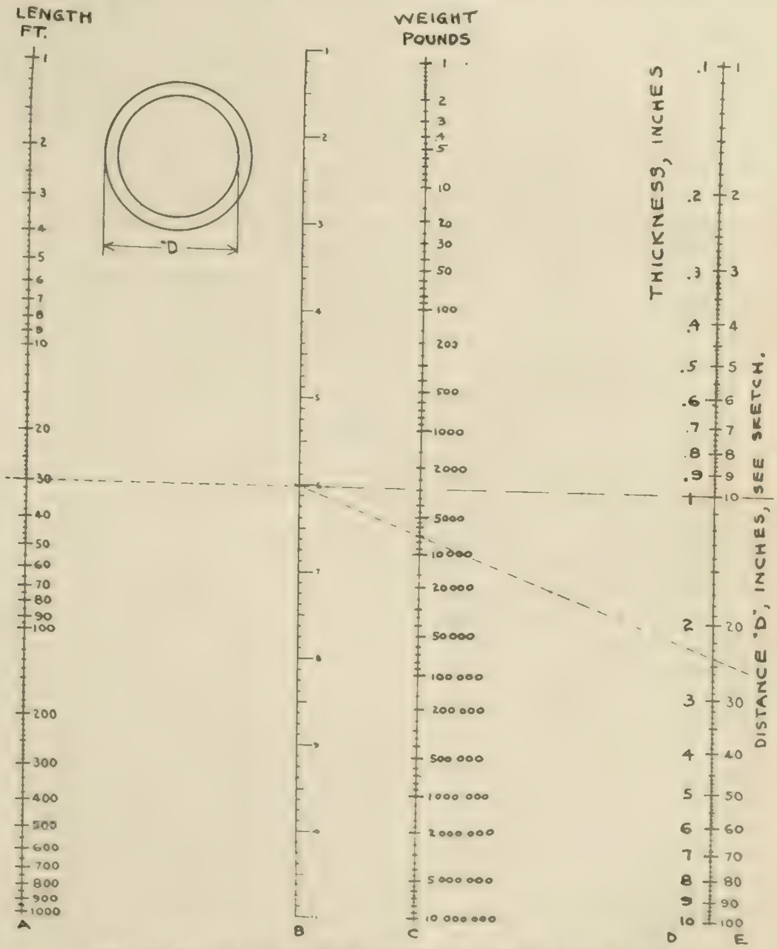


CHART FOR FINDING WEIGHT OF CAST IRON PIPE

* * *

MOLDING HAND GRENADES

By Allan Hill.

THE hand grenades which are being used to an enormous extent in the present war are of various types, but are generally round or oval in outline, and are made of various materials. The most destructive have been proved to be those made of cast iron, and molding of which is here described. The weight varies in different designs, but each design must be kept to its given weight, so the best method of molding is by machines, which keeps them to a perfect shape as well as a correct weight, and is more sure than ordinary pattern-plate molding on the floor.

Large Outputs at Low Cost.

The making of these grenades involves large outputs at low costs, and, as large numbers of foundries are engaged in their manufacture competition is very keen. The biggest proposition is in obtaining the cores. They are not difficult to make, but if ordinary methods are used a large amount of labour is required, for one molder will use more in a day than one core-maker can make in two days.

The sand must be such as to make a solid core that can be handled without damage, allow free venting, leave a smooth skin on the inside without having to resort to the use of blacking, and also enable the core to be removed from the casting whilst in the tumblers. Oil-sand mixed in the right proportions will be found to be the most satisfactory, as it will fulfil all the conditions mentioned, the following being the mixture used:— 1 barrow of dry rock sand, ¼ barrow of sharp sand, 1 quart of boiled linseed oil. These must be thoroughly mixed. The mixture being given its working degree of dampness by the addition of water. The core-boxes also must be kept well oiled with paraffin, and kept warm; if this is not done the sand will adhere to the box.

Molding Methods Employed.

Various methods of molding have been adopted, each establishment using its available appliances, converting them for the purpose and no doubt following its own practice as far as possible. The following are the methods used in a large Lancashire foundry, where quantities of two types are being turned out, one a round one, the other an oval one which goes by the name of "Mill's" grenade.

For the round grenades two series of machines are used, Farwell hand presses and stripping-plate machines made by the Adaptable Molding Machine Co., on which the molds are hand-rammed. In both cases the patterns are mounted so that cope and drag are rammed from the same face, using one pin and one pinhole in both cope and drag. On the "Farwells" a 12 in. by 12 in. snap flask is used, four castings being made in one flask. No bands are used for casting, a heavy flat weight with an opening for the runner being placed on the top of the mold.

On the "Adaptable" machines, cast-iron boxes are used, with eight castings in one mold, the boxes being 18 in. by 12 in. These are shown in Fig. 2. On the pattern face are thin pieces of wood leading from the centre of the core print to the outside of the mold, being ventways to carry the air and oil gases away. On all molds for this class of grenade, a small vent wire is pushed through the top to conduct the air from the mold, so the castings may be run very quickly, the ingate being placed on the side of the casting. The facing sand used is a mixture of equal parts of best red, yellow brass, and old floor sand, with the addition of 1-20th of the whole bulk of coal dust, the whole being well ground and mixed before using. This does away with dusting the molds with facing, the sand coming away from the castings quite easily and leaving a very smooth skin.

Core Feature.

The cores are shaped like a dumb-bell, one core thus being used for two castings. In the centre of the print is a small raised piece which coincides with one on the pattern, this being done so that the core can be set by simply dropping it into the print, the raised piece preventing it from being placed further into one casting than the other (which would alter the weight), besides doing away with the use of templates for setting. The ventway before mentioned also leads away from this part of the core.

Each core-box is made in three portions, two being the box proper, the other a dummy part. They are made as follows:—The bottom half is rammed with sand and the core-iron and vent-wire placed in position, then the dummy part placed in position and also rammed up. After taking away the dummy, the core is left, the core being given its correct shape by putting on the other part and giving it a few smart taps with a wooden mallet. The vent-wire is now withdrawn, the core released from the box, and the hole made by the wire made up, as a passage for the escape of gas is formed by the small stud on which the wire rests whilst the core is being rammed. This method gives a core that is perfect in size and shape, and does away with making the core in two halves and pasting them together. By using the first method, cores could be made at about twice the rate of the pasting method.

Oval Grenades.

For the oval grenade, the "Adaptable" machines are used and also the same type of boxes, but with 12 castings in one box. These grenades have 12 grooves running from top to bottom, and also three round the body, the latter being formed in the machine shop, so the castings have to be made on their ends, one core for each, which is set by template. To get gas away from core, a wire is pushed down every print, also underneath the boxes. A vent is made through the top of the mold to conduct away air in the mold.

The core-box from which the cores are made is somewhat of a novelty. It is in two halves, hinged on one side, and, when closed, is secured by a catch. Into one half a hole is drilled in which is placed a spring strong enough to force the box open when the catch is released. To use the box it is closed and the sand rammed through the print until the box is filled, a core wire inserted and also vented. After tapping very lightly the core-box is turned over and the catch released, allowing the box to spring open, leaving the core intact. Before using this spring the core has to be turned out on the hand, for if the box be opened on the bench the core is generally knocked over or remains fast in one half. The sands, both facing and core, are the same as for the round grenades.

The iron for these grenades must be close, but also easy to machine; and as they are very thin in section suitable irons must be used that will not chill on the edges which have to be machined. The following irons are used in the particular case under consideration:—1½ cwt. Staveley No. 3; 1½ cwt. Glengarnock No. 3; 2 cwt. Thorncliff No. 3; 6 cwt. good machinery scrap. As no complaints have been received in connection with this, it can be taken as being as satisfactory as any other for this class of casting generally.—Foundry Trade Journal.

* * *

SCRAPPING VS. REPAIRING

AN English author has characterized the American manufacturer as a man 'who scraps instead of repairs,'' says a writer in the Woodworker. Whether this is considered as a criticism or a compliment depends upon the point of view. With more expensive labor, the American manufacturer has been compelled to look for enough efficiency in his machinery to overcome this handicap and to meet competition. It has often been cheaper for him to scrap an old machine and install a late model that would increase his production. In fact, some of the most successful manufacturers have not hesitated to scrap comparatively new machines, when investigation showed that a newer type would materially increase production.

The man who holds the coin so close to his eye that it eclipses everything else, is not exactly a stranger, though rapidly dropping out of sight. The successful man is the one who holds the coin at a distance that allows a proper perspective, and hastens to spend it when his judgment assures him that the spending is really an investment.

* * *

It oftentimes requires courage and patience to wait for opportunity, but it is worth not only working but waiting for, and initiative and good practical ideas, combined with energy and enthusiasm, are sure, sooner or later, to bring their just reward.

* * *

There are 73 buildings, large and small, used for exhibit purposes at the Canadian National.

CONTEMPORARY WAR ARTICLES

Embracing Information and Data Drawn from a Variety of Sources Relative to and Arising from the Prosecution of this Many-Sided European War

FORGING DEPARTMENT OF A BRITISH NATIONAL SHELL PLANT

IN previous issues, through the courtesy of our British contemporaries, The Engineer and Engineering, we were able to place before our readers more or less extended and illustrated descriptions of typical munitions manufacturing plants, erected and equipped by the Imperial Government for the purpose of shell forging and machining These establishments numerous and on a comprehensive scale as regards capacity—have been built by Government money, although designed, equipped and operated each by a private company which has achieved distinction in some specific line of manufactured product. Such plants are supplementary to the Government arsenals and old-established private munitions works. They receive steel in the form of billets and forge and machine shells therefrom. They are not concerned with the loading of the shells nor with the production of the fuses, although making the steel nose pieces, which are screwed into the ends of the shells. Another of the plants is described in a general way in recent issues of The Engineer, which says that nine-tenths of the battle in the manufacture of modern artillery projectiles is the production of the steel shells. From the first of these articles are taken the following notes:

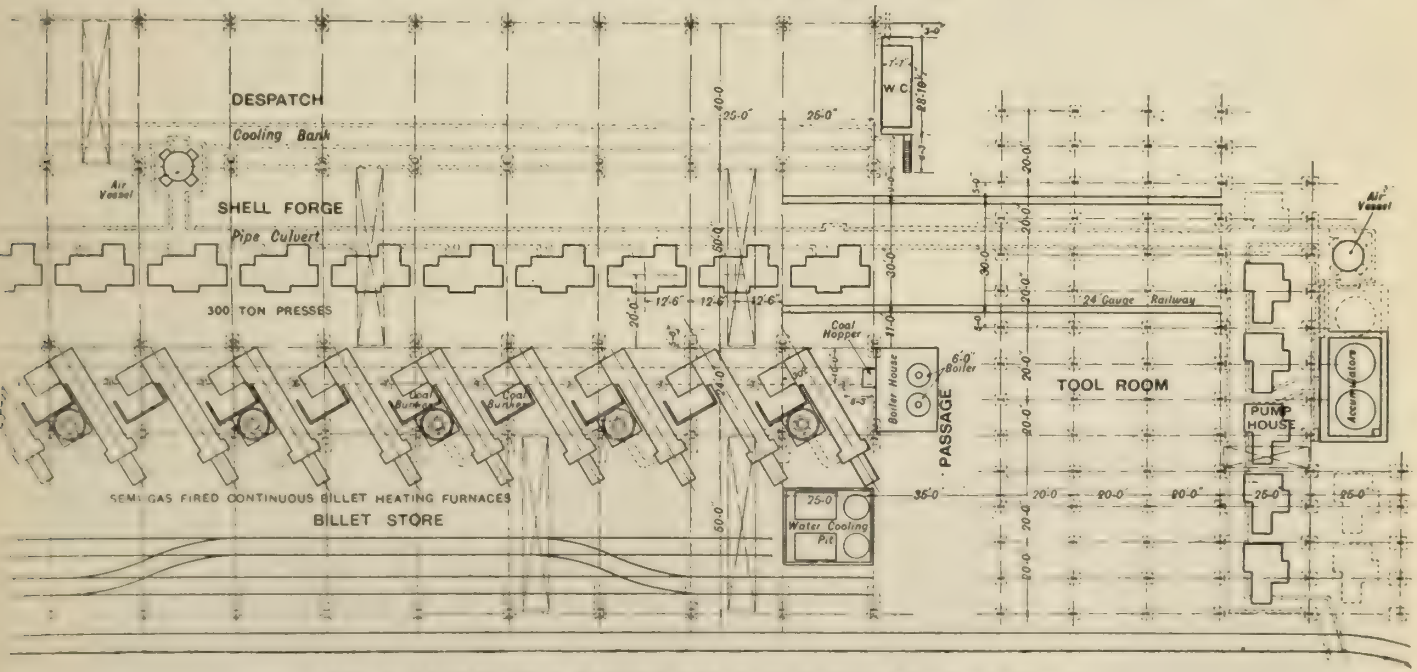


FIG. 1. LAYOUT OF A BRITISH NATIONAL SHELL FORGING PLANT.

Incidentally, there is no reason why a shell should not be completely machined on a single lathe. Such a lathe, however, would not be a simple machine, because it would require to have as many adjustments as there are operations to perform on the shell, and none but a skilled workman with long training could readily learn to operate it. Instead, therefore, of designing and making a lathe capable of performing the fourteen or so operations required on a shell, fourteen different types of machine have been constructed, each of which specialized to do a single one of the operations and no more. The simplification of the mechanism in each case has been carried to a truly remarkable degree, and as a result girls and others without previous acquaintance with the inside of an engineering shop are taught to use the different machines efficiently in anything from a fortnight to a month.

The factory consists of two distinct departments. In one the shells are rough-shaped by forging. They are then taken on railroad cars to the second part of the factory about a mile or so away, where they are machined to shape and size, bored internally, screwed at one end for the nose pieces, varnished inside and painted outside.

The factory when visited was engaged on the production of 60-pounder high-explosive shells. The raw material as received consists of billets of steel some $4\frac{1}{2}$ in. square, 15 in. long, and weighing about 80 lb. The steel has a breaking load of about 90,000 lb. per square inch. The billets arrive by rail in trucks, which are run on to the siding shown at the bottom of the plan of the shop, Fig. 1. Between this line of rails and the row of furnaces the ground is used as a billet store. At any given moment some thousands of billets will be found here arranged in stacks. On a pair of overhead girders, one along each edge of the storage ground, three overhead electric travelling cranes run in a direction parallel with the line of rails. These cranes, instead of using hooks and slings, are provided with powerful electric magnets. Five billets may thus be lifted at one time by each crane.

The billets as required are lifted by the cranes from the stacks and carried over to the furnaces. Each furnace is provided with a shutter-like door on the side nearest the storage ground. Just outside this door and level are deposited from the crane magnet. The table is provided with a horizontal hydraulic ram. The door of the furnace being lifted, the ram is operated and pushes the billets in a row off the table into the furnace. As fresh billets are added at one end, those nearer the other are, through the action of the ram, pushed forward towards another door, through which they are withdrawn, when heated, by the forge hands. The heating of the billets thus proceeds continuously—that is to say, there is always a hot billet ready to be withdrawn. Fig. 1 describes the furnaces as being "semi gas-fired." This means that the fuel used is coal and that the coal is gasified within the furnace itself. The billets are heated by the combustion of the gas and not by the actual combustion of the coal.

Forge Department

A row of hydraulic forging presses is arranged down the centre of the forge shop. Each furnace serves a separate press. From a point above the furnace outlet door to a point on the press structure a stout wire rope is stretched. On this runs a pulley from which a chain depends. To the chain a pair of tongs is attached. The white hot billets can thus be readily and quickly, one at a time, pulled out of the furnace and carried over to the press. On the way across any scale formed on the surface of the billet is knocked off with pointed bars of steel. The corners of the billet as received are rounded off so that the length across the diagonals is about equal to the diameter of the forging. This permits the billet to be readily slipped into the round mould or container. It will be noticed that the length of the forging is slightly greater than that of the billet.

The hydraulic presses are operated by water under a pressure of 1,200 lbs. per square inch. They are of the vertical type and consist of a bed-plate, upon which four pillars are erected. The main hydraulic cylinder, which does the forging work, is inverted, and is carried by these four pillars. The bed-plate also carries a pair of guides upon which there runs a carriage carrying two large steel pots, within each of which is placed a steel mould or container. The carriage with these pots is moved to and fro on the guides by a horizontal hydraulic cylinder. Each pot alternately can thus be brought under the forging cylinder.

At each end of the bed-plate a small vertical hydraulic cylinder is sunk into the ground. The rams of these cylinders are used to eject the finished forgings from the mould in which they have been formed. It is necessary to provide this power because, after forging, the metal being expanded tightly against the walls of the mould, is apt to stick. It is arranged that when pot A is under the forging cylinder pot B is over its ejecting cylinder. Thus, while one billet is being forged the preceding one is being ejected.

The ejector ram when it rises enters a hole in the bottom of the pot. Rising further, it enters a similar sized hole in the bottom of the container or mould. This hole just fits the diameter of the ejector ram and is smaller than the diameter of the finished forging. In sections, therefore, the container or mould shows a round bore of diameter equal to that of the forging and is carried to a depth which exceeds the length of the untouched billet by a short amount. At the foot of this bore comes another one of smaller diameter, equal to that of the ejector ram. On the circular step thus formed a round plate rests loosely. This supports the bottom of the billet while it is being forged, and can rise on top of the ejector ram when the billet is forced out of the mould.

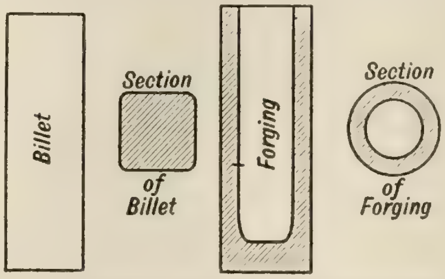


FIG. 2. SHELL BILLET AND FORGING.

The Forging Process

There are two punches on each press, these being mounted on a slide which can be moved in a direction at right angles to the guides on which the pots run. Just as these pots are brought alternately beneath the forging cylinder, so, too, are the punches. The two punches are so connected that they move in unison. Thus, when punch A is being forced by the ram of the forging cylinder into the billet, punch B is also descending. In so descending it passes into a pot of water where it is cooled. It is then ready to be moved across into the forging position and to deal with the succeeding billet. It will thus be seen that while one billet is being forged the preceding billet is being ejected and the succeeding billet being got ready in position. Simultaneously, the punch for the surrounding billet is being cooled.

To permit the punch to be withdrawn from the shell without dragging the shell out of the mould, two bars are fixed across the top of the pot at a distance apart which will permit the container or mould to pass between them as is required when the mould has to be replaced. When the forging is over, except for the withdrawal of the punch, a vee-shaped block of steel is slipped beneath these bars. The limbs of this block pass on either side of the punch. The bottom surface of the block rests on top of the mould and overlaps the lip of the shell. With this block inserted, the punch can be withdrawn, the block and the bars meanwhile holding the shell down.

First Inspection

Immediately after forging, the shells are inspected, and if found in order, passed and stamped by Government inspectors. An interesting mechanical device is in use to assist in the inspection

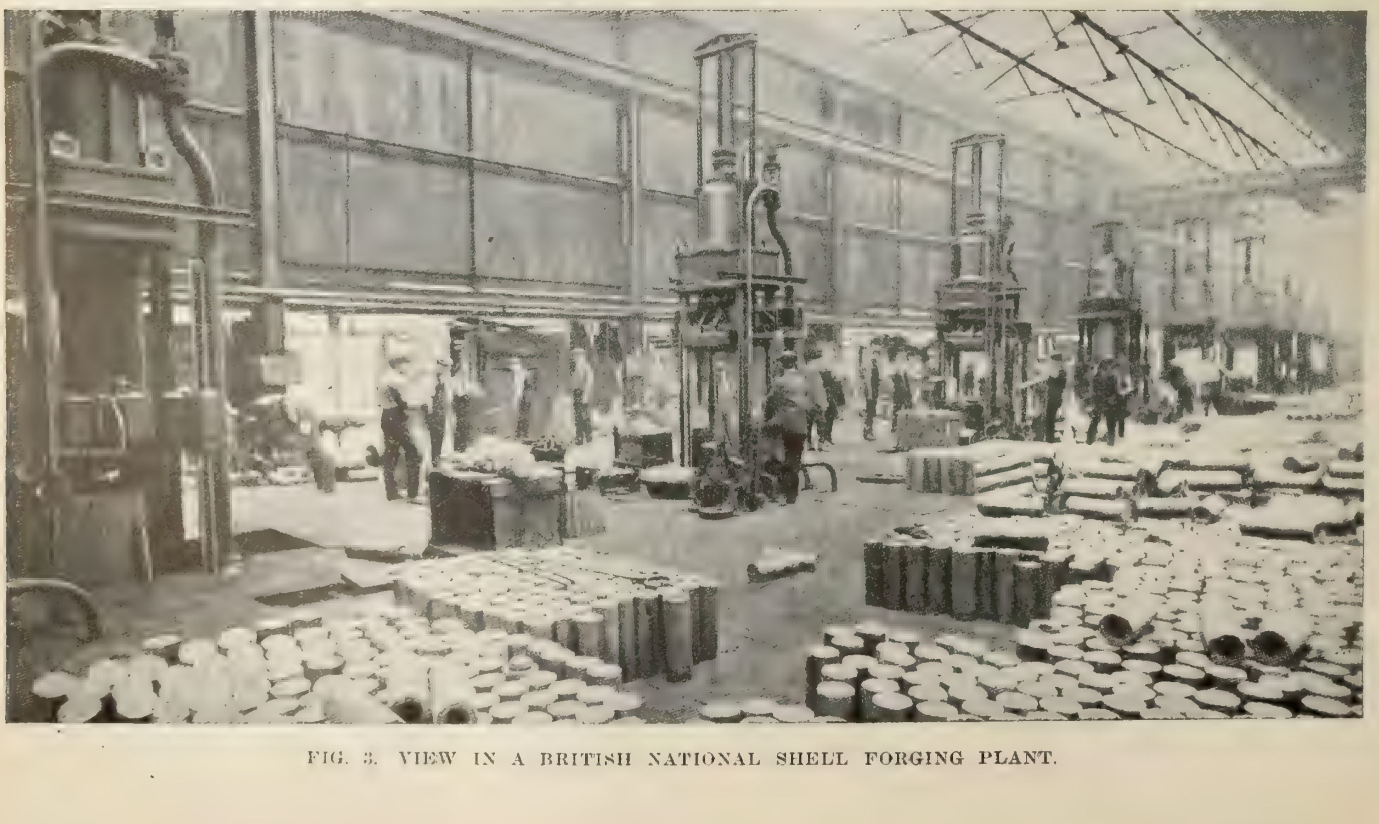


FIG. 3. VIEW IN A BRITISH NATIONAL SHELL FORGING PLANT.

process. It is intended to detect any shells which have been forged eccentrically. Precautions are taken at the presses to see that the punches and moulds are correctly aligned, but even so eccentrically forged shells are sometimes turned out.

The device referred to is sketched in Fig. 4. A is the end of the shell. B is a lever, one arm of which is provided with a roller which rests on the surface of the shell at a point near its closed end. The other arm of the lever is a pointer. The shell is slipped over a power driven spindle C, which just fits its bore. When it is rotated, the end of the pointer must not pass outside two gauge marks D inscribed on a board fixed behind the pointer. If it does, the shell is too eccentric to be passed. The eccentricity is thus examined at the closed end of the shell. If there is any eccentricity it will be most marked at this point. The device enables a large number of shells to be inspected in a very short time.

Upkeep and Labor

The containers, the punches and other parts of the presses have frequently to be renewed. The renewals are made and carried through by the staff of the tool room, the situation of which is shown on the plan. Beyond the tool room is the pump house, which supplies the pressure water used by the forging presses. Here are to be found electrically-driven pumps, each with three rams and all delivering into an accumulator. The current to the motors driving the pumps is controlled automatically in such a way that as the demand for water increases or decreases more and more of the pumps start or stop working.

A word may be said in conclusion regarding the staffing of the forge departments. At present no female labor is employed in the forge itself, nor is it probable that it will be in the future, at least in the forge proper. The heat here is somewhat trying, and it is believed that male labor alone is suitable. The men actually employed were all quite untrained for the work to begin with. On the average, however, fourteen days is found sufficient for instructing them in their work.

The tool room is staffed by both male and female labor. The portions of the presses actually coming into contact with the hot billets require very frequent renewal, particularly so in the case of the punches and their components. Arrangements have, therefore, been made for the production of these articles on the principle of specialized working, and the greater part of this work is carried out by women. The renewal of parts of the valves, however, and other delicate adjuncts of the presses remains in the hands of skilled male workers, who are also responsible for the management of the workshop and the instruction of the women.

DON'TS FOR THE GRINDING MACHINE OPERATOR

Howard W. Dunbar.

(1)—Don't attempt to grind without using the proper number and proper application of steadyrests, if you wish the work to be round, true and smooth.

(2)—Do not expect to get round work without round centre holes in your work and true centre points in your machine.

(3)—Don't attempt to grind without a quantity of good lubricant flowing over the work and wheel at the point of contact between wheel and work.

(4)—Don't put too much compound in the water; the proportion should be about 40 to 1; too much compound causes undue foaming.

(5)—Don't allow compound to foam and froth and run all over the machine and the floor. This can be reduced by sprinkling a little kerosene on the foam in the top of the tank, or by adding several pails of clear water.

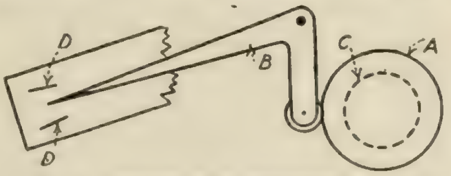


FIG. 4 DEVICE FOR TESTING ECCENTRICITY OF SHELLS.

(6)—Don't thin the compound so much that there will be no rust preventive in the water; if you do your machine will become rusty and corroded.

(7)—Don't use hard wheels; soft wheels give greater production.

(8)—Don't forget to oil the machine thoroughly at least once each day, preferably on starting up in the morning.

(9)—Don't use "any old oil" on the wheel spindle. Special spindle oil is provided for and necessary, due to the amount of clearance left between the diameter of the spindle and the diameter of the box, where clearance must be just filled by the oil used. Therefore, the oil must be of the proper grade and viscosity to accomplish this object.

10)—Do not worry if the wheel spindle runs warm or cold, so long as it grinds round, perfect work.

(11)—Don't attempt to take too deep cuts; lighter cuts and more of them will produce as much work and still keep the wheel true and in better shape for a greater length of time. Still you must use good judgment; excessively light cuts will permit the wheel to glaze over and not cut properly.

(12)—Don't forget that a generous use of the diamond yields large returns in dollars and cents.

(13)—Don't attempt to grind round work with a wheel that is out of balance. You should try the wheel for balance as it wears down; one balancing is not sufficient to insure a wheel remaining in balance throughout its entire life.

(14)—Don't try to grind without chatter marks when all the belts on the machine are uneven in thickness and bumping every time they pass over the pulley.

(15)—Don't try to grind work in your machine which is beyond the capacity of the machine both for length and swing.

(16)—Don't remove the wheel spindle of your grinding machine just for examination of the bearings.

(17)—Don't expect perfect bearings in the box of the wheel spindle for such a thing is impossible and unnecessary.

(18)—Don't press the point about the bearing in the wheel spindle box, because if the spindle is round you will get perfectly smooth rotation in a box, even if it only bears at three points.

(19)—Don't say that chatter marks are caused by imperfect scraping of wheel spindle box bearings. Scraping never was and never can be the cause for chatter marks.

(20)—Don't undertake to adjust the wheel spindle boxes unless you have had experience with such work.

(21)—Don't forget that nine-tenths of the trouble in this world is due to ignorance. So if you are not familiar with certain features of adjustment about the machine, don't attempt such adjustments until you are thoroughly acquainted with just how they work and how they are used.

(22)—Don't pound on the swivel table of the machine with tools, hammers, wrenches, etc., to make it move. If you swivel the table through its entire movement and clean it once a week, it can be moved without pounding.

(23)—Don't expect the machine alone to produce a fine finish; there is a good deal in the operator's knowing how.

(24)—Don't forget that the smoother the point of the diamond, the smoother will be the finish on the work.

(25)—Don't think of the diamond as sharpening the wheel, but rather as correcting the surface.

(26)—Don't expect to succeed in quantity or quality of work without having a diamond constantly at hand.

(27)—Don't use a wheel narrower than 2 in. except on special work which requires a narrower wheel.

(28)—Don't expect wide wheels to grind the same as narrow wheels; generally, the wide wheel is required to be a little softer.

(29)—Don't expect the machine to run itself; success in grinding depends upon constant attention and care in the operation of the machine.

(30)—Don't expect to get a "looking-glass finish" when the wheel is cutting freely.

(31) Don't run the diamond across the wheel rapidly if you wish a good smooth finish, as such a procedure will cause the wheel to be imperfectly trued and mottle marks are apt to appear on the work.

(32)—Don't run the diamond too slowly across the wheel if you wish the surface broken up so that it will cut freely and quickly.

(33)—Don't complain that diamonds wear out too quickly; diamonds are profitable—whatever their cost — in the hands of experienced operators.

(34)—Don't forget that cleanliness is as necessary at the machine as at our homes. We must wash our faces at least once a day. Why should it be a hardship to clean a machine two or three times a week? A good operator is generally known by the appearance of his machine.

(35)—Don't forget that the greatest mistake a man can make in life is to ignore the experience of an older man. —Grits and Grinds.

* * *

UNORTHODOX PATTERNS

By J. R. Moorhouse.

IT is admitted there should be no excuse for an unworkable pattern, but there are occasions when conditions positively compel the patternmaker to pass on to the foundry patterns that are scarcely worth the name. These add considerably to the foundry costs, and result in unsatisfactory castings—a very questionable economy. Apart, however, from these, a pattern may be quite practicable and leave much for the moulder to do to complete his mould. Of such nature are the "one-off" variety of patterns; and just where the line should be drawn in regard to what should be done in the pattern-shop and what left for the foundry to do, in view of the entire cost, is of itself a controversial subject. When patterns are required for standard work, too much consideration cannot be given to saving labor in the foundry. Such patterns should be built up in the best possible manner for repetition moulding.

It is here where the patternmaker is often in a difficulty. Though expense may be no consideration, time is vital to the making of a reliable and efficient pattern. As ideas are perfected and laid out in the drawing office, there is a rush to get these going in the pattern-shop, so that some tangible result may be seen in the shops as soon as possible. The daily reminder and inquiry, how soon these are to be sent on to the foundry, is no encouragement to thoroughness, neither is it conducive to the best of relations between the foundry and pattern-shop.

Pattern-Shop and Equipment

Given adequate and up-to-date machinery, arranged to the best of advantage in a well-lighted and ventilated building, the most vital factor in getting out good work and workable patterns cheaply and quickly is ensured. Of a secondary consideration in the make-up of a pattern is the materials used; and although timber will remain the standard for most classes of work, against which no other material can possibly compete, there are occasions when plaster-of-Paris can profitably be used for the quick production of patterns, not for the saving in the price of the material, but rather because it so readily can be worked up into intricate shapes that otherwise would require considerable labor if worked out in timber.

Plaster-of-Paris in Pattern-Making

To the wood pattern-maker this necessitates what, to him, are unorthodox methods of procedure in pattern construction. The use of plaster-of-Paris in the pattern-shop, as is well known, is not new; the writer in his early apprenticeship worked plaster for patterns. It was then used for making accurate forging-tool patterns, one example being a railway carriage draw-bar hook. A model of the hook to be forged is first made in halves in wood. This is then passed by the inspector to check all sections, etc. A frame is next made to conform to the dimensions of the forge block required, and deep enough to leave ½ in. of plaster at the shadow portion covering the hook face; nails are then driven in the inside with the heads protruding well out, to form an anchor for the plaster. One half of the hook, which has previously been varnished and thinly smeared with oil, or preferably vaseline, is secured to a board, on which is placed the frame, over and in correct relation to the hook. Having made this secure, the plaster is run in and strickled flush with the frame edges. In a few moments the board can be inverted and the hook carefully withdrawn, leaving a perfect impression of the hook in the plaster pattern.

It needs no argument to show how much quicker this can be accomplished than working the hook by trial and error into a wood block. To form the top stamping block the process is very much the same, with the exception that the two halves of the hook are placed together as a means of registering the top in true relation to the bottom, so that the stampings will not be overshot, being then put back in the already half-formed plaster pattern, on which is fixed the mating frame for retaining the plaster forming the top half block. This is weighted and then run in with plaster. When set it can be carefully removed, leaving a true impression of the model. The same procedure is often followed in jobbing lines of valves and intricate inlet pipes, etc.

Strickle Work and Plaster-of-Paris

A little experience is necessary, especially on strickle work to manipulate the plaster to the best advantage, as when once it commences to set it cannot be restored without seriously impairing the strength of the pattern. The amount of plaster to use to a given quantity of water varies according to the nature and grade of the material, as also the temperature of the room in which plaster patterns are to be made. A good method is to lightly and quickly sprinkle the plaster over the whole surface of the water, until it begins to settle on the surface. This is then thoroughly mixed, preferably with the hand, until it has a creamy nature, when it can be then run off. For strickle work it may be necessary for the first coat to run it a trifle stiffer, and thinner on the finishing layer. These, however, should follow immediately, if possible, one on the other, to form a bond for the best results. Especially is this necessary on thin strickled sections, where it is found impossible to complete it at one operation.

It should be mentioned that a useful material for working along with plaster-of-Paris, and which widens the field of application for pattern construction, is plasticine, a class of modelling clay. With this material, holes or pockets can be readily formed in plaster moulds, in the same way as cores are used in the sand mould.—From a paper before the Lancashire Branch of the British Foundrymen's Association.

* * *

Protection of Iron by Enamelling.—A method of enamelling iron, consists of the following:—The metal is first pickled in hydrochloric acid to free it from foundry scale, then washed thoroughly and dried. The first coating applied is composed of 34 parts silica, 2 parts soda, and 15 parts borax, mixed in water. The metal thus coated is exposed for 10 to 15 min. in a dull red-hot retort. A second coating is then applied, consisting of 34 parts feldspar, 19 silica, 24 borax, 16 oxide of tin, 4 fluorspar, 9 soda, and 3 saltpetre. This mixture is first melted in a crucible, then ground to a fine paste in a little water and applied with a brush. The coated piece is then again subjected to white heat in a muffle. It is claimed that the enamel unites with the iron and that pipes thus enamelled have been in use for many years without deterioration.

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EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

MACHINISTS' INSTRUCTION COURSE—I.

By J. Davies.

THE machinist or engineering trade is one that any young man might well be proud of, it offers unlimited scope for the display of inventive genius and calls forth the highest degree of skill and sound judgment, an error of one thousandth part of an inch being taken quite seriously in some of our Canadian high grade tool making establishments. The ordinary lathe hand is expected to be able to work within five thousandths of an inch as that amount more than represents the difference between a loose and tight fit.

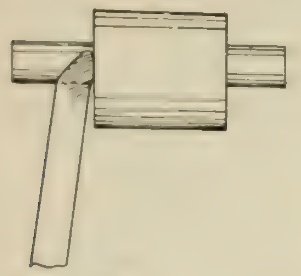


FIG. 1.

Commencing Studies.

The first advice I would offer to the boy entering the machine shop is to join some evening school technical class, where he can acquire a knowledge of machine drawing and construction and workshop mathematics. Although it will be some time before he is called upon to work from a blue print it is a good plan to begin to learn reading a drawing as soon as he enters the shop, then when the time comes that he is expected to work from a blue print he will not have to be continually chasing the foreman around to know what every little thing means. If you think you are a smart boy don't let the men know that you think so. A certain amount of confidence in your own ability is necessary for your success, but don't let that confidence develop into conceit. You may expect to be fooled a few times by being sent after the left-hand monkey wrench, or some other tool that only exists in the imagination of the man who sent you after it. When you find that you have been the victim of a practical joke, don't get angry, anger does not improve anything except the arch of a cat's back; take it as a part of your workshop education and you will soon make friends .

Regarding Left Hand Tools.

Don't imagine because you were fooled on being sent after some imaginary left hand tool, that there are no legitimate left hand tools. There are left hand dies, taps, side cutting tools for lathe planer and shaper, cutting off tools, knife tools, threading tools, hobs used on milling machine and gear cutter for making worm wheels. Remember that a left hand side tool or knife tool is bent toward the right and is called left hand because it is used for cutting the left hand side of the work or job that is in hand, see Fig. 1.

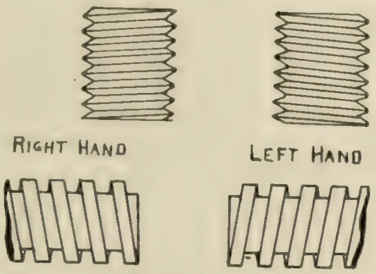


FIG. 2.

To distinguish a left-hand tap or thread take a pencil point, a nail, a piece of wire, or anything that is handy. You do not need an elaborate kit to place the point in the thread somewhere about the centre and move it around the thread clockwise—if your hand travels towards the top it is right hand; if towards the bottom it is left hand. Make a sketch of a left and right hand thread and fix it definitely upon your memory. If the thread inclines upward from left to right it is right hand, if it inclines downward from left to right it is left hand, see Fig. 2. A little study of this will fix it definitely upon your memory and you will find it a very useful thing to be able to distinguish right from left at a glance.

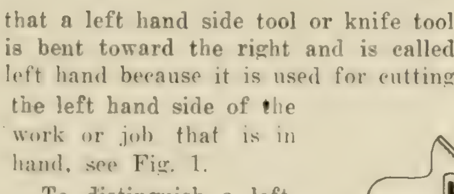


FIG. 3.

The only exception to this rule is a sectional elevation of a nut or internal thread such as a thread inside a handwheel. When an internal thread is shown in section it reverses the angle, because you are looking at the opposite side of the thread to what you are in elevation or outside view. It is here illustrated by making a section of the threaded boss of a press, see Fig. 3, in which it will be seen that while they are both right hand, the angle of the sectional elevation inclines in the opposite direction to the screw. The amount of the inclination is equal to half the pitch, that is half the distance of one thread from the other.

Get Tools of Your Own.

Study in order to become familiar with all ordinary shop tools and their uses. Plan to get some tools of your own as soon as possible as the youth that is always running around borrowing and returning tools soon gets in disfavor with both men and masters. You do not need an elaborate kit to begin with—a hand hammer, a combination set comprising square, bevel protractor, spirit level, and centre finder, and a 12-inch scale with square ends graduated on 4 edges, a 6-in flexible rule, a pair of dividers and a small pair of inside and outside calipers. Combination tools are more likely to be inaccurate than tools made for a single purpose. When buying a combination set, have them tested in the workshop and if you find them inaccurate to any appreciable degree the makers will gladly exchange them and thank you for calling their attention to the fact. It is not often that you will have any room for complaint if you buy your tools from some well known maker, but

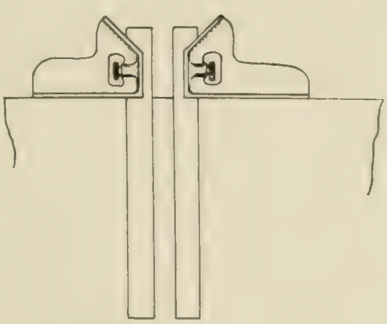


FIG. 4.

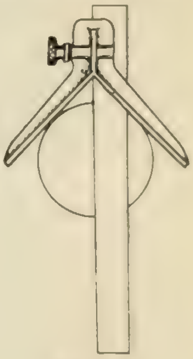


FIG. 5.

it gives you more confidence in your work if you know that your tools are correct.

Test your tools as follows:—(the method here described for testing your tools can be applied to a great variety of other jobs). Testing a combination square,—put in your 12 in. blade as shown in sketch 8, Fig. 4, taking care that there is no dirt or grit in the slot of the stock where the blade goes in, place the base of the stock against the planed edge of a surface plate or marking off table then make a fine line close up against the blade, reverse your square as shown, and draw another line parallel with the first one, leaving just as small a space between the two lines as the eye can detect, or you may draw one line exactly on the top of the other. If the two lines thus drawn run exactly parallel your square is correct, if the lines do not run parallel the error in your square is equal to half the error shown by the lines. Now take out the blade and turn it upside down to test the other edge, or you may try it with micrometers to see if it is parallel which amounts to the same thing.

Testing Tools.

To test your center finder, you practically repeat the same operations, except that instead of the surface place, or marking off table, you must get something that is perfectly round. The end of a short shaft turned and faced in the lathe, or the end of a plug gauge will serve very well, the diameter being such as will allow the sides of the center finder to bear somewhere about the middle, see Fig. 5.

To test a spirit level place it upon the surface plate, and pack up the plate, not the level, until the level shows perfectly level, then draw a pencil mark around the edge of the base of the level, reverse the level placing the base inside the pencil marks, and if the level still shows true it is true. If you are testing an adjustable level, adjust it until it fulfils the conditions as stated. If your level is not adjustable then you will have to scrape, file, or machine the base of your level to correct any error there may be in it.

To test your protractor—Since there are 360 degrees in every circle, if two lines forming a square or right angle are placed inside a circle, they will divide that circle into exactly four equal parts, and as 360 divided by 4 is equal to 90, the angle of the square will be 90 degs. Therefore set your blade at 90 degs. and test exactly as you did for your square, if the base of the stock does not form a perfect square with the edge of the blade, it follows that every other angle will be out an equal amount.

ERECTING AND OILING THE LATHE

THE following observations are taken from the Lodged Shipley "Lathe Operating Manual." They will be of interest to our readers not only on account of the primary intention, but because of their application to lathes generally.

Cleaning

Use benzine to remove the slush compound from the finished surfaces of the lathe. Let this clean-up be thorough, and be sure to remove every particle of grit or dirt from all bearing surfaces. Carefully clean out all of the oil holes, so that no dirt will be carried into any journal with the oil. The sliding tumbler gear under the headstock and the slip gear on the lead screw should work easily. The cross slide guard or extension of the lower compound rest slide should be removed by running the slide to the centre of the carriage; the guard may then be lifted off, the dovetail surface of the bridge cleaned and oiled, and guard replaced.

Foundation

A good, solid foundation is essential to best results in accuracy, rigidity and smoothness of finished work. Money spent to secure a solid base is true economy. Be sure the foundation is thoroughly laid before the lathe is placed. Never bolt the legs to the floor. The holes in the legs are for the lag screws which secure the lathe to the skids when crating it for shipment.

Levelling

No lathe can do good work or accurate work if it is not levelled exactly. Use a level which is very sensitive and accurate. A carpenter's or similar level is utterly useless for levelling a lathe bed. First lay the level on the flat track lengthwise with the bed, that is parallel with the track, and carefully level the bed lengthwise. Now place the level upon a straight edge which rests on the front and rear arms of the carriage, having the carriage close up to the headstock, and carefully level the bed by the head end leg. Move the carriage along the bed, letting it rest over each successive leg, and level the bed by that leg.

In preliminary levelling, leave the middle legs a trifle low rather than too high. Do not disturb the position of the level across the wings. Do not lean against the lathe. After having traversed the whole length of the bed as described, move the carriage again to the head end and repeat the operation to make sure that there is no wind. Grouting may, if desired, then be run under and around, but not over, the feet. No bed, no matter how strong, is stiff enough to prevent springing out of line when set on an uneven base; and in such a codition it is impossible to face or turn straight; hence the levelling of the bed is of the utmost importance to obtain smooth and accurate work.

Oiling

Ample and proper lubrication is essential to secure good results and preserve the bearings. It is false economy to use any but the best mineral oil, rich enough to lubricate the bearings, and with body enough to last a reasonable length of time, and with a 20 degrees cold test. Animal oil has a tendency to gum and clog the oil tubes in cold weather. Each lathe is thoroughly oiled before leaving the shop, but, after being cleaned and set up, all the bearings should be flooded with oil during the first few weeks of operation. The oil reservoirs on the spindle bearings of the headstock hold sufficient oil for a day's run under ordinary conditions. Where oil holes are plugged with wood, the regular oil cover or oil cup will be found in packing box.

To Ensure Accurate Work

If your lathe should not bore straight, level it carefully with a good level as already described. This will entirely overcome the difficulty.

If your lathe should not face straight, it also is merely a matter of levelling.

If your lathe should not turn straight, use the same levelling operation and then carefully test to see that the centres line up exactly with each other. Remember that if a long piece is turned between centres without steady or follow rest support the work itself will spring away from the tool to some extent.

If your lathe should chatter, it might be due to any one of several causes:

Improper levelling; correct as above.

All four feet not resting solidly on the floor or on wedges.

Work extending too far from chuck; change method of chucking or run outer end in steady rest.

Too great a distance between centres without support on slender shaft; use steady rest.

Inaccurately fitted chuck plate.

Bolts which hold chuck to chuck plate not tight.

End play in the spindle; adjust by means of the collar and nut on rear end of spindle.

Cross slide not fitting the bridge tightly; adjust gib.

Compound rest gib loose; adjust.

Cutting edge of tool below centre.

Dirt between one of the centres and its bushing.

Tool not securely clamped in tool post.

If using a tool holder, the set screw holding the inserted cutter should be tight.

Machine thrown out of balance—by addition of special chucking fixtures;

by being speeded too high on some classes of work.

If your lathe should cut a drunken thread, tighten the nut on the tailstock end of the lead screw, if that nut is too loose. On the other hand, do not make the nut too tight, as it would then be difficult for you to get the sliding tumbler knob into the holes when the lathe is running. The lead screw is always in tension whether you are chasing right-hand or left-hand threads, because the pull is against the outer end of the bearing in either case.

Should you have occasion to remove any of the gears from the reverse plate, be sure, when replacing them, that they are properly located by the dowel pins.

Never leave your lathe with the chuck wrench remaining in the chuck some one else might start up the lathe.

OUR 1916 IRON AND STEEL OUTPUT

OFFICIAL figures compiled by the American Iron & Steel Institute show that the production of pig iron in Canada in the first half of the current year was 40 per cent. ahead of production in the corresponding period of 1915, and 11 per cent. ahead of production in the last half of that year. At the rate of production in the first half of this year it is possible, if not likely, that the output for the full twelve months will exceed the high record established in 1913.

The total production of pig iron up to June 30 of this year was 507.750 tons and compares with 366,825 tons in the first half of 1915, 458,595 tons in the second half, and 1,015,118 tons for the full twelve months of the record breaking year of 1913.

Production of steel ingots and castings in Canada, according to the Institute, promises to break all records in 1916. Last year, production was very near the high record of 1,042,503 tons in 1913. The output in 1915 was 912,755 tons, compared with only 743,352 tons in 1914, an increase for the year of approximately 22 per cent.

The figures are interesting as official confirmation of the results achieved by the Canadian manufacturers in their effort to overtake an insistent demand, which has promised not only a market for all that can be produced, but a market at extremely attractive prices.

Pig Iron

The following table shows the production of pig iron in grades in 1915 and 1916

	First Half 1915	Second Half 1915.	First Half 1916.
Basic	292,556	307,813	388,387
Bessemer	5,228	8,476	12,575
Foundry, etc.	59,646	66,123	95,602
All other	9,385	6,183	11,186
Total gr. tons..	366,825	458,595	507,750

The output of pig iron, though larger in 1915 than in 1914, was still far below the record of 1912 and 1913. Production for 1915 amounted to 825,420 tons, compared with 705,972 tons in 1914 and the high record of 1,015,118 tons in 1913. Basic pig iron was the only grade showing larger output than in 1913 and 1912. The production of this grade of pig iron was 660,369 tons, compared with 558,524 tons in 1913 and 489,799 tons in 1912. Following table shows production of grades of pig iron from 1910 to 1915:

Years	Basic	Bessemer	Foundry	All Other	Total
1910	..365,000	221 494	143,986	9,640	740,210
1911	..413,303	186,274	190,324	34,467	824,368
1912	..489,709	228,742	194,208	129	912,878
1913	..558,524	227,662	225,231	3,701	1,015,118
1914	..331,456	184,053	174,346	16,117	705,972
1915	..660,369	13,714	125,769	25,568	825,420

Steel Production

The following table shows steel production since 1910:

Year	Open-Hearth	Bessemer	Other Kinds	Total
1910	542,354	199,570	....	741,924
1911	601,074	189,797	....	790,871
1912	645,062	207,569	400	853,031
1913	768,663	273,391	449	1,042,503
1914	556,910	186,158	284	743,352
1915	884,736	22,521	5,498	912,755

Production of steel rails in 1915 was far below the production of any year since 1905. Since that year, excluding 1915, output of steel rails in the Dominion has averaged in excess of 364,000 tons a year, comparing with only 209,752 tons in 1915. As will be seen from the following table, other finished rolled forms of leading products have equalled or exceeded previous year's outputs:

Product	1912	1913	1914	1915
Rails	423,885	506,709	382,244	209,752
Struct. shapes and wire rods.	64,082	68,048	59,050	114,829
Plates & sheets, nail plate, merchant bars, tie-plate bars, etc.	373,257	392,340	218,125	328,737
Grand total, tons	861,224	967,097	659,519	653,318

Miscellaneous

Production of wire nails in 1915 is estimated at 1,636,000 kegs of 100 pounds, as compared with 1,144,000 kegs in 1914, an increase of 492,000 kegs, or nearly 5,000,000 pounds. Output of cast iron pipe amounted to 53,700 net tons, as compared with 93,200 tons in 1914, a decrease of 39,500 tons.

EVERY MAN TO HIS OWN TRADE.

By J. H. R.

THERE are very few men who have not, at some time, been placed in a position of humility, on finding they were forced to relinquish a task they had ,at first considered as very simple. It seems to be a trait of human nature to think we are capable of performing certain tasks, as well, if not better than the other fellow, who in many instances has spent several years of his life in acquiring the necessary knowledge for the successful accomplishment of his allotted duties.

Some years ago, while working in a jobbing shop, I was turning the outside of a large cylinder, about 30 inches long. When noon hour arrived, there remained a portion of about one inch to complete the cylinder and as I would not be on hand in the afternoon, I disengaged the feed but left the tool in position, expecting to rough off the remainder in the morning. Upon my return I noticed that a portion about 3/8 inch long had been very roughly torn off. Upon making inquiries of one of the men, I learned that the office superintendent had endeavored to complete the job, with the above result. His effort proved very discouraging, for he finally left off and returned to the office. Under ordinary conditions, he might have achieved his purpose, but as this particular lathe was badly worn, it required careful handling for satisfactory results. To start a cut, it was necessary to take up all the slack in the apron gears before engaging the friction feed, and even then it would be some little time before the saddle would commence to move. As these conditions were not known to the "Supt.", he had tried several handles with no apparent result, finally trying to finish the cut by feeding with the hand wheel.

Another case of mistaken ability was that of a preacher, who anticipated, without much trouble, making a joint in a water pipe connection. Having obtained an ordinary flat faced union and a quantity of red lead from an engineer next door, he started in to do the "little" job. A few hours later, the engineer was called in for advice, to find the preacher covered from head to foot with red lead and perspiring freely in an effort to stop the joint from leaking. The engineer looked at the job, shut the water off, released the union with great difficulty, as the other had been using brute strength (pardon the expression) in trying to get a tight joint, inserted a rubber gasket, replaced the nut, and when the water was turned on, no leak was evident. The preacher thanked the engineer, but what was said before his appearance was not recorded.

* * *

There are 63 distinct varieties of canaries to be exhibited this year at the Canadian National Exhibition, 31 different breeds of rabbits and 24 cavies.

There will be 21 sections for field grain this year at the Canadian National Exhibition, five for grain in sheaves, and a similar number for grain in sacks.

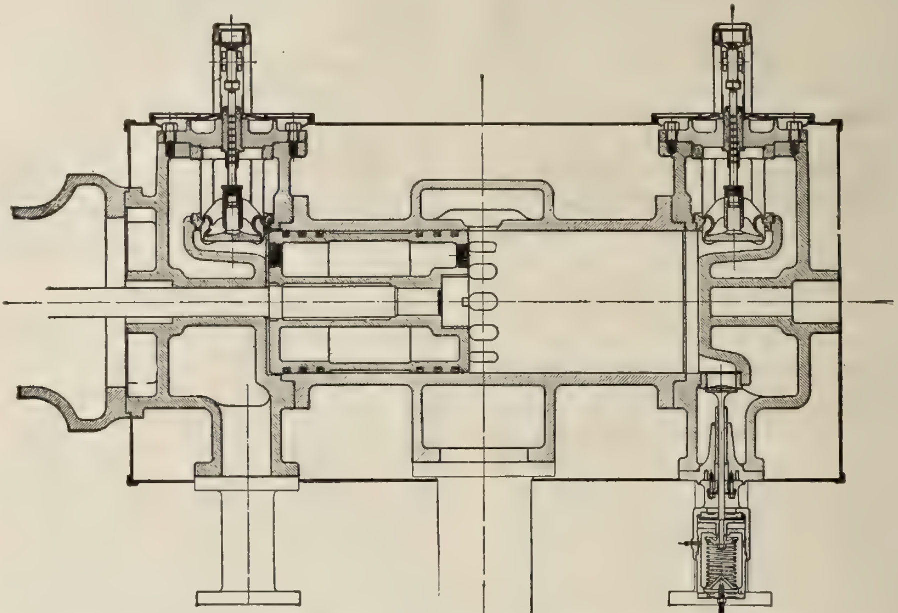
PROGRESS IN NEW EQUIPMENT

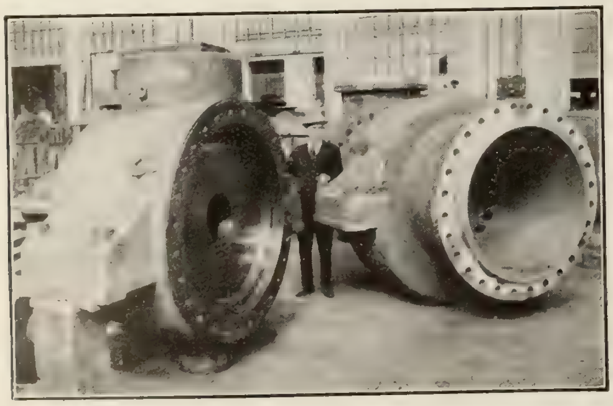
A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

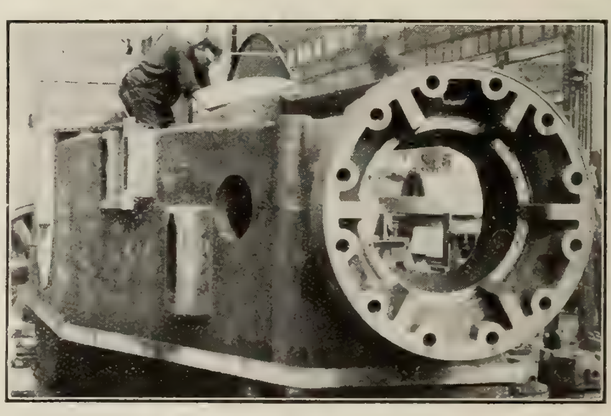
UNIFLOW ENGINES FOR DRIVING ROD MILLS.

THE merits of the uniform type of steam engine are gradually compelling a wider appreciation of its capabilities. In the struggle for efficiency in power production, attention has been chiefly centred on the steam economy of this engine with a consequent lack of appreciation in regard to its conspicuous ability in another direction, viz. overload efficiency.

Without detracting from its increased general efficiency, one of the most desirable features of the uniflow engine is its capacity for extreme overloads with a flat steam consumption curve, tests having shown that 200 per cent. load can be carried with an increase in steam consumption of only 10 per cent. Such a fact renders this type of engine well adapted for fluctuating loads with high peaks such as rolling mills and electric stations.

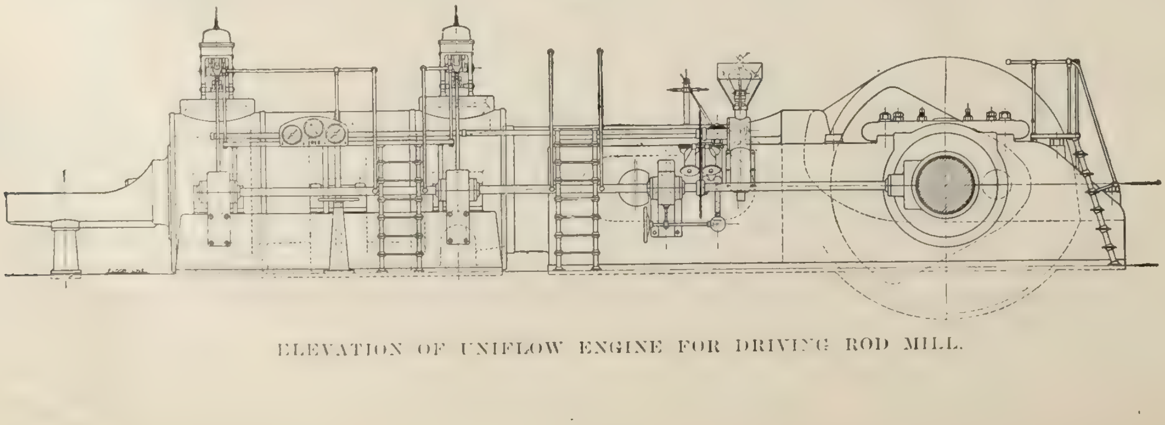

CROSS-SECTION OF UNIFLOW TYPE OF CYLINDER SHOWING CENTRALLY LOCATED EXHAUST PORTS.

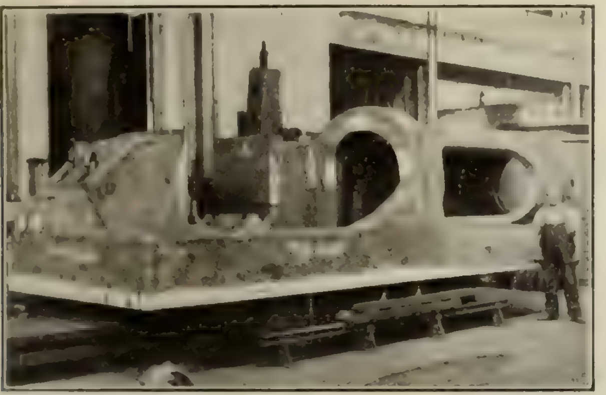

CYLINDER HEAD AND CYLINDER FOR 44-IN. DIA. BY 50-IN. STROKE UNIFLOW ENGINE.


END VIEW OF FRAME SHOWING REINFORCEMENTS ON FLANGE WHICH CONNECTS TO CYLINDER PARTS.

The first applications of this type of engine to rolling mill service in America have just been carried out by the Nordberg Manufacturing Company, Milwaukee, Wis., for the Youngstown Sheet & Tube Company, Youngstown, O. Two engines have been completed and shipped, the larger one to drive a 12 in. rod mill, and the smaller a 9 in. rod mill, the accompanying illustrations showing the principle of operation and some of the larger parts in course of construction.

The general design of the cylinders is shown in the cross-sectional drawing which illustrates clearly the distinguishing features of the design. Live steam is supplied to the interior of the two cylinder heads, which are duplicates in regard to general arrangement of passages, valves, etc. The cylinder proper


ELEVATION OF UNIFLOW ENGINE FOR DRIVING ROD MILL.


BED OF 44-IN. DIA. BY 50-IN. STROKE UNIFLOW ENGINE BEING MACHINED.

is of plain tubular form having cast around its centre portion an annular passage, into which the exhaust steam from either end of the cylinder alternately escapes as the piston uncovers in turn a number of ports in the cylinder wall. The piston is of considerable length being not quite equal to the stroke, and is provided with rings at either end.

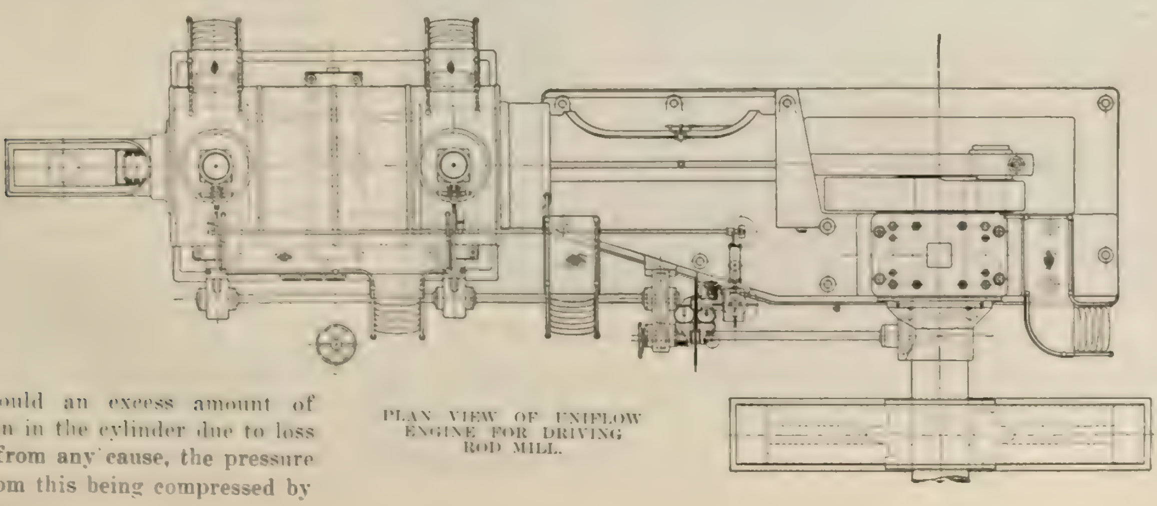
The steam admission valves are of the double beat poppet type, and are operated from a hay shaft by a releasing valve gear with spring dashpots, the cut-off being under control of the governor through the wide range of loads. As the only means of exhaust is through the ports referred to, the steam flows in one direction only, hence the name uniflow, consequently the ends of the cylinder are not cooled by the rush of exhausting steam which takes place at the point farthest from the ends. The temperature of the various parts, therefore, although it varies from the heads to the centre, is constant, and thereby renders the engine suited for a high ratio of expansion. Steam may be expanded from boiler pressure down to condenser pressure in one stroke, the steam economy of a single cylinder engine being equal to that of a modern compound engine.

Relief valves connect the interior of the cylinder with the live steam space so that should an excess amount of steam remain in the cylinder due to loss of vacuum from any cause, the pressure resulting from this being compressed by the piston on the return stroke will force the steam back into the steam space without damage. These valves are on the lower side of the heads, and are of the poppet type fitted with a cataract dampening device. A feature of the valves is the absence of packing on the value stems, which are accurately ground and lapped bushings.

The frame as will be observed from the illustrations, is of the horizontal Tangye type, with side crank and flywheel. Heavy duty requirements are met throughout the design, the general specifications and principal sizes of the two engines being as follows:—

	Large Engine	Small Engine
Brake horsepwore at 20-in. vacuum:		
Average	1,400	600
Maximum	2,100	1,600
Speed, r.p.m.	65-110	75-100
Diameter of cylinder, in	44	37
Stroke, in.	50	48
Shipping weight, lb.	480,000	360,000
Weight of frame, lb.	108,085	74,340
Weight of cylinder, lb.	19,005	......
Weight of front cylinder head, lb.	14,240	......
Weight of rear cylinder head, lb.	14,155	......
Normal steam pressure, lb.	170	170
Normal superheat, deg. Fahr.	75	75
Maximum steam pressure, lb.	200	200
Maximum superheat, deg. Fahr.	100	100
Diameter of main and outboard bearings, in	25	20
Length of main and outboard bearings, in	40	36
Size of crank pin, in	14x15	12x12
Size of cross-head pin, in	10x16	8⅝x14
Diameter of hollow piston rod, in	13	10
Diameter of flywheel, ft.	16	10
Weight of flywheel, lb.	110,000	90,000

POLISHING LATHE WITH PUSH-BUTTON CONTROL.


PLAN VIEW OF UNIFLOW ENGINE FOR DRIVING ROD MILL.

POLISHING LATHE WITH PUSH BUTTON CONTROL

THE adoption of push-button control and the provision of individual locking devices for each spindle are among the principal features of a new design of motor-driven polishing and buffing lathe developed by the Gardner Machine Co., Beloit, Wis. The control panel is arranged on the front of the machine as illustrated on page 183, the starting button on the right being sunk below the surface of the panel so as to eliminate any possibility of accidental starting. Further safety is provided by a simple device which locks the stopping button at the left of the panel.

The machine is built in several sizes, for either direct or alternating current, the motors used being fully enclosed so as to be proof against dirt and dust. Internal cooling of the motor is provided by a fan on the shaft, inside of the right hand cover, air being drawn from the base at this end, and discharged downward through the other end, thus obtaining a circulation of air which prevents the motor overheating under normal conditions.

When direct current motors are used, an adjustable speed range is available, the desired speed being obtained by moving a lever within the base. When using alternating current the speed adjustment is not so great as certain speeds only are available.

The spindles are locked, when changing wheels, by means of plunger pins mounted on the ends of the motor casing. These pins are normally held free by springs, and when in use are inserted into any one of four holes spaced around the collars seen in the photo, being locked in position by thumbscrews while changing wheels. Ball bearings are used on the armature shaft, suitable end frames being used for this purpose.

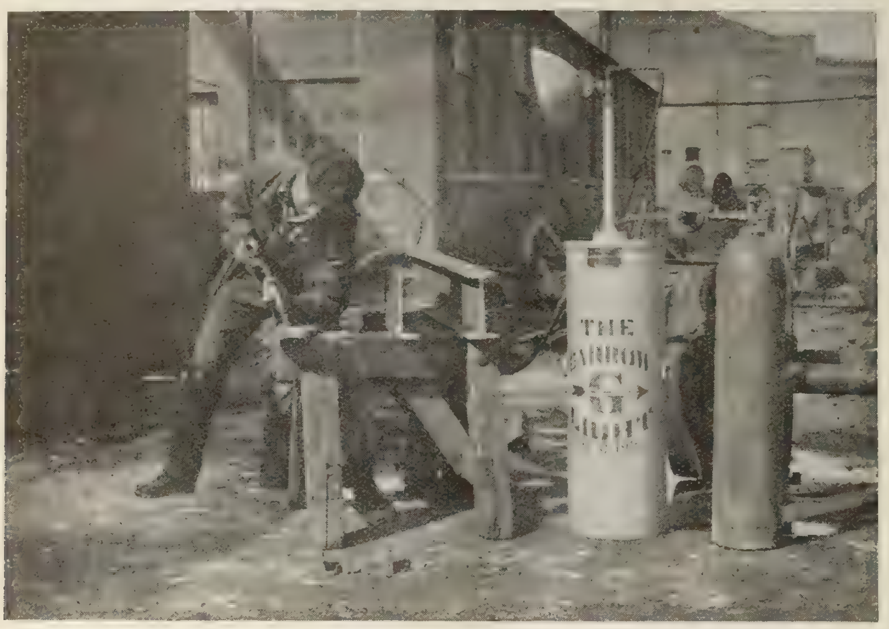


FIG. 1 PORTABLE LIGHT AND ACETYLENE GENERATOR

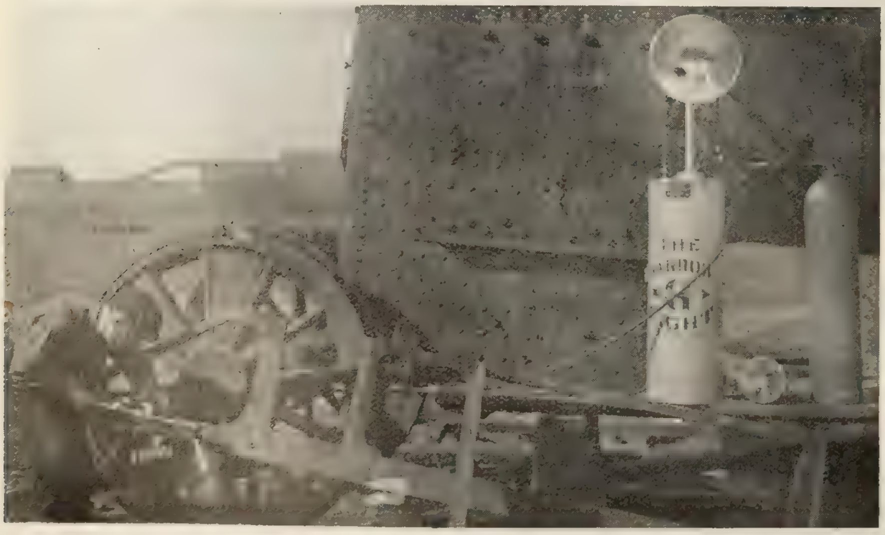


FIG. 2 PORTABLE LIGHT AND ACETYLENE GENERATOR

PORTABLE LIGHT AND ACETYLENE GENERATOR.

THE Garrow light recently put on the market by The Canadian Fairbanks-Morse Co., is designed to meet the requirements of contractors, miners, and others for a portable acetylene flare light of high candle power. This light is also suitable for use as a generator for cutting and welding by the oxy-acetylene process. The outfit consists of a Garrow Light, a tank of oxygen and a "low-pressure" welding or cutting torch. Fig. 1 shows several structural steel shapes that were cut in an average time of one minute and Fig. 2 shows the cutting up of a locomotive. The tire and main frame were cut in less than two minutes and the 7½ inch steel shaft shown between the light and the oxygen bottle was cut completely through in seven minutes. Welding may be done at proportional speeds, while an advantage of the outfit is that an 8000 candle power light is available at all times when the work is being done in dark or confined places.

The apparatus as illustrated weighs 70 lbs. and uses 9 lbs. of carbide at a charge. This provides 50 cu. ft. of acetylene gas at a cost of about ½ cent per cu. ft. The light can be recharged in two minutes, and has a patented by-pass that burns any excess gas produced, obviating all danger or smell of escaping gas.

PAT. MAY 7, 1907 OTHER PATS PENDING. RUB-STEEL VALVE

RUBBER AND STEEL VALVE.

❖

COMBINATION RUBBER AND STEEL VALVE.

THE use of a special process by which rubber is securely and lastingly attached to steel enables the makers of the Rub-Steel valve to produce a valve which resists warping and twisting under high pressures, and possesses the desirable seating qualities of a rubber surface.

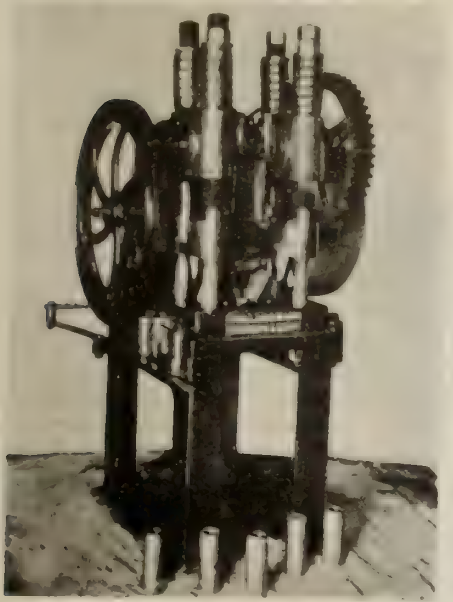
The construction consists of a plate of high-grade steel placed in the centre of the valve with a tough rubber composition on each side and edge. Because of the rigidity of form thus obtained, the surface of the valve retains its true normal position, and is not forced through the grating by high pressure. Its reduced thickness gives greater efficiency to the pump, and when pumping hot water, a softer valve may be used, thus securing a better seat on worn or uneven grids.

These valves are manufactured exclusively by Voorhees Rubber Mfg. Co., Jersey City, in four different grades covering all ordinary conditions as well as extra high temperatures, and condenser service. Canadian Fairbanks-Morse are Dominion agents.

* * *

SHELL BANDING PRESS

A SHELL banding press possessing interesting features of construction has been developed by Pullan & Mann, Leeds, Eng. The accompanying illustration shows the essential features of the machine which is operated mechanically on the lines of an ordinary power press, with eccentric rod and crosshead. The eccentric shaft is carried in bearings cast integral with the main frame and is driven through heavy spur gearing from the pinion shaft which extends across the frame, one end carrying the tight and loose pulleys and the other a suitable flywheel.


SHELL BANDING PRESS.

The dies which compress the band are three in number, two being mounted on the base plate and the third being fastened to the crosshead, which is moved up and down by the eccentric rod and is guided by four tie rods as shown. At the upper ends of the tie rods are mounted four heavy coil springs which receive the upward thrust from the eccentric rod, the main frame being flexibly connected to the base plate to allow of a slight upward movement when the compression on the band reaches a maximum.

Spring tension is adjusted by lock nuts on top of the rods, while the position of the upper die at the lower end of stroke is adjusted by lock nuts on the outer pair of the rods below the eccentric shaft bearings. A belt shipper handle is provided at the left side of the machine which delivers a number of blows on the band, the shell being turned around to distribute the pressure.

* * *

CORE MAKING MACHINE FOR GENERAL WORK

THE core making machine shown in the accompanying illustration is capable of making cores from 1 in. to 14 in. long, and will fill boxes using 200 cu. in. of sand. The sand is supplied by an elevating and feeding device by means of which the supply of sand is regulated to suit the core being made.

Compressed air is used for supplying the sand to the core boxes, which are filled at the rate of eight per minute regardless of the size of core in each box, the number of cores contained in any one box being limited by the size of box which the operator can handle at the speed of the machine. Surplus air escapes from the core immediately after the box is filled, leaving the core porous, firm, and strong. The presence of air in the sand when being compressed provides a natural vent for the gases to escape by when the casting is poured.

Cores may be made of sharp sand, loam sand or green sand, using any satisfactory binder except excessive flour. The air pressure required for sharp sand cores is from 80 to 90 lbs. per sq. in. and with loam sand, 100 to 115 lbs. per sq. in. The core box is automatically clamped in position to receive the charge of sand, as also the sealing of the ends and the clamping of the box together sidewise.

The mechanical operation of the machine requires about one horse-power, while approximately 12 cu. ft. of free air are necessary for the pneumatic operation. Its use is not confined to straight cores, but includes all general work of specialty manufacturers also.

The builders of this machine are Wm. Demmler & Bros., Kewanee, Ill.

* * *

BIG INCREASE IN TRADE

AN increase of nearly half a billion in the total trade of Canada is indicated by preliminary trade figures covering the 12 months ending with May last which have been issued by the Trade and Commerce Department. The total was $1,563,230,513.

As regards exports, the total this year was $820,000,000 as against $432,000,000 in 1915, and $358,000,000 in 1913. The greatest increase is in the export of manufactured goods, which has risen from $54,000,000 in 1915, to $261,000,000. Agricultural produce rose from $45,000,000 to $107,000,000; mine products from $57,000,000 to $68,000,000, fisheries from $16,000,000 to $23,000,000, products of the forest from $43,000,000 to $52,000,000.

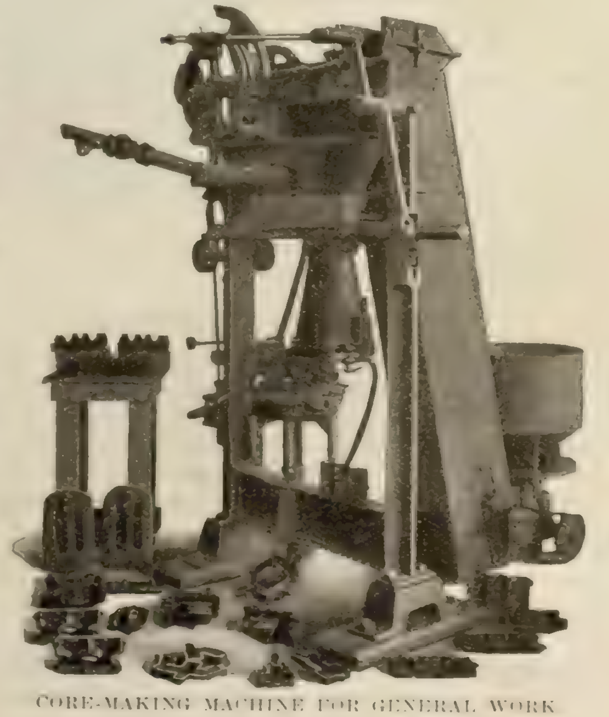
The greatest increase has been in exports to Great Britain, mostly of war supplies, the total being $518,000,000, as compared with $180,000,000. However, that this prosperity is not all war-produced is evident from the fact that exports to the United States also increased from $167,000,000 to $337,000,000. There was also an increase to France from $3,000,000 to $37,000,000.

There was a decrease in imports, those of dutiable goods dropping from $447,000,000 the year before the war to $321,000,000, the chief decrease being in imports from Great Britain, which fell off from $143,000,000 before the war to $86,000,000.

* * *

As early as 1882 a State deputation from Ohio visited the Canadian National Exhibition looking for pointers and they have been coming from various States ever since, many of the United States fairs being modelled along Toronto lines.

Legislation was once threatened to prevent Toronto holding an Exhibition except in years specified by the Ontario Government. Fortunately, the matter never reached the House.


CORE-MAKING MACHINE FOR GENERAL WORK

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OUR MUNITIONS PRODUCTION SHORTAGE—WHY?

OFFICIAL intimation has been made that munitions production in Canada has developed an unhealthy tendency. In a word, the output of shell parts is away below what it should be, and therefore scheduled shipments of completed shells—large and small—are not being maintained. The unfortunate situation may be said to arise from a variety of causes, each contributing its quota, and all, of course, bearing towards the undesirable. Raw and semi-finished materials entering into the manufacture of shells, labor shortage, and prices current which Canadian manufacturers receive, constitute, we believe, the main directions in which to seek the remedy.

In the matter of steel, the contracts already placed and those awaiting disposal among our shell-forging and machining plants surpass the capacity of our steel mills to produce on schedule, with the result that we are more or less dependent on U.S. steel mills to make good the shortage. These, of course, as is well known are also taxed to capacity to meet not only the munitions demands of their own forging and machining plants and the direct requirements of the Allied Nations, but those of a domestic nature in addition. To say that fancy prices are being realized for munitions material by the steel mills is quite a mild way of expressing oneself.

Male and Female Labor Problems

Regarding labor shortage and possible labor inefficiency both may be said to be existent, and the former possessive of a tendency to still further acuteness. While recruiting for overseas service has denuded our metal-working plants of a large proportion of what may be termed their regular employees, it has at the same time made replacement and augmentation a problem of considerable magnitude, the double contingency appearing at a time when the opportunities for forging and machining plant capacity outputs are without parallel.

The introduction of female labor is being sought as the remedy, both with the idea of filling the places of men who have enlisted and of making possible in due time the enlistment of other eligible men. In a number of plants this dilution of labor, as it is called, is already in practice, and not only are great things expected of it, but a tendency to something like rampant enthusiasm is abroad to foster it, especially by the executives of Women's Societies and Associations. A disposition is apparent as a result to find fault with and criticize our metal-working plant administrations for their caution, shall we say, in ushering in and developing the scheme. The place and part that women are taking in munitions manufacture in Great Britain are being given the necessary prominence by way of making the appeal to our plant managements of the greatest possible effect; unfortunately, however, for those making the appeal a limited knowledge of the circumstances there and here is at best available.

Plant Adaptation to Female Labor

There are, we believe, no Canadian manufacturers of munitions but would welcome the assistance of female labor. Their plants are, however, in the great majority of cases wholly unsuited for the purpose, and just here it should be noted that women munitions workers are most largely employed in Great Britain in specially designed and equipped national factories, the origin and establishment of which has been a wartime development. Canadian munitions manufacturers are face to face with the problem of erecting and equipping either wholly new plants or of making extensive and expensive additions to those already existing, and just to what length and under what circumstances they are prepared to commit themselves, brimful even of patriotism as they have proved themselves to be, outsiders may not judge.

As to our reference to labor inefficiency, such a condition has in some measure contributed to the falling off in output, particularly in the steel mill and forging departments. Here, however, perhaps extenuating circumstances may justly be pleaded, as more or less continuous tropical weather has been quite generally experienced in recent weeks. Under any weather circumstances, the men engaged in the departments indicated, no matter how exemplary the provision for their welfare, may be said to be highly susceptible to at least a temporary relaxation of effort.

Munitions Contract Prices

The prices current which Canadian manufacturers receive for shell parts, shell forgings, shell machining, etc., are, we believe, contributing quite as much as anything else to our diminished output. In the early days of shell-making in Canada, fabulous and extravagant prices were reckoned to have been paid our forging and machining plants. It looks as though we had now gone to the opposite extreme. Dissatisfaction exists, we understand, with the prices at which shell machining, shell forging, and shell part contracts are now being let, all the way down from the largest to the smallest, and so much so as to breed indifference regarding acceptance of orders. This war is to be won in our steel mills, in our forges and in our machine shops, and a price has got to be paid. The men who manage our plants are men of business and realize that as the successful conclusion of this war is now a business enterprise, it must needs be conducted according to the ethics of sound business. In a word, to do their part and sustain it to the bitter end, the prices paid must be commensurate with the manufacturing feature of the task.

Reverting to the employment of female labor in our metal-working plants, the solution is right up to the Imperial Munitions Board if Great Britain's achievement is to be emulated. The prices current for shells and shell parts for production in Canada are also due to receive the Board's immediate attention.

INDUSTRIAL NOTABILITIES

PERCY C. BROOKS, vice-president in charge of manufacturing, the Canadian Fairbanks-Morse Co., Toronto, was born at Memphis, Tenn., March 24th, 1872, the son of Edward W. and Eliza (Ralston) Brooks. He was educated at the Military Academy, the University of Georgia, and at the Georgia School of Technology. His engineering career began in 1892, and, six years later, in 1898, he became associated with the Fairbanks-Morse Co. as assistant to the president at Beloit, Wis. In 1906 he was appointed general manager at Toronto, and in 1910 was made vice-president of the Canadian enterprise.

PERCY C. BROOKS

Mr. Brooks married Edith King, daughter of Henry King, of New York City, on February 14, 1914, the family consisting of one daughter. His clubs are Lambton Golf, R.C.Y.C., Economics, Hartley Bay Hunting and Fishing; his societies, the A.F. & A.M., and his recreations, golf, fishing and shooting. In politics Mr. Brooks is Conservative and in religion a Presbyterian. His residence is Parkview Mansions, Toronto.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh		$18 70
Lake Superior, charcoal, Chicago		19 75
Michigan Charcoal iron.		28 00
Ferro nickel pig iron (Soo)		25 00
	Montreal	**Toronto**
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain ..	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	**Cents**
Iron bars, base, Toronto	3.35
Steel bars, base, Toronto	3.35
Steel bars, 2 in. and larger, base..	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base ..	3.30
Bessemer rails, heavy, at mill....	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh....	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.25
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.10
Bars, 2 in. and up	4.00
Structural shapes	3.10
Plates	3.50

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. **C.L.**	**L.C.L.**
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	**Toronto**
Lake copper, carload ..	$31 00	$29 00
Electrolytic copper	31 00	29 00
Castings, copper	30 00	28 50
Tin	43 00	43 00
Spelter	14 00	12 50
Lead	8 25	8 25
Antimony	15 00	16 00
Aluminum	68 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	**Toronto**
Plates, ¼ to ½	$4.25	$4 25
Heads	4 50	4 50
Tank plates, 3-16 in.	4 75	4 75

WROUGHT IRON PIPE

Prices in effect Aug. 1, 1916

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 06	5 25
½ in.	3 91	5 57
¾ in.	4 72	6 96
1 in.	6 97	10 29
1¼ in.	9 43	13 92
1½ in.	11 28	16 64
2 in.	15 17	22 39
2½ in.	23 99	35 39
3 in.	31 37	46 28
3¼ in.	37 72	55 66
4 in.	44 69	65 95

Lapweld

2 in.	$17 02	$24 24
2½ in.	25 16	36 56
3 in.	32 90	47 81
3½ in.	39 56	57 50
4 in.	46 87	68 13
4½ in.	57 15	83 19
5 in.	66 60	96 94
6 in.	86 40	125 80
7 in.	116 62	165 40
8 in. x 25 lbs. per ft ..	122 50	173 80
8 in. x 25 lbs. per ft. ..	141 12	200 20
9 in.	169 05	239 80
10 in. x 32 lbs. per ft.	156 80	322 40
10 in. x 40 lbs. per ft.	201 88	286 30

List for Ontario, Quebec and Maritime Provinces.

OLD MATERIAL

Dealers' Buying Prices.	**Montreal.**	**Toronto.**
Copper, light	$15 50	$15 00
Copper, crucible	18 50	18 00
Copper, heavy	18 50	18 00
Copper wire	18 50	18 00
No. 1 machine compos'n .	14 50	14 00
No. 1 compos'n turnings	12 50	12 00
New brass clippings ..	13 00	13 50
No. 1 brass turnings ..	11 50	11 50
Heavy melting steel ..	9 00	9 00
Boiler plate	11 75	10 50
Axles, steel	14 50	15 00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	12 50
Shafting	16 50	16 00
Malleable scrap	10 00	11 00
Pipe, wrought iron....	10 00	9 00
Stove plate	10 00	10 50
Heavy lead	6 00	6 00
Tea lead	5 00	5 00
Scrap zinc	8 00	8 00
Aluminium	34 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	50
Stove bolts	62½
Plate washers	25
Machine bolts, ⅜ and less	40
Machine bolts, 7-16 and over ..	30
Blank bolts	30
Bolt ends	30
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron....	25
Machine screws, fil. head, brass..	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$4.85
Structural rivets, as above	4.75
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent.
Sq. & Hex Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	.65
Coupling bolts	net
Planer head bolts, without fillet	.15
Planer head bolts, with fillet	net
Planer head bolt nuts up to 1 in. ..	.60
Planer head bolt nuts, over 1 in. ..	.55
Planer bolt washers	list plus 10
Hollow set screws	list plus .20
Collar screws	list plus.20
Thumb screws	.20
Thumb nuts	.75

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh ...	$43 00
Open-hearth billets, Pittsburgh..	45 00
O.-H. sheet bars, Pittsburgh....	45 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3 75	$3 70
Cut nails	3 40	3 40
Miscellaneous wire nails	65%	
Pressed spikes, ⅝ diam., 100 lbs.	$3 90	

MISCELLANEOUS

Solder, guaranteed	0.27½
Solder, strictly	0.25½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	13.95
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	0.30½
Pure turpentine, single bbls., gal.	0.69
Linseed oil, raw, single bbls.	0.90
Linseed oil, boiled, single bbls.	0.93
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.11
Pure Manila rope	.0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	55
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	25
3-fluted drills over 1½ in.	15
Bit stock	55
Ratchet drills	15
Machine bits for wood	20
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	30
Sockets	30
Sleeves	50
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	4 60	4 50
Canada plates, dull, 52 sheets	4 50	4 50
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 45	6 45
Premier, 10¾ oz.	6 75	6 75

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$19 55	.....
1¼ in.	19 55	.....
1½ in.	19 55	14 00
1¾ in.	25 00	16 50
2 in.	25 00	16 10
2¼ in.	28 50	18 50
2½ in.	32 00	21 00
3 in.	40 00	25 00
3¼ in.	.....	27 00
3½ in.	45 00	29 00
4 in.	50 00	37 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.35 to .37
Tin	.55 to .58
Zinc	.20 to 23

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	1.75 to 1.90
Polishing wheels, bullneck.	.90
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14-.18
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Que., Aug. 14, 1916.—The general trend of our industrial activity is much the same as a week ago. Production (in many lines) which was affected owing to the extreme heat of the past few weeks, is gradually assuming more normal conditions and outputs are regaining the standard being maintained immediately previous. It is however, not expected to reach its high point for some time yet, as the holiday season is still on. Encouraging reports continue to arrive of crop conditions in all parts of the country, and railroads have been active in making preparations to handle the grain and in securing the help necessary to harvest the same. The steel situation is showing signs of improvement, and some lines are beginning to strengthen. Ship-building is active but handicapped for lack of steel plates and other necessary material.

Steel

The long period of steadiness, which has prevailed in steel for a couple of months, is showing signs of breaking, but in an upward direction. Indications point to a number of advances, the market undoubtedly gaining strength, and some lines already showing increases. There is no abatement in demand and the mills are still heavily taxed to meet requirements. Foreign inquiries for billets and bars are relatively heavy, and an apparent shortage for prompt delivery has developed, with a corresponding stiffening of the market. In some cases consumers are meeting the situation by using first class shell steel discards. Pittsburg quotations on open hearth steel have been advanced $2 a ton. A similar advance has been, by some producers, placed on structural material. The situation in plates is becoming tighter and an advance of $2 per ton went into effect on Aug. 4. Sheets are fairly active, the demand for blue annealed being good. Owing to the condition of the spelter market, it is expected that galvanized sheets will weaken, but no change has as yet developed. This is due to the fact that the recent collapse in spelter has not yet reached the sheet product; however, unless a firmer tone is soon shown declines are looked for. Even should spelter become stronger, some slight decline in galvanized sheets is not unlikely. Inquiries for wire and wire products show an improvement, an advance of $2 being recently put into effect on the American market. Local dealers however, in the expectation of a stronger market are holding prices firm. The demand for boiler tubes, is taxing the capacity of many mills, bookings in some cases being as much as a year in advance. The local situation is unchanged, but dealers are expecting to revise some of their lists.

Machine Tools and Supplies

The general situation throughout the machine tool industry has shown little change. The activity recently developed by the demand for the larger tools, required for the manufacture of the heavier shells has apparently passed its maximum and indications point to a gradual decline from now on. However, a fair amount of business is still passing. Considerable interest is being shown in the domestic demand, which has grown to a very encouraging volume. The requirements of the trade still call for large quantities of machine tool accessories and supplies. The situation in this respect is however, not as tense as a few month ago, and delivery on all needed equipment is more prompt, in many instances prices are also easier.

No great change has taken place in the metal situation. Increased activity has given a better tone to copper. Tin is quiet and unsettled. Spelter is weaker in an indifferent market. Antimony continues dull, with prices easier.

Copper.—Increased activity is noted in the copper situation and higher prices are expected. Negotiations for large supplies of copper by the British Government have been concluded, and it is expected the quantity of metal under contract will be about 150,000 tons, delivery to extend throughout all next year. It is also certain that other Allied Governments have been buying heavy. The trend of the market with prospects of a further advance has created an additional demand from domestic consumers, the buying movement as a result being more general. The increase in the volume of war orders has necessitated manufacturers covering their copper requirements. The demands being made upon producers for early delivery are very heavy, and it is almost impossible for the refineries to fill orders for short period shipment. With the total disappearance of second-hand metal and the existing high pressure it is more than likely that quotations will show further advances. London reports a very strong market, with prices going up. Standard spot is quoted at £117 10s., being an advance of £5 10s. during the week. Futures have advanced a similar amount, and are quoted at £109 10s. Electro spot at £124 shows an advance of £1 per ton. New York market is active, with prices advancing. Prime lake is ⅛c stronger, and is quoted at 26½c; electrolytic is firm at 27c, but is expected to become stronger. Dealers here report a little increased activity, with prices holding firm at 31c for lake and electrolytic, and 30c for castings.

Tin.—The market at present is a little unsettled, due to increased difficulty in obtaining shipping permits. This is causing a little uneasiness among American buyers, and the tone of the market is a shade stronger. If excessive buying should develop it is anticipated that tin will advance. Prices on futures are hard to obtain, as sellers are dubious of quoting under present market figures. Recent advances on the London market denote a rising tendency, a £3 10s. advance on standard spot and futures, and £3 on Straits spot having placed the current prices at £171, £172 and £171.10s. respectively. New York reports an advance of .825 cents per pound, the quotation being 38⅝c. Dealers here report a steady market at last week's price of 43c per pound.

Spelter.—A revival in the foreign demand for spelter, which resulted in considerable buying, has placed the market in a somewhat unsettled condition, and domestic consumers are showing a little uneasiness as regards the situation.

Owing to the relapse recently experienced, both galvanized and brass interests have been fairly heavy buyers, and the requirements of the markets abroad, if heavy, may result in a stronger market, with a corresponding increase in price. Just what the exact position is at present is difficult to say, as the movement now on may prove to be of short duration, like that of a few weeks ago. It is safe to say that producers are not over-exerting themselves in stocking the market at present prices, as in some instances, small producers can make little or no profit under existing conditions. A slightly stronger market in London has resulted in an advance of £2 on spot and £1 on futures, the latest quotations being £49 and £43 respectively. New York, however, while apparently active, has declined to 8.675 cents, a drop of ⅛c per pound. The local situation is unchanged, with prices firm at 14c per pound.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

Lead.—The decline recently noted in the price of lead has not resulted in a very heavy demand, as was anticipated, although considerable buying has been reported. Consumers are under the impression that lead will be still lower. It is understood that while both the Trust and outside interests were nominally on the same basis, sales were made by the latter at a lower figure. It is, however, generally believed that the independents will again return to the basis of the Trust price. London reports a better demand and quotations show a slight advance—15 shillings on spot and 12 shillings on futures, or a basis of £29/5 £28/12½ respectively. The nominal price on the New York market remains firm at 6c. Local dealers are quoting 8¼c on a fairly steady market.

Antimony.—The market continues to weaken, despite the fact that buying has recently shown a little improvement. Holders of metal are apparently anxious to dispose of it even at a loss, as quite a number have considerable stock on hand, for which they paid almost double the price they can get for it now. New York quotations have again declined 2c, being quoted at 10½c per pound. Dealers here are asking 15c on a very weak market, a decline of 1c per pound.

Aluminum.—The situation is unchanged, and prices are firm at 68c per pound.

Scrap

Few developments have taken place in the scrap situation. The strength being shown in the steel market is not yet re-

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department is able to present the following list of the moreimportant British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL

Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE

Valparaiso, British Consul General.

COLOMBIA

Bagota, British Consul General.

ECUADOR

Quito, British Consul General.

EGYPT

Alexandria, British Consul General.

FRANCE

Havre, British Consul General.
Marseilles, British Consul General.

INDIA

Calcutta, Director General of Commercial Intelligence.

ITALY

Genoa, British Consul General.
Milan, British Consul.

MEXICO

Mexico, British Consul General.

NETHERLANDS

Amsterdam, British Consul.

PANAMA

Colon, British Consul.
Panama, British Vice-Consul.

PERU

Lima, British Vice-Consul.

PORTUGAL

Lisbon, British Consul.

RUSSIA

Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN

Barcelona, British Consul General
Madrid, British Consul

SWEDEN

Stockholm, British Consul.

SWITZERLAND

Geneva, British Consul.

URUGUAY

Monte Video, British Vice-Consul.

VENEZUELA

Caracas, British Vice-Consul.

flected in old materials, and, with the exception of steel axles, which have advanced 1½c to a basis of 14½c per pound, general quotations are reported by local dealers as steady. Old copper has advanced ½c per pound, being now 15½c for light copper and 18½c for crucible, heavy and wire.

Toronto, Ont., Aug. 17.—The falling behind in the deliveries of munitions is the subject of a statement recently given out by the Imperial Munitions Board. The shortage of production is largely due to the inadequate supply of sufficiently skilled labor, which is adversely affecting not only the machine shops, but also forging plants and factories making component parts. It is absolutely essential that all those engaged in the manufacture of munitions should co-operate in order to secure an increased production of munitions. The shortage of labor is also hampering other industries. The situation in this regard is becoming acute, and no serious effort has so far been made to relieve it.

Steel

Although easier conditions in the steel trade have been predicted, there is apparently little possibility of this taking place for some months, as there are now indications of considerable firmness in the market. This is evidenced by the recent advance in the States of $2 per ton on steel bars and wire, and higher prices on billets. The increased strength in the market is further indicated by the big contract for shell steel, amounting to 500,000 tons, recently closed in the States by representatives of the Allies. No statement has been made, and perhaps will not be for some time to come, as to the extent Canadian mills will benefit by this new buying movement, but it is fair to presume that they will get as much business as they are able to take care of. Production of steel in Canada this year will no doubt beat all previous records, and will probably run into well over one million tons. What may be termed ordinary business has been exceptionally good so far this month, considering the time of the year and owing to the otherwise industrial activity. With renewed strength in the market, prices are considerably firmer, and indications point to still higher prices on some steel products. Steel and iron bars have already advanced 10c per 100 lbs., and it is fully expected that plates will be affected in the near future. Prices of boiler tubes are very firm. The demand in the primary market is very heavy and deliveries extend well over a year. Wrought iron pipe is also very firm, and the skelp situation is unchanged. Wire nails have advanced 10c per keg, and are now quoted at $3.80 per keg base.

The sheet market continues irregular, with prices firm and unchanged. The demand for blue annealed sheets in the primary market is unusually active, but black sheets are quiet. Sheet bars continue very firm, with the prospect of higher prices, while production has fallen off, due to the hot weather. The galvanized sheet market is unsettled, but quotations are unchanged.

The steel market in the United States is stronger, due to heavy export demand; domestic buying is light for the time being. The contract for shell steel which the Allies have placed in the States calls for 500,000 tons of material, and includes billets, rounds and forgings, delivery to be completed by the end of July, 1917. The prices range from $40 to $90 per ton, according to quality of the steel, making an average price of $67.50 per ton. The market is very active, and the general opinion of producers is that another buying movement has started. Many domestic consumers are said to have not covered their requirements for steel on business booked, and shell steel, plates, bars, etc., are now being sought in large quantities. These orders must eventually be placed, which will tend to strengthen the market still further. The United States Steel Corporation reports unfilled tonnage on hand on July 31 at 9,593,592 tons, a decrease of 46,800 tons, as compared with 9,640,458 tons on June 30.

Pig Iron

The situation in the pig iron market is unchanged, and the consumption of steel-making grades of iron continues exceptionally heavy. The production of pig iron in the first half of this year was 40 per cent. ahead of the production in the corresponding period of 1915, and 11 per cent. ahead of production in the last half of that year. It is predicted that the output for this year will exceed the high record of 1913.

Scrap

The market continues dull, with little of interest to note. Prices remain steady and few changes of importance have been made. Heavy smelting steel is quiet, although the demand continues heavy. Copper and brass scrap are firm and unchanged, while quotations on both lead and zinc have a weaker tendency.

Machine Tools

Interest continues to be centered on munition contracts, and a number of inquiries have been received recently by local machinery houses for tools for machining large shells. While business continues good, it is not as active as it was, the reason being, of course, that many munition plants are fully equipped. Orders being placed now are largely confined to heavy duty lathes.

Supplies

Business continues brisk and prices steady but firm. Iron, steel and brass supplies are particularly firm, and an advance in some lines is looked for. An advance has been made in some lines of hack saw blades; mounted grindstones have also advanced. Soldering coppers have declined 2c per pound. Linseed oil and turpentine are both unchanged and firm. Gasoline and benzine have declined 1c per gallon following three reductions in the States in the price of crude oil, making a total of 25c per barrel. Canadian crude has declined 5c per barrel.

Metals

With the exception of copper, the metal markets generally have been dull and weak during the past week. Business is rather quiet, which may be expected at this season of the year. The undertone in the copper market is very strong, due to heavy demand for this metal for munitions. The demand for tin continues light and prices are receding. Spelter is also weak, with a small volume of business. Lead continues weak, with the outside market now lower than the Trust price. Antimony has declined again and the market continues weak, but aluminum is unchanged. Solders have declined following the reduction in prices of lead and tin.

Copper.—Quotations continue nominal, but the market is stronger on account of increased demand. It is reported that representatives of the Allies are negotiating for a large amount of copper with the leading U. S. producers for delivery over all of next year. There is practically no spot copper to be had, and much of the production to the end of the year has been disposed of. The market has a strong undertone and higher prices are not unlikely. Local quotations are unchanged and nominal at 29c per pound.

Tin.—Although the market is higher in London, quotations in New York are unchanged; the market, however, is weak. Large sellers are not pressing metal on the market, while consumers are not displaying much interest in tin. Local quotations are lower at 43c per pound.

Spelter.—The market continues weak, with light demand. Galvanizing interests have been buying fairly freely. Spelter has declined locally, and is now quoted at 12½ per pound.

Lead.—Business has been quiet, notwithstanding the recent reduction in price by the Trust to 6c, New York. The outside market is a shade lower, but there is some possibility of a reaction. Lead quotations are unchanged at 8¼c per pound.

Antimony.—Prices are still nominal, and the market continues weak. Antimony has declined 3c locally, and is now quoted at 16c per pound.

Aluminum.—The market is quiet but

firm, with quotations unchanged at 68c per pound.

Solders.—Quotations have declined 1c per lb. following the lower prices on lead and tin. Guaranteed is quoted at 27½c, and strictly at 25½c per pound.

◆

LACHINE CANAL TRAFFIC IN JULY

ALTHOUGH the ten days that the Lachine Canal was practically closed to navigation and the water-borne stream of freight entering and issuing from Montreal, thereby interrupted, the totals for the month of July are nevertheless interesting in that they show certain changes in the tendencies of trade. For example, the 1,589,432 bushels of wheat brought down through the canal during last month only lack 283,235 bushels of reaching the total for July in 1915, and this is the more noticeable in that so far this year the monthly totals have been almost half of those for 1915. If there had been no hiatus in the daily receipts, it is believed that July's total this year would have exceeded the same month in 1915 very decidedly.

Grain, Produce, Coal

The total grain received last month was 3,381,363 bushels, an increase of 122,503 bushels. The delay caused by the trouble in the Lachine Canal will show its effect more in August than in July as the boats which were delayed did discharge their cargoes in July, but they will be later in their next return trip. In addition to wheat the only grain to show a decrease for July was barley, 306,196 bushels having come down the canal, as against 391,906 bushels for the same month a year ago. Other grains showed increases as follows: Corn, 340,853 bushels, against nothing for July, 1915; oats, 948,152 bushels, an increase of 66,730; rye, 81,000, an increase of 57,865 bushels; and flaxseed, 49,000 bushels, an increase of 26,000.

For the whole season to date, however, 1916 falls 8,992,839 bushels short of 1915 in the total amount of grain brought down, the figures being 11,920,617 bushels and 20,913,456 bushels.

In produce the only increase shown is in the total of 1,073 packages of butter, as against 1,049 for July, 1915. Other statistics in this department for last month are as follows: Flour, no sacks, as compared with 1,400 a year ago; eggs, 1,785 cases, 485 cases less than in July, 1915; cheese, 42,097 boxes, a decrease of 1,247 boxes.

Coal still maintains its lead, the 220,042 tons brought down last month being 34,427 tons in excess of the figures a year before last month.

Vessel Trips and Passengers Carried

Other statistics of interest follow for the months of July in 1915 and 1916 respectively: Trips, 1,143 and 1,094, decrease 49; tonnage operated, 593,509 and 582,015, decrease 11,494; passengers carried, 22,656 and 22,299, decrease 357; cargo tonnage, 452,033 and 471,061, increase 19,029; light trips, 379 and 357, decrease 22. When it is considered that the warm weather during the time the canal was closed was ideal for the Rapids trip, it is evident that last month showed up better for passengers than July in 1915 in spite of the slight decrease.

From 1858 until 1878 the Toronto Fair was held in the old Asylum grounds on King Street West.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address, Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia.

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Poschad 9, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Brockville, Ont.—The Canadian Briscoe Motor Car Co., will build an addition to their plant here.

Sherbrooke, Que. — The Canadian Ingersoll-Rand Co., will build a large addition to their machine shop.

Welland, Ont.—The Canadian Steel Foundries, Ltd., will build a forge shop at their plant here to cost about $6,000.

Welland. Ont.—The Electro Steel & Metals, Ltd., will build an extension to the foundry at a cost of about $10,000.

Brantford, Ont. — Another important industry, the Dominion Steel Products Co., is now practically assured for Brantford. The City Council, at a special meeting on Aug. 10, granted the company a fixed assessment of $10,000, to run fourteen years. They will locate in Holmedale, where options have been secured on suitable available property. The Company propose erecting a factory to cost about $50,000.

Municipal

Lyall, Man.—The Town Council will construct an electric light and power plant at a cost of $8,000.

London, Ont.—The City Council will call tenders for a number of pumping units for the waterworks system.

St. Mary's, Ont.—The Town Council are considering the advisability of installing a septic tank sewage disposal system at a cost of $15,000.

London, Ont.—The City Council are considering the installation of a water wheel, electrical generator and 250-h.p. pump for the waterworks. Estimated cost, $15,000. General Manager, E. V. Buchanan.

Toronto, Ont. — The York Township Council contemplate extensions to the water distribution system. The engineer Frank Barber has been instructed to prepare plans for 24 in.. and 12 in. water mains.

Watford, Ont.—A bylaw to issue $10,000 in debentures to pay for the installation of a hydro system here carried almost unanimously on Aug. 1. Construction of a line will be commenced at once.

Hamilton, Ont.—The City Council has voted in favor of improving the waterworks system and will send a special delegation to other cities with a view to ascertaining the best means of accomplishing this end.

Hamilton, Ont.—The recommendation of the Works Committee that a 20-in. water main be constructed on Main Street at a cost of $11,468, has been adopted and the Board of Control instructed to purchase the necessary right-of-way.

Hamilton, Ont.—A gas expert at a cost not to exceed $3,000 will be engaged to come here and go over the gas fields from which Hamilton's supply is obtained and report on the possibility of a supply in the future, and on the advisability of increasing same by the addition of coke gas.

General Industrial

Sarnia, Ont.—An American concern contemplate establishing a dye works here.

Walkerton, Ont.—The Canada Spool & Bobbin Co., is having plans prepared for an addition to its plant which will increase its capacity over 50 per cent.

Trade Gossip

The International Engineering Co., Amherst, N.S., have sold two 600 h.p. water tube boilers to the Goodyear Tire & Rubber Co. for their plant at New Toronto, Ont.

Niagara Falls, Ont.—Mrs. Thompson, wife of J. Enoch Thompson, Spanish Consul at Toronto, opened the aerial tramway over the Whirlpool, constructed by the Niagara Spanish Aerocar Co., on August 8.

Canadian Vickers Co.—The London Times understands arrangements are being made for an issue of a million pounds sterling 6 per cent. debentures on behalf of Canadian Vickers Co. It is believed the issue will be redeemable by a sinking fund during a period of twenty years.

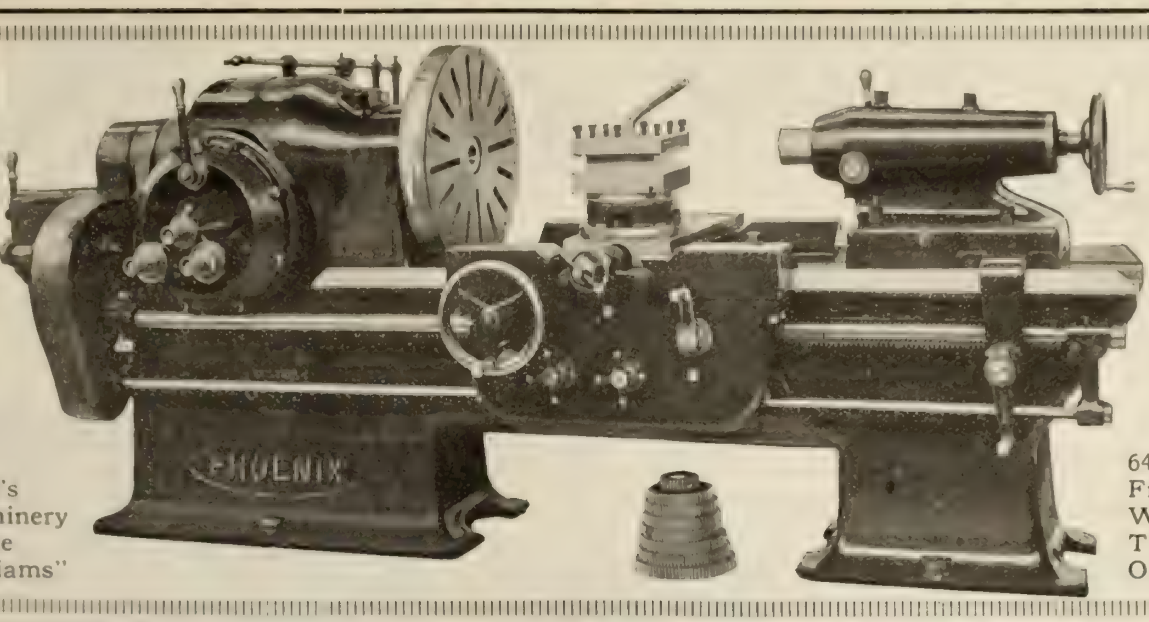
Business for Canada.—It is reported from London, England that Canadian Trade Commission which has been conducting a campaign in the interests of Canadian business, has carried out its mission most successfully. It was announced to-day that 1,700 forms have been filled in by British manufacturers and merchants who pledged themselves to purchase from and sell to Canadian houses the goods which were formerly purchased from and sold to enemy countries.

Ontario Steel Products.—The retiring board of directors of Ontario Steel Products was re-elected at the annual meeting, held recently at Gananoque, Ont. The board is as follows:—W. Wallace Jones, Toronto; Dr. N. C. Jones, Toronto; J. T. Richardson, Toronto; W. T. Sampson, Gananoque; D. Ford Jones, Gananoque; F. P. Jones, Montreal; F. Bacon, Montreal; Kenneth Nelson, Montreal; W. M. Byers, Gananoque. The officers are—President, W. Wallace Jones; vice-president and general manager, W. T. Sampson; secretary-treasurer, F. Petch.

Huge Steel Contracts.—It is reported from New York that contracts calling for 500,000 tons of shell steel, and valued at $34,000,000 were closed on August 11, between representatives of the Allies and the United States Steel Corporation, acting with several large independent companies. This business is the largest steel contract placed since the war began. The order includes semi-finished (billets), rounds and forgings, and delivery is to be completed by the end of July, 1917. The material will be used abroad in the manufacture of high explosive shells.

Oil-bearing Shales.—A proposal has been submitted to the Dominion Government asking that it encourage the development of the oil-bearing shales, of which there are known to be large deposits in New Brunswick, in parts of Saskatchewan and Alberta, and to some extent also in British Columbia. These shales exist not only in commercial quantities, but the resources are so rich as to provide for a considerable part of Canadian requirements, according to Louis Simpson, of Ottawa, who has made an exhaustive study of the subject. It is hoped by this means to reduce the price of gasoline.

Big Copper Purchase.—It is reported from New York that manufacturers supplying the Allies with munitions are negotiating for the largest copper purchase ever made in the United States. The amount required will be 250 million



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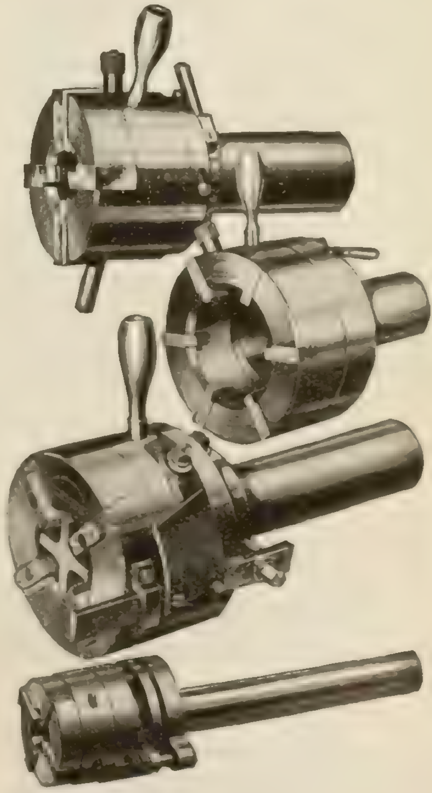


pounds about 15 per cent. of the country's entire prospective output for 1917. At present prices $70,000,000 will be involved. The agreement on prices is the only detail that is holding up the order. One of the principals in the deal is away from the city, and when he returns the order will be completed at once. This, it is expected, will be in about three weeks.

C.P.R. Tunnel Named.—At the request of Lord Shaughnessy, His Royal Highness the Duke of Connaught, Governor-General of Canada, has graciously allowed the tunnel, which the Canadian Pacific Railway bored under the Selkirk Mountains, to be named after him. The Connaught Tunnel, which is five miles long, double-tracked, gives the Canadian Pacific Railway the lowest grade of any transcontinental line through the Selkirks. His Royal Highness went through this tunnel on 17th July last, when the bore had been completed. This tunnel was bored in less than three years, and therefore, holds the world's record for tunneling. The permanent tracks are now being laid in the tunnel, and trains will be running through it very shortly.

C.P.R. Station Opened in Quebec.—At Quebec on August 10, the new C.P.R. station, the Palais, was opened under most auspicious circumstances. Nearly all Quebec turned out to witness the ceremony, and 250 specially invited guests were present at the luncheon provided in the new waiting room, which was artistically decorated for the occasion. A. D. MacTier, general manager of the Canadian Pacific, presided, and among those present were Major Lavigneur and Madame Lavigneur, Hon. T. Chase Casgrain, Hon. L. A. Taschereau, Minister of Public Works; Hon. N. Perodeau, M.L.C., and D. O. Lesperance chairman of the Quebec Harbor Commission, Dr. Reid, Minister of Customs and Acting Minister of Railways; Madame Casgrain, Sir Lomer Gouin, Premier of Quebec; Hon. J. S. Kaine, Hon. Geo. McCorkill, and F. L. Wanklyn, executive assistant of the C.P.R., etc.

Tenders

Carberry, Man.—Tenders will be received up to August 25, for the purchase of the following oil tanks and outfits: Two complete steel oil tanks, capacity 12,000 American gallons each with two pumps, piping, fittings and all connections. Apply W. D. Card.

Toronto, Ont.—Tenders for extension to Duncan Street sub-station, and addressed to Chairman, Toronto Electric Commissioners, will be received until August 30. Plans, specifications and form of tender may be obtained at the engineering offices, corner Duncan and Nelson Streets.

Ottawa, Ont.—Tenders for Incandescent Lamps, Public Buildings, Ottawa, Ont., will be received August 22. Specifications to be seen on application to Thos. A. Hastings, Clerk of Works, Postal Station "F," Toronto; to R. L. Deschamps, Overseer, Dom. Bldgs., Montreal, and to the Chief Architect, Department of Public Works, Ottawa.

Winnipeg, Man.—Tenders will be received until August 21 for the various works required in the completion of the New Parliament Buildings, and not included in the general contract. The words include structural steel, heating and ventilation, electrical conduit and wiring. Particulars may be obtained from S. C. Oxton, Deputy Minister of Public Works, Winnipeg.

Ottawa, Ont.—Tenders will be received until August 18, 1916, for the supply of filing cabinets for Dominion public buildings generally. Plans, specifications and forms of contract can be seen and forms of tender obtained on application to the office of Edwin Francis, caretaker, Post Office, London, Ont.; R. L. Deschamps, overseer of Dominion Buildings, Post Office, Montreal; Thos. A. Hastings, clerk of works, Postal Station "F," Toronto, and at the Department of Public Works, Ottawa.

Tweed, Ont.—Tenders will be received by the secretary-treasurer, High School Board, up to August 30, in whole or part, for the erection and completion of a high school building. Plans and specifications can be seen and all particulars procured at the architects' or secretary's offices. Ellis & Ellis, architects, Manning Chambers, Toronto; C. W. Huyck, secretary-treasurer, High School Board, Tweed.

Ottawa, Ont.—Tenders will be received up to August 24, for the construction of a reinforced concrete grain elevator with a capacity of 1,000,000 bushels. Plans, specifications and blank form of contract may be seen at the offices of the following: Chief Engineer, Department of Railways and Canals, Ottawa. Chief Engineer, Canadian Government Railways, Moncton Government Railways, Moncton, N.B. General Superintendent, Winnipeg, Man. Resident Engineer, Port William, Ont. John S. Metcalf Co., Engineers, Montreal, Que. Contractors who wish to obtain plans and specifications temporarily for their own use, may obtain same from any of the offices at which plans are on exhibition, on depositing a certified bank cheque in favor of the Canadian Government Railways for which will be refunded on the return of the plans and specifications.

Personal

C. T. Wimwood, who died at the home of relatives at Big Point, near Chatham, Ont., was a prominent mining engineer and mining operator. He was president of the Bisbee Copper & Development Co.

Sir George E. Foster, Minister of Trade and Commerce, sailed for Canada last Friday, on the steamer Missanabie. Previous to going on board Sir George delivered an address before the members of the Liverpool Chamber of Commerce.

Geo. A. Walkem, managing director of the Vancouver Machinery Depot, who recently left for England with the object of joining his Majesty's forces, has obtained a commission in the Royal Engineers, and has left for Egypt, where he will be stationed for the present.

William Yellowley, superintendent of the Canadian Locomotive Works, Kingston, Ont., died at his home on August 6 of heart failure, aged 57. He was a native of Newcastle, England, and had been with the locomotive works for over 15 years. Deceased was a clever inventor, and had put into operation a number of time and labor-saving devices. He devised two machines, which have materially increased the output of shells. Both are widely used in Canada, the United States and England.

Marine

Vancouver, B.C.—The Wallace Shipyard No. 1 is busy making preparations for the construction of a steel steamer for the Kishimoto Steamship Co., of Osaka, Japan.

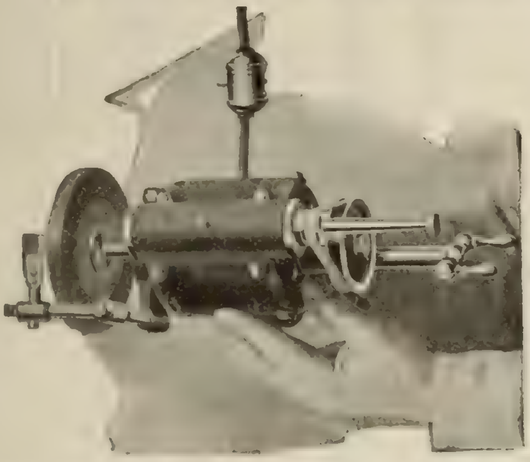
Victoria, B.C.—The keel of the first of the three ships under construction by the Cameron-Genoa Mills Shipbuilders, was laid down at the new plant on July 29. The keel is 225 feet in length over all.

Montreal, Que.—The work of strengthening by steel piles the coffer dam which has been built at the break in the weir waste of the Lachine Canal is progressing favorably and traffic has been resumed.

Vancouver, B.C.—A. Wallace, head of the Wallace Shipyards, states that the contracts had been signed for the construction of three more auxiliary schooners for the H. W. Brown Co. This makes six schooners to be built at the Wallace Yard No. 2.

The Vancouver Dredging & Salvage Co., have succeeded in floating the Japanese steamer Kenkon Maru, No. 3, which ran ashore near Mayne Island on January 12. The vessel has been placed

Aikenhead's DUMORE GRINDER



The DUMORE Portable Grinder. The only small grinder giving wheels the correct surface speed. Speed, 30,000 R. P. M.

Weighs only 17 pounds

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Valve stem does not pass through air chamber and therefore no packings are required.

Automatic cutoff guards against waste of air.

All details the result of many years' study in manufacturing and operating cranes and hoists of all kinds.

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Complete Foundry Equipments. Cranes of all Types.

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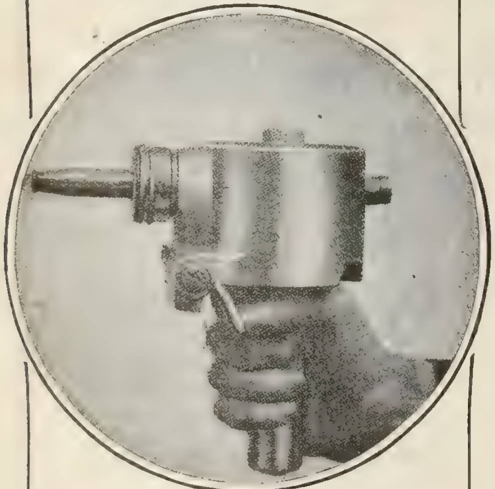

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Solves one of the greatest problems heretofore confronting the structural engineer, because it produces on iron or steel a permanent coating not susceptible to corrosion.

Carbons can be coated with copper, etc.

For full information write for booklet "D".

in drydock at Esqumalt, B. C., and will be repaired by the Victoria Machine Depot.

The Canada Steamship Lines' steamer "Moreland" is being rebuilt at Duluth, Mich. The Morland was wrecked in 1912 on Saw Tooth Reef, Lake Superior, and her stern, the only portion left intact, is being fitted to a new forward part, which will make the new steamer over 600 feet in length.

Chatham, N.B.—The trial trip of the new pilot motor schooner, Admiral Beatty, built at the Miramichi Foundry Shipyard, was held recently. The boat is 72 feet over all, has a beam of 18 ft. 4 in., and a depth of 7 ft. 6 in. She has a 50 h.p. Regal gasoline engine, and is equipped with the regular rigging of a vessel of her class. Accommodation is provided for a crew of 14 men.

Owen Sound, Ont.—The Provincial Government has purchased the small steamer Wawana and is having her converted into a motor boat with oil engines. A complete reconstruction of her deck houses is being made to afford accommodation for the officers and crew. It is expected that the power installed will make the boat the speediest craft in the lake service.

Lake Carriers' Advance Wages.—At a meeting of the directors of the Lake Carriers' Association in Cleveland, Ohio, on August 2, wages were marked up $10 a month for all men on boats below the grade of licensed officers, making a second general advance by the Association this season. An advance of 10 per cent. was made the men at the opening of the season. This action affects fully 10,000 men on the Great Lakes. The scale which was adopted is independent of the fall schedule effective in October.

A. B. MacKay of Hamilton, Ont., a well-known figure in lake shipping, has just purchased from the National Steamship Co., of Toronto, the steamer Natironco at a price not disclosed. The Natironoco is a steel vessel of about 1,600 tons dead weight capacity. She was built at Detroit in 1892, and was transferred to Canadian registry about four years ago. At present she is engaged in carrying grain and coal on the upper lakes.

Soo Canals Traffic.—Records of traffic through St. Mary's Canals were broken in July, when 14,048,404 tons of freight were carried, an increase over the previous record made in June of 1,087,935 tons; 254 more vessel passages were made, compared with July of last year. Shipments of grain showed greatest increases. In 1915 there were 2,398,662 bushels of grain, and 3,938,366 bushels of wheat. During July this year 13,349,113 bushels of grain and 31,907,803 bushels of wheat went through. Iron ore also shows increase of 2,547,023 tons over July, 1916. Of the total amount of freight, 2,629,439 tons passed through the Canadian canal, and the balance of 11,418,965 tons through the American.

Ottawa River Vessel Burned.—The pleasure steamer G. B. Greene, owned by the Upper Ottawa Improvement Co., which has plied the waters of the Upper Ottawa River for over a quarter of a century, was burned to the water's edge off her berth at Quyon on the morning of July 27. Four members of the crew, who were trapped below decks when the fire broke out, lost their lives. They are: John Stevenson, fireman, Luskville, Que.; Alcide Guertin, deckhand, Aylmer, Que.; Oscar Lapierre, deckhand, Quyon, and George C. Bryant, first mate, Mattawa. Owing to the age of the vessel, the fire spread so rapidly that no attempt could be made to stay its progress, and the members of the crew, ten in number, barely escaped with their lives by jumping overboard and swimming ashore. The fire was first noticed about 1.30 by one of the deckhands, A. Gibson, who awoke to find the cabin full of smoke. He at once gave the alarm and rushing on deck found the amidships part of the vessel a mass of flames, which had burned the hawsers holding her to the wharf. The boat was drifting out into the stream, with flames shooting from every part of her. So quickly did the fire spread through the ancient timbers that the crew, hurriedly awakened out of their slumbers, had to dash through a barrier of flames and smoke to the deck.

"Charles S. Price" Salvage.—Salvage work on the sunken steamer Charles S. Price, known as the "mystery ship," was abandoned on July 25, by the Great Lakes Towing & Wrecking Co. Captain Cunning, wrecking master in charge, left for Cleveland, where he will make a detailed report to the underwriters. It is now probable that unless some wrecker cares to take a chance on blowing up the Price for the junk that is in her the boat is on the bottom for all time to come. In a statement made just before leaving Capt. Cunning said:—"We have abandoned the work entirely on the Price. There is nothing but a scrap heap there, and during the two working days that divers have explored the hull we have become convinced that it would be impossible to float the hull without spending a fortune, and there would be nothing to show for the work but a pile of junk. The interior of the steamer, in the boiler and engine rooms, indicates that the boilers exploded. I do not say this is true, but it is probable, as the aft bulkhead is shoved forward and the machinery is wrecked and pushed to-

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We have the Steel, Equipment and Experience and can execute orders for

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Federation of the Empire. 1,200 Performers. 400 Musicians.

Gorgeous spectacle, symbolizing and epitomizing Imperial solidarity, power and cohesion. Mammoth scenic reproduction of British Houses of Parliament, Westminster Abbey and the War Office.

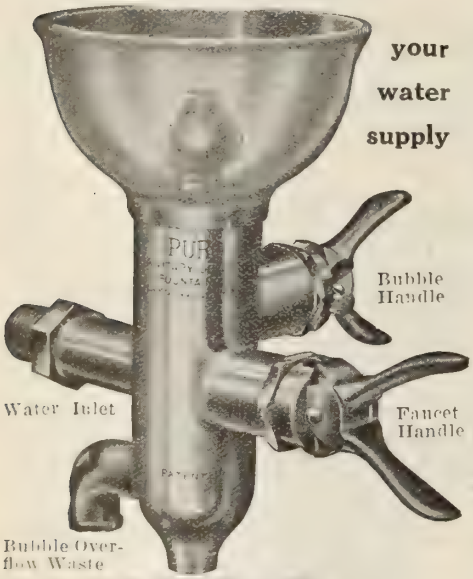
WAR—on land, in the air, on and under sea.

Scenes that have thrilled the world, re-enacted by Overseas troops. Model camp; trench warfare.

Anmer, the King's horse. Acres of manufactures. Glorious agricultural exhibits. Government exhibits and practical farm demonstrations.

wards the stern, indicating that an explosion or some other powerful agency tore everything to pieces. The aft section of the steamer is so badly damaged that repairs cannot be made under water. Our idea was to float the boat by compressed air, but with bulkheads broken and aft section damaged beyond repair, the air could not be controlled, and there was no chance. The aft and forward cabin sections are flat and part of the machinery is resting on the lake bottom. No bodies were found anywhere inside the hull, and if there are any in the vicinity they are so tangled up in the wreckage they never will be found."

"PURO -FY"
(MADE IN CANADA)



THE American Museum of Safety conferred a Gold Medal Award upon the Puro Sanitary Drinking Fountain at the First International Exposition of Safety and Sanitation.
The Puro Sanitary Drinking Fountain won because it deserved to win. Puro had merits that made it stand head and shoulders above any other drinking apparatus.

Safe Simple
SANITARY Economical
Quickly Attached

These are the qualities that forced the leading [illegible] sanitary engineers to pick Puro in preference to all others.
No drinking [illegible] is efficient that does not contain [illegible], and Puro was not [illegible] place. Puro was first.
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If the men in your factory must drink, give them a [illegible] drink.
Puro [illegible] rust or corrode.
Puro is [illegible]. It allows just the proper amount of [illegible] clean fresh water to come through the bubbler. No spurting, no overflowing [illegible]. Puro regulates itself. You can [illegible].
[illegible] in your factory and your [illegible].
We'll [illegible] what it will cost to "PURO-FY" YOUR WATER SUPPLY.

PURO SANITARY DRINKING FOUNTAIN
TRADE MARK
147 University Ave. TORONTO, ONT.

Railways—Bridges

London, Ont.—Traffic on the London & Port Stanley Railway has increased to such an extent that the Commission is preparing data so as to submit a by-law next January to secure money for double-tracking and increased equipment.

Brantford, Ont.—The building permit for the new Lake Erie & Northern station was issued here last Friday, subject to the carrying out of the award of the Dominion Railway Board in regard to the transfer of certain lands. Work on the foundation has started and the new station, which will be a handsome one, will cost $25,000. Schultz Bros. have the contract.

Contracts Awarded

Stratford, Ont.—The City Council have awarded the contract for construction of a steel water tower to the Chicago Bridge & Iron Works, Chicago. Approximate cost, $23,000.

The H. G. Vogel Co., of Canada, Montreal, has been awarded a contract for the installation of a sprinkler system at the Goodyear Tire & Rubber Co., plant at New Toronto, Ont.

Prince Rupert, B.C.—The City Council has let the following contracts for supplies required in connection with the new waterworks and power plant: Machinery, Canadian Fairbanks-Morse Co.; wood pipe, Vancouver Wood Pipe & Tank Co., steel pipe, hydrants, etc., Campbell, Gordon & Co., Vancouver; pipe fittings, etc., Letson & Burpee, Vancouver.

New Incorporations

The Milton Foundry has been incorporated at Toronto, with a capital of $40,000, to carry on a foundry business at Milton, Ont. Incorporators: A. Fasken, Duncan McArthur, and E. H. Brower, all of Toronto.

Feldspar & Clay Products has been incorporated at Toronto, with a capital of $1,500,000, to develop mining properties and treat ores and minerals of all kinds at Wiarton, Ont. Provisional directors are: T. M. Ferguson, J. P. Walsh and A. E. Kelly, all of Toronto.

Refrigeration

Galt, Ont.—In order to produce revenue from surplus water from artesian wells in winter months and as a means of preserving the health of the community, the Galt Water Commission is considering going into the business of making artificial ice.

Wood-Working

Magog, Que.—D. Audt's sawmill was recently destroyed by fire, the loss being estimated at $8,000.

Vancouver, B.C.—The Alberta Lumber Co., has ben granted a permit for the erection of a lumber mill to cost $100,000.

"HAWK'D" CHROME VANADIUM STEEL

Will Give You Exceptional

Shell Forging
Production

WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

There are many cases where each punch has turned out over 2,000 shells.

It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

Hawkridge Brothers Company
303 Congress St., BOSTON, MASS.
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Toronto, Ont.—The plant of Ewing & Murphy, wood turners, was completely destroyed by fire on July 25. According to an estimate made by Richard Ewing, senior partner of the firm, the loss entailed will be in the neighborhood of about $10,000. The loss is partly covered by insurance.

Catalogues

The Roller-Smith Co., New York, has issued bulletin No. 200 illustrating and describing fully the "Roller-Smith" portable direct reading bond testers.

Portable Ohmeters.—Bulletin No. 300 recently issued by the Roller-Smith Co., New York, describes and illustrates the "Roller-Smith" portable direct reading slide wire ohmeter in two types, the telephone and galvanometer type.

The American Pulley Co., Philadelphia, Pa., have issued a booklet entitled "Belt Pulleys" being a report of tests for belt slip. The booklet contains a description of testing apparatus, methods and results of test with five data sheets giving full particulars of the tests. There are also included a number of curves showing the slip for various types of pulleys.

Tumblers.—The Whiting Foundry Equipment Co., Harvey, Ill., have issued catalogue No. 120 illustrating and describing their line of tumblers and dust arresters for foundries. A brief specification is included covering the construction of the tumblers with detailed illustrations showing some of the parts, while the principal dimensions are given for the various sizes. Other lines dealt with include dry and wet cinder mills.

Foundry Ladles. — Catalogue No. 122, deals with a line of foundry ladles made by the Whiting Foundry Equipment Co., Harvey, Ill. The various types of crane ladles, crane truck and standard truck ladles, bottom tap ladles, etc., are illustrated and their principal features described. Tables are included giving the capacity and principal dimensions of the various sizes.

The Brown Hoisting Machinery Co., Cleveland, Ohio, have issued a catalogue dealing with the "Brownhoist" suspended concrete coal bins for power plants. The construction of the bin is described fully and a number of views are included showing several large installations. Other illustrations show the "Brownhoist" weighing larry and locomotive cranes in operation in connection with the coal bins. A list is included of some plants where bins have been installed.

Steel Shell Forgings or Billets of any size or weight will move any distance or about curves upon our specially constructed Gravity Carriers and Incline or Horizontal power devices. No labor required.

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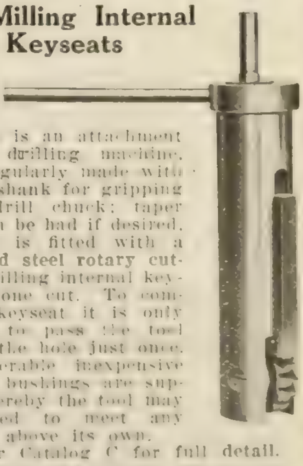

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for Milling Internal Keyseats

This tool is an attachment for the drilling machine, and is regularly made with straight shank for gripping in the drill chuck; taper shank can be had if desired. The tool is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. To complete a keyseat it is only required to pass the tool through the hole just once. Innumerable inexpensive eccentric bushings are supplied whereby the tool may be bushed to meet any diameter above its own.

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SPRINGS

are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

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Man'frs of "Barnes-made" Products
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Write us for prices.

Belt Pulleys by Charles A. Brinley. A reprint of a paper recently read before the Engineer's Club of Philadelphia and issued by the American Pulley Co., Philadelphia, Pa. The intention of the paper was to draw the attention of engineers to the question of pulleys for the transmission of power by belts, and to point out that there is more in the selection of pulleys of a proper type than has been commonly supposed. The conclusions were arrived at by means of a number of tests, particulars and results being given accompanied by charts showing the respective merits of various types of pulleys. A list of data sheets is included to which references are made in the text, and this list can be obtained along with the reprint upon application to the American Pulley Co.

The Vulcan Soot Cleaner Co., Du Bois, Pa., have recently published an attractive book dealing with the "Vulcan" soot cleaner as applied to boilers, superheaters, economizers, garbage destructor boilers, waste heat boilers and similar apparatus. The book is arranged in seven sections. Section 1.—"What Soot Really Is" points out the predominance of ash in most soot, and what happens if this is allowed to accumulate, not only as to reduction in efficiency, but by reason of the fusing and hardening of the deposit. Section 2.—"Why Clean Heating Surface Pays" gives the results of a large number of tests and investigations on the effect of soot deposit on efficiency of heating surface in boilers, superheaters and economizers, etc. Section 3.—"How Soot Cleaning Can Be Accomplished." Discusses the fundamental requirements of soot cleaning and what can be accomplished with hand-blowing. This is followed by a discussion of mechanical soot cleaning, which includes the principles of design of steam nozzles and their location in the boiler. Section 4.—Takes up the design of the "Vulcan" soot cleaner as applied to different types of water tube boilers. Section 5.—Is devoted to the "Vulcan" soot cleaner as applied to different types of fire-tube boilers. Section 6.—Is devoted to the application of "Vulcan" soot cleaners to economizers illustrating the design for both the straight and staggered tube types of economizer. Section 7.—"Details of Construction of the Vulcan Soot Cleaner," discusses the design of nozzles, anti-corrosion air relief valves and automatic tell-tale drain valves. The illustrations are unusually good and show the application of the "Vulcan" soot cleaner to various types of boilers etc. The frontispiece consists of a four-color reproduction of actual specimens of soot from different boilers and with different fuels.

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Book Reviews

Conservation.—A report just issued by the Commission of Conservation, entitled "Conservation of Fish, Birds and Game," directs attention to the great value of these resources to Canada. The volume is a report of the proceedings of a conference of the Committee on Fisheries, Game and Fur-Bearing Animals of the Commission, and contains a fund of information regarding the present condition and the necessity for protection of Canada's fish, birds and mammals. Canada is taking a prominent part in the international movement for the protection of wild life. A Migratory Bird Treaty between Canada and the United States is under consideration. Through the influence of the Commission of Conservation and other interests, bird reservations are being created, where the birds may find safe nesting and breeding places. The fur-bearing animals of Northern and Western Canada are being rapidly exterminated. This is clearly shown by the present report. To secure their more adequate protection, the Commission is advocating the amendment of the Northwest Game Act to place responsibility for its administration upon the Dominion Parks Branch, which already protects the animals in the Dominion National Parks. The future of the fisheries of Canada is dealt with in an able manner by the highest authorities in this country. That they are of great present value is recognized, but there is also a potential value in our oceanic and inland waters which, upon development, would mean the creation of new industries. To meet this condition, the Commission is suggesting vocational training and simple demonstration stations for the fishermen, that they may take advantage of the most practical and modern methods of their calling. The report is replete with illustrations applicable to the subject matter.

Mechanical Engineer's Hand-Book, by Lionel S. Marks, Editor-in-Chief, 1836 pages, ($4\frac{1}{2}$ in. x $7\frac{1}{8}$ in.) limp leather binding. Published by the McGraw-Hill Book Co., Inc. N. Y., New York. Price $5.00 net. This is the first edition of a handbook intended to supply both the practising engineer and the student with a reference book which is authoritative in character and which covers the field of mechanical engineering in a comprehensive manner. The general arrangement of the handbook is based on "Hutte" and is the work of a number of specialists with Professor Marks as editor-in-chief. The various contributors are authorities on the subjects which they have contributed, a guarantee that the information is not

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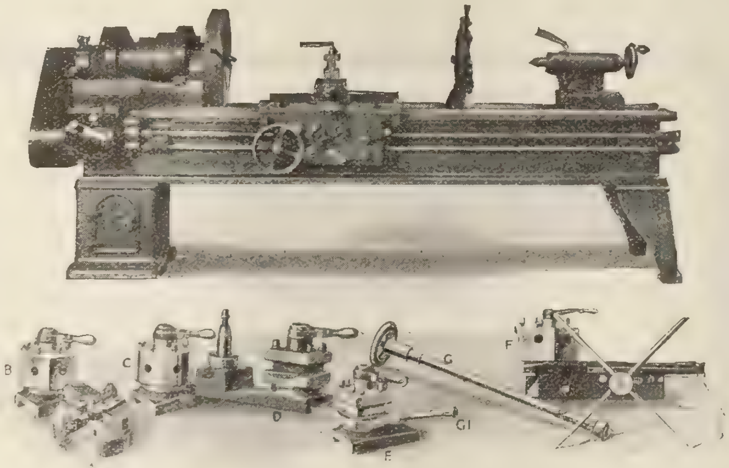

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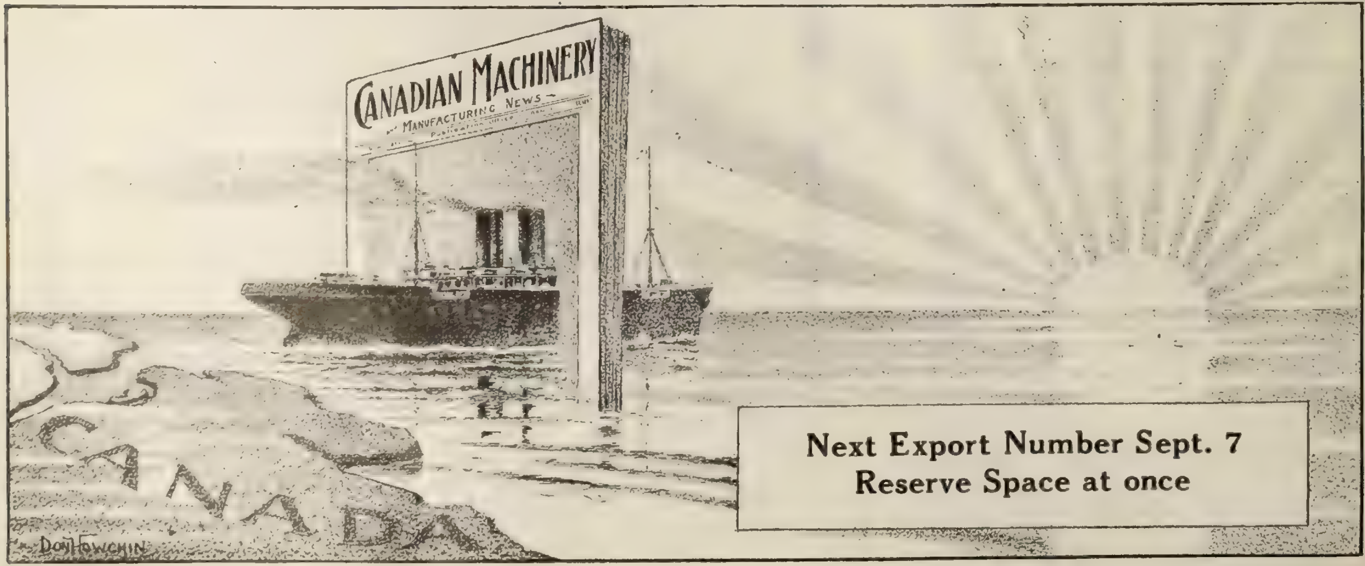
Grand Central Terminal Building NEW YORK, N.Y., U.S.A.

Prices lower than any other lathe of same specifications because of volume of manufacture and fixed low percentage of profit over actual cost of production.

only reliable but that it at the same time follows the latest practice. While the subject of "Friction" and "Hydraulic Turbines" follow "Hutte" closely with the addition or substitution of American engineering data, the greater part of the book, particularly those portions which deal with engineering practice, are entirely new. The handbook is subdivided into fifteen sections well defined, dealing with major topics, and readily located by means of a thumb index. The first seven sections are to a large extent of a theoretical nature while the remaining eight are devoted to more practical subjects. The handbook contains a large number of well arranged mathematical tables of considerable value. The illustrations of which there are about one thousand, including charts and diagrams, have been carefully prepared and form a useful feature of this work. Engineers and students will find this a most valuable handbook, covering a wide range of subjects and dealing with each in a comprehensive manner. In addition to the thumb index there is one of important reference tables and a complete alphabetical index.

* * *

War Office and C.P.R.—The purchasing department of the British War Office for Canada is purchasing very extensively through the system and machinery of the C.P.R., and up to May 1, had placed orders in this country for $13,000,000 worth of various general supplies, not including munitions. Since May 1, orders aggregating about $4,000,000 have been placed. The Canadian Pacific, through Sir Thomas Shaughnessy offered to the War Office to handle the distribution of these orders without any charge other than any actual expenses, so they will not have any bearing on the earnings of the road.



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An Ideal Locker for Clothes and Personal Tools

This combination Tool and Clothes Locker will be very useful to the mechanic because it provides ample space for clothes and a safe place for his tools.

Built for life-time service. Supplied in unit or group construction.

We also manufacture **STEEL SHELVING FOR ALL PURPOSES.** Drop a line for full details.

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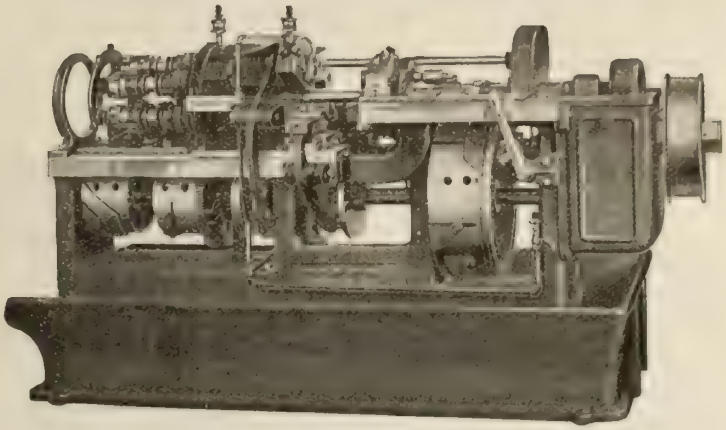
Features of
"New Britain" Six Spindle Automatic
Screw Machines



Tool and Forming Slides

THE TOOL SLIDE is of extremely rigid construction and so designed as to bring the ways on the center line. The latter are large and of such length that there is no overhang to tool slide when fully advanced. Extra large sockets are provided for tool holders. In consequence of these ample proportions of the tool slide, together with the equalization of the thrust above and below the center, work of the highest accuracy is insured.

The Forming Slides are entirely independent of each other. The one for rough-forming is mounted upon the frame; that for finish-forming being connected with the spindle cylinder housing. The advantage of this design ever a single slide for both tools are—greater rigidity, more solid backing to tools, freedom from chatter, and work of smoother finish. In case an extra slide is desired the cutting-off slide is amply substantial to permit mounting an extra tool holder block, so that forming can be done in the fifth position.

"New Britain" Six-Spindle Automatics are built in the following capacities: 1" x 5", 1⅝" x 7", and 2½" x 9".

DESCRIPTIVE BULLETIN UPON REQUEST

The New Britain Machine Company
—Automatic Screw and Chucking Machines—
New Britain, Conn., U.S.A.

CASTINGS
To any pattern
Manganese Bronse
Brass Aluminum
Propellers
Impellers
Gears
ONTARIO SPECIALTIES LIMITED
OTTAWA CAN.

YOU'LL FIND WHAT YOU WANT

In the Classified Advertising Section of Canadian Machinery. Watch it each week for all kinds of new and used machinery.

YOU MAY WANT WHAT YOU FIND.

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Five cents each insertion when box number is required. Each figure counts as one word. Display rates on application.

FOR SALE

HORIZONTAL GAS ENGINE 25 H.P. IN SERvice at present time, $375.00 cash. Write Penberthy Injector Co., Limited, Windsor, Ontario. (5)

FOR SALE STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

A SNAP IN TURRET LATHES SLIGHTLY used on shell work. Fourteen splendid machines at bargain prices. Do you need these machines? If so, drop a line to Box 953, Woodstock, Ont.

LATHE FOR SALE—ONE 39 x 17-FOOT Pond engine lathe, suitable for heavy shells; in good condition; $1,500.00. A. B. Ormsby Company, Limited, Toronto. (2)

A BARGAIN FOR QUICK SALE—30 H.P. 10 x 14 engine; guaranteed in first-class working condition; drive belt included. Hamilton Whip Co., Hamilton.

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make. used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

DROP PRESS FOR SALE—NO. 9 MINER & Peck drop press; anvil 2,000 lbs.; base 30,000 lbs.; 36" between uprights; 40" x 35" between poppets; 34" x 29" top of anvil; guaranteed as good as new. Can be shown in operation to any genuine prospective buyer. The Metallic Roofing Co., Limited, Toronto. (4)

FOR SALE

■ ■

Two 24-inch standard Gisholt Turret Lathes, completely tooled for boring 4.5" H.E. Shells.

■ ■

Box 212
Canadian Machinery
t.f.

FOR SALE

Fox Monitor Lathe, 18" x 5' 6", 9-hole turret, cross feed, hollow spindle, 5-step cone; good as new. Plating dynamo, 6 volts, 250 amp.; used only a short time.

PENDRITH MACHINERY COMPANY
970 Queen St. West, Toronto

FOR SALE—ONE DAVIS 4½" CUTTING-OFF machine; practically new; been used less than three months; very reasonable. Canadian Linderman Co., Ltd., Woodstock, Ont. (tf)

12-INCH HEAVY DUTY (CANADIAN CORporation) moulder; just used six months; also band saw, shaper, buzz planer, used two years. Apply W. A. Rumney, 36 Fuller Ave., Toronto. (28)

FOR SALE — AT ALEXANDRIA, ONT. — Machine shop in two buildings; 10,500 sq. feet concrete floor space; equipped with lathes, shaper, plainer, miller and variety of other iron-working machines and tools; good foundry in connection. Inventory of buildings, machinery and stock, $64,272. Practically new plant, in good condition. F. T. Costello, Assignee, Schell F. & M. Co., Ltd., Alexandria, Ont.

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

SITUATIONS VACANT

TWO EXPERIENCED DIE SETTERS, TWO good die makers, and one experienced screw machine operator. Box 216, Canadian Machinery. (8)

SUPERINTENDENT FOR FACTORY EMploying 150 men. Must be graduate mechanical engineer with practical experience in factory management. We have a modern plant and a growing business. None but Canadians or Americans with Canadian experience need apply. Address Box 214, Canadian Machinery. (tf)

Machinery Wanted

New or Second-hand, in good condition:

Power Squaring Shear, 4' gap type or 8' to cut ⅛" plate.

Double Crank Geared Press — 36" Minimum between uprights; 3" Minimum stroke.

Butt Welder to take 5" x ⅛, or equivalent in rounds or squares.

W. D. BEATH & SON LIMITED
20 Cooper Ave. - Toronto

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 40, 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN LAMP FACTORY
ST. CATHARINES, ONTARIO

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

WANTED

WANTED — 250-VOLT D.C. GENERATOR — 75 to 150 k.w., direct connected to steam engine; must be in good condition. Write to The Kaufman Rubber Co., Berlin, Ont. (13)

WANTED—ELECTRIC TRAVELLING GANtry crane, span about 57 ft., clearance 50 ft., overhanging at one end; load 15 tons. State full particulars and price. Thor Iron Works, Limited, Toronto, Ont. (27)

SITUATIONS WANTED

SUPERINTENDENT OF SHELL FACTORY desires position—at present employed, but wishes to change. Would accept general foremanship. Best references. Box 217, Canadian Machinery. (9)

For Sale Cheap

- 1—Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.
- 1—12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 3 tons capacity; complete, less the Hoist.
- 1—10" Single "I" Beam Overhead Hand Power Crane, 23' 0" span, 2 tons capacity; complete, less the Hoist.
- 1—Brantford (Gas) Bake Oven and 4 Racks.
- 1—Linderman 2-Spindle Boring Machine.
- 1—24" Drill, Bertram Company.
- 1—26" Drill, London Machine Tool Company.
- 1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

M. BEATTY & SONS,
Limited
Welland, Ont.

FOR SALE

We are offering, subject to prior sale, all or any portion of the following:

No. 1—1—2 x 24 Jones & Lamson Cone-Driven Turret Lathe, complete with Countershaft, 1 Cut-off Slide, 3 Tool Holders, 1 12" Cushman 4-Jaw Universal Chuck No. 2098. $670.00.

No. 2—1—2 x 24 Jones & Lamson Cone Driven Turret Lathe, complete with Countershaft, 1 Cut-off Slide, 3 Boring Tool Holders, 1 12" 4-Jaw Universal Chuck No. 2914. $670.00.

No. 3—1—14" Davis Plain Cone Driven Turret Lathe, with Countershaft, No. 13. $250.00

No. 4—3—2" Murchey Die Heads: 1 with 2¼" shank, 1 with 1⅝" Shank; 1 with 1½" Shank. $50.00 each net.

No. 5—1—2" Wells Die Head with 3½" Shank. $50.00 each net.

No. 6—1 Generator, 36 Amp., 1800 Speed, 15 K.W. $350.00.

No. 7—1 New Varnishing Baking Oven, built by Brantford Oven Co.; total space inside 5' 10"; height from floor, 6 ft. $400.00. This could also be used for Japanning.

Items 1, 2 and 3 are used Tools, having been in service making small Munition Plugs, but are in splendid condition.

Items 4 and 5 were in use not more than one month.

Item No. 6 was in use about three months. Item No. 7 is absolutely new; never used.

Taylor-Forbes Co., Limited
Guelph, Ontario

New
Machine Tools in Stock
Immediate Shipment

ENGINE LATHES.

13" x 6' South Bend, Four-Step Cone, Single Back Geared.
16" x 7' Oliver, Three-Step Cone, Double Back Geared, Quick-Change Gear, Oil Pan and Pump.
18" x 8' Giddings & Lewis Three-Step Cone, Double Back Gear, Geared Feed.
18" x 8' South Bend, Four Step Cone, Single Back Geared.
18" x 8' Mueller, Three Step Cone, Double Back Geared, Quick-Change Gear and Geared Feed.
18" x 8' Stevens, Four Step Cone, Single Back Geared, Standard Change Gears.
22" x 10' Milwaukee Three-Step Cone, Double Back Geared and Geared Feed.
24" x 12' Milwaukee, Three-Step Cone, Double Back Geared and Geared Feed.

DRILLS.

20" Rockford, Back Geared, Upright Drills with Power Wheel and Lever Feed.
3" Dreses Plain Radial Drill, with Quick-Change Gear Box.

Large stock of Second-Hand Machine Tools. Write or wire for full specifications and prices.

H. W. Petrie of Montreal, Ltd.
327 St. James St., Montreal, Que.

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3¼" Gridley Automatic
40" x 16' Conradson, heavy duty
40" x 12' New Haven
25" x 8' Davis
24" x 16' LeBlonde
24" x 8' Lodge & Shipley
21" x 8' Gisholt
26" x 10' American (2)
25" x 7' Fay & Scott
17" x 6' Garvin
16" x 6' Pratt & Whitney
16" x 5½' Warner & Swasey
16" x 5' Windsor, wire feed
15" x 5½' fox, American
2" x 24" Jones & Lamson flat turret
No. 22½ Garvin, wire feed
No. 2 Garvin, wire feed
8" x 31" Brown & Sharpe

Engine Lathes

36" x 15' Putnam
30" x 16½' Pond
26" x 14' Hamilton, D.B.G. (4)
26" x 14' Gleason, D.B.G. (2)
24" x 10' Peerless
24" x 10' Lodge & Shipley, patent head
21" x 12' Peerless
21" x 8' Back geared single purpose (3)
20" x 12' Lodge & Shipley, patent head (2
20" x 8' London
20" x 8' Hercules, heavy duty
20" x 8' Bullard
20" x 8' Ames
19" x 8' LeBlonde
18" x 10' MacGregor Gourlay
18" x 8' New Haven
18" x 8' Lodge & Davis
18" x 6' New Haven
17" x 8' Blaisdell
16" x 10' MacGregor-Gourlay, D.B.G
16" x 8' Back geared single purpose (4)
26" x 40" x 20' London Gap
16" x 6' Porter
16" x 24" x 10' South Bend Gap
14" x 6' Hendey, taper attachment

Upright Drills

D4 Colburn, heavy duty
D3 Colburn, heavy duty (2)
24" Bickford, shaft-driven
24" Foote-Burt
22" Barnes, back geared
20" Bertram, power feed
16" Avey, high speed, 4-spindle, sensitive
14" Excelsior
14" Garvin, 4 spindle
10" Barnes, friction (2)
60" Bertram Semi-universal Radial
48" Gang, plain radial, tapping attachment
36" New Century, plain radial
36" Fosdick, plain radial
32" Candy-Otto wall radial

Iron Planers

30" x 30" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
24" x 24" x 6' American
20" x 20" x 5' Bertram

Milling Machines

No. 5 Becker-Brainard, plain
No. 25 Becker, plain
No. 12 Brown & Sharpe plain
No. 2A Owen Universal
No. 1½ Brown & Sharpe Universal
Louden Universal
24" Bertram, plain
Lees Bradner Thread Miller
Holden-Morgan Thread Miller

Presses

No. 12 Geared Rhodes, roller feed
No. 4½ Bliss
No. 5 Waterbury
No. 150 Brown-Boggs

Miscellaneous

24" MacGregor-Gourlay B.G. Iron Shaper
No. 1 Racine Hack Saws (10)
Lo-Swing Lathes (2)
No. 14 Besly Grinder
32" x 9' Special Facing and Tapping Machine
40" Binsse Horizontal Boring Mill
No. 60 Heald Cylinder Grinder
No. 2 Garvin Automatic Tapping Machine
No. 1 Garvin Automatic Tapping Machine
¾" Shuster Riveters (3)
9½' Bertram Bending Rolls
4½" Davis Cutting-off Machine

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.
Front St. W., - - Toronto, Ont.

FOR SALE COMPLETE WOOL HOSIERY PLANT

IN THE STATES **IN WHOLE OR PART**

One plant consists of 5 sets of woolen cards, 48 x 48, iron frames, 3 cards to set, with 8 J. & B. mules, [illegible] gauge, 48' 340 and 32 spindles; 2 double shoddy cards, Kitson rag picker, 36-in. Fearnaught mixing picker, wool duster, grinders, etc. In first-class shape, ready for immediate use.
Second plant: Ribbers, winders, loopers and footers sufficient for daily output of 800 doz. in misses' and boys' cashmere hose, and cashmere and wool merino half hose. Exactly suited for the Canadian market.
Also complete dye plant.
All the machines are in A 1 shape, ready to run, and can be purchased for less than one-quarter cost of new, and arrangements made whereby the General Manager, who has been connected with the concern for several years and is thoroughly practical, would become interested and take active part in new company. Excellent reasons for selling. Address Box 215, Canadian Machinery. (8)

FAIRBANKS-MORSE
New and Used Machinery

In Stock at Toronto

1 5" Bickford Universal Radial Drill.
1 ⅝" 4 Spindle National Acme Automatic.
2 No. 3 Foster Hand Screw Machines.
4 No. 4 Smith & Kamen Turret Lathes.
13" x 5' Seneca Falls Lathes.
10" x 5' Seneca Falls Lathes.
22" x 16' Davis Lathes.
18" x 8' Springfield Lathes.
20" x 7' and 9' Fairbanks-Morse Lathes.
16" x 7' and 9' Fairbanks-Morse Lathes.
Gisholt Turret Lathes.
30" McDougall Drill.
Gisholt Lathe Tool Grinder.
6" Hall Cutting-off Machines.

In Stock at Montreal

3 16" F.M. Single Purpose Lathes.
1 Hendey 16" x 8' Lathe taper attachment, Q.C.G., used
2 American 16" x 6' Tool room Lathes.
2 Barnes 18" x 8' Lathes.
2 Walcott 20" Lathes, 3 Step cone, D.B.G. and Q.C.G.
3 Walcott 18" Lathes, 3 Step cone, D.B.G. and Q.C.G.
1 Rivett Precision Lathe.
1 Valley City No. 1½ Universal Miller.
1 Brown & Sharpe No. 1½ Universal Miller.
1 Ford Smith Plain Miller.
W. & M. Drill Grinder.
4' Niles Radial Drill.
Banfield Plug Miller.
Dill 15-18" Slotter.

This is only a partial list of our stock of Machine Tools.

CFM

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

FOR SALE

GRINDING MACHINES

1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16" x 66" Landis Crank Shaft Grinder (18 months old).
2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES

58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13" Gisholt Semi-Automatic (12 mos. old).
20 21" Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES

1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES

1 8-spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.
2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS

1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES

38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES

2 Noble & Westbrook No. 1 (new).

PROFILERS

1 No. 3H Becker (new).

PLANERS

1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 40" x 40" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS

1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES

1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES

1 12" Jackson (new).

KEY SEATERS

1 No. 1 Catlin (new).

SCREW MACHINES

1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2" x 24" Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼" capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES

1 No. 3 La Pointe (nearly new).

BOLT CUTTERS

1 2" Landis Double Head (nearly new).

BORING AND TURNING MACHINES

1 4' Bickford Boring & Turning Mill (nearly new).
1 20" swing 4-Spindle Moline Vertical Boring Machine with 18" x 36" table.

BULLDOZERS

1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES

1 Large Filing and Sawing Machine with 12" stroke.

PUNCHES AND SHEARS

1 No. 3 Walsh Punch Press.
1 Moser 1½" stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8" throat capacity ¼" x ¼".
1 27½" throat lever punch ½" capacity 1¼" stroke.
1 Thompson Bevel Shear ½" capacity.

PIPE MACHINES

1 6" Saunders.

SHAPERS

1 14" Hendey Geared Friction.
1 20" Hendey Geared Friction.

TAPPING MACHINES

1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2" collapsible taps (new).

THREAD ROLLING MACHINES

1 Waterbury Farrell ⅜" capacity (nearly new).

THREADING MACHINES

5 Special Threading Machines for threading 3" steel shells (nearly new).

SPOT WELDERS

1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

Write us what you want new or second-hand.

32 North Clinton Street, Chicago **W. F. Davis Machine Tool Co.** **403 Singer Building, New York City**

MACHINE TOOLS - THE VERY BEST

GRINDERS.

Two (2) 14 x 72 Norton, plain, excellent condition, modern type, each	$2500
Two (2) 10 x 72 Norton, plain, excellent condition, modern type, each	2200
12 x 36 Cincinnati Universal	1250
No. 3 Brown & Sharpe Universal 12 x 50	2000
No. 60 Heald Cylinder	1000
Landis plain, 8 x 38	1400
Springfield Universal, 16 x 40	850
Two (2) No. 5 Rivet, each	550
No. 3 Brown & Sharpe Cutter Grinder	300
No. 7 Geo. Gorton, double end disc grinder with wheel chuck on one end, steel discs and tilting table	300
Diamond Side Type Shop Face Grinder, working surface of table 9" wide x 2' long, cup wheel 14" dia	300
Wells Cutter Grinder	75
No. 1 Peerless Surfacing Machine, 10" belt	75
Plain Grinders, Wet Tool Grinders, Polishing Machines, large and small.	

HAND MILLING MACHINES.

Two Chicago, each	200
Pratt & Whitney No. 2	175
Four Pratt & Whitney No. 1, each	125
Two No. 2 Garvin, each	150
Two No. 3 Garvin, each	175
Six Pratt & Whitney, No. 1½, each	175
Two Pratt & Whitney Hand Millers	...
Reed	150
Pratt & Whitney	150
Pratt & Whitney, with vise	150
Two Pratt & Whitney	...

HORIZONTAL BORING MACHINES.

No. 2 Beaman & Smith Combination Boring, Drilling and Milling Machine; good as new	5000

HORIZONTAL BORING MACHINES (Continued)

Beaman & Smith No. 8, 5" spindle	$3500
Bement & Dougherty No. 3, Knee Type, 3¾" bar	1450

PLANERS.

48 x 48 x 20' Putnam, 2 heads on rail; excellent condition.	3500
36 x 36 x 14' Powell, 2 heads on rail	1750
32 x 32 x 10' Gleason, single head; good as new	700

LATHES.

60 x 28' Fifield, raising blocks to swing 75", double back-geared, face plate drive, dia. of face plate 56" x 8"; good as new	5000
50 x 20' Fifield, Massive Pattern, 48" four-jawed chuck	2750
52 x 16' Gleason, heavy triple-geared, faced plate drive	2500
24 x 18' Lodge & Shipley, quick-change gear, taper, motor driven, carriage control	2000
16 x 8' Pratt & Whitney, quick-change gear, taper attachment, H.S., C.R.; good as new; latest type	1000

MULTIPLE SPINDLE DRILLS.

Bausch 8 spindle, 1¼" joints	1150
Foote-Burt 8 spindle, spindles adjustable on rail, center to center outside spindle 6' max	800
Snyder 28" 4 spindle, back geared, sliding head, table 30" long, 16½" wide	300
Five (5) Gardan 4 spindle, each	250
No. 11 Pratt & Whitney 15 spindle	325
Two 14" Barr 3 spindle Sensitive, each	90
No. 11 Pratt & Whitney, 10 spindle	325
2 spindle Barr	60
Bausch 16 spindle	750
Three 4 spindle Fenn Sensitive, adjustable heads, each	150
Allen 4 spindle	200
Henry & Wright 3 spindle	200

REMEMBER, THESE ARE ONLY SAMPLES ! ! ! WRITE FOR OUR STOCK LIST.

THE CO-OPERATIVE USED MACHINERY COMPANY

50 Church St., Suite 482, Telephone Cortlandt 665, New York **Warehouse, 408 Claremont Ave., Jersey City, N.J.**

High-Grade

MACHINE TOOLS

The list below is a small portion of our present stock. Write for complete lists.

12 26"-48" x 14' new style McCabe Double Spindle Heavy Pattern New Lathes.
2—26"-48" x 18' new style McCabe Double Spindle Heavy Pattern New Lathes.
24" x 10' Putnam, H.S., C.R.
20" x 8' Prentice, H.S., C.R., T.A.
3—19" x 8' Sidney New Lathes, swing 21".
2—19" x 8' Sidney New Lathes, Quick Change, swing 21".
2—17" x 8' Sidney New Lathes, Quick Change, swing 19".
2—18" x 10' Rahn Mayer, H.S., C.R.
18" x 10' Cincinnati, H.S., C.R.
18" x 10' Hendey, New Taper Attachment.
9—17" x 8' National, New, Quick Change.
14" x 10' Prentice, Taper Attachment.
2—13" x 7½' Carroll, Jamieson, New.
40" Swing, 3¾" H.S. Conradson Semi-Automatic Turret.
No. 00 B. & S. Automatic Screw Machine, with slotting attachment.
⅝" Pratt & Whitney Screw Machine.
36" Baker Bros. Tapping and Boring Drill.
36" Currie & Snyder Sliding Head Drill.
30" Hamilton Sliding Head Drill.
No. 3½ Fox Miller, Vertical Attachment, Index Head.
Pedrick & Ayre Back-geared Miller, table swivels 42" x 9", 3 power feeds.
No. 210 Heald Wet Ring Grinder.
16" Steptoe New B.G. Shaper.
20" Steptoe New S.G. Shaper.
24" American B.G. Shaper.
18 x 18 x 5' Pond Planer.

FRANK TOOMEY, INC.
127-131 North Third St., PHILADELPHIA, PA., U.S.A.

List of

Second-Hand Machinery

on hand for immediate delivery, subject to prior sale

1—No. 2 Brown & Sharpe Vertical Chucking and Boring Machine; excellent condition.
1—No. 4 Quint Vertical Turret **Drilling and Chucking Machine; excellent condition.**
1—24" x 24" x 7' Lodge & **Davis Planer, fitted with full electric equipment and** in good condition.
1—Without Electric Equipment and Countershaft.
1—1¼" Belt-driven Gridley **Automatic; excellent condition.**
2—1¼" Motor-driven Gridley **Automatics; excellent condition.**
1—24" x 8' National Engine **Lathe, with compound rest** and quick-change gears; **excellent condition.**
1—26" x 42" x 10' J. J. McCabe Lathe; good condition.
1—No. 12 16-spindle Pratt & Whitney Multiple Drill, ½" **capacity in steel, ⅝" capacity** in cast iron; excellent **condition.**
1—No. 5 Pearson Screw Machine, with all equipment; **good condition.**
1—Foster Ring Turret; good condition.
1—22" x 22" x 4' Whitcomb **Planer.**
1—18" Warner & Swasey Plain Head Turret Lathe.
1—14" Flather Engine Lathe, rod and screw feed, plain rest, slip change gears.
1—14" Pratt & Whitney Engine Lathe, screw feed, plain rest, slip change gears.
1—No. 15 Toledo Punch, 18" **throat.**
1—No. 12 Badger Punch and **Shear.**
1—30" Collier Circular Shear.
1—16" Steptoe - McFarland **Lathe.**
1—12" Shepard Gap Lathe.
1—No. 2 Mitts & Merrill Key**seater.**
1—No. 2 10" Massillon Punch; new.
2—20" Barnes Drills.
1—¼" Shuster Riveter.
2—Marvel Hack Saws.
1—14" Fox Drill.
1—24" Ohio Shaper.
1—14" Steptoe Shaper.
1—Shinn Metal Band Saw.

C. E. Fales Machinery Co.
Kerr Building, Detroit, Mich.

Used Machinery for Immediate Delivery

BORING MILLS.
51" Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52" Niles Car Wheel Boring Mill.

DRILLS.
22" Aurora, S.H., B.G., P.F.
24" Hamilton, B.G., P.F.
25" Fitchburg, S.H., B.G., P.F.
26" Hoefer, B.G., P.F.
32" Hamilton, S.H., B.G., P.F.
32" Hoefer, S.H., B.G., P.F.
34" Barnes, S.H., B.G., P.F.
4" Baker Tapping and Drilling Machine.
2½' Dreses Radial
2½' Industrial Radial
12 Spindle Multiple
6 Spindle V.C.
No. 300 Baush, 12 spindles

GEAR CUTTERS
20" G. & E., for spur and bevel
24" x 7" G. & E., for spur
36" Walcott, for spur
No. 14 Brown & Sharpe

GRINDERS
No. 3 Landis Universal
14" x 20" B. & S. Universal
Gisholt Tool Grinder

LATHES
12" x 4' Hendey, C.R., Q.C.G., taper
12" x 5' Davis, C.R.
14" x 5' P. & W., R. and F., taper
14" x 6' Fairbanks, C.R., taper
15" x 6' Goddard, C.R., taper
16" x 6' Prentice, C.R.
16" x 6' Sebastian, P.R.
16" x 6' Walcott, C.R.
16" x 8' Lodge & Shipley Pat. Head, C.R., Q.C.G.
16" x 10' Greaves & Klusman, C.R.
17" x 10' Blaisdell, C.R.
18" x 6' Bradford, C.R., taper
18" x 8' Lodge & Shipley, Pat. Head, C.R., taper
18" x 12' American, C.R., Q.C.G.
18" x 12' Greaves & Klusman, C.R.
20" x 10' Flather, C.R.
21" x 12' New Haven, C.R.
24"-40" x 12' McCabe Double Spindle, C.R.
24" x 16' Schumacher & Boye, C.R.
30" x 14' Reed, C.R.
32" x 16' Blaisdell, C.R.
36" x 28' American, C.R.

MILLING MACHINES
No. 12 B. & S., plain
No. 24 Oesterlein, plain
No. 1½ Garvin Universal
No. 2 Cincinnati Universal
No. 2 Cincinnati Vertical, High Power
No. 32 Plain Kempsmith—Lincoln
No. 3 Cincinnati Universal
No. 13 P. & W. Lincoln
No. 4 Becker Vertical

PLANERS
Morton Portable
22" x 22" x 6' Gray, one head
30" x 30" x 8' Woodward & Powell, one head
30" x 30" x 12' Cincinnati, two heads
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Cincinnati, two heads
36" x 36" x 16' Sellers, one head
39" x 39" x 12' New Haven, one head
40" x 38" x 14' Putnam, one head
40" x 40" x 12' New Haven, one head, one side head

PRESSES
No. 3 Delivouk & George, O.B., Inc.
No. 30 A. Perkins, O.B., Inc.
No. 133 Ferracute, Double Action, O.B., Inc.
No. 5½ Walsh, O.B., Inc., geared
No. 174 Consolidated Double Crank
No. 25 Toledo, O.B., Inc., Cam Drawing

SHAPERS
15" Hendey Friction
16" Walcott
16" Niles, B.G.
16" Rockford, B.G.
20" Rockford, B.G.
26" Putnam

SCREW MACHINES
No. 1 Chicago Automatic
1 3-16" Hartford Automatic
2" Cleveland Automatic
2¼" Cleveland Automatic
⅝" P. & W. Plain
1" B. & S. Plain
16" P. & W. Plain

MISCELLANEOUS
No. 4 Warner & Swasey Turret Lathe
No. 2 Warner & Swasey Turret Lathe
No. 2 Baker Keyseater
Whitton Centering Machine
1½" Acme Bolt Cutter
2—Springfield Stud Lathes
Blount Speed Lathe

Write for our Stock List.

The H. A. Stocker Machinery Company, 566-572 W. Randolph St., CHICAGO, ILL.

MACHINE TOOLS In Stock At Jersey City

PLANERS AND SHAPERS

72" x 72" x 16' Bement-Miles, four heads
60" x 60" x 15' Sellers, four heads
60" x 60" x 10' Pond, three heads
60" x 30" x 13' Pond, two heads
44" x 44" x 16' Niles, one head; fitted for three heads
44" x 44" x 12' Niles, two heads
42" x 42" x 13' Sellers, two heads
36" x 36" x 12' Chandler, heavy duty, weight 35,000 lbs., platen 6½" thick, rack 12" wide, face of cored housings 12", rail 17½" deep
30" x 30" x 16' Harrington, one head
28" x 28" x 7' 6" Putnam, one head
24" x 24" x 6' Wood-Light
22" x 22" x 5' Whitcomb
18" x 18" x 36" Wheeler
30" Morton Draw Cut Shaper
14" Sellers Traveling Head Shaper

BORING MILLS.

10' Betts Vertical, two heads
6' Betts Vertical, two heads
66" Betts Vertical, two heads
62" Baush Vertical, two heads.
60" Bement-Miles Vertical, two heads.
60" Bement Vertical, one head.
50" Bement-Miles Car Wheel Mill.
30" Baush Vertical, turret head.
Barrett Horizontal, 5" bar
Beaman & Smith 2-Spindle.
Underwood New Cylinder Mill, 3⅝" bar.

MILLING MACHINES.

No. 2 Cincinnati Universal.
Ingersoll Slab, adjustable rail, platen 3 ft. x 12 ft., three heads.
No. 1-B Milwaukee Late Type Plain, Universal dividing head, chuck, vise.
76" Newton Heavy Duty Vertical, 48" circular table.
Newton Slab, platen 18" wide, 10' long
No. 1 Cincinnati Plain.
No. 2 Kempsmith Plain.
No. 9 Kempsmith Plain.
No. 1 Brainard Plain.
Detrick & Harvey Milling, Drilling and Boring.
Garvin Plain, No. 4½, No. 4, No. 3.
Newton Plain, table 7¼" x 36".

RADIAL DRILLS.

6' Pond Plain.
3' Bickford Plain.
3' Fosdick Plain, tapping attachment.

KEYSEATERS.

Baker Bros., 24" stroke.
Baker Bros. Colburn, 20" stroke.
No. 2 Mitts & Merrill, 13" stroke.
No. 0 Mitts & Merrill, 7" stroke.
No. 2 Davis, 4" stroke (2).

PRESSES.

DG-56 Ferracute, 4" stroke.
No. 1 Bliss, 8" stroke.
No. 4 Bliss Geared Double Crank, 3" stroke.
No. 2 Bliss Double Crank, 2" stroke.
Farrell Press, 2" stroke.
PG-6 Ferracute, 1½" stroke.
No. 4 Farrell, 1½" stroke.
Fowler, 1¼" stroke.
No. 3 Manville Stamping, 1" stroke.
350-ton Hoe Hydraulic.
200-ton Robertson Hydraulic.
100-ton Sellers Hydraulic Wheel Press.

PUNCHES AND SHEARS.

Sellers Double Angle Shear, capacity 8" x 8" x 1".
8' Lennox Rotary Splitting Shear, split 16' plates.
Lennox Rotary Splitting Shear, split 12' plates.
Bement Plate Iron Shear, 26" throat.
Bement Punch, 31" gap.
Cockburn & Barrow Punch, capacity 1" in 1".
Kling Bros. Punch, 24" throat.
Reed Cleveland Punch, 22" throat.
Bass D. E. Punch and Shear, 20" throats.
Wilson Kalamazoo D. E. Punch and Shear, 6" throats
Style D Long & Alstatter Shear, capacity 3½" round stock.
No. 2 Long & Alstatter D.E. Punch and Shear, 12" throats
No. 10½ Badger State Punch and Shear.

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2 No. 5½ Sloan-Chase Bench Lathes, C.R., 3-step cone, set collets x 16ths. Aug. 15 del.	$ 30
2—13" swing x 6' bed South Bend Lathes, H.S., C.R., P.C.F.; complete	275
2—11" swing x 5' bed Meyers Lathes, H.S., C.R., P.C.F.	225
2—16" swing x 8' bed South Bend Lathes, H.S., C.R., power cross feed; complete	390
1—14" swing x 6' bed Neat Lathe, D.B.G., C.R., H.S., P.C.F.; complete	535
2—21" swing x 8' bed, Sidney, D.B.G., H.S., C.R.; complete	925
1—No. 24 Oesterlin Heavy Plain Miller	1,070
3—No. 1 Standard Hand Miller with vise	313
1—20" Ohio Back-geared Shaper, complete	650
1—25" Smith-Mills Back-geared Shaper, complete	900
1—16" American High Duty Shaper, motor drive, 220-440 volt, 60 cycle, 3 phase	850
1—Wilmarth Morman Drill Grinder, style J.B.P.T.	100
No. 6 Standard Universal Cutter Reamer, Grinders	400
2—No. 28 Canedy-Otto Sensitive Drills	25

USED MACHINERY.

1—28" swing x 10' bed Ames P.C.F.; complete	290
1—28" swing x 10' bed Ames P.C.F., chuck; complete	300
1—12" swing x 5½' bed Barnes, H.S., swivel rest, screw cutting, steady rest, turret on shears	200
1—18" swing x 8' bed, Porter Lathe, C.R., P.C.F., C.K.	400
1—30" swing x 16' bed, New Haven, P.R., P.C.F., chuck, 5" belt; complete	450
1—30" swing x 9' bed, New Haven, turret tool post, chuck, taper attachment; complete	460
1—20" swing x 8' bed, Pond, C.R., P.C.F., H.S., chuck	550
1—Potter & Johnson Semi-Automatic Turret Lathe, complete with 3" hollow spindle	650
1—Potter & Johnson Semi-Automatic, 4½" hole	750
1—14" swing x 6' bed, Lodge-Shipley, Patent Head, Q.C.G., H.S., C.R., chuck, complete; in excellent condition	660
1—34" swing x 22' bed, New Haven Lathe, block to 44", C.R., 34" chuck; complete	800
12—22" swing x 8' bed, American, Q.C.G., D.B.G., four-sided turret tool post, complete; used three months	1,050
1—66" swing x 16' bed, Pond, C.R., P.C.F., H.S., 4½" hole, 5" belt; complete	2,000
1—No. 2 Cincinnati Universal Miller, complete	1150
2—No. 7 Becker-Brainard Lincoln Millers, complete	475
1—24 x 24 x 6 Lathe Morse Planer with Adams Universal Milling Head with Milling Cutter; complete with chuck	600
1—24 x 24 x 6 Gray Planer; excellent condition	675
1—30 x 30 x 16 Bement, extra heavy; perfect condition	750
1—20" Canedy-Otto Power Drill, tapping attachment.	105
1—Four-spindle Dwight Slate, 14" Drill	120
1—No. 51 Canedy-Otto Drill with 3½" arm	240
1—No. 68-N Bliss Press, double acting; good as new.	550
1—31-S Bliss Press, back-geared	700
9—No. 52 National Acme, 4-spindle, 1¼-inch hole; used three months	1,800
1—4' Niles Radial Drill, semi-Universal, single pulley drive	1,050

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HIGH SPEED DRILLS

No. 5 Taper Shank Special Long Flutes

Price Attractive

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Montreal Toronto Winnipeg

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LATHES

1 24 x 12 London Machine Tool; used
1 24 x 10 Heavy Duty (new).
1 20 x 10 Rahn, double back gear, chuck; A1 condition.
2 18 x 8 Heavy Duty Lathes; new.
1 18 x 8 American Tool Works, quick-change gear; new.
1 18 x 6 Reed; nearly new.
5 16 x 8 Single purpose, suitable for rough turning 6" shells; new.
1 14 x 6 Champion; new.
1 14 x 6 Bertram, hollow spindle, compound rest; A1 condition

DRILLS

1 24" Barnes, sliding head.
1 20" Davis back-geared; used.
1 14" Henry & Wright, ball-bearing; used.
1 14" Avey, ball-bearing; used
1 12" Barnes Pedestal.
1 3-spindle Reed.

MISCELLANEOUS.

1 Plain Miller, with Dividing Head; used.
1 New 16" Back-geared Ohio Shaper.
1 24" McGregor-Gourley Back-geared Shaper, with vise and countershaft; used.
1 25 H.P. Motor; second-hand.
1 10 H.P. Motor; new.

Every used tool listed guaranteed as represented, otherwise returnable.

Write for Prices and Particulars on our Tool-Room Grinder.

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TORONTO, ONTARIO. CANADA
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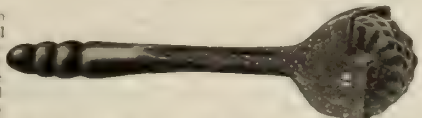

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We also manufacture Diamond Dressers
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ARMSTRONG TOOL HOLDERS
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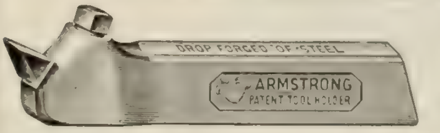

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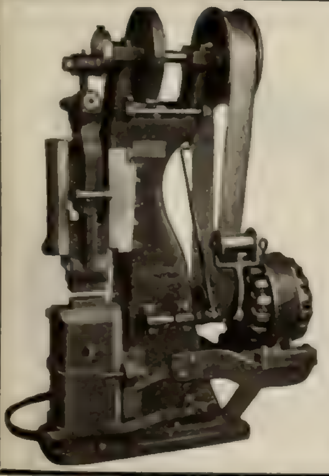

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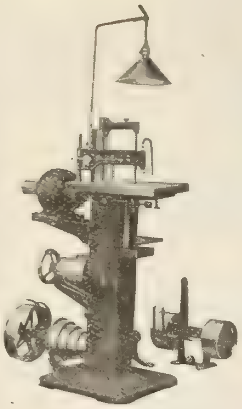
Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.



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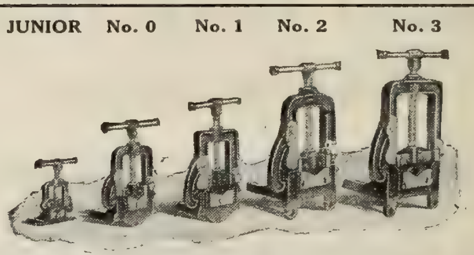

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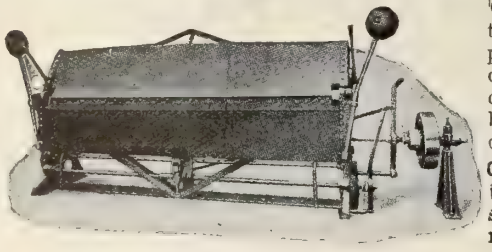

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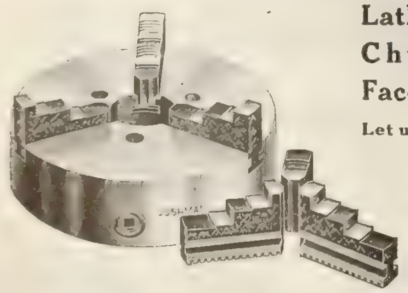

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Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.

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Canada Metal Co., Toronto.
Foss & Hill Machy Co., Montreal.
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
H. W. Petrie, Toronto.
Tallman Brass & Metal Co., Hamilton.

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Webber Bros. Mach. Co., Toronto, Ont.

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Morse Chain Co., Ithaca, N.Y.
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H. W. Petrie, Toronto.

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Dominion Machinery Co., Toronto.
Graton & Knight Mfg. Co., Worcester, Mass.
Main Belting Co., Montreal.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
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Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, O.
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H. W. Petrie, Toronto.
A. R. Williams Machinery Co., Toronto.

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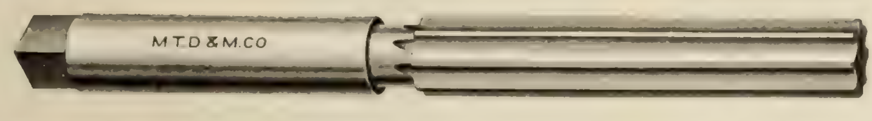

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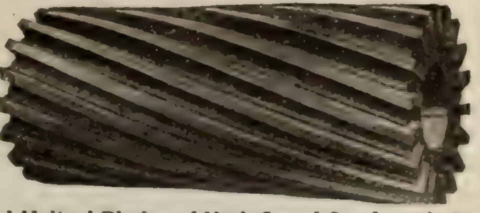

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Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
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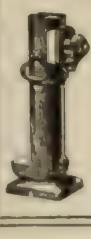

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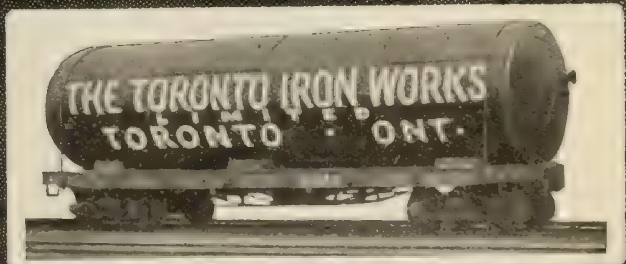

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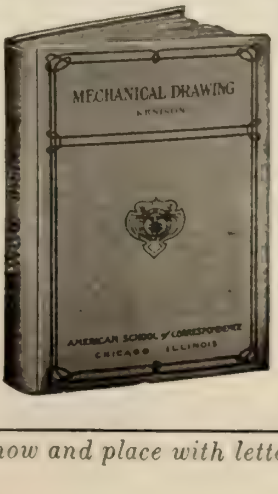

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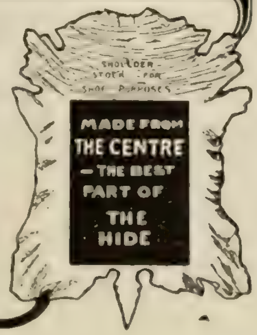
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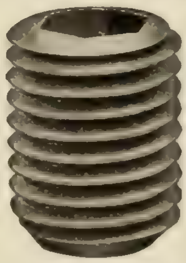

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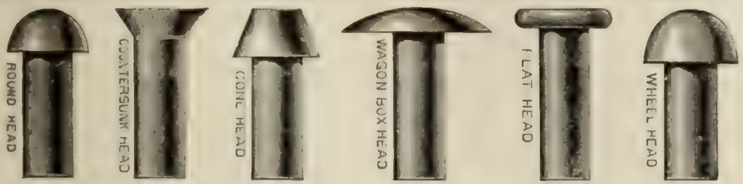

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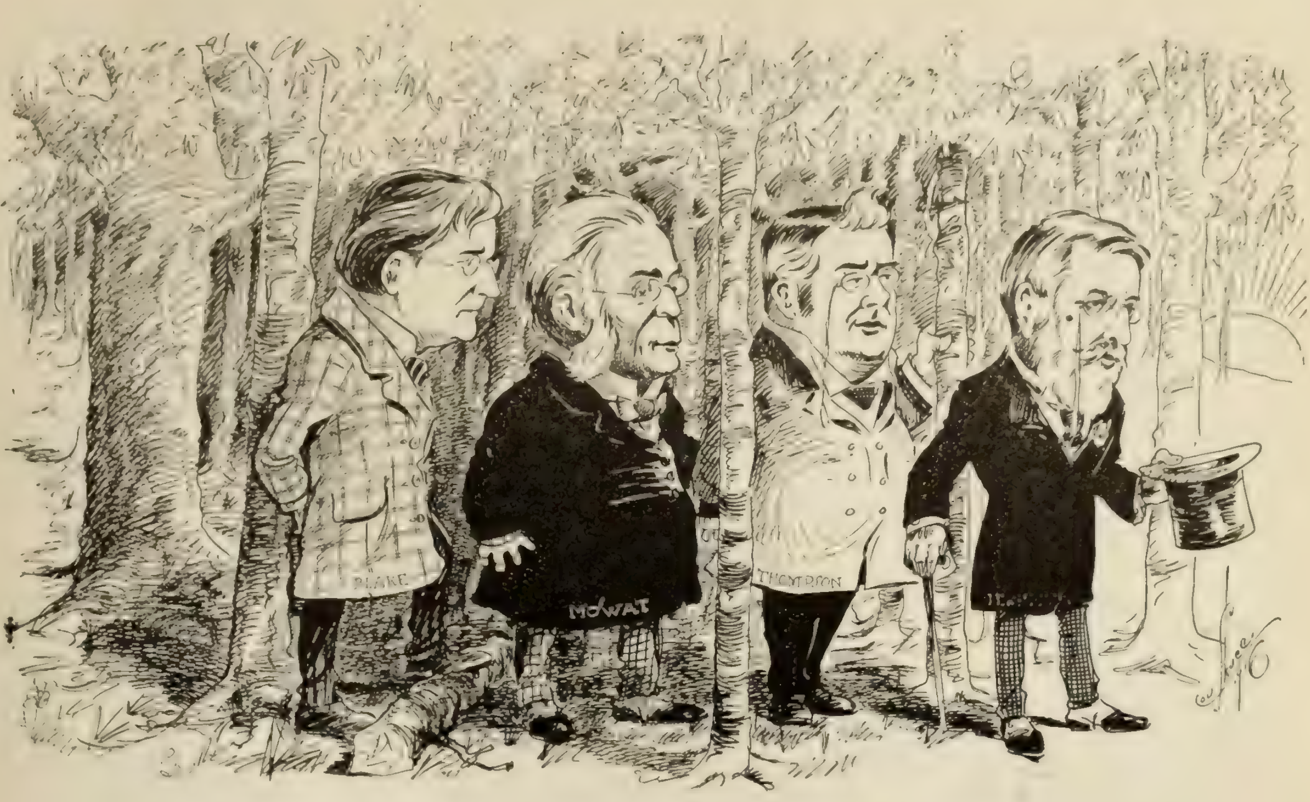

The woods are full of them

Judges have been numerous in Canada who have come down off the bench to lead the people—who have stooped to conquer, as it were—Blake, Mowat, Thompson, Meredith. And so there is plenty of precedent for a move which is being talked of in the Liberal party—the grooming of Mr. Justice Duff for the leadership of the party against the day when Sir Wilfrid Laurier will seek his ease. Mr. Justice Duff is a member of the Supreme Court of Canada, but it is said that, should the boom in his favor reach a suffcient volume, he will be willing to step down from the bench and get into the fight.

This makes the basis for an extremely interesting article by H. F. Gadsby in the September issue of MacLean's Magazine. Mr. Gadsby discusses the Duff boom in a thoroughly impartial way, and tells something of the young Judge who may be slated for so high an honor.

"The Duff Boom" is but one of many features in the September MacLean's. The number bristles with bright stories and powerful articles by such clever and famous contributors as Arthur Stringer, Agnes C. Laut, Robert W. Service, Arthur E. McFarlane, Alan Sullivan, Mrs. Arthur Murphy (Janey Canuck) and many others. It is Canadian from cover to cover the best reading obtainable on this side of the border.

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CANADIAN MACHINERY
AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XVI. TORONTO, AUGUST 17, 1916 No. 7

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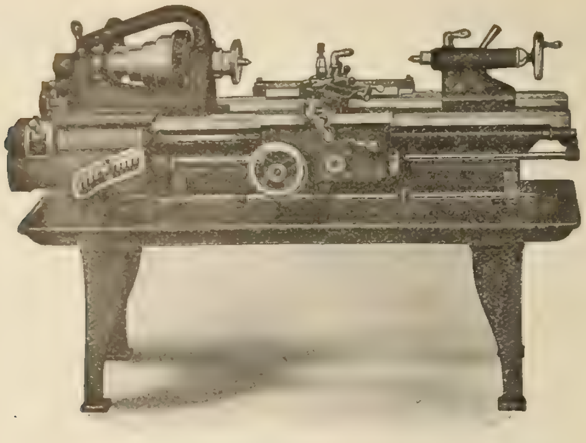

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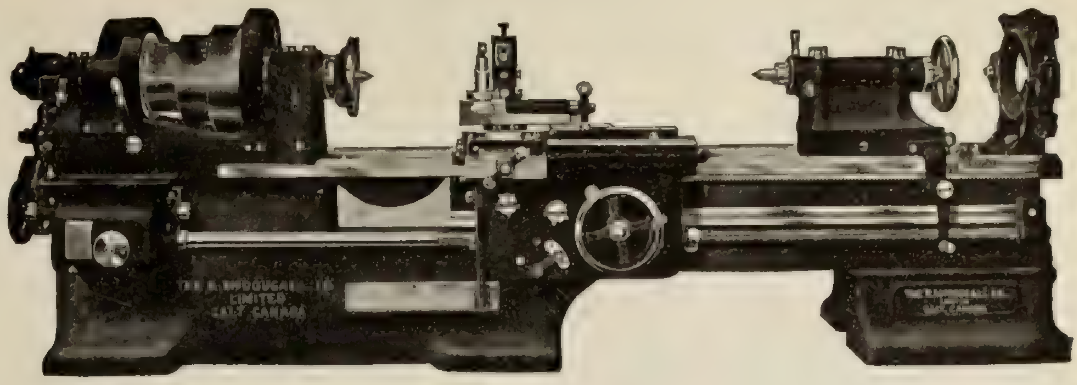

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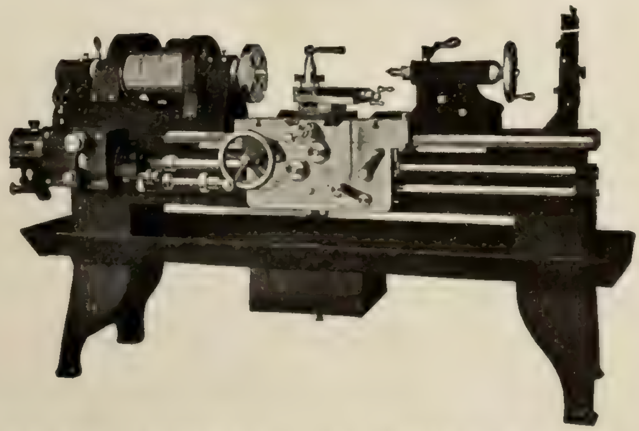

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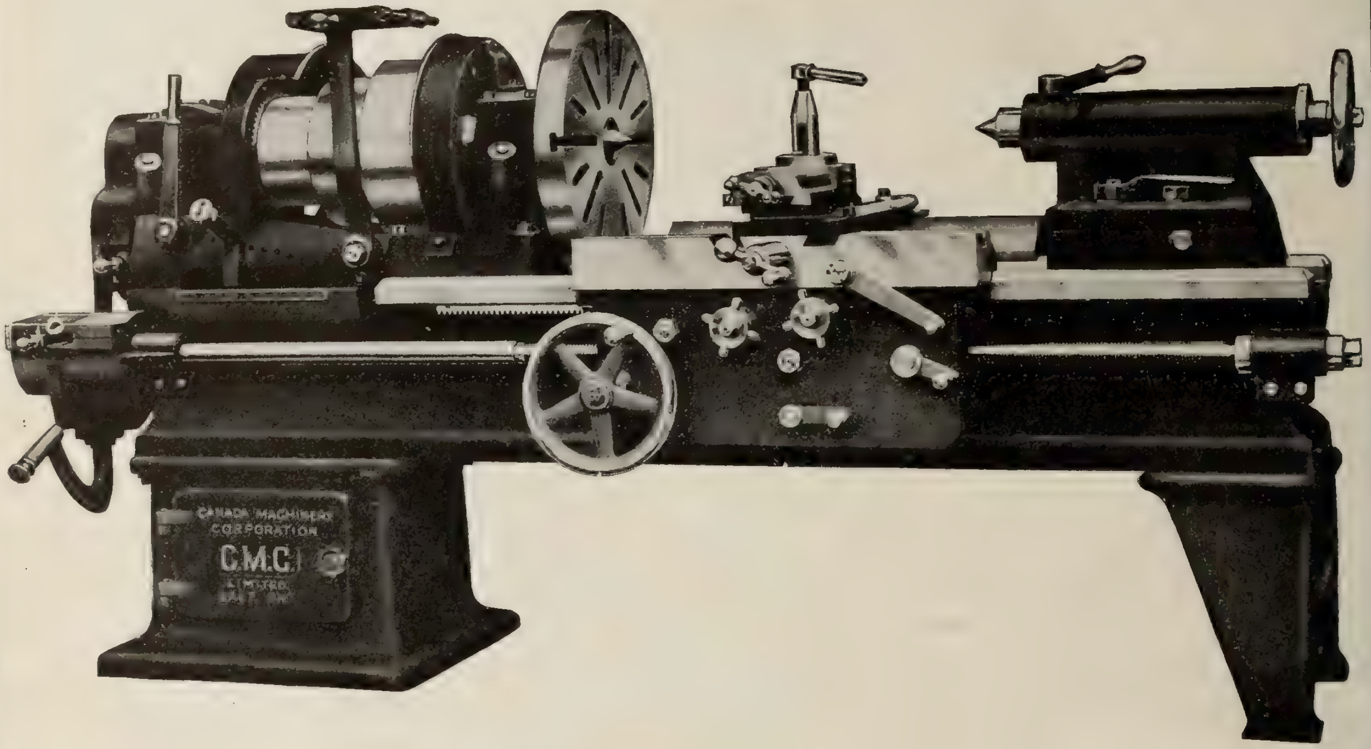

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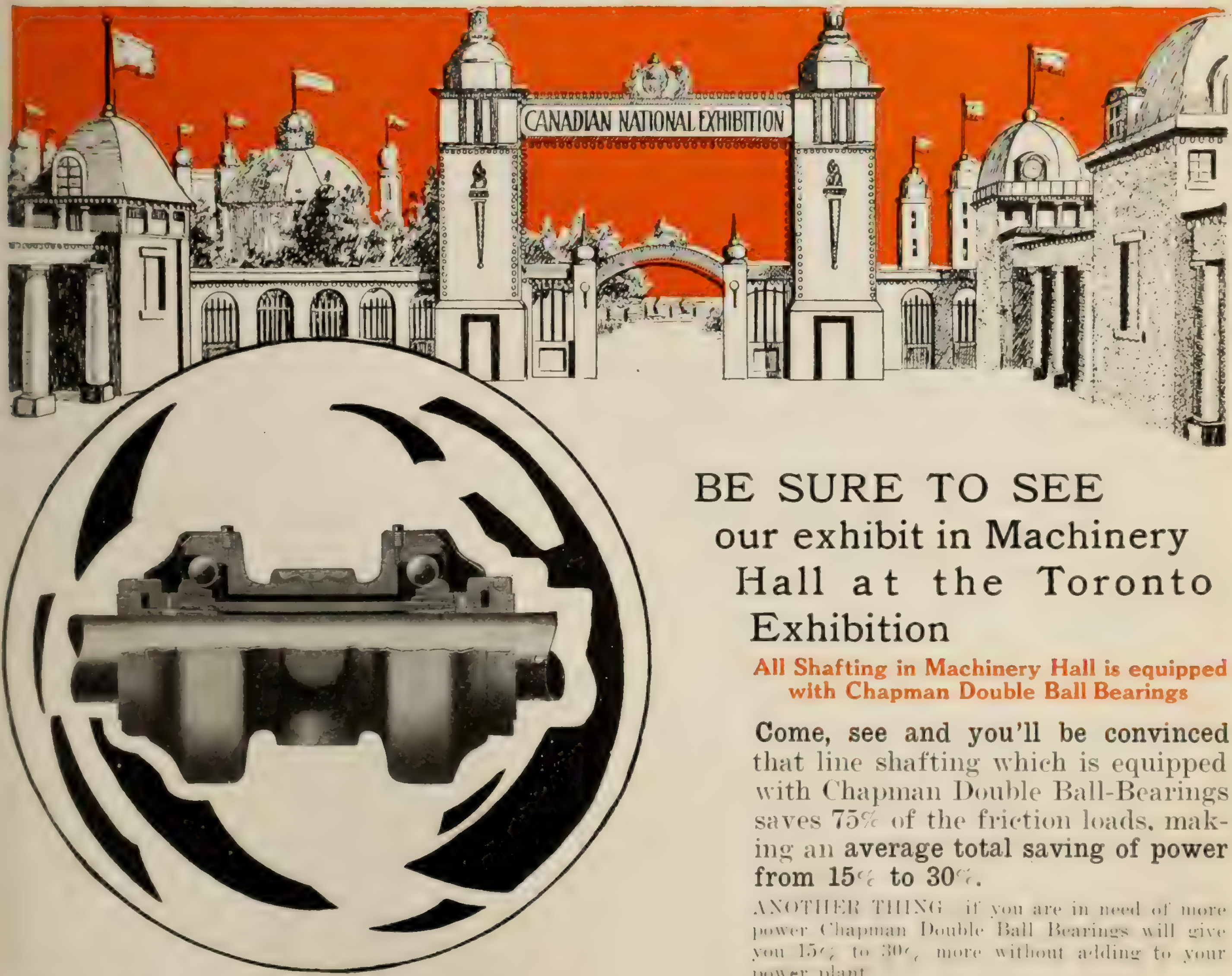

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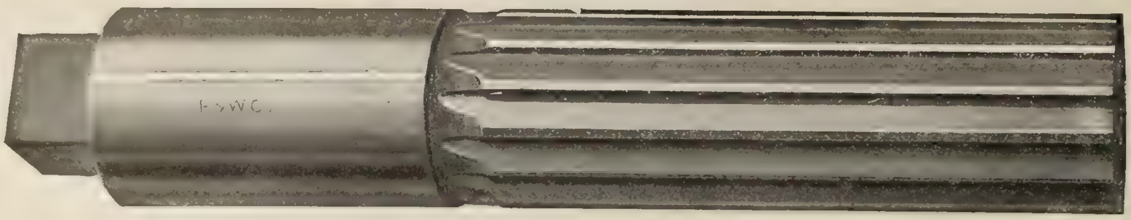

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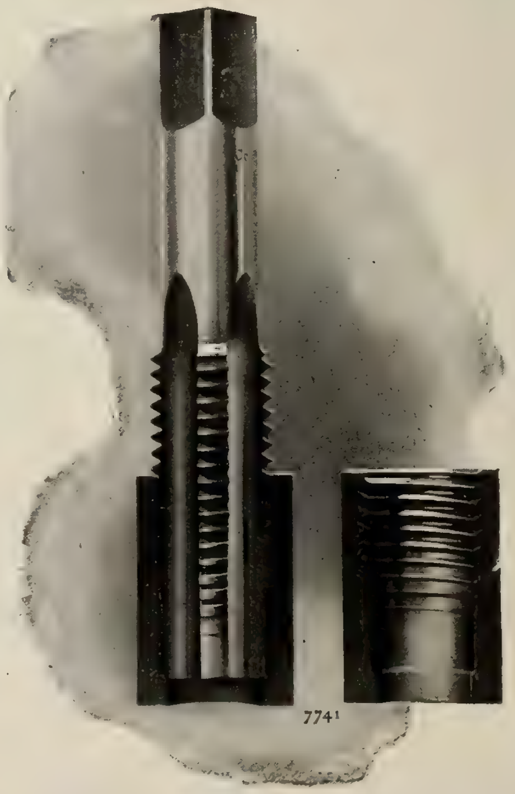

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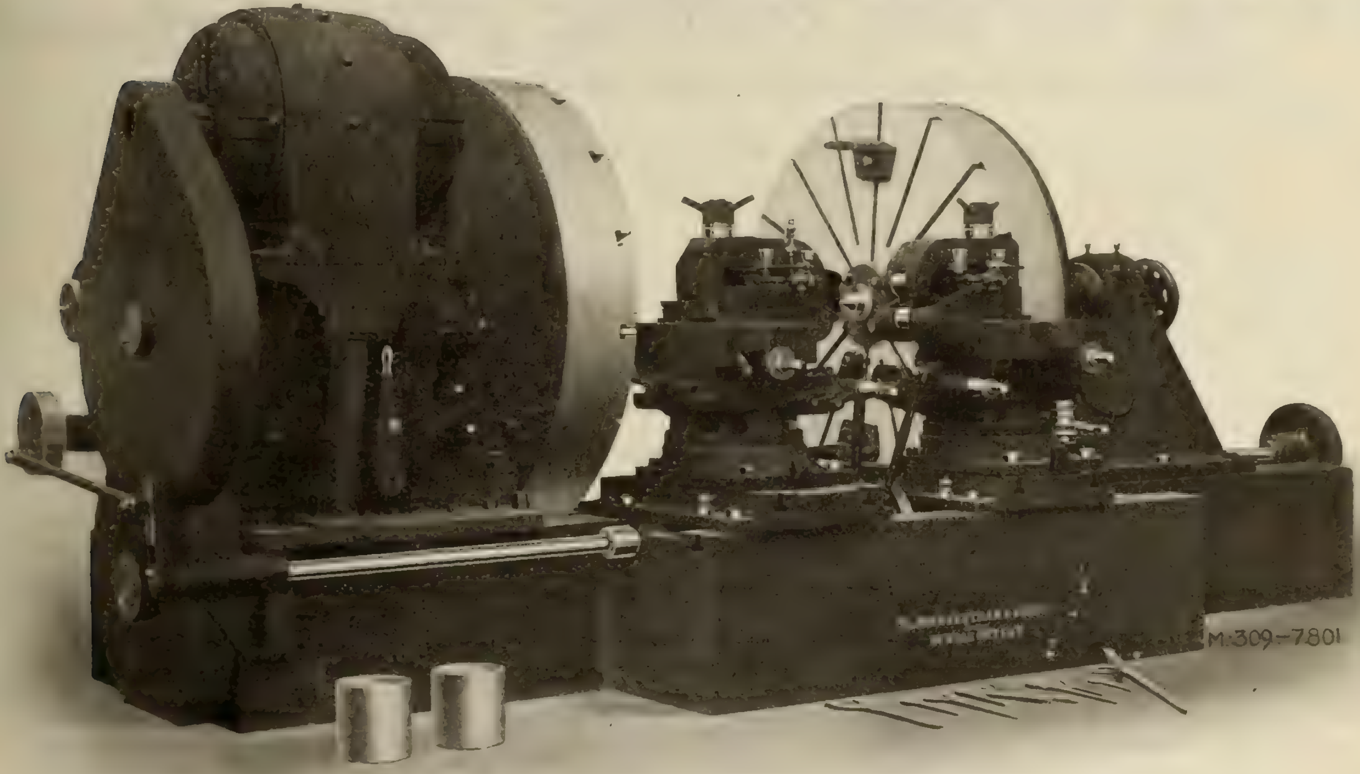

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The Publisher's Page

TORONTO **August 24, 1916**

Advice to the Budding House-Organist

A Letter from an Old Advertising Man Who Has Been Through the Mill

DEAR BILL: I note with no little anxiety that you are "thinking of starting a house-organ," and that you want my advice. Do you really want *advice,* I wonder, or do you expect me to tell you a lot of things to make you feel good? Does the fact that you are "thinking of starting a house-organ" mean that you have set your heart on it, or are you seriously considering its cost to your firm in relation to the profits it may probably bring to the business? In other words, are you regarding it with an eye to the company's benefit exclusively, or have you a sneaking suspicion that it may shed lustre upon your personal reputation?

Them are crool words, I know, and you may get sore—and if you *do* get sore just remember that you asked for "advice," not compliments. But if you are really and truly thinking of the house-organ as a means of promoting the company's business without any bob-tailed notion of advertising your own cleverness, you won't get sore. So if you feel yourself getting hot under the collar by the time you have read this far, my advice is very brief. Don't gamble with the company's money.

Assuming, however, that your gorge hasn't risen, and that you only smile good-naturedly at my ill-founded suspicions, I shall proceed. Do I think you are capable of editing an interesting and instructive house-organ? I most certainly do. But whether you can do it with your left hand while your brain is occupied with the thousand and one problems of your job is another matter. Believe me, son, the publication of a house-organ which returns dividends on the investment is no between-times job. You'll have to nurse it, and coddle it, and give it castor oil, and walk the floor with it rather more than you would with a human baby. You can hire a bright young man to polish it off with a lick and a promise, and put it to bed on a cylinder press, but it will never grow into anything but an expense. Just go and take a good look at the editorial equipment of any influential trade-paper, and then ask yourself if you can hope to compete with it by delegating a sub-assistant to paste down clippings.

In the first place, you have got to determine that there is actually a need which your publication can supply, and that need must actually *exist.* You can stimulate it, and awaken it, and make it stronger; but you can't *create* it. You can't assume that it exists, and then proceed to satisfy it. I remember well an experience of my own in editing a house-organ for the employees of a certain sizable organization. It was reall a respectable-looking publication—32 to 48 pages standard magazine size, two-color covers, plenty of half tones. It had a staff of maybe a dozen people par time, and no publisher would be ashamed of it eithe as regards mechanical make-up or character of contents It contained articles about the product, stories of har sales which had been put over, uplift editorials of pretty decently high order, athletic notes, a few goo jokes, and a lot of personalities about people in the organization. Put it alongside any similar publication and it would stand well up in the front ranks. But i had a sudden and tragic death.

Unless your house-organ is to be merely a collectio of circulars advertising your own product and disguise with a cover and a date line, you are up against th same problems which face any independent publishe Unless he can locate an actually existing desire whic can be satisfied—it needn't be a *conscious* desire nece sarily, but it must exist somewhere outside his imagin tion—he isn't likely to get very far. He can succeed i two ways: by discovering a new field (that is to say, b satisfying a group of desires which has hitherto go unsatisfied), or by serving an old field *better* than it being served by the publications which are already existence. I am talking about *successful* publicatio mind you, that have a real influence upon the opinio of their readers, or which are regarded with confiden in the quality of the information or entertainme which they furnish. That's the class you must p your house-organ into if it is really going to represen profitable investment—unless, as I said before, y merely intend to send out a bunch of direct advertisi under the guise of a publication.

All of which may sound decidedly discouraging, b let me tell you that discouragement in large chunks what the budding house-organist chiefly needs. T high mortality rate among house-organs proves th without any further argument. If your faith in proposition is high enough, and your analysis of problem is clear enough to overcome criticism and paragement, why go to it. You're the judge. B don't let the itch to play with a publication get so str that you don't notice the pricks of conscience or prods of good judgment.

Sincerely and affectionately,

YOUR UNCLE, (*in Printers' Ink.*)

Canadian Machinery and Manufacturing New

143-153 UNIVERSITY AVENUE - - - TORONTO, CANAD

Quality **Service**

The Steel Company of Canada, Limited

PRODUCTS

"HAMILTON" PIG IRON

BASIC, MALLEABLE AND FOUNDRY

IRON AND STEEL

BLOOMS, BILLETS, BARS, WIRE RODS, ANGLES, CHANNELS, PLOW BEAMS, ETC.

FORGINGS

Car Axles, Shape and Drop Forgings, Horse Shoes, Carriage and Automobile Hardware, Top Goods, Etc.

WIRE, ETC.

Steel, Brass, Copper and Bronze, Heavy and Fine, Bright Annealed, Coppered Liquor Bright, Galvanized and Tinned. Stranded, Steel and Copper Cable, Clothes Line, Wire Nails, Staples, Barb Wire, Woven Wire Fencing, Fence Gates.

RAILWAY FASTENINGS

Angle Bars, Track Bolts, Tie Plates, Spikes, Tie Rods, Etc.

NAILS, SPIKES, RIVETS, ETC.

Wire, Cut, Boat and Horse Shoe Nails, Railway, Pressed and Drift Spikes. Tacks and Shoe Nails, Steel and Copper Rivets, and Burrs, Iron, Brass and Copper.

POLE LINE HARDWARE

Pole Steps, Cross Arm Braces, Guy Clamps and Guy Rods, Etc., Black and Galvanized.

BOLTS, NUTS AND WASHERS

Machine, Carriage, Elevator, Stove, Tire and Sleigh Shoe Bolts, Blank, Tapped Nuts, and Washers.

WROUGHT PIPE

Black and Galvanized Nipples and Couplings.

SCREWS

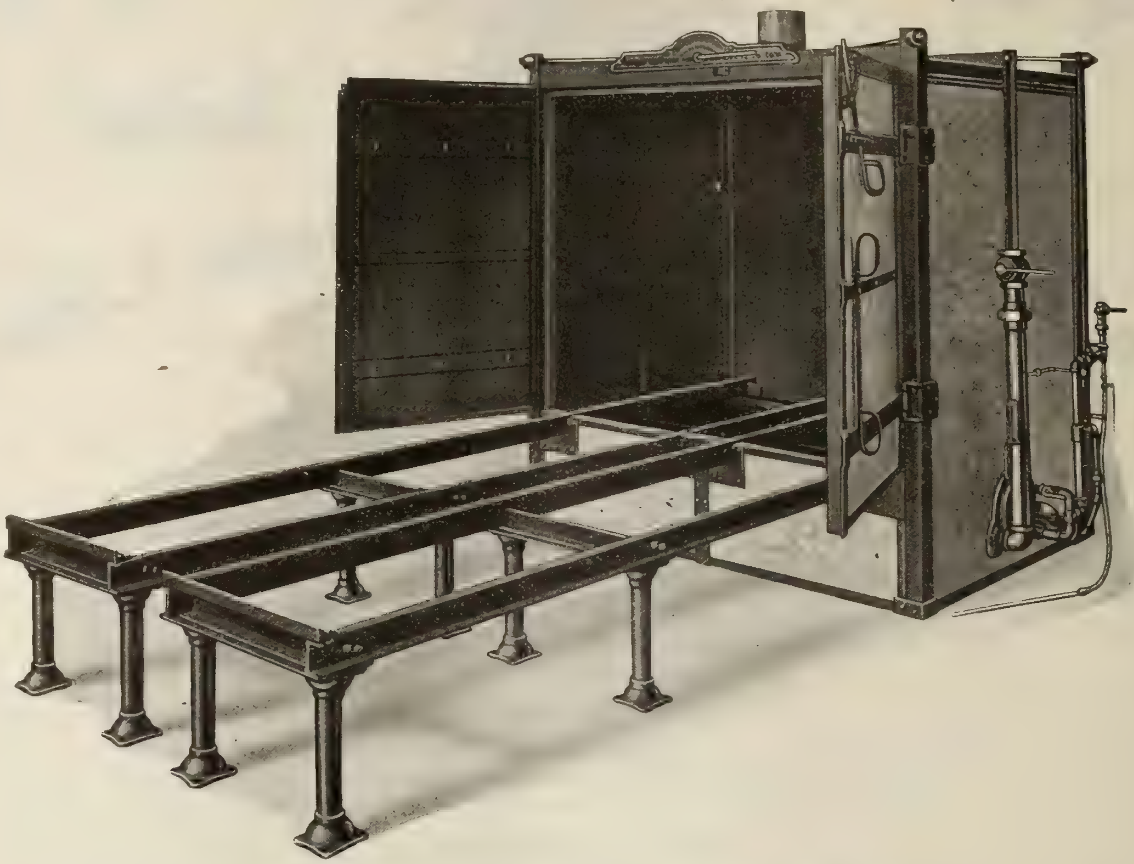
Wood and Machine Steel, Brass and Bronze.

LEAD PRODUCTS

Lead Pipe, White Lead, Shot and Putty.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG



A convenient type of Crawford Sectional Oven largely used by manufacturers turning out Shells up to twenty-eight pounds each.

The method of heating explained in previous issues is the same with all types of Crawford Ovens—no direct flame coming in contact with the material in the oven.

Either city, natural, gasoline or producer gas can be used with either type of oven.

Ovens and trucks built for baking the varnish or finish on any number or size of shells required at a time.

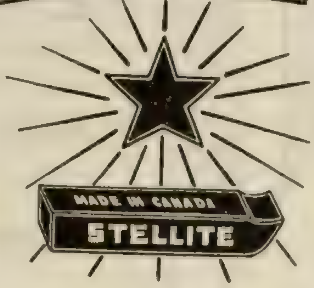
The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN., U. S. A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA

STELLITE

The New Alloy High-Speed Cutting Metal



Is not a steel.
Contains no iron.

"Stellite" Tools Set the Pace for Fast Cutting

They will stand up under the fastest speeds that your machines can drive them.

They take *heavier feeds and cut much faster than steel tools* because they are harder, tougher and are not susceptible to heat. They cut when red hot just as well as when cold; there is no loss of temper.

They *do 20 to 100 per cent. more work than steel tools* and require less attention to keep a keen edge.

Save money at the point of the tool.

It will be well worth your while to try it.

Made in Canada by

The Deloro Mining and Reduction Co., Limited

DELORO, ONTARIO

The Canadian B. K. Morton Co., Limited

SOLE SELLING AGENTS FOR CANADA AND NEWFOUNDLAND

49 Common St., MONTREAL, QUE.   86 Richmond St. East, TORONTO, ONT.

STEEL

for SHRAPNEL SHELLS AND SHELL BLANKS

Only Company in Canada producing steel ingots by the "HARMET" Liquid Process.

REASONS WHY THESE INGOTS ARE SUPERIOR TO THE ORDINARY KIND:

1. Prevention of cracks, due to shrinkage; of internal stresses and resulting cracks and fissures.
2. Early cessation in the crystallization of the metal, and the production of fine crystallization of the metal, without cleavage planes.
3. Lessening of segregation, i.e., reduction of tendency to carbon and other impurities to concentrate in the central and upper parts of the ingot.
4. Prevention of "Pipes" or interior cavities, and thus preservation of absolute solidity in the ingot.
5. Improvement in physical properties.
6. Reduction in waste of ingot.

WE CAN SUPPLY FORGINGS OF ALL SHAPES AND SIZES MADE OF ORDINARY OR "HARMET" FLUID COMPRESSED OPEN-HEARTH STEEL ON THE SHORTEST NOTICE.

Nova Scotia Steel and Coal Company

Limited

Head Office:
NEW GLASGOW,
N.S.

Western Sales Office,
Room 14 Windsor Hotel,
MONTREAL

ECONOMY

Rapid production is dependent on the use of

Economical Tools and Steel.

It is safer NOT to specify High Speed Steel but

Demand "TYR," the Economy Steel.

(MADE IN CANADA)

Armstrong, Whitworth of Canada, Limited

OFFICES: 22 Victoria Square, Montreal, P. Q.
Dominion Bank Building, Toronto, Ont.
WORKS: Longueuil, P. Q.

Red Cut Superior High Speed Steel

Quality First

THE BEST FOR MACHINING ALL HARD MATERIALS

Are your tools made of **Red Cut**?

Send for folder

VANADIUM-ALLOYS STEEL COMPANY

PITTSBURGH, PA.
Works at Latrobe, Pa.

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL & WELLAND.

Machine-moulded Gears made without the use of patterns, insuring quick delivery in case of breakdown.

Atlas Crucible Steel Company
DUNKIRK, New York, U.S.A.
Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX
High Speed Steel, Atlas LX
Chrome Vanadium Steel

Carbon Tool Steel
"Deward" Oil Tempering, Non-Shrinking

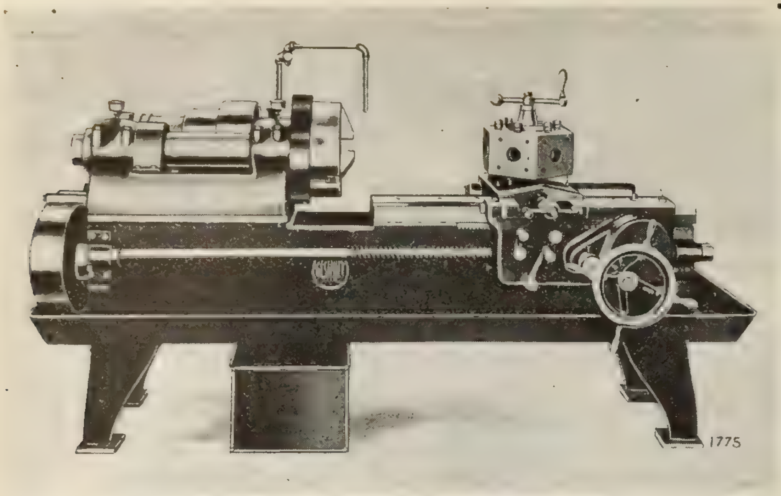
"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

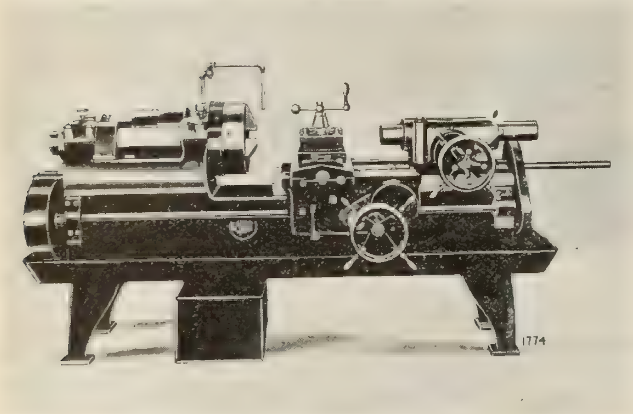
"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

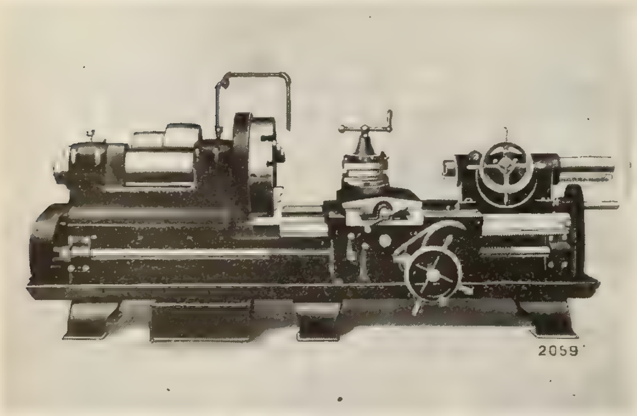
Sold by
YOUNG, CORLEY AND DOLAN, Inc.
115 BROADWAY, NEW YORK CITY, U.S.A.



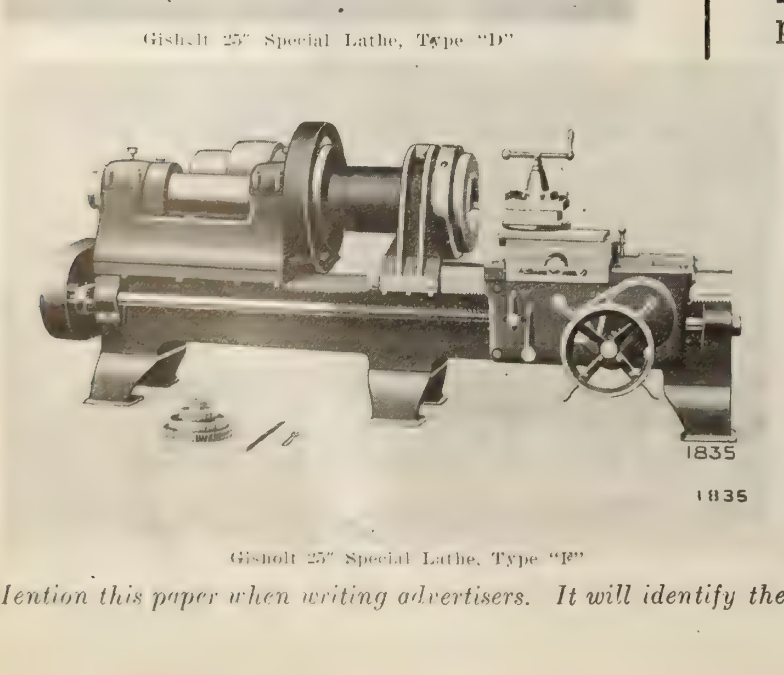
Gisholt 16" Special Lathe, Type "A"



Gisholt 16" Special Lathe, Type "D"



Gisholt 25" Special Lathe, Type "D"



Gisholt 25" Special Lathe, Type "F"

GISHOLT

Special Lathes for Simplified Operations

Can be equipped for various operations such as rough and finish turning, waving, grooving, etc. Also for simplified operation on any regular line of manufacture.

Spindle Bore on the 16"—3¾" or 6¼".
Spindle Bore on the 25"—6¼".
Special attachments can be furnished—taper and forming attachments, scroll and collet chucks, etc.

Nearly 1,000 of these machines have already been shipped to England, France, Russia and the United States. Over 25 years' experience in special tool manufacture and our modern equipment enable us to produce machines that will effectively solve your manufacturing problems.

The machines illustrated are made in addition to our standard lines of heavy **Turret Lathes, Tool Grinders, Vertical Boring Mills, Horizontal Boring Mills, etc.**

Prompt delivery is offered subject to prior sales.

Write us about your requirement, whether it be the equipment of an entire new shop or just a single machine to balance your present equipment.

Gisholt Machine Co.

**1084 E. Washington Ave.
Madison, Wis., U. S. A.**

Canadian Agents
THE CANADIAN FAIRBANKS-MORSE CO., LTD.,
Montreal, Toronto, Quebec, Ottawa, St. John, N.B.; Winnipeg, Calgary, Saskatoon, Vancouver, Victoria.

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO, LIMITED, SHEFFIELD, ENGLAND

Sole Agents for Canada:

H. BOKER & CO., Inc.

(Formerly Hermann Boker & Co.)

332 St. James Street, Montreal, P.Q.

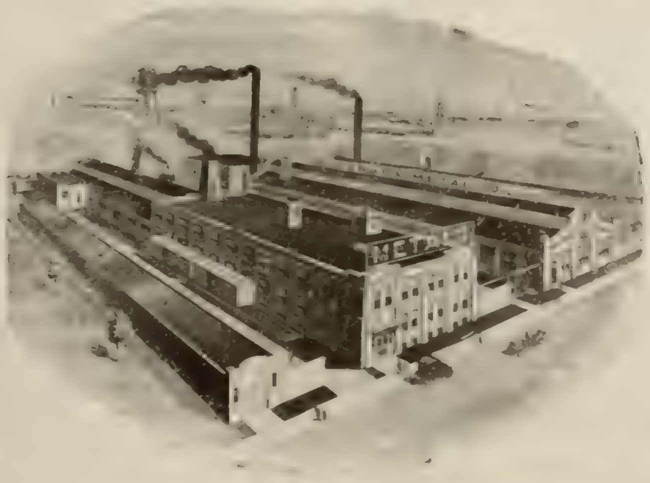
Established 1837 Incorporated 1914

TO SHELL MAKERS

WE MAKE

WIRE SOLDER ALL SIZES

Imperial Soldering Paste



Headquarters for Pig Lead

ALL INGOT METALS

The Canada Metal Co., Limited, Fraser Ave., Toronto

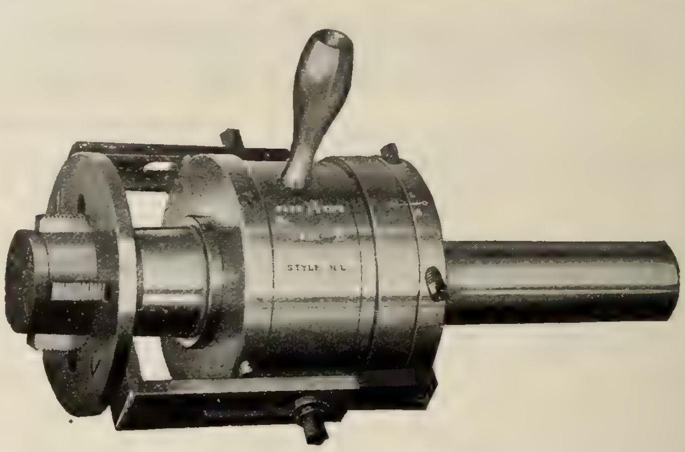
HAMILTON - MONTREAL - WINNIPEG - VANCOUVER

DON'T WASTE TIME PUZZLING OVER YOUR TAPPING PROPOSITION

Submit it to us, and our Exports will tell you how it can be done
TO YOUR BEST ADVANTAGE

Geometric Collapsing Taps are arranged for all classes of thread tapping above $^3/_4$-inch diameter. Rigid while tapping, but collapse the chasers when the required depth is reached. Can be fitted to screw machine or turret lathe, also to live spindle, such as a drill press.

Let us send our booklet describing these Geometric Collapsing Taps in a general way, or, with your specifications at hand, we will describe your Tap in particular.



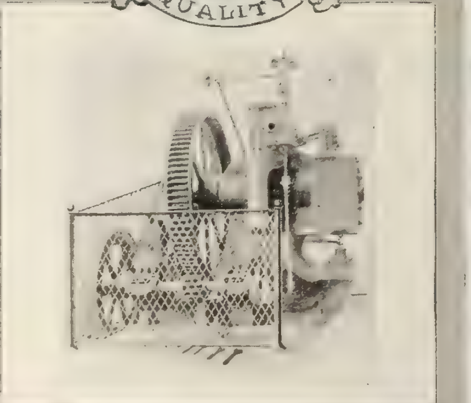
Geometric Collapsing Tap, Class "N-L," Equipped with Chasers for Plug Tapping

The Geometric Tool Company

New Haven, Conn., U.S.A.

Canadian Agents: Williams & Wilson, Ltd., Montreal
The A. R. Williams Machinery Co., Ltd., Toronto,
Winnipeg, and St. John, N.B.

D
QUALITY



PROTECT YOUR PROFITS

One serious accident can cost you thousands of dollars. DENNIS Machine Guards cost little, save life and limb, and prevent heavy damage actions. Write for literature.

Dennis Wire & Iron Works Co., Limited
LONDON, CANADA

DENNIS-LONDON

WOLFRAM
MADE IN THE U.S.A.
HIGH SPEED STEEL
TRADE MARK

Wolfram Cobalt High-Speed Steel, BEST FOR TURNING SHRAPNEL. Vulcan Hot Piercing Steel, FOR ALL KINDS OF HOT WORK. Vulcan Regal No. 2 Steel, FOR BRASS FINISHINGS. Vulcan Special "W" Steel, For Special Taps and Dies. Vulcan Non-Shrinkable Steel, For Intricate Dies. Vulcan Special Vanadium Steel Does Twice the Work of Regular Carbon Steels.

VULCAN CRUCIBLE STEEL COMPANY

ALIQUIPPA, PA.

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Pittsburgh, Penn., U.S.A.

MANUFACTURERS OF

SHELL FORGINGS

Have the Steel, Equipment and Experience and can execute orders for

Nose Pieces
Adapter Plates
Base Plates

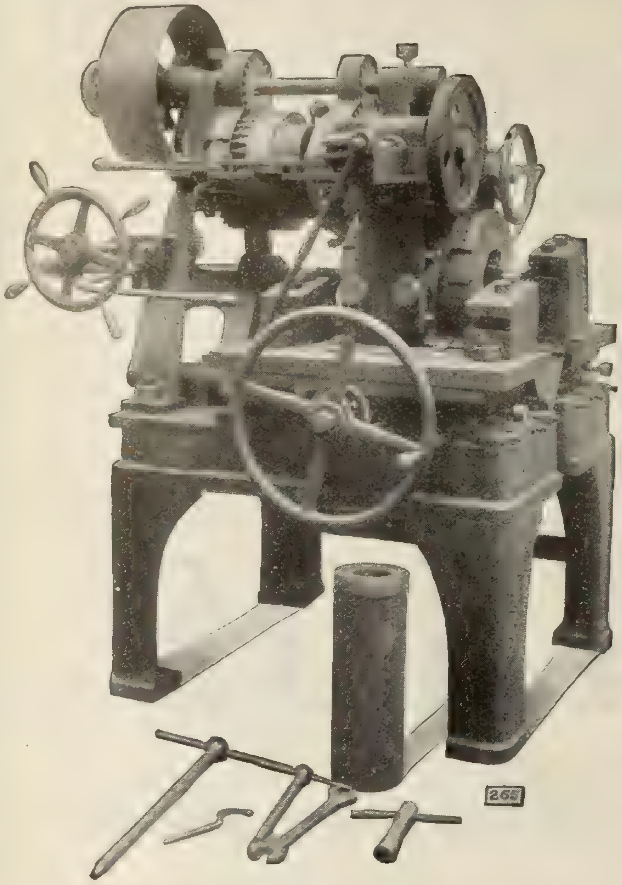
for any size of shells.

Can begin shipments of Nose Pieces, Adapter Plates, and Base Plates promptly, and maintain these in required quantities as soon as necessary inspections are authorized and executed.

On Imperial Munitions Board List.

ADDRESS OUR REPRESENTATIVE :

John A. Buchanan, King Edward Hotel, Toronto



CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal

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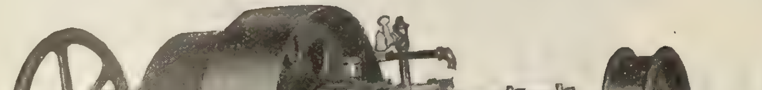


For Turning, Facing and Milling the Thread on Gas Check Plugs for 6-inch High-Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

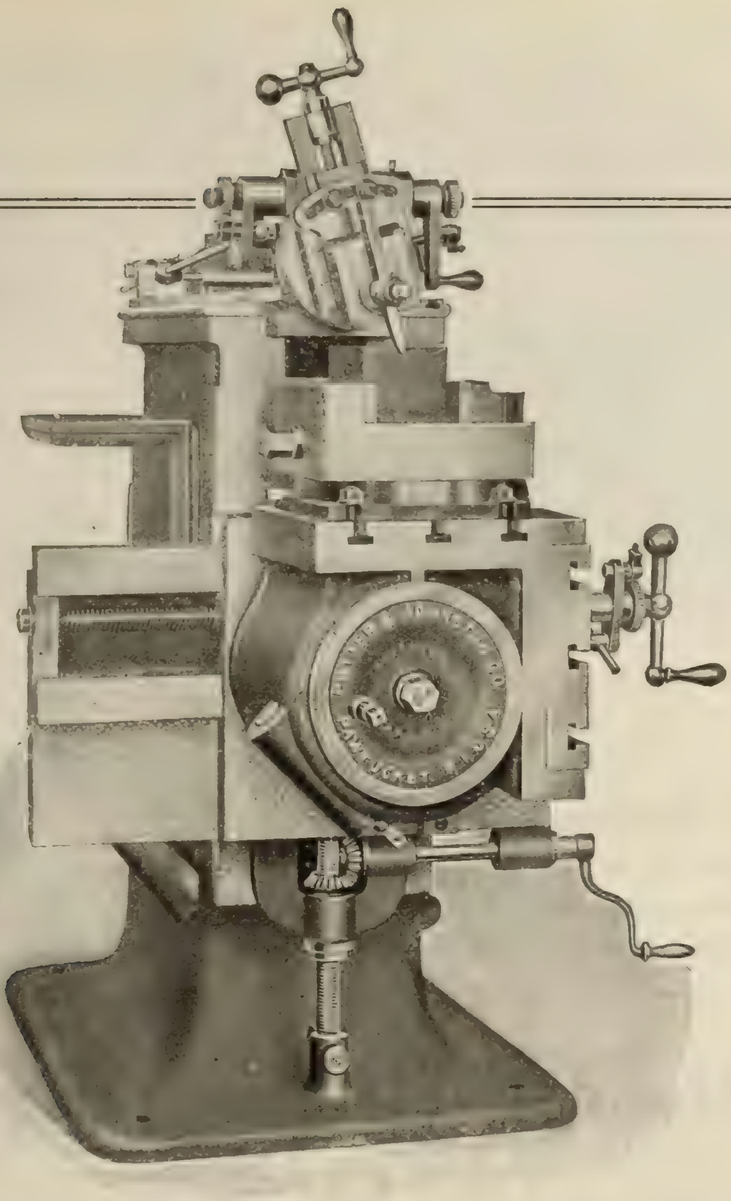
Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells. Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

Prompt Shipment
BUILT EXCLUSIVELY BY
Edwin J. Banfield
STAIR BUILDING, TORONTO, ONT.



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

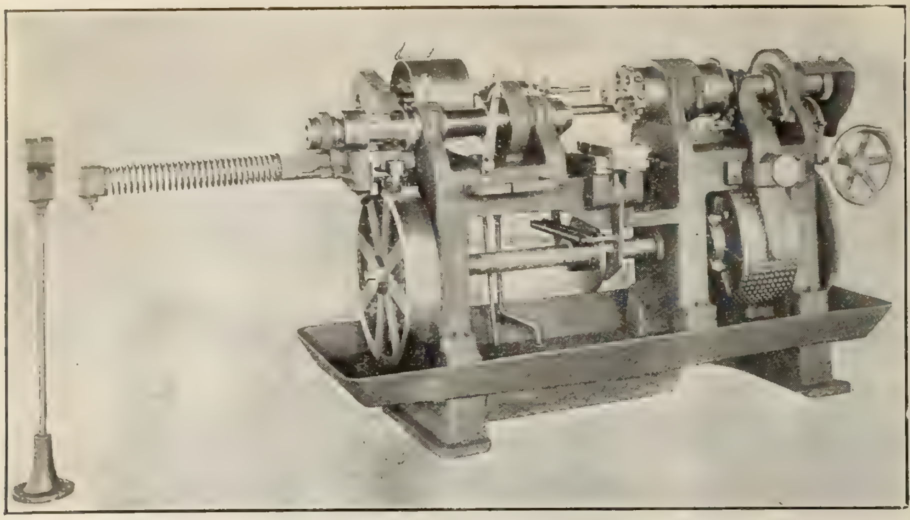
Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

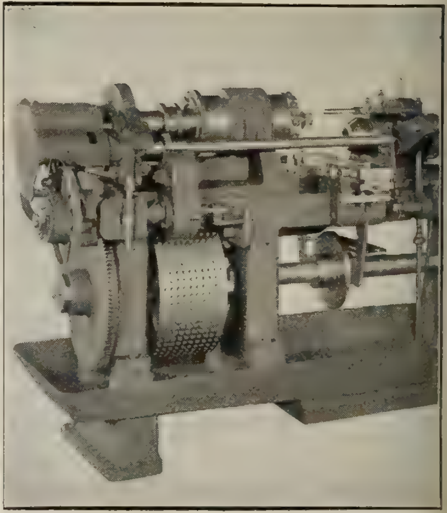
Quick Delivery

In less than six weeks from the time your order reaches us we can place

Chicago Automatic Screw Machines

in your plant ready for operation.





A New Departure in Turret Indexing

By an indexing device selective in type—one or more idle holes—holes not carrying tools—can be skipped in indexing without pause or loss of time—a feature that makes for increased production.

Chicago Automatics stand up under the strain of day and night service and economically turn out any screw machine product in minimum time.

They are the result of 10 years extensive screw machine manufacture.

Drop a card now for details and specifications.

The John Macnab Machinery Co.

90 West Street - New York

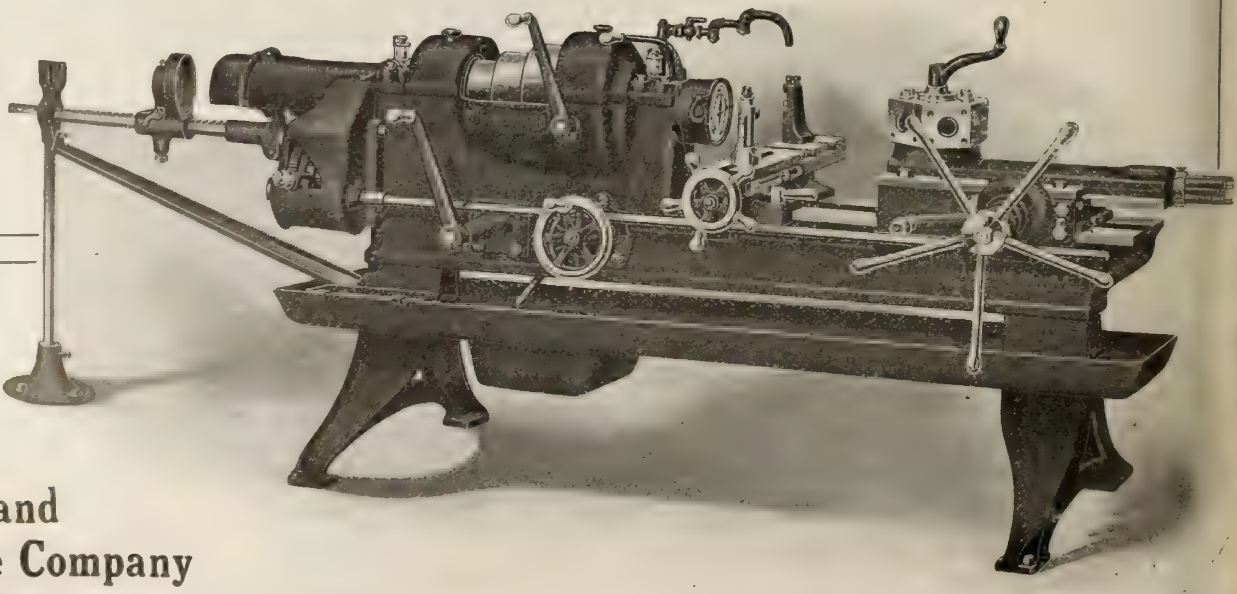
European Representative—JOHN MACNAB, Hyde, England

Millholland 1⅝x10 Turret Screw Machine

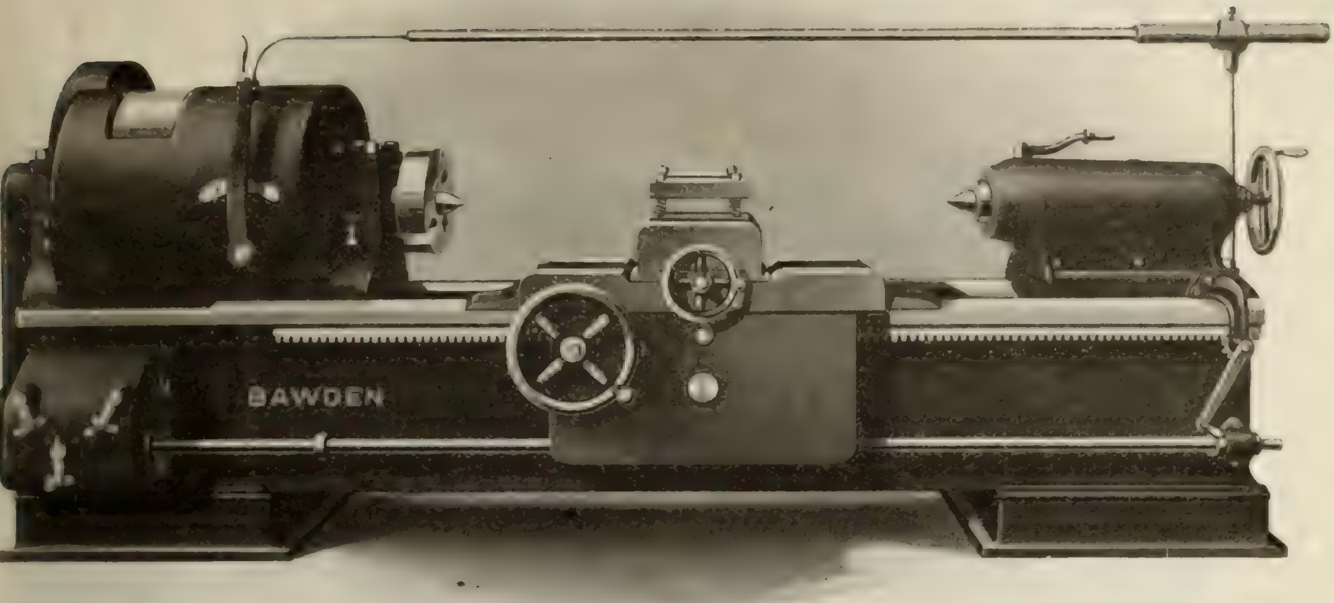
The combined result of two generations of engineering and mechanical experience. While, as a whole, it is no radical departure from established lines of the turret lathe, it has many original features, and with these features are combined well-known devices.

Safety, rigidity, convenience, production and durability are the ideas behind every step in their construction.

Your request will get you full details and specifications by early mail. Make it.



W. K.
Millholland
Machine Company
INDIANAPOLIS, IND., U.S.A.



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

Powerful Machine Tools—

that are good for many years' service on big jobs after the war is over.

BAWDEN
Heavy Duty Shell Lathes

are really wonderful in their **accuracy, power** and **speed.**

Every part is made in our plant. Bronze bearings, steel spindles and gears. Best material and finish throughout.

USERS ALL HAVE A GOOD WORD FOR BAWDEN TOOLS. Write for full details.

We manufacture a full line of gauges for all sizes of British, Russian and French Shells and component parts.

The Bawden Machine Co., Limited

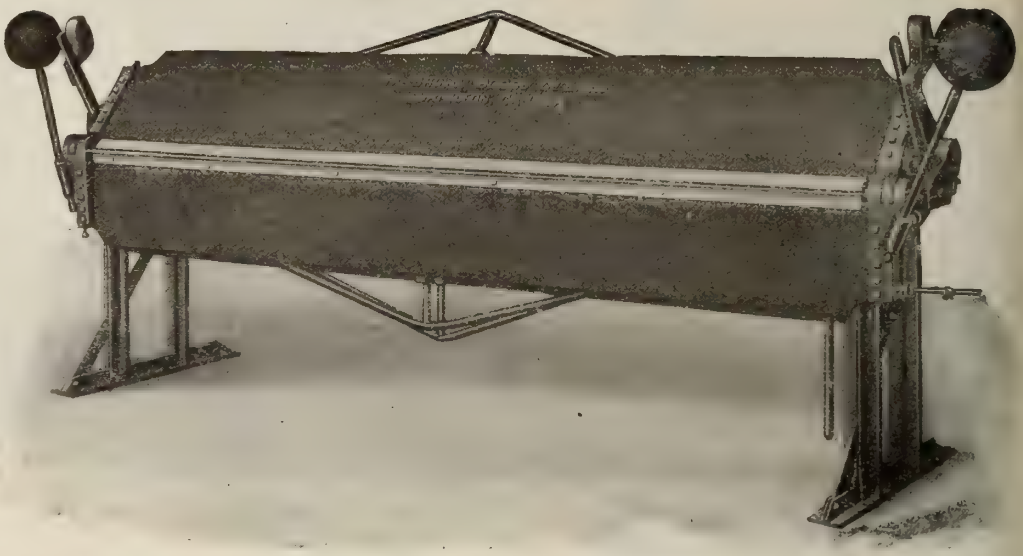
TORONTO, CANADA

A GOOD INVESTMENT

A "B.B." STEEL BRAKE

FOR a Cheap Brake the "B.B." Steel Plate Machine is the best investment you can make. It is especially designed for rapid forming of sheets, and is suitable for a large variety of work, such as can be accomplished on an ordinary Cornice Brake. We can furnish these Brakes for bending all sizes and gauges of metal.

Write for Catalogue if Interested.

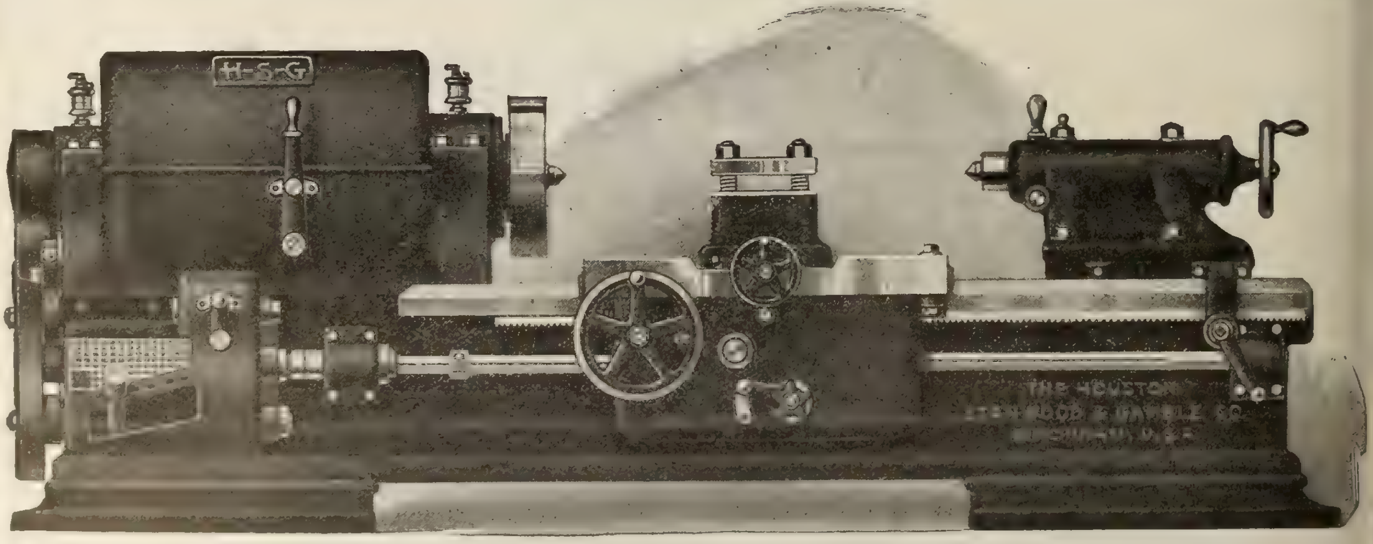


"ALWAYS, EVERYWHERE, SPECIFY 'B.B.' QUALITY."

The Brown-Boggs Co., Limited, Hamilton, Canada

Tinsmiths' Tools, Sheet Metal Working Machinery, Dies, etc.

Western Representatives: MESSRS. BISSETT & WEBB, LIMITED, WINNIPEG AND EDMONTON



H-S-G TRADE MARK single-pulley, high-powered, all-geared engine lathe which can be shipped promptly in three sizes, 26″, 30″ and 36″ swing.

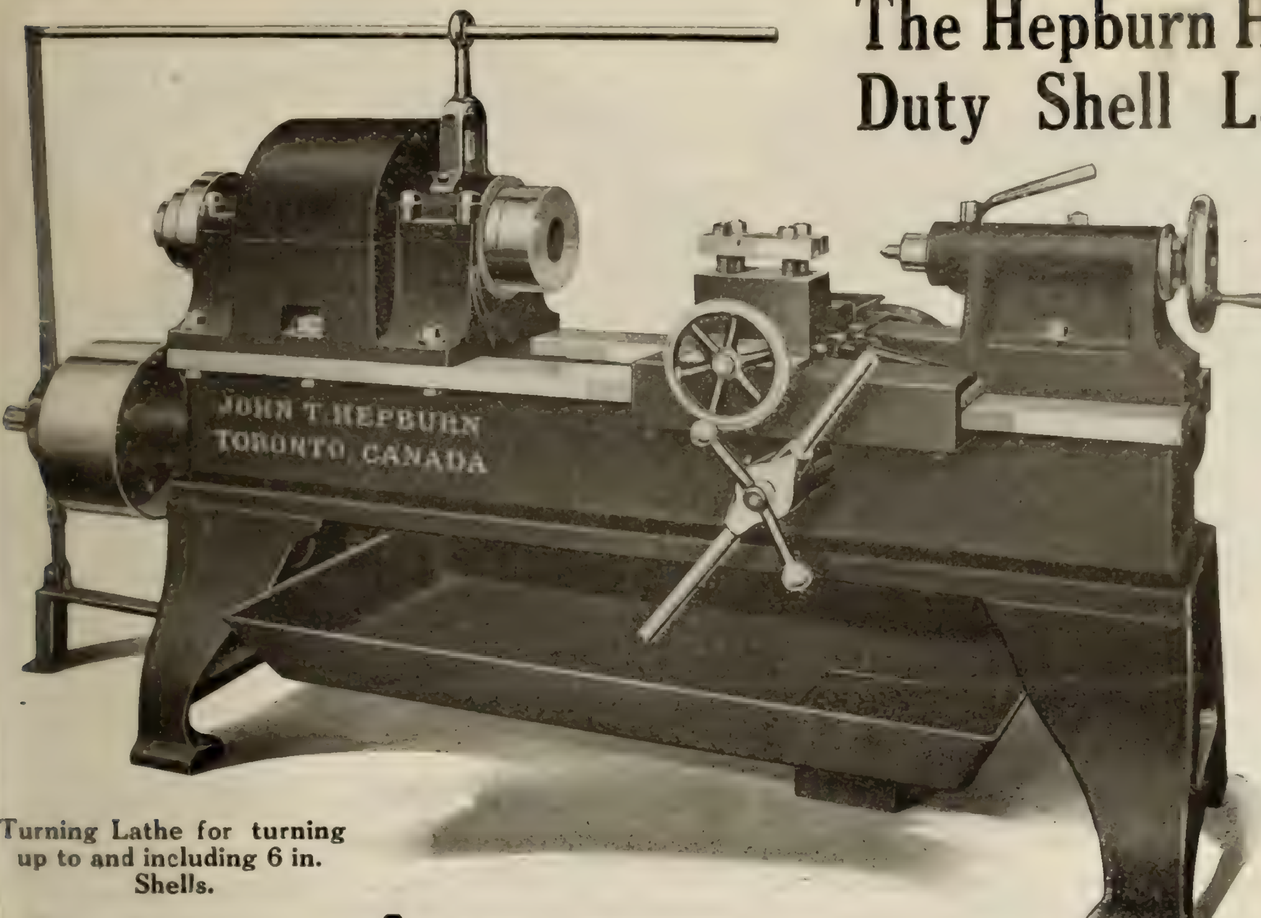
This is a heavy duty lathe. For instance, the 30″ swing lathe has 7″ face drive pulley, 8″ x 10″ front spindle bearing and other parts of correspondingly liberal dimensions. The net weight with 12 ft. long bed is 15,000 pounds. Weight with profiling attachment and pot chuck for boring 18,000 pounds. All gears without exception are of steel. The design and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

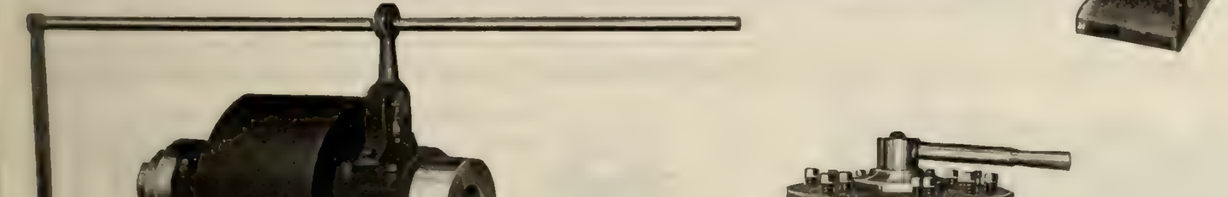
CINCINNATI, U.S.A.

Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto

The Hepburn Heavy Duty Shell Lathes


JOHN T. HEPBURN
TORONTO, CANADA

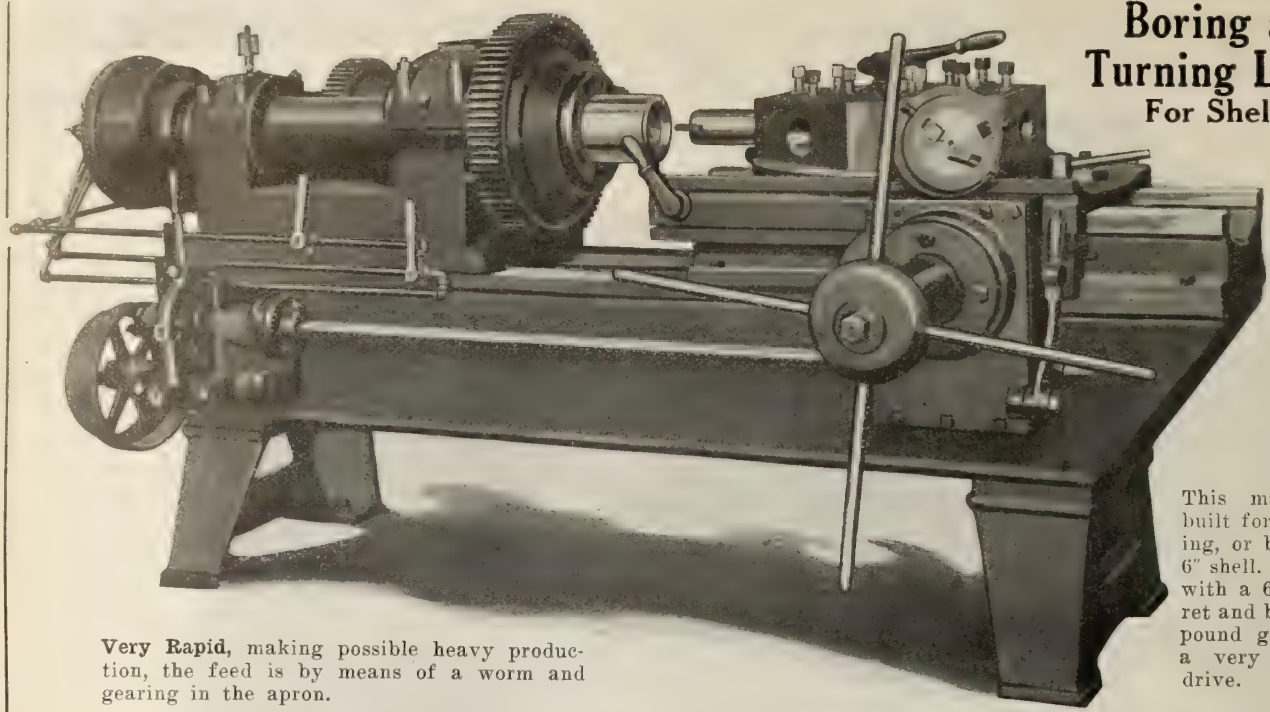
Turning Lathe for turning up to and including 6 in. Shells.


JOHN T. HEPBURN
TORONTO, CANADA

Turret Lathe for boring up to and including 6 in. Shells.

JOHN T. HEPBURN, Limited, 18 to 60 Van Horne St., Toronto, Can.

Boring and Turning Lathe
For Shell Work



This machine is built for base facing, or boring the 6" shell. It is made with a 6 side turret and being compound geared has a very powerful drive.

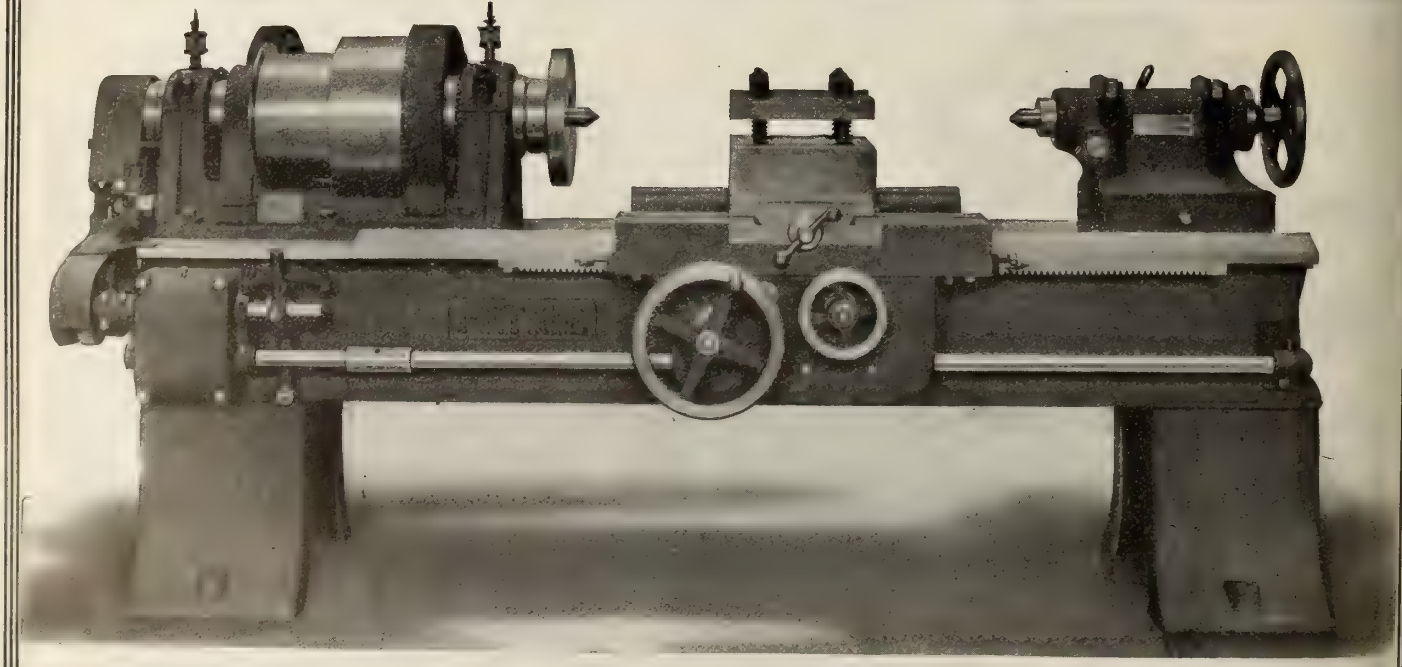
Very Rapid, making possible heavy production, the feed is by means of a worm and gearing in the apron.

WRITE FOR DELIVERIES.

THE JENCKES MACHINE COMPANY, LIMITED

Works: SHERBROOKE, QUE.; ST. CATHARINES, ONT.

SALES OFFICES: 727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.



Petrie 20-inch Heavy Duty Manufacturing Lathe

A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

Made in Canada **Reasonable Price** **Prompt Deliveries**

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.

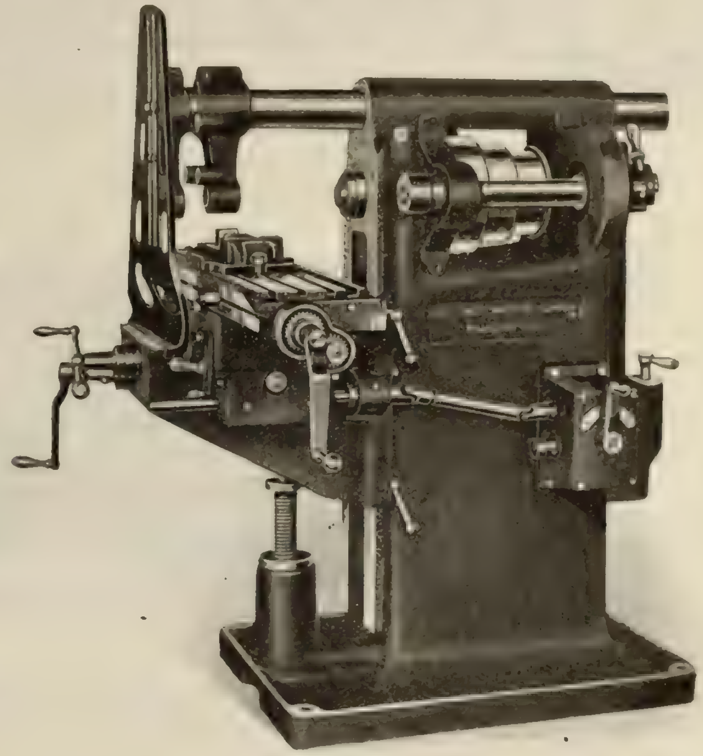
The Ford-Smith Machine Company

Ford-Smith

27" x 19" x 7½"

Milling Machines

We can make interesting deliveries on these machines, either through our regular dealers or direct from our plant.



The Ford-Smith Machine Company
LIMITED
Hamilton Canada

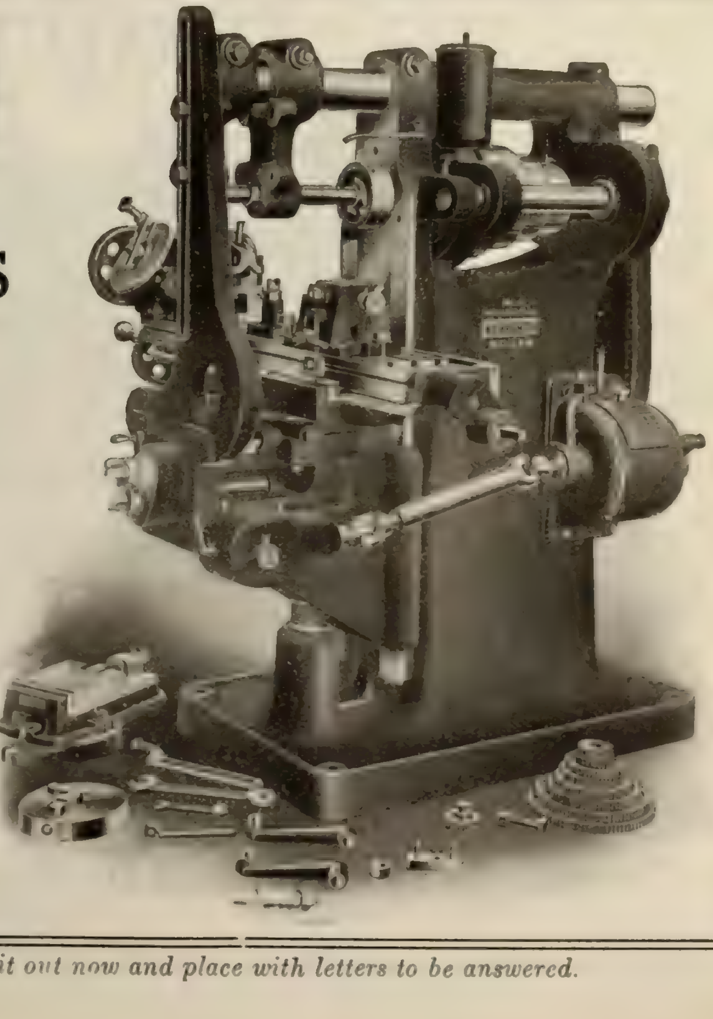
KEMPSMITH

UNIVERSAL MILLING MACHINES

When installing a Universal Milling Machine for tool room work, one of the prime considerations is simplicity of machine and convenience of operation.

Kempsmith Milling Machines are notable leaders in these two requirements. Note especially that all feeds are reversed by one lever at the front of the knee. Likewise all power feeds are tripped and engaged by one compound lever, also located at the extreme front of the knee. The swiveling table is clamped rigidly at any angle by a quarter turn of a single bolt.

Our catalogue illustrates and describes more fully the features mentioned. A copy will be gladly sent on request.



Kempsmith Manufacturing Co.
MILWAUKEE, U. S. A.

Agents:—Foss & Hill Machinery Co., Montreal
General Supply Company, Toronto and Ottawa
Western Supply and Equipment Co., Calgary

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO. LIMITED

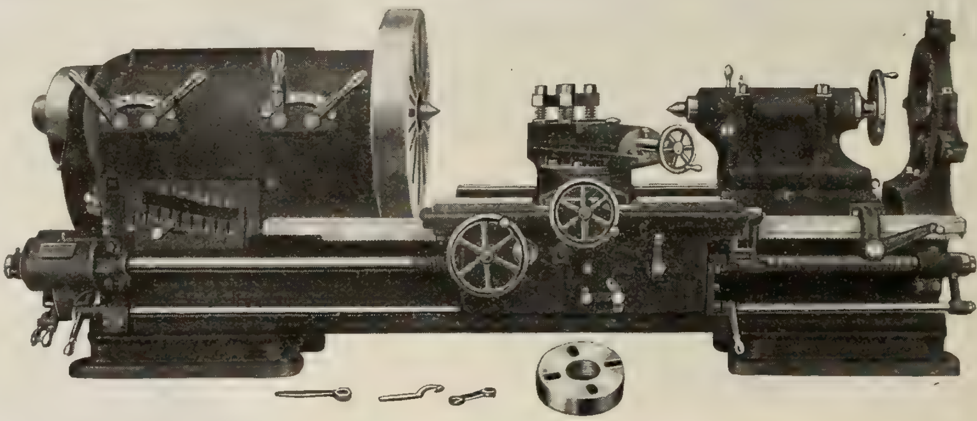
32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Lodge and Shipley—Selective Head—Triple Gear - 36" Lathe—Good Delivery

Strong, speedy, accurate Machines for all operations on 6-in., 8-in., 9.2-in. and 12-in. Projectiles.

Unexcelled 18 in. and 20 in. Engine Lathes for Tool Room Equipment

Send us a list of machines required, and full particulars will come by return mail.

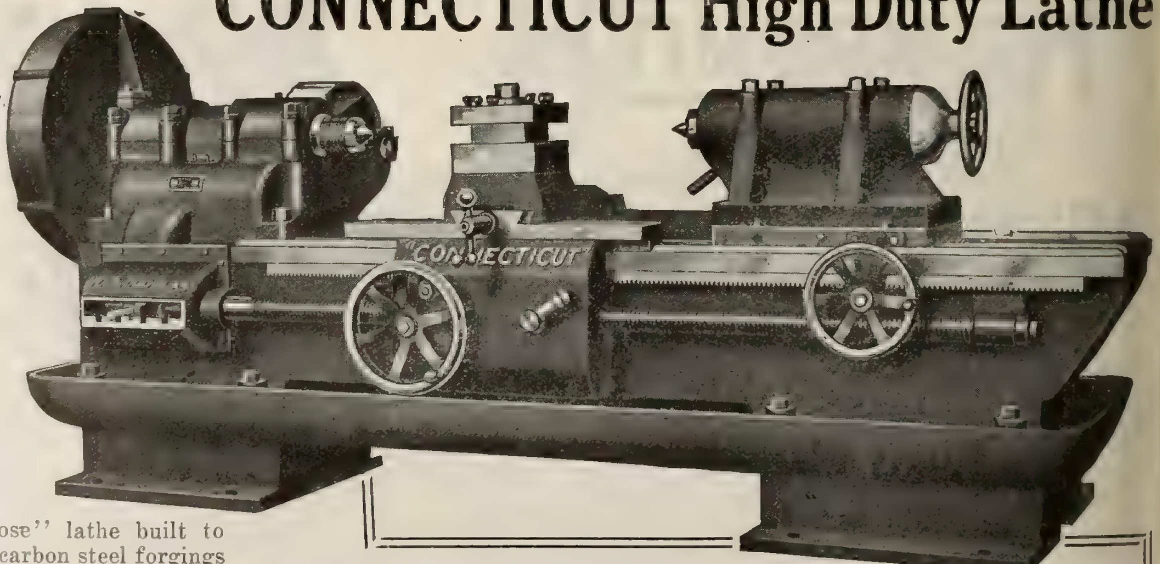


GARLOCK-WALKER MACHINERY CO., Limited, Telephone Main 5346 **32 Front St. West, TORONTO**

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds

CONNECTICUT High Duty Lathe



Sets the pace on HEAVY WORK

A "Single Purpose" lathe built to turn or bore high carbon steel forgings at maximum speeds.

It is in all respects heavier and more rigid than standard 30-inch or even 36-inch lathes giving the same distance between centers.

The usual cutting speeds on shell work are 40 to 50 feet per minute on shells up to 8" diameter, 30 feet per minute on larger sizes. Depth of cut from ¼" to ⅝", depending upon the eccentricity of the piece. Our lathes will stand more than this.

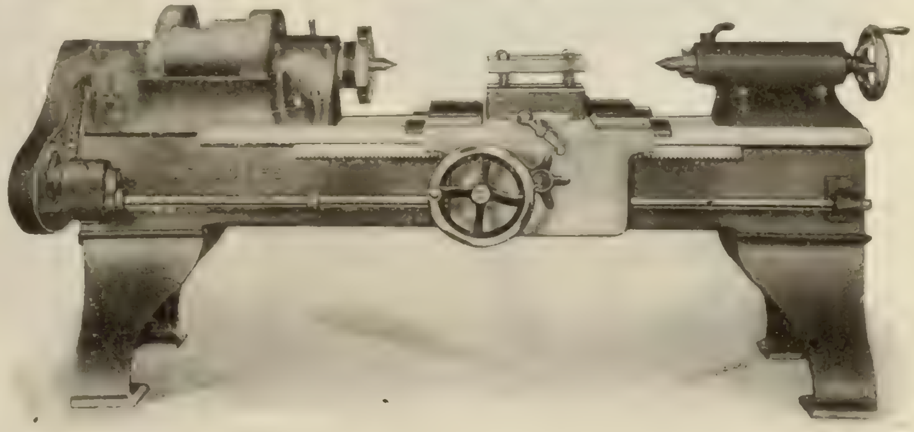
We admit the **Big Gear** is not particularly handsome, but it eliminates the train of small gears, and adds greatly to the strength and wearing qualities.

Write for bulletin giving full details.

W. & B. DOUGLAS, ***Middletown, Conn.***

How Lathe Simplicity Solves Labor Problems

The great simplicity, the compact, convenient design, make the Hercules Lathe an ideal single-purpose machine. To train an unskilled laborer to perform accurately one or two operations on this machine requires but a short time. The rugged, powerful construction then enables that laborer to turn out precise work continuously at the maximum speed.



Where skilled mechanics are not always available — the Hercules Single-Purpose Lathe is the logical machine tool.

At the present time, we can still make early deliveries. Write — at once—for full details.

HIMOFF MACHINE COMPANY, INC.
128 MOTT STREET, NEW YORK CITY

Canadian Down Draft Forges in Railroad Shops

CANADIAN BLOWER & FORGE CO., Limited, BERLIN, ONTARIO
St. John · Montreal · Toronto · Winnipeg · Vancouver

All Rough Work is Consistently Penalized

—By—

Williams'

"VULCAN"

Caliper

Gauge

"THE OFFICIAL UMPIRE"

10 sizes
Capacities ¼ to
3 in.

8 sizes
Capacities 3 to
7½ in.

6 sizes
Capacities 1 to
3 in.

For External, Internal and Eternal Use.

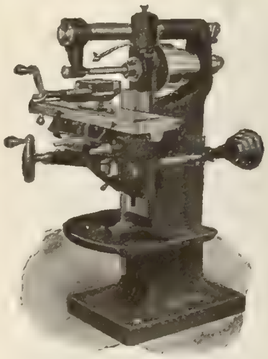
They won the Grand Prize, the Highest Award, at the P. P. I. E.

Western Office and Warehouse
40 So. Clinton Street
Chicago, Ill.

J. H. WILLIAMS & CO.
45 RICHARDS STREET BROOKLYN, N.Y. CITY
THE WRENCH PEOPLE

Secure them from your dealer. We guarantee them.

Cut Your Shop Costs

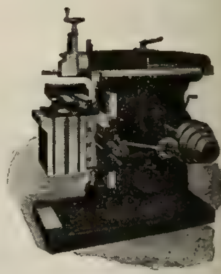


Nobody would think of putting 16-inch lathe work on a 30-inch lathe, then why leave small parts on a large Milling Machine?

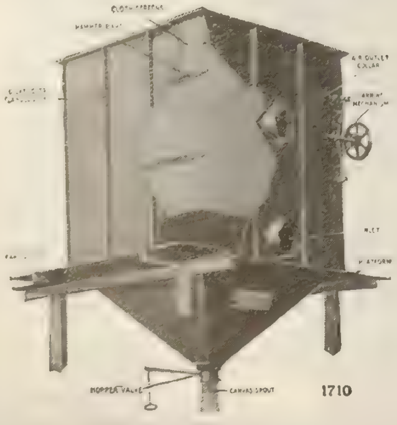
A Steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

That same principle applied to your small planer work will cut the cost of planer work.

A Steptoe Shaper will do the work faster because it can be handled quicker.



The John Steptoe Company, CUMMINSVILLE, CINCINNATI, OHIO, U.S.A.



Dust Collecting Systems

Designed for taking care of dust from exhaust tumbling mills, emery wheels, sandblast machinery, etc.

Dust-laden air after passing through arrester can be discharged back into shop free from dust.

Cleaning Rooms equipped complete
New catalog No. 120 on request

Complete
Foundry
Equipments

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U. S. A.
CHICAGO SUBURB.

Cranes
of all
Types

One Paragraph From A Machinery Dealer's Letter:-

PEERLESS
PEERLESS MACHINE Co. RACINE WIS. U.S.A.

"One of our customers has recently purchased from us two of your 6" PEERLESS High Speed Power Hack Saws, and they now wish to install several more, providing we can take some of their old hack saws in exchange. They claim these old machines are as good as new, but they consider the PEERLESS so far superior to the others that they would like to fully equip their factory with PEERLESS Machines."

The principle of construction in the PEERLESS High Speed Heavy Duty Cutting off Machine admits of a cutting speed which cannot be approached by the ordinary type of machine. The output of the machine is controlled by the efficiency of the blade. At the maximum speed which this machine is guaranteed to operate it cuts off a 3 in. round cold rolled bar in 1½ minutes.

Bearings are extra large. The ones that are subject to excessive wear are made of steel hardened and ground, which eliminates the continuous [illegible] and repairing that ordinarily is the case when a machine is worked to its utmost.

PEERLESS MACHINE COMPANY
1607 Racine Street RACINE, WISCONSIN

SPEED SPEED

This pile of 1-inch square steel bars was cut in nine hours with a

Racine Metal Cutter

with ONE BLADE at a blade expense of six cents.

You will profit by learning all about the Racine features that make records like this possible.

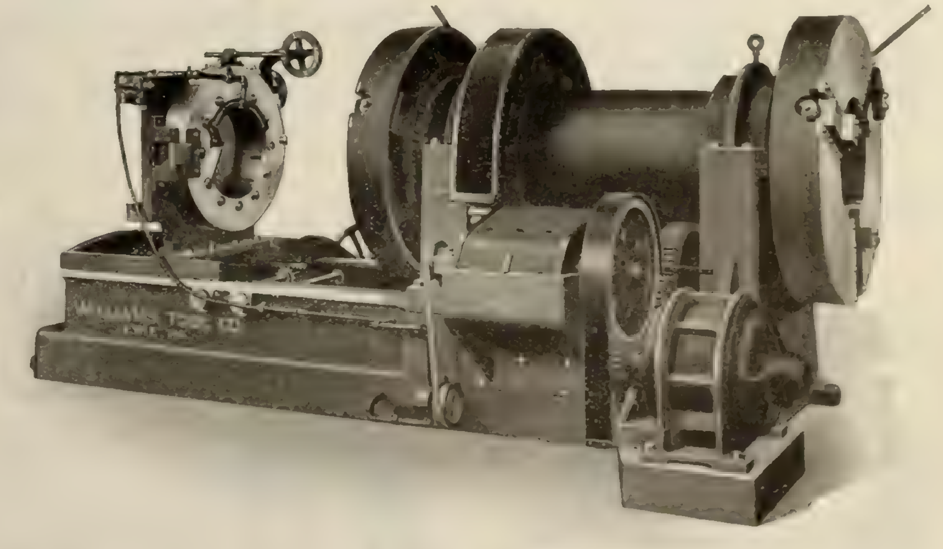
Used extensively in Canadian plants. One Canadian Steel Company is using 120.

We'll gladly put you in touch with users and send full details.

RACINE TOOL & MACHINE COMPANY
15 Melbourne Ave., Racine, Wisconsin, U.S.A.

WILLIAMS PIPE MACHINES

Received Highest Award at Panama Exposition



The Following Letter Explains Why:

Williams Tool Co., Erie, Pa.: Rochester, N.Y., 12-3-14.

Gentlemen:—We are so pleased with our No. 3 Pipe Machine, and it is doing such splendid work for us at a minimum of expense that we are now considering the advisability of displacing two smaller machines for one of your No. 1½ or No. 2 motor drive.

The machines which we would displace, if we make a change, are belt drive, are (names of two of the oldest and best known machines on the market) equipped with nipple holders, extra dies, etc. Both of these machines are still in fairly good condition. On what basis could we make an exchange with you?

Yours very truly, SAMUEL SLOAN & CO.

WILLIAMS TOOL CO. - - - ERIE, PA.

—He's a Poor Workman

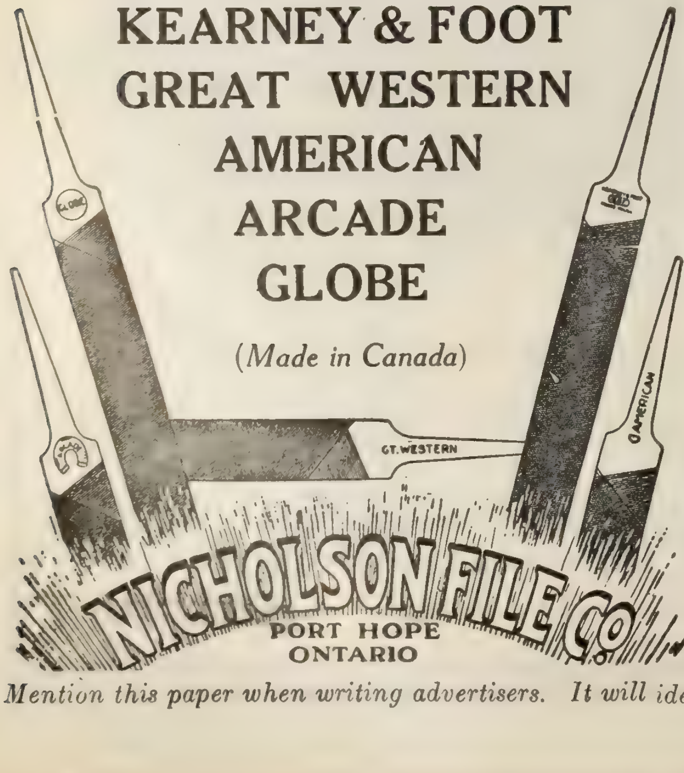
who complains of his tools, as a general rule. But he's a poorer workman who, knowing his tools are inefficient, does not complain.

Educate your men to turn in their files the moment they reach their "inefficient point." That will give them no excuse for poor work.

The cost of the extra files will be much less than the loss in labor, time and mental energy spent in using files that have worn smooth.

Send for a copy of our book, "File Filosophy." It is worth the while of any manager, factory superintendent, shop foreman and workman to read it.

The Famous Five Are:

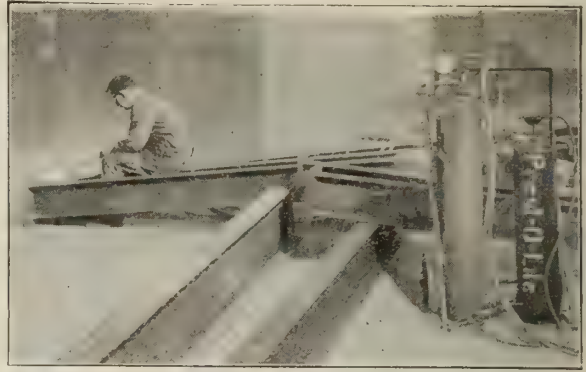


KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(*Made in Canada*)

NICHOLSON FILE CO
PORT HOPE
ONTARIO

Oxy-Acetylene Welding and Cutting



Welding "shoe" on steel "I" beam used in large construction job—saving time and labor.

Even the Smallest Jobs Show Important Savings

Once you become accustomed to specifying oxy-acetylene welding wherever two pieces of metal are to be joined—in manufacturing, construction or repair jobs—the opportunities for savings of time, labor and materials increase at a surprising rate. Even the very small jobs—oftentimes made to seem large solely through adherence to old, cumbersome methods—can be made to show important savings.

Just as the simple welding of base plates to the steel columns, illustrated above, saved valuable time on a "rush" construction job, you will find that the oxy-acetylene process can make regular savings for you in hundreds of similar instances. In making shop repairs, expensive dismantling, costly replacements and annoying delays are eliminated, the work being done right "on the spot." Just one important repair, preventing a serious tie-up in production, might easily repay you for all needed welding apparatus and years of Prest-O-Lite service.

Shops large and small have an equal opportunity to secure this efficiency, economy and simplicity through the

Prest-O-Lite PROCESS

Employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene (ready-made carbide gas) is backed by Prest-O-Lite Service, which provides dry, purified gas, insuring better welds, quicker work, and lower cost, and also avoids the large initial outlay and heavy depreciation incurred in making crude acetylene in a carbide generator.

The necessary equipment is not expensive. We furnish high grade welding apparatus for $75; acetylene service at additional cost. Also adaptable for oxy-acetylene cutting by the purchase of a special cutting blow-pipe. Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene—any average workman who understands metals can learn the process quickly and easily.

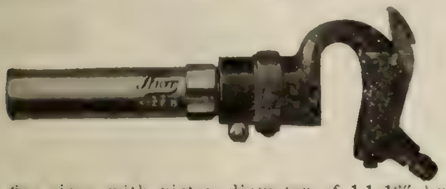
Send for special reports, engineering data and illustrated literature covering a wide range of welding and cutting work—it is bound to prove valuable to you.

The Prest-O-Lite Company, Inc.
Dept. F.
The World's Largest Makers of Dissolved Acetylene.
Canadian Main Office and Factory
MERRITTON, ONTARIO
Factory Branch: Winnipeg, Man.
53 Branches and Charging Plants

Keep Canadian Factories Going. Insist on Buying Goods MADE IN CANADA.

Thor

CHIPPING HAMMERS with Single Valve of the Latest Improved Design.



Made in five sizes, with piston diameter of 1 1/16" by strokes of [illegible] 1 to 5", designated as sizes A, B, C, D and E. Shipped on Trial at Our Expense

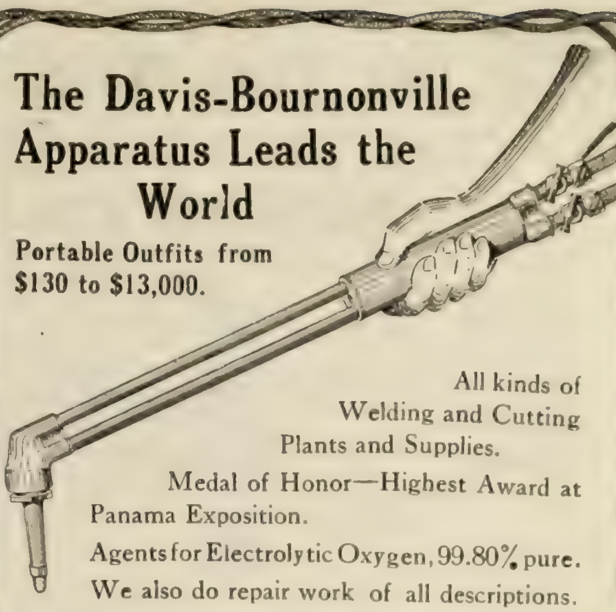
Independent Pneumatic Tool Co.

CANADIAN OFFICE:
334 St. James St., MONTREAL, QUE.

General Offices: Thor Building, Chicago, U.S.A.
Branches: New York, Pittsburgh, Detroit,
San Francisco, Birmingham

The Davis-Bournonville Apparatus Leads the World

Portable Outfits from
$130 to $13,000.



All kinds of
Welding and Cutting
Plants and Supplies.

Medal of Honor—Highest Award at Panama Exposition.

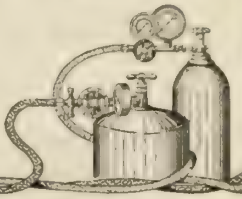
Agents for Electrolytic Oxygen, 99.80% pure.

We also do repair work of all descriptions.

Write us for price list.

Carter Welding Company

561 King Street West, Toronto
Tel. Ade. 893



Canadian Agents for
The Davis-Bournonville
Apparatus

WHY NOT APPLY the

OXY-ACETYLENE WELDING and CUTTING PROCESS

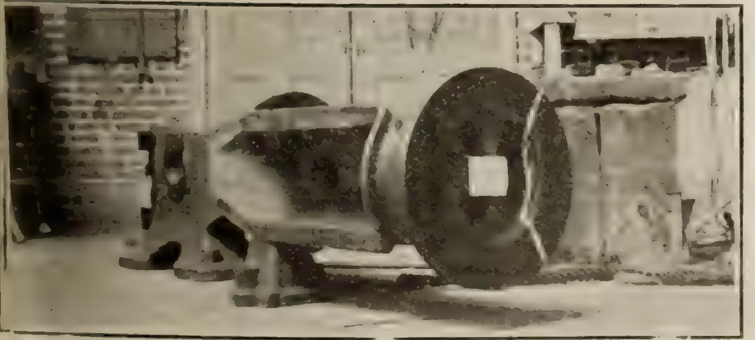
for your REPAIRS and in your MANUFACTURE?
It SAVES you MONEY. —— It BRINGS you MONEY.

—OXYGEN—

—PURE, EFFICIENT, SAFE, LOW-PRICED—

WELDING and CUTTING PLANTS as well as **Pure DISSOLVED ACETYLENE**

Portable and Stationary—Made in Canada



Broken Engine Cylinder—PERFECTLY RECLAIMED by WELDING in short time and at low cost. (See white line.)

Ask for more information—DO IT NOW—
Use THIS COUPON, please. ⟶

supplied by

L'AIR LIQUIDE SOCIETY

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Maisonneuve MONTREAL
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—The OXY-ACETYLENE PEOPLE—

L'Air Liquide Society, Maisonneuve,
MONTREAL, P.Q.

Gentlemen,—Will you please send, without obligation to me, postpaid, your New Booklet?

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Business ....

C.M.

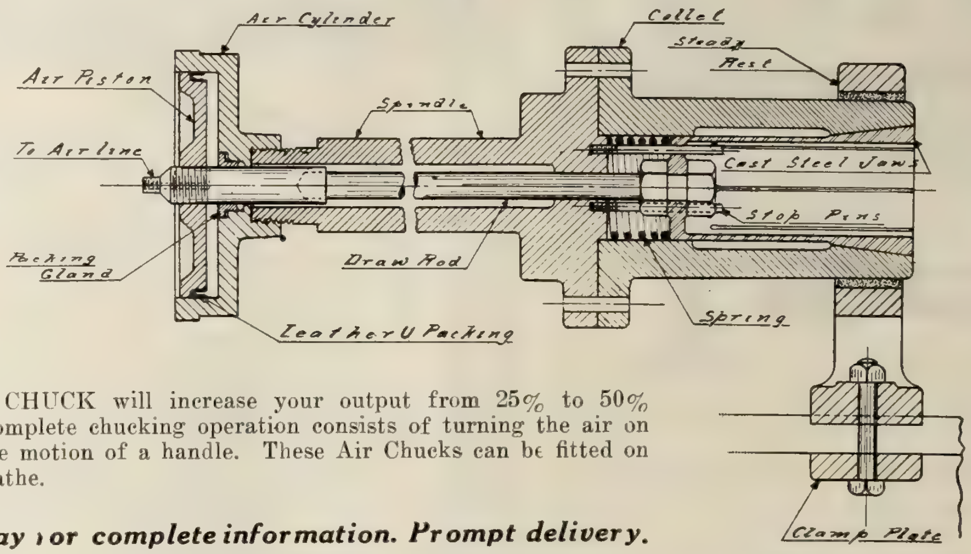
If any advertisement interests you, tear it out now and place with letters to be answered.

Get Out Your Watch and Time Your Chucking

With most screw chucks you have to use brute force or the hammer to tighten, and even then your shell is not always rigid.

H.E.W. AIR COLLET CHUCK IS RIGID

Saves Time


Air Cylinder
Collet
Steady Rest
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Spindle
To Air line
Cast Steel Jaws
Stop Pins
Packing Gland
Draw Rod
Spring
Leather U Packing
Clamp Plate

Saves Money

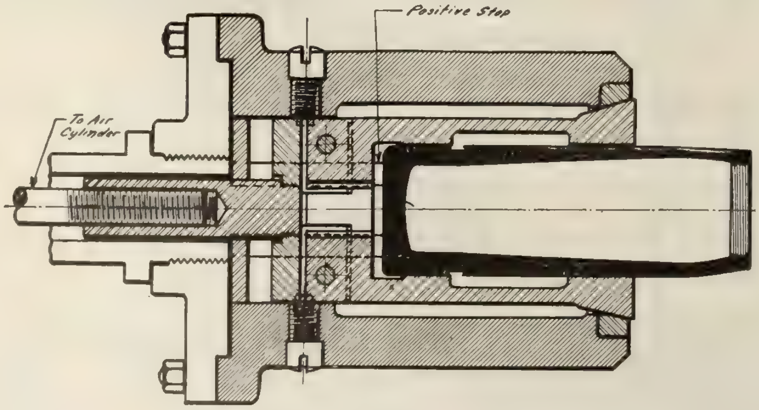
H.E.W. AIR CHUCK will increase your output from 25% to 50% because the complete chucking operation consists of turning the air on and off, by the motion of a handle. These Air Chucks can be fitted on almost any Lathe.

Write to-day for complete information. Prompt delivery.

HYDE ENGINEERING WORKS

P.O. Box 1164 **27 William St., MONTREAL**

You Can Produce More Shells Per Day


Positive Stop
To Air Cylinder

M. E. C. Air Operated Hinge Collet Chuck adapted for rough and finish boring operations.

If you are interested in Machining Fuse Plugs, Shells, Etc. the best Chuck and Taps are M. E. C.

These devices will increase your production from 25 to 40 per cent. over any other method now employed.

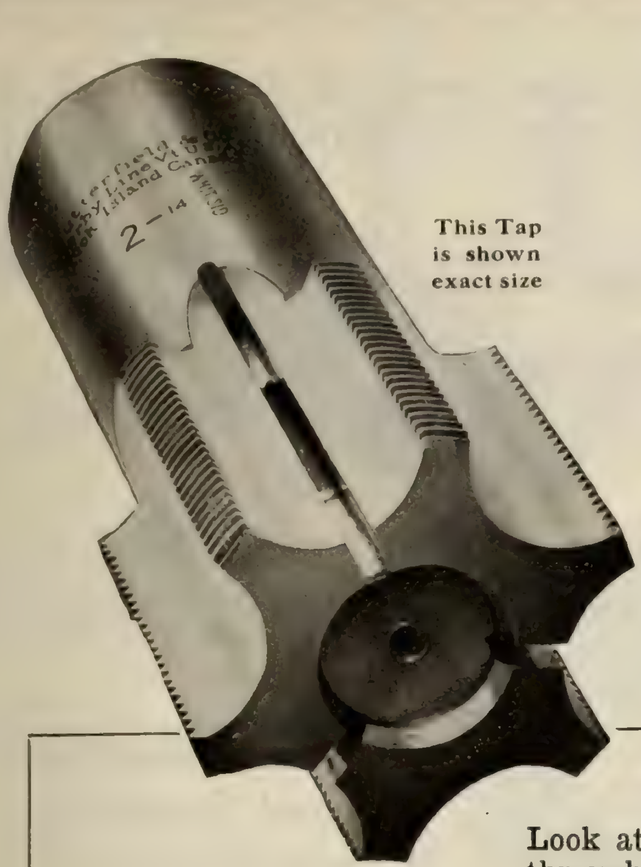
ONCE KNOWN—ALWAYS USED

It will pay you to investigate at once.

Manufacturers Equipment Company

175-179 North Jefferson St., CHICAGO, ILL.

FOREIGN AGENTS: C. W. Burton Griffiths & Co., Ludgate Circus, Ludgate Hill, London, England.
Louis Besse, Bureaux & Caisse, 39 Rue de Lappe, Paris, France; Geo. A. Todd, 826 Traders Bank Bldg., Toronto, Canada



This Tap
is shown
exact size

For—

FASTER FEEDS
FASTER SPEEDS
LONGER SERVICE

Look at that solid strength through the shank of this tap — it means power that will stand up under the heavy strain of exceptional production.

BUTTERFIELD
TOOLS

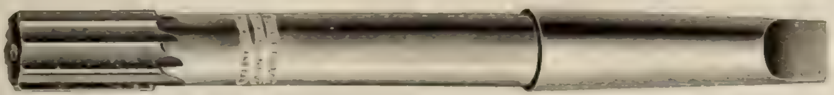
are the highest development of over 35 years' experience.

Try them and you'll have a new idea of tap service, economy and efficiency.

Our new catalog illustrates and describes all the Butterfield Products. May we send you a copy?

Butterfield & Company, Inc.
ROCK ISLAND, QUEBEC

**Taps,
Dies**

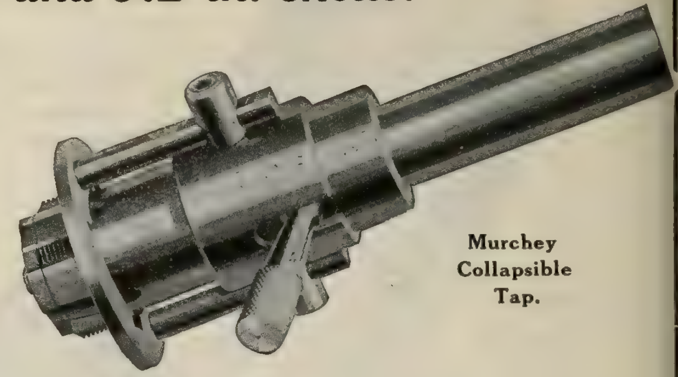


**Reamers,
Etc.**

MURCHEY
TAPS AND DIES

—very extensively used on 6-in., 8-in. and 9.2-in. shells.

The great advantage of using MURCHEY COLLAPSING TAPS AND DIES on large shells



Murchey Collapsible Tap.

MURCHEY Taps and Dies save the buying of extra machines. The time alone required to thread one of the large shells, together with rehandling, will more than pay for the tap in a very short time.

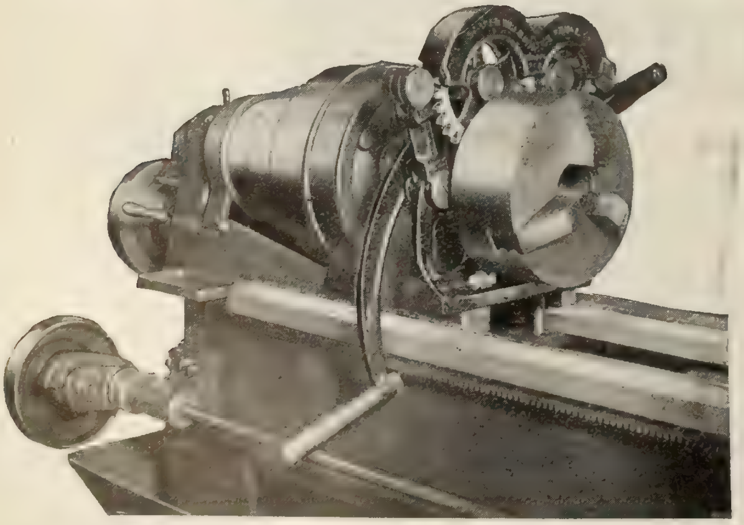
The largest American firms are doing all the threading on shells with Murchey Collapsing Taps and Murchey Self-opening Dies, and are getting most desirable results.

They save the time of rechucking and rehandling, the possibility of the shell getting out of center. By using a roughing and finishing tap they are able to tap the base and nose of these shells in about one-fifth of the time it requires on a thread miller and produce accurate work.

Send us Blue Prints of your requirements and we'll gladly quote you on the necessary tools.

Murchey Machine & Tool Company
75 Porter Street, Detroit, Mich.

Speed Up! Production
With a Barker Wrenchless Chuck



You don't consider money spent, on something which will bring returns—it is invested.

A chuck which will cut the time of setting-up in half and at the same time not be prohibitive in initial cost or maintenance is a most worth-while investment in your plant—is it not?

Barker Wrenchless Chucks are proving their worth as an investment in many plants where multiple chucking has been a profitless bugaboo—perhaps your neighbor is a Barker fan—let us send you a list of users in your territory.

An inquiry to-day will bring the Barker proposition to you by return mail. You can't go wrong and you do not obligate yourself in any way whatsoever.

The entire opening and closing operation is accomplished with a short action of the hand lever—think what this means in saving of time.

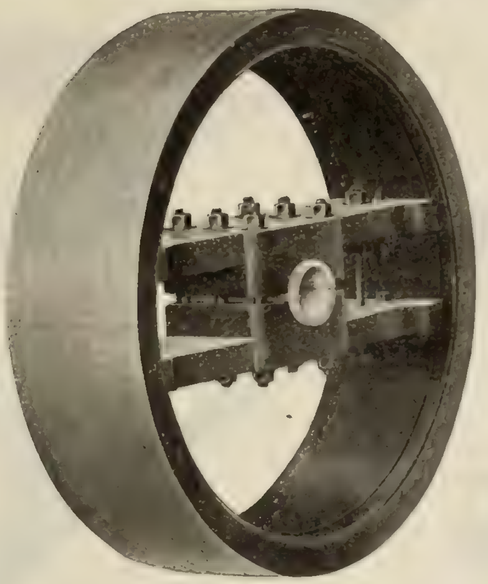
THOMAS ELEVATOR COMPANY
22 South Hoyne Avenue - - CHICAGO, ILLINOIS, U.S.A.

PULLEYS

No Keys

No Set Screws

In Perfect Balance



Lighter

Stronger

Better Belt Surface

The Dodge Standard Wood Split Pulley

The Wood Split Pulley is better than either cast iron split pulleys or steel split pulleys for the following reasons—

The wood pulley is lighter, stronger, better balanced, and provides a very much better belt surface. It costs 33 1-3% less money and provides 50% more returns in horse-power value. It may be run at very much higher speeds with no danger of bursting—also it may be had quicker and in a greater range of sizes.

It costs less to get—less to put on—and less to keep.

We make approximately 300 Dodge pulleys every day—everybody uses them.

There are more Dodge pulleys making ammunition than any other kind—you can get them quick.

Every pulley is thoroughly nailed. Every pulley is guaranteed for Double Belts.

We are Canada's greatest pulley makers.

If you have not our Books, write us.

DODGE MANUFACTURING COMPANY

Toronto - - Montreal

STARRETT
NO. 145
STARRETT TOOLS
TRADE MARK REG. U.S. PAT. OFF.
BY INVITATION MEMBER OF

LONG LIVED HACK SAWS

STARRETT Hack Saws are made for work in different metals and different thicknesses. We have developed for these saws a special steel which gives maximum strength and hardness without brittleness.

TRADE MARK Starrett REG. U.S. PAT. OFF. Hack Saws

when properly selected for the work are quick-cutting and long-lived. To learn the best blades for your work write for new Starrett Catalog. This also describes 2100 styles and sizes of accurate, dependable tools and instruments—Micrometers, Gages, Levels, Steel Tapes, Steel Rules, Calipers, Dividers, Combination Squares.

Write for Free Catalog No. 21-3

THE L. S. STARRETT COMPANY, Athol, Mass.
"The World's Greatest Tool Makers"
NEW YORK CHICAGO LONDON

Cost has absolutely nothing to do with the service a belt will render you.

LEVIATHAN AND ANACONDA ELEVATING TRANSMITTING CONVEYING BELTING

LEVIATHAN
AND
ANACONDA

cost less than some, and more than others, but are guaranteed to deliver more service per dollar of cost than any other belts of any kind—rubber, balata, fabric or leather.

It will pay you to investigate before you spend another dollar for belts.

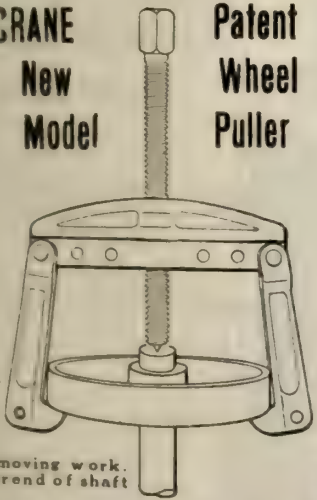
Write us now about your particular belt troubles.

Main Belting Co. of Canada
Limited
10½ St. Peter St., Montreal

WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE

CRANE New Model

Patent Wheel Puller



Removing work near end of shaft

For Removing

Transmission and Cam Shaft Gears, Auto Wheels, Fly-Wheels, Sprockets, Collars, Couplings, Propellers, Universal Joints.

For straightening Shaft, Bending Pipe, etc.

The Screw has a flat end with inserted tempered tool steel point that will not spread centres. Makes its own centre on work that has none. The strain is taken on the flat end of the screw. Grease to keep from cutting. The screws are made of high carbon steel and case-hardened all over. All Pullers are furnished with two sets of new combination hook extension arms.

The Pipe Bending Attachment is indispensible in a repair shop for straightening propeller and jack shafts, bending exhaust pipes, and removing universal joint yokes, etc.
Drop a line for full particulars.

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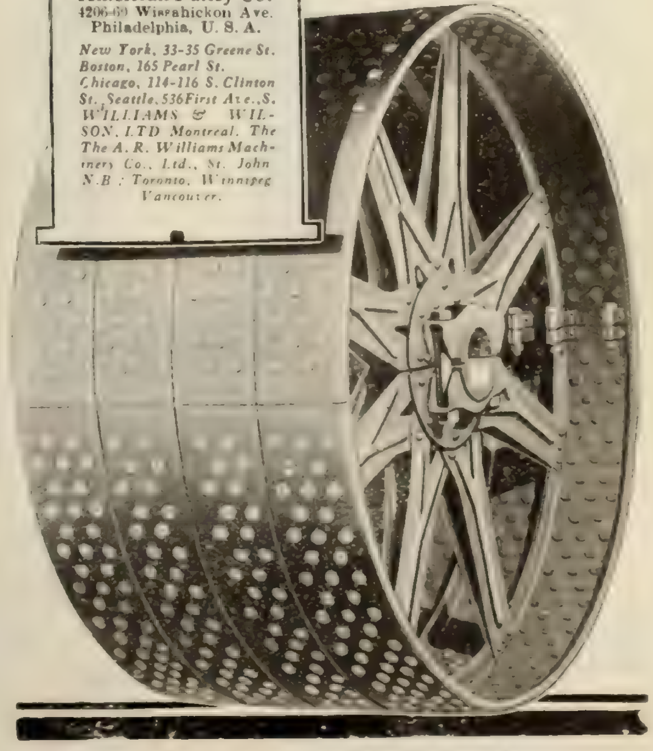

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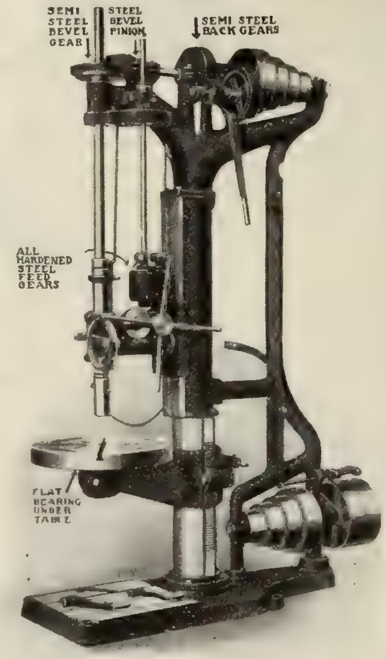

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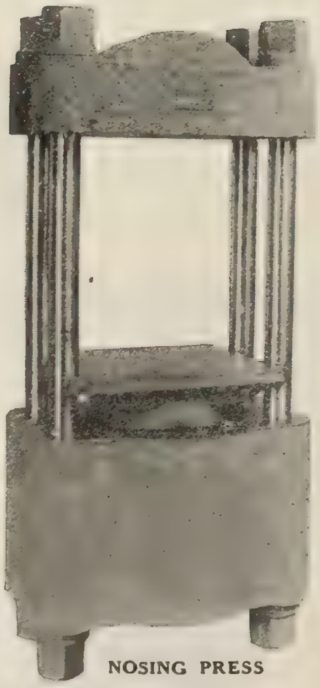

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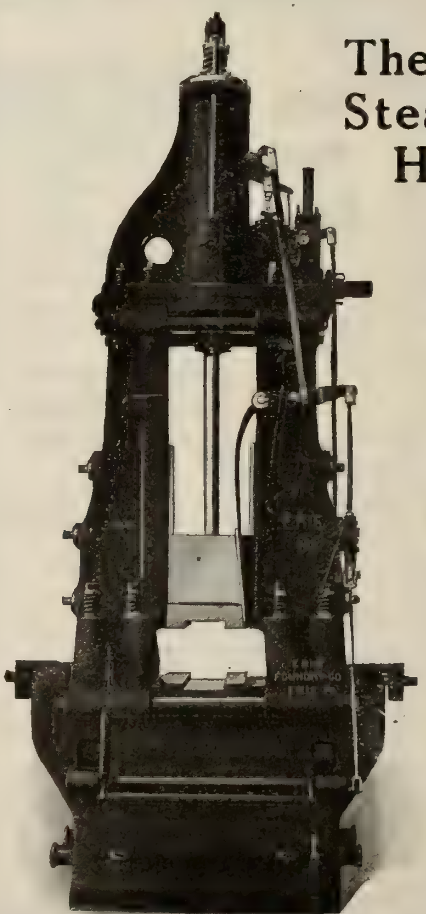

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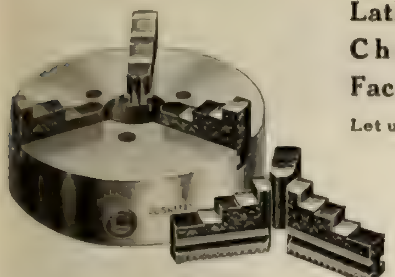

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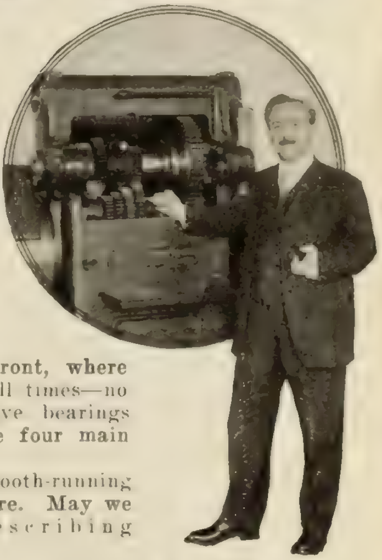

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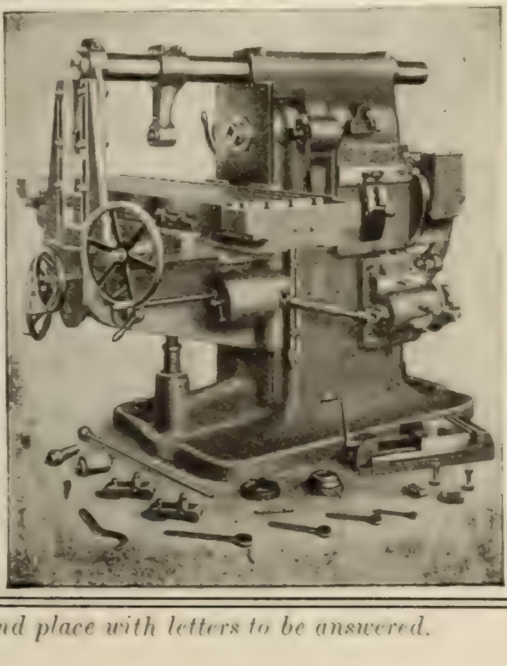

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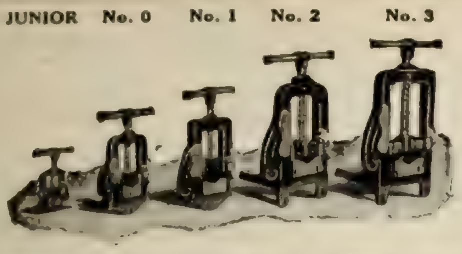

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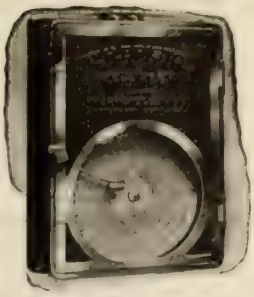

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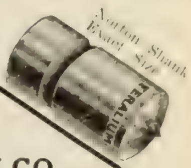

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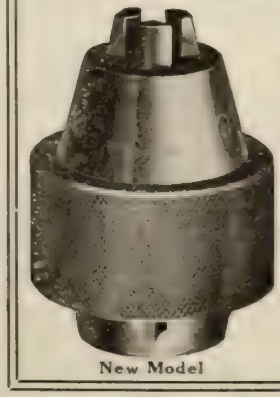

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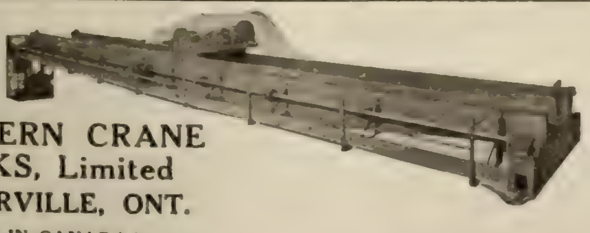

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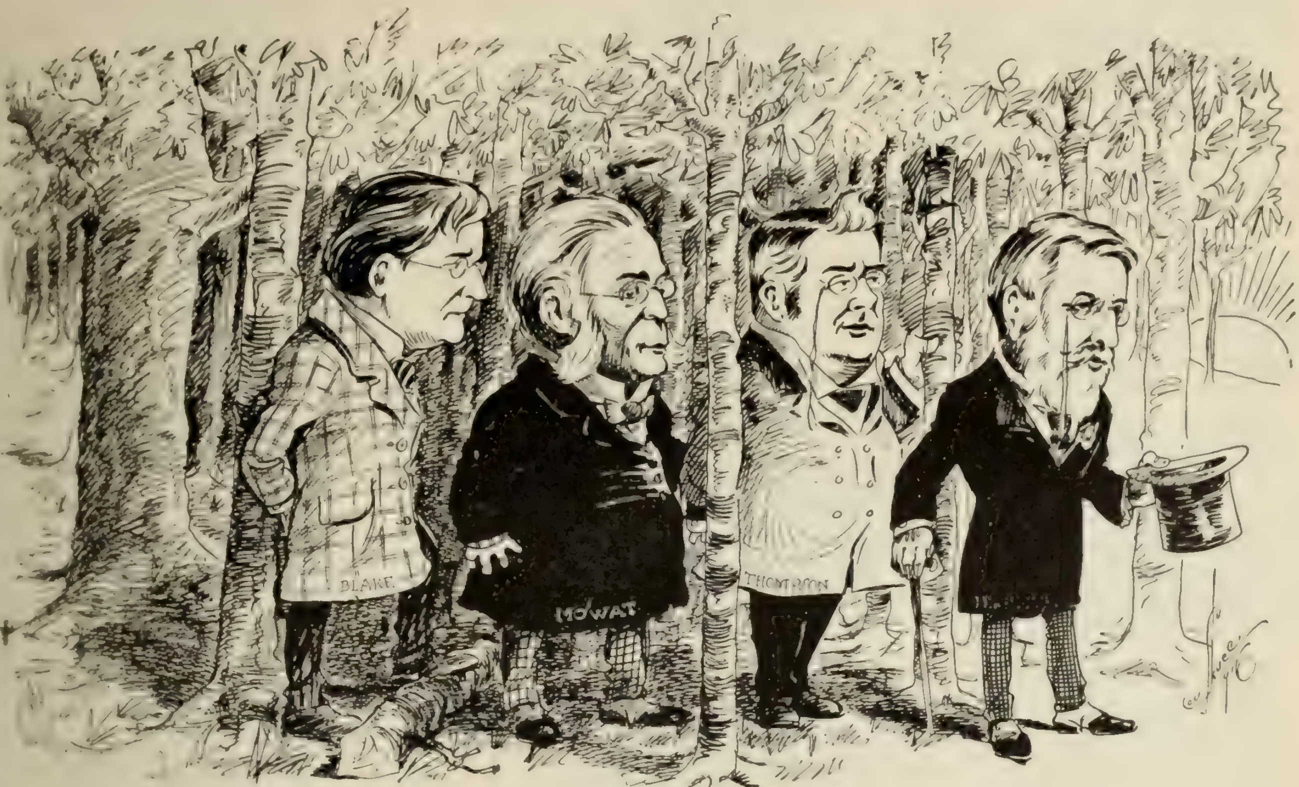

The woods are full of them

Judges have been numerous in Canada who have come down off the bench to lead the people—who have stooped to conquer, as it were—Blake, Mowat, Thompson, Meredith. And so there is plenty of precedent for a move which is being talked of in the Liberal party—the grooming of Mr. Justice Duff for the leadership of the party against the day when Sir Wilfrid Laurier will seek his ease. Mr. Justice Duff is a member of the Supreme Court of Canada, but it is said that, should the boom in his favor reach a sufficient volume, he will be willing to step down from the bench and get into the fight.

This makes the basis for an extremely interesting article by H. F. Gadsby in the September issue of MacLean's Magazine. Mr. Gadsby discusses the Duff boom in a thoroughly impartial way, and tells something of the young Judge who may be slated for so high an honor.

"The Duff Boom" is but one of many features in the September MacLean's. The number bristles with bright stories and powerful articles by such clever and famous contributors as Arthur Stringer, Agnes C. Laut, Robert W. Service, Arthur E. McFarlane, Alan Sullivan, Mrs. Arthur Murphy (Janey Canuck) and many others. It is Canadian from cover to cover—the best reading obtainable on this side of the border.

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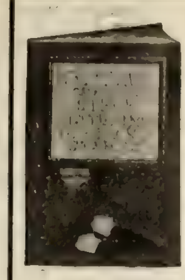

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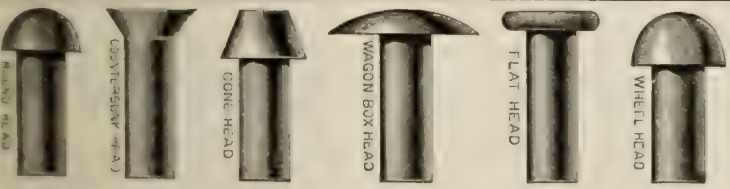

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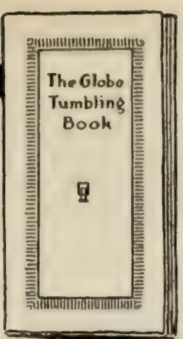

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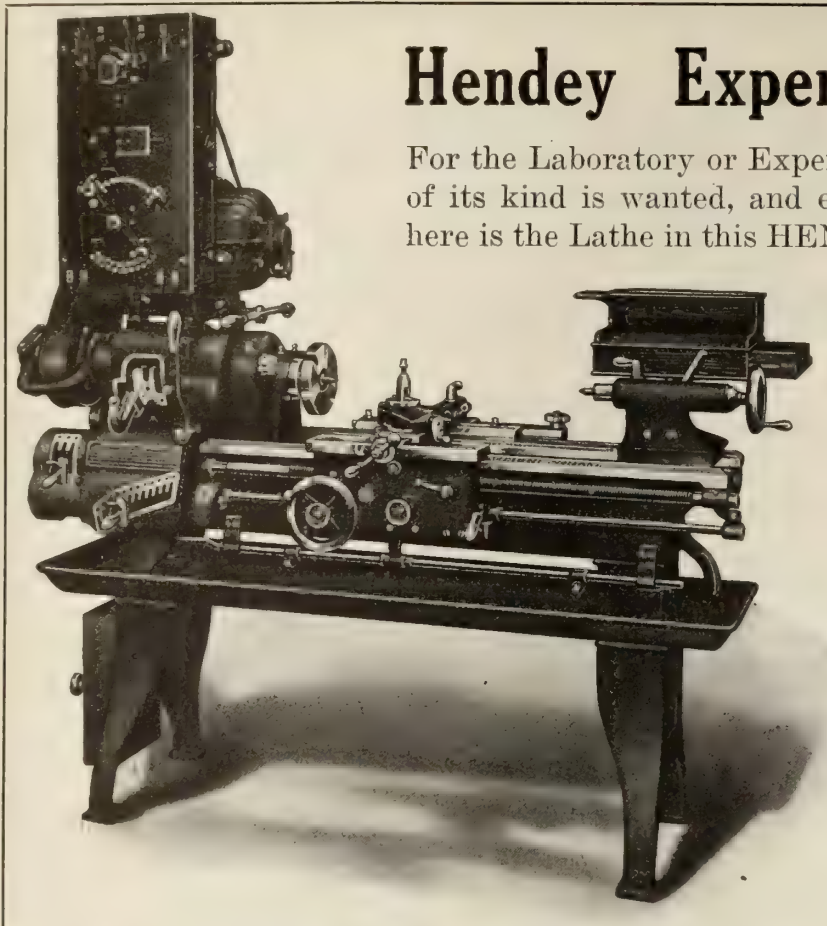

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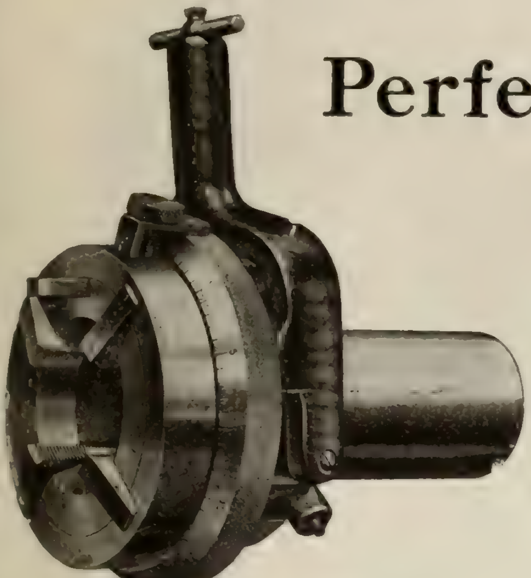
Young, Corley & Dolan, Inc. 7 and 68

Z
Zenith Coal & Steel Products, Ltd. 79

Wells Self-Opening Dies

CUT

Perfect Screw Threads



WELLS SELF-OPENING DIE
has both face and hand trip.

The Wells Self-Opening Die cuts the thread with a fine shearing cut, then opens with a quick, positive snap.

Adaptability

The Wells Self-Opening Die can be used on screw machines, lathes, automatics, drill presses and bolt cutters.

Chaser Principle

The Wells Self-Opening Die embodies an entirely new principle of design. The chasers are about four times as long as the threaded portions and are supported throughout their entire length and width by the solid sides of the slots in the body. They cannot squirm away from the work. Wear is reduced to a minimum throughout. Adjustment is simple, positive and accurate.

A large number of these Dies in Stock for immediate shipment.

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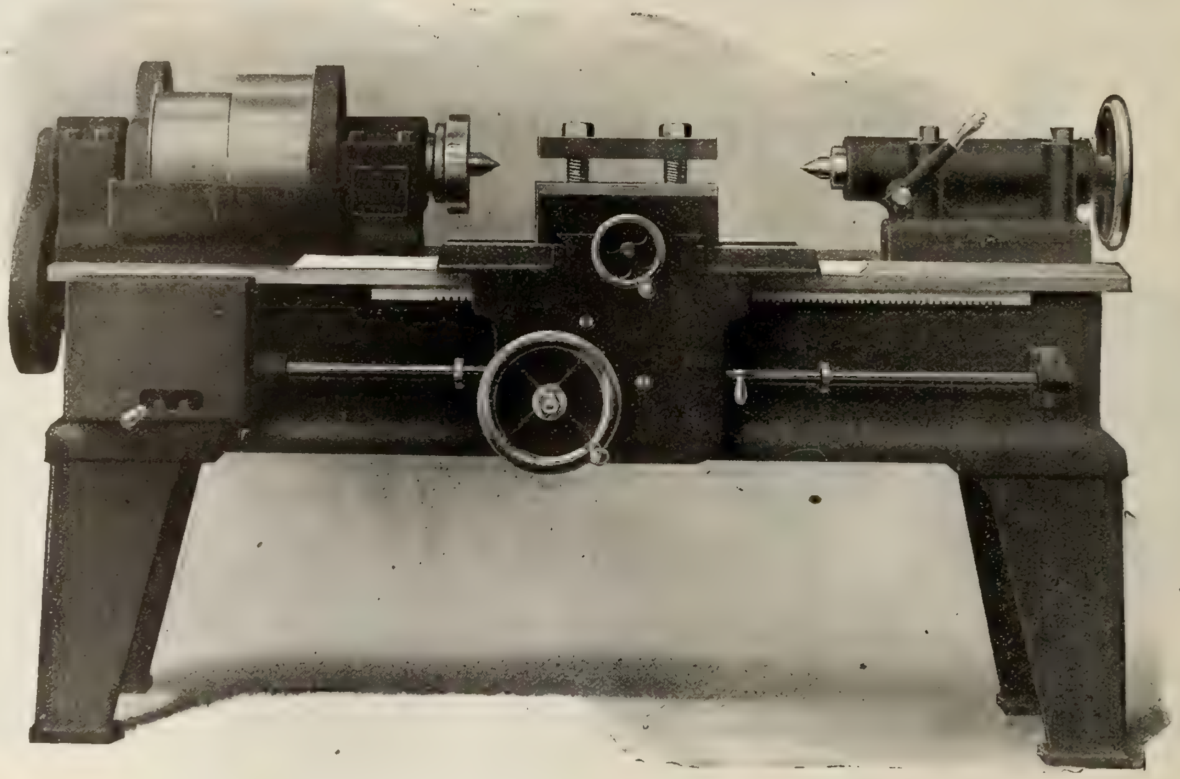

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CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

Manufacturing Cartridge Cases for 18 Pounder Shrapnel and 4.5 in. H.E. Shells

Staff Article

Not the least important among the many successes achieved by Canadian metal-working plants in the matter of munitions production has been that of the brass cartridge cases required for 18-pdr. shrapnel and the smaller high explosive shells. The output of cartridge cases has steadily developed in quantity, so much so, that in spite of the fact that comparatively few plants are so engaged, it is possible to now keep pace with the production of the corresponding steel projectiles to which the cartridge cases are a necessary supplement.

THIS plant, which is turning out approximately fourteen to fifteen thousand 18 pdr. shrapnel or 4.5 in. H.E. shell brass cartridge cases per day, receives the flat discs from several sources; and in order to keep a record on quality of output, these blanks are stored in separate bins, having the makers name attached, in order that faulty material may be traced back through the proper channels. These blanks, which are 6.22 inches in diameter, are punched out of rolled sheet brass, 0.380 inch thick. They are generally annealed at the makers mill, and are received at the case manufacturing plant in readiness for the first press operation.

Fig 1 shows a general view of the press department, those presses in the foreground being mechanically operated, central crank drawing units, and those, in the rear, of the heavy toggle type with the main mechanism located beneath the level of the floor. All of the presses are belt-driven from a line shaft overhead, one 75 horse power motor being used for the drawing presses, and three 75 horse power Westinghouse motors for the eight heading presses; the latter consisting of five-900 ton and three 1500 ton Ferracute toggle type products. A general idea of the shop layout will be had from Fig. 2.

First Operation—Cupping

After the blanks are received, the first operation is that of cupping, shown in Fig. 3. This is performed on two Ferracute presses, each one capable of producing from 7500 to 8000 cups a day of 22 hours. These presses are fitted with revolving turrets, so that, if necessary, the discs can be placed in position when clear of the punch; however, experience has shown that better results are obtained if the die is left permanently in a working position, as the possibilities of an operator being caught are comparatively slight, owing to the slow action of the moving ram. The cups are forced completely through the die, and are removed from below by another workman. A copious supply of lubricating material is automatically distributed to the punch and die, by an arrangement attached to the ram of the press and operated by its vertical movement, as shown in Fig. 5. The valve

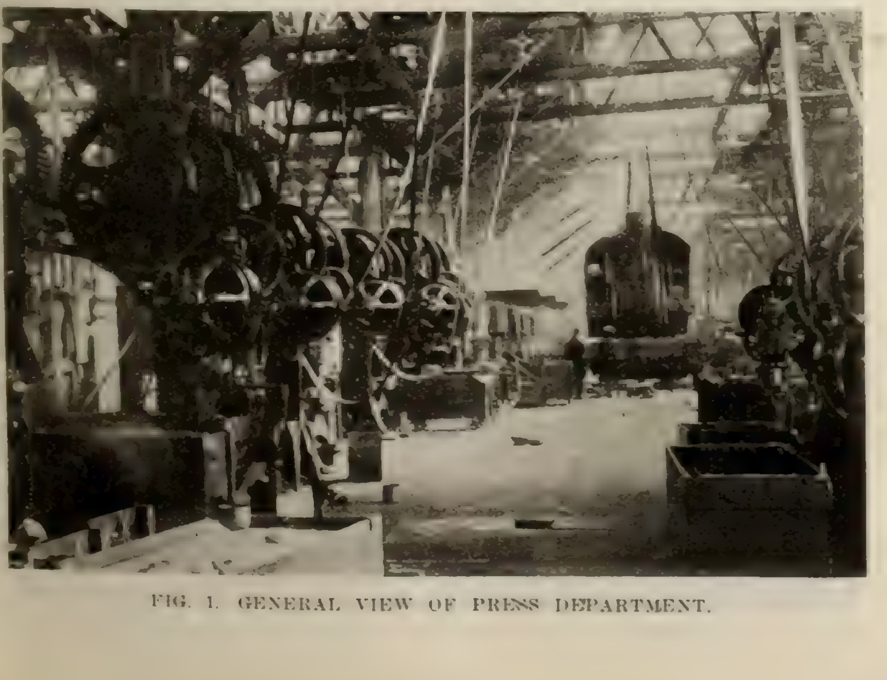


FIG. 1. GENERAL VIEW OF PRESS DEPARTMENT.

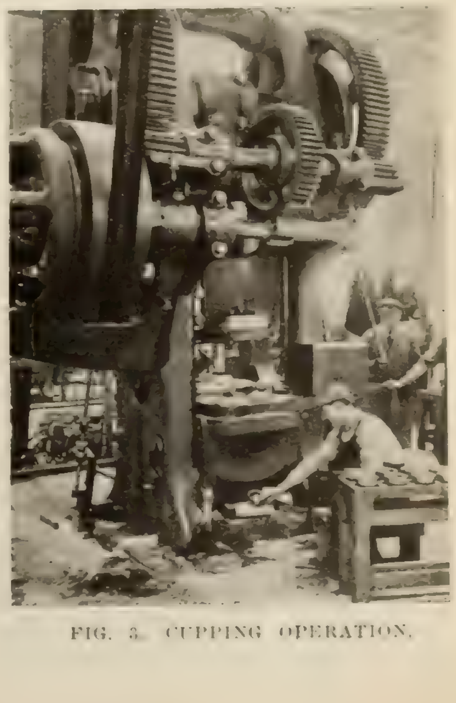


FIG. 3. CUPPING OPERATION.

A is secured to the ram and is controlled by the position of the handle B, which is in the position shown when press is operating, but the spring C causes the valve to close when the ram is at the top of its stroke. The lubricant is supplied from a tank overhead, through the hose F, and fed to the work through the pipe E. The drawn cup has an inside diameter of 3.99 inches, outside diameter of 4.544 inches, and a depth of 2¼ inches.

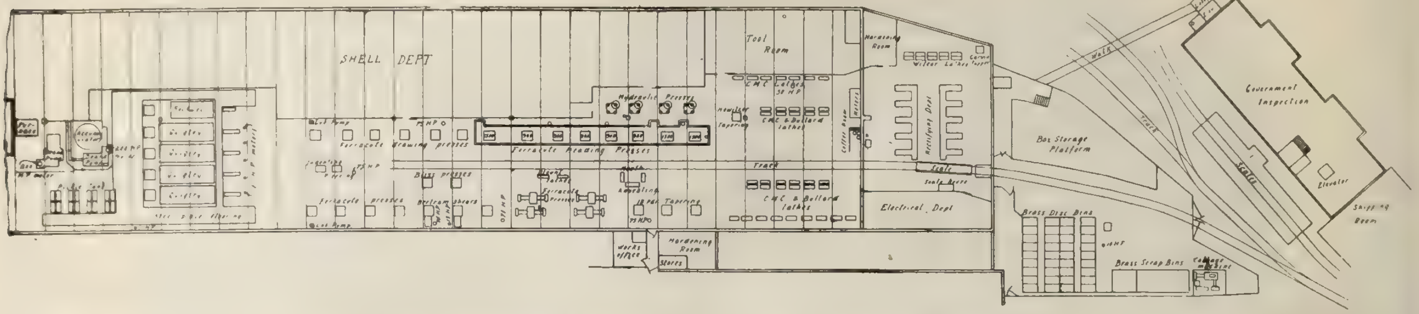

SHELL DEPT
Ferracute Drawing presses
Ferracute Heading Presses
Hydraulic Presses
Bliss presses
Ferracute presses
Bertram shears
Annealing
Tapering
Works office
Hardening Room
Stores
Tool Room
CMC Lathes
CMC & Bullard lathes
Track
Scale
Electrical Dept
Rectifying Dept
Box Storage Platform
Walk
Track
Scales
Government Inspection
Elevator
Shipping Room
Brass Disc Bins
Brass Scrap Bins

FIG. 2. GROUND PLAN SHOWING THE PLANT LAYOUT FEATURES.

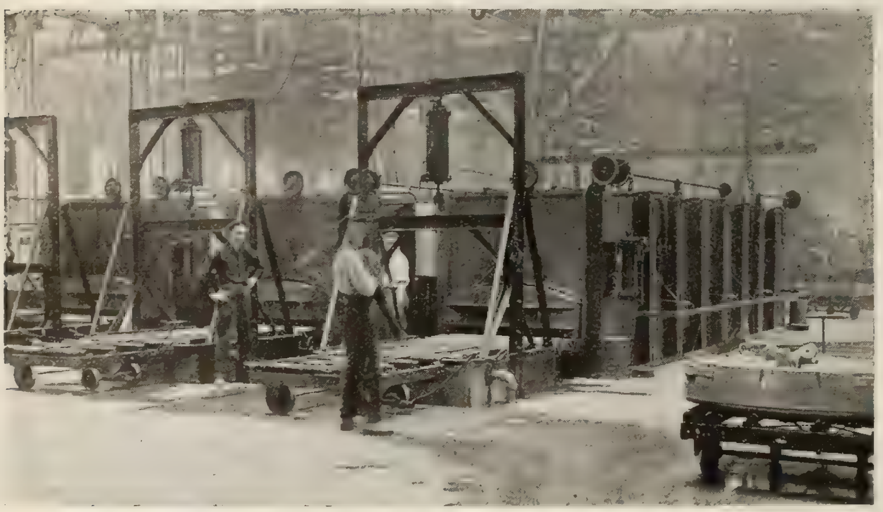


FIG. 4. DISCHARGE END OF ANNEALING FURNACES.

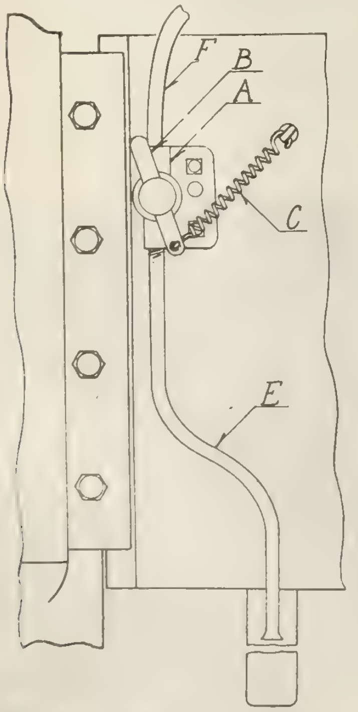


FIG. 5. SEMI AUTOMATIC LUBRICATING DEVICE.

Annealing the Cases

Owing to the drawing process hardening the metal, it is necessary to anneal the partly finished cases previous to each re-drawing operation. This is essential to restore the metal to the required ductility, in order to obtain satisfactory results. The cups are placed in large perforated, sheet steel boxes, which are placed on steel frame trucks, having several rollers on the upper surface to aid in transferring the boxes to and from the furnace chamber, which is also fitted with rollers throughout its entire length. At intervals of about six minutes, the charging door of the furnace is opened, and by the action of a pneumatically operated ram, the crate is shoved into the furnace. By means of a system of pulleys and shafts, operated from an air cylinder, both front and

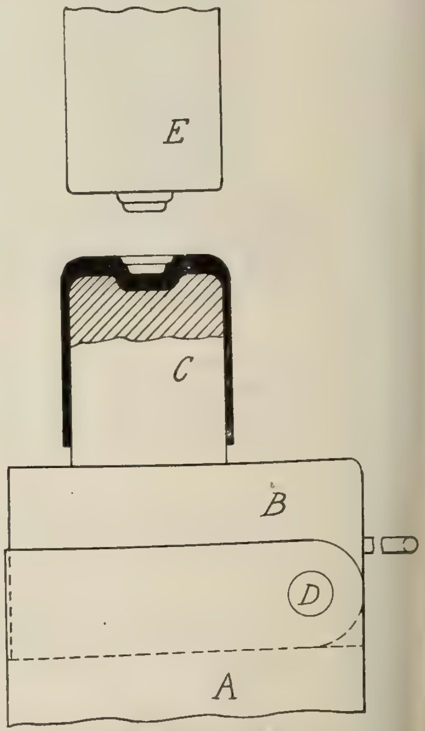


FIG. 6. SWIVEL BLOCK FOR INDENTING.

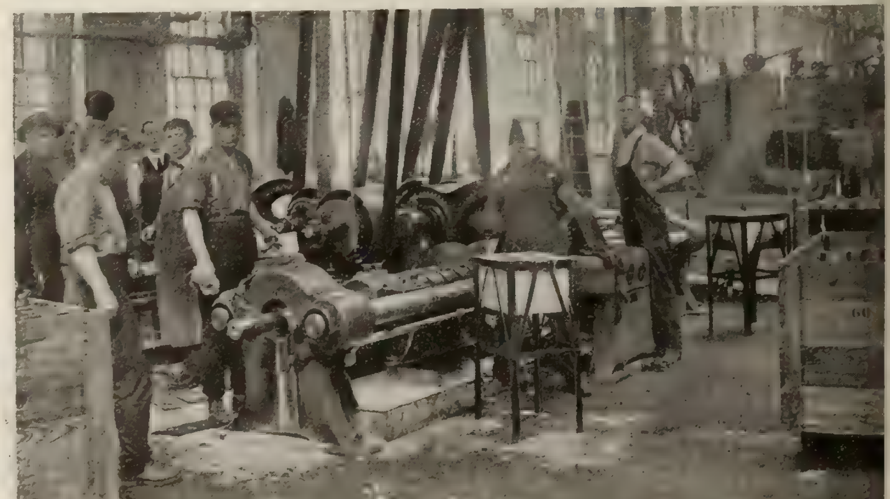


FIG. 6a. FIFTH AND SIXTH DRAWING OPERATION ON HORIZONTAL SCREW PRESS

rear doors of the furnace are controlled simultaneously, so that as one crate of cold cases enters at one end, a fully heated lot is discharged at the opposite end. This crate, which has been in the furnace for about 40 minutes and has attained a temperature of approximately 1200 degrees F., is placed upon a specially constructed roller platform, that is lowered into a water cooling bath. Several immersions are made before the pieces are sufficiently cool to be handled. Running water is used, being pumped from a nearby canal.

After cooling, the cases are placed in wooden boxes in such a position that the pickling solution will have free access to the entire surface, and yet drain easily when raised from the bath. The pickling solution consists of a weak solution of sulphuric acid (about 20 to 1). The pieces are allowed to remain in the bath for several minutes, and are then immersed in a caustic soda bath and afterwards thoroughly washed in warm water to remove all traces of acid.

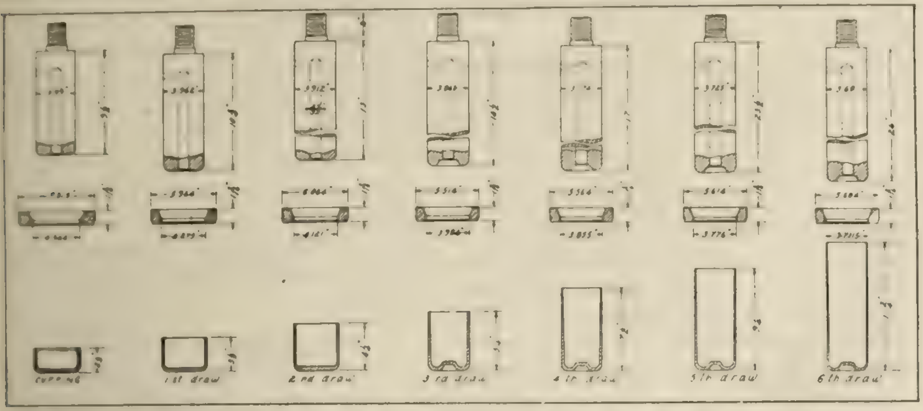


FIG. 7. PUNCHES AND DIES FOR CUPPING AND DRAWING OPERATIONS, 18 PDR. SHRAPNEL SHELL CARTRIDGE CASES.

While some authorities contend that water cooling affects the physical properties of the brass, it is the process generally adopted by cartridge case manufacturers, the very best of results being obtained.

First Redrawing Operation

The first redrawing operation is accomplished on Ferracute presses. The latter operates continuously, the workman placing the cups in the disc as the ram ascends. In all instances, the pieces are forced through the die, falling out below. The dimensions of the case after the first draw show an inside diameter of 3.962 inches, outside diameter of 4.275 inches, and a height of about 3⅛ inches. Two Ferracute presses are working on this draw, each with a capacity of from 380 to 400 an hour. The cases are again annealed, going through the same process as already described, and are then taken to the second re-drawing operation, which is similar to the first in every respect. The finished dimensions of the case are now 3.912 inches inside diameter, 4.121 inches outside diameter, with a height of 4¼ inches.

First Indenting and Third Draw

Before going to the annealing furnaces, again, the cases receive their first indent. This is accomplished on a single acting Ferracute press, one such being sufficient to handle the output of the shop. Two men are engaged in its operation, one removing the finished piece as the other places the next one on the post and operates the swinging block. The press runs continuously, an indent being made at every other stroke. Fig. 6 is a sketch of the tilting post used when indenting the head. The post A is secured to the base of the press, and the block B which carries the post C is fitted in the slot and tilts on the pin D; the punch E is secured to the moveable ram. Following indenting, the cases are again annealed and taken to the third re-drawing press, where they are drawn to a length of 5¼ inches, with an outside diameter of 3.984 inches and an inside diameter at the mouth of 3.843 inches, the punch being slightly tapered to leave the wall a little thicker near the head. Two Ferracute presses, with

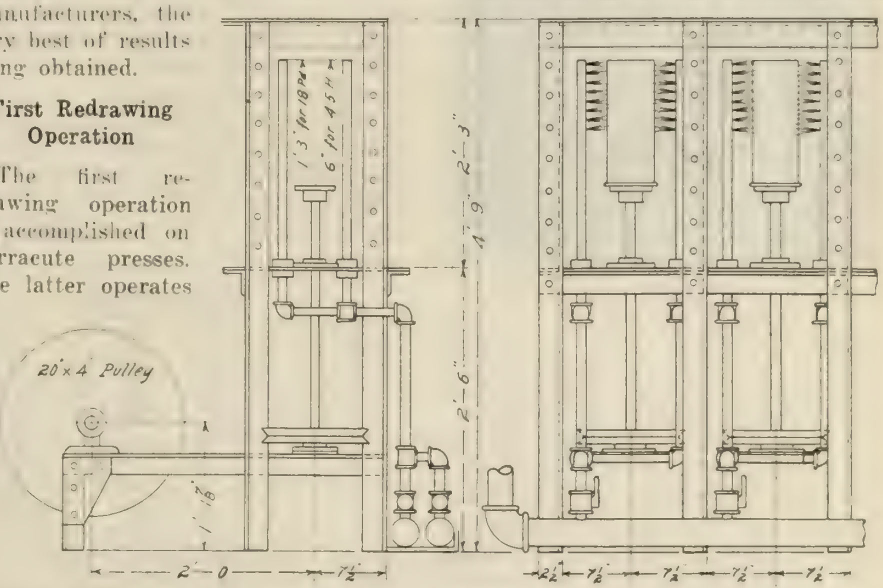


FIG. 9. PART ELEVATION OF CARTRIDGE CASE MOUTH ANNEALING FURNACE.

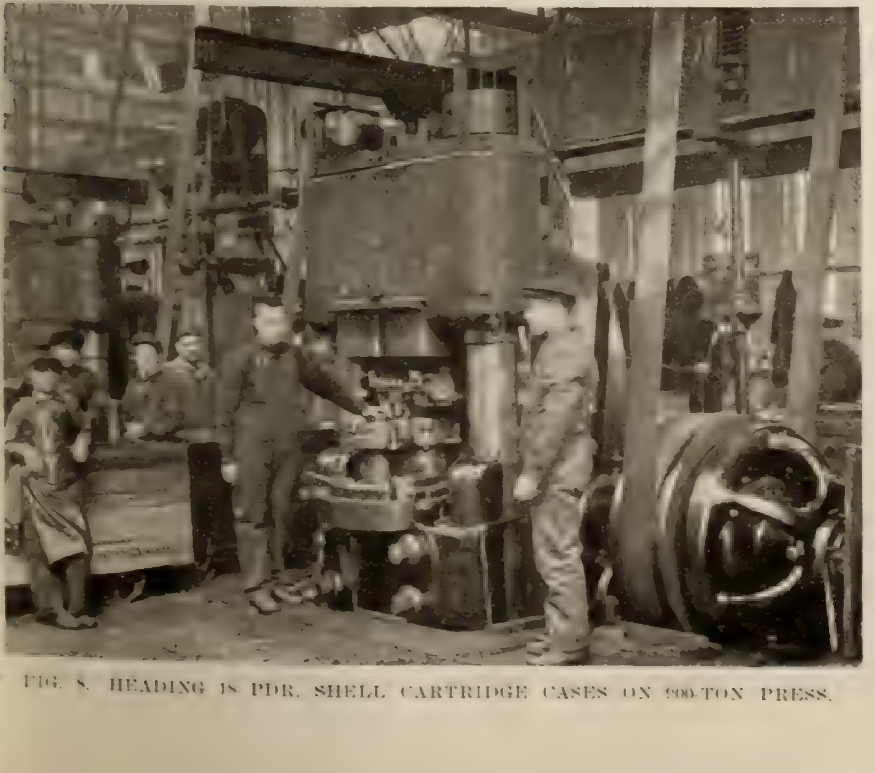


FIG. 8. HEADING 18 PDR. SHELL CARTRIDGE CASES ON 900-TON PRESS.

similar capacity to that of the previous operations, are used on this draw.

Fourth Draw and Second Indent

The cases are again annealed and taken to the fourth draw, where they are brought to a length of 7½ inches and an outside diameter of 3.855 inches, with walls 0.042 inch thick at the mouth, and tapering to about 0.077 inch near the head. Owing to the increasing length, three presses are required on this draw, the capacity of each being about 5,000 per day of 22 hours. The second indent follows, being really a repetition of the first, and being performed on a Ferracute press in like manner to that already described. To facilitate further operations, a small 5-16 inch hole is punched through the centre of the indent to permit the free passage of air, as the punch enters and leaves the case. If this condition was not provided for, the trapped air would seriously affect the drawing operation. The cases are again annealed before passing to the fifth draw.

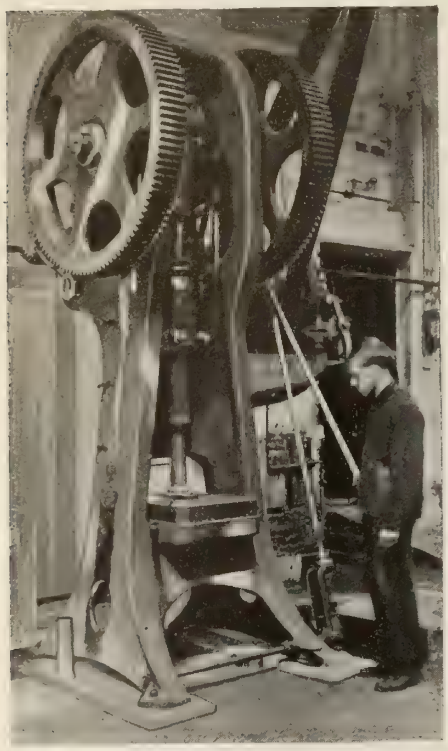


FIG. 10. TAPERING 18-PDR. SHELL CARTRIDGE CASES.

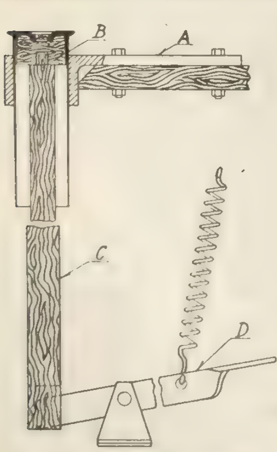


FIG 11. DEVICE FOR RETAPPING CASES.

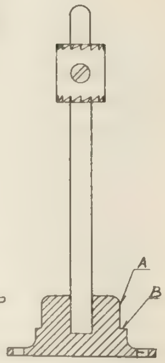


FIG. 12. TOOL FOR FACING INSIDE OF INDENT.

Fifth Draw and Preliminary Trimming

Owing to the extreme length, the fifth and sixth draws cannot very well be performed on a crank press, and for this reason other means are necessary. This plant has two large Bliss presses, the rams of which are operated by a rack and pinion, the length of the stroke being adjustable and the action controlled in the same manner as a belt driven planer. These two presses operating on the fifth draw have a capacity of about 220 per hour each. In addition, there are four large horizontal, double ended Ferracute screw presses, working on the fifth and sixth draws. The dimensions after the fifth draw show an outside diameter of 3.776 inches, with a tapering inside diameter; the mouth being 3.725 inches. The length is roughly 9¼ inches. Following this draw, the cases are trimmed to a length of 9 inches on a Blount lathe fitted with a special trimming attachment. Two men are employed on this operation, one taking off and trimming while the other places the cases on the arbor; the work being accomplished as fast as the men can handle the case.

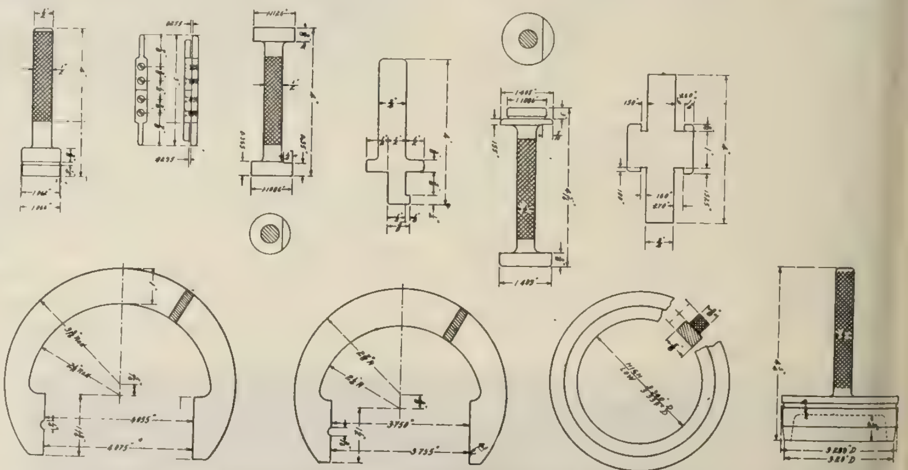


FIG. 13. SOME OF THE MORE IMPORTANT GAUGES FOR 18 PDR. SHELL CARTRIDGE CASES.

Final Annealing and Sixth Draw

The cases now pass through the annealing furnace for the last time, and are then taken to the horizontal presses, shown in Fig. 6a. These presses are of the double-ended type, the cross-head which holds the punch being secured to either end of a central shaft, which is operated by a coarse pitch groove running along the whole length, the nut being secured in the bore of the main driving gear located in the centre of the press. The action of the punches is under automatic control, but to avoid any possibility of accident, an operator, is placed in charge of the reversing lever. These presses operate at about six strokes per minute. A continuous flow of lubricant is supplied to the cases directly above and in front of the drawing die. This solution is pumped up from a central well, located below the floor, to a large tank overhead, from which it flows by gravity to the various machines. The dimensions after the final drawing operation show an approximate length of 12½ inches, an outside diameter of 3.7315 inches, and inside diameter, at the mouth of 3.680 inches, tapering to 3.635 inches near the head end.

Final Trimming and Heading

The cases are now trimmed to a length of 11¾ inches. In Fig. 7 is shown the various draws with their respective punches and dies. The next operation, that of heading is shown in Fig. 8. This process is accomplished on several 900 ton mechanically operated Ferracute toggle presses. A turret is provided having two sets of case holders, one for flattening and the other for final heading. Three men are in attendance, one operating the press and removing th case, while another places the next cas on the post and revolves the turret; th third operator receives the cases an places them in crates. The headed c is mechanically ejected by rods a levers controlled from below the mo able ram. The turret rides on a hea spring and ball bearing to facilit operation.

Mouth Annealing and Tapering

Before the tapering can be procee with, it is necessary to anneal the up portion of the case, to allow of diameter being reduced without bul ing the stock. The furnace employed this purpose (a section of whic is shown in Fig. 9), holds six ca s, the time required to heat the mout of the latter to the desired tempera re being from ½ to ¾ of a minute. To insure uniform heating, which is a so-lutely necessary, the case rests up revolving post which permits the gas flames to play evenly upon the exposed surface.

To complete the tapering of the case requires two operations. The first reduces the mouth to a diameter of 3.34 inches, the length of the taper being about 7 inches. The final tapering leaves the mouth parallel for a little over an inch, with a gradual taper of 0.04066 inch throughout the remainder of its length. Three Ferracute presses (one of which is shown in Fig. 10), take care of this feature, one exclusively on each operation, with the third alternating between the first and final tapering. A knockout is provided to strip the case from the upper die. When buckling occurs, the case is carefully examined, and if defects are found to have been in the metal, new discs are supplied by the maker. However, many other reasons, such as uneven annealing, slight imperfections in the walls of the case, due to defects in the drawing dies or punches, etc., may cause trouble in the tapering operations; therefore, in order to reduce the possibility of spoiled cases, every one is carefully inspected after each machining operation, and if any fault is discovered, the cause is immediately eliminated.

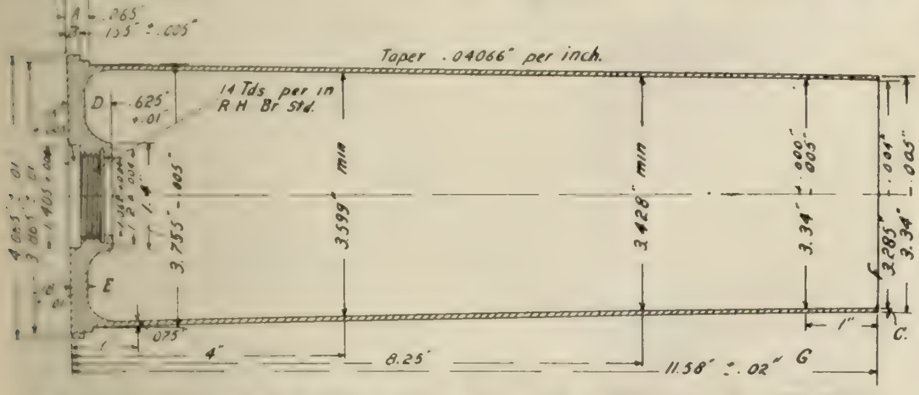


FIG. 14. DETAIL OF FINISHED 18 PDR. SHRAPNEL SHELL CARTRIDGE CASE.

Machining the Head and Mouth Ends

Machining the head is performed on a number of Bullard and C.M.C. special purpose lathes, fitted with a turret, also with facing and mouth boring attachments. The operations on the head are drilling, recessing, facing and turning [illegible], tapping with a Murchey collapsible tap and reaming. At the same setting the open end of the case is faced (from the rear), and the mouth bored parallel to a diameter of 3.285 inches, with an allowable variation, above or below of 0.004 inch. Each machine has a capacity of from 50 to 60 an hour, dependent upon the speed of the operator, and the condition of the tools. An output of 70 an hour has been maintained on various occasions; this with a second operator working on the mouth while the other finishes the head.

Hand Tapping and Rectifying

To maintain the highest degree of accuracy, the thread in the head is tapped by hand with a special sizing tap, the average life of which is about 300 holes. The device used for holding and lifting the cases is shown in Fig. 11. The bracket A, which is bored out to fit the taper of the case, is secured firmly to the bench, the case being held by friction only. When the hole is tapped, the case is forced up by the depression of the treadle D. The block B is made of hardwood, and shaped to fit the inner contour of the case head. The piece C is made of hardwood, 2½ inches square, the upper portion being turned to a diameter of 2¼ inches. The inner surface of the indent is faced off by a tool similar to that shown in Fig. 12. Minor defects are removed from the interior by scraping, and on the outside by draw filing and polishing with emery cloth. The markings on the head are done on a single-acting press fitted with a swinging post similar to that shown in Fig. 6.

Scleroscope tests for hardness are made at various stages throughout the process of manufacture, and these readings must conform to specification. Every case is carefully inspected, not only by the shop inspectors during the progress of manufacture, but by Government inspectors after the cases are completed. Some of the more important gauges, and their applications are shown in Fig. 13.

4.5-in. Howitzer Cartridge Cases

The processes of manufacture on the 4.5-inch howitzer cartridge cases are very similar to those of the 18-pdr. shrapnel, an exception being that there is one less drawing operation. The heading operation requires a much heavier press, owing to the additional amount of metal to be worked. Before the ad-

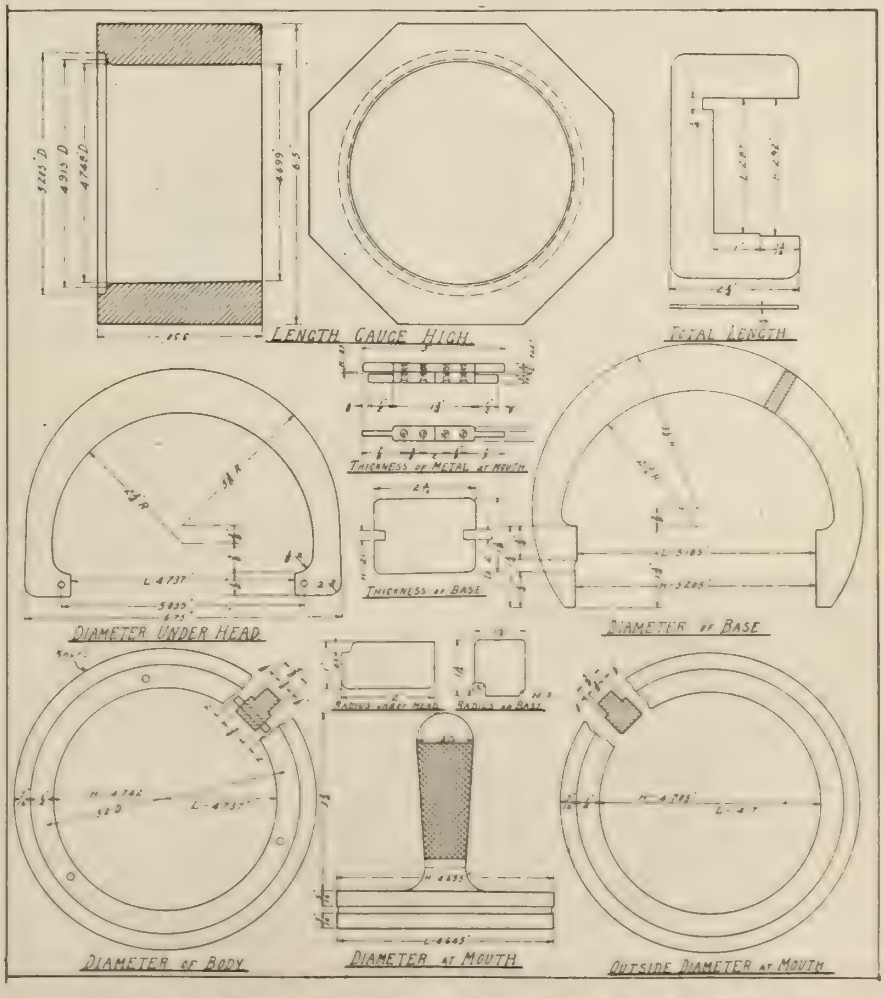


FIG. 15. SOME OF THE MORE IMPORTANT GAUGES FOR 4.5 IN. CARTRIDGE CASES.

vent of the large hydraulic presses, now employed on this operation, the plant here described had performed the heading on a powerful Bertram plate punch, fitted with special case heading equipment. Owing to the short length of the 4.5 cartridge cases, it is necessary to have a separate setting when machining the mouth end. The head is finished in a similar manner to that of the 18-pdr. cases, the machine tools employed consisting of special C.M.C. and Bullard lathes. Following this, the cases are taken to a number of small speed lathes fitted up with special chucks and cam attachments that allow of machining the mouths of the cases as fast as an operator can handle them. The rectifying and inspections are identical with those of the 18-pdr. cases.

An important factor in the manufacture of munitions is the handling of the scrap material, so as to prevent its locational accumulation. The scrap brass and copper in this particular plant are packed into blocks, 6 inches square by about a foot in length, this being procured through the medium of what is called a cabbage machine, made by the Longemann Machine Co., of Milwaukee, Wis. A 5-h.p. Westinghouse motor operates the hydraulic pumps in connection with the cabbage machine, a final pressure of about 2,300 pounds per sq. in. being both necessary and attainable.

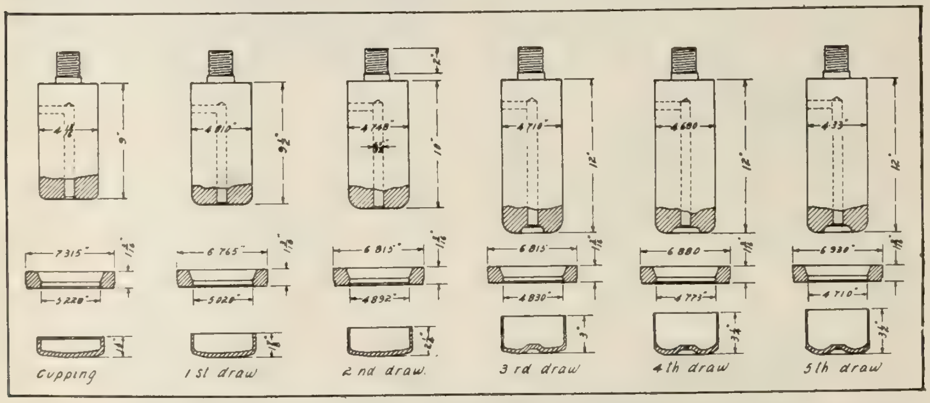


FIG. 16. PUNCHES AND DIES FOR CUPPING AND DRAWING OPERATIONS, 4.5 H.E. SHELL CARTRIDGE CASES.

INTENSIVE SHELL PRODUCTION

A LARGE contract for high explosive shells has just been completed by the Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa. The company, it is understood, established a new American high record for making projectiles per man and per lathe. It became necessary to stimulate production in the last few weeks to the highest attainable point in order that the contract should be completed by June 30, as any unexecuted portion was to be automatically cancelled if not completed by that time. Large bonuses on all shells made over a certain number were given to the workmen with this is view. The men produced 50 per cent. more shells than the company had thought possible from its equipment, but it stood by its agreement, although the bonuses paid were excessive, as they were only operative for a short time. According to the Iron and Coal Trades Review, the pay of one worker for one week, with his bonus, amounted to over $150, and a number of others made nearly $100 a week.

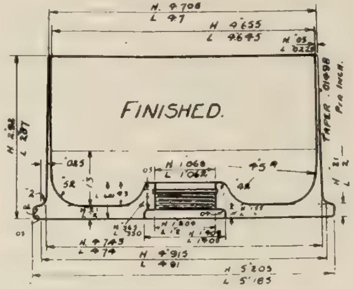


FIG. 17. FINISHED 4.5 IN. SHELL CARTRIDGE CASE.

* * *

COLLIERY GUIDE ROPE FRACTURE

A CASE of fracture in a colliery guide rope, which led to fatal results in a Scottish colliery, is calculated to afford matter for investigation by the metallurgist. The rope, which was made of steel strands, had been lengthened, the joints being welded into a solid mass of steel; the fracture occurred close to a weld. These ropes are exposed to numerous alternate bending strains in use, owing to the vibration of the cage, and it is possible that these had fatigued the metal at the plane of transition between the solid and the strand condition.

In the case of bicycle frames, it is well known that the inserting of lugs of uniform thickness weakens the tubes at the points opposite to where the liners end, but that this difficulty can be overcome by tapering the metal of the liners and, by allowing this metal to give a little under stress, increasing the tube area over which the strain is distributed. The Ironmonger states that possibly a similar effect might be obtained in the case of these rope welds by a tubular sheathing, extending a short distance beyond the solid mass of the weld.

ROPE DRIVE ADVANTAGES

I AM inclined to favor a rope drive in preference to a belt when the belt to be replaced is over 12 inches in width, says a writer in the Paper Trade Journal. Having had experience with both, he finds that the rope drive is much better than the belt. There are several advantages claimed by installing a rope drive

1.—It is economical; the drive bein cheaper to install than that by leathe belting.

2.—The ease by which the power i transmitted to any distance or in an direction.

3.—There is less loss by slipping.

A single rope is carried round th pulley as many times as is necessary t produce the required tractive effor while the necessary tension is obtaine by passing the rope around a tensi pulley weighted to give the desir strain.

The ropes used in rope transmissi are of hemp, Manila, or cotton. Mani ropes are perhaps mostly employed.

The breaking strength of the ro varies from 7,000 to 12,000 pounds p square inch in cross section, and t average value may be taken as 700 when D is the diameter of the rope inches. The weight of ordinary Man or cotton rope is about .3D pounds foot of length. For continuous tra mission, it has been determined by periment, that the best results are tained when the tension on the driv side of the rope is about 1/35 of breaking strength. The ropes run in shaped grooves. The co-efficient of f tion for grooves with sides at an a of 45 degrees may be taken at from to .33. The formula for finding horse-power transmitted is as follo

$$H = \frac{xD^2}{825} \times \frac{200 - v^2}{107.2}$$

H—Horse-power transmitted.
D—Diameter of rope in inches.
v—Velocity of rope in feet per se

The greatest tractive effort is ob ed at a speed of about 84 feet per ond. For higher velocities, the ce fugal force becomes so great that effort is decreased; therefore, a should not run faster than about feet per minute, and it would pe be better to limit the velocity to feet per minute.

Rope pulleys differ from belt p only in their rims. The inclinati the sides of the grooves may vary 30° to 60°. The more acute the the greater the coefficient of frictio an consequent wear on the rope. The am eter of a rope pulley should be at lea 30 times the diameter of the rope. he possible, the lower side of the rop should be the driving side, for i tha case the rope embraces a greater p tion of the pulley.

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

MACHINISTS' INSTRUCTION COURSE—II.

By J. Davies.

THE drilling machine is a real necessity to every machine shop, although its chief work is to make holes, yet it can be used for a variety of other jobs, such as tapping, reaming, facing, boring, etc. There are many varieties of drilling machines, but we can consider them in two classes, those in which the drill is moved to suit the work, termed radials, and those in which the work must be moved to suit the drill, [illegible] by moving the table and the work [illegible] or by moving the job alone.

In setting up a job such as a cylinder [illegible] flange or anything with a [illegible] of holes in it on a radial drill [illegible] to try if the drill will reach [illegible] hole, before finally bolting down [illegible] the drill table. Make it a rule to [illegible] reset any job on any machine, [illegible] you are satisfied that it cannot [illegible] be done at one setting. The [illegible] of a drilling machine should be at [illegible] angles or square to the drill spindle, and before starting on an important job you may want to know that it is square to the drill spindle.

The best method by which to test the machine is as follows: Put a fairly stiff taper shank boring bar in the drill spindle, through one of the slots in the boring bar put a piece of flat iron, long enough to reach to the outer edge of the table, and have the blacksmith draw out one end of the flat bar and turn down like a caliper leg to serve as a pointer. Fasten the flat iron in boring bar with a key or a set screw, lower the drill spindle until the pointer nearly touches the table, then pull the drill round by hand and try the table at four different places. It is best not to let the pointer touch the table as the spring on the pointer might fool you; cut some slips of paper and use them for feelers lowering your pointer until you can feel it touching the paper.

If your pointer touches the paper the same way at the four opposite places, the table is accurate; if the table is found to be inaccurate and there is no means of adjusting it, note which is the low side of the table and allow for it in setting up your work. You will find this pointer a very useful tool in setting up work in which the holes must be drilled at right angles to a given surface on a piece of work.

The best and most frequently used drill for ordinary work is the twist drill, which is probably the most efficient tool found in the workshop to-day. It is formed by cutting spiral grooves in a round piece of tool steel, and has a cone shaped end on which suitable cutting edges are formed. Drills taper very slightly being biggest at the cutting end, this is to provide clearance in deep holes and prevent the drill choking in the hole. They also have what is called body clearance, that is part of the surface is cut away a short distance from the cutting edge back to the flute, thus reducing the friction between the drill and the sides of the hole, as without this body clearance the drill would soon get hot and become soft to a degree that would make it useless for further use. See Fig. 8.

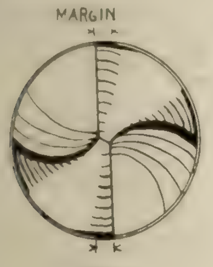


FIG. 8.

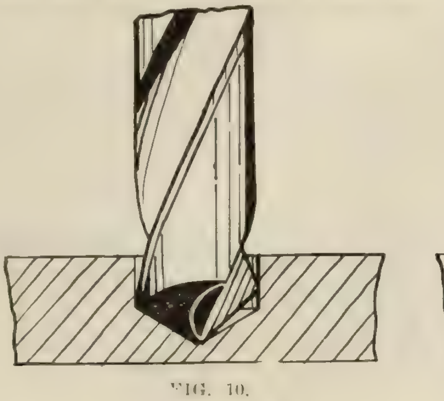


FIG. 10.

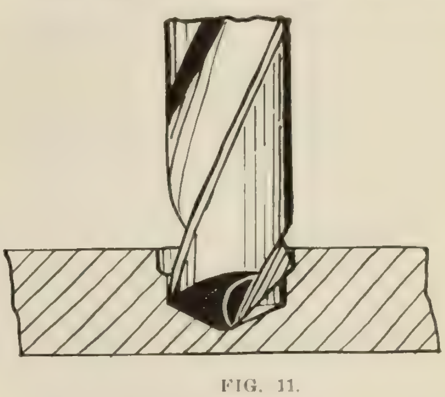


FIG. 11.

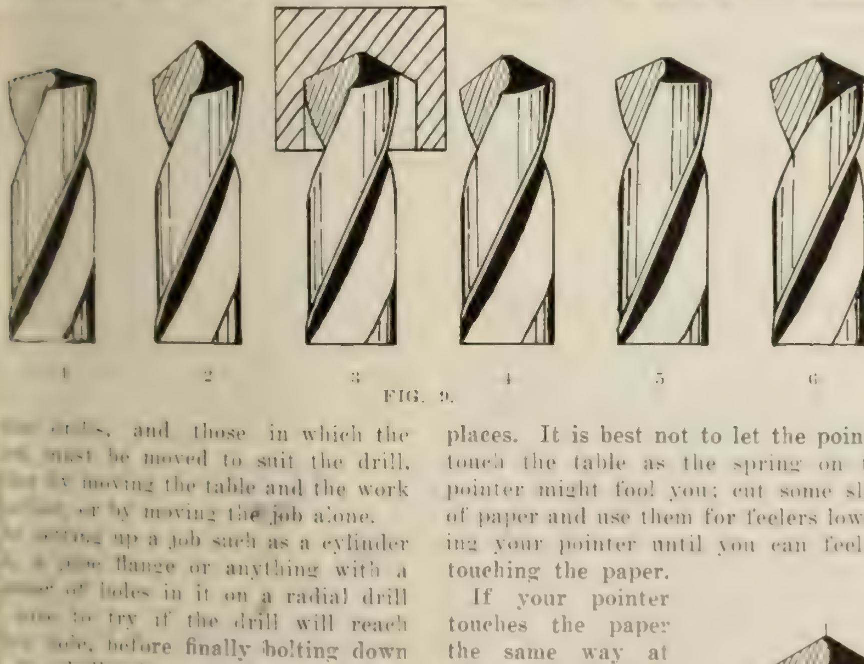


FIG. 9.

Drill grinding is a very important thing for every apprentice to learn, as the result of drilling machine work depends largely upon the condition of the drill. No amount of instruction without actual practice and experience can make any one proficient in this art; all that can be done on paper is to point out ideal conditions and the results of inaccurate grinding of the cutting edges.

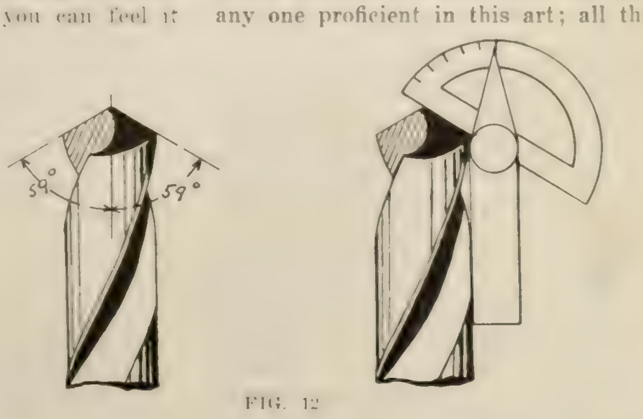


FIG. 12

There are at least seven wrong ways of grinding to say nothing of a few original methods of every apprentice: (1) Too flat; (2) Too sharp; (3) Unequal cutting edges; (4) Unequal angles; (5) No lip clearance; (6) Too much lip clearance; (7) Unequal lip clearance. See Fig. 9.

1. The result of grinding too flat forms a hook-like cutting edge and it is very hard to get a round hole. The drill ground in this manner is very apt to get away from the centre punch mark, and must be watched very closely.

2. Too sharp a point puts unnecessary strain upon the machine and if you happen to be drilling thin plates, the drill point comes through the plate before the full size of the drill is entered into the metal, this allows the drill to wobble all over the job and causes a very irregular shape hole.

3. Unequal lengths of the cutting edge form a serious defect as this results in the hole being too large, although sometimes the fact of a drill possessing equal angles and one cutting edge longer than the other, can be turned to advantage, as in a case where you want a hole just a shade larger than the drill, or between the sizes of standard drills, otherwise, as it often happens especially in a small shop, you will have to use a drill with the margin considerably worn. Wear on the margin or land in Fig. 8 leaves the drill without sufficient clearance, so that it is apt to bind in the hole, and also drill a little small. In a case of this kind it is a distinct advantage to grind one cutting edge longer than the other.

4. If the point of the drill is in the centre but the angles of the cutting edge different all the work will be done by one cutting edge, and the drill will be crowded over to one side, which has a tendency to bind the drill, also make the hole too large. See Fig. 10.

When both the angle and the length of cutting edges are wrong it is impossible for the drill to give anything like satisfaction, it will be working under the very bad conditions shown in sketch Fig. 11. The support which a properly ground drill receives from the metal being drilled is entirely lacking.

5. If the drill has no clearance it simply will not cut and any attempt to make it cut by force will only end in disaster, usually by splitting the drill up the web. On the other hand if the drill has too much clearance it is liable to dig into the work and become loose in the drill socket. If you are using a straight shank drill, it would most likely slip around in the drill chuck and the edges also will keep breaking away because there is not sufficient metal behind them to support the edge.

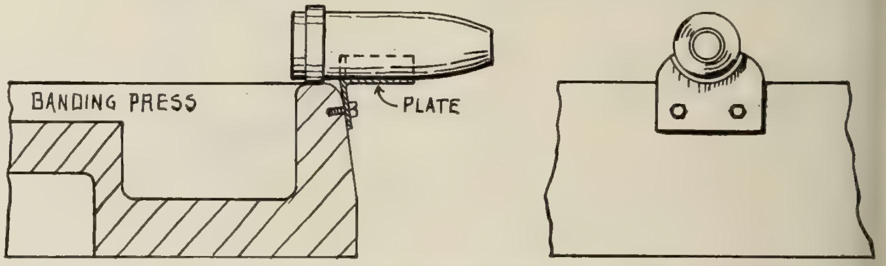
As the drill becomes shorter the centre becomes thicker, because the web of the drill is made thicker towards the shank to give the drill strength. To overcome this thin the edges taking care to keep the point central. The three main features to aim at in grinding drills are: (1) equal lengths; (2) equal angles; (3) proper clearance. The angle recommended by most drill makers is 59 degrees on each side as shown in Fig. 12.

* * *

ATTACHMENT FOR SHELL BANDING PRESS.

By John S. Watts.

THE sketch shows a rest for attaching to the side of banding press, which forms a convenient place whereon to rest the shell while hammering the band into the groove in the shell. It is necessary to give the band a blow or two with a hand hammer to set it into its groove so that it will stay in position on the shell when the shell is stood in place on the press.



ATTACHMENT FOR SHELL BANDING PRESS.

The rest is simply a piece of steel plate bent to the shape shown and secured to the side of the banding press with two cap screws in the position shown in sketch. The shell can then be laid on this rest while hammering the band into position.

* * *

ACTIONS IN EMERGENCIES

By J. Hamilton.

WHAT a person would actually do in a case of emergency is a debatable question. We are all prone to believe that we would or could control our actions under certain conditions; but in many instances an exactly opposite effect has been the result. The reaction of the nerves, due to any sudden news or local disturbance, so affects the brain of the average person, that they are plunged into a state of semi-panic or bewilderment, with a temporary loss of thinking power; consequently, predetermined actions are forgotten, and we are forced to obey a power, over which we apparently have no control. The spirit is often willing, but the flesh is nearly always weak.

In a large factory some time ago the main belt from one of the motors broke, striking and destroying one of the water sprinklers. If the men in the shop had been told that this particular mishap was expected, they may or may not have acted differently, but what did occur was equally as sudden and complete as that of the breaking of the belt, wit
the subsequent distribution of dust an
flying water. Without a thought
what had happened, the entire gang
men, with the exception of the forema
stampeded for the doors, falling ov
themselves and others with the one o
ject of reaching the outside. Howeve
they were no sooner outside than t
"gray matter" began to settle, and, r
turning to the interior, they found t
foreman (somewhat unstrung) watchi
a gradually decreasing flow of wat
from the broken sprinkler.

An interesting test was recently ma
to determine the stability of a young
who had been continually saying wh
he would do under certain conditi
The question of bravery under fire
shot and shell was being discussed
several men in the shop, and this yo
fellow intimated that he could stand
to the ordeal alongside of anyone; s
show the others and prove to him
fallibility of the majority of hum
we chose a time when he was ab
from his lathe, and, taking the h
or "light" end of several pa
matches, inserted them in the large
of the back shaft, the matches bein
cured by a small quantity of belt d
ing. When he returned to his lathe
pushed over the shifter, the effec
the "machine gun" can be well
agined. Where the blood had gone
doubtful, but it was certainly not in the
"pale" of his face.

* * *

"SHRINKING-IN" A SHAF

J. R. H.

AS the years roll by, we are const
adding to our store of knowledge
while casting about for useful fur
to occupy the vacant cells of our
storey, we sometimes fasten our
upon a unique object, which is of
material value, but serves the p
of showing to what extent some
require refurnishing, and some
furniture remodeling.

A few years ago I was en
shrinking a large cast iron collar
shaft. I had machined the pa
readiness for the shrinking ope ion.
and was heating the collar to pl
the shaft, when a young man w had
been doing fitter's work for eral
years came to watch the ope tion.
When the collar was sufficiently ted.

I placed it in position on the shaft and in a few moments it took hold. The man inquired if it was not possible to "shrink in" the shaft. Not grasping his meaning I asked what he meant, and he replied: would it not amount to the same thing to head the shaft instead of the collar? After a little explanation, he left me, taking with him a useful piece of furniture, which up till that time had been obscured by dust, and was probably blocking the passage to more efficient material.

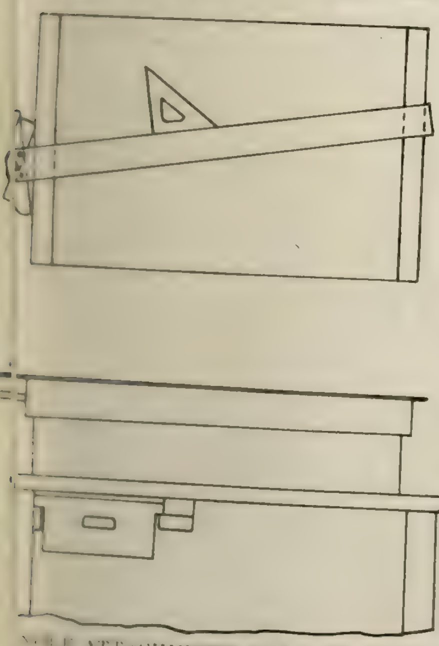
If your brain is to be a storehouse, examine each piece as it goes in, to avoid accumulating a lot of junk, that in a short time may cover up or obscure some more useful material.

* * *

ANGLE ATTACHMENT FOR TEE-SQUARE

By H. M. F.

IT often happens when making drawings that certain parts of the object being drawn are located at an angle with other surfaces. With the tee-square used in the usual manner it is quite difficult to obtain these surfaces, as a protractor must be used which takes up considerable time. To overcome this difficulty a block may be fitted to the tee-square, as shown by the accompanying illustration. This consists of a knurled screw and a rectangular piece of wood, having the corner slightly rounded, which is placed on a tee-square in the manner illustrated.



ANGLE ATTACHMENTS FOR TEE-SQUARE.

To use this tee-square for drawing on an angle it is necessary to first locate on the line at the desired angle, after which, by swiveling the block until the tee-square matches this line, the remaining angular lines are drawn in the usual manner by sliding the tee-square up and down and using triangle.

MICROMETER DISCS FOR USE IN SETTING CALIPERS

By F. Scriber.

IT frequently happens in measuring work that micrometers handled in the usual manner do not adapt themselves very well to the condition, and in this case some other form of measuring must be resorted to.

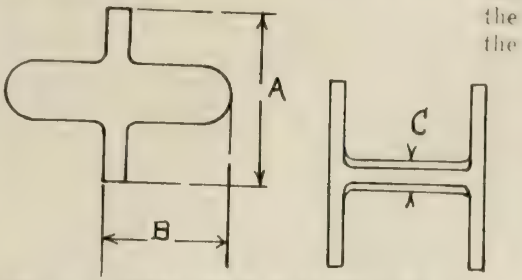


FIG. 1. ILLUSTRATING DIFFICULTIES IN MEASURING CERTAIN PARTS OF OBJECTS.

Two examples showing work of this nature are illustrated by Fig. 1, the conditions being obvious. In the diagram at the left the dimension A cannot be measured owing to the projection B interfering with the frame of the micrometers. In the diagram at the right it is necessary to measure at C, which is about two inches from the end of the part being measured, and likewise this is impossible with an ordinary micrometer.

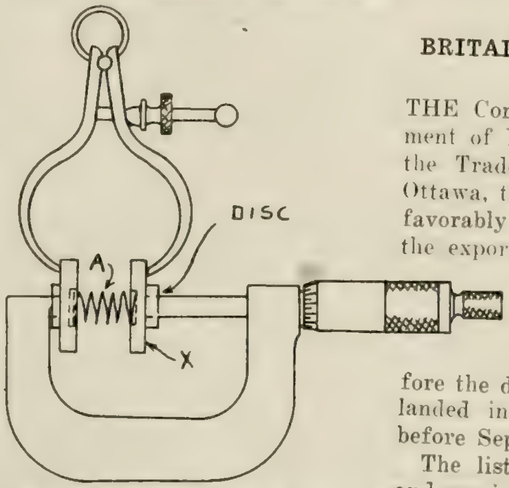


FIG. 2. METHOD OF USING DISCS ON A MICROMETER FOR SETTING OUTSIDE CALIPERS.

Recognizing this difficulty, a pair of discs, as illustrated in Figs. 2 and 3, are used in the following manner. Referring to the illustration, the discs are placed on the anvil and spindle of the micrometer, with a spring A to keep them in place. These discs have the surfaces X ground so that a reading taken from these surfaces will coincide with a reading taken in the usual manner without the discs. In using these discs a pair of ordinary spring calipers are set, as illustrated, using extreme care not to force the discs out of place; after this the work to be measured is calipered in the usual manner by the sensitiveness of the touch as the spring calipers are tried on the work.

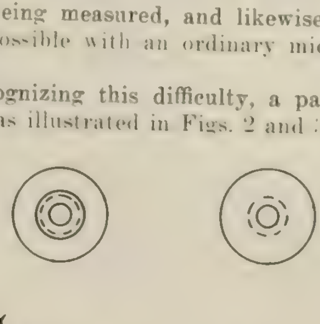


FIG. 3. TYPES OF DISCS FOR USE AS SHOWN IN FIG. 1.

A convenient pair of discs used for setting dividers is also shown in Fig. 3. In setting the dividers to these discs the point of the dividers are set to the groove Z. These two pairs of discs will be found very useful in getting around many of the odd jobs which present themselves in the day's work, and will greatly increase the usefulness of the micrometer caliper.

* * *

BRITAIN FAVORING CANADIAN EXPORTS

THE Controller of the British Department of Import Restriction has notified the Trade and Commerce Department, Ottawa, that he is prepared to consider favorably applications for licenses for the export to England from Canada of goods on the prohibited list. The condition attached, however, is that the goods in question were ordered before the date of the prohibition and are landed in the United Kingdom on or before September 15.

The list of prohibited goods is long and consists of goods whose importation is wholly restricted and others for which licenses must be obtained. The dates of prohibition vary from March 1 last to recent periods. Ivory, leather, paper, cardboard, sewing machines, furniture and many other such commodities are on the lists in question. Canadian exporters of such goods as pulp and paper, cardboard, furniture, etc., whose importation is allowed by license only, and is as a general rule restricted to two-thirds the normal consumption, are being favored as far as possible by the British authorities in the granting of these licenses, it is learned. It is a species of preference within the Empire.

* * *

Copies of the Canadian National Exhibition prize list may be obtained by writing Dr. J. O. Orr, general manager, Toronto.

The Toronto Board of Trade urged the C.N.E. directors to run the Fair for three weeks as far back as 1885, but the management thought two weeks quite long enough.

CONTEMPORARY WAR ARTICLES

Embracing Information and Data Drawn from a Variety of Sources Relative to and Arising from the Prosecution of this Many-Sided European War

MACHINING DEPARTMENT OF BRITISH NATIONAL SHELL PLANT

IN our August 17 issue through the courtesy of The Engineer, London, England, we were able to submit to our readers a racy though none the less interesting illustrated article covering the forging department of one of Britain's National Shell Manufacturing Plants. In the present instance, and from the like source, date and illustrations relative to the shell machining and finishing departments are featured.

Establishment.

About a mile distant from the forge department there is situated that in which the forgings are machined into finished shell cases. The history of this branch of the factory is one of the romances of the war. On August 30, 1915, the site was viewed for the first time. It was then under a crop of oats. On September 2, half a dozen workmen started operations. By October 6, all the foundations were in, but even before this, namely, on September 18 the erection of the columns had been begun, and this part of the work was completed by Christmas. The roof trusses followed, but bad weather came along, and it was not until the end of February that the glazing of the roofs was finished. The whole factory was completed by March 20, that is to say, everything down to the floors and the concrete foundations for the machines was ready.

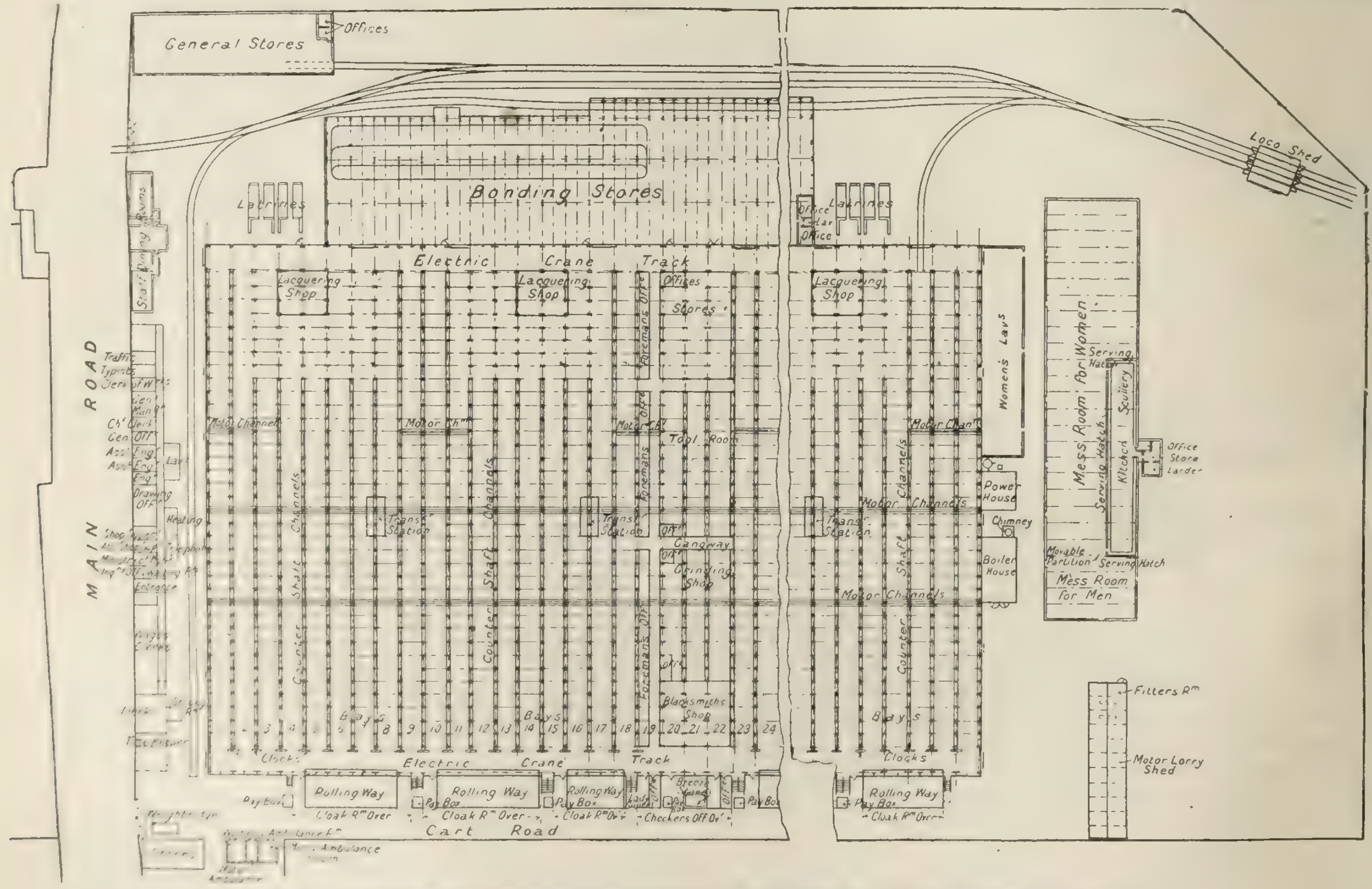

General Stores
Offices
Loco Shed
Bonding Stores
Latrines
Office
Electric Crane Track
Lacquering Shop
Offices
Stores
Foremans Off.
Tool Room
Motor Channels
Shaft Channels
Counter Shaft Channels
Trans. Station
Gangway
Grinding Shop
Blacksmiths Shop
Bays
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Clocks
Rolling Way
Pay Box
Cloak Rm Over
Checkers Off Or
Cart Road
Ambulance
MAIN ROAD
Staff Dining Rooms
Drawing Off.
Women's Lavs
Mess Room for Women
Serving Hatch
Scullery
Kitchen
Office
Store
Larder
Power House
Chimney
Boiler House
Movable Partition
Mess Room for Men
Fitters Rm
Motor Lorry Shed

FIG. 1. LAYOUT OF MACHINING DEPARTMENT, BRITISH NATIONAL SHELL PLANT.

Naturally the provision of the machines for the factory could not be accelerated beyond a certain limit, but as they arrived, section after section of the workshop was set going. Some of the machines arrived before the end of the year. Indeed, by January 12, that is to say, more than two months before the factory could be said to be complete as a building, twelve women were started on the machining of shells. The number of workers was increased to keep pace with the growth of the factory, those parts not completed being meanwhile screened off by boarding from those which were at work.

At first the operators worked on one shift lasting eight hours, but as more operators became available, a second and a third shift were started on April 12 and May 1 respectively. By the latter date a third of the factory was in full working order. On the date of the Engineer representative's visit, it was rapidly approaching its full contemplated staffing. In fact, it was then running from 6.30 on Monday mornings until 10.30 on Saturday nights, with breaks only for meals, and was increasing its staff at the rate of 100 per day.

Constructional Features

The factory, not counting the offices, mess-room and other adjuncts, covers an area of several acres. The ground was not level to begin with, and had to be filled in with ashes, in places up to a depth of 4 ft. Between two and three thousand tons of ashes were thus accounted for. The columns and roof trusses contain altogether about 1800 tons of steel, and there are about 400 tons of glass used in the roof. In addition, there were the galvanized iron sheets for the sides and all the details of the equipment to be reckoned with. Naturally one of the first problems to be faced was the connection of the chosen site with the nearest railway. A main line passed the works about 300 yards away, but, to get to this, the line had to be carried from the works across a main road and down a bank at an incline of 1 in 25. The line was started on September 6 and with all its connecting sidings inside the works was ready for use by November 18. Now that the work of erection is completed the line is used principally for the removal of the finished shells.

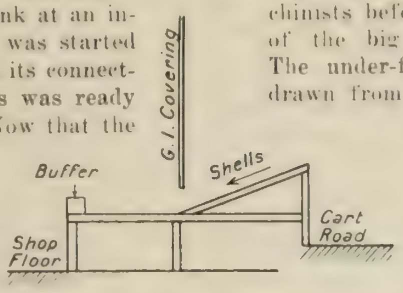


FIG. 2 ARRANGEMENT OF ROLLING WAY.

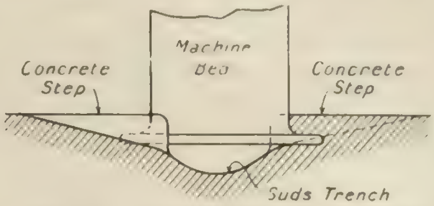


FIG. 3. ATTACHMENT OF MACHINE TOOLS TO FLOOR.

Training the Workers

So much for the material difficulties. The difficulty of getting suitable operators was no less great, and it was met with equal courage and energy. At a recent date the factory was employing 1725 girls and 314 men, the men being largely employed in setting up and keeping the machines in order. In fact it may be taken as correct that all the actual shell making and finishing was in charge of girls. The majority of the laborers, that is to say, those not occupied on the machining of shells but on such work as carrying the shells from one machine to another, were women. All this female labor had to be collected and passed as the works progressed.

By the principle of specialization explained in the forging article, the machine tool-makers have been able to supply machines which are readily operated and handled. In few cases is more than a month required in which to teach a future operator her work, and in many instances fourteen days is sufficient. The operators themselves, if properly trained, make excellent instructors.

All the workpeople have been trained by the firm in charge of the factory. This applies not only to the women but to the men in most cases. The superior foremen were mostly shell machinists before the war at one of the big armament works. The under-foremen have been drawn from many classes, and have been trained for their special work since the factory was started. A few skilled blacksmiths and tool fitters are employed. Such men, of course, required little or no training, as they were already qualified. A few male tool setters are to be found in the works. These men have been "lent" to the firm after having been trained, say, in a technical institution. At the factory they are principally employed to train women tool setters, who when proficient will take over the entire work of this nature. The total number of men employed at present is not at all great. As time goes on the number will decrease, while the number of women will rise. It is expected that ultimately the number of male employees will fall to something less than 5 per cent.

Lay-Out of the Factory

In Fig. 1 is shown a block plan of the factory. At the lower left-hand corner are the gates through which the steam wagons carrying the rough shells from the forge enter the works and at the top left-hand corner are the gates through which the machined shells pass out of the works in railway trucks. Between these gates, flanking the main road, are the offices. These are all on one floor. Their construction is interesting. The inside, outside, and partition walls are made entirely from cement slabs, 2 ft. square and $2\frac{1}{2}$ ins. thick. Primarily intended for sidewalk making, they form excellent building material, for they become dry and hard very quickly. They are cemented together along their edges, so that the walls everywhere are only $2\frac{1}{2}$ ins. thick. In addition to the cement, small steel U-shaped pieces are employed to bind each neighboring pair of slabs together. The inside and outside walls are stiffened at intervals of 29 ft. by pillars of reinforced concrete, and, on the outside, facing the road, the wall is rough cast.

The main factory extends to a considerable depth behind the offices. It may be described as consisting of numerous rows of steel columns, forming a corresponding number of manufacturing bays, each 18 ft. wide and provided with a pointed roof glazed on both slopes. The side walls are of galvanized iron. Three of the bays, namely, those numbered 20, 21 and 22, are given over to a blacksmiths' shop, where the tools used in the machines are forged and dressed; a grinding shop where the tools are ground to shape and sharpened after being forged; a tool room where repairs

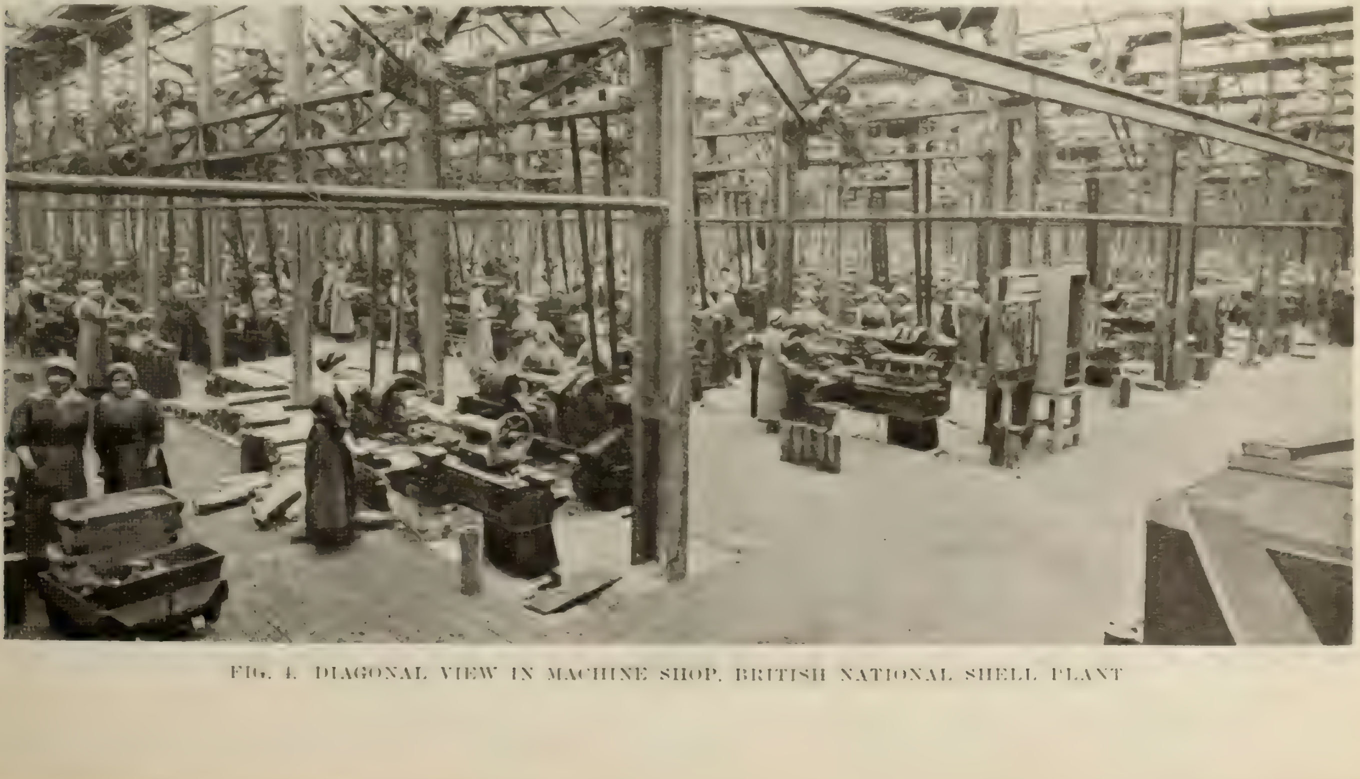


FIG. 4. DIAGONAL VIEW IN MACHINE SHOP, BRITISH NATIONAL SHELL PLANT

and equipment for the machines are carried out and produced, and a storeroom whence tools, oil and other details required by the operators are issued. The nineteenth bay is occupied by foremen's offices.

Although the blacksmiths' shop is surrounded, as it were, by the rest of the machinery, no inconvenience is experienced. The place of steam hammers has been taken by electrically-driven hammers using compressed air as the medium instead of steam. The smoke from the smiths' hearths is drawn by fans through overhead trunks and delivered through the roof.

Looking at the bottom of Fig. 1 where the incoming cart road is shown, it will be noted that opposite the four non-productive bays an annexe is provided as offices of the lady superintendent, her assistants and so on. In line with this annexe, and situated so that they may readily serve all the machine bays, are some rolling ways. These rolling ways are built-up structures of wood and greatly facilitate the passage of the forgings from the steam wagons to the inside of the works. The sketch—Fig. 2 will explain their construction. The galvanized iron sheeting which forms the side walls of the building is stopped short some distance above the level of the shop floor. The rolling way is built beneath, part inside and part outside. The outside edge of the rolling way is at such a level above the cart road surface that when the steam wagons come alongside and let down their side doors, the shells may be rolled right on to the incline, whence they travel by gravity down to the buffer inside the building. From the table within the wall, the operators can readily carry the shells to their machines as required.

Machine Tool Arrangement

The passage of the product within the factory is in a continuous straight line. Each bay may be said to be self-contained. If we pass down a bay, starting from the rolling way end, we will find that on either side of the central passage way is a row of machines, each one of which is different, and performs a different operation on the shell forging. A shell once taken from the rolling way into a particular bay remains in that bay and on one side of it until, having been passed from one quarter to the next, it emerges at the opposite end completely machined. Just as a sound system of lines of communications is required by an army, so, too, in a modern engineering factory, efficiency requires a sound system of distribution for the work. Crossing of the lines of communication in the one case and the lines of distribution in the other do not promote good output.

What we may call the lines of control of the factory are at right angles to the lines of distribution of the work. It will be gathered that if we imagine a line drawn at any point of any bay at right angles to its length and passing through a certain type of machine, all the machines in the other bays and lying on this line will be of same type and will be performing the same operation. Over each such row of machines a separate foreman is placed, so that each foreman has one and only one class of machine under his charge. It may be remarked that certain of the operations are simpler and can be performed more quickly than others. To prevent congestion and to secure the maximum output, the quickest and easiest operations are made to set the pace, the more difficult operations being brought into line by providing more than one machine for them in each day. Thus walking down any bay in the direction in which the work travels, we may notice in places that two or more successive machines on either side are similar and are performing identical work.

Cutting Lubricant Arrangements

In this factory the machine tool lubricant used is a soap-and-water compound. The provision of this cutting fluid in a works of the size and nature of that here described is no small nor insignificant matter. The arrangement adopted is to provide central pumping stations for the fluid, with an overhead delivery pipe with branches to each machine and a trench or gulley leading into a main trench and well, wherein the used fluid is collected ready to be strained and returned by the pumps to the overhead delivery pipe. There is one such pipe on each row of columns, so that each pipe serves two rows of machines. The lubricant having done its work, drips off into the trench beneath the machine. This trench is of concrete, there being one such trench for each row of machines. At the centre of the shop, running at right angles to the trenches, is a main trench with which the others drain; for this purpose each half trench is given a fall of 5 in. towards the centre of the shop. At each end of the main trench there is a pumping station and a suds well, 5 ft. in diameter by 18 ft. deep.

Machine Tool Foundations

In ordinary practice the machines in an engineering workshop are fixed in position by means of bolts embedded in foundations of concrete. By loosening the nuts the machines may be removed, leaving the bolts projecting from the concrete foundation. It is not quite easy by this means to secure a satisfactory job. Considerable pains, for instance, have to be taken to ensure that the bolts shall when the concrete sets, register accurately with the holes in the machine base plates. At this factory, the machines are fixed in a manner which is somewhat unusual, and which, although open to certain objections in a less critical time, undoubtedly has the merit of expediting installation. The machines are simply cemented down across the concrete suds trenches, no bolts whatever being used. The sketch, Fig. 3, will make the method quite clear.

The suds trenches of two adjacent rows of machines are united throughout their lengths by a level layer of concrete. From this level layer the columns supporting the roof rise. The arrangement gives the operators plenty of room to pass behind their machines for cleaning and adjusting them, and at the same time results in the columns being situated where they are least obstructive of room. The columns in general are supported on concrete foundations, 3 ft. square and 3 ft. deep, and are held thereto by means of bolts 18 in. long. Certain of the columns are heavier than the average. For these the depth of the foundations blocks is increased to 4 ft. It will be gathered then, that the suds trenches and the foundations for the columns form a continuous mass of concrete, which was laid as far as possible without a break.

The floor of the factory, except at the suds trenches, is of wood—a factor which adds not a little to the comfort of the workers. The ground, as we have said, was first levelled with ashes. Thereafter, old railway ties were laid down at 3 ft. intervals transversely between the columns. These directly support the floor, which is of 2 in. battens running longitudinally. Further to add to the workers' comfort, the factory throughout is steam heated. For this purpose, steam pipes are carried by each row of columns at a height of about 10 ft. above the floor level. The glazing of the roof has been tinted blue by stippling on the inside with washable distemper. This keeps out the direct rays of the sun, and has a very pleasant effect.

Machine Tool Drives

The problem of how best to drive the immense number of machines in use seems to have been very satisfactorily solved. Two factors had to be kept prominently in mind. First, the driving arrangements should not materially obstruct the natural lighting of the factory. It is quite common in certain engineering workshops to find the machine shops in a state of semi-darkness because of the tangle of belts which are required to drive the machines. Secondly, the drives to the machines should be well out of the way so as to avoid accidents.

This, if belts are used, as is the case here, is a point of the greatest importance in a factory employing female labour. These two points have been well attended to, and, in addition, the method adopted does not, we believe, result in an excessive loss of power in the transmission.

Figs. 4 and 5 are sufficient to show that the natural lighting of the factory is all that could be desired. A view is got along one of the bays in operation. It will be seen that the machines in the bay are all driven from one overhead shaft, which runs down the centre of each bay. This shaft is carried from the underside of the roof trusses, which ensures as high a position as possible; it is driven by electric motors, which are supported high up in the roof. There are either two or three of these motors in each bay, as the case may be, each driving a portion of the line shafting, which serves from 12 to 20 of the machines below. At the roughing-out end of the shop, the work done by the machines is of a heavier nature than at the finishing end of the shop, so that one electric motor is powerful enough for a greater number of machines at the finishing end than at the roughing end. From the main shafting down the centre of the bay belts slope down right and left to individual countershafts attached to girders running between the columns. Each machine thus has a separate countershaft. It is situated slightly to the rear of the machine and quite 10 ft. above the operator's head.

When the shells have been completely machined, they are varnished or lacquered inside. This work is carried out in rooms situated at the outgoing ends of the bays. These rooms are each spread over the width of two bays, and are separated from the rest of the building by walls of asbestos board $\frac{1}{4}$ in. thick nailed to the inside of a framework of wood. In each varnishing room there are several gas-heated drying stoves, where the shells after varnishing are baked for two hours.

Leaving the lacquering rooms, the shells are conveyed to the bonding store, an adjunct to the main building; this is screened and locked off therefrom. The bonding store may be said to be private Government ground. Here Government officials take delivery of the shells, which are finally examined and, if found satisfactory, painted externally. The arrangements made for pointing the shells are interesting. As they come into the bonding store they are hung separately on hooks suspended from an overhead runaway. Thus supported, they can be readily examined and painted, the entire operation involving the latter being conducted by a few women, each of whom is provided with a sprayer, which, served by one pipe carrying paint and another carrying compressed air, sprays the paint on to the shells when the trigger is pulled. The shells are taken down from their hooks when they are dry, being thereafter tested over their coat of paint with a gauge, following which they are ready to be stored or dispatched.

Nose pieces at the time of this writing were being machined from sections of round steel bars sawn to length. Recently, however, it has been proposed to reduce the machining required by forging the nose pieces to approximate shape under drop hammers. The objection to this course earlier has been due to the possible difficulty of cutting into the hard skin which was formed on the surface of the pieces during the forging process. The difficulty has now been surmounted by removing the scale or skin in question by sand-blasting, before machining.

Management and Welfare

We have already indicated certain features in the working of the factory bearing on the all-important matter of the health and welfare of the girl workers. Some other facts connected with this subject may be stated by the way of conclusion. The control of the girl workers, so far as what may best be described as domestic matters are concerned, is in the hands of a principal lady supervisor. Under this lady are three sectional lady supervisors, each responsible for a section of the works. Under each sectional supervisor are two assistants. In addition to these, there are one lady canteen supervisor and three canteen assistants. Three fully trained nurses have been engaged, one at least of whom is always on duty. These nurses attend to any cases of accident or sudden illness, and keep a watchful eye on the general health and condition of the girls. Speaking of accidents, it may be remarked that up to the date of this writing, none requiring the use of a stretcher had occurred, though these are provided for. As for

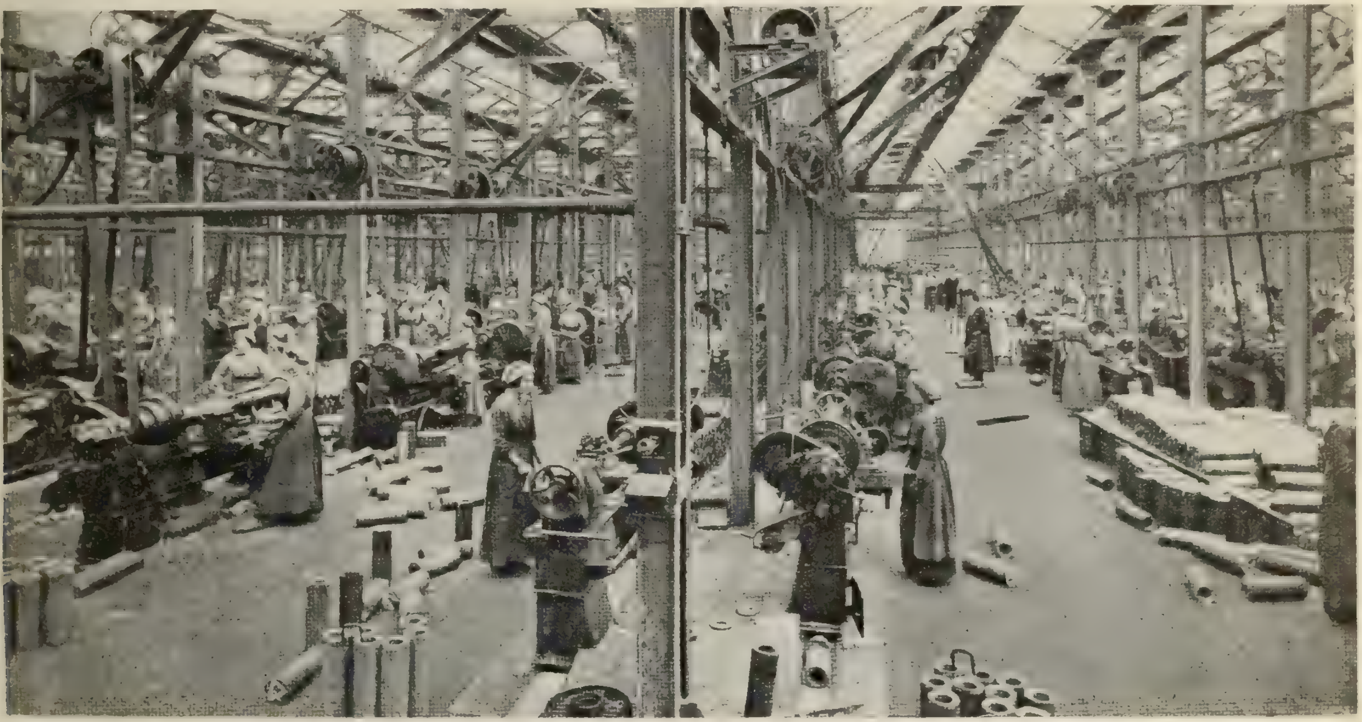


FIG. 5. LONGITUDINAL VIEW IN SECTION OF MACHINE SHOP, BRITISH NATIONAL SHELL PLANT.

minor accidents, such as cut and bruised fingers, it is found that on the whole these are more numerous than with men employees. This is explained quite satisfactorily by the existence of a rigid rule which requires every mishap, however small, to be reported and attended to at the ambulance room, whereas with male workers many a cut and so on is attended to by the workers themselves without a report being made.

Plant Hours

The hours of the factory are divided into three equal shifts, namely, from 6.30 a.m., to 2.30 p.m., from 2.30 p.m. to 10.30 p.m., and from 10.30 p.m. to 6.30 a.m. Half-way through each shift there is a break of half an hour for a meal. Particular inquiry was made as to how the efficiency of the night shift compared with that of the others. As the workers are girls, it was expected to find quite a perceptible reduction of the output during the third shift. Experience would teach us to expect it even with men. From signed statements showing typical outputs over the three shifts separately, on not a few of the operations the output during the third shift was distinctly better than that during the first and second. In a few cases it was slightly poorer. Taken on the whole, the figures shown enable us to say with perfect certainty that the efficiency of female labour in this factory does not fall off during the night.

When the works were designed and laid out arrangements were made for the employment of girls on the smaller operations only, and to the extent of about 10 per cent. of the total employees arranged for, but before the factory started work the scarcity of men was so severely felt, and the experience proved so satisfactory elsewhere, that it was decided to arrange throughout the factory for girls to operate the shell machines, and, as stated above, it is expected that the proportion when the factory is in full working order will be 95 per cent.

This alteration entailed considerable modifications to the lay-out of the factory, which had to be developed after the factory had started work. It was found necessary to build additional ambulance rooms, cloak rooms and rest-rooms for the girl workers on a larger scale than had been allowed for on the assumption that men were to be the chief workers in the factory. A large canteen has been erected, and arrangements have been made for cooking and supplying hot meals at as low a cost as practicable.

Two facts predominate as a result of a visit to this plant. One is the apparent ease and willingness with which the girl workers have taken up their new work and the efficiency with which they perform it. The work they have to do involves lifting weights up to 80 lbs. or so—about the limit for a woman—and standing for eight hours, except for the meal-time break. It might well tax the strength of many a man. Yet they all seemed cheery and happy, and went about their work with a zest which is not always manifested among male workers.

Our other impression is one more difficult to express in suitable words. It takes the form of a consciousness that behind the good work and efficiency of the girls and the factory as a whole, there is evident to those who can see it the dominating influence of a few master hands, those, namely, of the men—the engineers, in the very truest meaning of the word—who planned the construction and working of the factory and of the machines and appliances with which it is equipped.

This influence is none the less evident because it is silent, yet silence on the subject is apt to mislead the country, and certainly has misled it and our Allies. It is, in our opinion, most desirable for all, even the enemy, to learn that Great Britain is not asleep, that her engineers realise what is required of her and that they are straining every nerve to do their duty. Self-depreciation is largely founded on ignorance of one's true worth and capabilities. From what we know, not only at the factory described in the two articles, but elsewhere, we can tell all whom it may concern that self-depreciation, at least in the matter of the supply of warlike material, is unreasonable, absurd and foolish.

* * *

CASE HARDENING WITH CYANIDE

FOR many purposes a thin, hardened outer surface is required on wrought-iron or steel articles. This can be quickly secured after finishing by the use of potassium cyanide. All iron and steel, roughly speaking, will absorb carbon when, at a temperature of from 800° to 850° Cent., or in smithy terms from bright to cherry red. This is taken advantage of in surface-hardening, the metal being heated to this point, preferably in some form of muffle, even rough. At this stage the metal can be plunged into a bath of melted cyanide or rubbed with a lump of cyanide held in a pair of tongs until the metal becomes dull red, after which, reheating to the hardening temperature, and immersing immediately in cold water is done to secure the greatest hardness possible. Properly done, this should turn a file. A better plan, where the size and shape of the articles permit, is to coat a piece of leather with powdered cyanide and press the heated articles on this, repeating the heating and pressing several times, afterwards reheating and quenching. For deep case-hardening, the usual method of packing and heating must be adopted.

* * *

A STEP IN THE RIGHT DIRECTION

AN important work has begun in Indianapolis with the teaching of the English language to every alien employed in a local factory. It is the outgrowth of the national "America First" movement, having for its object the training of the foreign-born resident for citizenship.

In no country is it possible to exercise intelligently the priveleges of citizenship without having first an adequate understanding of the prevailing tongue, and of what such citizenship means. So the work of education must begin at the bottom.

There are in numerous Canadian and American factories, many aliens who have never signified their desire to become citizens. Some have only a meager knowledge of English. Our country cannot grow as it should when many of its inhabitants remain ignorant of our language, and of the national customs and habits.

Now, as never before must we awaken to our responsibilities in this matter. The new education may be slow but it means preparedness.

* * *

WAR AND ENGINEERING

IF there is any fact that the war has driven more deeply into our mind than any other, it is that engineering science, next to unquestioning patriotism, is the greatest single factor in modern warfare. This fact the engineers see clearly. They know that money and men are not enough. There must be some thinking force to turn the money into guns and to prepare a way for the soldiers. While the civilian engineer is by no means fitted to plunge into active military engineering, he is prepared to make the most of a course in training.

* * *

In a recent issue the "South African Mining Journal," Johannesburg, stated that the Rand Water Board has decided to proceed with a modified scheme for supplying the Witwatersrand with water from the Vaal River. Originally the scheme was one for impounding 20,000,000 gallons of water and providing plant for pumping 10,000,000 gallons to the Rand. It has now been decided to proceed with the erection of the barrage on the original lines, but to instal a plant capable of dealing with only 5,000,000 gallons. The cost of the scheme is estimated at $3,790,000, including an amount of $210,000 already expended for surveying, etc.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

AUTOMATIC DISTRIBUTING VALVE FOR STEAM PUMPS

Designed to meet all the requirements of a successful device for controlling the distribution of steam in pump cylinders, the Attwood Patent Operating Valve is applicable to both horizontal and vertical pumps without any change. An explanation of the working is given in the following illustrations:

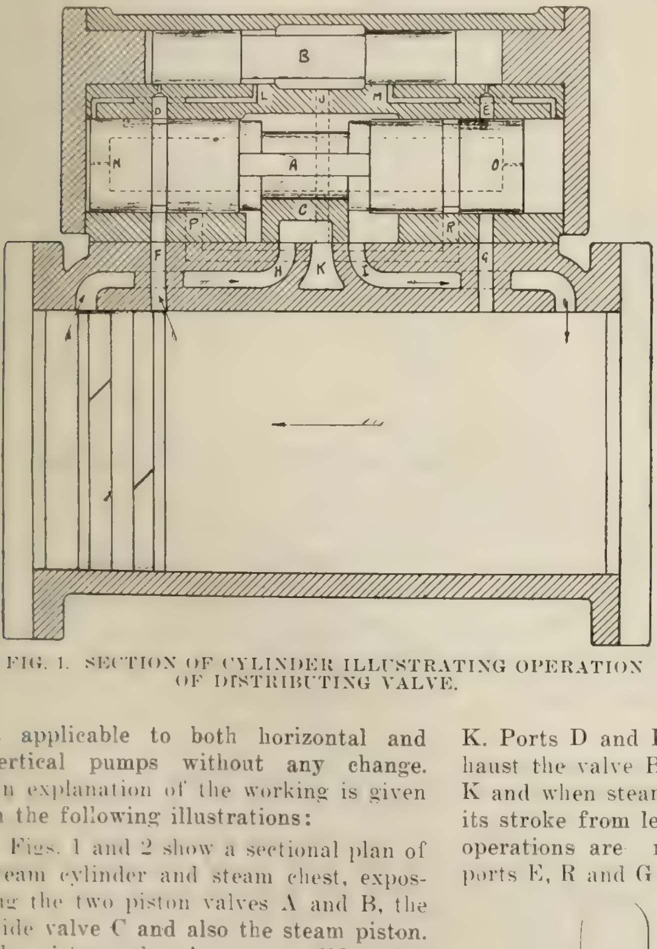


FIG. 1. SECTION OF CYLINDER ILLUSTRATING OPERATION OF DISTRIBUTING VALVE.

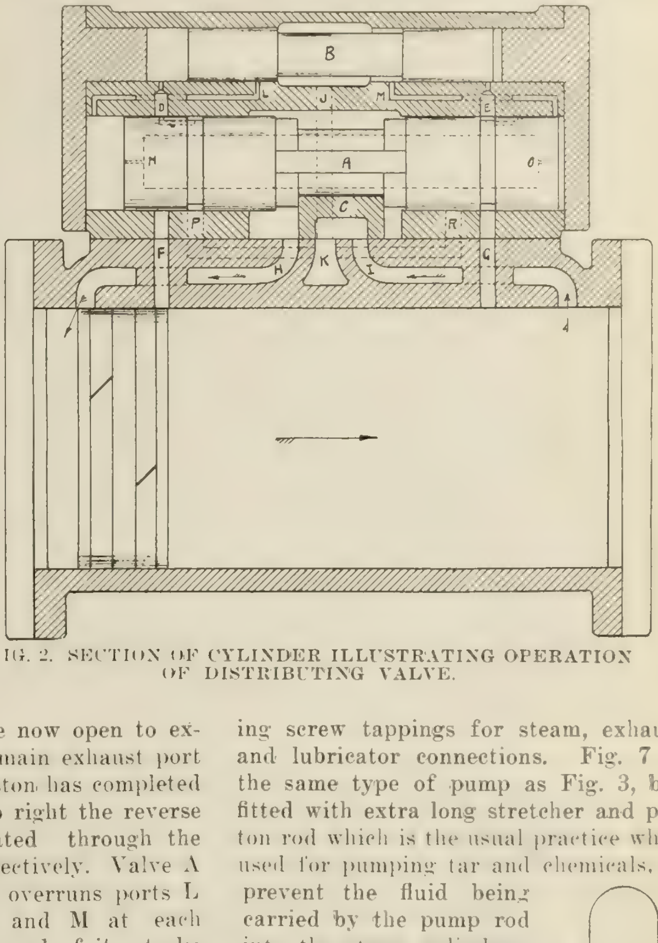


FIG. 2. SECTION OF CYLINDER ILLUSTRATING OPERATION OF DISTRIBUTING VALVE.

Figs. 1 and 2 show a sectional plan of steam cylinder and steam chest, exposing the two piston valves A and B, the slide valve C and also the steam piston. The piston valve A engages slide valve C, which opens ports H and I to live steam and to exhaust port K alternately in order to operate the steam piston.

Live steam is admitted to centre compartment of steam chest containing the piston valve A and slide valve C. When the valves are in position shown in Fig 1, steam is entering cylinder by port I, and exhausting from cylinder by port H to main exhaust port K. Piston has completed its stroke from right to left by uncovering port F, and admitting steam by ports F and D on to end of piston valve B, which is now moved to the position shown in Fig. 2. Ports N and O admit live steam from the centre compartment of chest through the inside of piston valve A to the outer ends of same.

In Fig. 2 piston valve B has uncovered port M, and steam is exhausted from the right end of valve A through ports M and J to main exhaust port K, while port L is covered to the exhaust port J and steam accumulates at left end of valve A through port H and moves valve A from left to right, opening port H to live steam and port I to main exhaust, K. Ports D and P are now open to exhaust the valve B to main exhaust port K and when steam piston has completed its stroke from left to right the reverse operations are repeated through the ports E, R and G respectively. Valve A overruns ports L and M at each end of its stroke thus preventing waste of steam.

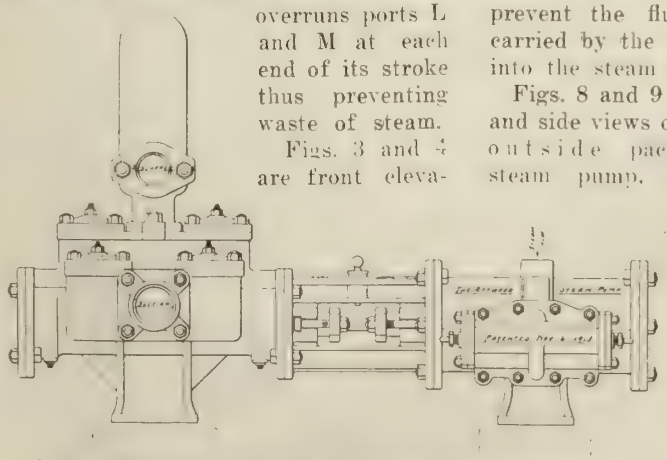


FIG. 3. ELEVATION OF INSIDE PACKED POT VALVE PUMP.

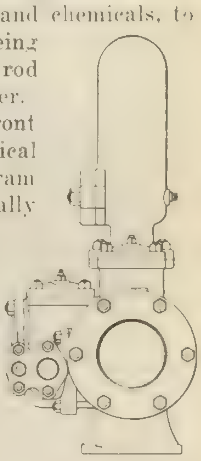


FIG. 4. END VIEW OF FIG. 3.

Figs. 3 and 4 are front elevation and end views of the Attwood patent horizontal, inside packed, pot valve pump, which is designed for medium pressure boiler feeding, tank, vacuum, and general purposes. Fig. 5 is a cross section through one end of the steam cylinder showing the main steam port entering the lower side of the cylinder bore.

Fig. 6 is a cross section through centre of steam cylinder and steam chest, showing screw tappings for steam, exhaust and lubricator connections. Fig. 7 is the same type of pump as Fig. 3, but fitted with extra long stretcher and piston rod which is the usual practice when used for pumping tar and chemicals, to prevent the fluid being carried by the pump rod into the steam cylinder.

Figs. 8 and 9 are front and side views of vertical outside packed ram steam pump, especially designed for high pressure boiler feeding and also for mine sinking purposes. Engineering readers will at once notice a distinct advance in the right direction by placing the steam chest and cylinder ports of the Attwood pump on the side of the cylinder instead of on the top as in previous designs, thus enabling the steam ports to drain the cylinder at every stroke of the piston, rendering the use of cylinder drain cocks quite unnecessary. Every operating engineer knows of the trouble caused by water accumulating in a pump cylinder when the steam ports are located on top of the cylinder necessitating the drain cocks to be left slightly open all the time to prevent water hammer. This condition becomes still more aggravated in a vacuum pump operated by a governor when used on a steam heating system owing to the slow piston speed and occasional periods of rest. Condensation will accumulate in the steam line as well as in the steam cylinder.

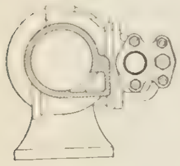


FIG. 5.

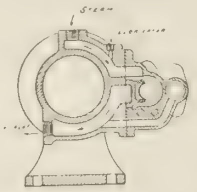


FIG. 6.

Vacuum pumps on low pressures will frequently refuse to start off the governor under such conditions until the cylinder drain cocks are opened. Again pumps for mining purposes have long and tortuous steam lines which are not insulated and frequently have cold water dripping on them from the roof. Such conditions are the worst possible and produce the maximum amount of condensation and trouble for the engineer. The cylinder and valve becomes water-logged, lubrication is washed away, rod and joint packings are ruined and cylinder heads and pistons are frequently broken because the cushion is destroyed by the presence of water in the cylinder.

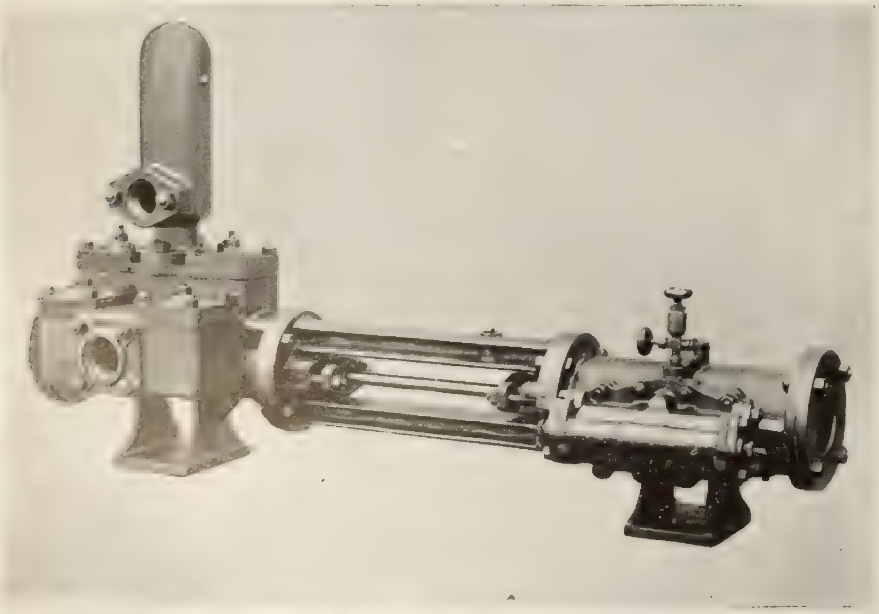


FIG. 7. HORIZONTAL, INSIDE PACKED, POT VALVE PUMP WITH EXTRA LONG STRETCHER AND PISTON ROD.

An examination of the drawings accompanying this article reveal two notable facts, viz.: 1st. The simplicity of the valve motion and its operation. 2nd. A complete automatic self-draining system accomplished by the disposition of steam chest, steam cylinder ports and pipe connections, as illustrated in Figs. 5 and 6.

It is apparent that cylinder drain cocks are superfluous because condensation through all the operations drains to the atmosphere by gravitation and the arrangements of steam ports permit the use of saturated steam without any risk to the cylinder head as already demonstrated by a series of daring experiments carried out under the worst conditions.

Figs. 8 and 9 show improved designs of a vertical outside packed ram pump which has the special feature of dispensing with one of the ram packing glands used on this type of pump, thus enabling an outside packed pump to occupy practically no more space than an inside packed pump of same length of stroke.

The saving in weight, friction, packing and space appeals to marine and stationary engineers alike, and the moving parts which are accessible without disturbing any pipe connections are a feature of convenience that will be appreciated by everyone experienced in the upkeep and repair of machinery.

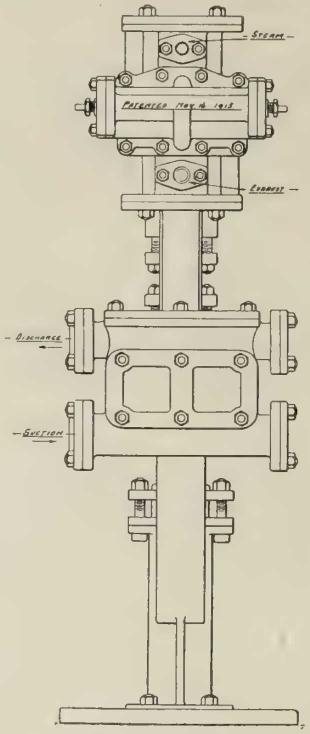


FIG. 8. FRONT ELEVATION OF OUTSIDE PACKED RAM PUMP.

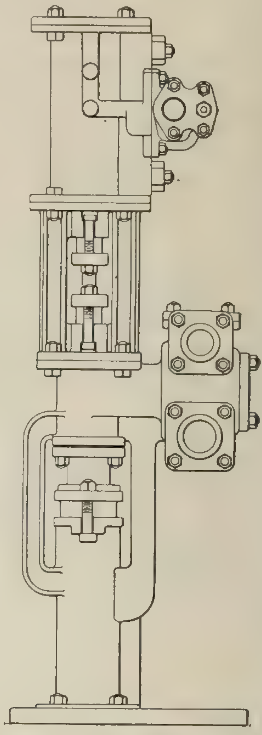


FIG. 9. SIDE VIEW OF FIG. 8.

CONSIDERATION OF ASSISTANTS

THERE are two principal ways for a manager and his assistant to work together. One kind of a manager works very hard himself and does not leave much of importance for his assistant to do. The other kind lets his assistant do all he can while he reserves his own time and thought chiefly for things the assistant cannot do—at least, cannot do so well. He puts responsibility on his assistant just as fast as the assistant shows his ability to take it.

The firt manager retards his own growth and that of his assistant. He is always over-worked and has little or no time to think of new things . He is often doing work that should have been done several days before. His assistant either chafes under the restraint, or concludes that he is incompetent, and settles into a dull mediocrity.

The second manager has time and opportunity to grow, and gives his assistant room to grow also. The assistant feels his own strength, and loves his work. He shoulders the responsibility with eagerness, and the work goes merrily on. Ask yourself, which is best.

◆

The biggest number of starters on record for a bicycle race, 76 in all, were sent away over the Canadian National Exhibition course on one of its Athletic Days.

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MUNITIONS OUTPUT SHORTAGE—THE LABOR AND CONTRACT PRICE FEATURES

A STUDY of the descriptive article in another section of this issue, covering the machining department of a British National Shell plant should have the result of providing timely enlightenment to those—male and female, whose enthusiasm outpoints their intelligence in the matter of seeking to thrust on Canadian metal-working plant managements the onus of refusing to employ women munitions workers on either a lesser or greater scale, or at all. Among a number of things to be noted in this particular plant—which by the way is but a unit of a myriad so established enterprises, the fact of its bearing the qualification "National," has quite a good deal of significance for our patriotic citizens, and especially so for our equally patriotic, responsible Government.

Official Support Lacking

Catering to the spectacular has not been overlooked by our Government in this war-time, yet the erection of even a modest number of "National" munitions plants does not appear to have harmonized with the rest of the display. Has it been because the "National" would have overshadowed the individual achievement? Whatever the reason it has been wholly left to our metal-working plant administrations to work out our national salvation, and, when opportunity offered, to be well slammed as seekers after abnormal profits. It appears to be pretty well substantiated that the manufacture of brass cartridge cases is quite remunerative, yet as regards the plants so engaged, their number is a mere handful in the scope of our munitions production, and as a consequence they figure little—if included at all as contributories to the present munitions output shortage.

The munitions product in its main and detail part into which steel enters is what our manufacturers and the Imperial Munitions Board are exercised over meantime, although their views may be said to be widely divergent as to the cause or causes from which the falling off in production arises. It will be clearly evident from the British National Shell Plant description and illustrations that the general conditions for female operators are as nearly as possible ideal, and that therefore their substitution for men already enlisted and their being procured to take the place of still employed, but eligible men, become comparatively easy of accomplishment. To anyone familiar with our metal-working plants generally, the comparison between them and the British National Establishments is odious, for, right from the entrance gates in the case of the former, an atmosphere for "men only" makes its presence felt; nor do we expect other, for in their establishment and institution they were designed and laid out so.

Theoretical Displaces the Practical

Isn't it more or less a waste of time for the Munitions Board to keep "harping away on this female employment string," in view of what has been said, and taking account of the disabilities under which not only the women would labor, but all concerned in the plant management. Our manufacturers equipped their plants to handle both quality and quantity output of munitions, and received in the beginning, we believe, prices which enabled them to do so more or less profitably. A new situation has arisen, but in many respects similar to that which marked the institution of shell-making within our borders. Male labor is scarce through enlistments for overseas service, the output of munitions has materially decreased, our Government still continues to look on, and the Imperial Munitions Board invites manufacturers to save the situation by employing female labor, while apparently ignorant of plant conditions to make the latter possible. The Board cannot, we understand, establish "National" factories, and both it and our Government appear equally helpless in furnishing direct assistance in the matter of extending or rearranging plants whose managements are willing to employ female labor.

Why we ask should Canadian women be asked to take employment under conditions so much less inviting than their British sisters. Grievous fault was found with the Shell Committee because of its personnel being largely composed of men whose intimacy with engineering workshops was a very essential part of their every-day life. The readjustment has not, however, improved that feature. The situation is, we admit, a delicate one to adjust for, as National factories are remote possibilities, and grants to individual firms are much in the same category, there remains but an increased product price to enable the manufacture to make the necessary extensions to his plant to accommodate female labor. Just here, of course, a difficulty is still in evidence, for all need not and certainly all would not perhaps recognize female labor to be available, yet all would very probably call for the higher prices ruling on each particular munition detail.

Manufacturing Enthusiasm Chilled

In view of the foregoing we reiterate that the situation is a delicate one, but not however outside the pale of adjustment. In spite of the male labor shortage which is admittedly of considerable proportions, the manufacturers' enthusiasm as we stated a week ago has been chilled by the keenness of prices ruling, and while we are not prepared to say that more margin would eliminate the munitions output shortage, we think it would go quite a long way towards it. We are in any case quite certain that the present indifference to the employment of female labor would be less marked. The tendency to place contracts at the lowest possible prices, while praiseworthy, can be carried to extremes, and it would appear that with shell and shell part forgings of steel, brass parts, shell machining, and shell boxes, all more or less involved, prices ruling are a trifle keen. Experience proves that the speediest production is secured when manufacturers and operators have on the one hand the hope of profit and on the other the certainty of a fair rate of wages. It seems to us that it is possible to prevent the British people from being robbed without alienating Canadian manufacturers from munition contracts, as appears to be the meantime situation.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh		$18 70
Lake Superior, charcoal, Chicago		19 75
Michigan Charcoal iron.		28 00
Ferro nickel pig iron (Soo)		25 00
	Montreal	**Toronto**
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base, Toronto	3.25
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.25
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.10
Bars, 2 in. and up	4.00
Structural shapes	3.10
Plates	3.50

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$29 50
Electrolytic copper	31 00	29 50
Castings, copper	30 00	28 50
Tin	43 00	44 00
Spelter	14 00	14 00
Lead	8 50	8 50
Antimony	17 00	18 00
Aluminum	68 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4.25	$4 25
Heads	4 50	4 50
Tank plates, 3-16 in.	4 75	4 75

WROUGHT IRON PIPE

Prices in effect Aug. 1, 1916

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 06	5 25
½ in.	3 91	5 57
¾ in.	4 72	6 96
1 in.	6 97	10 29
1¼ in.	9 43	13 92
1½ in.	11 28	16 64
2 in.	15 17	22 39
2½ in.	23 99	35 39
3 in.	31 37	46 28
3¼ in.	37 72	55 66
4 in.	44 69	65 95

Lapweld

	Black	Galv.
2 in.	$17 02	$24 24
2½ in.	25 16	36 56
3 in.	32 90	47 81
3½ in.	39 56	57 50
4 in.	46 87	68 13
4½ in.	57 15	83 19
5 in.	66 60	96 94
6 in.	86 40	125 80
7 in.	116 62	165 40
8 in. x 25 lbs. per ft	122 50	173 80
8 in. x 25 lbs. per ft.	141 12	200 20
9 in.	169 05	239 80
10 in. x 32 lbs. per ft.	156 80	322 40
10 in. x 40 lbs. per ft.	201 88	286 30

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$16 00	$16 00
Copper, crucible	19 00	19 00
Copper, heavy	19 00	19 00
Copper wire	19 00	19 00
No. 1 machine compos'n	14 50	14 00
No. 1 compos'n turnings	12 50	12 00
New brass clippings	13 50	13 50
No. 1 brass turnings	12 00	11 50
Heavy melting steel	9 00	9 00
Boiler plate	11 75	10 50
Axles, steel	14 50	15 00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	12 50
Shafting	16 50	16 00
Malleable scrap	10 00	11 00
Pipe, wrought iron	10 00	9 00
Stove plate	10 00	10 50
Heavy lead	6 00	6 00
Tea lead	5 00	5 00
Scrap zinc	7 50	8 00
Aluminium	34 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	50
Stove bolts	62½
Plate washers	25
Machine bolts, ⅜ and less	40
Machine bolts, 7-16 and over	30
Blank bolts	30
Bolt ends	30
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$4.85
Structural rivets, as above	4.75
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent.
Sq. & Hex Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	.65
Coupling bolts	net
Planer head bolts, without fillet	.15
Planer head bolts, with fillet	net
Planer head bolt nuts up to 1 in.	.60
Planer head bolt nuts, over 1 in.	.55
Planer bolt washers	list plus 10
Hollow set screws	list plus .20
Collar screws	list plus.20
Thumb screws	.20
Thumb nuts	.75

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$45 00
Open-hearth billets, Pittsburgh	45 00
O.-H. sheet bars, Pittsburgh	47 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3.85	$3.80
Cut nails	3 40	3 40
Miscellaneous wire nails	65%	
Pressed spikes, ⅝ diam., 100 lbs.	$3 90	

MISCELLANEOUS

Solder, guaranteed	0.27½
Solder, strictly	0.25½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	13.95
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	030½
Pure turpentine, single bbls., gal.	0.69
Linseed oil, raw, single bbls.	0.90
Linseed oil, boiled, single bbls.	0.93
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.11
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	55
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	25
3-fluted drills over 1½ in.	15
Bit stock	55
Ratchet drills	15
Machine bits for wood	20
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	30
Sockets	30
Sleeves	50
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks....list plus	30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	4 60	4 50
Canada plates, dull, 52 sheets	4 50	4 50
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 45	6 45
Premier, 10¾ oz.	6 75	6 75

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$19 55	.....
1¼ in.	19 55	.....
1½ in.	19 55	14 00
1¾ in.	25 00	16 50
2 in.	25 00	16 10
2¼ in.	28 50	18 50
2½ in.	32 00	21 00
3 in.	40 00	25 00
3¼ in.	.....	27 00
3½ in.	45 00	29 00
4 in.	50 00	37 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

Ist Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.	
Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.35 to .37
Tin	.55 to .58
Zinc	.20 to 23

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	1.75 to 1.90
Polishing wheels, bullneck.	.90
Emery in kegs, American.	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft..	$12 00	$12 00
Sheets, 3½ lbs. sq. ft...	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14-.18
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute).	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Aug. 19.—Among the more interesting features of the week are the renewed activity in pig iron and the continued buying of shell steel by the belligerent powers. The latter has assumed a more desirable aspect in the eyes of some producers by reason of a substitution clause whereby the original form in which the material was ordered may be changed at the option of the purchaser, the balance being taken in sections such as structural shapes, plates, bars and other non-war purpose forms. Satisfactory crop reports continue to be received from the various grain districts with the usual stimulating result on business conditions generally. Business in machine tools and allied products shows signs of further activity in the future but deliveries which are the chief basis of present business have suffered somewhat as a result of the renewed activity in export business from the States.

Pig Iron

Prices continue firm as a result of increased enquiry for both home and foreign consumption. Any prospects of future advances are the subject of close scrutiny by large consumers, although for the present a small amount of price shading has been done on early deliveries. Pittsburgh prices remain steady at $21.95 for Bessemer, $18.95 for basic. and $19.45 for No. 2 foundry.

Steel

The recent advance in bars to 2.60c Pittsburgh following the placing of extensive contracts for large shells has given considerable impetus to buying both by manufacturers and merchants. Efforts are now being made to place contracts for the remainder of this year and the first half of next but producers are not over anxious to accept even at present prices. Pressure from foreign buyers of shell steel has finally forced producers to get down to business in spite of their desire to accommodate domestic consumers, however dilatory these may have been. Shell steel is now held at 3.75c to 4c per pound Pittsburgh. Structural shapes are quoted 2.50c to 2.60c, soft steel bars 2.50c to 2.60c, hoops 2.75c to 3.00c, bar iron 2.65c to 2.75c, all Pittsburgh. Semi-finished materials are quoted as follows f.o.b. Pittsburgh. Forging billets, $65 to $70; Bessemer billets, $45 to $46; open hearth billets, ditto; Bessemer and open hearth sheet bars being also quoted at this price. The demand for plates and sheets continues strong. Consumption of plates on the Pacific coast continues at a high rate while the efforts of foreign builders to secure supplies on this continent has contributed to the present high export prices obtainable. Shipyards on the eastern seaboard are already negotiating for material, while railroad companies are known to have absorbed large tonnages on rolling stock maintenance.

Tank plates are quoted 3.50c to 4.00c Pittsburgh, a few widths being quoted at 3.00c to 3.25c, with 3.50c for immediate delivery. Up to the present no figure has been mentioned as to the price of sheets for fourth quarter of this year, although some consumers are even now endeavoring to contract for next year shipments. The demand for black, blue annealed and galvanized sheets remains unchanged. Pittsburgh quotes blue annealed, Nos. 9 and 10 (base), 3.00c to 3.25c; Nos. 3 to 8, 2.95c to 3.25c; Nos. 15 and 16, 3.20c to 3.45c. Galvanized sheets, No. 28 (base), 4.25c to 4.50c; Nos. 10 and 11, 3.25c to 3.50c; Nos. 22 and 24, 3.80c to 4.05c. Cold-rolled box annealed, Nos. 9 to 10 (base), 3.00c to 3.25c; Nos. 15 and 16, 3.20c to 3.45c. Tin plate, $6 per 100 lb. The demand for shapes for home consumption is comparatively quiet owing to continued high prices, 2.60c being asked for some shapes at Pittsburgh. Export demand still retains fair proportions.

Metals

Spelter has been an interesting member of the metal markets this week, export and other business having been placed covering business to the end of the year. Much interest attached to the announcement that Great Britain had reached an agreement with Australia whereby the former contracts to purchase 100,000 tons of zinc concentrates and 45,000 tons of spelter annually during the war and for ten years afterward. Something of this nature has been expected for some time in view of the announcement by Australia some time ago that the industry would never be again tainted with German influence. Copper, tin, and lead are quiet and firm, with a slight upward tendency during the week. Antimony has registered a 50 per cent. increase in a few days from the recent low price, largely as a result of the stoppage of sales by importers.

Copper.—Large sales are reported on an active market. No definite information has been obtained regarding the progress of large foreign orders under negotiation, and until this is disclosed the market will remain more or less exitable. London quotes spot standard at £111, futures at £108/10, and electrolytic at £127. New York reports that during the last few weeks home consumers have purchased up to possibly 150,000,000 pounds, despite the fact that large producers were considered to have sold up to the end of the year. Prime lake is quoted at $31, electrolytic $31, and casting $30.

Tin.—The getting of permits for Straits tin continues to be difficult with a corresponding strength showing in Banca tin. Near futures at reasonable prices are obtained with difficulty. Spot tin is steady at $28.25 to $32.75 New York, and £169/5 spot, £170/5 futures, London. Local quotation 43c per lb.

Spelter.—General conditions continue to justify the recent strength shown by spelter. The galvanized sheet trade holds promise of more activity. More than half of Australia's annual output is booked for a term of years, and several large producers report contracts covering from 50 per cent. to 75 per cent. of their output for the balance of the year. Prices are firm at 14c per lb.

Lead.—Increasing strength has been shown during the week. Recent good sales by independent producers have prepared the market for an advance, which was promptly followed by the Trust. Local price 8½c per lb.

Antimony.—Great activity in antimony was a feature of the week, and the recent low level of $10.50 has disappeared in the rapid advance. All of the metal offered is obtained from distant sources, which fact, along the increased demand for ammunition, points to higher prices for some time. The fact that only a few months ago antimony was almost three times its present price shows that a substantial jump is not impossible from the present price of 17c per pound.

Aluminum.—No change is noted in aluminum, present prices remaining firm at $58 to $60 for No. 1 Virgin, $56 to $58 for pure re-melt, and $45 to $47 for No. 12 alloy re-melt. Local price 68c.

Machine Tools and Supplies

Conditions are practically unchanged so far as demand is concerned. Considerable business is promising, but majority of inquiries are not productive of immediate results. Deliveries have suffered somewhat, due to the recent recurrence of activity in certain branches in the States, but with the greatly increased production there, this condition is more or less temporary. Small tools and supplies continue in good demand. No great stock of supplies has been laid up by consumers, and orders are for immediate requirements only and correspondingly urgent.

Scrap

Dealers report very little activity, although prices are fairly well maintained. The renewed strength of pig iron is expected to improve matters, and conditions during the fall should be more satisfactory.

Toronto, Ont., Aug. 22.—The shortage of raw materials particularly, semi-finished steel, will doubtless be the most important result of the heavy new demand for steel. The shortage will be reflected in prices and deliveries of practically all kinds of machinery both small and large. Until recently it was thought that the crest of the upward movement had been reached, but the new developments have changed the aspect of the situation and previous calculations have been upset. In addition, the scarcity of skilled labor will help to further complicate matters which have already reached an acute stage. The combined effect of these two causes will mean a further reduction in output at a time when maximum production is so much desired and in the case of munitions and war supplies, imperative.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

Steel

Although there have been no price changes in this market except in wire nails since the recent new buying movement started in the States, it is very likely that an advance in some steel products may be made in October for the fourth quarter, if not before then. Apart from the demand for steel for munitions, business is above the average for this month and is much better than for the corresponding period last year. Not only has domestic business improved but the steel companies continue to do a large export trade. In addition to its large output of shell steel, the Steel Company of Canada is making arrangements to take care of the increased demand for steel for other purposes. All signs point to a continuance of the present extraordinary activity in the steel trade for a considerable part of 1917. Prices of all steel products continue very firm, the plate situation being particularly strong owing to the heavy demand in the United States for ship and other plates, except car material. The boiler tube situation is unchanged , there being a continued heavy demand in the primary market for merchant and locomotive tubes. Prices of wrought iron pipe are firm and unchanged, particularly black pipe although galvanized material has recovered from its recent weakness.

The situation in the sheet market continues firm and unchanged. The demand for black and blue annealed sheets remains steady although prices are somewhat irregular. An advance of $2.00 per ton on sheet bars has stiffened the market for black sheets and may result in higher prices, as sheet bars are now considerably higher than at the time when black sheets were last advanced. Prices of galvanized sheets are firmer but the demand is comparatively light at the present time and the output of the mills is much below normal.

The greatest activity again characterizes the steel trade in the United States since the new buying movement started. Domestic consumers who have been for some time waiting for price recessions will now have to pay higher instead of lower prices for their steel. As a result of the new demand a more pronounced scarcity of semi-finished steel has developed which will affect the situation to a greater degree than higher prices. Prices of Bessemer billets and open-hearth sheet bars have advanced $2.00 a ton and are now quoted at $45.00 and $47.00 per ton respectively f.o.b. Pittsburg. Steel bars are now quoted at 2.60c; plates 3.50c and shapes 2.50c f.o.b. Pittsburg.

Pig Iron

The pig iron market is marking time and the situation is unchanged. The demand for steel-making grades of pig iron is as insistent as ever, but foundry iron is quiet. Quotations are unchanged.

Machine Tools

The situation in the machine tool market is unchanged, business being almost entirely with munitions plants. A steady demand continues for large swing lathes, while tool maker's equipment is in fair demand. Deliveries are showing some improvement but no price revisions have been made recently although advances are looked for on some lines of machine tools.

Supplies

The demand for machine shop supplies continues brisk with prices very firm, particularly for iron, steel and brass goods. The shortage of raw materials is adversely affecting the situation, causing a scarcity of some supplies. White lead has declined 50c per 100 lbs., and is now quoted at $13.45 per 100 lbs. in ton lots.

Metals

The metal markets have undergone a decided improvement during the week with an upward trend in prices. The stronger tone is a result of heavier demand which is particularly evident in copper and spelter. Business locally has improved and is good considering the time of the year.

Copper.—The large buying of copper for the Allies and enquiries for additional large amounts of metal has resulted in a strong market and higher prices. It has also had the effect of forcing domestic consumers into the market and an important selling movement is now in progress. Sales of copper for delivery during practically the next twelve months have been made and indications point to a high level of prices for that period. Copper has advanced ½ cent locally and is now quoted at 29½ cents per pound .

Tin.—An improved undertone in the tin market due to heavier demand has had the effect of advancing prices. Tin is now quoted at 44c per pound.

Spelter.—The recent declines in spelter would appear to have stimulated business as the demand has considerably improved during the week. Galvanizers are buying more spelter and brass mills are taking more metal. Local quotations are higher at 14c per pound.

Lead.—The position of lead is strong and the price has advanced, the Trust now quoting 6.25c, New York with independents at the same level. The market at present is rather slow but a much improved demand is anticipated. Lead is now quoted at 8½c per pound.

Antimony.—The demand is active with the market higher and excited. The price has advanced and indications point to still higher prices. Antimony has advanced 1c and is quoted locally at 17c per pound.

Aluminum.—The market is quiet but firm with quotations unchanged at 68c per pound.

Solder.—Quotations are firmer but unchanged. Guaranteed is quoted at 27½c and strictly at 25½c per pound.

Trade Gossip

Quebec Bridge.—It is expected that between September 14 and 16 the great centre span of the Quebec Bridge will be floated into position. This will pave the way for the opening of the structure early next year.

Paper Industry Develops.—It has been stated on good authority that there are in course of erection in the Dominion of Canada paper mills and increased machinery sufficient to make at least 750 tons a day of extra product.

Flaws In Steel Rails.—President A. H. Smith, of the New York Central, has announced that Dr. Plimmon H. Dudley, head of the railroad staff of scientists, has discovered the cause and an absolute remedy for hidden flaws in steel rails

The Jenckes Machine Co., of Sherbrooke, Que., have been awarded contracts for steel and cast iron columns by the Canadian Cotton Mills for a factory extension, and by the Sherbrooke Railway & Power Co. for a transformer station.

The Tivani Steel Co., Belleville, Ont., which has been experimenting for some time on an electric smelting process for the direct reduction of refractory ores, is now about to engage on a commercial scale in the manufacture of high-speed molybdenum steel. A three-phase electric furnace is used.

The Standard Ideal Co. plant, Port Hope, Ont., has been sold to L. M. Wood, of Toronto, president of the Standard Chemical Co. of Toronto, and associates, among whom are W. D. Ross, financier. The new company will take possession at once, and will carry on the present line of business. It is understood that the name of the concern will be changed to the Port Hope Sanitary Mfg. Co.

French Steel Output.—Steel production in France during the second year of the war was double that of the first year, it was shown by statistics submitted at a general meeting of the French Steel Association recently. Eighty per cent. of the pig iron and 70 per cent. of the steel prior to the war was produced in the part of France now invaded.

The Manitoba Steel Foundries, McArthur Building, Winnipeg, states that its new foundry is nearing completion, and that one furnace will probably be in operation September 1. The company will make electric steel, both in the form of castings and ingots for rolling, and when in full operation will have an annual capacity of 8,000 to 10,000 tons. A. M. Tirbutt is secretary and treasurer.

Copper Output Up to 50 Per Cent.—Twenty leading copper companies operating in the United States, Canada and South America produced approximately 895,000,000 pounds of copper in the first half of 1916, an increase of 299,000,000 pounds, or 50 per cent., over the corresponding period of last year. Of these, the Anaconda made the largest individual increase—52,300,000 pounds more than a year ago.

Thanks Canadian Firm.—The official Press Bureau, London, England, recently gave out this statement: The Canadian Cartridge Co., at Hamilton, Ont., having completed a large contract for cartridge cases, handed the Imperial Munitions Board of Canada $758.248, this sum being the difference between the contract price and the cost of the materials and the manufacture. Minister of Munitions Montague thanked the company for its patriotism.

Sulphuric Acid Plant.—The new sulphuric acid plant of the Consolidated Mining & Smelting Co., at Trail, B.C., is now in operation, being the only plant of its kind in B.C. The acid is recovered from the sulphur fumes from the furnaces, previously allowed to go to waste. The output is about ten tons daily, of which five tons is required for use in the company's own works, the balance being readily sold on the market, which at the present time is poorly supplied, prices having risen considerably since the war.

Windsor, Ont.—Charles A. Bradley, manager of the Windsor branch of Remington Arms Co., is authority for the statement that negotiations are in progress for the sale of the company's Windsor property to a syndicate composed of New York capitalists. Mr. Bradley said that a change in the policy made by the Remington parent company intended to centralize the business at Bridgeport, Conn., is the reason why the Windsor plant is on the market. Since the Remington firm located here four years ago more than $40,000 has been spent in additions to the factory. Over 150 men and girls are employed.

Australian Spelter Contracts.—It is reported from London that an agreement has been reached between Great Britain and Australia, under which Great Britain contracts to purchase 100,000 tons of zinc concentrates, and 45,000 tons of spelter annually from Australia during the period of war, and for ten years afterwards. The effect of the agreement will be to ensure the transfer of the smelting industry from Germany to British hands. The amount exceeds $25,000,000, covering more than half of Australia's annual report output. The remainder of the output is expected to be taken over by France and Belgium.

Safety of Explosive Plants.—It is announced from Ottawa that an Order-in-Council, under the War Measures Act, 1914, in order to make greater provision for safety in explosives factories, provides that every person who takes or attempts to take or assists in taking any matches into any explosives factory or into any building, enclosure or place wherein the manufacture of explosives is being carried on, or has matches in his possession while in any such factory, building, enclosure or place, is liable to a fine not exceeding $100 or to imprisonment for any term not exceeding six months, or to both fine and imprisonment.

Tungsten in B.C.—Considerable interest attaches to a discovery of tungsten ore on the Mud Creek claims of Wm. Thompson and Barney Halloran and while the amount of this valuable mineral is not yet sufficient to warrant working the property for the tungsten values alone, the fact that this mineral exists has added a new incentive to prospecting and mine development in this district. Advices from the Mines Department at Ottawa are to the effect that tungsten ore carrying 60 to 65 per cent. of the mineral is worth $4500 per ton, and that the ore may be marketed through the Canadian Munitions Resources Commission.

Australian Parliament Bldgs.—Canadian architects are to be given the opportunity of competing for the furnishing of plans for the construction of the new Australian Parliament buildings. Their construction was planned before the war, but was allowed to lapse at the outbreak of hostilities. The following cablegram, however, has been received by the Prime Minister from the Acting Premier of Australia: "With reference to my telegram of September 25, 1914, in the matter of both Houses of Parliament, the architectural competition for the Federal Capitol, issued 1914, has been resumed. Designs are receivable to January 31, 1917. Would appreciate publication."

Tinplate Industry to be Revolutionized.—It is reported from Cardiff, Wales that the tinplate industry is about to undergo a revolutionizing process owing to the introduction of a new method of tinning and preparing plates for tinning, according to an announcement made by the Mellingriffith Tinplate Works in South Wales. The process now said to be in successful operation dispenses with the necessity of white pickling, and the white annealed plates, after being separated, are, without handling, taken up by machinery and picked, washed, turned, cleaned and piled. It is asserted that the new method increases the production of tinplates in the proportion of more than two to one as compared with the ordinary process.

Government Sells C.G.S. Montmagny.—The Canadian Government steamer Montmagny, which has been beneath the waters of the St. Lawrence, near the Island of Orleans, for almost a year, has been sold by public tender to the St. Charles Navigation Co., of Quebec, for $25,000. The vessel originally cost over $100,000. A contract was some time ago given to the Levis Wrecking Co. to raise the Montmagny, but they were unsuccessful.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC
H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA
D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES
E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA
J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA
Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE
Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN
G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND
Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA
L. D. Wilgress, Omsk, Siberia .
C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Ploschad 9, Petrograd.

NEWFOUNDLAND
W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND
W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA
W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM
N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.
J. E. Ray, Central House, Birmingham. Cable address, Canadian.
J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.
F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.
J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.
Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES
Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.
R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN
C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM
W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Sarnia, Ont.—The Sarnia Gas Co. is making considerable extensions to its gas mains.

Chatham, Ont.—The directors of the Gray-Dort Motor Co. have decided to extend their plant here.

Toronto, Ont.—The Bawden Machine Co., will build a two storey addition to their factory at a cost of $2,000.

Niagara Falls, Ont.—The Pollard Mfg., Co., will shortly begin the construction of a foundry to cost about $40,000.

Toronto, Ont.—John T. Hepburn, Ltd., 18 Van Horne street, will erect a one-storey frame galvanized iron addition to machine shop at a cost of $3,000.

Niagara Falls, Ont.—Plans have been prepared for the erection of a $200,000 addition to the Lincoln Paper Mills at Merritton. The addition will consist of a sulphite plant.

Hamilton, Ont.——The Brown-Boggs Co. has awarded a contract for the rebuilding of their plant to H. G. Christman & Co., of Hamilton. The cost will be about $15,000.

Joliette, Que.—The Joliette Steel Co., whose head office is in Montreal, is in the market for a new or second-hand three to five-ton suspension scale for weighing steel castings.

Port Arthur, Ont.—The Canadian Northern Railway will shortly proceed with the construction of a machine shop here. The general contract has been let to J. Brown of Winnipeg.

Toronto, Ont.—The Toronto Suburban Electric Railway are installing a new generator supplied by the Canadian Westinghouse Co., of Hamilton, in the power house on the Weston Road.

Port Colborne, Ont.—It is understood that the International Nickel Co. will establish a nickel refining plant here. Options have been secured on a site and other preliminary work has been started.

Cornwall, Ont.—Additional machinery, will be installed by the Toronto Paper Mfg. Co., which will bring the capacity of the plant up to 30 tons per day. R. S. Waldie is president and W. Wallace is manager.

Toronto, Ont.—The Canadian Hanson and Van Winkle Co., will build an extension to their foundry to cost $7,000.

Ottawa, Ont.—The construction of a civic workshop is contemplated by the City Council. A. F. Macallum is city engineer.

Goderich, Ont.—The Doty Foundry, which has been closed for some time past, will in the near future be reopened, and everything will again be in full swing. An arrangement has been reached by W. J. Thorold and the local Town Council, and the former will continue the operation of the plant.

Kingston, Ont.—Lewis F. Houpt, of Buffalo, has purchased the Thomson paper mills at Newburgh, and has organized a company. He is having the building repaired and machinery installed. The concern will manufacture all high-grade bond papers. Mr. Houpt is now president of the George Irish Paper Co., Buffalo, and the Monarch Paper Co., Toronto.

Toronto, Ont.—The William Davies Co. have had plans prepared for the erection of three buildings of flat slab concrete construction on Front Street east. The company will erect an abattoir and tank house, five and three storeys respectively, to cost $60,000; a cold storage building, six storeys, to cost $100,000, and stock pens, seven storeys, to cost $40,000. The total expenditure on the buildings will be $200,000.

Toronto, Ont.—The British-Canadian Refining Co. have been granted a lease by the Ontario Government for the development of power on the Wahnapitae River, to be used in connection with their proposed smelting works near Sudbury. The Hon. G. Howard Ferguson, who made the announcement recently, declared that four or five million dollars

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department is able to present the following list of the moreimportant British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL
Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE
Valparaiso, British Consul General.

COLOMBIA
Bagota, British Consul General.

ECUADOR
Quito, British Consul General.

EGYPT
Alexandria, British Consul General.

FRANCE
Havre, British Consul General.
Marseilles, British Consul General.

INDIA
Calcutta, Director General of Commercial Intelligence.

ITALY
Genoa, British Consul General.
Milan, British Consul.

MEXICO
Mexico, British Consul General.

NETHERLANDS
Amsterdam, British Consul.

PANAMA
Colon, British Consul.
Panama, British Vice-Consul.

PERU
Lima, British Vice-Consul.

PORTUGAL
Lisbon, British Consul.

RUSSIA
Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

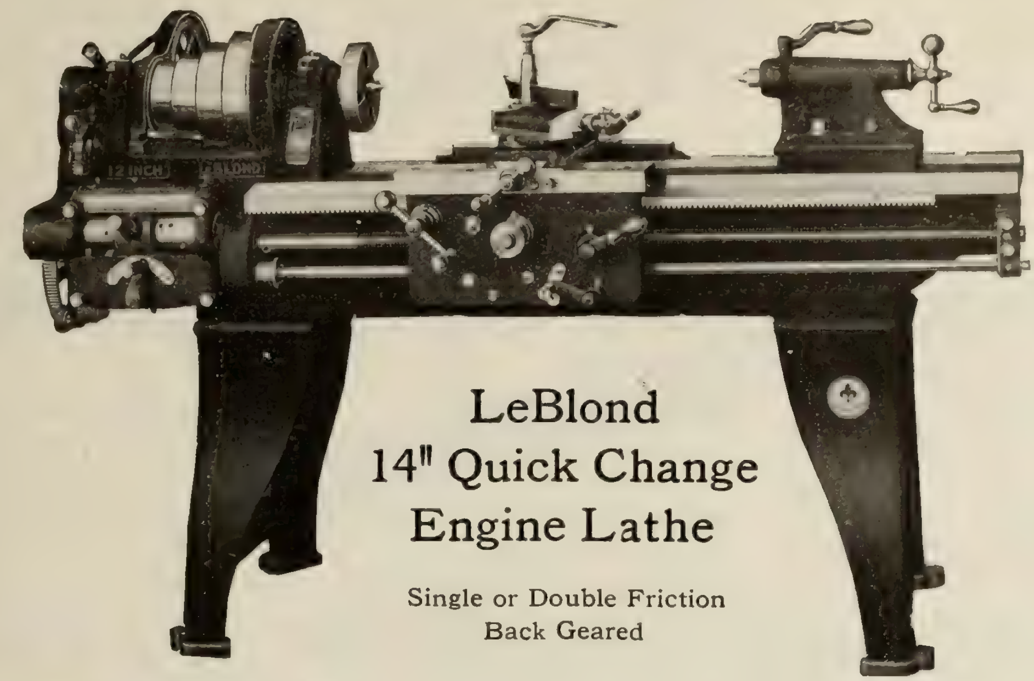
SPAIN
Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN
Stockholm, British Consul.

SWITZERLAND
Geneva, British Consul.

URUGUAY
Monte Video, British Vice-Consul.

VENEZUELA
Caracas, British Vice-Consul.



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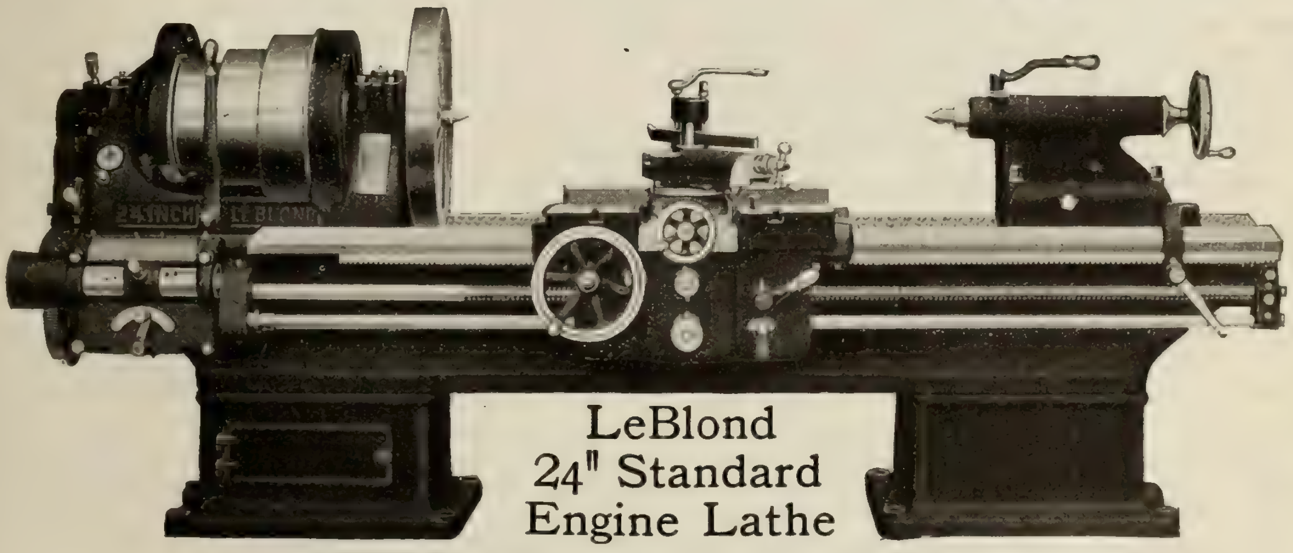
Back Geared



LeBlond 24" Standard Engine Lathe

Single or Double Friction Back Geared

LeBlond 14-in. Q.C. Engine Lathe as the keystone of your tool-room equipment will at once stamp that department as "efficient." It has a 4-step cone for a 2-in. belt and graduates from 4¾-in. to 10¾-in. dia., compound rest, follow rest, steady rest, swings over shears 15¼-in., swings over carriage 9½-in., distance between centres 3-ft., weight 1725 lbs. By these few specifications and a study of the upper illustration you will see that for quality, strength, rigidity and efficiency this machine would fit exactly into your requirements.

Send for full particulars and specifications.

The LeBlond 24-in. Standard Engine Lathe stands pre-eminent among the many general purpose lathes manufactured, in quality, workmanship and general design. A glance at the illustration will at once impress this on you. It swings over shears 24½-in., swings over carriage 16-in., distance between centres 5-ft., 3-step cone 4-in. x 10-in., 12¼-in.—14½-in. dia., hole in sp. 1½-in., comp., steady and follow rests, weight 5700 lbs. It's a thoroughbred, a mere glance at the illustration will tell you that. But looks are not everything, if you will write us we will give you such specifications and particulars that will convince you of its undoubted leadership quality.

THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED
TORONTO CANADA

will be invested in the property, but he is not ready yet to announce the terms of the lease.

Dundas, Ont.—The John Bertram & Sons Co. is calling tenders for the erection of a pattern shop.

Montreal, Que.—William Hood & Son, 10 Richmond Square, are in the market for a 10 to 15-h.p. electric motor, a heavy Bliss trimming or punching press, a power hack saw, and a 2,000-pound drop forge hammer.

Municipal

Nokomis, Sask.—It is proposed to install an electric light and power plant here.

Almonte, Ont.—The Town Council will build a Hydro-Electric plant to cost $18,000.

Halifax, N.S.—The City Council contemplate the construction of an abattoir at an approximate cost of $25,000.

London, Ont.—An extension is being made to the sewage disposal plant at an estimate cost of $40,000, The engineers are Chipman & Power, Mail Building, Toronto.

Richmond Hill, Ont.—The Village Council contemplate installing a waterworks system at a cost estimated at $30,000. James, Loudon and Hertzberg of Toronto are the engineers.

Montreal, Que.—City engineer Mercier has recommended the purchase of ten auto-flushers for the road department. These machines cost about $9,000 each.

Dunnville, Ont.—The Town Council will submit a by-law to the ratepayers for authority to borrow $53,000 for the purpose of installing Hydro-electric light and power, and to buy out the plant of the existing light company.

Lethbridge, Alta. — The following tenders have been submitted for the proposed filtration plant; New York Continental Jewell Filtration Co., of New York, $92,000; Roberts Filter Manufacturing Co., Darby, Pa., $95,000: Western Canada Foundry & Supply Co., $111,857.

North Bay, Ont.—A by-law will be submitted to the citizens in the course of a few weeks to guarantee the bonds of the Queen Hat Mfg. Co. of Toronto, and give a free site. The company will locate at North Bay if the by-law passes. The town secures a first mortgage on machinery.

Toronto, Ont.—The railway viaduct on the Esplanade may be delayed until after the war on account of the financial situation, but the Union Station will be completed. The city is financially interested in the construction of the viaduct, and it, as well as the railways, will find it difficult to finance large undertakings for some time.

General Industrial

Hamilton, Ont.—The Mercury Mills, Ltd., are building a factory here.

Ottawa, Ont.—The National Mfg., will build an extension to their factory to cost about $4,000.

Toronto, Ont.—The Willard Co., contemplate building an extension to their chocolate factory.

Burford, Ont.—The Canadian Milk Products Co., Toronto, propose erecting a factory here to cost about $100,000.

Toronto, Ont.—The William Wrigley Co., will build a large addition to their chewing gum factory on Carlow Ave.

Toronto, Ont.—Adams Brothers' Harness Mfg. Co. will erect a factory on King Street West. Estimated cost, $75,000.

Pembroke, Ont.—Damage to the extent of $10,000 was done by fire in the factory of the Pembroke Woollen Mills Co. on August 15.

London, Ont.—Plans are being prepared for an addition to a factory for J. R. Shuttleworth, hat manufacturers, Estimated cost, $10,000.

London, Ont.—plans are being prepared for an addition to the premises of the Canada Cereal Mills Co. Estimated cost, $10,000. Manager, J. A. Barnard.

Sarnia, Ont.—William P. Fitzsimons, Commissioner of Industries for the Grand Trunk, has notified A. G. Laschinger, at Point Edward, that for the present no action will be taken on the part of the dye industry to locate in Western Ontario. Negotiations, however, will be renewed at a later date, when it is hoped to make final plans for the locating of the plant at this point.

Electrical

Renfrew, Ont.—A Hydro-Electric by-law will be submitted to the ratepayers on September 2.

Dutton, Ont.—A proposal is under way for the extension of the hydro line from Dutton to Wallacetown.

Dunnville, Ont.—The Dunnville Electric Light Co. have offered to sell out their plant to the Hydro for $30,000.

Contracts Awarded

St. John, N.B.—Fire on August 11 damaged the Consumers' Sack Co.'s factory to the extent of $7,000, which is covered by insurance.

Brockville, Ont.—T. J. Davidson has received the contract for the erection of a large addition to the premises of the Canadian Briscoe Motor Car Co.

Oshawa, Ont.—J. D. Young & Son, Toronto, has received the general contract for three buildings for the Chevrolet Motor Co. of Canada, at Oshawa, Ont.

Walkerville, Ont. — The Canadian Bridge Co. has been awarded the contract for the steel girder bridge over the Nelson River at Kettle Rapids, Man., for the Hudson Bay Railway, at a cost of $325,000.

Toronto, Ont.—The Board of Control has granted contracts for seven motor fire appliances, valued at $46,103. Hugh Cameron & Co. got the contract for the tractor at $5900 and also the contract for the ladder and truck at $8500. The contract for the combination salvage and chemical wagon was awarded to the Dominion Automobile Co. at $4750. The Cameron concern also got the business for one commercial truck at $4200 and a portion of the chemical wagon order.

Personal

Sir George Foster, Minister of Trade and Commerce, has arrived at Montreal, having returned from England on the steamship Missanabie.

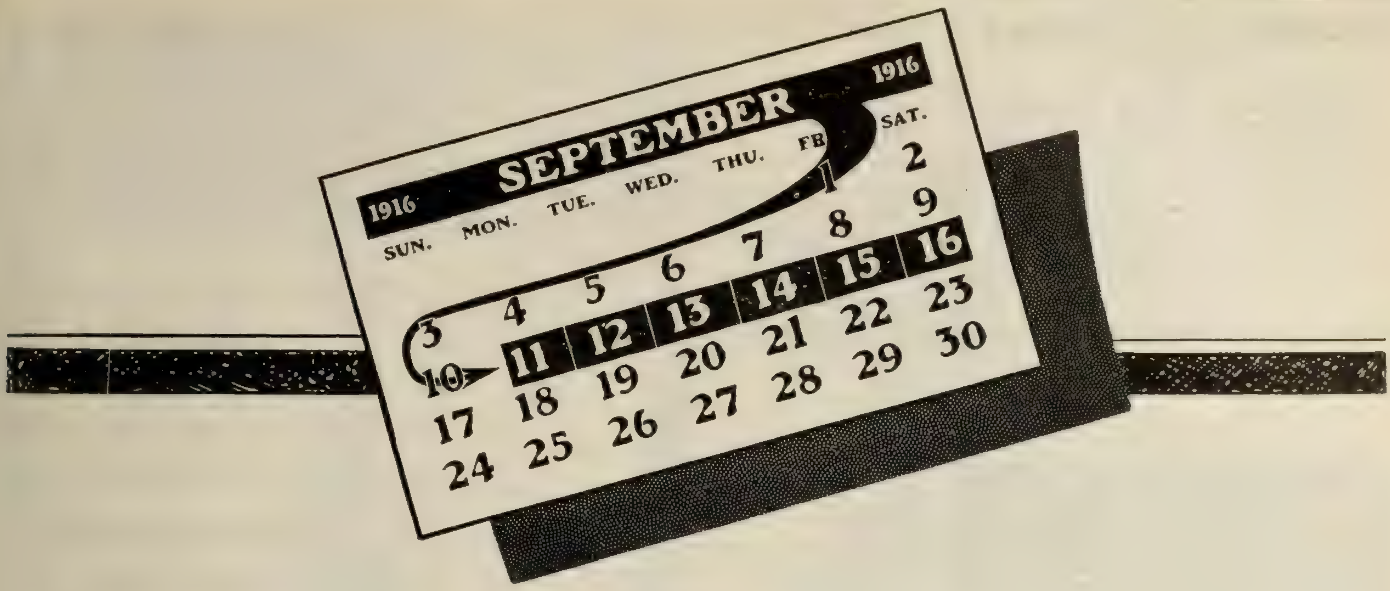
C. W. Knighton, general manager of the Canadian Hart Accumulator Co., of St. Johns, P.Q., has opened an office at 701 Merchants Bank Building, Winnipeg.

A. C. Towne has resigned his position with the Canadian Johns-Manville Co., Montreal, to take charge of the engineering department of the Electrical Equipment Co., Montreal .

Tenders

Toronto, Ont.—Tenders will be received up to August 29, for the supply and delivery of 36-inch cast iron special castings. Specifications may be obtained at the Works Department, Room 12, City Hall.

Toronto, Ont.—Tenders for extension to Duncan Street sub-station and addressed to Chairman, Toronto Electric Commissioners, will be received until August 30. Plans, specifications and form of tender may be obtained at the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engineering offices, corner Duncan and Nelson Streets.

Tweed, Ont.—Tenders will be received by the secretary-treasurer, High School Board, up to August 30, in whole or part, for the erection and completion of a high school building. Plans and specifications can be seen and all particulars procured at the architects' or secretary's offices. Ellis & Ellis, architects, Manning Chambers, Toronto; C. W. Huyck, secretary-treasurer, High School Board, Tweed

Marine

C. S. L. New Freighter.—Announcement is made in Detroit, Mich., that a new six hundred foot steamer being brought out for the Canada Steamship Lines, at the Superior yard of the American Shipbuilding Co., will be named after Sir Trevor Dawson, managing director of Vicker's, London. The boat is expected to go into commission some time next month.

Vancouver Harbor Dues.—Vessels using Vancouver harbor are to pay a tax of three cents a registered ton on and after August 1, according to notice from Ottawa. The harbor commissioners had this clause in their original by-laws together with other tariffs and license fees. Owing to the strong opposition engendered the tax was suspended during the war, but now the commissioners have succeeded in getting an Order-in-Council through for the imposition of the three cents tonnage tax. However, all the other tariffs and licenses are cancelled and the three cents tax is the only one. Ships will not be required to pay on more than five entries in a year. Shipping men do not regard the tax as excessive.

S. S. Saronic Total Loss.—Manager Gildersleeve, of the Northern Navigatiin Co., received that the wooden steamer Saronic had burned to the water's edge on the shore of Cockburn Island, Georgian Bay, where she was beached by her skipper, Capt. J. D. Montgomery, when she broke into flames amidships on Lake Huron early Sunday Morning. The crew of 21 men landed on this bleak shore in lifeboats, and made their way to Thessalon, where they were provided for. The Saronic was built at Sarnia in 1882, and was 252 feet in length. She was formerly the United Empire, and was in the passenger service until the 1914 season. On the present trip she was taking a cargo of grain to Port Nichol. She had no wireless, which caused the late report of the accident.

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PORTABLE PLANERS
DRAW CUT SHAPERS
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THE WALLACE BARNES COMPANY
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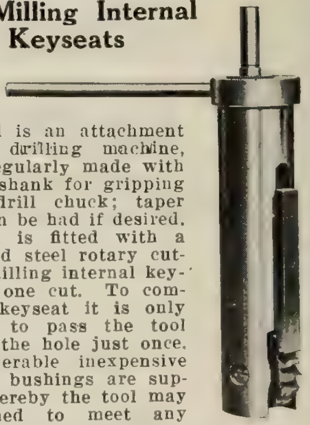

This tool is an attachment for the drilling machine, and is regularly made with straight shank for gripping in the drill chuck; taper shank can be had if desired. The tool is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. To complete a keyseat it is only required to pass the tool through the hole just once. Innumerable inexpensive eccentric bushings are supplied whereby the tool may be bushed to meet any diameter above its own.
Write for Catalog C for full detail.

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for all purposes, accumulators, pumps, high pressure valves and fittings, forcing presses, wheel presses, belting presses, metal drawing presses.

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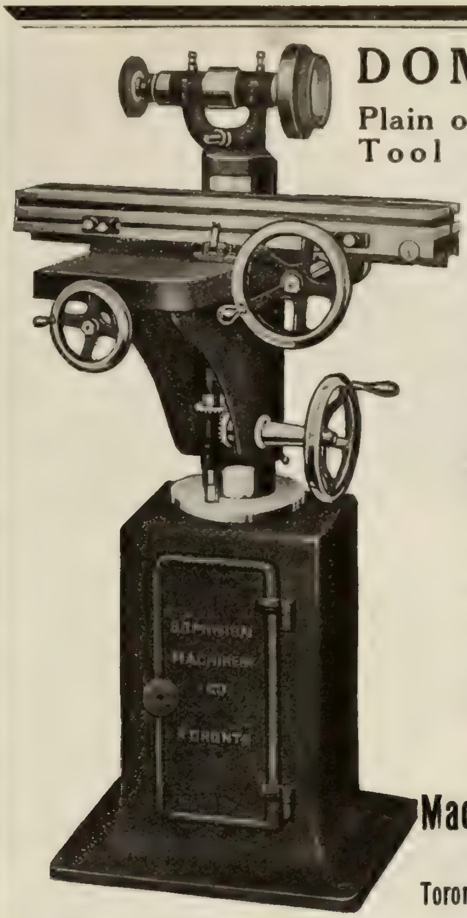

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With or without full Universal equipment.

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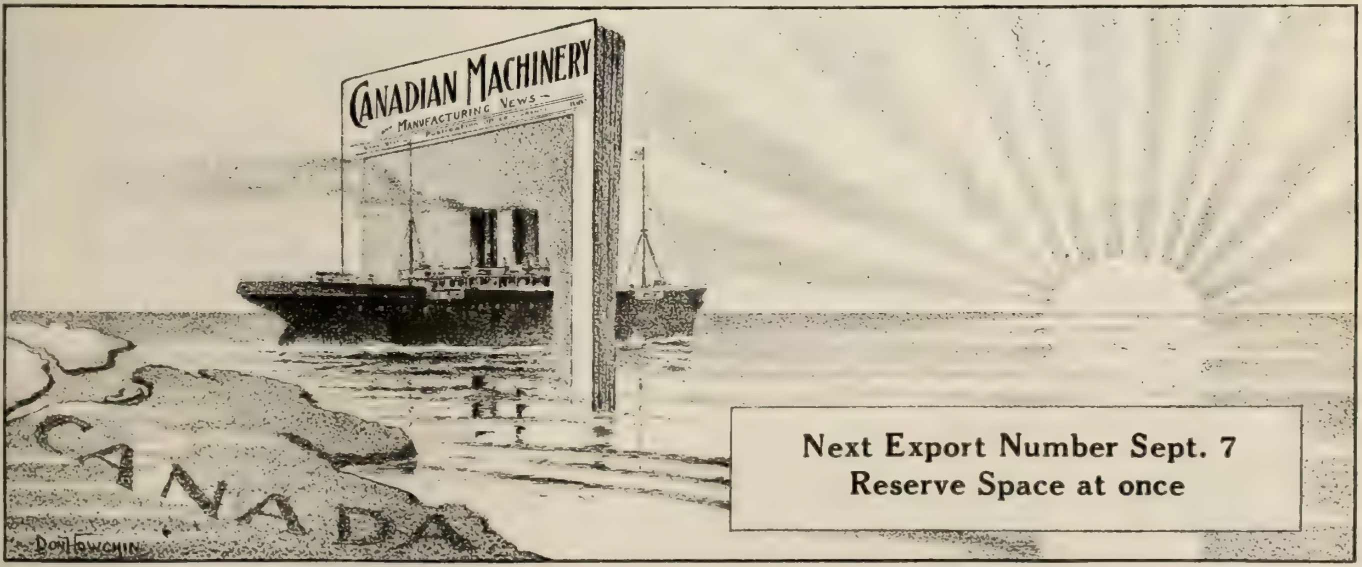

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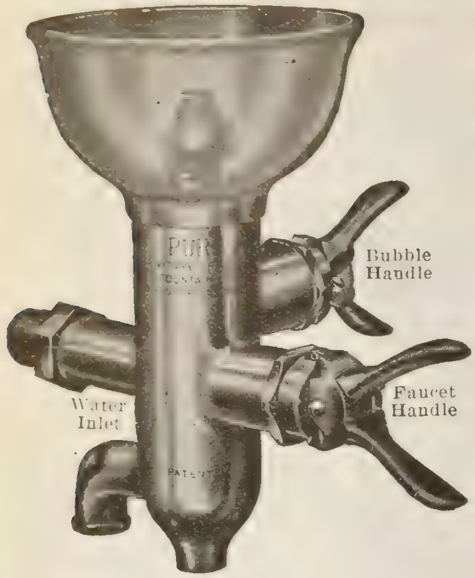

Saving or Wasting?

The manner in which you handle the drinking water problem in your plant may seem to be a small matter to you —but investigate. The results will be surprising.

The old-time faucet is costly. Running hour after hour, day after day, its ceaseless flow is costing you money, yet without any better service.

Puro Saves 35%

A Puro Sanitary Drinking Fountain will cut that water bill 35%. We can prove that it has done that for others.

It will give every employee a safe, saner draught of bubbling water free from the contamination of the common drinking cup.

In a word, it is the only sanitary Drinking Fountain that is really safe, sanitary, simple, automatic in control, and easy to attach.

"PURO -FY"
(MADE IN CANADA)
YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

Stampings and Metal Specialties

We have the plant and equipment for turning out stampings of the highest quality in brass, copper, aluminum, tin and steel, and are prepared to undertake the manufacture of metal specialties of any description.

PUNCHES, DIES, TOOLS.

COLEMAN FARE BOX COMPANY, LTD.
70 Bond St., Toronto

Railways—Bridges

Montreal, Que.—Blazing wreckage from two freight trains which collided on the C. P. R. line here fired the bridge carrying Notre Dame street and the tramway rails on Monday. The bridge was destroyed. Thirty-three freight cars were also burned up.

Vancouver, B.C. — Application has been made to Building Inspector McKenzie by the C.N.R. for a building permit for the erection of the main portion of its railway depot on the reclaimed lands of False Creek. The permit will be issued for $574,929. It does not include station platforms or butterfly sheds or freight sheds. The building will be 320 ft. by 105 ft. It will be ventilated by fans, and will be steamheated. There will be one passenger elevator and an ash hoist. The contractors for the erection of the building are the Northern Construction Co., and the Carter-Hall-Aldinger Co., Pratt & Ross of Winnipeg are the architects.

New Incorporations

James, Loudon & Hertzberg, Limited, have been incorporated at Toronto with a capital of $20,000 to carry on business as consulting engineers at Toronto.

The International Metal Co., has been granted an Ontario Provincial License to develop mineral deposits etc. The capital stock of the company is $20,000 and the attorney is James Aylesworth of Toronto.

Leaside Munitions Co., has been licensed at Toronto with a capital of $250,000 to carry on business in the Province of Ontario, with head office at Toronto, George C. Loveys of Toronto is the attorney.

The Boss Lock Nut Co., of Canada, has been incorporated at Ottawa with a capital of $50,000 to manufacture all kinds of nuts, bolts and other mechanical appliances at Montreal. The incorporation are F. G. Bush, G. R. Drennan and H. W. Jackson all of Montreal.

The Overseas Export Co., of Canada, has been incorporated at Ottawa with a capital of $100,000 to import, export and manufacture all kinds of goods, wares and merchandise. Head office is at Montreal and the incorporators are H. J. Elliott, J. S. Lamarre and S. F. Innes, all of Montreal.

The Lincoln Electric Co., Of Canada, has been incorporated at Toronto with a capital of $40,000 to take over the business of the Lincoln Electric Co., of

PATENT ATTORNEYS

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PATENTS—TRADE MARK—DESIGNS
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Book "Patent Protection"—free. Master of Patent Laws. Formerly Patent Office Examiner.
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Patent Solicitors. Head Office, Royal Bank Bldg., Toronto. Ottawa Office, 5 Elgin St. Send for our Plain Practical Pointers. Copy of National Progress, in which our patents are advertised, mailed free.

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In all countries. Ask for our Inventor's Adviser, which will be sent free.
MARION & MARION, 364 University St
Merchants Bank Building, corner St. Catherine St., MONTREAL, Phone Up. 6474 and Washington, D.C., U.S.A.

METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS
372 Pape Avenue, Toronto, Can.

Toronto manufacturers of electric motors, etc. Provisional directors are George Hunt and L. Gordon McAndless of Toronto.

The Canadian Chicago Bridge & Iron Co., has been incorporated at Ottawa with a capital of $100,000 to manufacture tanks, standpipes, bridges and all kinds of construction work at Bridgeburg, Ont. Incorporators, George T. Horton, R. H. Murray and H. B. Horton all of Chicago, Ill., and C. C. Gregory of Bridgeburg, Ont.

Building Notes

Toronto, Ont.—The Canadian Bag Co. has taken out a permit for the erection on the north side of Paton road, of a two-storey brick factory to cost $40,000.

Toronto, Ont.—The City Architect has issued a building permit to the T. Eaton Co., to erect a one-storey brick factory on the south side of Bloor street, near Dufferin street, to cost $12,000.

Toronto, Ont.—The City Architect has granted a building permit to Northop and Lyman Co., Richmond street west, to erect a four-storey brick factory and warehouse at 66 Wellington street west, at a cost of $59,000.

The Pas, Man.—Tenders for the new courthouse to be erected here have been opened by Hon. Thos. Johnson, Minister of Public Works. Six bids had been sent in. The A. W. Cassidy Co., of The Pas, submitted the figure $37,500; Smith Bros. & Wilson, of Regina, tendered at $27,900 if common brick is used, and $9,000 more if Sydney pressed brick is the chosen material. Snyder Bros. will do the work for $35,879, using pressed brick. Sam Brown tendered at $41,036, and E. E. Snyder & Co. at $43,500. The Northern Plumbing Co. submitted a plumbing and heating bid of $8,417. The contract will likely be awarded in the near future.

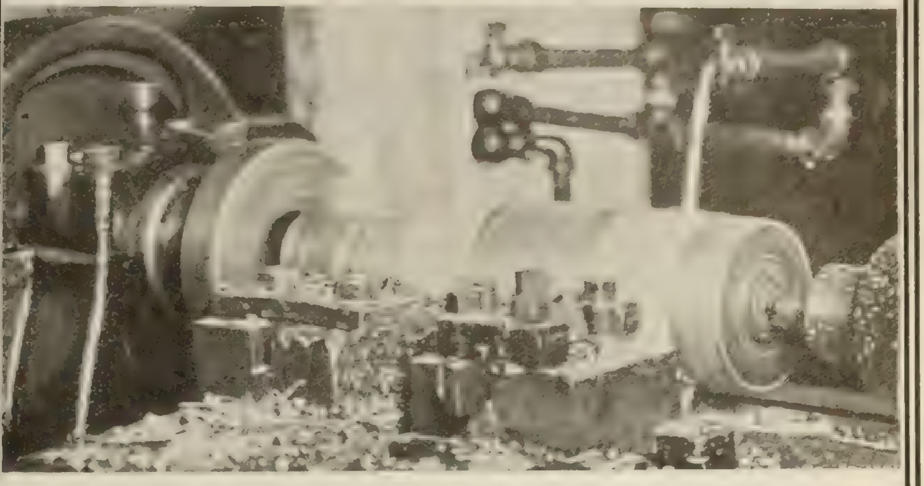
Wood-Working

Deseronto, Ont.—The Dominion Hardwood Co., contemplated rebuilding their factory which was destroyed by fire.

Catalogue

Grinding and Polishing Machinery.—Bulletin No. 11 illustrates and describes an interesting line of grinding and polishing machinery made by the Gray Mfg. & Machine Co., Toronto. A specification is included covering each type of machine, while other matter deals briefly with foundry equipment.

ECONOMIC WATER OIL



SHELL MANUFACTURERS use Economic Water Oil for Metal Cutting of every description, because it will not gum nor rust, and it Saves Time and Labor, and **BECAUSE One Gallon** of Economic Water Oil will readily mix with **30 to 50** gallons of Water, making a thick, creamy emulsion, giving you a cutting mixture which will not only be **satisfactory**, but will produce very **economic results. One TRIAL ORDER Will PROVE Our STATEMENT. MADE IN CANADA.**

Canadian Economic Lubricant Co., Ltd., 1040-1042 Durocher St., Montreal

FOR INTERNAL

Shell Grinding

Motor Shaft Combination

On Pedestal or Suspended Type
All Standard Currents
Capacity up to 4 x 1" wheel

$75.00 Complete

Stow Manufacturing Co.
Binghamton, N.Y., U.S.A.

IMMEDIATE SHIPMENT

STOW TOOLS ARE AN INVESTMENT AND NOT AN EXPENSE (8)

You Sell Something to Somebody

AND to that somebody you must make known — by advertising — what you sell, why it is good, and so on. Also, you must have a medium—a publication read by your customers or should-be customers.

All this you consent to without demur. What may perplex you a little is the **Medium** to employ.

This should not be a puzzle if your product or commodity is one purchased by the general public, and if your constituency of buyers is found everywhere in Canada.

The one medium of quality and of national circulation is

MACLEAN'S MAGAZINE

You can find no substitute for it at a lower cost, and none that will carry your proposals or announcement with greater acceptability.

The conclusion is plain.

N.B. Objectionable advertising not accepted. Both editorial and advertising columns are closely censored to keep them clean and decent.

Published by
The MacLean Publishing Co., Limited, 143-153 University Ave., Toronto

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Five cents each insertion when box number is required. Each figure counts as one word. Display rates on application.

FOR SALE

HORIZONTAL GAS ENGINE 25 H.P. IN SERVICE at present time, $375.00 cash. Write Penberthy Injector Co., Limited, Windsor, Ontario. (5)

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

A SNAP IN TURRET LATHES SLIGHTLY used on shell work. Fourteen splendid machines at bargain prices. Do you need these machines? If so, drop a line to Box 953, Woodstock, Ont.

LATHE FOR SALE—ONE 39 x 17-FOOT Pond engine lathe, suitable for heavy shells; in good condition; $1,500.00. A. B. Ormsby Company, Limited, Toronto. (2)

A BARGAIN FOR QUICK SALE—30 H.P. 10 x 14 engine; guaranteed in first-class working condition; drive belt included. Hamilton Whip Co., Hamilton.

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make. used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

DROP PRESS FOR SALE—NO. 9 MINER & Peck drop press; anvil 2,000 lbs.; base 30,000 lbs.; 36" between uprights; 40" x 35" between poppets; 34" x 29" top of anvil; guaranteed as good as new. Can be shown in operation to any genuine prospective buyer. The Metallic Roofing Co., Limited, Toronto. (4)

MACHINE SHOP WITH MODERN EQUIPMENT manufacturing a good staple line; orders for months ahead; will bear the fullest investigation; satisfactory reason for selling. Box 220, Canadian Machinery.

For Sale Cheap

- 1—Box Girder Type Overhead Hand Power Crane, 48′ 6″ span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.
- 1—12″ Single "I" Beam Overhead Hand Power Crane, 30′ 10″ span, 3 tons capacity; complete, less the Hoist.
- 1—10″ Single "I" Beam Overhead Hand Power Crane, 23′ 0″ span, 2 tons capacity; complete, less the Hoist.
- 1—Brantford (Gas) Bake Oven and 4 Racks.
- 1—Linderman 2 Spindle Boring Machine.
- 1—24″ Drill, Bertram Company.
- 1—20″ Drill, London Machine Tool Company.
- 1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

M. BEATTY & SONS,
Limited
Welland, Ont.

FOR SALE

Fox Monitor Lathe, 18" x 5' 6", 9-hole turret, cross feed, hollow spindle, 5-step cone; good as new. Plating dynamo, 6 volts, 250 amp.; used only a short time.

PENDRITH MACHINERY COMPANY
970 Queen St. West, Toronto

FOR SALE—ONE 16" X 8' HENDEY LATHE, with taper attachment, $1,100.00; one 22" x 10' Blaisdell lathe, with taper attachment, $1,200.00; one 24" Gould & Eberhardt shaper, $800.00. The above machines are in first-class condition. For particulars apply Box 221, Canadian Machinery.

FOR SALE—ONE DAVIS 4½" CUTTING-OFF machine; practically new; been used less than three months; very reasonable. Canadian Linderman Co., Ltd., Woodstock, Ont. (tf)

12-INCH HEAVY DUTY (CANADIAN CORporation) moulder; just used six months; also band saw, shaper, buzz planer, used two years. Apply W. A. Rumney, 36 Fuller Ave., Toronto. (28)

FOR SALE — AT ALEXANDRIA, ONT. — Machine shop in two buildings; 10,500 sq. feet concrete floor space; equipped with lathes, shaper, plainer, miller and tools; good foundry in connection. Inventory of buildings, machinery and stock, $64,272. Practically new plant, in good condition. F. T. Costello, Assignee, Schell F. & M. Co., Ltd., Alexandria, Ont.

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

SITUATIONS VACANT

TWO EXPERIENCED DIE SETTERS, TWO good die makers, and one experienced screw machine operator. Box 216, Canadian Machinery. (8)

SUPERINTENDENT FOR FACTORY EMploying 150 men. Must be graduate mechanical engineer with practical experience in factory management. We have a modern plant and a growing business. None but Canadians or Americans with Canadian experience need apply. Address Box 214, Canadian Machinery. (tf)

SITUATIONS WANTED

SUPERINTENDENT OF SHELL FACTORY desires position at present employed, but wishes to change. Would accept general foremanship. Best references. Box 217, Canadian Machinery. (9)

POSITION WANTED AS MANAGER OR superintendent of manufacturing plant. At present manager of a large shell plant. Former experience, electrical, gasoline and steam engines. Member A.S.M.E. At liberty October 1st. Address Box No. 219 Canadian Machinery. (16)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 40, 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN LAMP FACTORY
ST. CATHARINES, ONTARIO

WANTED

WANTED — 250-VOLT D.C. GENERATOR — 75 to 150 k.w., direct connected to steam engine; must be in good condition. Write to The Kaufman Rubber Co., Berlin, Ont. (13)

WANTED—ELECTRIC TRAVELLING GANtry crane, span about 57 ft., clearance 50 ft., overhanging at one end; load 15 tons. State full particulars and price. Thor Iron Works, Limited, Toronto, Ont. (27)

WANTED—12" BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Apply Box 218, Canadian Machinery.

FOR SALE

■ ■

Two 24-inch standard Gisholt Turret Lathes, completely tooled for boring 4.5" H.E. Shells.

Box 212
Canadian Machinery
t.f.

When writing advertiser kindly mention that you saw his ad. in this paper.

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

Wanted to buy or sell Scrap Iron, Metals, etc.

At the present time we are paying the following prices:

No. 1 Scrap Wrought Iron, $13.75 gross ton.
Heavy Scrap Copper, $20.00 per cwt.
Mixed Heavy Scrap Brass, $13.00 per cwt.
Heavy Scrap Lead, $5.75 per cwt.
Scrap Aluminum, $32.00 per cwt.
Scrap Babbitt, $8.00 per cwt.

Our Motto: Honest dealings and prompt settlements. Make us a trial shipment.

L. S. TARSHIS & SON
88-98 Wellington Street, Montreal

A SNAP

For Sale—Boiler Repair and Sheet Iron Works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars.

Box 213, Canadian Machinery

New Machines at Second-Hand Prices

1 only Foster, No. 1 Hand Screw Machine, with plain head, automatic chuck, wire feed, capacity 9/16, ...$500.00

1 only Hendy Type 18" stop Friction shaper, with Countershaft, with swivel vise, SECOND-HAND $300.00

1 only Puttnam Speed Lathe, 14" swing, 6-foot bed, 5-step cone, countershaft, SECOND-HAND (as good as new) $150.00

1 only Fox Monitor Lathe, No. 4, with Chaser attachment and standard equipment, SECOND-HAND $150.00

1 only 10 H.P. BRAND NEW Lincoln Motor, with Starting box, Pulley, etc., complete 25-cycle, 3-phase, 550 volts, 1,500 R.P.M. $250.00

1 only 1" Bolt Cutter, BRAND NEW, with lead screw, countershaft, no dies, National make.. ....$450.00

Ontario Metal Products Co., Ltd.
119 Adelaide St. W., Toronto

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3¼" Gridley Automatic
40" x 16' Conradson, heavy duty
40" x 12' New Haven
26" x 8' Davis
24" x 10' LeBlonde
24" x 8' Lodge & Shipley
25" x 10' American (2)
25" x 7' Fay & Scott
17" x 6' Garvin
16" x 6' Pratt & Whitney
16" x 5½' Warner & Swasey
16" x 5' Windsor, wire feed
15" x 5½' fox, American
2" x 24" Jones & Lamson flat turret
No. 22½ Garvin, wire feed
No. 2 Garvin, wire feed
8" x 31" Brown & Sharpe

Engine Lathes

36" x 16' Putnam
32" x 14' Can. Mach. Corporation, D.B.G.
30" x 10½' Pond
26" x 40" x 20' London Gap
26" x 14' Hamilton, D.B.G. (4)
26" x 14' Gleason, D.B.G. (2)
24" x 10' Peerless
24" x 10' Lodge & Shipley, patent head
21" x 12' Peerless
21" x 8' Back-geared single purpose (3)
20" x 12' Lodge & Shipley, patent head (2)
20" x 8' London
20" x 8' Hercules, heavy duty
20" x 8' Bullard
20" x 8' Ames
19" x 8' LeBlonde
18" x 10' MacGregor-Gourlay
18" x 8' New Haven
18" x 8' Lodge & Davis
18" x 6' New Haven
17" x 8' Blaisdell
16" x 10' MacGregor-Gourlay, D.B.G
16" x 8' Back-geared single purpose (2)
26" x 40" x 20' London Gap
16" x 24" x 10' South Bend Gap
14" x 6' Hendey, taper attachment

Upright Drills

D4 Colburn, heavy duty
D3 Colburn, heavy duty (2)
24" Bickford, shaft-driven
24" London, back-geared, sliding head
24" Foote-Burt
20" Barnes, back-geared
20" Bertram, power feed
16" Avey, high speed, 4-spindle, sensitive
14" Excelsior
14" Garvin, 4-spindle
10" Barnes, friction
60" Bertram Semi-universal Radial
48" Gang, plain radial, tapping attachment
36" New Century, plain radial
36" Fosdick, plain radial
32" Canedy-Otto wall radial

Iron Planers

30" x 30" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
20" x 20" x 5' Bertram

Milling Machines

No. 5 Becker-Brainard, plain
No. 25 Becker, plain
No. 12 Brown & Sharpe plain
No. 2A Owen Universal
No. 1½ Brown & Sharpe Universal
Louden Universal
24" Bertram, plain
Lees-Bradner Thread Miller
Holden-Morgan Thread Miller

Presses

No. 12 Geared Rhodes, roller feed
No. 4½ Bliss
No. 5 Waterbury
No. 150 Brown-Boggs

Miscellaneous

24" MacGregor-Gourlay B.G. Iron Shaper
No. 1 Racine Hack Saws (10)
Lo-Swing Lathes (2)
No. 14 Besly Grinder
32" x 9' Special Facing and Tapping Machine
40" Binsse Horizontal Boring Mill
No. 60 Heald Cylinder Grinder
No. 2 Garvin Automatic Tapping Machine
No. 1 Garvin Automatic Tapping Machine
¼" Shuster Riveters (3)
9½' Bertram Bending Rolls
4½" Davis Cutting off Machine

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.
Front St. W., - - Toronto, Ont.

FOR SALE COMPLETE WOOL HOSIERY PLANT

IN THE STATES IN WHOLE OR PART

One unit consists of 5 sets of woolen cards, 48 x 48; iron frames, 3 cards to set, with 8 J. & B. mules, 2-inch gauge, 280, 340 and 360 spindles; 2 double shoddy cards, Kitson rag picker, 36-in. Fearnaught mixing picker, wool duster, grinders, etc. In first-class shape, ready for immediate use.

Second unit—Ribbers, winders, loopers and footers sufficient for daily output of 800 doz. in misses' and boys' cashmere hose, and cashmere and wool merino half hose. Exactly suited for the Canadian market. Also complete dye plant.

All the machines are in A-1 shape, ready to run, and can be purchased for less than one-quarter cost of new, and arrangements made whereby the General Manager, who has been connected with the concern for several years and is thoroughly practical, would become interested and take active part in new company. Excellent reasons for selling. Address Box 215, Canadian Machinery. (8)

FAIRBANKS-MORSE New and Used Machinery

In Stock at Toronto

One 5' Bickford Universal Radial Drill; used.
One 7/8" 4-spindle National Acme Automatic; used.
Two No. 3 Foster Hand Screw Machines; new.
Four No. 4 Smith & Kamen Turret Lathes; new.
Three 14" x 5' Seneca Falls Lathes; used.
One 16" x 5' Seneca Falls Lathe; used.
Two 18" x 8' Springfield Lathes; new.
Ten [illegible] x 7' and 9' Fairbanks-Morse Lathes; new.
One Gisholt Universal Tool Grinder.
One No. 3 Cincinnati Milling Machine; used.
One No. 3B Milwaukee Universal Milling Machine; used.
Two No. 1 Racine Hacksaws; new.
One No. 304A Oster Pipe Machine; new.
One [illegible] x 8' Hendey Lathe; used.

In Stock at Montreal

3—16" F.M. Single Purpose Lathes.
1—Hendey 16" x 8' Lathe-taper attachment, Q.C.G., used
2—American 16" x 6' Tool-room Lathes.
2—Barnes 18" x 8' Lathes.
2—Walcott 20" Lathes, 3 Step cone, D.B.G. and Q.C.G.
3—Walcott 18" Lathes, 3 Step cone, D.B.G. and Q.C.G.
1—Rivett Precision Lathe.
1—Valley City No. 1½ Universal Miller.
1—Brown & Sharpe No. 1½ Universal Miller.
1—Ford Smith Plain Miller.
W. & M. Drill Grinder.
4' Niles Radial Drill.
Banfield Plug Miller.
Dill 15-18" Slotter.

This is only a partial list of our stock of Machine Tools.

CFM

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

FOR SALE

GRINDING MACHINES

1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16" x 66" Landis Crank Shaft Grinder (18 months old).
2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 360 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES

58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13" Gisholt Semi-Automatic (12 mos. old).
20 21" Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES

1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES

1 8-spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.
2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS

1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES

38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES

2 Noble & Westbrook No. 1 (new).

PROFILERS

1 No. 3H Becker (new).

PLANERS

1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 40" x 40" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS

1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES

1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES

1 12" Jackson (new).

KEY SEATERS

1 No. 1 Catlin (new).

SCREW MACHINES

1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2" x 24" Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼" capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES

1 No. 3 La Pointe (nearly new).

BOLT CUTTERS

1 2" Landis Double Head (nearly new).

BORING AND TURNING MACHINES

1 4' Bickford Boring & Turning Mill (nearly new).
1 20" swing 4-Spindle Moline Vertical Boring Machine with 18" x 36" table.

BULLDOZERS

1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES

1 Large Filing and Sawing Machine with 12" stroke.

PUNCHES AND SHEARS

1 No. 3 Walsh Punch Press.
1 Moser 1½" stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8" throat capacity ¼" x ¼".
1 27½" throat lever punch ½" capacity 1¼" stroke.
1 Thompson Bevel Shear ½" capacity.

PIPE MACHINES

1 6" Saunders.

SHAPERS

1 14" Hendey Geared Friction.
1 20" Hendey Geared Friction.

TAPPING MACHINES

1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2" collapsible taps (new).

THREAD ROLLING MACHINES

1 Waterbury Farrell ⅜" capacity (nearly new).

THREADING MACHINES

5 Special Threading Machines for threading 3" steel shells (nearly new).

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1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

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Two 6 x 6 Vertical steam engines, 10 horse	125.00	"
One 7 x 8 Vertical steam engine, 15 horse	175.00	
One 8 x 8 Vertical steam engine, 20 horse	200.00	
Two 4 x 6 Horizontal steam engines, 6 horse, with base	100.00	"
One 5 x 6 Horizontal steam engine, 8 horse, with base	125.00	
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One 8 x 8 Automatic, with base, 20-42 H.P.	500.00	
One 10 x 10 Automatic, with base, 39-82 H.P.	700.00	
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51" Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52" Niles Car Wheel Boring Mill.

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22" Aurora, S.H., B.G., P.F.
24" Hamilton, B.G., P.F.
25" Fitchburg, S.H., B.G., P.F.
26" Hoefer, B.G., P.F.
32" Hamilton, S.H., B.G., P.F.
32" Hoefer, S.H., B.G., P.F.
34" Barnes, S.H., B.G., P.F.
4" Baker Tapping and Drilling Machine.
2½' Dreses Radial
3½' Industrial Radial
12 Spindle Multiple
6 Spindle V.C.
No. 300 Baush, 12 spindles

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20" G. & E., for spur and bevel
24" x 7" G. & E., for spur
36" Walcott, for spur
No. 14 Brown & Sharpe

GRINDERS

No. 3 Landis Universal
14" x 20" B. & S. Universal
Gisholt Tool Grinder

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12" x 4' Hendey, C.R., Q.C.G., taper
12" x 5' Davis, C.R.
14" x 5' P. & W., R. and F., taper
14" x 6' Fairbanks, C.R., taper
15" x 6' Goddard, C.R., taper
16" x 6' Prentice, C.R.
16" x 6' Sebastian, P.R.
16" x 6' Walcott, C.R.
16" x 8' Lodge & Shipley Pat. Head, C.R., Q.C.G.
16" x 10' Greaves & Klusman, C.R.
17" x 10' Blaisdell, C.R.
18" x 6' Bradford, C.R., taper
18" x 8' Lodge & Shipley, Pat. Head, C.R., taper
18" x 12' American, C.R., Q.C.G.
18" x 12' Greaves & Klusman, C.R.
20" x 10' Flather, C.R.
21" x 12' New Haven, C.R.
24"-40" x 12' McCabe Double Spindle, C.R.
24" x 16' Schumacher & Boye, C.R.
30" x 14' Reed, C.R.
32" x 16' Blaisdell, C.R.
36" x 28' American, C.R.

MILLING MACHINES

No. 12 B. & S., plain
No. 34 Oesterlein, plain
No. 1½ Garvin Universal
No. 2 Cincinnati Universal
No. 2 Cincinnati Vertical, High Power
No. 32 Plain Kempsmith—Lincoln
No. 3 Cincinnati Universal
No. 13 P. & W. Lincoln
No. 4 Becker Vertical

PLANERS

Morton Portable
22" x 22" x 6' Gray, one head
30" x 30" x 8' Woodward & Powell, one head
30" x 30" x 12' Cincinnati, two heads
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Cincinnati, two heads
36" x 36" x 16' Sellers, one head
39" x 39" x 12' New Haven, one head
40" x 38" x 14' Putnam, one head
40" x 40" x 12' New Haven, one head, one side head

PRESSES

No. 3 Delivouk & George, O.B., Inc.
No. 30 A. Perkins, O.B., Inc.
No. 133 Ferracute, Double Action, O.B., Inc.
No. 5½ Walsh, O.B., Inc., geared
No. 174 Consolidated Double Crank
No. 25 Toledo, O.B., Inc., Cam Drawing

SHAPERS

15" Hendey Friction
16" Walcott
16" Niles, B.G.
16" Rockford, B.G.
20" Rockford, B.G.
26" Putnam

SCREW MACHINES

No. 1 Chicago Automatic
1 3-16" Hartford Automatic
2" Cleveland Automatic
2¾" Cleveland Automatic
5/8" P. & W. Plain
1" B. & S. Plain
16" P. & W. Plain

MISCELLANEOUS

No. 4 Warner & Swasey Turret Lathe
No. 2 Warner & Swasey Turret Lathe
No. 2 Baker Keyseater
Whitton Centering Machine
1½" Acme Bolt Cutter
2—Springfield Stud Lathes
Blount Speed Lathe

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Springfield Universal, 16 x 40	850
Two (2) No. 5 Rivet, each	750
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No. 7 Geo. Gorton, double end disc grinder with wheel chuck on one end, steel discs and tilting table	300
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No. 1 Peerless Surfacing Machine, 10" belt	75
Plain Grinders, Wet Tool Grinders, Polishing Machines, large and small.	

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Two Chicago, each	200
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Four Pratt & Whitney No. 1, each	125
Two No. 2 Garvin, each	150
Two No. 3 Garvin, each	175
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Two Pratt & Whitney Hand Millers	...
Reed	150
Pratt & Whitney	150
Pratt & Whitney, with vise	150
Two Pratt & Whitney	...

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No. 2 Beaman & Smith Combination Boring, Drilling and Milling Machine; good as new	5000

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24 x 18' Lodge & Shipley, quick change gear, taper, motor driven, carriage control	2000
16 x 8' Pratt & Whitney, quick change gear, taper attachment, H.S., C.R.; good as new; latest type	1000

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Bausch 8 spindle, 1¼" joints	1150
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Snyder 28" 4 spindle, back geared, sliding head, table 30" long, 16½" wide	300
Five (5) Gardan 4 spindle, each	250
No. 11 Pratt & Whitney 15 spindle	325
Two 14" Barr 3 spindle Sensitive, each	90
No. 11 Pratt & Whitney, 10 spindle	325
2 spindle Barr	60
Bausch 16 spindle	750
Three 4 spindle Fenn Sensitive, adjustable heads, each	150
Allen 4 spindle	200
Henry & Wright 3 spindle	200

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Bliss Straight Sided Press, 7" stroke, weight 3,000 lbs.

No. 3 Manville Straight Sided Press, 1" stroke.
Bliss Straight Sided Press, 8' stroke, 4,000 lbs.
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350-ton Hoe Hydraulic Press.

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10' Betts Vertical, two heads.
6' Betts Vertical, two heads.
66" Betts Vertical, two heads.
60" Bement-Miles Vertical, two heads.
60" Bement Vertical, one head.
50" Bement-Miles Car Wheel Mill
Niles-Bement-Pond Horizontal, 3" bar
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30" Baush Vertical, turret head.
Barrett Horizontal, 5" bar.
Beaman & Smith, 2 spindle.
Underwood New Cylinder Mill, 3⅝" bar.

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No. 1½ Cincinnati Universal.
Ingersoll Slab, adjustable rail, platen 3' x 12', three heads.
76" Newton Heavy Duty Vertical, 48" circular table.
Newton Slab, platen 18" wide, 10' long.
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No. 1 Cincinnati Plain.
No. 9 Kempsmith Plain.
No. 20 Kempsmith Plain.
No. 1 Brainard Plain.
No. 22 Garvin Plain.
No. 1 Pratt & Whitney Plain (2).
Detrick & Harvey Milling, Drilling and Boring.
Garvin Plain, No. 1½, No. 4, No. 3.
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2—13" swing x 6' bed South Bend Lathes, H.S., C.R., P.C.F.; complete	275
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2—16" swing x 8' bed South Bend Lathes, H.S., C.R., power cross feed; complete	390
1—14" swing x 6' bed Neat Lathe, D.B.G., C.R., H.S., P.C.F.; complete	535
2—21" swing x 8' bed, Sidney, D.B.G., H.S., C.R.; complete	925
1—No. 24 Oesterlin Heavy Plain Miller	1,070
3—No. 1 Standard Hand Miller with vise	313
1—20" Ohio Back-geared Shaper, complete	650
1—25" Smith-Mills Back-geared Shaper, complete	900
1—16" American High Duty Shaper, motor drive, 220-440 volt, 60 cycle, 3 phase	850
1—Wilmarth Morman Drill Grinder, style J.B.P.T.	100
No. 6 Standard Universal Cutter Reamer, Grinders	400
2—No. 28 Canedy-Otto Sensitive Drills	25

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1—28" swing x 10' bed Ames P.C.F.; complete	290
1—28" swing x 10' bed Ames P.C.F., chuck; complete	300
1—12" swing x 5½' bed Barnes, H.S., swivel rest, screw cutting, steady rest, turret on shears	200
1—18" swing x 8' bed, Porter Lathe, C.R., P.C.F., C.K.	400
1—30" swing x 16' bed, New Haven, P.R., P.C.F., chuck, 5" belt; complete	450
1—30" swing x 9' bed, New Haven, turret tool post, chuck, taper attachment; complete	460
1—20" swing x 8' bed, Pond, C.R., P.C.F., H.S., chuck	550
1—Potter & Johnson Semi-Automatic Turret Lathe, complete with 3" hollow spindle	650
1—Potter & Johnson Semi-Automatic, 4½" hole	750
1—14" swing x 6' bed, Lodge-Shipley, Patent Head, Q.C.G., H.S., C.R., chuck, complete; in excellent condition	660
1—34" swing x 22' bed. New Haven Lathe, block to 44", C.R., 34" chuck; complete	800
12—22" swing x 8' bed, American, Q.C.G., D.B.G., four-sided turret tool post, complete; used three months	1,050
1—66" swing x 16' bed, Pond, C.R., P.C.F., H.S., 4½" hole, 5" belt; complete	2,000
1—No. 2 Cincinnati Universal Miller, complete	1150
2—No. 7 Becker-Brainard Lincoln Millers, complete	475
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9—No. 52 National Acme, 4-spindle, 1¼-inch hole; used three months	1,800
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Price Attractive

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1—Foster Ring Turret; good condition.

1—22" x 22" x 4' Whitcomb Planer.

1—18" Warner & Swasey Plain Head Turret Lathe.

1—14" Flather Engine Lathe, rod and screw feed, plain rest, slip change gears.

1—14" Pratt & Whitney Engine Lathe, screw feed, plain rest, slip change gears.

1—No. 15 Toledo Punch, 18" throat.

1—No. 12 Badger Punch and Shear.

1—30" Collier Circular Shear.

1—16" Steptoe - McFarland Lathe.

1—12" Shepard Gap Lathe.

1—No. 2 Mitts & Merrill Keyseater.

1—No. 2 10" Massillon Punch; new.

2—20" Barnes Drills.

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2—Marvel Hack Saws.

1—14" Fox Drill.

1—24" Ohio Shaper.

1—14" Steptoe Shaper.

1—Shinn Metal Band Saw.

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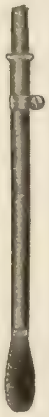

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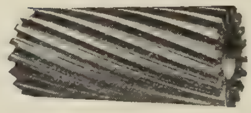

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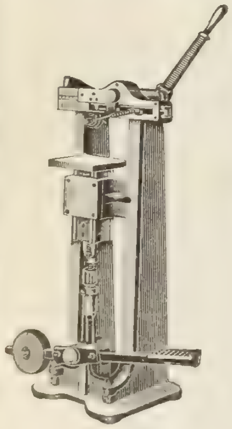

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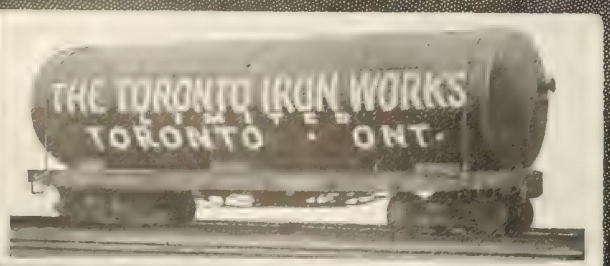

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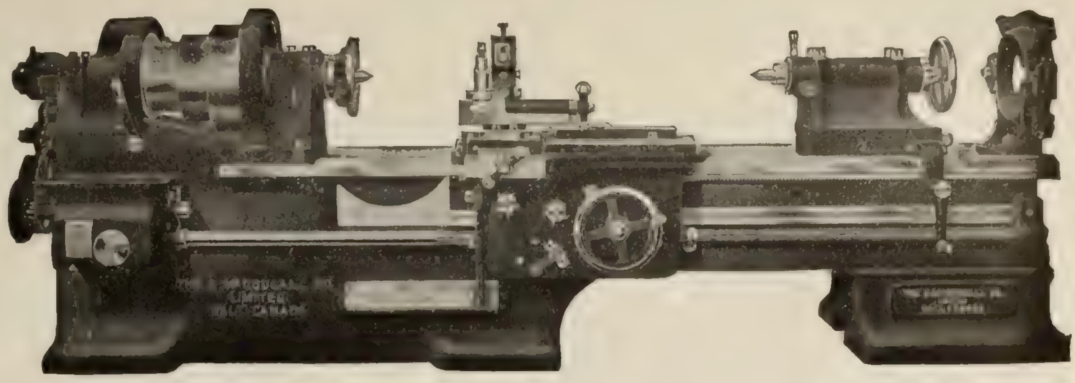

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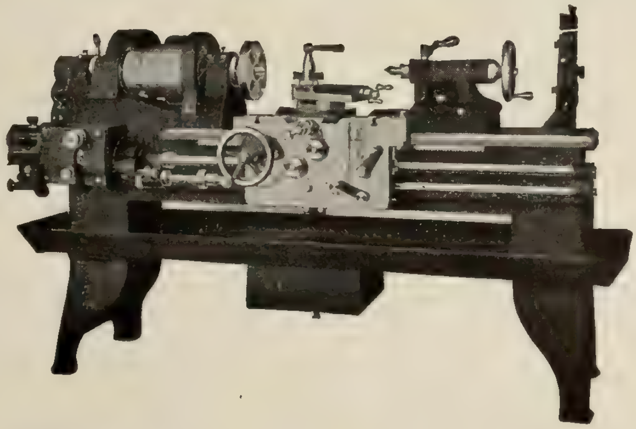

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20 x 8 Roulsted Heavy Duty Lathes, with turret for boring 4.5 or 6" shells.
-20 x 8 C.M.C. Turret Lathe, for boring 4.5 shells.
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1—26" Sibley Sliding Head, Back-geared Drill Press.
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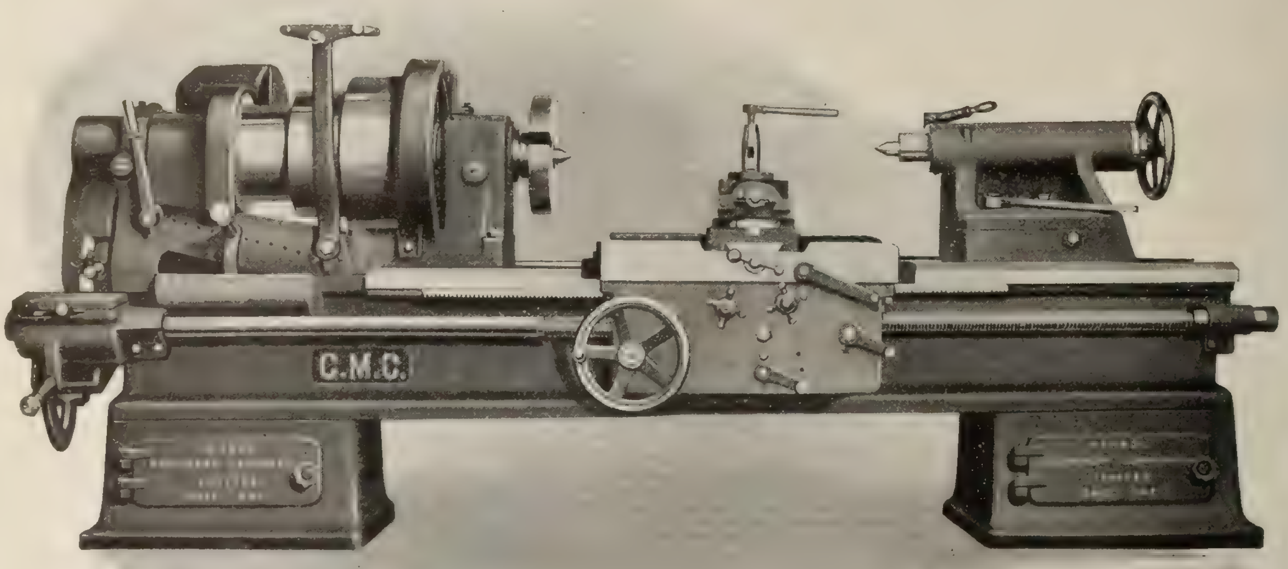

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AND MANUFACTURING NEWS

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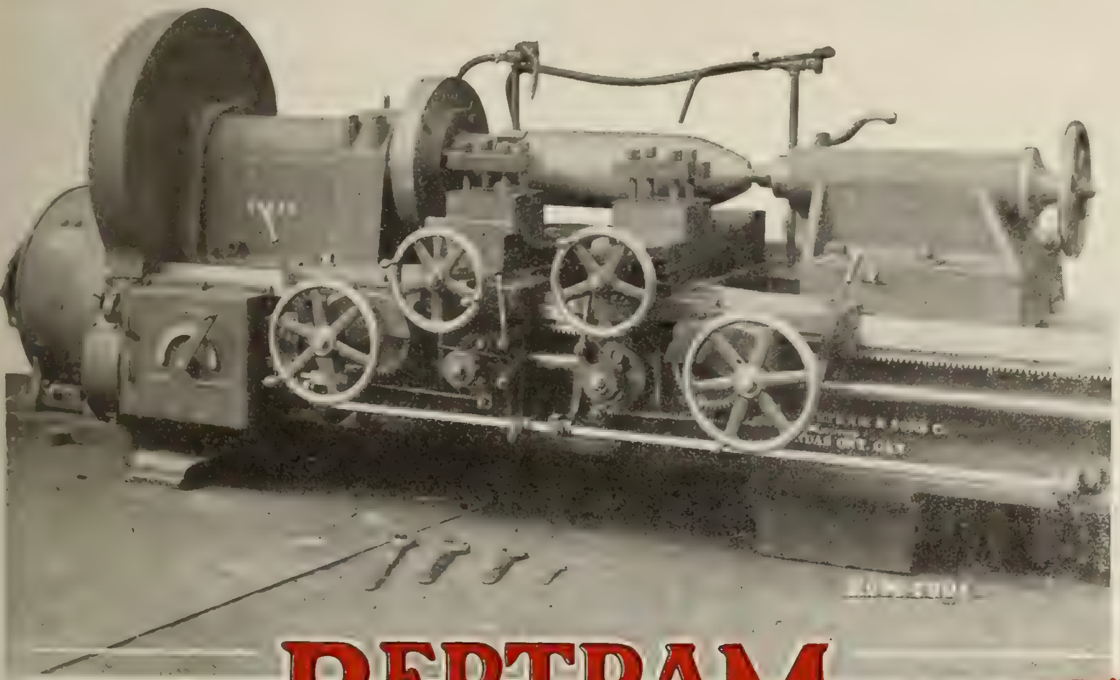

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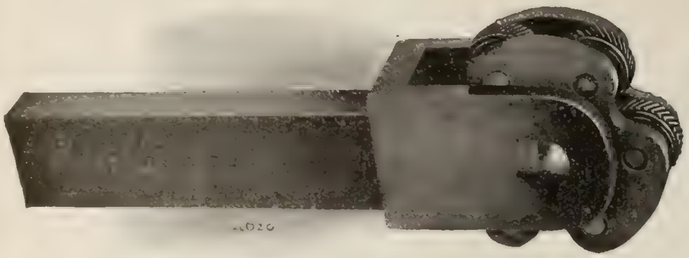
The John Bertram & Sons Co.
Limited
DUNDAS, ONTARIO, CANADA
MONTREAL: 723 Drummond Building
VANCOUVER 609 Bank of Ottawa Building
WINNIPEG: 1205 McArthur Building

LET US QUOTE YOU ON SPECIAL SHELL MACHINERY AND EQUIPMENT

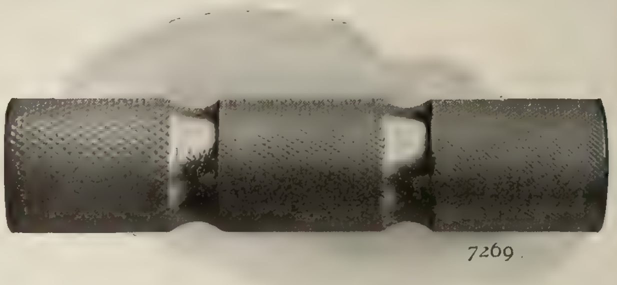


Don't Waste Time Changing Knurls

and don't be bothered with three holders when one will do.

Use the P. & W. "Three-in-One" Lathe Knurling Tool

Carries three pairs of knurls, making it three distinct knurling tools in one.



Coarse, Medium and Fine

The three pitches of knurls which we carry in stock are all combined in this one tool.

Uses same knurls as regular Lathe Knurling Tool shown opposite.

Same Holder for Chasers and Single Point Cutters

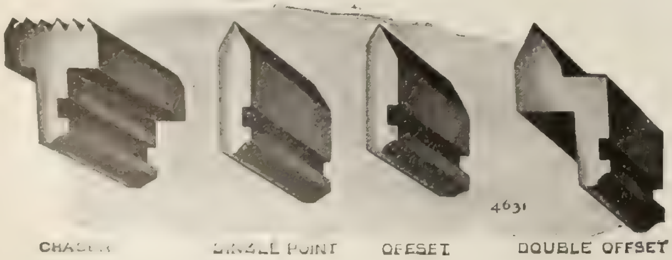
and the change can be made in a jiffy on the

P. & W. Threading Tool

A Few Of Its Advantages

1. Threads can be cut very close to a shoulder.

2. Tools are sharpened by simply grinding off top of cutter.



3. Combines economy with all features essential in a threading and forming tool.

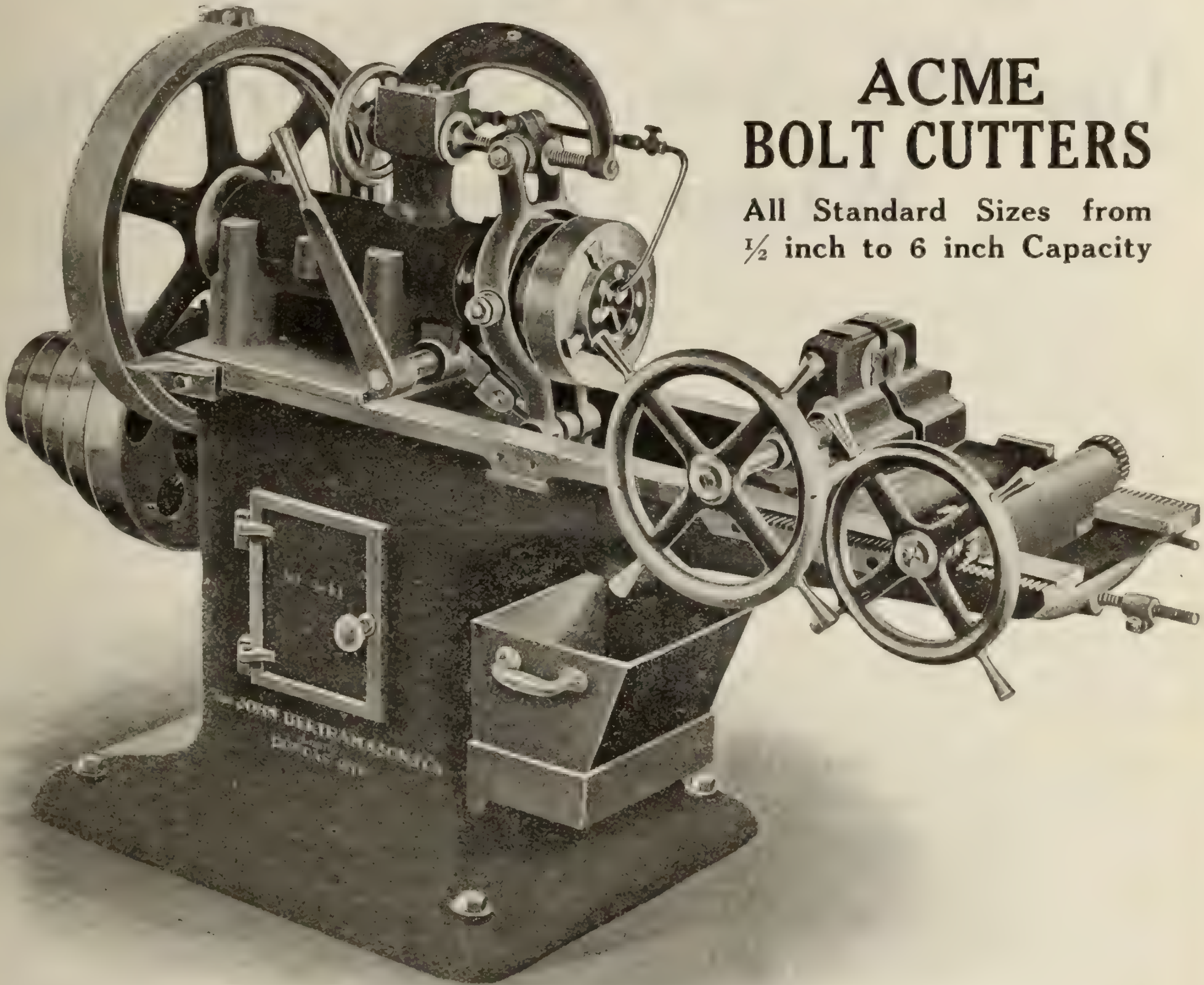
4. Cutters have 15° clearance which experience has taught gives the longest wear in various metals.

Place a trial order with our nearest store.

Pratt & Whitney Co. of Canada, Limited

DUNDAS	MONTREAL	WINNIPEG	VANCOUVER
Ontario	723 Drummond Bldg.	1205 McArthur Building	B.C. Equipment Co.

BERTRAM MACHINE TOOLS



ACME BOLT CUTTERS

All Standard Sizes from ½ inch to 6 inch Capacity

Supplied with Leadscrew Attachment for Stay Bolts or other work requiring special Accuracy of pitch.

WRITE US FOR FULL DETAILS ON ANY MACHINE OR MACHINES IN WHICH YOU ARE INTERESTED

The John Bertram & Sons Company Limited

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO August 31, 1916

The Wisdom of Advertising When Oversold

ASK the "man in the street" to call the roll of talking-machine manufacturers, and he will name three almost certainly, four probably, and perhaps will go as far as five or six before his knowledge of the subject is exhausted. But ask him for the name of the leading concern in the industry and ninety-nine times out of one hundred you will get the same answer. The wisdom of the Victor Talking Machine Company's policy of continued advertising when the factory is oversold can be demonstrated by so simple a test as that.

Our neighbor, the Dry Goods Economist, points out that the talking-machine business is no longer a specialty proposition, requiring expert handling. The public at large is so thoroughly familiar with the idea of owning a machine and operating it that the department store can profitably enter the field and sell the line on a merchandise basis. And certainly there are plenty of available sources of supply. We counted the ads. of twenty-six different manufacturers in a single issue of a trade-paper, and that is by no means the complete roster. Some of them are also advertising to the consumer, others are not, yet the fact remains that the immense prosperity of the industry is attracting a multitude of concerns which intend to share it if they can. The leaders have done the pioneer work of educating the public to the talking-machine idea, and now let them look to their laurels!

The same thing has happened before in many other lines of business. We can name concerns which once were leaders, but which have gone down under the pressure of just such competition as is now threatening the talking-machine industry. Prestige meant little to them so long as they got the business; they felt that their standing was secure because the factory could not keep ahead of its orders. They regarded advertising as a useful means of getting more business, but why advertise when we don't need business?

There is little likelihood that the leaders in the talking-machine industry will be deposed, for they have not advertised merely to "get business." Their advertising has represented in large part an investment in good-will—the laying up of a fund of public confidence which could be drawn upon whenever it became necessary. The wisdom of that policy will become more and more apparent as time goes on.—Printers' Ink.

Canadian Machinery and Manufacturing News
143-153 UNIVERSITY AVENUE - - - TORONTO, CANADA

Quality **Service**

The Steel Company of Canada, Limited

PRODUCTS

"HAMILTON" PIG IRON

BASIC, MALLEABLE AND FOUNDRY

IRON AND STEEL

BLOOMS, BILLETS, BARS, WIRE RODS, ANGLES, CHANNELS, PLOW BEAMS, ETC.

FORGINGS

Car Axles, Shape and Drop Forgings, Horse Shoes, Carriage and Automobile Hardware, Top Goods, Etc.

WIRE, ETC.

Steel, Brass, Copper and Bronze, Heavy and Fine, Bright Annealed, Coppered Liquor Bright, Galvanized and Tinned. Stranded, Steel and Copper Cable, Clothes Line, Wire Nails, Staples, Barb Wire, Woven Wire Fencing, Fence Gates.

RAILWAY FASTENINGS

Angle Bars, Track Bolts, Tie Plates, Spikes, Tie Rods, Etc.

NAILS, SPIKES, RIVETS, ETC.

Wire, Cut, Boat and Horse Shoe Nails, Railway, Pressed and Drift Spikes. Tacks and Shoe Nails, Steel and Copper Rivets, and Burrs, Iron, Brass and Copper.

POLE LINE HARDWARE

Pole Steps, Cross Arm Braces, Guy Clamps and Guy Rods, Etc., Black and Galvanized.

BOLTS, NUTS AND WASHERS

Machine, Carriage, Elevator, Stove, Tire and Sleigh Shoe Bolts, Blank, Tapped Nuts, and Washers.

WROUGHT PIPE

Black and Galvanized Nipples and Couplings.

SCREWS

Wood and Machine Steel, Brass and Bronze.

LEAD PRODUCTS

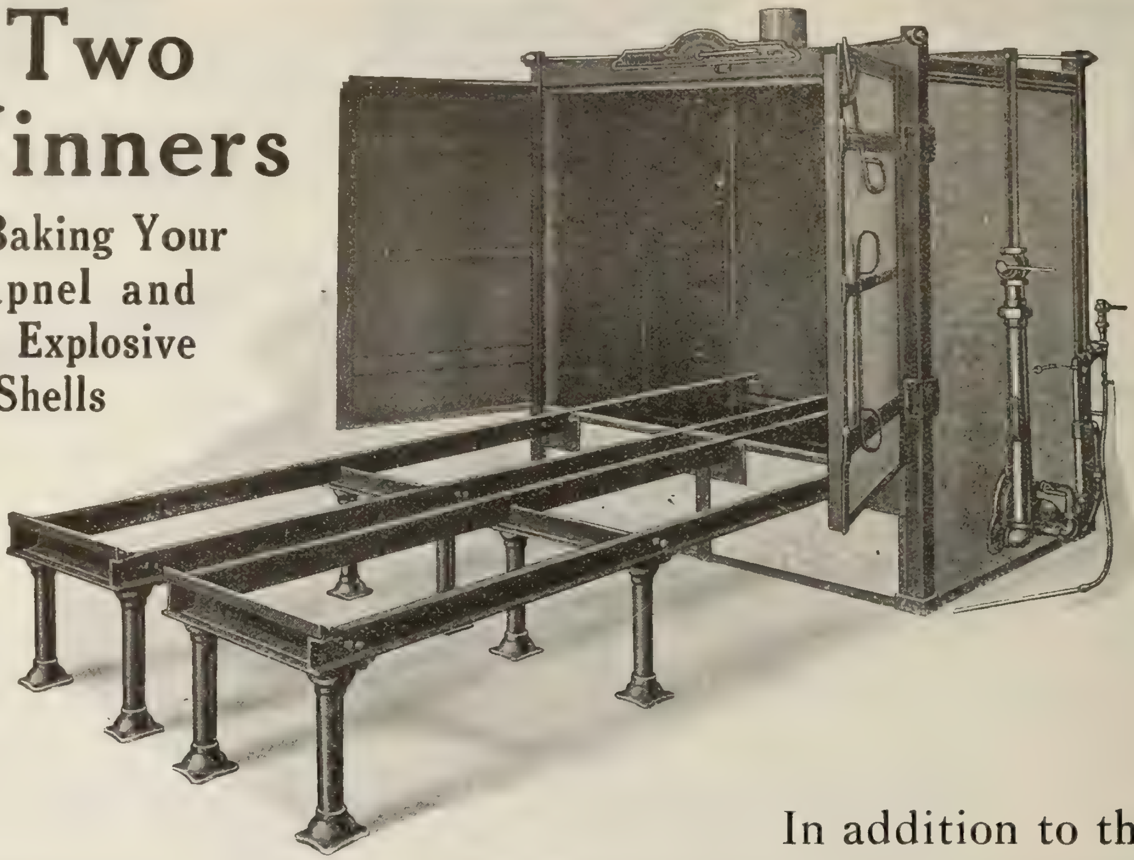
Lead Pipe, White Lead, Shot and Putty.

The Steel Company of Canada, Limited

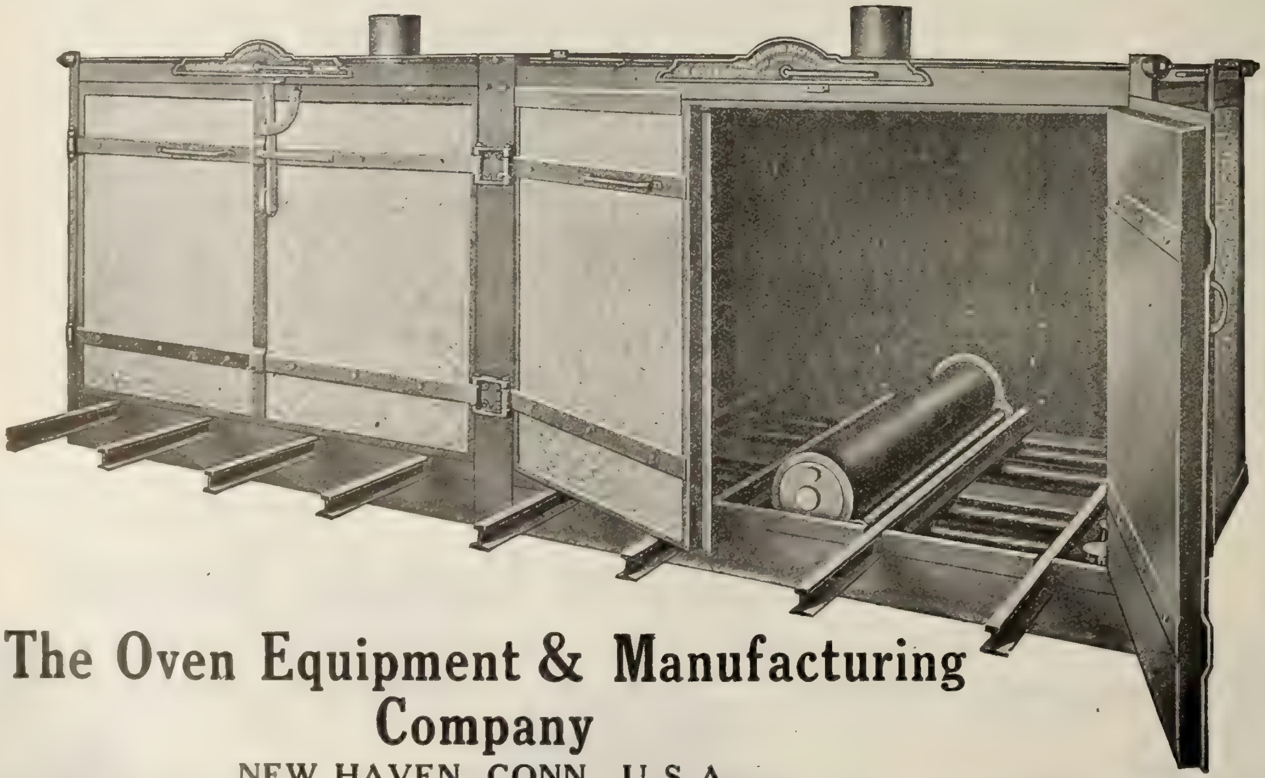
HAMILTON TORONTO MONTREAL WINNIPEG

Two Winners

for Baking Your Shrapnel and High Explosive Shells



In addition to the constructing of Special Oven Equipment, we design and build trucks suitable for handling any size of shell.



The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN., U. S. A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA

"Stellite" Tools

will give you the most startling demonstration of turning you have ever seen. No metal too hard, no work too heavy.

STELLITE

MADE IN CANADA
STELLITE

IS NOT A STEEL

It is an alloy so hard that it will perform every operation at a higher speed than is possible with the best speed tool steel,

Do you see what this means to you? *A direct increase of capacity of every lathe in your plant.* Increasing the productivity of every lathe hand, lowering labor cost on every piece produced, lowering proportionate overhead.

It does not require near as much grinding, therefore it lasts longer and saves much of the operator's time.

Let Stellite tool metal show you that it's a big step in advance of high speed steel—try it.

Made in Canada by

The Deloro Mining and Reduction Co., Limited
DELORO, ONTARIO

The Canadian B. K. Morton Co., Limited
SOLE SELLING AGENTS FOR CANADA AND NEWFOUNDLAND
49 Common St., MONTREAL, QUE. 86 Richmond St. East, TORONTO, ONT.

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX
High Speed Steel, Atlas LX
Chrome Vanadium Steel

Carbon Tool Steel
"Deward" Oil Tempering, Non-Shrinking

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

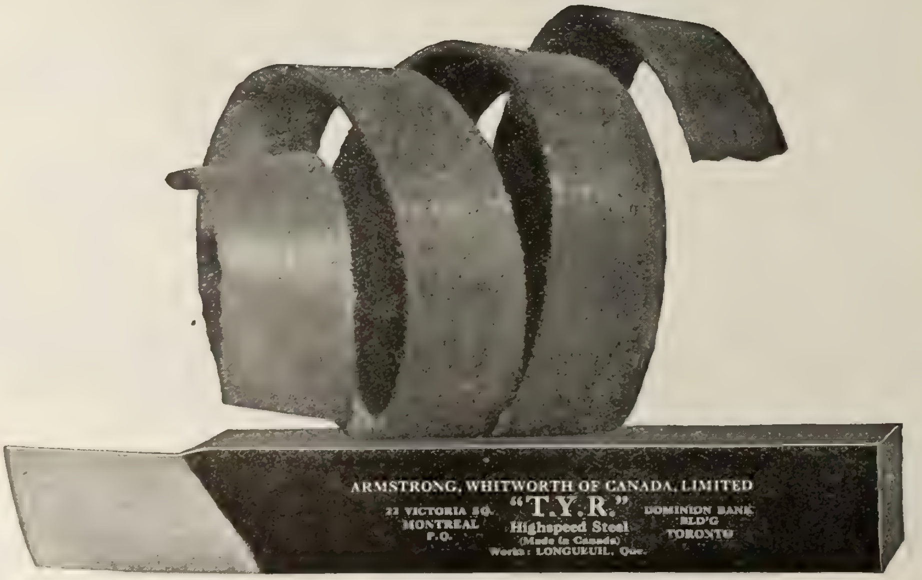
"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

YOUNG, CORLEY AND DOLAN, Inc.

115 BROADWAY, NEW YORK CITY, U.S.A.

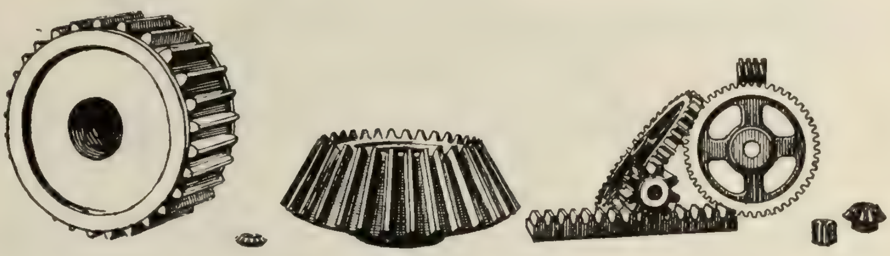

ARMSTRONG, WHITWORTH OF CANADA, LIMITED
22 VICTORIA SQ. MONTREAL P.Q.
"T.Y.R."
Highspeed Steel
(Made in Canada)
Works: LONGUEUIL, Que.
DOMINION BANK BLD'G TORONTO

Immediate shipment of all standard sizes and shell-turning sizes can be made from stock.

MADE IN CANADA

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL & WELLAND.

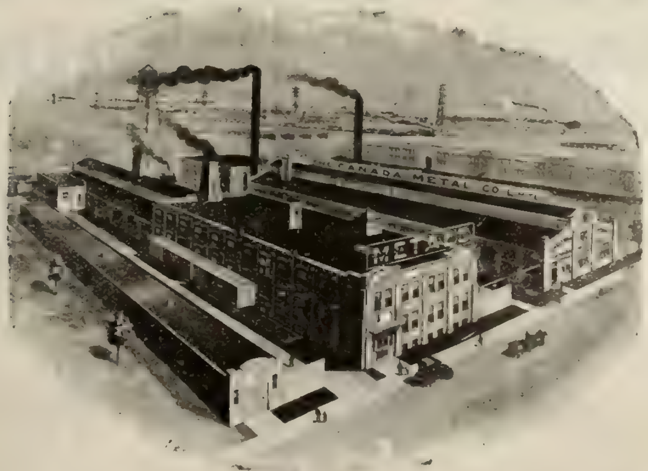
Machine-moulded Gears made without the use of patterns, insuring quick delivery in case of breakdown.



TO SHELL MAKERS
WE MAKE
WIRE SOLDER ALL SIZES

Imperial Soldering Paste

Headquarters for Pig Lead



ALL INGOT METALS
The Canada Metal Co., Limited, Fraser Ave., Toronto
HAMILTON - MONTREAL - WINNIPEG - VANCOUVER

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO, LIMITED, SHEFFIELD, ENGLAND

Sole Agents for Canada:

H. BOKER & CO., Inc.

(Formerly Hermann Boker & Co.)

332 St. James Street, Montreal, P.Q.

Established 1837 Incorporated 1914

EXTRA Die Steel

is produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

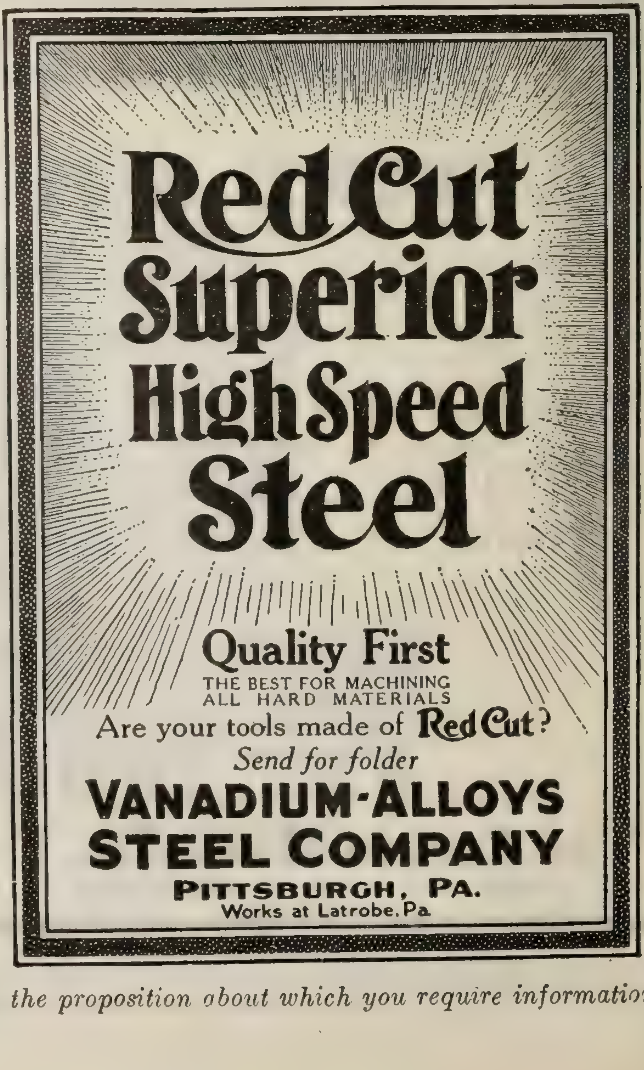
You get extra service from "EXTRA" DIE STEEL. A trial is convincing.

H-A-DRURY COMPANY LIMITED

STEEL

MONTREAL TORONTO NEW YORK

Manufactured By SANDERSON BROTHERS & NEWBOULD, Limited SHEFFIELD, ENGLAND



Red Cut Superior High Speed Steel

Quality First

THE BEST FOR MACHINING ALL HARD MATERIALS

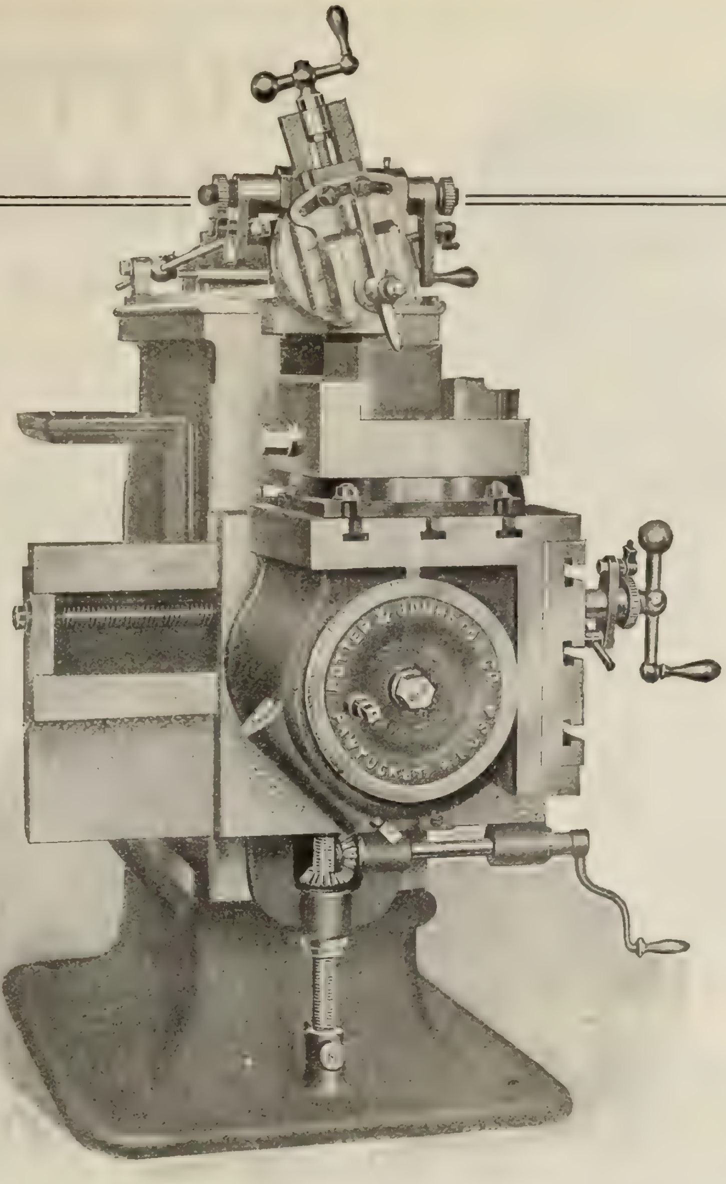
Are your tools made of Red Cut?

Send for folder

VANADIUM-ALLOYS STEEL COMPANY

PITTSBURGH, PA.

Works at Latrobe, Pa.



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

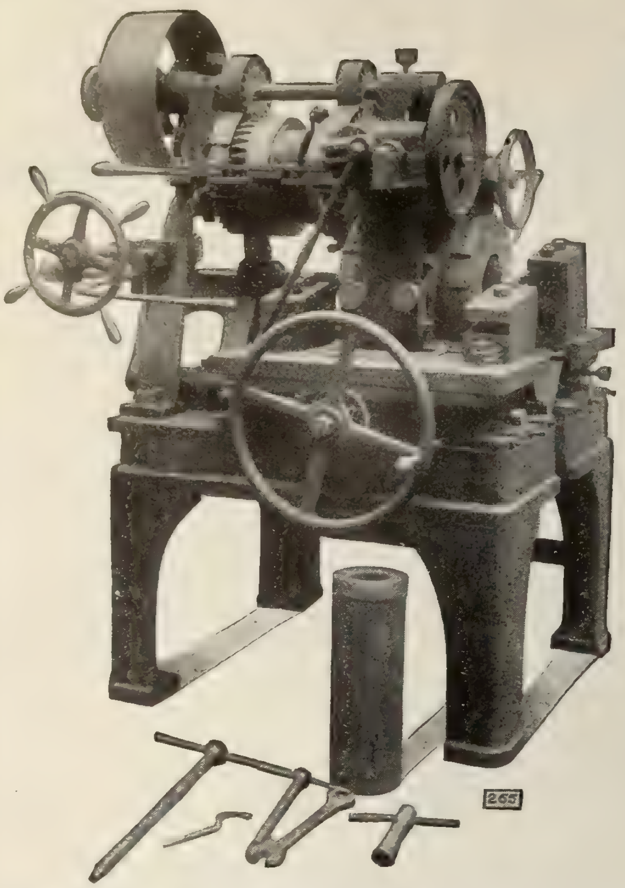
WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA

Works: GALT, ONT., CANADA



CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal

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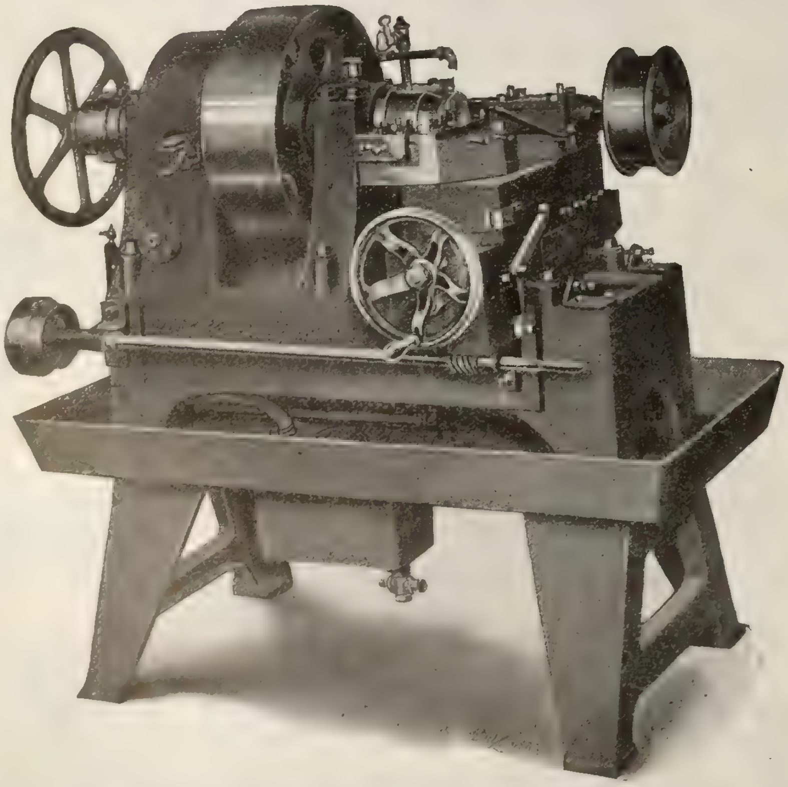


For Turning, Facing and Milling the Thread on Gas Check Plugs for 6-inch High-Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells, Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

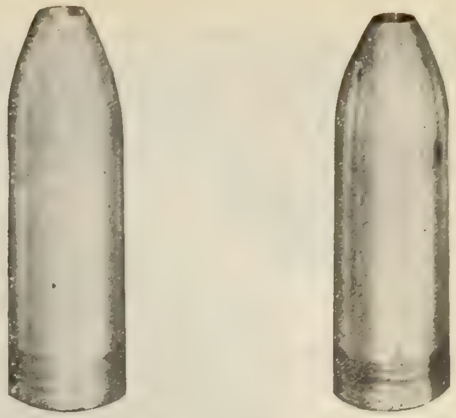
Prompt Shipment

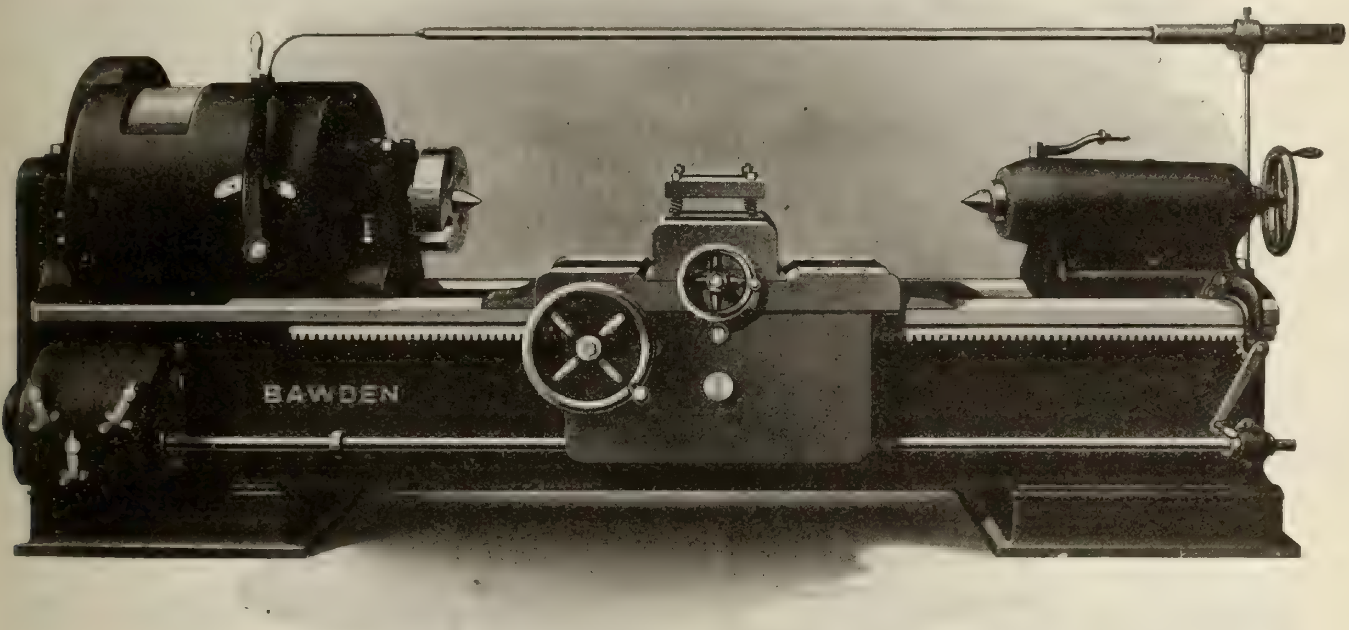
BUILT EXCLUSIVELY BY

Edwin J. Banfield
STAIR BUILDING, TORONTO, ONT.

BAWDEN

Heavy Duty Shell Lathes





36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

All the features essential to power, strength, rigidity and accuracy, are embodied in these Bawden Machine Tools.

They are not only most capable masters of the big shell situation but are machines that will stand up to big jobs long after the demand for munitions ceases.

Bawden Lathes are quantity as well as quality producers—they will give you more profit on your shell work.

Write for full particulars and learn what Bawden Lathes are doing.

We manufacture a full line of gauges for all sizes of British, Russian and French shells and component parts.

The Bawden Machine Co., Limited

TORONTO, CANADA

GARLOCK-WALKER MACHINERY CO. LIMITED

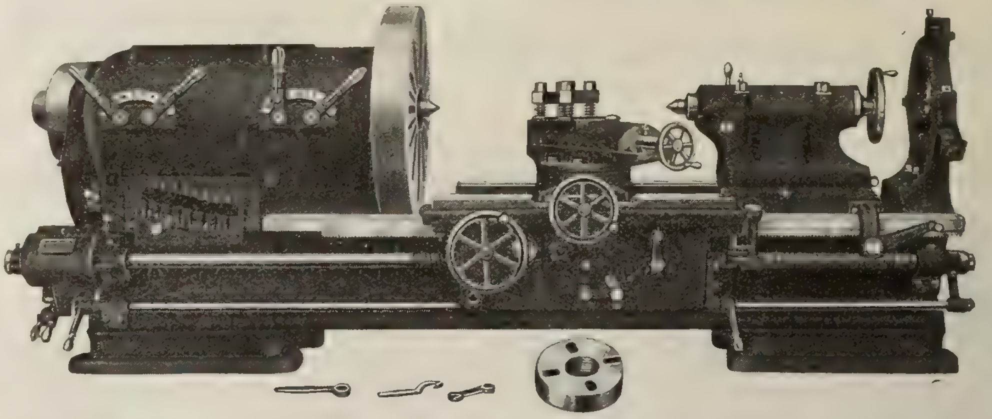
32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Lodge and Shipley—Selective Head—Triple Gear 36" Lathe—Good Delivery

Strong, speedy, accurate Machines for all operations on 6-in., 8-in., 9.2 in. and 12-in. Projectiles.

Unexcelled 18 in. and 20 in. Engine Lathes for Tool Room Equipment

Send us a list of machines required, and full particulars will come by return mail.

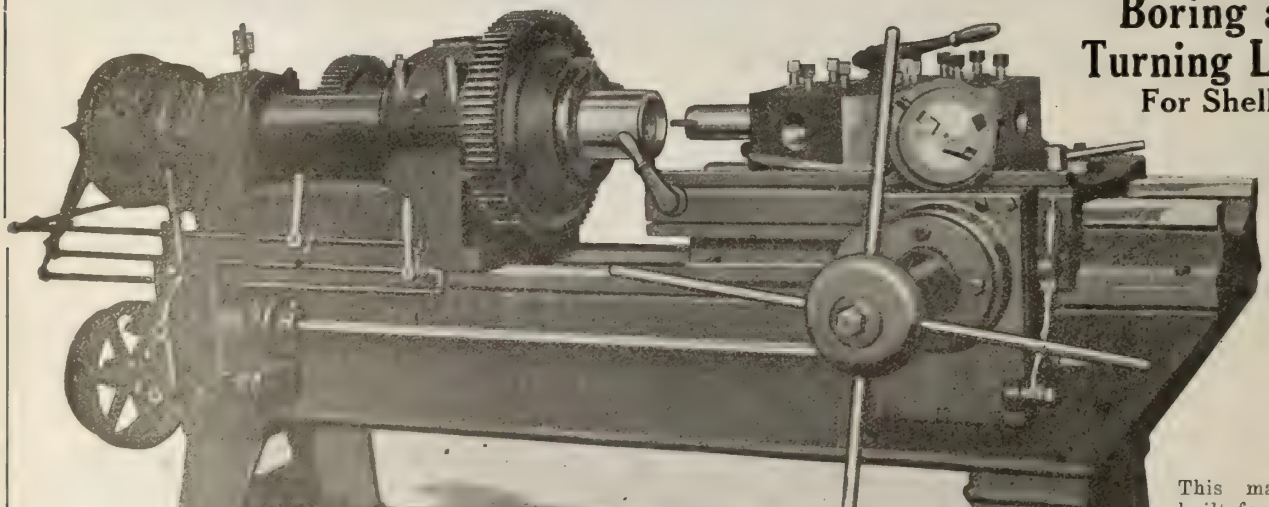


GARLOCK-WALKER MACHINERY CO., Limited, Telephone Main 5346 **32 Front St. West, TORONTO**

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds

Boring and Turning Lathe
For Shell Work



This machine is built for base facing, or boring the 6" shell. It is made with a 6 side turret and being compound geared has a very powerful drive.

Very Rapid, making possible heavy production, the feed is by means of a worm and gearing in the apron.

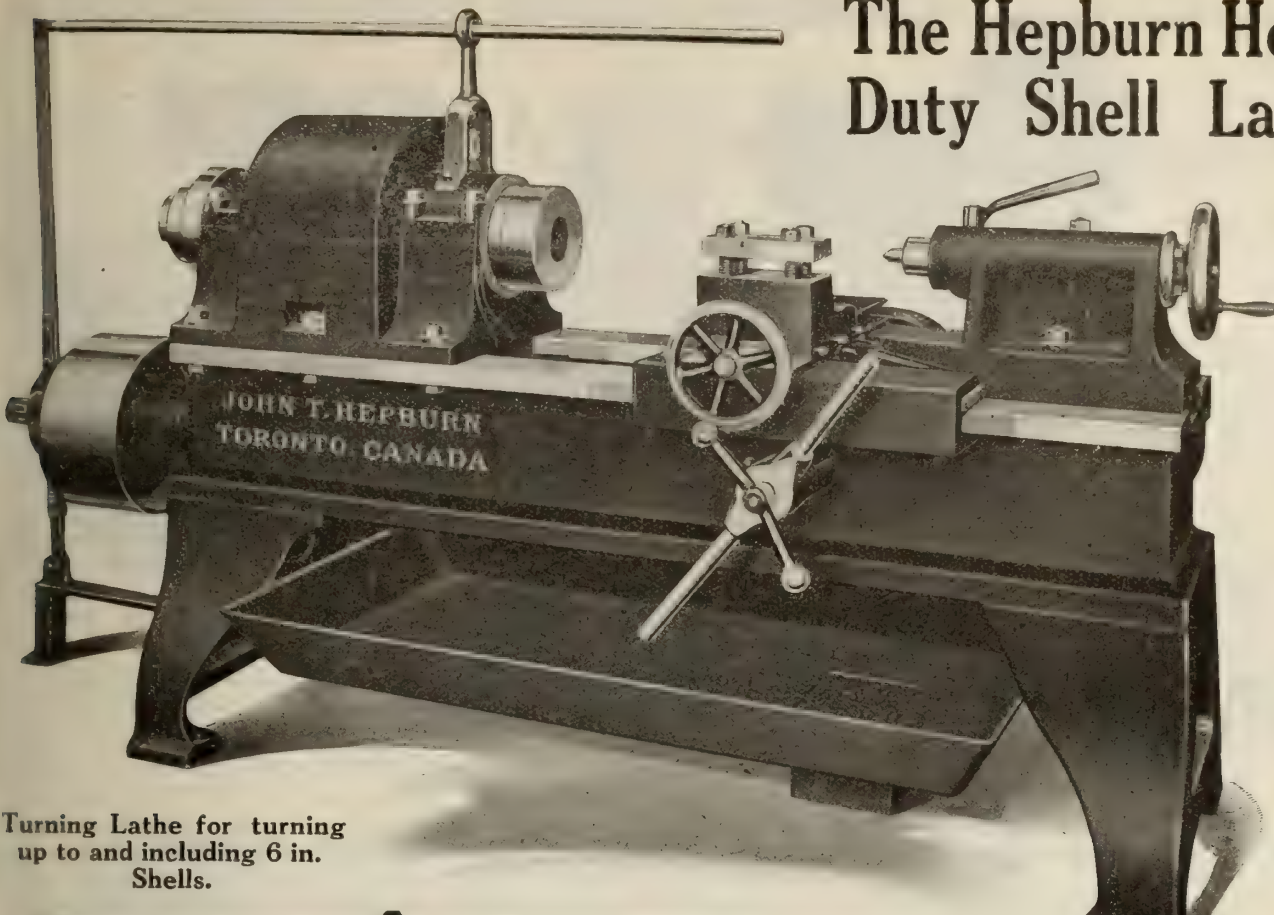
WRITE FOR DELIVERIES.

THE JENCKES MACHINE COMPANY, LIMITED

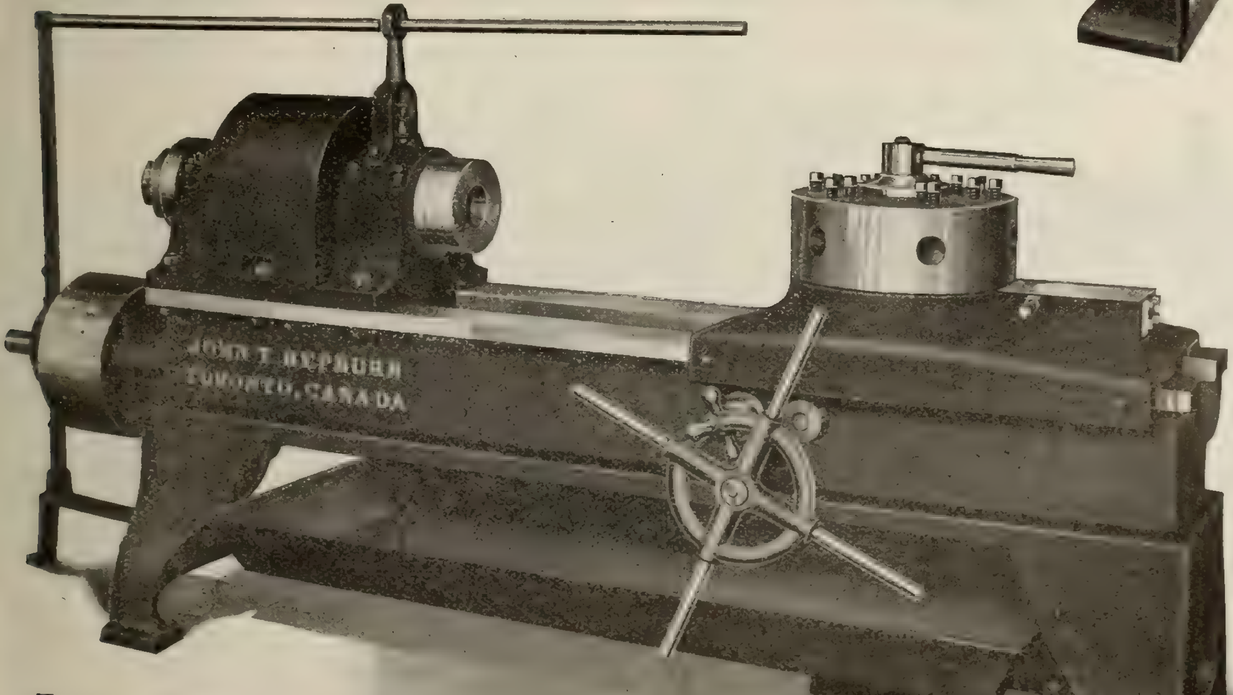
Works: SHERBROOKE, QUE.; ST. CATHARINES, ONT.

SALES OFFICES: 727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

The Hepburn Heavy Duty Shell Lathes


JOHN T. HEPBURN
TORONTO, CANADA

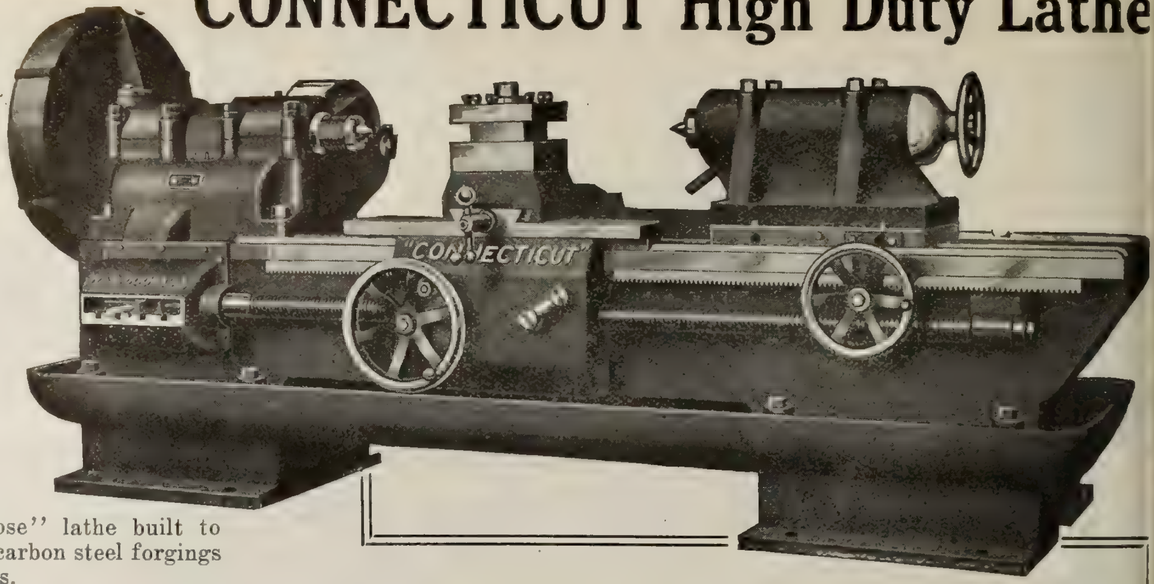
Turning Lathe for turning up to and including 6 in. Shells.


JOHN T. HEPBURN
TORONTO, CANADA

Turret Lathe for boring up to and including 6 in. Shells.

JOHN T. HEPBURN, Limited, 18 to 60 Van Horne St., Toronto, Can.

CONNECTICUT High Duty Lathe



Sets the pace on HEAVY WORK

A "Single Purpose" lathe built to turn or bore high carbon steel forgings at maximum speeds.

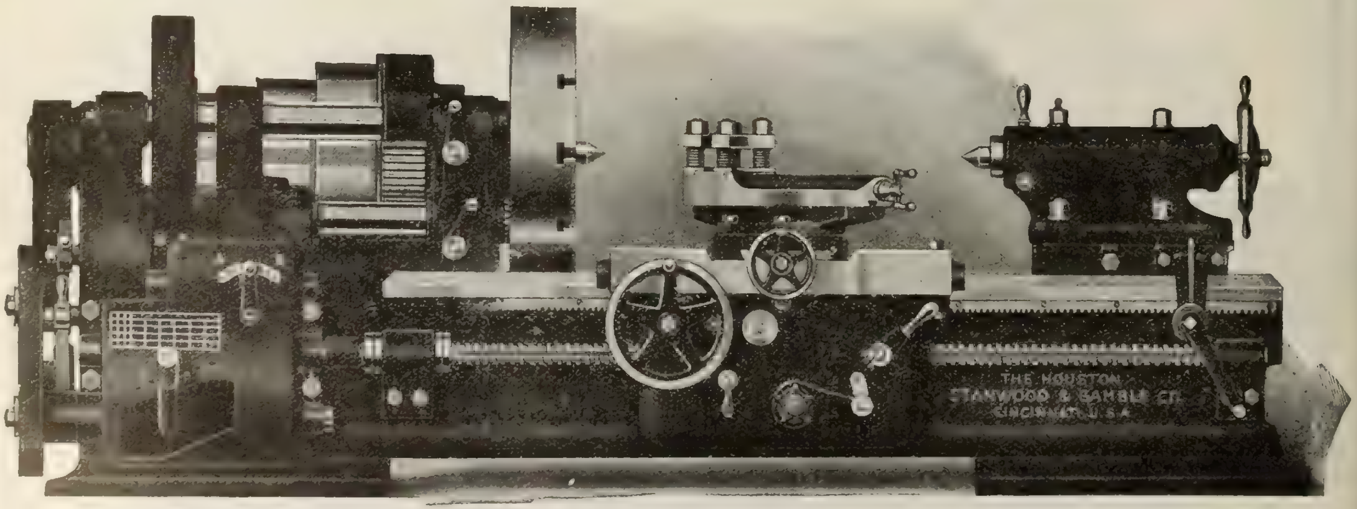
It is in all respects heavier and more rigid than standard 30-inch or even 36-inch lathes giving the same distance between centers.

The usual cutting speeds on shell work are 40 to 50 feet per minute on shells up to 8" diameter, 30 feet per minute on larger sizes. Depth of cut from ¼" to ⅝", depending upon the eccentricity of the piece. Our lathes will stand more than this.

We admit the **Big Gear** is not particularly handsome, but it eliminates the train of small gears, and adds greatly to the strength and wearing qualities.

Write for bulletin giving full details.

W. & B. DOUGLAS, *Middletown, Conn.*



H-S-G TRADE MARK

Heavy Duty Engine Lathe, triple-geared into internal gear on face plate. Prompt shipment in 30" and 36" sizes.

This is a well-designed lathe. The cone has 7" face for 6" belt. Spindle has 8" x 10" front bearing. All parts are of correspondingly liberal proportions. Absolutely all gears are of steel. The net weight of the 30" lathe with 14' length of bed is 16,500 pounds. The design, materials and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

CINCINNATI, U.S.A.

Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto

James McKay Company

Pittsburgh, Penn., U.S.A.

MANUFACTURERS OF

SHELL FORGINGS

We have the Equipment and Experience and can execute orders for

Nose Sockets
Base Plates
Adapter Plates

for any size shells. Can execute orders promptly.

SPECIAL FORGINGS

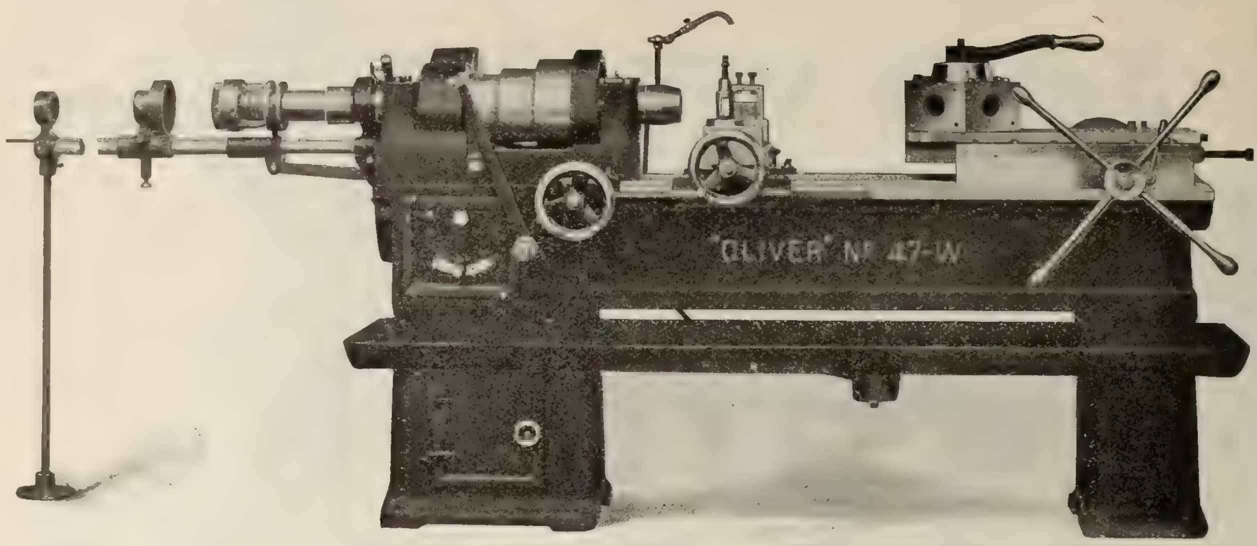
We can make any forging that can be made under Drop Hammers.

CHAINS AND ACCESSORY FORGINGS

We have a complete line.

ADDRESS OUR REPRESENTATIVE:

John A. Buchanan, King Edward Hotel, Toronto

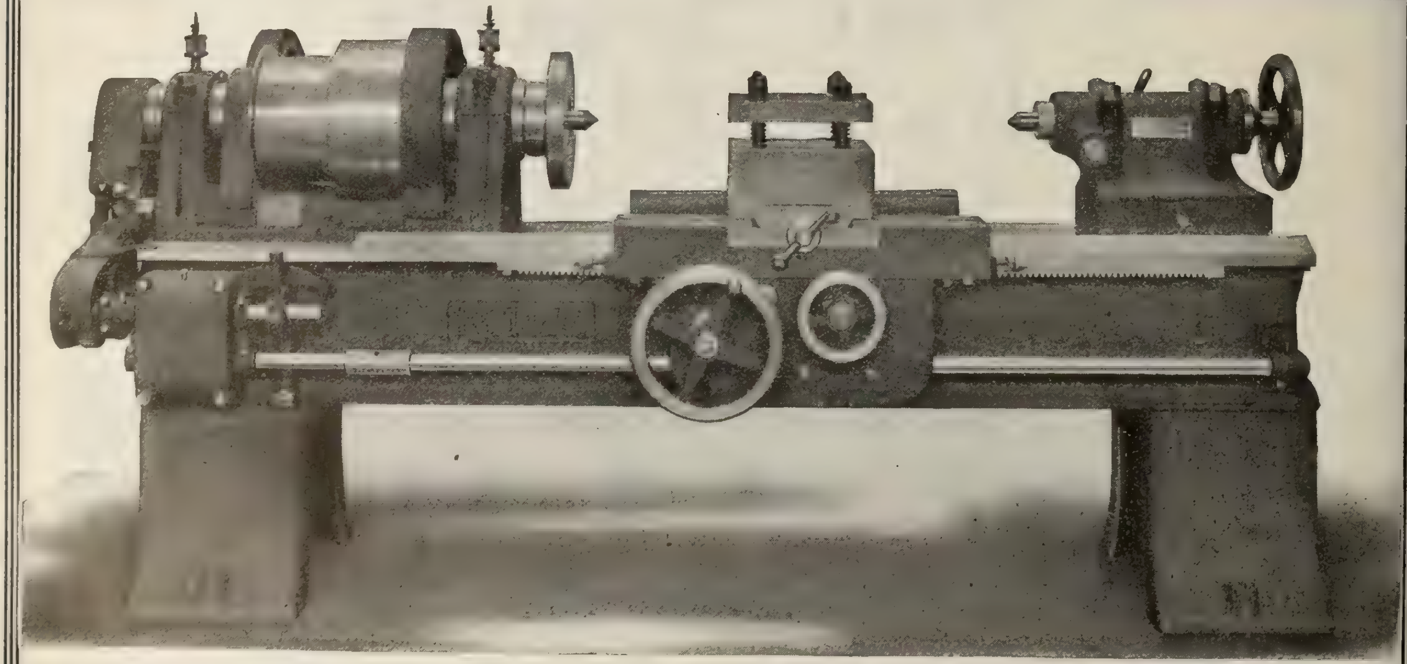


"OLIVER" NO. 47-W HEAVY DUTY SCREW MACHINE 2¼"—SWING 16".

A HEAVY TOOL FOR HEAVY WORK—A MODERN MACHINE—OLIVER QUALITY—
PROMPT DELIVERIES.

WRITE FOR FULL INFORMATION.

OLIVER MACHINERY COMPANY, Grand Rapids, Mich.



Petrie 20-inch Heavy Duty Manufacturing Lathe

A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

Made in Canada Reasonable Price Prompt Deliveries

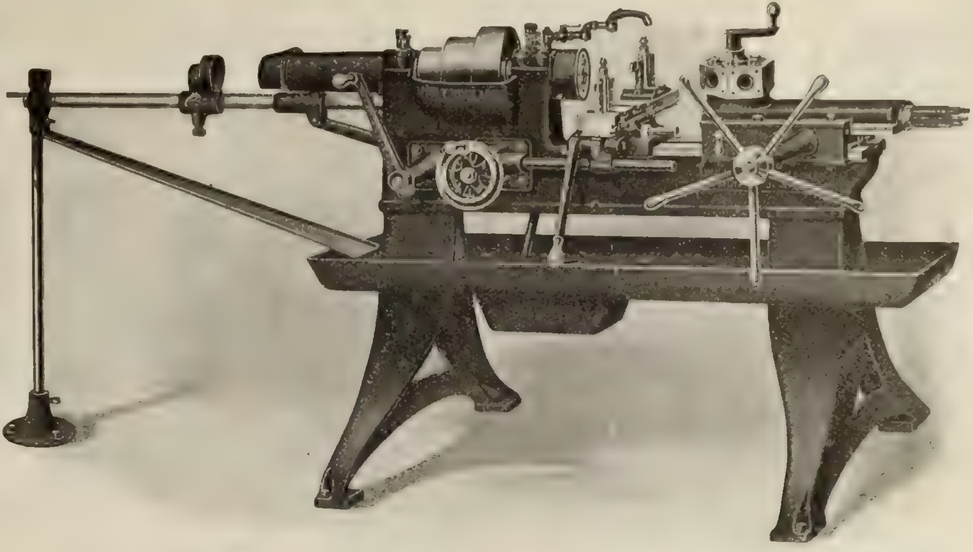
WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.

Mention this paper when writing advertisers. It will identify the proposition about which you require information.

Every Feature to secure strength and stiffness on the heavy cuts is embodied in

Millholland
1"x7"
Screw Machine



The Bed is of box construction well ribbed, and with the headstock cast solid.

The Headstock is made with plain head three-step cone. The steps of the cone pulley are of large diameter and wide face and are so proportioned as to transmit the maximum power with proper spindle speeds.

The Spindle, high-carbon steel with hardened and ground thrust washers.

The Cut-off Slide, with broad, flat, well-gibbed bearings.

The Turret is of heavy construction and mounted on a large steel stud.

The Automatic Chuck and Bar Feed, operated by the long lever on the front of the bed, grips or releases the work instantly. The operator with one movement opens the chuck and feeds the bar without stopping the machine.

DROP A LINE FOR FULL DETAILS AND SPECIFICATIONS.

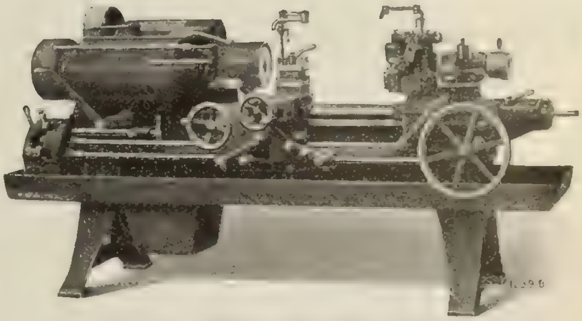
Manufactured by

W. K. Millholland
Machine Company
INDIANAPOLIS, IND.

Two Cuts at One Time

The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

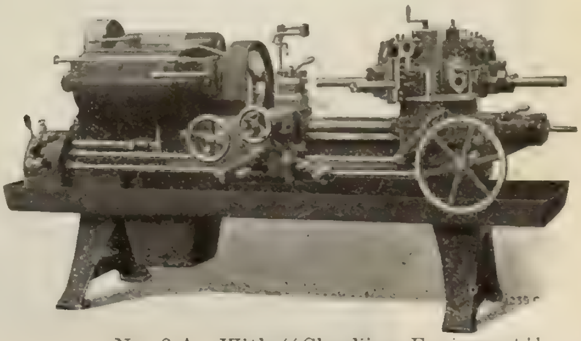


No. 2-A—With "Bar Equipment"

Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.

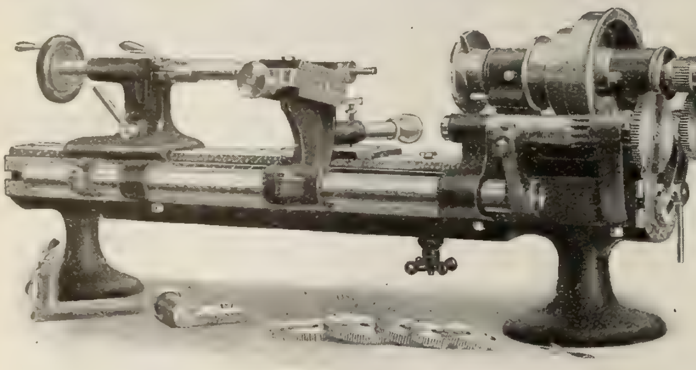


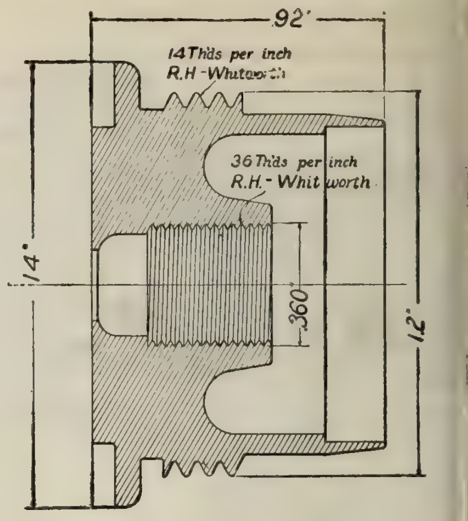
No. 2-A—With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal

THE CATARACT BENCH LATHE WITH CHASING ATTACHMENTS





We have sold many of our lathes to Canadian concerns who are eminently satisfied with results. Will you be next?

For work requiring greatest accuracy and rapidity, THE HARDINGE CATARACT BENCH LATHE will not disappoint you. Machine equipped with Automatic Chuck Closer for rapid operation of chuck, and with chasing bar arranged with multiple point, chasing tool is producing from ten to twelve hundred 14-pitch Whitworth threads on primers in TEN HOURS. Prompt deliveries. Catalogue No. 15 is ready to mail TO YOU. You are invited to write for it to-day.

HARDINGE BROTHERS, Inc., 1770 Bertau Ave., CHICAGO, U.S.A.

Davenport 22-Inch Lathe — For Extr
Heavy Service

These lathes are built exceptionally rigid and heavy. No feature has been omitted, to secure great strength and power. The bed, the headstock, the tailstock, the carriage—every detail has been designed and constructed with a view to driving the heaviest cut that any tool will stand up against. At present we can make quick deliveries on this machine.

Built with ordinary change gears unless otherwise specified.

Write at once for Bulletin. It gives full details of construction.

DAVENPORT LOCOMOTIVE WORK
DAVENPORT, IOWA

Length of Bed, 8', 10', 12', 14'.

Canadian Representatives:
Williams & Wilson, Ltd., Montreal
A. R. Williams Machinery Co., Toronto, Winnipeg,
Vancouver

BEAVER BRAND

COPPER & BRASS BROWN'S QUALITY ROLLING MILLS

BRASS, BRONZE

AND GILDING METAL IN SHEETS, ROLLS, PLATES AND RODS

SPECIAL MARINE BRONZE ROD
For Shafting and Bearings.

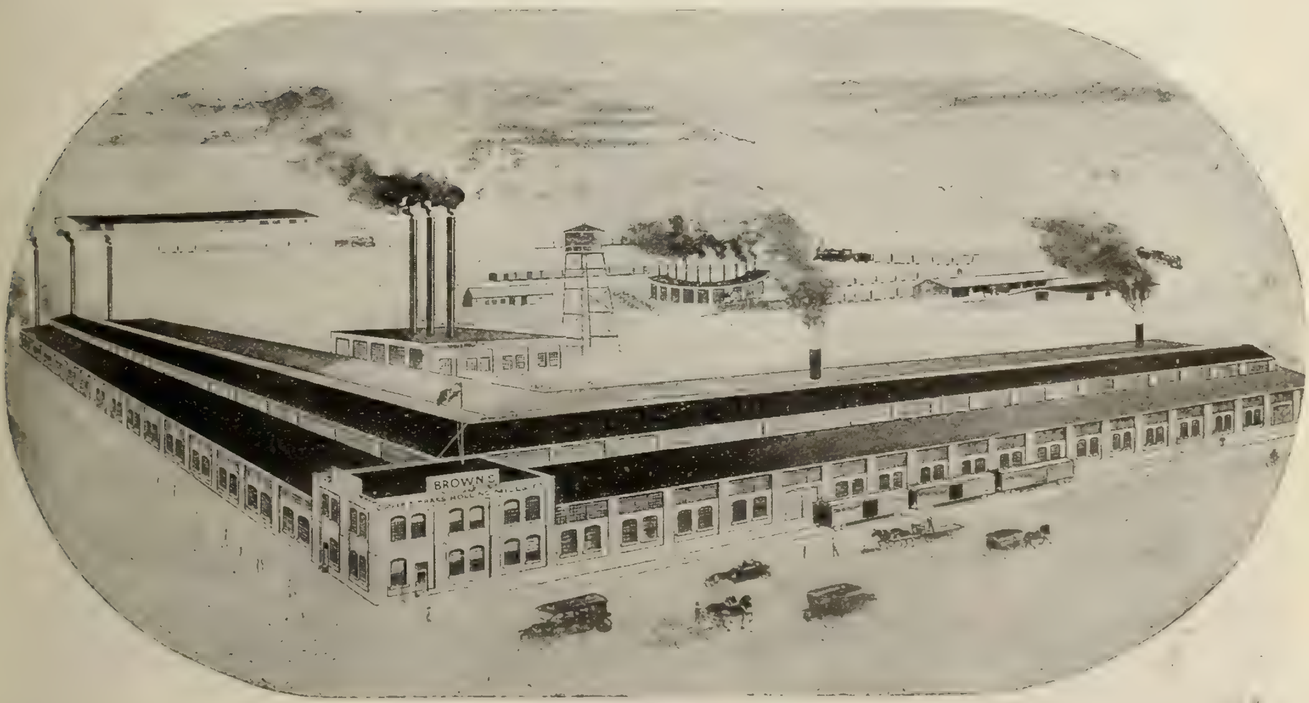
For Drilling and Free Turning, Order BEAVER BRASS ROD.

Beaver Brand "SPINNING BRASS."

Beaver Brand products are made in Canada, and are quality through and through.

Our manufacturing facilities assure you the best of service and a moderate price.

Send a Trial Order



Brown's Copper and Brass Rolling Mills, Limited

General Offices and Mills:
NEW TORONTO, CANADA

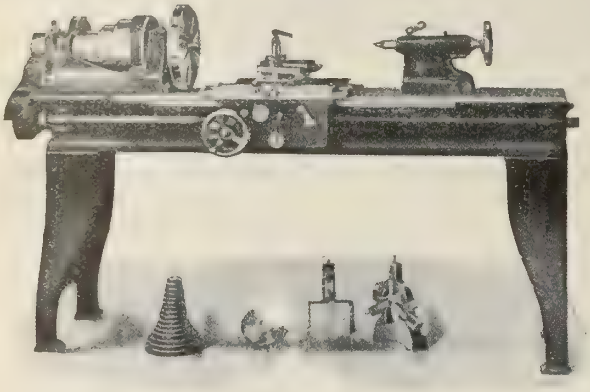
The Improved Power Hack Saw

MADE IN CANADA

will cover its cost many times over with the money it saves through long, efficient service.

Saws bars 6 x 6 in., either round or square, and is so constructed as to require no attention after work is put in vise, and stops automatically when piece is cut off.

The Improved Saw Guide is a Special Feature — it keeps the saw perfectly in line at all times.



The "McKenzie" Engine Lathe

The Standard of Accuracy

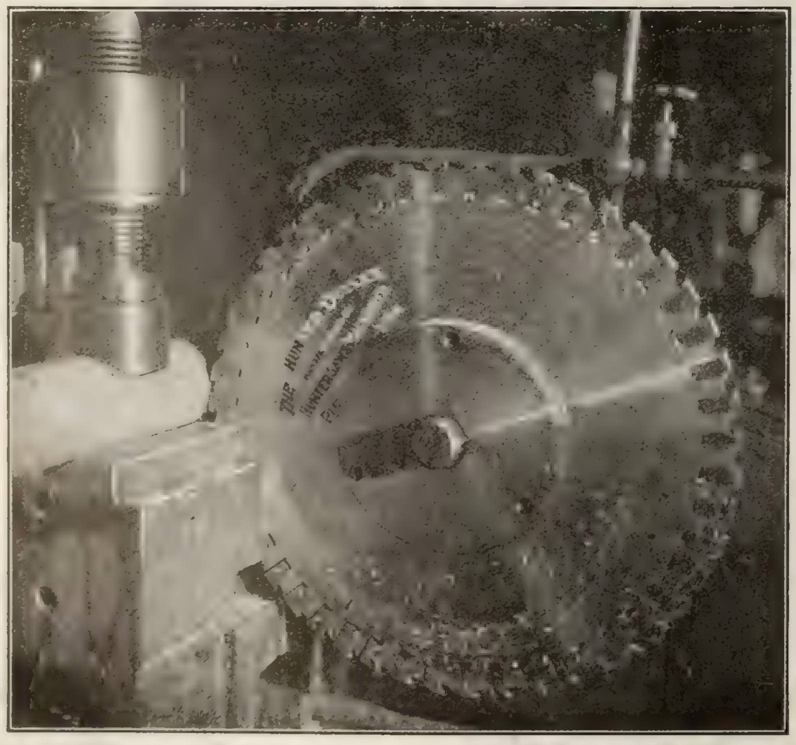
Made from new patterns, of improved design, and constructed of the very best material by expert workmen. Every part is mechanically perfect and excellently finished.

Its accuracy and durability mean a big saving of money to you.

Let us put full details before you. Write!

The D. McKenzie Machinery Co.
GUELPH, ONTARIO

A Hunter "Duplex" on Shrapnel Stock



FAST GOING
on Newton Machine

Through 3½" round 60 Carbon, 70 Manganese Shrapnel Stock every

2 MINUTES

The secret of Hunter "Duplex" Saw speed is the method of holding the high speed teeth.

You can use this speed profitably—on shrapnel or any other stock.

Let us send full Particulars.

HUNTER SAW & MACHINE COMPANY, Pittsburg, Pa.

One Paragraph From A Machinery Dealer's Letter:-

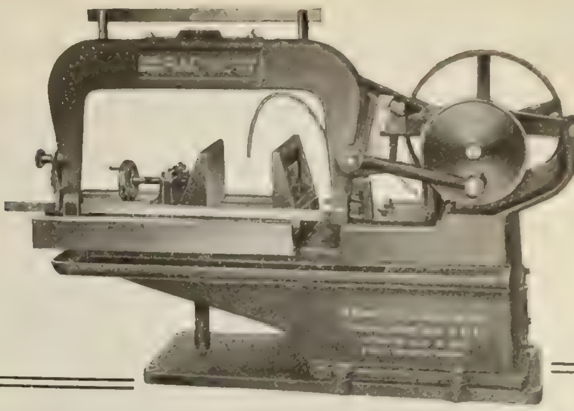
PEERLESS
PEERLESS MACHINE CO. RACINE, WIS., U.S.A.

"One of our customers has recently purchased from us two of your 6" PEERLESS High Speed Power Hack Saws, and they now wish to install several more, providing we can take some of their old hack saws in exchange. They claim these old machines are as good as new, but they consider the PEERLESS so far superior to the others that they would like to fully equip their factory with PEERLESS Machines."

The principle of construction in the PEERLESS High Speed Heavy Duty Cutting off Machine admits of a cutting speed which cannot be approached by the ordinary type of machine. The output of this machine is controlled by the efficiency of the blade. At the maximum speed which this machine is guaranteed to operate it cuts off a 3 in. semi cold rolled bar in 1½ minutes.

Bearings are extra large. The ones that are subject to excessive wear are made of steel, hardened and ground, which eliminates the continuous adjusting and repairing that ordinarily is the case when a machine is worked to its utmost.

PEERLESS MACHINE COMPANY
1607 Racine Street RACINE, WISCONSIN



ONE BLADE on this machine does what SIX of the same kind will do on any other

The Racine Metal Cutting Machines are exceedingly easy on the blade, BUT THEY FAIRLY EAT THE METAL.

One reason for the greater blade life is the Positive Automatic Lifting Device which lifts the blade clear of the work on the non-cutting return stroke.

Another reason is the Saw Frame Guide which positively prevents springing, and insures greater accuracy and there are many other reasons that we will be pleased to put before you.

The Racine is a metal cutting machine that will effect an immense economy in your plant.

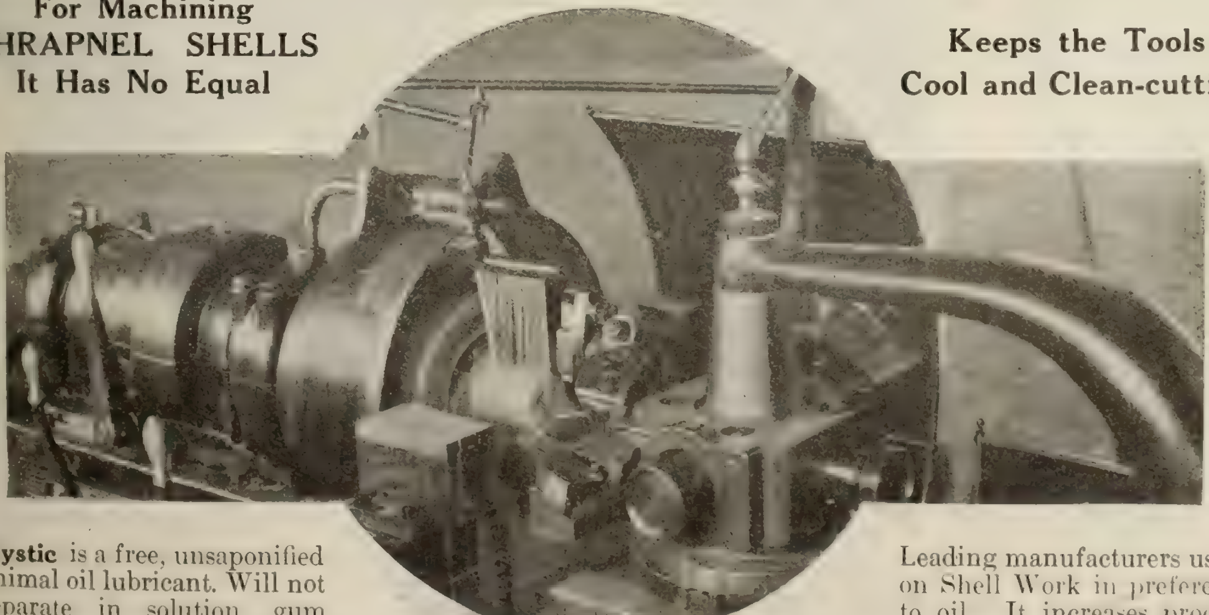
Many Canadian plants are on our list of users. One Canadian Steel Company is using **120 Racine machines** and has saved $11,019.00—particulars of saving will be sent on request.

Racine Tool & Machine Company
15 Melbourne Ave., Racine, Wisconsin, U.S.A.

Mystic Cutting Compound

For Machining
SHRAPNEL SHELLS
It Has No Equal

Keeps the Tools
Cool and Clean-cutting



Mystic is a free, unsaponified animal oil lubricant. Will not separate in solution, gum machines or rust.

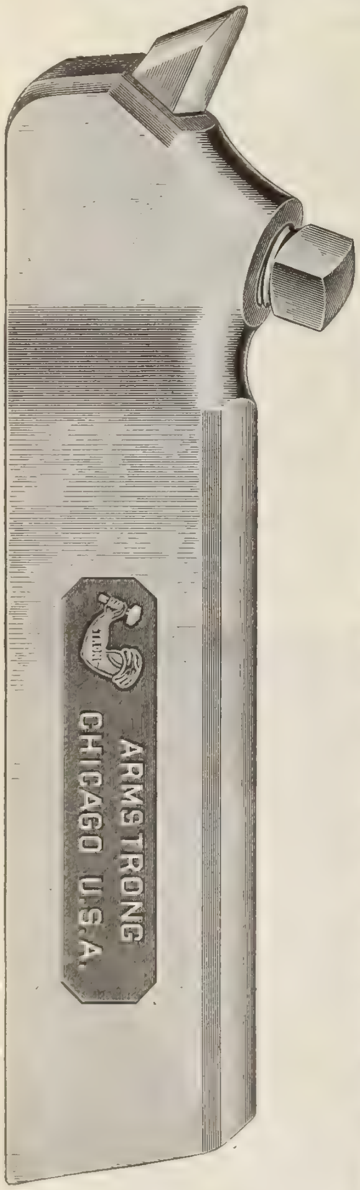
Leading manufacturers use it on Shell Work in preference to oil. It increases production and costs less.

Cataract Refining Company, Limited, Toronto, Ont.

The Only Grand Prize for
TOOL HOLDERS
Awarded separately and independent of other lines exhibited at the
PANAMA-PACIFIC EXPOSITION
WAS WON BY
ARMSTRONG
TOOL HOLDERS

HIGHEST AWARD
at 4 World's Expositions
Paris - - - 1900
St. Louis - 1904
Liege - - - 1905
San Francisco 1915

THEY ALWAYS MAKE GOOD


ARMSTRONG
CHICAGO U.S.A.

OFFICIAL
AWARD
RIBBON
PANAMA PACIFIC
INTERNATIONAL
EXPOSITION
SAN FRANCISCO
1915
PRESIDENT
DIRECTOR OF EXHIBITS
SECTY OF THE INTERNATIONAL AWARD SYSTEM
GRAND
PRIZE
DEPARTMENT OF
MACHINERY
CHIEF

They Are Saving Millions of Dollars in High Speed Steel

CATALOG FREE

Armstrong Bros. Tool Co.
"The Tool Holder People"
306 N. Francisco Ave., CHICAGO, U.S.A.

The Panama-Pacific MEDAL OF HONOR was also won by ARMSTRONG Drop Forged Wrenches, Ratchets, Clamps, Lathe Dogs, Etc.

SAWS FOR SHELLS

We have experimented on the

SPECIAL SHELL STEEL

and have produced a *HACK SAW BLADE* that will give unequalled service on this material in *HIGH-SPEED MACHINES.*

Possibly we could help you.

"VICTOR BLADE—CANADIAN-MADE."

Victor Saw Works, Ltd.
Hamilton, Ont., Canada

VICTOR HACK SAWS Get a Box and Try 'Em

"STERLING"
Hack Saws

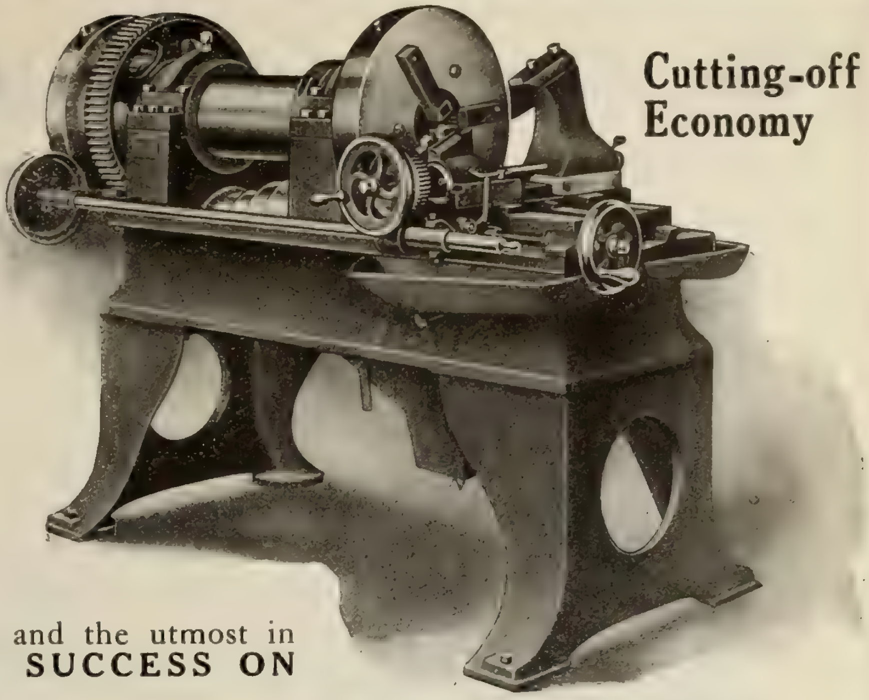
Will prove an economical investment and should be used in every machine shop.

If you care to save money, use "Sterling" Blades.

MANUFACTURED BY
DIAMOND SAW & STAMPING WORKS
BUFFALO, N. Y., U. S. A.

Two Cuts

Simultaneously



Cutting-off Economy

5-inch Cone-Driven Machine

One up, the other down. This is what makes the **Hurlbut-Rogers Cutting-Off and Centering Machine** virtually double the output and reduce the cost per piece about one-half.

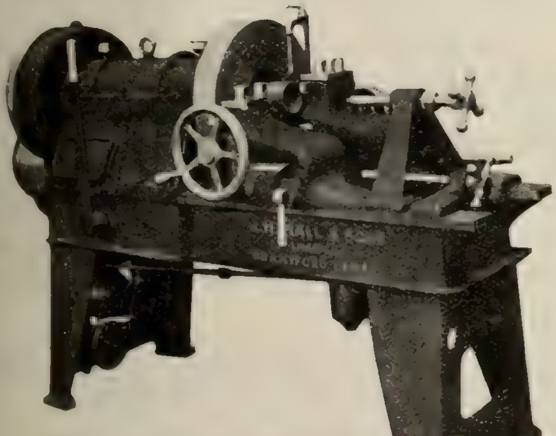
The Hurlbut-Rogers Machine gives you capacity of two machines at the expense and in the floor space of one machine.

We build them for hard work and the utmost in accuracy—and their **GREAT SUCCESS ON SHELLS** shows it.

Let us go into details.

HURLBUT-ROGERS MACHINERY CO., South Sudbury, Mass.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle-on-Tyne. H. W. PETRIE, TORONTO, CANADA.



No. 6 — For cutting off and facing 4.5 shells or bar stock.

HALL

SHELL CUTTING-OFF and FACING MACHINES

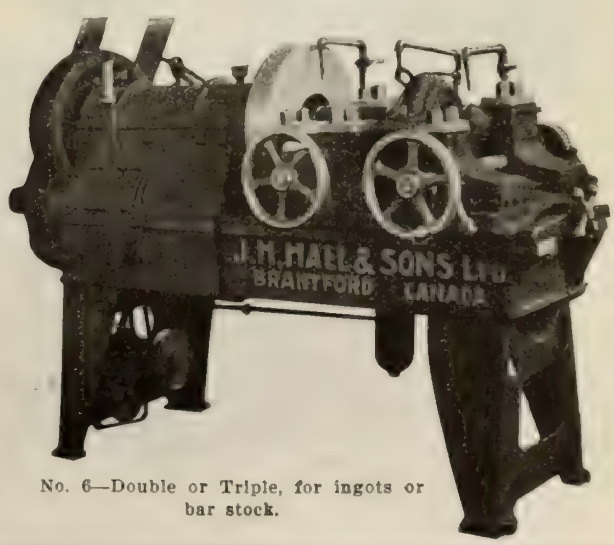
For Shells, Bar Stock, Ingots—High Speed, Heavy Duty

For cutting off the open ends.
For facing off the closed ends.
For facing off projecting ends of plugs.
For cutting off bar stock.
For cutting off ingots, any size.

We manufacture a full and complete line of machinery for the above operations, used in the manufacture of shrapnel, 4.5, 60-Pr. and 10" shells.

Write us for particulars of our new 12" cutting-off machine, designed especially for the new 10" shells and ingots now to be made in Canada. Single or double cut at one chucking.

Let us tell you the nearest point at which you can see some of our machines in operation.



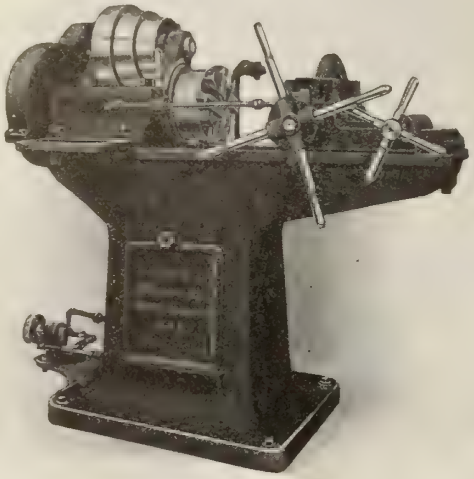
No. 6—Double or Triple, for ingots or bar stock.

John H. Hall & Sons, Limited

Manufacturers of Pipe Threading and Special Machinery

BRANTFORD, CANADA

The Simple Job is Often the Real Test



Don't think that you must have requirements covering special threads to install a Landis Bolt Cutter.

Remember that a good quality of thread on your standard product together with a high production and a low cost of upkeep is essential to profitable threading. To obtain this profit you must have a machine which will give the best results at all times.

The Landis Die is designed to give uniform satisfaction on all classes of work and under all conditions. The many repeat orders which we get from shops where efficiency is the practice, is sufficient testimony that the Landis is producing the desired results. Its many distinctive characteristics are bound to give you a better quality of thread, a high production and a lower cost of upkeep than you can obtain with any other threading tool.

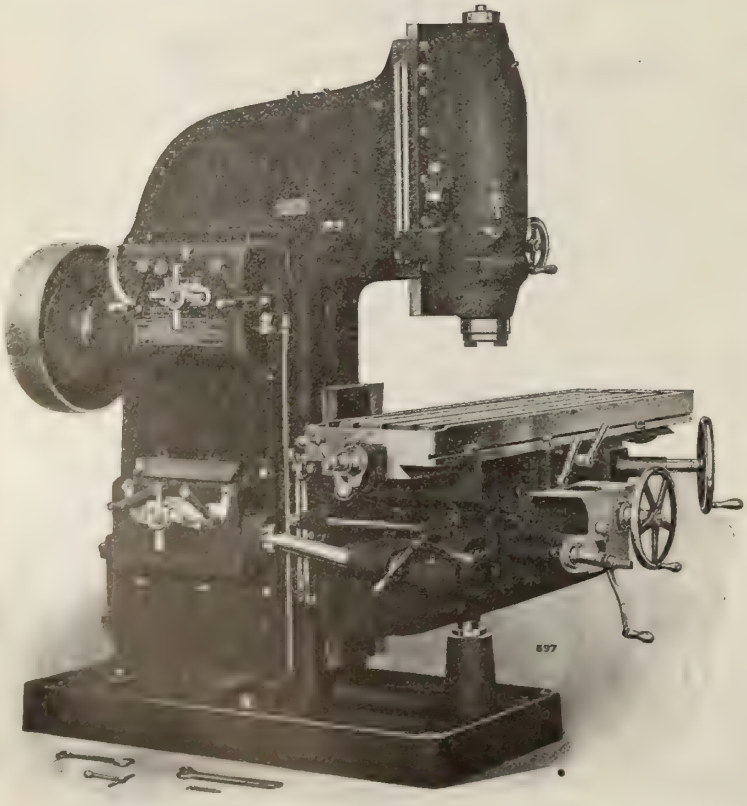
Let us have your specifications at once, no matter how simple, or how special, just so it is thread cutting. It will be worth your while to investigate our claims.

Catalogue No. 22

LANDIS MACHINE COMPANY

WAYNESBORO, PA., U.S.A.

EXCLUSIVE CANADIAN AGENTS: WILLIAMS & WILSON, Limited, MONTREAL, CANADA



CINCINNATI VERTICALS

UNUSUAL SPINDLE POWER. HEAT TREATED ALLOY STEEL HARDENED GEARING.

MASSIVE SPINDLE HEAD CONSTRUCTION.

HANDY—CAN MILL AROUND A RECTANGLE WITHOUT STOPPING FEED OR SPEED.

These are some reasons why you should use CINCINNATI VERTICALS.

The Cincinnati Milling Machine Co.

CINCINNATI, OHIO

Canadian Agents:

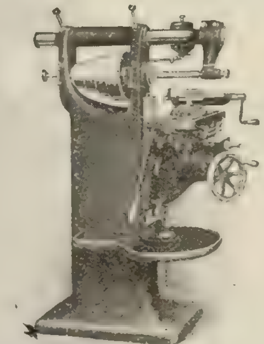
H. W. Petrie, Ltd.	Toronto, Ont.
H. W. Petrie of Montreal, Ltd.	Montreal, Que.
Taylor Engineering Co., Ltd.	Vancouver, B.C.
General Supply Co. of Canada	Winnipeg, Man.

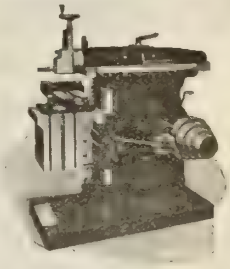
“W. & B.” Drop FORGINGS

¶ We make a specialty of the highest grade Drop Forgings. Our exceptional capacity and equipment insure accurate forgings and prompt delivery.

The
Whitman & Barnes
Manufacturing Co.
Established 1854
St. Catharines, Ontario

Send us Blue Prints on Special Forgings, three pounds and under in weight, and permit us to estimate on your requirements.





Increased Production Means Increased Profits

Large Millers for large work —STEPTOE MILLERS for small work

Large Planers for large work --STEPTOE SHARPERS for small work

Will result in increased production; less money invested in machinery, and increased profits.

THE JOHN STEPTOE COMPANY
CUMMINSVILLE, CINCINNATI, OHIO, U.S.A.

“ALLEN” Riveting Machines

cut the time on a riveting job to the limit.

Whatever your riveting problem there's an “Allen” machine to solve it, or we will build one of special design to meet your requirements.

Made in types suitable for structural bridge or boiler riveting.

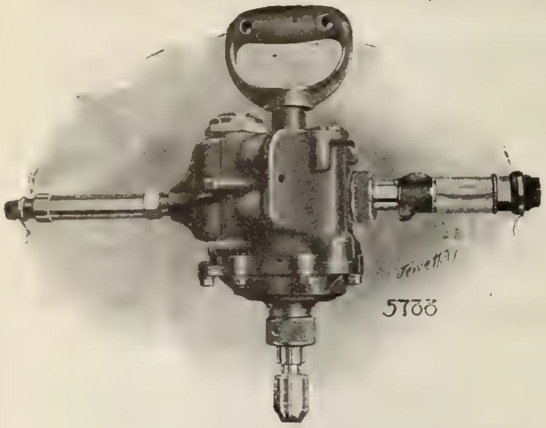
SEND FOR ILLUSTRATED BOOKLET.

JOHN F. ALLEN COMPANY
370-372 Gerard Avenue, NEW YORK

Established 1872.

Lieber's and W. U. Codes “Riveter”

The Absence of Complicated Parts



and their ability to do the maximum of work on the minimum of power and cost, has made "LITTLE DAVIDS" the most extensively used pneumatic tools in Canada.

Let us send you Circular 739.

CANADIAN INGERSOLL-RAND CO., LIMITED
COMMERCIAL UNION BUILDING - MONTREAL, CANADA
SYDNEY TORONTO COBALT TIMMINS WINNIPEG NELSON VANCOUVER
Works: Sherbooke, Que.

HIGH SPEED HAMMERS
For High Speed Work

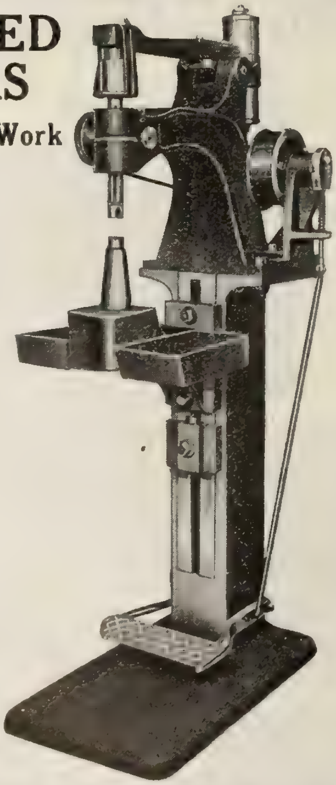
FEATURES:

Economy in floor space, elimination of weight and a guaranteed saving of from 15% to 20% on any class of work. The life of the machine is practically indefinite as phosphor bronze bushings are used throughout.

No riveting too intricate for us; no riveting which our machine cannot accomplish.

Send for our High Speed Hammer Book.

THE HIGH SPEED HAMMER CO.
Rochester, N.Y.
Sales Agents: The A. R. Williams Machinery Company, Limited, Toronto, Ontario.



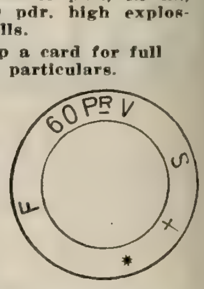
Marking Base of SHELLS

A PERFEC
JOB
in 15 Seconds

The "Grant" Shell Marker
is so arranged that the blow is brought to bear on each individual letter successively, while the blow can be adjusted to give a shallow or deep impression which is uniform for each letter or figure. The work is completed in one revolution of the shell, which is done by hand. Made for 18 pdr., 4.5 in., and 60 pdr. high explosive shells.

Drop a card for full particulars.

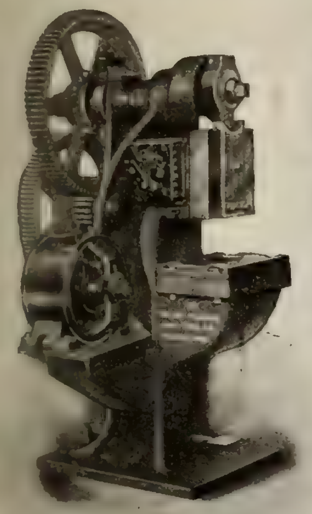
Cut on right shows marking on shell.



THE GRANT MFG. & MACHINE CO.
Holland Ave.
BRIDGEPORT, CONN.
U.S.A.

Strong, Rigid, Compact — Built Up to the Customary "Toledo" Standard.

"Toledo" PUNCHING PRESSES



Answer every requirement in speed of adjustments, ease of operation, and great efficiency.

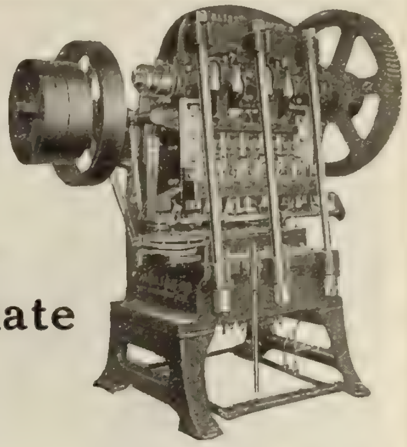
Built in 15 sizes for punching, shearing and cutting out blanks of heavy metal; for operating, trimming and forming dies in the manufacture of automobiles, motor cycles, and an extensive line of work formed from bar and sheet metal.

Our expert engineers at your service to place in your plant the right machine for your special requirements.

Presses for Every Purpose.

The Toledo Machine & Tool Co.
Toledo, Ohio, U.S.A.

BLISS



Eliminate Intermediate Handling

Bliss Automatic Combination Presses perform five operations each stroke, eliminate intermediate handling, give multiplied production, reduce costs and effect a saving in shop room.

Especially adapted for the economical production of lamp sockets, burner shells, ferrules, stove trimmings, door knobs, lantern parts and a large number of stampings which require a series of operations.

Write us your requirements. A study of your individual needs will enable us to fulfil your every requirement. We have the facilities.

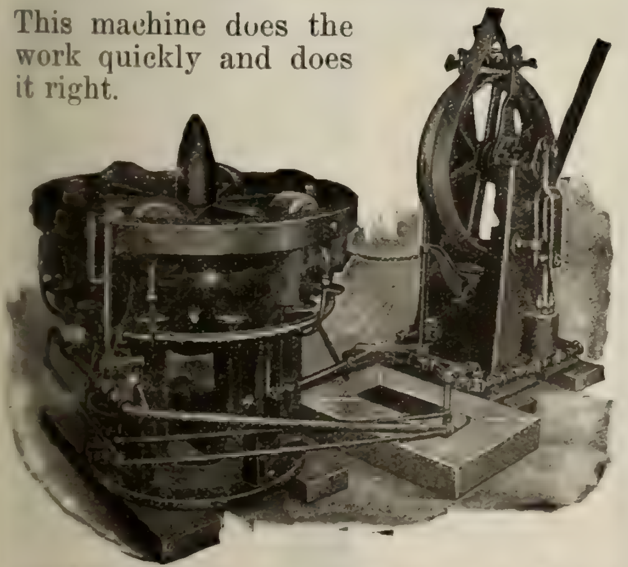
E. W. Bliss Co., 20 Adams Street, Brooklyn, N.Y.

Chicago Office: 622 West Washington Boulevard;
Detroit Office: Dime Bank Building

Hydraulic Banding Machine

For compressing bands on shrapnel shells and other projectiles

This machine does the work quickly and does it right.



In writing for information or quotation please advise width and thickness of bands and diameter of shells to be handled.

Machines for our Canadian Customers are built in Hamilton, Ont.

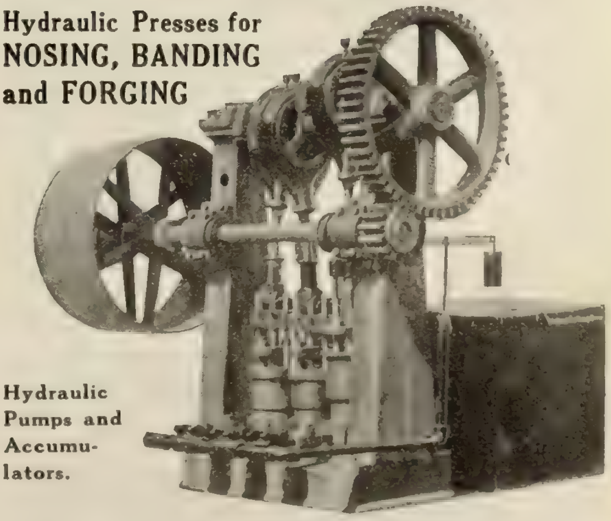
We also manufacture machines for setting wagon and carriage tires, cold.

Please address all communications to our Rochester Office

THE WEST TIRE SETTER COMPANY
ROCHESTER, NEW YORK, U.S.A.

PRESSES FOR SHELLS

Hydraulic Presses for NOSING, BANDING and FORGING

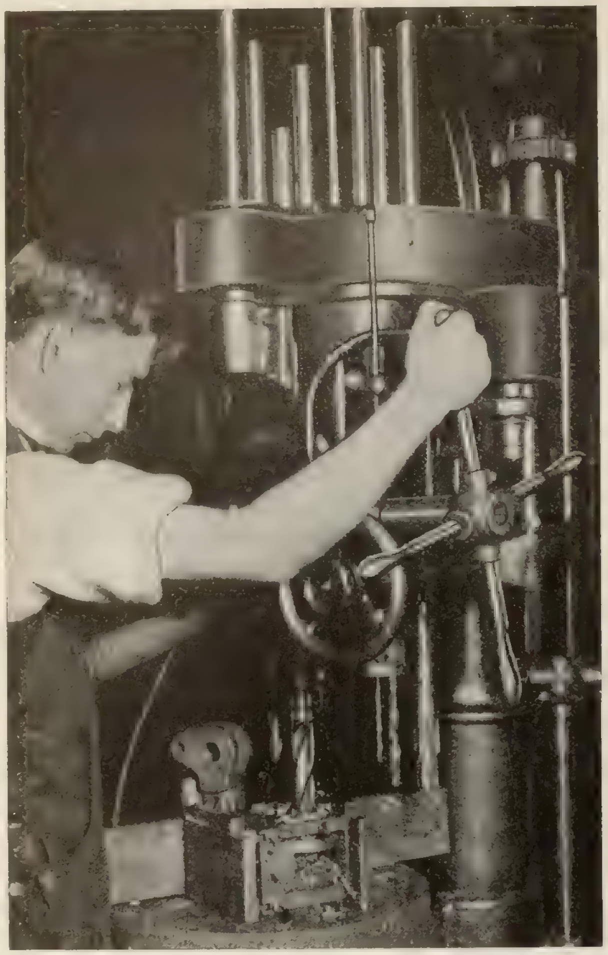


Hydraulic Pumps and Accumulators.

Hydraulic Presses for all purposes.

WRITE FOR FULL DETAILS NOW.

William R. Perrin, Limited
TORONTO, ONTARIO



In Service Several Years—*but as accurate and fast as ever*

One of the four Turner Turrets owned by the A. O. Norton Co., Boston, one of which is in operation at their Canadian plant at Coaticook, Quebec.

The casting is a malleable iron socket for a 100 ton Norton Jack. The operations are: 1st Spindle, drill 1⅛", hole through two ¾" sections. 2nd Spindle, a double cutting tool reams the lower section and counterbores the upper section. 3rd Spindle, drill a 5" hole 2¾" deep. 4th Spindle, drill ¼" hole through two ¼" lugs. 5th Spindle, drill 5-16" hole ½" deep. 6th Spindle, drill 3-16" hole and counterbore to ½". **And all this work is done on the Turner Turret in 8 minutes.**

The

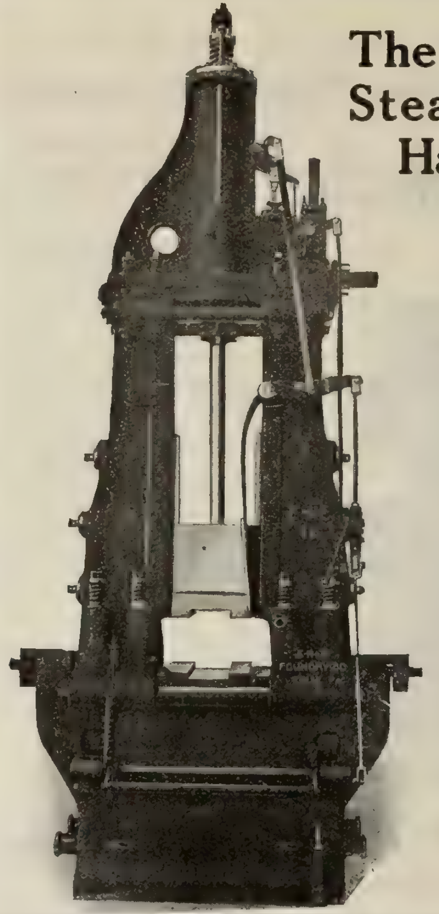
TURNER TURRET

is built in several sizes, and is designed especially to perform several operations upon a piece of work at a single setting. On all work within its range it is more economical than a big chucking machine because its initial cost is about half that of the larger tool. Also, it is fast—and accurate, because it performs its work at one setting of the piece. The TURNER TURRET is a rapid producer on shell parts.

Mail us your blue prints, and let us give you estimates on the Turner Turret. Ask for catalog

TURNER MACHINE COMPANY
DANBURY, CONN., and Newark, N.J. U.S.A.

Incorporated with Turner, Atherton & Co., Ltd., Denton, Manchester and Stockport, Eng.



The "ERIE" Steam Drop Hammer

is the last word in Hammer construction. Ask any user.

A list will be supplied upon request.

We also build Trimming Presses.

Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

Erie Foundry Co.
ERIE, PA.

Charles F. Elmes Engineering Works

217 N. Morgan Street, Chicago, U.S.A.

Hydraulic Machinery

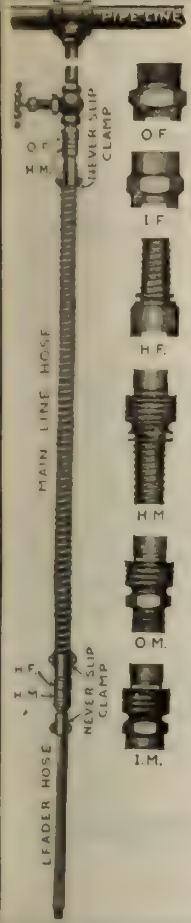
for all purposes, accumulators, pumps, high pressure valves and fittings, forcing presses, wheel presses, belting presses, metal drawing presses.

Special Machinery

built to order, hot and cold molding presses, patented rapid-acting operating valves, veneer presses, patented veneer retainers, lead and solder presses.

Write for Catalog

CLEVELAND HOSE SPECIALTIES



Bowes Automatic Air Hose Couplings

Over 1,000,000 in general use

STYLE O.F. is an Outside Thread Female Pipe End. Made in sizes ⅜-in. to 1½-in.

STYLE I.F. is an Inside Thread Female Pipe End. Made in sizes ¼-in. to 1½-in.

STYLE H.F. is a Female Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes ¼-in. to 1½-in.

STYLE H.M. is a Male Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes ¼-in. to 1½-in.

STYLE O.M. is an Outside Thread Male Pipe End. Made in sizes ⅜-in. to 1½-in.

STYLE I.M. is an Inside Thread Male Pipe End. Made in sizes ¼-in. to 1½-in.

The Male and Female Ends of Bowes Couplings interchange in sizes, ¼-in. to ¾-in. Sizes 1-in. and 1¼-in. interchange. The 1½-in. ends interchange only with themselves.

BOWES COUPLINGS

Are instantly connected or disconnected.

They are absolutely air-tight under all pressures.

They quickly pay for themselves by stopping costly leaks.

They interchange in sizes most commonly used.

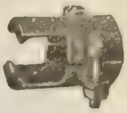
They have no loose parts to be mislaid or lost.

They are made of brass and will not rust.

The U-shaped interchanges in couplings ¼-in. to ¾-in.

The Cleveland Never Slip Hose Clamp

Made in same sizes as Bowes Couplings

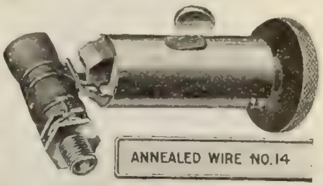


The adjoining cut of Never Slip Hose Clamp shows the "Flanges" which engages the groove provided in all hose ends of Bowes Couplings. The "Model Hose Line" illustrated shows correct styles of couplings to use and proper way to attach the clamps.

CLEVELAND GROOVED HOSE NIPPLE

Grooved Nipples when attached to hose with the wire clamp cannot "blow-out," as one half of the Wire Clamp lies in Nipple Groove, and the other half on the hose, uniting nipple and hose permanently. "Blow outs" are expensive, as one to five men are idle while new connection is being made; time wasted, ten to thirty minutes. Can you afford it?

WIRE CLAMP TOOL



To apply Wire Clamps to Grooved Hose Nipples you need the Wire Clamp Tool illustrated, a small hand-operated tool at moderate cost which we carry in stock for immediate delivery.

In Stock: Riveting and Chipping Hammers, Four-piston Air Drills, Corner Drills, Emery Grinders, Sand Rammers, Holder Ons, Etc.

WRITE FOR BULLETIN NO. 29.

IMPORTANT:—The Small Leaks in your "AIR LINE" mean serious loss in DOLLARS. Have you any idea of the amount of "Air" wasted in small leaks at your connections? Air Leakage through 1-16 in. opening equals 5.32 cu. ft. per minute at 80 lbs. It will pay you to install Bowes Couplings and stop costly leaks.

Write for Catalog No. 12, which illustrates our complete line of Air Tools.

CLEVELAND PNEUMATIC TOOL CO. OF CANADA LTD., 80 Duchess St., TORONTO

A. R. WILLIAMS MACHINERY CO., TORONTO. WILLIAMS AND WILSON, MONTREAL

Thor

CHIPPING HAMMERS with Single Valve of the Latest Improved Design.

Made in five sizes, with piston diameter of 1 1/16" by strokes of from 1 to 5", designated as sizes A, B, C, D and E. **Shipped on Trial at Our Expense**

Independent Pneumatic Tool Co.

CANADIAN OFFICE:

334 St. James St., MONTREAL, QUE.

General Offices: Thor Building, Chicago, U.S.A.

Branches: New York, Pittsburgh, Detroit, San Francisco, Birmingham

---

U. S. Electric Drills and Grinders

Save Time, Labor and Money

They can be attached to any lamp socket.

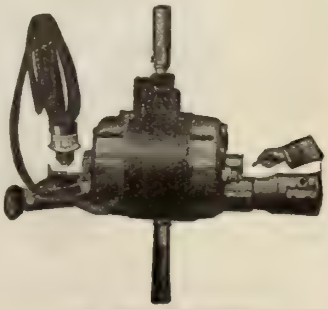
For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

3 SIZES		
3-16 inch,	W.G.T.	6 lbs.
¼ inch,	W.G.T.	9 lbs.
⅜ inch,	W.G.T.	12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



½ inch—2 SPEED.

Speed, 400-750 R.P.M.

For Sale By

The Canadian Fairbanks-Morse Co., Limited

Montreal. St. John, N.B., Toronto. Winnipeg. Calgary. Vancouver.

THE UNITED STATES ELECTRICAL TOOL CO.

CINCINNATI, OHIO

If any advertisement interests you, tear it out now and place with letters to be answered.

The Greenfield

For Special Work, Tools, Jigs, Etc.

This Universal Grinder is just the machine needed in many of the shops engaged in equipping for the manufacture of special lines. It is an all-around grinder and will handle about any kind of a job that comes within its range.

It has a stiffer, more rigidly supported table than any similar machine. It will turn out accurate, dependable work. Also, we believe we are perfectly correct in stating that we furnish this machine with a larger and more complete set of attachments than can be had for any grinder selling at anything like the same price.

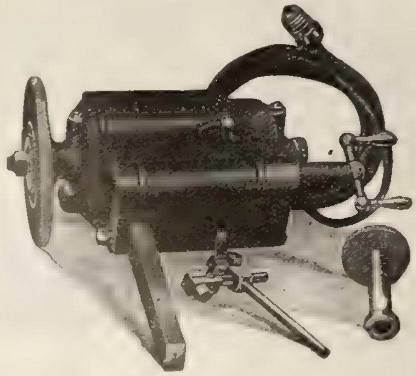
How can we do it? Specialization and building in quantities.

Ask for Catalog No. 5, showing the machine in twenty-one different "set-ups" and explaining the purpose of each.

Greenfield Machine Company
Greenfield, Mass., U.S.A.

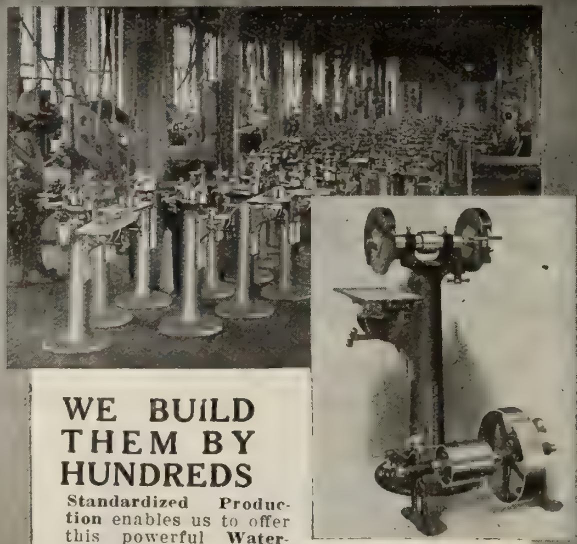
Stow Tool Post Grinder

Does the most accurate of work—patent bearings, for Internal and Surface Grinding—A.C. or D.C. Immediate shipment from stock. Plain or with slide.



One of the many electric portable tools built by

Stow Manufacturing Co.
Binghamton, N.Y.
Oldest portable tool manufacturers in America.
London Stock, 85 Queen Victoria St.



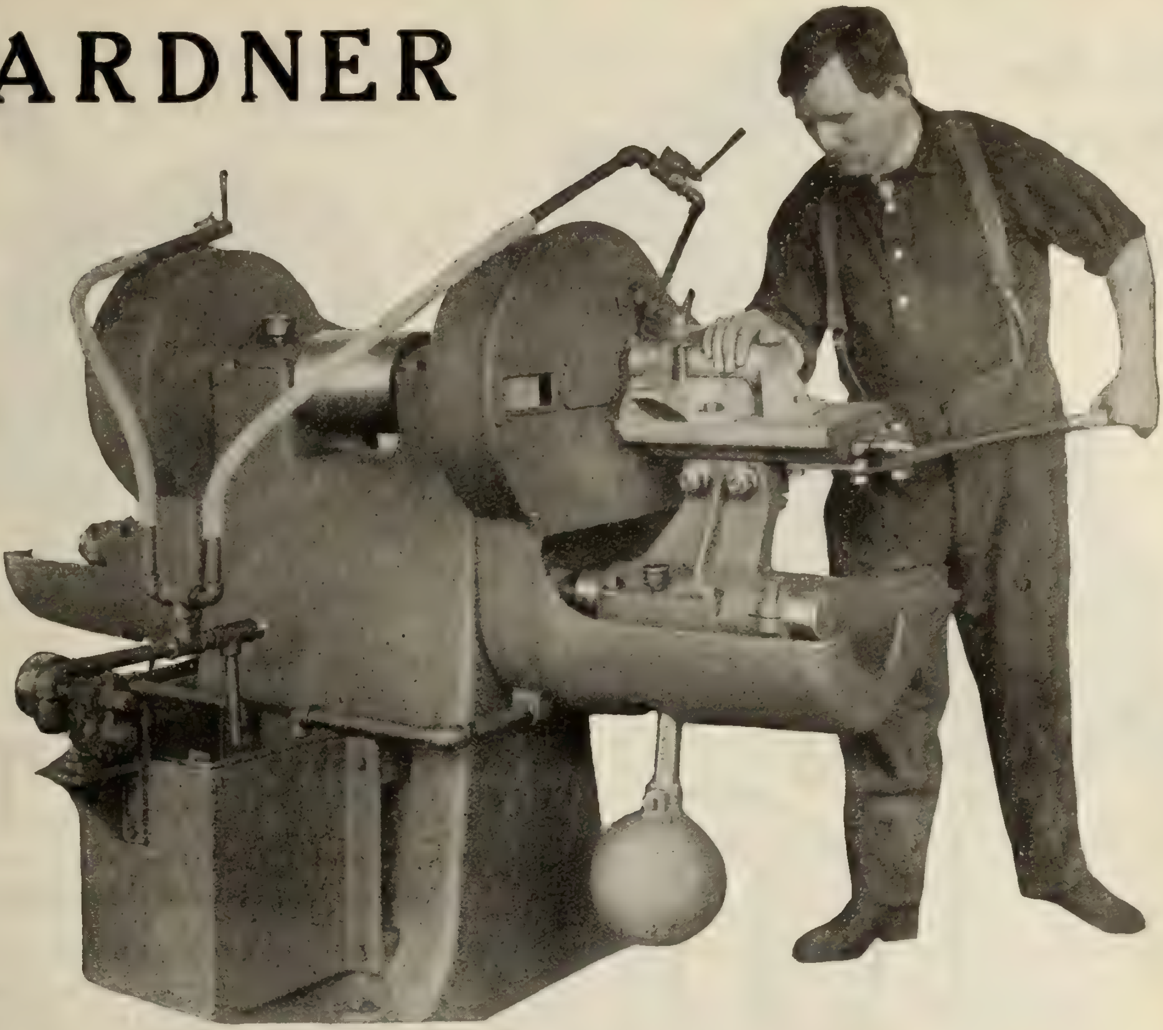
WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only $60 Complete

The Blake & Johnson Co., Waterbury, Conn.

GARDNER GRINDERS



For Grinding Ends of Shells

We have developed a Special Grinding Machine for removing the hub or centre projection from the ends of shells. This grinder is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates.

We build as well a much heavier and more Powerful Grinder to be used for these same operations on 6" Shells.

FEATURES

- **High-Grade Babbitt Bearings and Lever Feed.**
- **Rapid clamping of Shell into "V" fixture.**
- **Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.**
- **Can be equipped and operated at both ends for double output.**
- **Output, according to size of projection to be removed, from 40 to 100 per hour.**
- **Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments.**
- **Weight, 4,500 lbs.**

For further particulars write

The Gardner Machine Company, Beloit, Wis., U.S.A.

The New "Murchey" Adjustable TAP

MURCHEY MCH.& TOOL CO.
DETROIT, MICH.
2"-14
WHITWORTH

POSITIVELY ACCURATE

10 times the life of the ordinary tap

With the Murchey Tap and chasers can be ground any number of times and adjusted each time to compensate for wear. One set of chasers will last ten times as long as a solid tap, and new chasers can be replaced at low cost.

Now with the solid tap it is an entirely different matter. Just as soon as you begin to sharpen a solid tap, it loses size and accuracy, and after one or two sharpenings the tool is of no further use.

This new Murchey Adjustable Tap is working finely and we are receiving a great number of orders for it. Send in yours to-day—the price is of no consequence considering the remarkable results and economies shown in length of service.

FULL PARTICULARS ON REQUEST.

Murchey Machine & Tool Co.
34 Porter Street, DETROIT, MICH.

Once Known—Always Used

M. E. C. Collapsible Taps

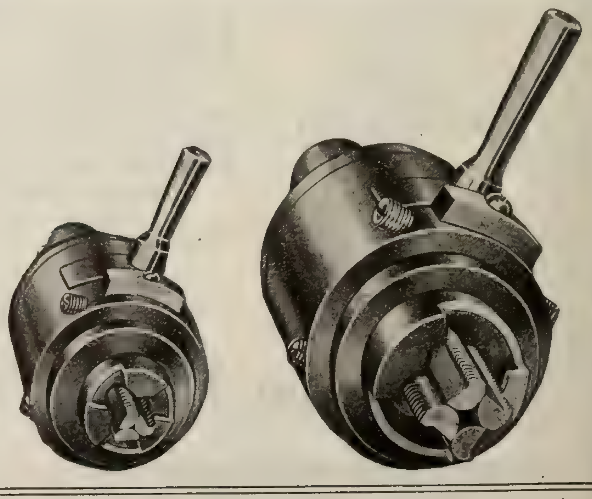
are giving extraordinary service on Shrapnel and Cartridge SHELL work.

It will be Greatly to your interest to get a line on the value of this tap. WRITE SOME USERS—we'll gladly send names and addresses.

Full particulars and details of our liberal proposition on request.

Manufacturers Equipment Co.
175 North Jefferson St., CHICAGO, U.S.A.

Canadian Agents:
FOSS & HILL MACHINERY CO., Montreal
A. R. WILLIAMS MACHINERY CO., Winnipeg
GEO. A. TODD, 826 Traders Bank Bldg., Toronto



HEAVY DUTY

Ammunition Lathes

FOR

Immediate Delivery

FULL INFORMATION ON REQUEST TO

HYDE ENGINEERING WORKS

27 WILLIAM STREET - - - MONTREAL, P.Q.

Don't Buy a Magnetic Chuck on Price!

Its first cost may be low. But

HOW MUCH WILL IT COST TO OPERATE?

HEALD MAGNETIC CHUCKS

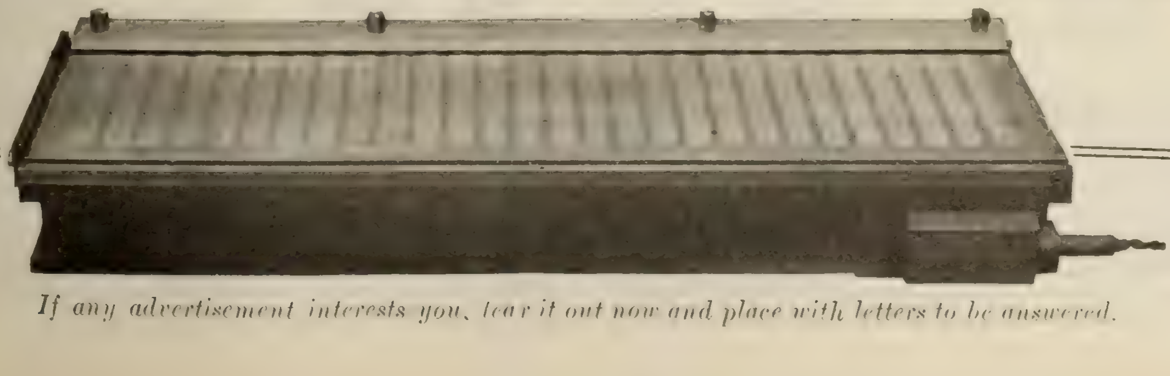
Consume a Comparatively Small Amount of Current

considering their great holding power, therefore the operating cost of Heald Magnetic Chucks is lower than the ordinary magnetic chucks.

Catalog and full information on request.

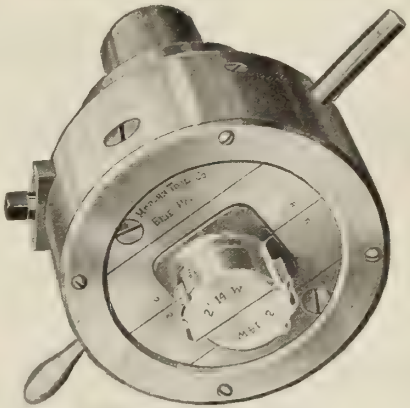
THE HEALD MACHINE CO., 8 New Bond Street, Worcester, Mass.

BRANCH OFFICE: CHICAGO, 24 So. Jefferson St. CLEVELAND, 710 Engineers Bldg.
CINCINNATI, 602 Provident Bank Bldg. DETROIT, 303 Majestic Bldg.



Modern Self-Opening Adjustable Die Heads and Collapsible Taps

Modern Self-Opening Die Head.



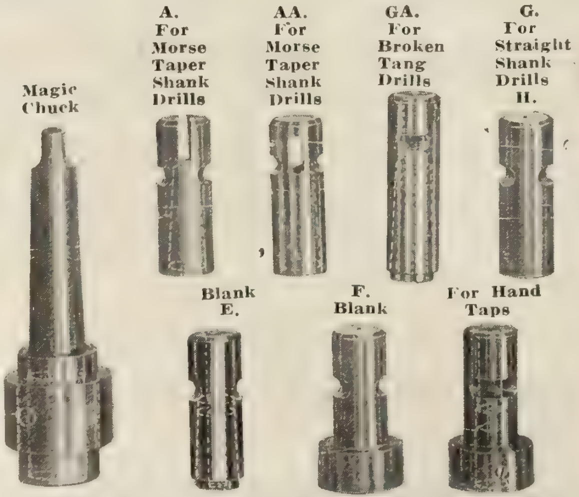
Modern Collapsible Tap.

"Modern," Self-Opening Die Heads and Collapsible Taps in your thread-cutting department mean efficiency and accuracy. With "Modern" Dies and Taps it is not necessary to take a roughing cut—a single cut gives a finished thread of absolute accuracy in diameter, form, lead and pitch. They are properly supported to insure the cutting of a perfectly straight thread of full size and accurate lead, and will not clog with chips, necessitating frequent cleaning. Cuts close to a shoulder.

"Modern" Die Heads and Collapsible Taps are used on all styles of Hand and Automatic Screw Machines, Turret Lathes, Chucking Machines, Drill Presses, in fact on any Machine that is used for thread-cutting.

Magic Chuck Equipment

The simplest, safest, easiest to operate and most adaptable chuck on the market. For use on Drill Press, Lathe, Screw Machines and other Revolving Spindle Machines.

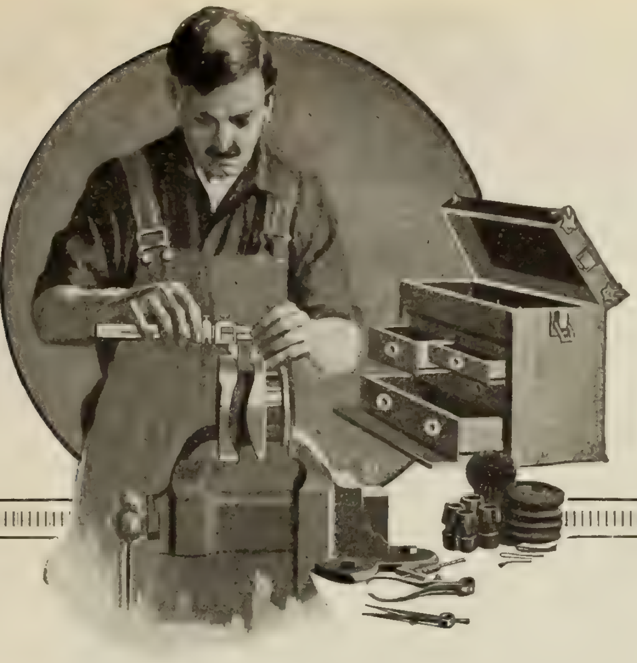

Magic Chuck
A. For Morse Taper Shank Drills
AA. For Morse Taper Shank Drills
GA. For Broken Tang Drills
G. For Straight Shank Drills H.
Blank E.
F. Blank
For Hand Taps

Made in six sizes—the largest with capacity up to 5% diam. drills.

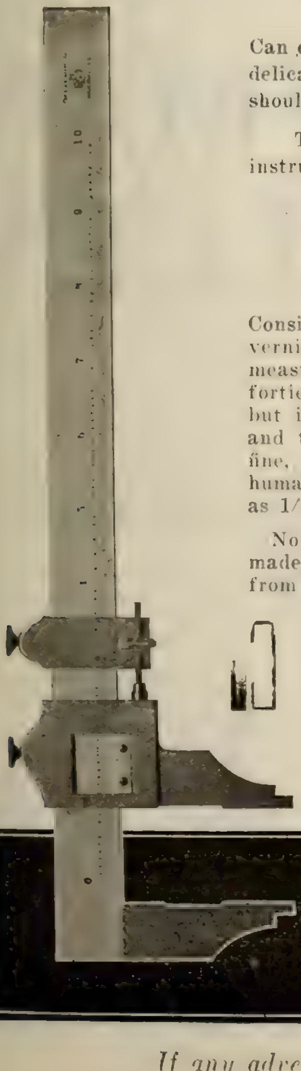
Handles such operations as Drilling, Reaming, End Milling, Counter Boring, Tapping, in fact any operation that can be done on a Drill Press, increasing the output from 20% to 100%.

MODERN TOOL COMPANY

Main Office and Works: STATE and PEACH STREETS, ERIE, PENNSYLVANIA, U.S.A.
Canadian Agents: Rudel-Belnap Machinery Co. Toronto and Montreal
New York Office: 50 Church Street
Chicago Office: 32 N. Clinton Street



What Makes a Vernier Caliper Accurate?



Can one vernier caliper be better than another? Is there a difference in the quality of such delicate instruments as this? If accurate government standards are accessible to all, why should one instrument be superior to another?

The answer is just this—the quality of the graduations determines the quality of the instrument and the cleanest, sharpest graduations are found on

Starrett Vernier Calipers

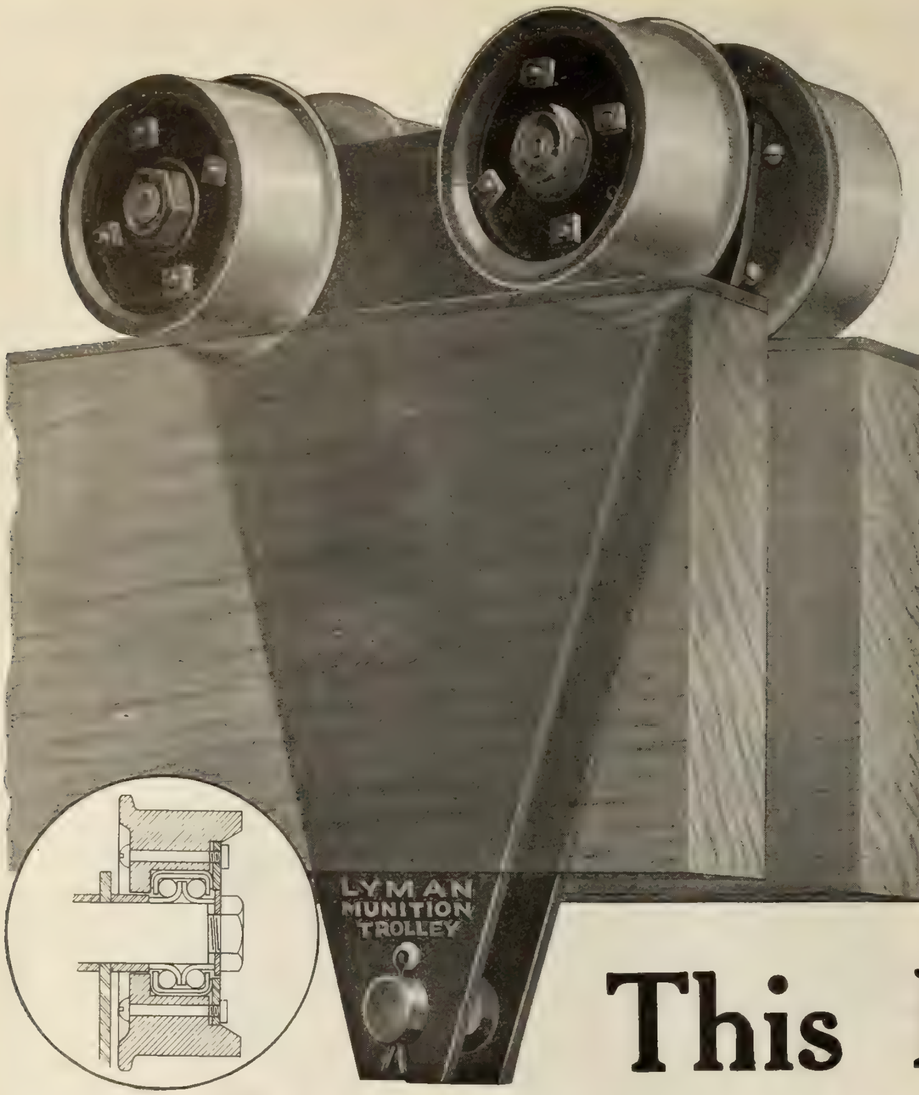
Consider that the finest graduations on a vernier caliper are 1/40 of an inch. To measure thousandths of an inch, these fortieths must be split into twenty-fifths, but if the graduations on the fixed scale and the vernier plate are not sharp and fine, it is physically impossible for the human eye to discern adjustments as fine as 1/1000 of an inch.

Now, while our vernier calipers are finely made, with accurately graduated scales from carefully selected and hardened steel, and with fine workmanship, we leave our whole claim for actual supremacy to the man who examines the graduations of the tool and finds them cleaner, finer, and sharper than any he ever saw before.

Look at those graduations under a microscope and see for yourself if they are not cleaner, daintier, and snappier than you have seen before. Then decide whether you will trust really accurate work to any but Starrett Tools.

Catalog 213 contains 336 pages of fascinating reading for the man who loves tools. It's free to men interested.

The L. S. Starrett Co.
The World's Greatest Toolmakers
Athol, Mass.
New York London Chicago



SIMPLE and inexpensive—light and easy-running — strong and durable—the Lyman Munition Trolley saves labor, time and costs in handling shells. It has more than made good in the plants where it has been introduced.

For tracks it uses 2" planks, faced with ¼" steel, as illustrated. These are quickly erected, at trifling cost.

The track wheels are fitted with double-row ball-bearings, which take care of thrusts due to side-sway, and reduce friction to a minimum.

This LYMAN MUNITION TROLLEY

Speeds Up Shell Making

Used with our "CYCLONE" Chain Hoists and new, quick-acting Shell Tongs, the Lyman Munition Trolley handles shells with surprising ease and speed, increasing output and reducing costs.

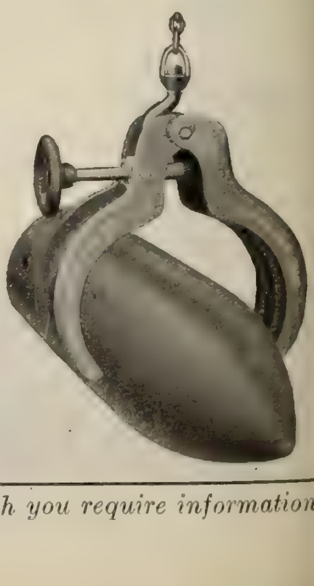
Its simplicity enables us to offer the LYMAN Munition Trolley at a most attractive price. Write or 'phone us for particulars.

Lyman Tube & Supply Co., Limited

Montreal
323 St. James St.

Toronto
33 Melinda St.

Cyclone Shell Tongs



"FULFLO" MACHINE TOOL Lubricant PUMP

You can drive your machines faster

but your cutting tools won't stand it — the speed burns them up.

A cutting tool will stand up to higher speed and heavier feeds, providing it is kept cool.

The "FULFLO" Machine Tool Lubricant Pump supplies a good "HEAVY" stream of compound sufficient to carry away all the heat.

No gears or other close-fitting parts to be affected by the grit, dirt, or small chips that are always present in the coolant. No clogging.

The only working part is the impellor. Since no check valve, reverse valve or any other kind of valve is present in the pump or pipe, other than the stop cock, the usual valve troubles are eliminated.

Easily attached to any machine. **Insist that the new machines you buy be equipped with the "FULFLO."**

The Cincinnati Lubricant Pump Co.
126 Opera Place **Cincinnati, U.S.A.**

ECONOMIC WATER OIL

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the **COST** of your **CUTTING MIXTURE** BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with **30 to 50** gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be **satisfactory**, but will produce very **ECONOMIC RESULTS.**

One TRIAL ORDER will **prove** our STATEMENT.

Made in Canada

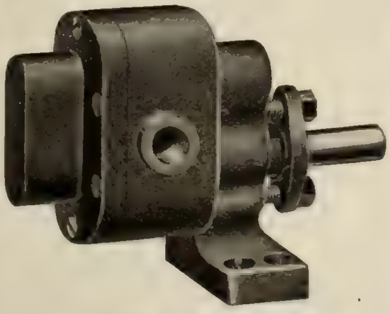
Canadian Economic Lubricant Co.
LIMITED
1040-1042 Durocher St. **MONTREAL**

ROPER Circulating Oil Pumps

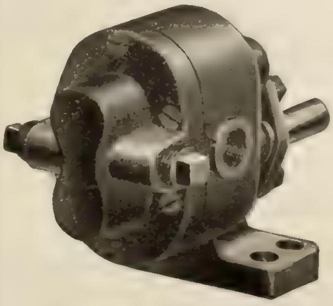
Whenever you are in the market for oil pumps, we ask you to investigate the pumps of our making. A long and wider experience, joined to Specialization, have pre-eminently fitted us for the making of this line. We meet with literally thousands of buyers and users and have the benefit of their knowledge and judgment. Our pumps are suitable

FOR ANY MACHINE

being made in five sizes. Two of our three models are illustrated in this advertisement. The action of these Roper Pumps is extremely simple, consisting of two accurately cut steel gears running in a tight chamber. There is nothing to get out of order.



Type 1 One-way



Type 2 One-way

Type No. 1. ONE WAY is specially designed for use on machines in which the cutting tools operate constantly in one direction.

Type No. 2. ONE WAY is designed for use on machines where the delivery is cut off or varied with the pump running. Both models supply oil to the cutting tools at exactly the required rate. We also make reversing pumps in both types.

WRITE FOR FULL INFORMATION

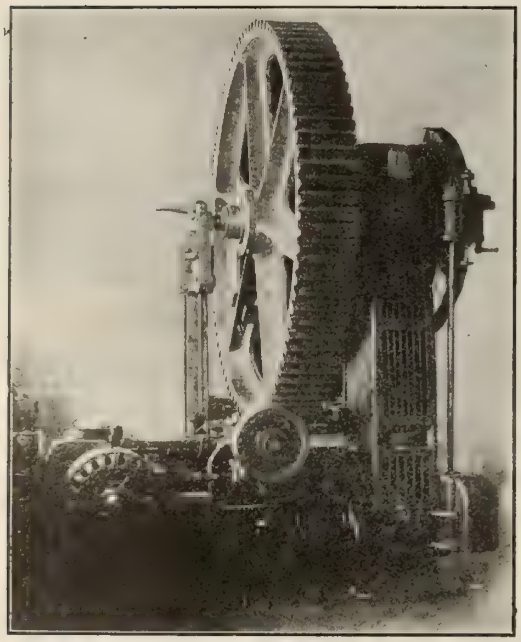
concerning these pumps. Our strong arguments with users are: simplicity, economy and perfect service. We surely have the right article.

Tell us of your needs. If you have complaints or criticisms or suggestions to make send us them. We are out to meet difficulties and solve them – for the common good.

C. F. ROPER & CO., HOPEDALE, MASS., U.S.A.

CUT GEARS

CUT GEARS



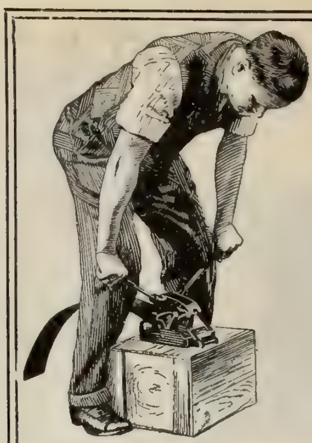
CUTTING LARGE STEEL SPUR GEAR

90 in. diam. 88 teeth. 1 in. diam. pitch.
12 in. face. 5,700 lbs. weight.

Nothing special about this job for us.

Hamilton Gear & Machine Co.

COR. CONCORD & VAN HORNE **TORONTO**

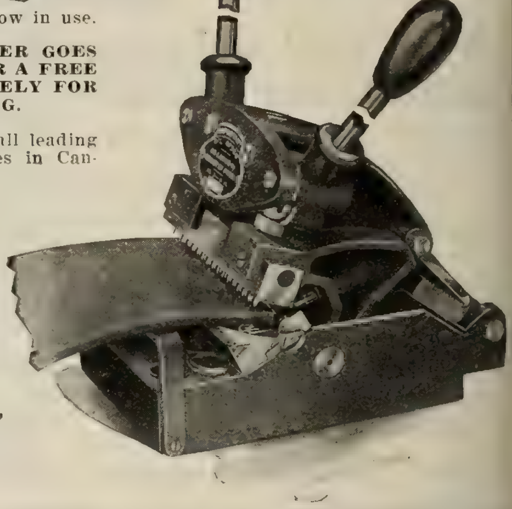


The CLIPPER Lacer Belt

Makes belt lacing easy, quick and durable.

Can be carried to the broken or stretched belt, set on the floor or a box and the lacing done in **THREE MINUTES** without removing belt from shaft.

Laces any width or thickness. Each hook will stand a pulling strain of 60 lbs., equal to 400 lbs. per inch belt.



Over 23,000 now in use.

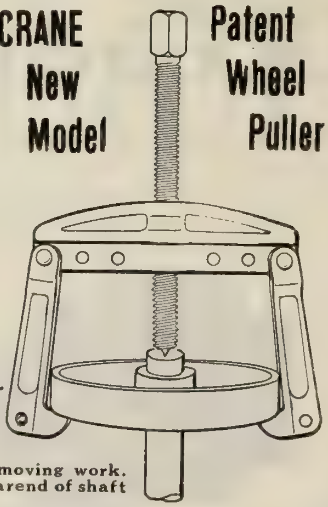
THE CLIPPER GOES TO YOU FOR A FREE TRIAL MERELY FOR THE ASKING.

For sale by all leading supply houses in Canada.

Clipper Belt Lacer Co.

1 Front Ave.,
Grand Rapids,
Mich.

CRANE New Model **Patent Wheel Puller**



Removing work. nearend of shaft

For Removing

Transmission and Cam Shaft Gears, Auto Wheels, Fly-Wheels, Sprockets, Collars, Couplings, Propellers, Universal Joints.

For straightening Shaft, Bending Pipe, etc.

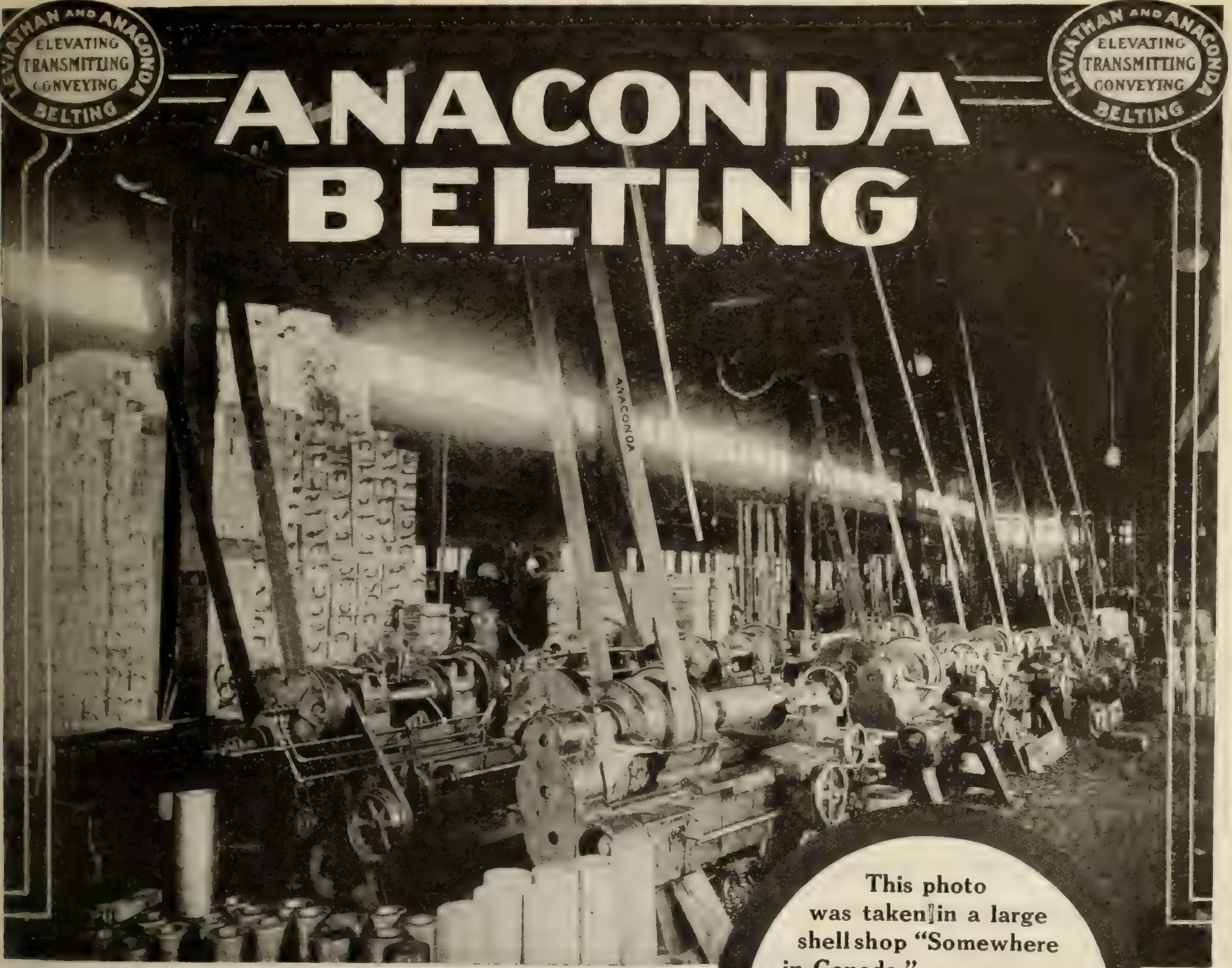
The Screw has a flat end with inserted tempered tool steel point that will not spread centres. Makes its own centre on work that has none. The strain is taken on the flat end of the screw. Grease to keep from cutting. The screws are made of high carbon steel and case-hardened all over. All Pullers are furnished with two sets of new combination hook extension arms.

The Pipe Bending Attachment is indispensible in a repair shop for straightening propeller and jack shafts, bending exhaust pipes, and removing universal joint yokes, etc. Drop a line for full particulars.

The Crane Puller Company

54 Lake St., Arlington, Mass., U.S.A.

Canadian Distributors: Canadian Fairbanks-Morse Co., Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary. John Millen & Son, Montreal, Toronto, Winnipeg, Vancouver.



ANACONDA BELTING

This photo was taken in a large shell shop "Somewhere in Canada."

All the belting you see is "Anaconda"—6000 ft., 1″ to 12″, in 4, 5 and 6 ply, was supplied by us.

Machines are working on 6″ shells.

Call at our Booth, in Machinery Hall, Canadian National Exhibition, Toronto, Ont., and secure one of our Catalogues, with full information.

"Anaconda" way, makes belts more waterproof, with less slip, less stretch and of greater general serviceability than any other belt of any kind.

"Anaconda" Belting reduces belt repairs and "take-up" to a minimum and materially increases the mechanical efficiency of the plant.

The right belting for Heavy Duty Drills, Grinders, Turret Lathes, etc., that use liquid cutting compound, because it is filled with a composition to withstand heat and acid, which also makes it waterproof.

"Anaconda" will deliver you more service per dollar than any other type of belt made. A trial is convincing.

Our 64-page illustrated book is yours for the asking. Tells of

Transmission Belts
Conveyor Belts
Elevator Belts
Big Belts
Small Belts
High Speed Belts
Waterproof Belts
Gas and Heat Resisting Belts
Endless Belts

CONTAINS CHAPTERS ON

The Matter of Stretch, Joining Belts, Fasteners, Belt Dressings, Capacities and Pulley Sizes, Belt Making, Belt Conveyors, Belt Elevators, Conveyor Equipment, Installing Belts, and other practical matters about belts.

WRITE FOR IT NOW.

MAIN BELTING COMPANY OF CANADA

32 Front St W., Toronto ***LIMITED*** **10½ St. Peter St., Montreal**

MAGNOLIA
ANTIFRICTION
METAL

TRADE MARK

SAVES "SHUT DOWNS"

GUILER SAND CO.,
KINGSTON, PA.

January 24, 1916.

I am very glad to say that I am a user of Magnolia Metal, and a satisfied one.

Furthermore, I have put this metal in three places where other metals failed; one place that caused us to shut-down several occasions at the busiest time. This special place is a 30" Cylinder of a separator that we use to break the sand and to mix the different grades. It travels 1,150 r.p.m., and will test any metal in speed and grit.

We have had very little trouble since using Magnolia and find that it does not cost half as much as other metals that we have used.

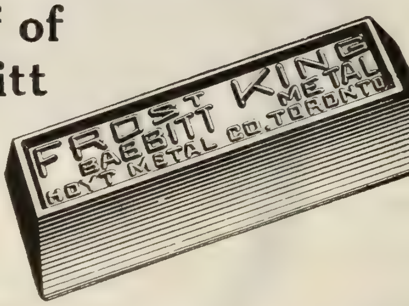
I never found any fault with Magnolia that caused me any trouble and at the end of the year I found my babbitt bills were just about half as much as before.

Yours very truly,
D. C. BOYLE,
Manager Guiler Sand Co.

PRACTICAL ENGINEER POCKET BOOK:
Over 600 pages. A valuable reference work imported from England and sold as an advertising medium at the low price of 40c. post paid.
Address Montreal Office.

SOLD BY LEADING DEALERS EVERYWHERE OR BY
MAGNOLIA METAL CO.
OFFICE AND FACTORY :
225 St. Ambroise St. MONTREAL

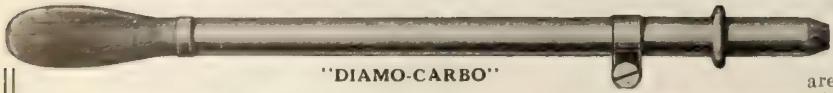
The proof of the Babbitt Metal is in the using



TRY "HOYT FROST KING"

and you'll discover something really distinctive in babbitt service. Get it from your jobber. If he cannot supply you we'll take pleasure in making you a 25-lb. shipment.

HOYT METAL COMPANY
FACTORY AND OFFICES
EASTERN AVE. and LEWIS ST., TORONTO, CANADA
New York, N.Y. London, Eng. St. Louis, Mo.



"DIAMO-CARBO"

Our **"Diamo-Carbo"** Dressers are the economical substitute for the Black Diamond Dressers. They are so low-priced that each grinding stand may be provided with its own dresser.

Our **"Sherman-Huntington"** Dressers are for use on large and coarse wheels upon which the Diamond cannot be used. It is the most satisfactory Dresser ever designed.

You can make your dull or coated grinding wheels like new in efficiency by dressing them with

DESMOND-STEPHAN GRINDING WHEEL DRESSERS

and you will eliminate delayed production and lost time, due to the loss of their cutting properties.

Insist upon having your dealer supply you with one of our tools for trial. If he cannot, write us, and we will send any of them on approval.

"SHERMAN-HUNTINGTON"

Alfred Herbert, Ltd., Coventry, Agents for Great Britain.

The Desmond-Stephan Mfg. Company
URBANA, OHIO

MR. GEORGE RIGNOLD
As Henry V. in "King Henry V."

> "If it be a sin to covet honour,
> I am the most offending soul alive."
> —KING HENRY V.

It is no sin to covet honour, and for years we have been striving for the honour of manufacturing the best

BABBITT METALS

it is possible to produce.

Our sales bear testimony that our efforts are appreciated.

HARRISMETAL
HEAVY
PRESSURE
THE CANADA METAL CO. LIMITED
TORONTO

Harris Heavy Pressure for all General Machinery Bearings.

Imperial Genuine for all Bearings Carrying Extremely Loads.

If your hardware man cannot supply you, order a box from our nearest factory.

We guarantee our Babbitt Metals to give EXCELLENT SERVICE.

THE CANADA METAL COMPANY, Limited

HEAD OFFICE AND FACTORY **TORONTO** FRASER AVENUE

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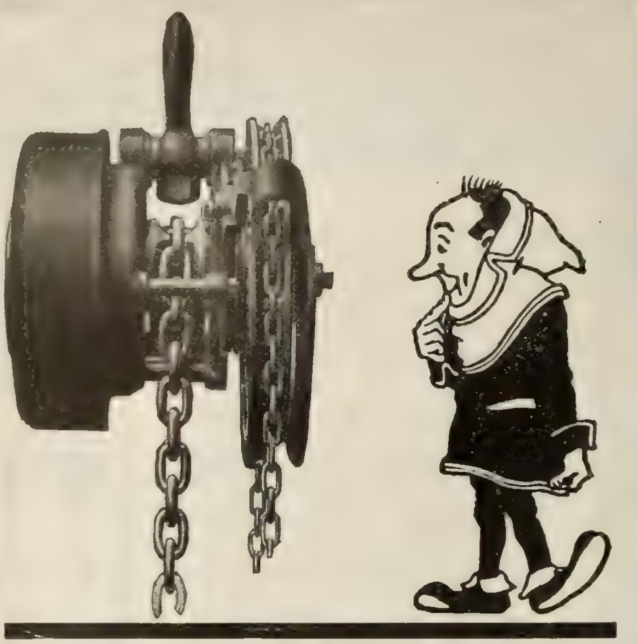

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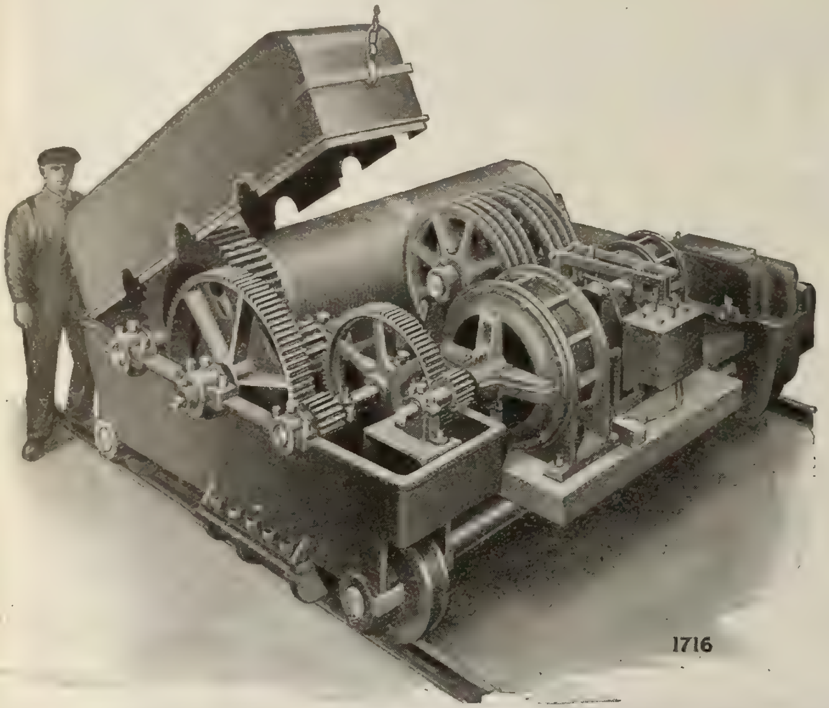
shown below was furnished the Seaboard Air Line Ry. for their Portsmouth, Va., shops for handling locomotives, two 80-ton trolleys operating on an 86 ft. span bridge.



The type "R" is essentially a "Safety-First" trolley—it has been approved by steel mill engineers as meeting all safety requirements.

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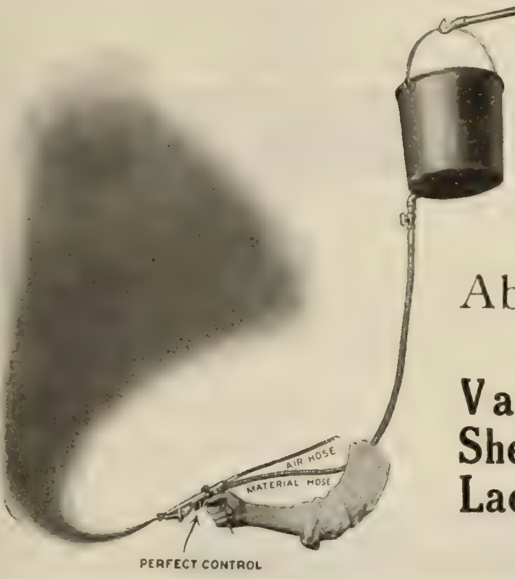
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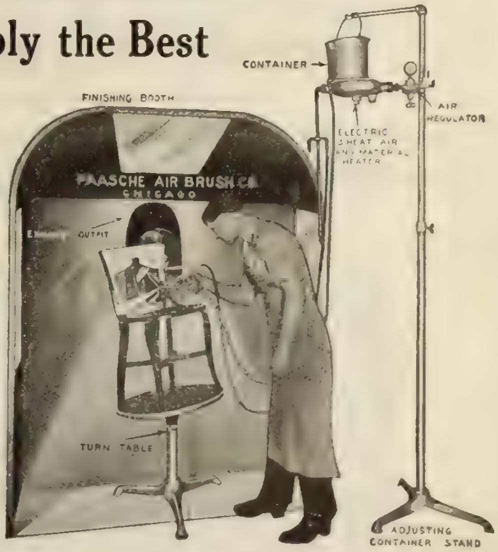
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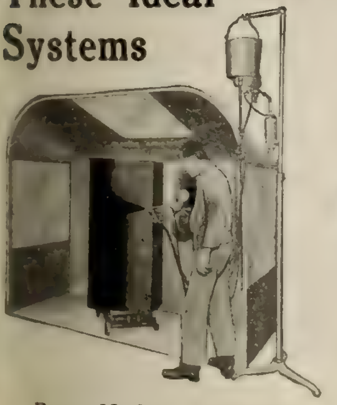

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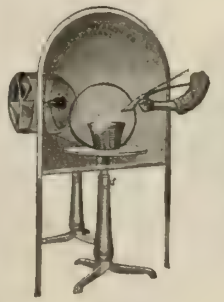

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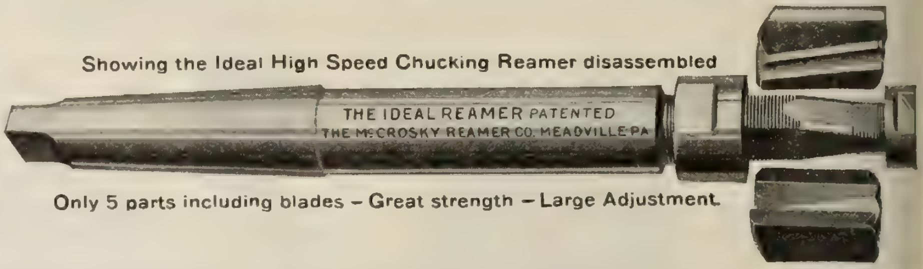
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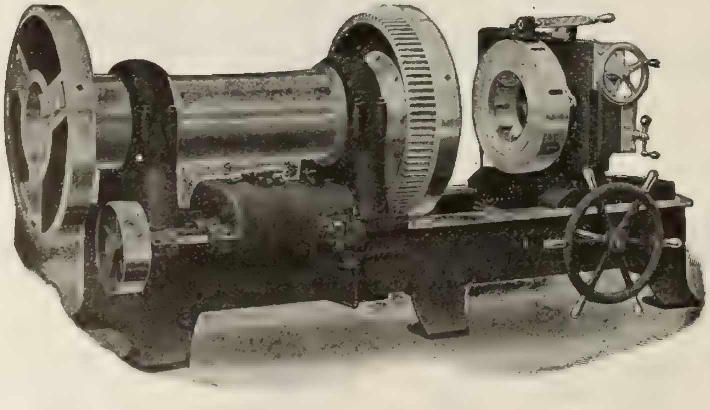

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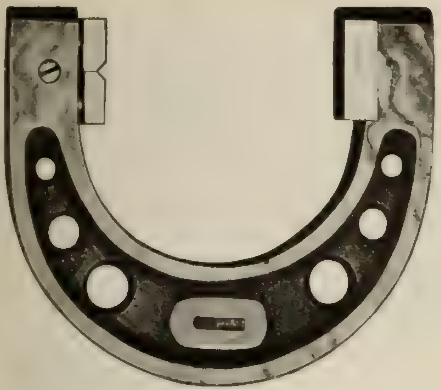

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The wheel used is a Norton Alundum, 24 x 2 x 5 in., grain 24, grade M, running at a periphery velocity of 6,000 ft. per minute.

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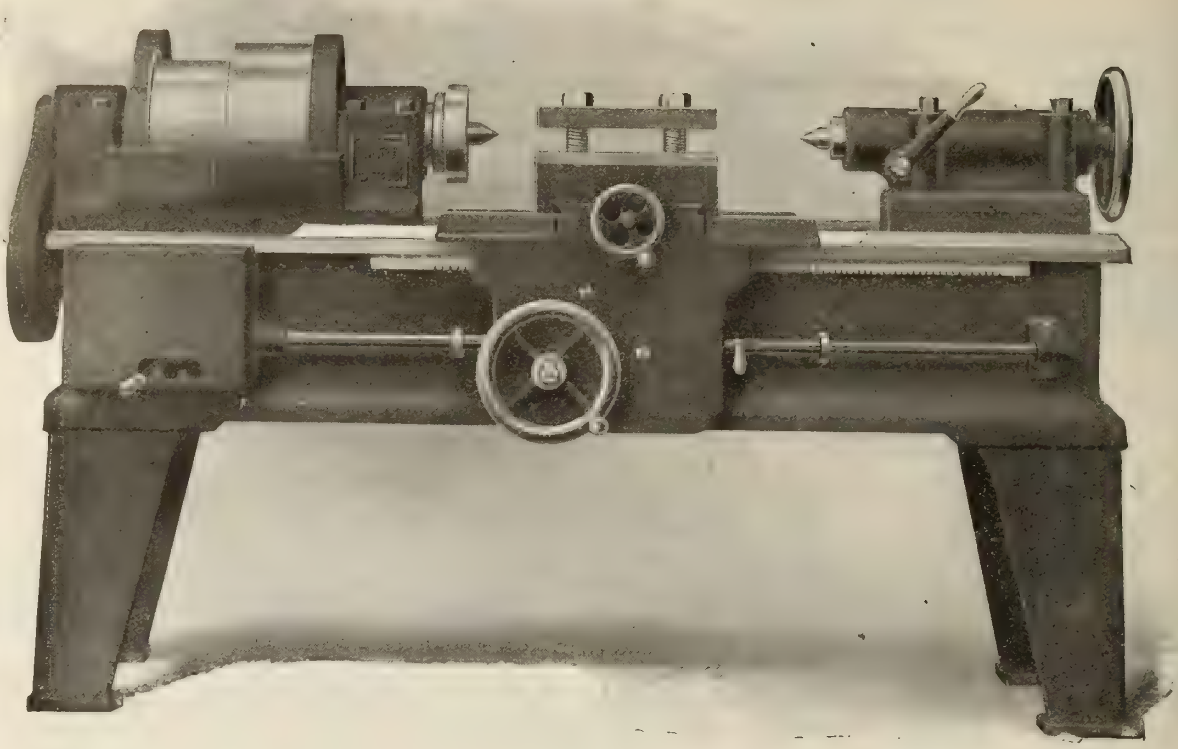

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These lathes are particularly adapted for the minor operations on all large shells, and all operations on smaller shells up to 5 in., with the application of various attachments, which we can supply. Ideal machines for rough and finish turning.

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CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

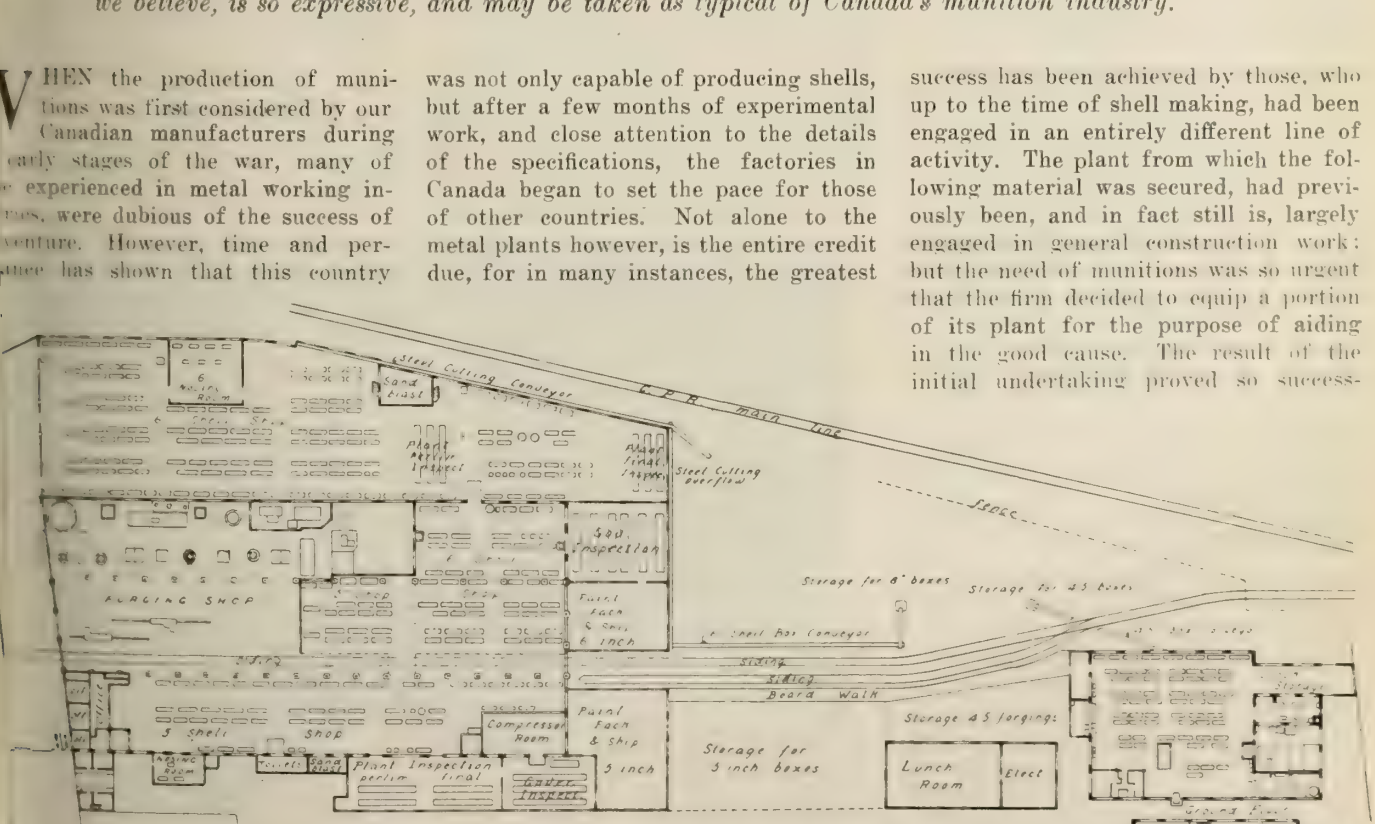
HIGH EXPLOSIVE SHELL MANUFACTURE

Equipment, Methods and Devices for Producing 6 in. Shells

Staff Artiele

While this is by no means the first descriptive article to appear in these pages covering the production of 6-inch high explosive shells, it may not be assumed that repetition of equipment and operation data figure to any appreciable extent. With the development of the munitions industry, it is but reasonable to expect a relatively increased display of inventive genius in the directions of greater quantity and higher quality output. The accompanying article, we believe, is so expressive, and may be taken as typical of Canada's munition industry.

WHEN the production of munitions was first considered by our Canadian manufacturers during the early stages of the war, many of the experienced in metal working industries, were dubious of the success of the venture. However, time and perseverance has shown that this country was not only capable of producing shells, but after a few months of experimental work, and close attention to the details of the specifications, the factories in Canada began to set the pace for those of other countries. Not alone to the metal plants however, is the entire credit due, for in many instances, the greatest success has been achieved by those, who up to the time of shell making, had been engaged in an entirely different line of activity. The plant from which the following material was secured, had previously been, and in fact still is, largely engaged in general construction work; but the need of munitions was so urgent that the firm decided to equip a portion of its plant for the purpose of aiding in the good cause. The result of the initial undertaking proved so success-


Steel Cutting Conveyor
C. P. R. main line
Sand blast
6 Nosing Room
6 Shell Shop
Plant Prelim Inspect
Plant Final Inspect
Steel Cutting overflow
Fence
Gov. Inspection
Forging Shop
Shop
Paint Pack & Ship 6 inch
Storage for 6" boxes
Storage for 4.5 boxes
Shell Box Conveyor
Siding
Siding
Board Walk
5 Shell Shop
Compressor Room
Paint Pack & Ship 5 inch
Storage for 5 inch boxes
Storage 4.5 forgings
Lunch Room
Elect
Storage
Ground Floor
Nosing Room
Toilets
Sand blast
Plant Inspection prelim final
Gov. Inspect
Lunch Room
Tool Room
Repairs Mach Fge
4.5 Shop
First Floor

TYPICAL PLANT LAYOUT FOR THE PRODUCTION OF 4.5 IN., 5 IN. AND 6 IN. HIGH EXPLOSIVE SHELLS.

ful that the entire plant is now equipped for the manufacture of high explosive shells. A brief description of the sequence of production operations on the 6 inch shells is here given.

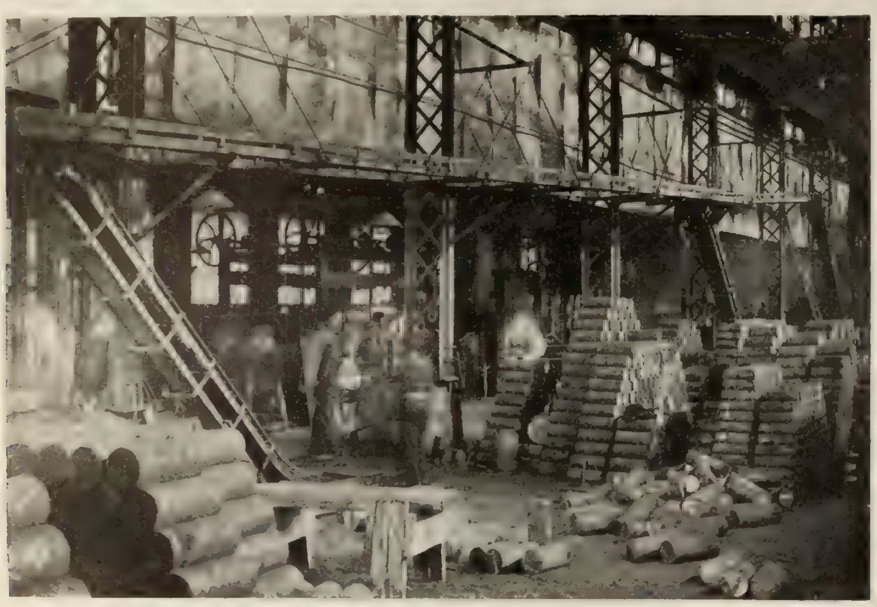


FIG. 1. MATHEWS GRAVITY CARRIER AT LEFT FOREGROUND WITH HEATING FURNACES AND FORGING PRESSES IN REAR.

Receiving the Billets

Two methods of producing the rough billets are now being used; that of casting an ingot in a metal mould, and the other of rolling a bar to the desired dimensions from a forged ingot. In the case of the former, sufficient molten metal is used in each ingot to insure a good sound billet after the crop end has been removed, which in the majority of cases amounts to about 20 per cent. of the total length of the cast ingot. When using stock from the forged bar, the rough portion at the end of the bar is first cut off, and then the billets of a length suitable for the shell forging.

This plant, not being equipped with the necessary facilities for producing the rough billets, receives them from outside sources, and is using stock derived from both the above processes. The billets arrive by teams and also by rail, being stored in separate piles, in relation to their respective heat numbers. To meet the requirements of the Munitions Board specifications, and at the same time maintain a high quality of product, it is essential that every furnace heat be kept separate, as it progresses through the various operations, to the finished shell. Owing to the experience of the past two years, and the increased facilities of production, the losses due to the variation in the physical properties of the different heats, have been greatly reduced. As every shell is stamped, indicating the heat and carbon content, the heating for the forging operation can be so adjusted that the nature of the steel in the finished shell forging will more closely conform to the desired specifications.

Heating and Forging the Shells

The forging department of this plant is equipped with all the necessary furnaces, presses and auxiliary machinery for the production of 4.5 and 6 inch high explosive shells. Two single and two double chamber Mechanical Engineering Co., furnaces are used for heating the smaller billets; while two continuous furnaces of the same make are used for the 6 inch billets. The approximate time required to heat the 4.5 in. billets to the desired temperature of about 2,300 degrees F., is roughly one hour, and to heat the 6 inch billets to a corresponding temperature requires nearly 1¾ hours. The crude oil used for heating the furnace, is under a pressure of 30 pounds per square inch, and is mixed with air at a pressure of 8 ounces.

When the billets have attained the desired heat, they are removed from the fire chamber by means of a long pair of tongs, which are supported by a chain hanging from a rail above the front of the furnace. This rail is arranged so that the shell in its passage to the press passes over a steel plate upon which the billet is dropped; this allows of the scale being removed from the surface before the piece is placed in the die The removal of this scale is an important factor in the making of a good shell forging, as the adherence of scale, especially in uneven patches not only injures the dies, but prevents the steel from drawing uniformly when the punch is being forced into the metal, often resulting in a forging with eccentric walls. When the billet is dropped on to the plate, an operator quickly removes the hard scale with suitable scrapers; and while every particle is not taken off, care is usually exercised to have the surface as clean as possible.

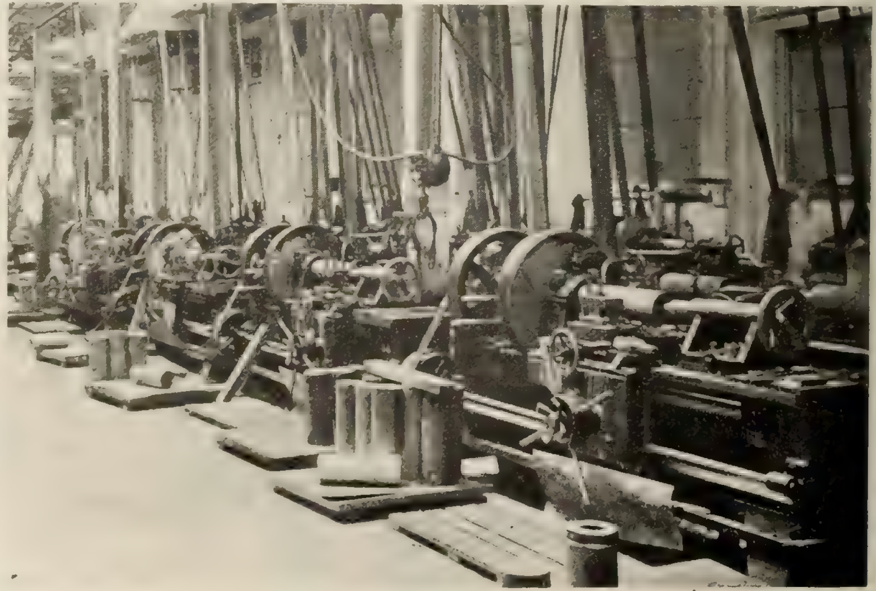


FIG. 2. JOHNSTON & JENNINGS SPECIAL PURPOSE LATHES FOR ROUGH TURNING 6 IN. SHELLS.

Very little time is taken in this operation. The billet is next picked up by another workman with a pair of tongs and dropped into the die, which is made of vanadium steel, as are also the piercing punches. Before the forging of each shell, the punches and dies are cooled by means of running water, and all scale is blown from the die chamber by a blast of compressed air. The die is lubricated between each operation by swabbing the interior with a mixture of oil and graphite; and after the billet is placed in the die, a small quantity of coal dust is thrown on the upper surface before the punch descends. This not only lubricates the punch while the shell is being drawn, but the gas generated at the nose of the punch aids in its removal after the drawing operation is completed. If, however, the shell shows any tendency to cling to the punch when the ram ascends, provision is made whereby a block can be inserted in a suitable slide at the top of the die holder and the shell stripped from the punch.

Three 350-ton hydraulic presses, built by the Southwark Foundry & Machine Co., are operating continuously on the 6-inch shells, each with an approximate capacity of 30 to 35 an hour. These presses receive their power from two Southwark accumulators, one having a piston 24 inches in diameter and a stroke of 12 feet, with 315 tons of iron ore ballast, and the other a piston of 15 inches diameter, a stroke of 15 feet, loaded with 120 tons of iron ore. The accumulators are supplied by two Deans of Holyoke, and one Dean of Indianapolis hydraulic pumps. The two former are belt-driven, one from a 200 h.p. Allis Chalmers-Bullock Co. motor, and the other from a 200 h.p. Canadian General Electric Co. motor. The Dean pump is direct coupled to a 200 h.p. Triumph motor.

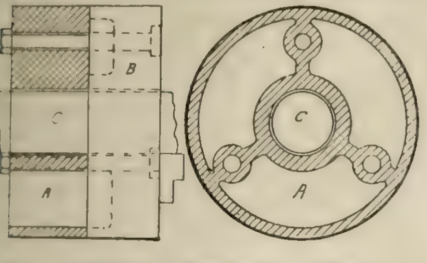


FIG. 4. CHUCK EXTENSION PIECE ON BULLARD SINGLE PURPOSE LATHE FOR INSIDE BORE MACHINING.

After the shells have been forged, they are removed from the die and placed upon a Mathews gravity carrier and transferred to another department. An idea of this installation can be gathered from Fig. 1, which shows the gravity carrier in the foreground and the furnaces in the rear. The elevating portion of this conveying system is mechanically operated by means of a one h.p. motor, located on the structural steel column above the conveyor. When the shell reaches the top of the incline, it drops on to the rollers, and is subsequently transferred to any desired location in the same or an adjacent department.

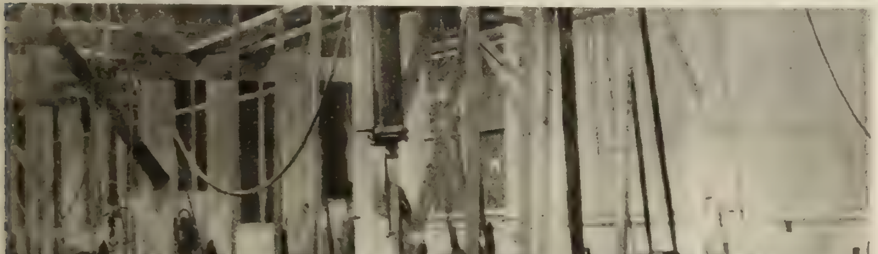


FIG. 3. CINCINNATI PULLEY LATHES ROUGH TURNING 6 IN. SHELLS.

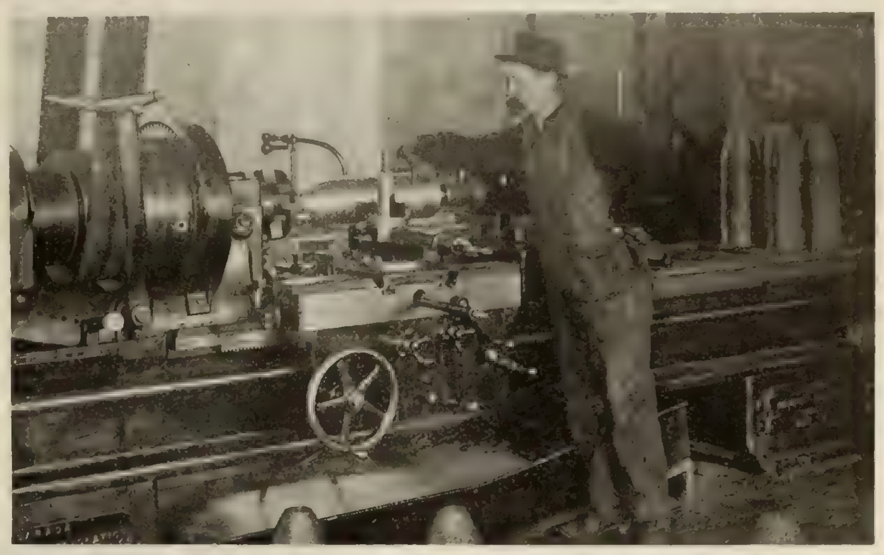


FIG. 5. BORING AND THREADING NOSE, AND FINISH TURNING 6 IN. SHELL BODY.

Machining the Shells

Before the machining of the shells is proceeded with, the rough forgings are carefully examined by competent inspectors for visible defects. Every shell is subjected to various gauging operations, such as overall length, base thickness, concentricity of walls, etc., to avoid any defective shells reaching the machining department. When shells are discovered to have eccentric walls, and yet within the passable limits, they are placed to one side and gives an extra rough boring operation before being rough turned. Experience, however, has almost eliminated this feature, and, with few exceptions, the forgings produced in this plant can be successfully machined without much loss from the forging process.

Cutting to Length and Rough Turning

To prepare the shells for the actual machine operations, it is first necessary to cut the surplus metal from either end of the rough forging. To avoid any unnecessary work on the interior of the shell, the preliminary gauging for the roughing operations is always made from the inside surfaces. When the open end has been cut to length, the base is roughed off, both these operations being accomplished in a number of Hall cutting-off machines. The centre in the base is also located in relation to the rough interior of the forging. This is advisable, for economic production, as it is much easier to remove the uneven metal from the outside surface of the shell. When the cut is irregular during the boring operation, much additional wear and tear is placed upon both the tools and containing turret or operating mechanism. Several engine lathes fitted with three-point expanding arbors are used for centering the base of the shells. Two methods of producing the 6-inch shells are being employed in this plant—that of the steel nose piece (screwed in), and also the solid closed-in nose; the first being gradually superseded by the latter, however. The former method is adopted

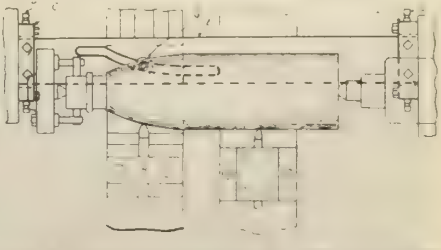


FIG. 6. PROFILE FORMING ATTACHMENT.

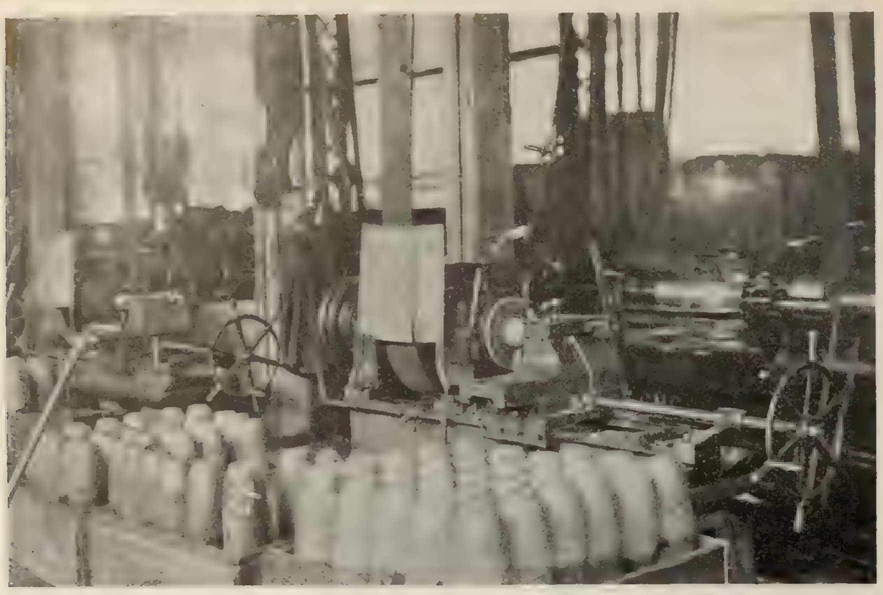


FIG. 7. LYALL LATHES INSIDE PROFILING 6 IN. SHELLS.

when shells are found to be too short for the hot nosing process.

Several makes of lathes, including Wickes, McDougall, Johnston & Jennings, Canadian Fairbanks-Morse, etc., are working on the rough turning operation, the mean average output being approximately six shells per hour on the short shells, and slightly less on the hot nosed shells. In Fig. 2 is shown a row of Johnston & Jennings special purpose lathes at work on the rough turning operation. It will be noticed that small air hoists are provided to facilitate the handling of the shells to and from the lathe. One of these hoists is supplied to every two lathes, a rail running the length of the two machines. Fig. 3 shows a group of Cincinnati pulley lathes on the roughing operation. These machines are fitted with three cutting tools, each mounted on a separate carriage, so that two can be operating on the outside diameter while the third is used for facing off the base. The duty required is, however, so great that the production is no larger than that of the single tool machine, as the feeds must necessarily be reduced; the only advantage is that the base can be faced off at the same setting.

Boring and Nosing the Shell

With the solid nose, the boring operation is somewhat longer, but the necessity of the thread for the other method (that of the removable socket) is eliminated. The cycle of operations when boring are similar to those of the smaller shells; that is, roughing the bore and mouth of shell, roughing out base contour and finishing open end, finishing bore and base profile. Upwards of thirty Bullard single purpose lathes are at work on this operation. These machines are all fitted with chuck extensions, similar to that shown in Fig. 4. These pieces are cored out, as shown, to eliminate weight and yet provide a good rigid support for the shell, when the tools are in operation.

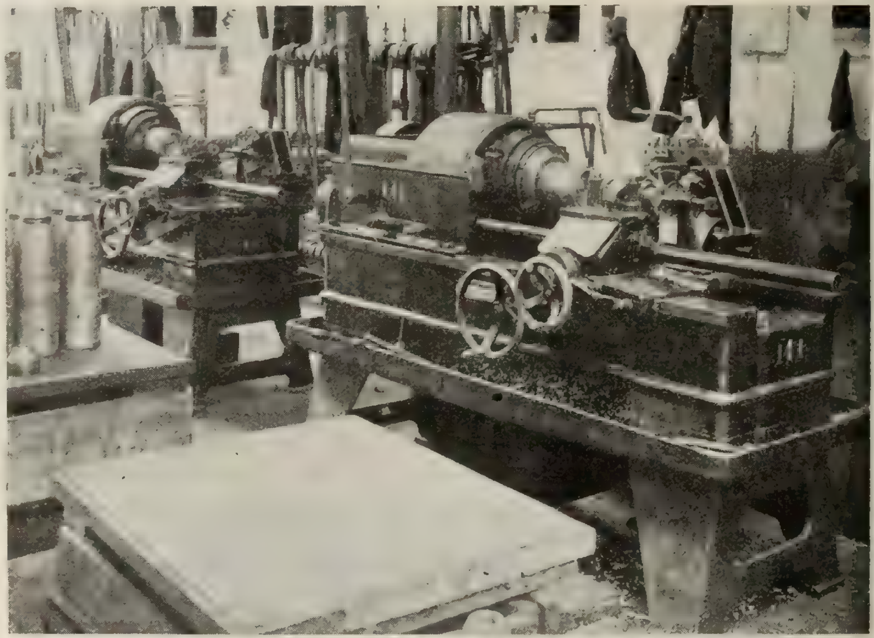


FIG. 8. GROOVING AND WAVING 6 IN. SHELLS.

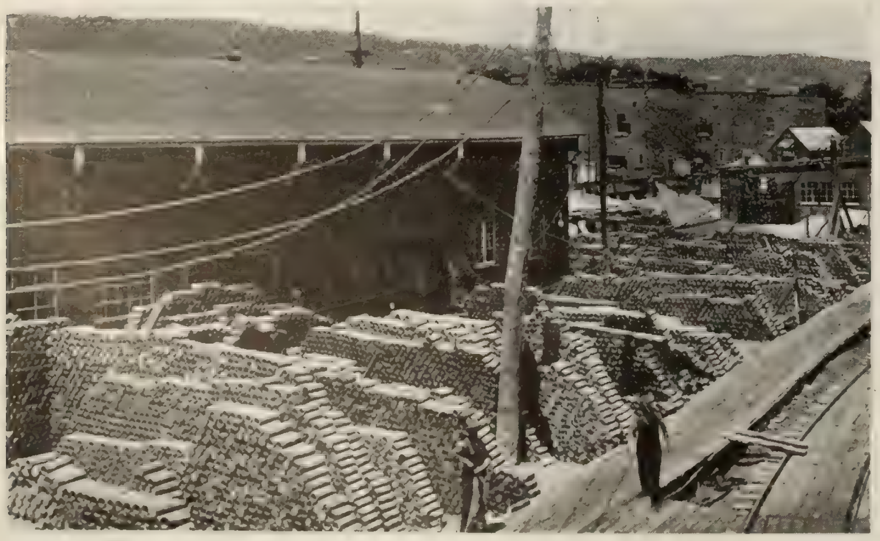


FIG. 10. SHELL FORGING STORAGE YARD.

The shells are now ready for hot nosing. Four Mechanical Engineering Co. nosing furnaces are provided for heating the mouth of the shell, this being inserted into the holes in the front of the furnace and exposed to the heat for a distance of between three and four inches. The temperature required is about 1,700 degrees F., and should be as uniform as possible to give the best results and to avoid undue wear upon the nosing die. It may be interesting to note that the water cooled chamber, through which the shells are placed, is made from two pieces of channel iron, the holes being cut and the entire jacket constructed by the oxy-acetylene process. This has been found to be a great improvement over the cast iron water jacket previously used. Four Perrin presses are being operated on the nosing process. Proper heating is the chief factor in the nosing operation, and, to maintain the highest degree of efficiency, it is necessary to have a reliable man on the furnace, as an inexperienced operator may be the cause of an extra high percentage of rejected shells. If the shell is heated too far down, there is a possibility that the body of the shell below the profile will be distorted, often resulting in a short shell. On the other hand, too low a heat will cause excessive pressure to come upon the die, which may crack or break the latter.

Bore Nose and Finish Turn

After the shells are nosed, they are inspected for overall length and mouth opening. They next commence to receive the finished machine work. Each shell is placed in a special chuck for operations on the inside of the nose, that is, boring to a diameter of 1.9 inches, cutting a small recess 1.2 inches from the face of the shell, reaming and facing, tapping with a 14 thread Murchy collapsible tap, and finishing the face of the nose. The threaded portion is then sized with a hand tap. A driving plug is afterwards screwed into the nose, and the shell placed between the centers of an engine lathe, preparatory to finishing the outside diameter and nose profile. A view of this operation is shown in Fig. 5. The device used to obtain the desired contour of the nose is shown in Fig. 6. The cam plate is secured between the headstock and the tailstock, and provision is made for slight adjustment in the containing brackets C and D. The cam rolled is secured to the cross slide of the carriage, the tool being set in the desired position to form the proper shape of the nose. An auxiliary tool slide is fitted to the carriage for the purpose of turning the parallel portion of the shell. This extra head is, however, not always used; the single tool being often used to accomplish the entire operation, the roller entering the cam slot at the desired location.

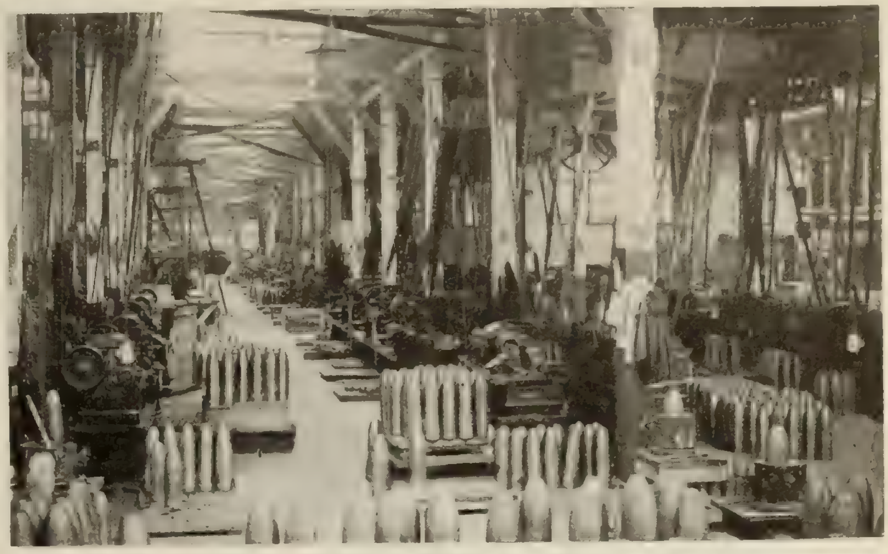


FIG. 11. GENERAL VIEW IN SHELL MACHINING DEPARTMENT.

Inside Profile and Base Recess

A number of Yeates, and Lyall special lathes are at work forming the inside nose profile, the latter being equipped with pneumatic chucks for holding the work. A view of one of the Lyall lathes is shown in Fig. 7, operating on the inside of the nose. Before proceeding with further machining, the shells are weighed to determine the amount of metal to be removed from the base to bring them to the required weight, which at this point should be 88.8 pounds, with a high or low limit of 8 ounces. The stock removal is about 1-64 of an inch for each two ounces. After the shells are faced to weight, they are taken to a number of Bullard lathes to have the base recessed out. With very few exceptions, the base

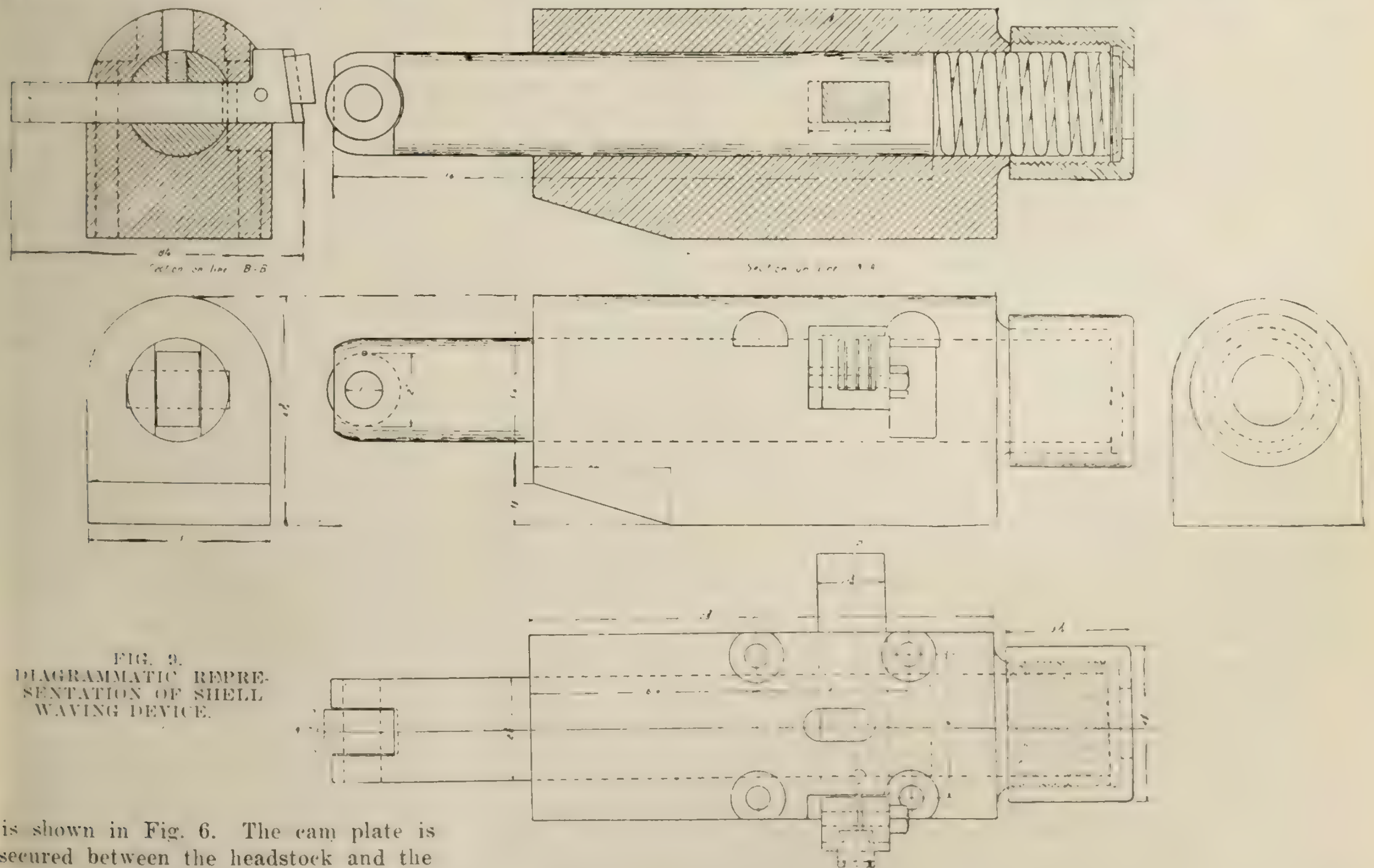


FIG. 9. DIAGRAMMATIC REPRESENTATION OF SHELL WAVING DEVICE.

plates are now inserted in and riveted without recourse to the threading process. The recess for the base plate has a diameter of 4.5 inches and a depth of 0.5 inch, the outer edge of the disc being slightly chamfered, to allow the metal around the edge of the recess to close over it when being riveted in.

Grooving and Waving

The grooving and waving is performed in manner similar to that on the smaller shells. The groove is first roughed-out to the desired depth, leaving ridges of sufficient width to obtain the ribs and form the proper wave which in every case is irregular to prevent any possible slip of the copper band. After the ribs have been formed, the sides are undercut, with a special attachment secured to the tool post of the carriage. Several chisel cuts are afterwards made across the ribs to allow the free escape of the air, when the bands are being pressed on.

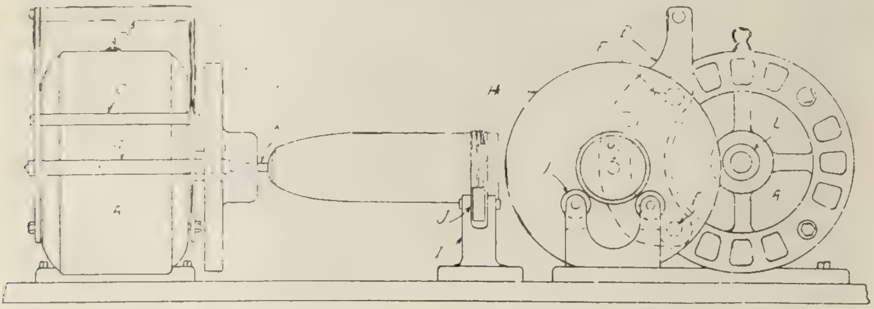


FIG. 12. DETAIL OF SHELL PAINTING DEVICE.

The grub screw hole, for the brass socket is next drilled and tapped, after which the shells are sand-blasted to thoroughly clean the interior of the bore so that the varnish will form an even coating on the interior walls.

Finishing Base Plates and Copper Bands

Following a preliminary inspection, the base plates are put in and riveted, after which the square tips are sawn off by several Racine saws. The base is then faced off, and the shells taken to the varnishing room to receive a coat of varnish on the inside surface. It is very important that this coating should cover the entire surface and be evenly distributed, as the action of the explosive (which is placed therein) has a very deteriorating effect upon any exposed metal.

The copper bands, which have previously been prepared, are now forced over the base of the shell, to a position over the groove. The shell is then placed in a hydraulic press and the band pressed into the groove under a pressure of about 1,500 pounds per square inch. Several Jenckes band turning lathes fitted with air chucks are operating on the finishing of the copper bands.

After the shells are marked, they are given their final shop and Government inspection. The latter is very thorough, and every shell is subjected to careful examination. When faults are discovered, they are rectified wherever possible, so that rejected shells are kept as low in number as possible. The painting of the shells is accomplished by means of the device shown in Fig. 12. The small motor operates continually, the shell being placed in position and revolved by pressing the framework forward, thus bringing the disc H in contact with the small driving wheel L, attached to the spindle of the motor. After the paint has thoroughly dried, the shells are again inspected. Crating in readiness for shipment follows.

* * *

HANDICAP OF BAD BELTING

HOW many machinery users possess even an elementary knowledge of belting? Comparatively few, says a writer in Page's Weekly, yet belting in many cases serves as the great muscle of the workshop for extended power, and if the leather is wrongly fitted, as it often is, and badly-made as some specimens undoubtedly are, the belting capacity cannot be equal to specifications. Many a workshop is losing power and cash daily through its belting.

Leather Belting Characteristics

Putting aside woven belting, which has characteristics of its own, let us see how leather operates. The tenacity of good new belt leather varies from 3,000 lb. to 5,000 lb. per square inch of sectional area, and thickness averages ¼ in. Clearly, if the tenacity "varies," a danger point exists somewhere when two leathers of different tannages are joined in one belt, although that danger may be well beyond the usual stress limit. Those two leathers may have inherent differences, as well as the differences imparted by separate tannages and separate modes of finish, so that to specify one stress limit in pounds for two different leathers may prove misleading. The maker of the machinery concerns himself with power, speed and pulley dimensions, and the user is concerned very materially in the strength per inch of width, and if tensile strength in pounds per inch of width were added, it is argued that the user would have a better safeguard.

Our view is that while a percentage of difference exists between one piece of leather and another, the user may rest satisfied that if he purchases from a reputable maker, in accordance with clear and practical specifications, he may count on obtaining a sound article at a fair price. "Cheap" belting should be classed with other "cheap" goods. Assuming that the right belt is purchased, the fitting should receive the greatest care. Any leather will stretch after a period of use, and if the stretching is excessive then troubles ensue. The removal of undue stretching is as important in its way as the original purchase, for erroneous removal has a sequel in hampered work. A thick belt stretches more on the outside than a thinner one because such a belt cannot lie so closely around the pulley. The greater thickness of material requires greater bending force, and greater friction is set up.

Belt Thickness

Uniform thickness throughout is desirable in all cases, and its influence is particularly emphasised with regard to light high-speed machinery. The cumulative importance of this is illustrated by comparing the velocity of belts on ordinary shop line shafts (1,000 to 1,500 ft. per minute) with the speed of lathe belts, which ranges from 1,500 to 3,000 ft. per minute. The item of centrifugal force has no material bearing upon the line shafts at ordinary velocities, but when the speed reaches 3,000 ft., or more, the centrifugal force tends to reduce the amount of power which a belt is capable of transmitting. Recently, we have heard of belt speeds above 5,000 ft. per minute, due to pressure of work, but such speeds should be discouraged.

Camel-hair belting constitutes a subject which should be dealt with in a separate article. Woven belting exhibits great strength and flexibility, regardless of temperature, water, steam, chemical fumes, etc., yet it is never likely to displace leather in the estimation of a host of engineers. Link belts are useless at high velocities, although they are superior to leather belts at low speeds. In a number of instances compound belts formed by placing one belt upon another have been found to add most substantially to the power transmitted.

Some really useful substitutes for leather belts are on the market, and cotton may have a greater future on the pulley than it enjoys at present. Considering that the fibre is tested to 1,500 lb. per square inch, a belt of such material is capable of great service in the workshops.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data and Ideas Evolved from Actual Practical Application and Experience

MACHINE SHOP ADAPTATION TO LABOR SHORTAGE

By D. A. Hampson

DURING the past two years, the supply of skilled men in the mechanical trades has been woefully short of the demand—the chances of "picking up" a few first-class machinists being about as slim as those of finding grand opera tenors. Three courses have been open to shop managers, i.e., to train new men, to instal automatic machinery and appliances, and to conserve the energies of their employees so as to secure the greatest possible production. To this end, a shop of 35 men doing a general machine business and small accurate manufacturing adopted some methods as follows:

A beginning was made with the receiving and shipping end. As the plant was away from the railroad, all raw and finished materials had to be trucked. Raw material came in as tubes and pipes, rolled stock boxed and unboxed, barrels of castings and forgings weighing up to 500 lbs. The finished product went out in heavy boxes and barrels, also in crates, weighing up to 2,000 lbs. All the foregoing came and went through a ground level door at one end of the building. The factory building stood in a large space of fairly level ground and was 150 feet square. Owing to the diversity of products, different classes of work were done in different parts of the building, the tools being arranged to suit. The castings, forgings, and bar stock went largely to separate departments. This much description is necessary to give a clear idea of conditions—which it will be noted are not unlike those found in many shops. Truck men delivered goods to the shop floor and loaded from there. To transfer the heavy barrels and (generally) 20 ft. bar stock, shop help was employed.

Improving Shipping Facilities

While this item of transferring had at one time been considered, it was not a dead loss, for it was added to selling price—the customer willingly paying, because the products were mostly patented and were labor-saving supplies of merit. When there came a shortage of men, however, the matter became too big to overlook. The discomfort of having large doors open in winter, the time Jim's miller was idle while he was giving a hand with the barrels, the time of three men who had to stand aside while the long boxes were shunted around past the inspection bench, and that of the two or three laborers who were always required anyway, had finally to be considered. As the time loss figured up as high as 30 hours per week, there was little hesitation about putting some betterment into practice.

A drive was graded part way around the building so that a wagon body was on the floor level at certain points and above it at others. A loading platform with storm doors was built, and receiving doors and hatches were cut for the different departments: the object was to put the entire transfering on the truckman. The barrels were rolled down a slight incline to the very spot where the forgings were first used, long pipes and boxes slid out of the wagon through the hatches on permanent rollers to a position directly in front of the storage racks, machines were rolled out directly into the wagons—there was no lifting for the truckmen, and his work was easier, besides there was nothing for the shop men to do.

Elimination and Simplification

Inside the shop, many of the merely physical operations that machinists were doing were given to boys or laborers, or eliminated altogether. Several more drinking fountains were installed and toilets put in — this saved the time it took to walk often 250 feet several times a day. It had been customary for the men using machine oil, cutting oil, or compounds to fill their own squirt cans and the pots on the machines. This work was given to a boy whose duty it was to make four daily rounds and replenish the supply. The same boy gathered up tools that were out of place and returned them, carried lathe and planer tools to the blacksmith, and other similar work. Once a week, the boy doled out the supply of waste.

Because of the interruption and loss of time therefrom, sweeping in the daytime was abandoned, and was done at night along with cleaning out of the chip pans. The night man was instructed in the repairing of belts and did all of this work except breakdowns, which were rare after the machine hands got the habit of watching out for and reporting loosened laps and frayed laces.

Racks were built near the drills, the arbor press, and on walls, and tools like taps and dies, reamers, arbors, drills, wrenches, etc., in common use were taken out of the tool room and put in the racks most convenient to the place where used. While this did not improve the general appearance of the room, it saved a great deal of time spent in running to the tool room, waiting, checking, etc. The loss from this method (which might seem like retrograding) was no more than under the old system and the gain was great.

Quite a saving of machinists' time was effected by training a couple of bright helpers in the rudiments of setting up work. If, for instance, a pulley was to be bored, a helper changed the faceplate for a chuck, got out bolts and clamps, and roughly trued up the piece, turning the job over to the machinist who did the accurate centering and borrowing. The helper put the tools away when the job was done. By so going around ahead, the helpers gave the machinist a chance to do a maximum of skilled work. Some work like rough planing, roughing cuts on heavier castings, and practically all of the drilling was turned over to helpers altogether. These arrangements were mutually agreeable—the machinists being glad to be relieved of the hard physical labor, and having in consequence more energy for the closer work. The helpers were glad to learn and to be put in the way of advancement. In connection with general machine work, an important point was observed and saved a good bit of time. All castings on receipt from the foundry were marked on the finished surfaces and then the helpers went over them looking for lumps, scabs, sand on the faces, and particularly in corners wherever cutting had to be done. These places were well cleaned and prevented many a broken off and spoiled tool.

Wholesale Labor Saving

On the sensitive drills it had been the practice to use squirt cans with cutting compound, and to clean jigs with brushes. A pipe service was put in that did away with the cans and brushes by supplying a flood of liquid, and most of the jigs were fastened down. In some cases more than half of a man's time was saved. Drills in sufficient quantity were supplied and kept sharp by a boy so there was little delay there.

Realizing that the secret of rapid assembling is in accurate machine work, better and more gauges were made, parts were completely jigged, and more inspections were made. Savings of from ten to two hundred per cent. were thus made. Simple devices for doing away with the use of hammers, hand punches, pliers, etc.—tools which have to be picked up and laid down, were perfected.

In the milling machine operations, pronounced savings were effected. This work was all on Lincolns and semi-automatic millers and the cuts were short necessitating a man for each machine or each two of the latter. The feed screws in some machines were lengthened out to suit the new fixtures made. These fixtures, as far as possible, held long rows of parts and while they were cutting, the operator could load up two others.

One battery of six machines that had been run by three men was so arranged that two men were no longer needed, and were given other work. Compressed air fixtures were applied for clamping the work and the air valve was operated by a dog on the table, so that the operator had only to "click" the feed on and later return to find the work milled, the table returned, and the work loosened up. To facilitate his getting about and forestall fatigue, his seat was set on rollers running on a track before the row of machines and then after loading up his six machines, he could give a shove and bring himself back to the starting point with a rush.

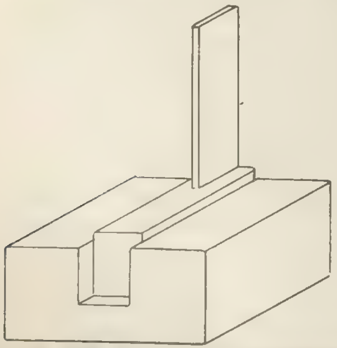
The shortage of men thus started what proved to be an efficiency campaign. No part of the plant escaped. In the drafting room, fewer tracing and blueprints were made of parts that would not be wanted again. Boys and helpers moved the tote boxes around where skilled men had done it before. Packing boxes were standardized and made in quantities. Whenever possible, the final inspector placed his parts directly in the shipping cartons or boxes. These changes secured a greatly increased production and the loss of some employees was not so keenly felt as it would otherwise have been.

⁂

TRY-SQUARE HOLDER

By C. H.

IT is a difficult matter to keep a tool such as a square on a machine without knocking it over, or having it fall on the floor. Especially is this true when using one to square up work being ground on a disk-grinder, where the vibration of the machine jars it off the table. A square is an expensive tool and requires care in order that it will not become nicked, or out of true. A useful suggestion is shown herewith of a try-square holder. It is simply a block of wood having a groove cut across the face wide enough for the heel of the square to fit into. The block will always keep the square upright on a machine or wherever it is used.



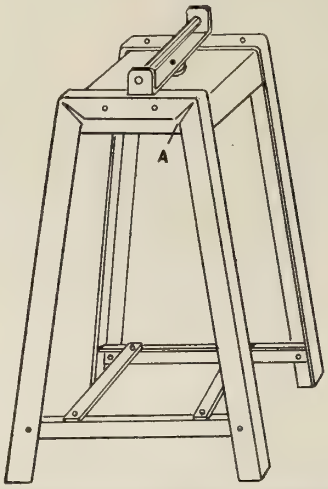
BLOCK FOR HOLDING TRY SQUARE.

⁂

HACK-SAW MACHINE STOCK SUPPORT.

By J. E. C.

WHEN cutting off pieces from long bar stock in a hack saw machine, it is necessary to support one end of the stock in order to hold it straight and keep it from tipping up in the vise; also, so it can be easily moved along after a piece is cut off. In the accompanying sketch is shown a cheaply contrived stock-stand that can be produced from 1 in. angle-iron. Two pieces indicated at A, are cut out where the bend is made in the legs and cross-stays are riveted on the lower part of the legs to keep them from 2 in. thick by 6 in. square. In the center of the block, fastened with a bolt and washers, is a cast-iron bridge containing a steel roller on which the stock is supported. A rod extends through the roller as shown. The height of the stand should be directly on a line with the seat of the vise. The apparatus is light and rigid, and is easily moved about.



SUPPORT FOR STOCK IN HACK SAW

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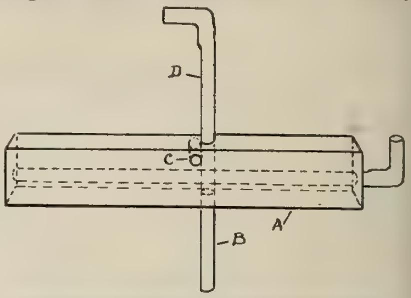
A NOVEL DEPTH-GAUGE

By Alden Street

THE depth-gauge shown in the accompanying art for measuring depths of holes, tee-slots, etc., is designed on a simpler principle than the most of those in general use. The block A consists of a piece of square cold rolled stock, having a depth-finder or rod B. Instead of the usual screw for holding the rod in place, a small pin C is driven in the block A, passing slightly through the rod hole as shown. The rod B is filed or slightly flattened off along the side as at D, so that it will have a free-fit in the hole. To locate a depth, the rod B is simply pushed down, and then given a slight turn which binds it firmly against the pin C. A hole is drilled through the center of the block for holding the depth-finder so that it may be laid flat in the tool-chest.



SIMPLE FORM OF DEPTH GAUGE.

⁂

WEIGHT CHART FOR CYLINDRICAL STEEL STRUCTURES

By Woodworker

IN the August 17 issue of Canadian Machinery a chart appeared under the title, "Chart for Finding Weight of Cast Iron Pipe." Here is a similar chart, except that it applies to cylindrical steel structures. Its range, as will be noted, is very wide. The length (or height) of the structure may be 100 ft., diameter 100 ft., and thickness of steel may be anything from 0.1 inch to one inch.

For example, how many tons of steel would be needed to build the cylindrical shell of a water tank 20 ft. long, by 10 ft. diameter, steel being 0.5 inch thick? Connect the 20 (column A), and the 10 (column E), and locate the intersection with column B. From the intersection, drop over to the 0.5 (column D), the intersection there with column C gives the answer—about 5.7 tons. The basis of the chart is 2240 pounds per ton.

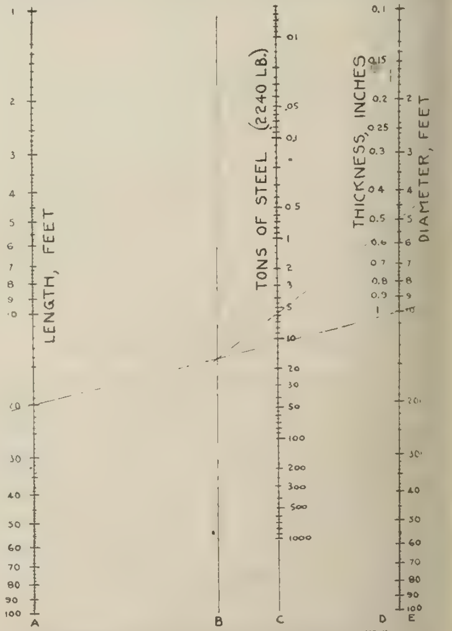


CHART FOR FINDING WEIGHTS.

Engineering Exhibits at The Canadian National Exhibition

Staff Article

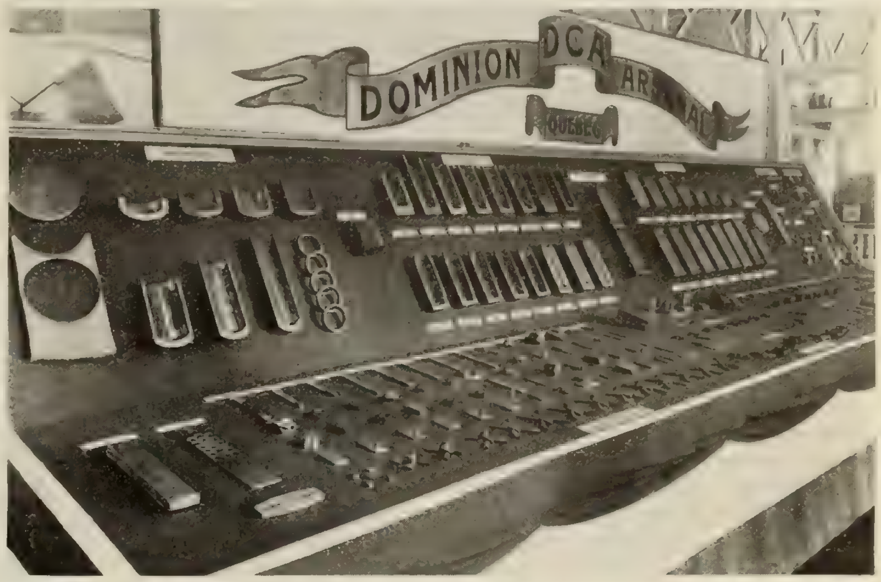
Some of the products on view in the Machinery Hall still bear evidence of war-time influence, but at the same time the trend of future events is witnessed by a general advance in quality, design and application indicative of a national determination to still further enhance the reputation already earned by so many of our Canadian manufacturers.

EACH succeeding year since the outbreak of the war has witnessed the increasing importance of the engineering industry as one of the deciding factors. The co-operation of the Imperial Munitions Board with the authorities of the Canadian National Exhibition has resulted in a unique display of war products by the leading munitions firms of the country.

Housed in what was formerly the education building, these exhibits possess a double attraction for the discriminating observer: not alone because of the destruction which marks the termination of their existence as manufactured products, but also because of their significance as evidence of the ability and versatility of our manufacturing firms. From motor cars to fuses, from bridges to cartridge cases, from bricks to steel shells, no transfer of effort has been too great to prevent complete success, and as if such incidents were not convincing enough, there is the case of the steel companies who had to produce a new type of steel and at least one concern which is producing copper bands from the raw metal.

Steel Making

Prominent amongst the large exhibits is that of the Nova Scotia Steel & Coal Co., which consists of samples of the various substances which enter into the composition of shell steel. Coal, coke, iron ore, lime stone, magnesite, etc., are all shown in the natural state just as the steel maker uses them. The gradual transformation of these materials into a real live 9.2 in. shell is illustrated by specimens of pig iron, a full size ingot of shell steel weighing 6670 lbs., standing eight feet high, and various sizes of bars into which the ingot is rolled and from which the different shells from 18 pdr. to 9.2 in. are forged. The exhibit is in the charge of M. P. Graham who displays pardonable pride in its completeness.



DISPLAY BY DOMINION ARSENAL, SHOWING SMALL ARMS AMMUNITION, SHRAPNEL AND BANDS.

Fuse and Cartridge Making

As if in contrast to the massiveness and weight which characterizes the exhibit referred to above, the displays of the Dominion Arsenal, Quebec, and the Russell Motor Car Co., Toronto show products of the machine shop which vie with each other for accuracy and complexity of manufacture, smallness of component parts, and rigidity of specifications to be met. The former display illustrates the making of small arms ammunition i.e. cartridges cases, bullets, clips, etc., with samples of the punches, dies, traps, gauges and other small tools used in their production, the raw material being shown in successive stages as each operation is completed. Brass cases and copper driving bands for 18 pdr. shells are also exhibited from the copper

NOVA SCOTIA ST
L & COAL COMPANY
NOVA SCOTIA STEEL & COAL COMPANY LIMITE

NOVA SCOTIA STEEL & COAL CO.'S EXHIBIT OF RAW MATERIALS, STEEL FORGINGS AND FINISHED SHELLS.

ingot and brass disc through the successive operations.

The various stages of fuse manufacture are shown in a similarly complete manner by the Russell Co. Parts in profusion enter into the construction of these important articles, the extreme accuracy combined with oddness of shape or smallness of size rendering their successful manufacture an accomplishment of no mean order.

CANADA MACHINERY CORPORATION
LIMITED
HEAD OFFICE & WORKS
GALT ONT.
TORONTO SHOWROOMS
BROCK AV SUBWAY

EXHIBIT OF IRON AND WOOD-WORKING MACHINE TOOLS BY THE CANADA MACHINERY CORPORATION.

British and Russian Shells

The Dominion Bridge Co., along with Montreal Ammunition Co., and Dominion Copper Products Co., shows sectional specimens of each operation on 18 pdr., shrapnel and high explosive, 4.5 in. 60 pdr. and 6 in. British, and 75 mm. Russian forgings; while copper bands for all sizes and brass cases for the smaller sizes are likewise fully exhibited. The companies are represented by J. H. Bradley, and their record is displayed on a special poster which shows that over 6,000,000 brass cases alone have been shipped to date with proportionate outputs of other items.

A novel treatment of their stand is shown by the Canadian General Electric Co., and Canadian Allis-Chalmers who display a number of photographic transparencies showing numerous scenes in their various factories where munitions are now being produced. These companies are making a greater variety of munitions than any other firm in Canada, amongst their product being 3 in., 6 in., 7.5 in. and 9.2 in shrapnel for the navy and 18 pdr., both types, 4.5 in. and 60 pdr. for the army, including cartridge cases and percussion primers, numerous samples being displayed in an attractive manner under the direction of J. F MacLean.

Both branches of the armed forces are represented, the navy by an 18 in. Whitehead torpedo and the army by a captured German field gun. The torpedo is ably explained by Lieutenant Miller of H.M.C. Torpedo Depot, the exhibit being loaned by the Dept. of Naval Service, Halifax. Compressed air is supplied to the apparatus so that the propellors, rudders and all controlling gear may be seen in motion. The field gun was captured by the 9th Lancers in Aug, 1914, when the enemy was within 25 miles of Paris.

The moving picture exhibit is staged in the annex and gives a lucid insight into the actual conditions under which our munition workers are now doing their bit throughout the country.

Other exhibitors include:—Brown's Copper and Brass Rolling Mills; John Bertram & Sons Co.; Brandram-Henderson Ltd.; Canadian Car and Foundry Co.; Canadian Explosives Ltd.; Deloro Mining and Reduction Co.; Empire Mfg. Co.; Ross Rifle Co.; Standard Brick Co.; Standard Chemical Co.; H. Bock; Universal Tool Steel Co.

Machinery Hall

The gathering of machinery builders, dealers, and buyers which takes place in this department retains its hold on the trade as an annual event of importance, having shown a tendency of recent years to becoming somewhat of a counterpart of those conventions of kindred societies which in other countries have become important factors in various industries. The opportunity for renewing old and making new acquaintances is accepted by many while the value of the event as an occasion on which to introduce new designs and models is too well known to require any comment. Armstrong, Whitworth of Canada, have provided a tasteful reception room where the visitor may investigate in ease and comfort the merits of the first high-speed tool steel to be made in Canada. Prominent among machine builders is the Canada Machinery Corporation who have arranged their display in an exceedingly creditable manner. A model of a field gun constructed of ball bearings is a feature of the Chapman Double Ball Bearing Co.'s display, while an emergency outfit of oxy-acetylene cutting apparatus which has already saved many lives in railroad wrecks is a fea-

N BRIDGE CO. LTD.
AMMUNITION CO. LTD.
DOMINION COPPER PRODUCTS CO. LTD.
AUG. 26
SHIPMENT
COPPER DRIVING BANDS
BRASS DISCS
SHRAPNEL DISCS

DOMINION BRIDGE CO.'S EXHIBIT OF SHELL CASES AND FORGINGS FOR BRITISH AND RUSSIAN SHELLS.

ture of the Carter Welding Co., exhibit. The Canadian Hoskins Co., are showing a full line of both gas and electric furnaces while the belting industry is represented by Dominion Belting Co., and D. K. McLaren. The A. R. Williams Machinery Co., exhibit an extensive line of machinery including special toy machinery in the process building, and amongst new comers is noted the Thwing Instrument Co., showing pyrometers. Following is a list of exhibitors and representatives.

Armstrong, Whitworth of Canada, Montreal High-speed steel and small tools. Representatives, H. Johnson, J. L. Hynes, Rooms 201 King Edward Hotel.

Armstrong Cork and Insulation Co., Toronto Insulating materials, cork products, models of power plant equipment showing applications, etc.; samples of diatomaceous earth. Representatives, J. C. Kyle, G. C. Albertson, H. Johnson.

Aylmer Pump & Scale Co., Aylmer, Ont.—Hand and power pumps, scale trucks, water supply systems.

Russell Motor Car Co.
GRAZE FUSES

TIME AND GRAZE-FUSE PARTS, COMPLETED FUSES, ETC., ILLUSTRATING WORK BY RUSSELL MOTOR CAR CO.

L'Air Liquid Society, Toronto—Oxy-acetylene welding apparatus, gas generators; work in progress. Representatives, L. B. Deane, A. M. McDougall.

Boiler Repair & Grate Bar Co., Toronto—Gate" firebrick lining for boiler furnaces, 20th Century grate bars. Representatives, C. W. Andrews, A. H. Hetts. Also products of United States Graphite Co., Saginaw, Mich., represented by E. D. Robinson.

Baines & Peckover, Toronto—Exhibit of tool steel, crucible vanadium and cold rolled steel; expanded metal, chain, wire and kindred products. Representatives, C. R. Peckover, W. M. David, J. A. Steven, H. Marshall, H. Febet.

Boico, Ltd., and Shell Bar Grate Co., Toronto Boiler compounds and grates. Representative, Mr. Downes.

Canada Machinery Corporation, Galt, Ont.—[illegible] in. tool room lathe, completely equipped; [illegible] in. by 10 ft. quick-change, double back-geared engine lathe; selected wood-working machines, including hollow chisel and chain mortisers, 12-spindle dove-tailer, etc. Representatives, D. King, P. D. Burton, W. J. Irving, I. Preston.

Cleveland Pneumatic Tool Co., Toronto—Full line of Cleveland apparatus, hammers, drills, grinders, riveters, couplings and accessories. Representatives, C. D. Garner, H. F. Olrich.

Chapman Double Ball Bearing Co., Toronto Transfer trucks, transmission bearings and various ball-bearing appliances. Representatives, W. C. J. Hockin, M. J. Fulcher.

Cling-Surface, Buffalo—Exhibit of special preparation for maintaining efficiency of driving belts. Representatives, J. B. Faatz.

Canadian Ice Machine Co., Toronto—Refrigerating machinery and supplies. Representatives, F. F. Allison, C. Bower, C. E. Allison.

Carter Welding Co., Toronto—Davis-Bournonville oxy-acetylene apparatus, mechanical equipment for cutting, emergency outfits for rescue work; demonstrations in progress. Representatives, P. Sorley, H. W. Carter, C. Steadman.

Cowan & Co., Galt, Ont.—Selected types of modern wood-working machinery. Representatives, W. Cowan, S. F. Barrows, W. C. Clark.

Geo. W. Cole Co., Toronto—Steam specialties, including Cole boiler feeders, heaters, etc. Representative, Geo. W. Cole.

Climax Baler Co., Hamilton—Machine for packing waste paper. Representatives, H. Robinson, Melville Moore.

Canadian Hoskins Co., Walkerville, Ont.—Gas and electric furnaces, pyrometers, etc. Representative, G. F. Shepherd.

Dodge Mfg. Co., Toronto—Dodge wood pulleys, shafting, bearings, hangers, demonstrating line of transmission equipment. Representatives, T. F. Gary, J. F. Haas.

Dominion Belting Co., Hamilton—Stitched belting of all sizes for power transmission and conveyor equipment. Representative, J. Scott.

Day Name Plate Co., Toronto—Representative, L. S. Day.

Elliot Wood Worker, Toronto—Combination wood-working machines, floor sander, etc. Demonstration in progress. Representatives, W. A. Elliot, Frank Elliot.

Foster, W. L., Toronto—"Carbic" system of oxy-acetylene lighting. Representatives, A. E. Haigh, M. V. O'Neill.

Goodyear Tire & Rubber Co., Toronto—Goodyear products. Representatives, W. H. C. Crosby, R. F. Fox, — Wood, F. E. Holland.

Garlock-Walker Machinery Co., Toronto — Giddings & Lewis tool room lathe, Hepburn 6 in. shell lathe, wood-working machinery, including "American" double arbor saw table and Linderman dove-tailer; display of Thor pneumatic tools, and machines in operation. Representatives, W. Garlock, jr., A. B. Walker.

Holden Co., Montreal—Pneumatic and electric portable tools, rock drills, railway supplies, etc. Representative, J. B. Wilson.

Hutchinson Woodworker and Contracting Co., Toronto—Wood-working machinery in operation. Representatives, M. Hutchinson, P. H. Bradley.

Jones & Moore Electric Co., Toronto—Electric motors and machinery in operation.

McLaren, Ltd., D. K., Montreal—Leather and balata belting, wood and pressed steel pulleys, transmission accessories. Representative, W. S. Hamilton.

Massey-Harris Co., Toronto—Gasolene engines in operation, portable saw outfits, farm appliances, etc. Representatives, N. A. McIntosh, E. Greig.

Morrison Co., J. L., Toronto—Bookbinders and paper machinery. Representatives, D. Brown, W. Duncan, C. Leake.

Positive Clutch & Pulley Works, Aurora, Ont.—Power transmission apparatus. Representatives, R. A. Fraser, — Beard, W. Day.

Pratt & Whitney Co., Dundas, Ont.—Samples of fine tools, cutters, gauges, etc. Representatives, M. B. Davidson, H. Webb.

Small Brothers, Smiths Falls, Ont.—Evaporators and supplies for the maple sugar industry. Representative, Len Edmonds.

Tallman Brass and Metal Co., Hamilton—Brass and aluminum ware and castings, anti-friction metal, etc. Representatives, Geo. McKnight, R. H. Eckert.

Toledo Scale Co., Toronto—Scales.

Thwing Instrument Co. — Thermo-electric radiation and electric resistance pyrometers, indicators and recorders. Representative, J. DeVon.

Williams Machinery Co., A. R., Toronto — Stationary and marine gasoline engines—A. Kischel and R. Hunter. Machine tools and wood-working machines—T. B. Reid, F. Barber, T. J. Eason and A. Hasen. Toy-making machinery in Process Building—C. Foderingham and W. T. Peck.

* * *

SHELL BOX PRICES—ARE THEY ADEQUATE?

ALTHOUGH we have heard a great deal of discussion recently in regard to the shell box business in Canada, bearing chiefly upon the prices at which contracts have been awarded by the Imperial Munitions Board, we, says The Canada Lumberman and Woodworker, have avoided discussing the subject to any extent, feeling that it was wise to wait until the situation had been developed more fully and the pros and cons of criticism that we have heard had been more definitely sifted out. We have heard so much criticism during the past few weeks, however, that it seems to us that the situation now calls for some publicity. Briefly, the main point of criticism that we have heard from many quarters is to the effect that contracts have been let at such low prices that there is no profit in them for the manufacturers. It may be thought by some that this is an indication of good business on the part of the Government, or rather on the part of the Imperial Munitions Board, but when the matter is analyzed it is not difficult to see that by following out such a course the Munitions Board is really cutting off its nose to spite its face.

We cannot put this matter any more clearly or forcibly than in the words of a manufacturer and wholesaler who discussed the matter with us recently. This man, representing one of the most important Canadian firms, finds that in selling material to the box manufacturers he is up against a very different proposition to any that he has had to face in the past. In spite of the fact that he is dealing with firms that are handling very large orders for the production of shell boxes, he has to be on the watch every minute of the day in connection with the credit end of the business. He is gradually eliminating many of the customers whom he took on at first, finding that it is not safe to give them credit, and that without credit they cannot handle the business.

Production Cost

"In the first place," this lumberman says, in speaking of the Bethlehem box, "there is the question of cost for the production of shell boxes. The cost of labor, the cost of bands, steel, etc., are all very much higher than they were for the old boxes, and the price of lumber should be higher, but we cannot get it. The man who makes a contract for the box, in the first place, cannot cut down his labor cost, and there is a close enough combination among the steel producers to prevent him from cutting down the cost of steel. The only way in which he can keep down the cost is by trafficking around with his order for lumber until he can get it at the lowest possible price. Naturally, the first result of this is a tendency on the part of the firm from whom he buys the lumber to furnish him with an inferior article. The lumberman has to do this in order to get his cost out of the order at all. It costs just as much more proportionately to produce lumber to-day as it does to produce steel.

Disposition of Contracts

"Then there is another feature of the situation that is of great importance. A large portion of the orders given out for shell boxes during the past two months have gone to concerns that are being run by a liquidator, or to concerns whose credit ratings are such that they are not entitled to the regular lumber terms of credit. The consequence is that if you want to sell material to them you either have to stand out for a straight cash discount before you unload the stock or take your chance of ever getting your money for your goods. Labor has no such a thing as a credit term. It must be paid for each week. Steel concerns will not give credit. As a consequence, the box manufacturers pay for their labor and pay the steel man, while the lumber manufacturer and dealer either holds his lumber or takes a considerable risk. If the box manufacturer can make good and work out a profit—which is questioned by most of the authorities upon the subject then the lumberman will be paid; but if the box manufacturer falls down, as it is predicted that many of them will, the lumber dealer and the manufacturer of lumber are stung.

Lumberman's Protection

"The question, then, arises as to what protection the lumberman can get under these circumstances. Will the Government permit him to attach moneys due, or will they throw out an application for attachment, the same as they do when you try to attach the wages of a Government employee; or, provided they permit you to attach these moneys, will they then cancel the manufacturers' contracts for boxes? In the face of the great quantity of orders that have been placed for these boxes and of the fact that so many of the manufacturers are now falling down on their deliveries and dropping out on their contracts, would it not be possible for the Imperial Munitions Board to do something in the way of assisting those who are supplying these materials, so that they may be secure as to their money? The supplies of material are just as necessary to the quick and efficient delivery of munitions and boxes as the work that has to be done in their production, and are just as worthy of consideration from the Munitions Board.

A Constructional Anomaly

"There is another feature in connection with the production of the Bethlehem box that calls for some criticism. In the production of these boxes it is stipulated that the diaphragms are to be produced from one quarter and five-sixteenth inches veneer. This material costs about three times what it would have cost to produce the diaphragms in solid wood, and it is very questionable whether they are any better in veneer. The only material effect that the use of veneers for this work has had, so far as we can see is that practically all of this material, instead of coming from Canadian manufacturers who are paying taxes and bearing the brunt of our financial troubles, is coming from veneer manufacturers in Wisconsin, who, of course, are paying a duty to our Government when the stuff is imported, but are having 99 per cent. of the duty refunded as soon as the boxes are shipped out of Canada. On the whole, is there anything fair or equitable in the manner in which the Imperial Munitions Board are treating the lumbermen of Canada in this shell box situation?"

If the price at which shell boxes are now being ordered by the Munitions Board is not sufficient to permit of the manufacturers doing their business in a sound and moderately profitable basis, the sooner the fact is properly appreciated by the board the better it will be for all concerned. Our definite conviction is that the board should make a detailed study of the cost of production of its shell boxes and make sure that orders given out are upon a price base that will not increase the financial difficulties of manufacturers in Canada to-day.

* * *

TRANSMISSION SAFETY—III.

NUMEROUS accidents occur to men whose duty it is to oil the bearings of overhead shafting. It is highly desirable to prohibit the oiling of shafting while it is in motion, but this is not always practicable, when the bearings are of the usual type. A special form of bearing, known as a "ring bearing", is favored by many shops, and it is to be commended to the attention of those who have not tried it, inasmuch as it greatly lessens the likelihood of accidents from oiling. This form automatically supplies oil to the bearings from a small reservoir which holds a sufficient amount to last for more than a week. The reservoirs throughout the shop can then be filled on Sunday, while the machinery is idle, and in this way the danger from oiling moving shafting is entirely obviated.

When the bearings are of the ordinary type, they can be oiled with a fair degree of safety by doing the work from elevated platforms or walks, properly railed and running parallel with the shafting for its entire length. Provision can often be made for platforms of this kind when designing and laying out a shop, but it is usually a difficult matter to instal them in a shop that was erected without reference to them. Another method that can sometimes be used with advantage consists in erecting, parallel to the shafting, an overhead rail or track, along which an iron ladder travels by means of wheels or rollers. In most cases this plan is difficult of application in shops that are already in use, because the ladder would interfere with belts or pulleys, or with machinery on the floor.

Vertical pipes are sometimes extended through the floor over the shafting and immediately above the bearings, through which oil may be poured; but when this is done it is not easy to see how much oil reaches the bearing, and the attendant is therefore likely to use either too little oil, or else an excess of it. In the former case the bearing may run dry, while in the latter case a considerable quantity of the oil may be wasted. Special oil-cans are sometimes used, having necks or spouts bent in the form of a U at one end,—the necks being long enough to permit the oiler to lubricate the bearing while standing upon the floor.

* * *

EXHIBITION NOTES

Over 15,000 men did all or part of their training at the Exhibition Camp last winter.

Over 1,000 persons will take part in the performance daily in front of the grand stand at the Canadian National Exhibition this year.

Exclusive of live stock and outdoor exhibits there is an exhibit space at the Canadian National Exhibition of over 500,000 square feet.

The exhibit in the Fine Arts Gallery this year at the Canadian National Exhibition will comprise 200 masterpieces of French art representing all the schools of the present day.

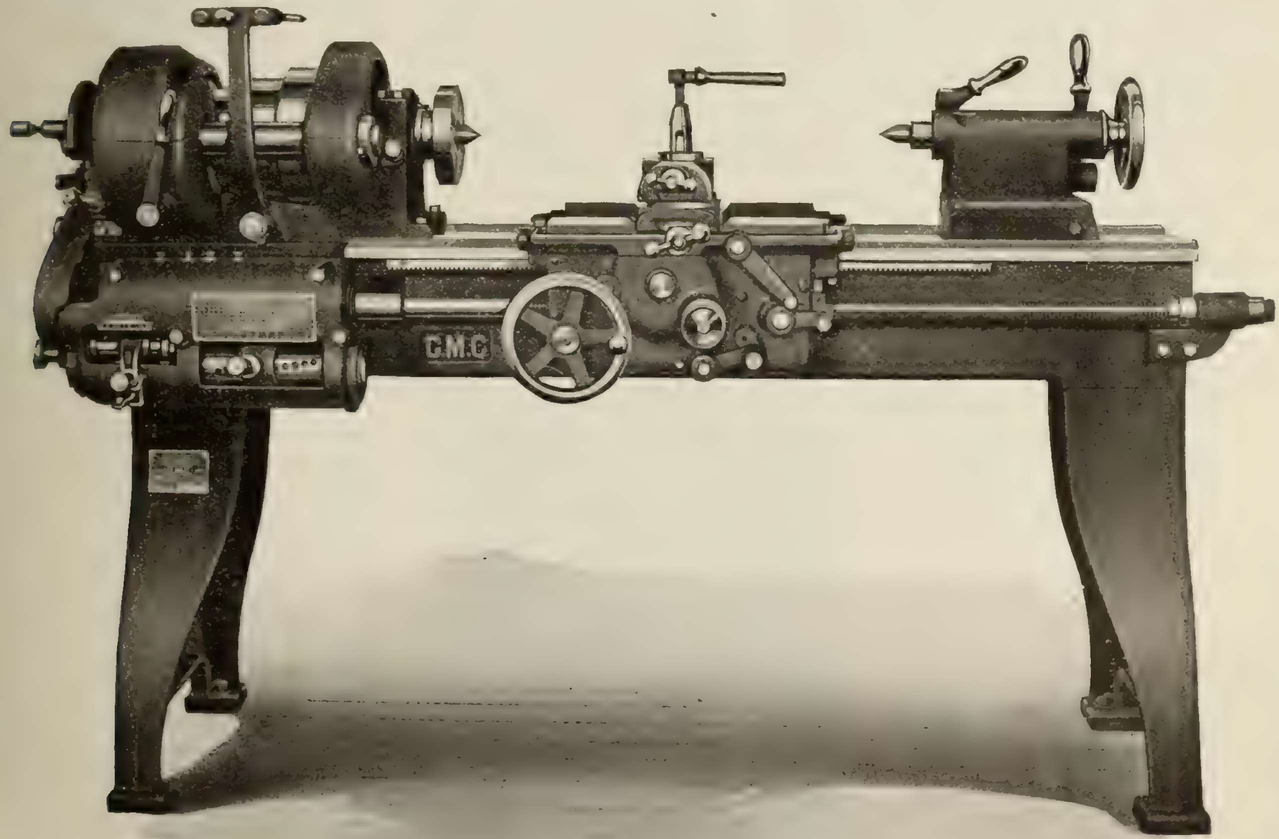
Saturday, Aug. 26th, and Monday, Sept. 11th, are exhibitors' days at the Canadian National Exhibition, and the public are not admitted. On the other twelve days everything is in full swing.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

NEW DESIGN 14-INCH QUICK CHANGE ENGINE LATHE

A NEW design, 14-inch quick change engine lathe has been placed on the market by the Canada Machinery Corporation, Galt, Ont., its special purpose being to meet the requirement demand from small machine shops, technical schools, etc., for a tool embodying all up-to-date improvements, with at the same time the widest possible range of service. From the illustration and detail description that follow, it will be observed that the C. M. C. may justly claim to have achieved the ideal to which they aspired. In addition to having a contract to supply a number of these lathes for the machine shop department f the new Technical School, Toronto, ·veral are already installed and operatig in the machine shops of Canadian etal-working plants, the managements which, in every case, we are given to nderstand, express complete satisfacon both with the lathe workmanship id its quality and quantity product



NEW DESIGN 14-IN. QUICK-CHANGE ENGINE LATHE.

We are advised that one of these lathes is included in the C. M. C. exhibit in the Machinery Hall at the Canadian National Exhibition now being held in Toronto.

As indicative of the handiness and adaptability of this lathe, reference may be here made to its thread-cutting provision, the latter admitting a range from 32 threads per inch to 5-inch lead, or one thread in 5 inches without changing a single gear. Again, by making extra change gears for the quadrant plate, practically any thread can be cut between the limits of 100 threads per inch and 5-inch lead. The relieving attachment supplied with the lathe, when equipped for toolroom work, is universal, being thus applicable to external, parallel, taper, angular and spiral reliefs, or to internal and end reliefs.

Bed and Headstock Spindle

The bed is unusually deep and rigid, and is thoroughly braced with cross ribs of box section. It is provided with three inverted vees of liberal proportions. The headstock and the tailstock each rest on one vee and one flat surface, while the saddle bears on two vees and also on the flat surface. The brackets attached to the bed are made with a tongue fitting into a groove in the bed, and the rack is of steel securely screwed and dowelled to the bed.

The headstock throughout is unusually massive, and is of the three-step cone, double-back geared type. It is made with split phosphor bronze spindle bearings, which are provided with large oil wells to ensure ample lubrication at all times. The back gear eccentric has been moved to the front of the lathe instead of the back, a feature which has several important advantages. In the first place, the eccentric handle is at the front of the lathe, avoiding the necessity of the operator reaching over the lathe with the accompanying danger of getting caught in the belt. Another advantage is that the wear on the front spindle bearing is much more even, this being brought about because the back gear pinion, when the back gear is engaged, pushes the spindle down in its bearing in opposition to the upward thrust from the tool point. These forces, when the tool is at the pitch line radius of the spindle gear, balance each other, leaving only the pull of the belt to cause wear on the spindle bearing. With the back gear pinion at the back, the pinion and tool thrusts are both upward, causing greater wear on the top half of the spindle bearing. The gears on the head are entirely enclosed, but at the same time are readily accessible, as the headstock is built up to the centre line of the spindle, and the gear covers drop on the planed faces at the front and back, being located by means of dowel pins. The covers lift off readily, simply resting in position by their own weight.

Spindle and Belt Shifter

The spindle is made from special high carbon spindle steel, and has a hole bored from the solid throughout its entire length. It is accurately designed to facilitate putting on chucks or face plates. The plain part of the spindle nose is longer than the thread portion, thus centering the face plates before they enter upon the thread.

A C. M. C. improved belt shifter, for rapidly and safely shifting the belts to any of the steps of the cone, is part of the regularly fiurnished standard equipment. It consists of an arm with a belt guide carried on the head, and provided with a self-locking pin for securing the arm centrally over each step. A corresponding shifter is provided on the countershaft, and by means of the manipulation of these levers, the belt may be shifted to any desired cone step in the minimum time without the operator endangering himself.

Feed and Screw-cutting Changes

The feeds and screw-cutting changes are instantly obtainable by the movement of a lever to any of the different locations shown on the index plate. The thread of the lead screw is used for screw-cutting only. The lead screw is reversed for right and left-hand threads by means of the reverse plate on the head. The forty-four quick change feeds are obtained in a new design of quick change box having only two handles. This arrangement is specially convenient, besides having the advantage of rapidity of action. A quadrant plate is supplied to carry the intermediate gear between the head and the quick change box. This makes the lathe elastic in its screw-cutting capacity, for by getting special gears made, practically any thread can be cut between the limits of 1/100-inch pitch and 5-inch pitch. All the quick change gears are made of steel.

Quick Thread Cutting

A quick thread-cutting arrangement is incorporated in the design of the head as part of the regular equipment. This is accomplished by putting the reverse plate and gears inside the back bearing of the spindle in the head, means being provided for sliding the reverse plate 13/16 of an inch, so that the stud gears mesh with the cone back gear pinion, which is of the same number of teeth and pitch as the feed gear pinion on the spindle. The back gear is made of ten-to-one ratio, which means that when the back gear is engaged, quick threads may be obtained ten times as coarse as the threads on the thread index plate, with equal gears driving from the head to the quick-change box. Many useful pitches can be obtained with this device, such as ⅝ in., 2-3 in., 5-6 in., 1 in., 1¼ in., 1 2-3 in., 2 in., 2½ in., 3 1-3 in., 4 in., and 5 in. The screw-cutting capacity of the lathe is vastly increased by this device.

Apron, Feed Friction and Tailstock

The apron is of the double wall type, and all shafts and studs have double bearings. The rear wall of the apron is made heavy and solid with the top where it is bolted to the saddle. The front plate is readily removable, and is comparatively light. The gears in the apron are all steel, and, where running loose on studs, are bronze bushed. An improved feature is the position of the friction engaging knob. This knob is lower than usual on the apron, giving more room for the hand when grasping it, and what is most essential in obtaining ample clearance for the knuckles, one knob engages either the longitudinal or the cross feed by turning to the right or to the left. Another advantage claimed for this location for a feed friction clutch is the fact that they run faster in proportion to a given feed than in the lathe with two separate frictions. This means there is no difficulty in making the frictions hold, only a light pressure on the knob being necessary. The feed handle and the nut clamp handle are interlocked, so that the feeds and screw cannot be engaged simultaneously. The feeds may be reversed at the apron by the lower lever. The saddle is made with a trough all round the edge, and has wipers to wipe the bed clear of chips. A locking handle is located at the front of the saddle for use when cross-feeding. The cross screw and the top slide screw have micrometer collar adjustments. The compound rest swivel is graduated in degrees.

The tailstock is of substantial proportions, and is arranged to set over to turn tapers. The barrel is graduated in inches. The locking handle is always in position at the rear, and no separate wrench is required.

Universal Relieving Attachment

A universal relieving attachment can be applied to any of these lathes, and is only supplied as an extra. It is arranged to do parallel relieving, both internal and external, taper relieving, and angular and spiral relieving. Any angle of taper can be relieved as the motion is carried up through the centre of the swivel in the rest. The attachment is driven off the spindle gear on to a pinion shaft at the rear of the lathe. This pinion shaft gears on to a lower spiral gear shaft by means of change gears and a quadrant, which is carried on the rear wing of the saddle. The spiral gear shaft drives a cross shaft on the cross slide of the lathe. This cross shaft carries right and left-hand relieving cams. The relieving cams give a vertical motion to the shaft running through the centre of the swivel slide. This shaft is arranged to work on to either of two oscillating levers in the tool slide, one of which is used for internal relieving, and one for external relieving. Provision is made for adjusting the amount of relief from nothing to ⅛ of an inch, either internal or external. When cutting spiral reliefs it is necessary to reverse the lathe in order to run back to start the tool for the next cut. The timing of the oscillation of the tool slide is not interrupted by reversing the lathe, as the oscillating motion is going on all the time that the lathe is reversed. The depth of cut is adjusted by means of the cross-feed screw, the arrangement being such that full use of the cross feed screw is obtained at all times. If desired, the relieving attachment and the taper attachment can be used at the same time to relieve long slow taper reamers.

Taper Attachment

The taper attachment is supplied only as an extra. It is of improved design, and has a fine adjustment for setting the taper swivel bar by means of a worm with micrometer adjustment and segment. The connecting bar to the cross slide is guided at both front and back of the taper swivel bar, this construction overcoming the excessive cross-wind with the corresponding friction in the cross slide.

The lathe is furnished with a two-speed countershaft, friction pulleys, steady head, follow rest, two face plates and all the necessary wrenches. Other attachments, which are extras, embrace the following:—Universal relieving attachment, taper attachment, pump and pan, turret on saddle, turret tool post, turret on bed, automatic stop for saddle, all-geared head, and motor drive.

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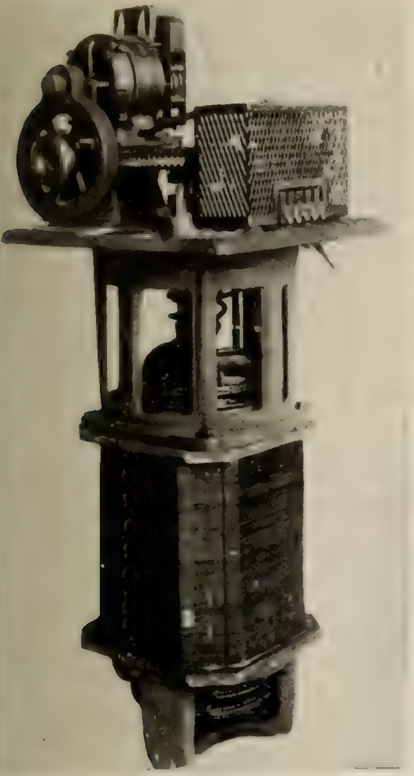
IMPROVED DESIGN INDUCTION FEEDER VOLTAGE REGULATOR

AFTER a considerable amount of engineering and experimental work, with a view to improving the electrical performance and mechanical details, the Westinghouse Electric & Mfg. Co., East

Pittsburgh, Pa., has placed on the market the improved design feeder voltage regulator, illustrated. This is a single phase induction regulator, known as type C, for 2,300 volts, 60 cycles, 10 per cent. regulation, and it is standardized in all ratings from 5¾ k.v.a. to 69 k.v.a. The refinements secured in this new design have increased the reliability of the regulator in service, and have simplified and decreased the expense of the wiring necessary for installing accessories for automatic operation, in addition to improving the electrical efficiency.

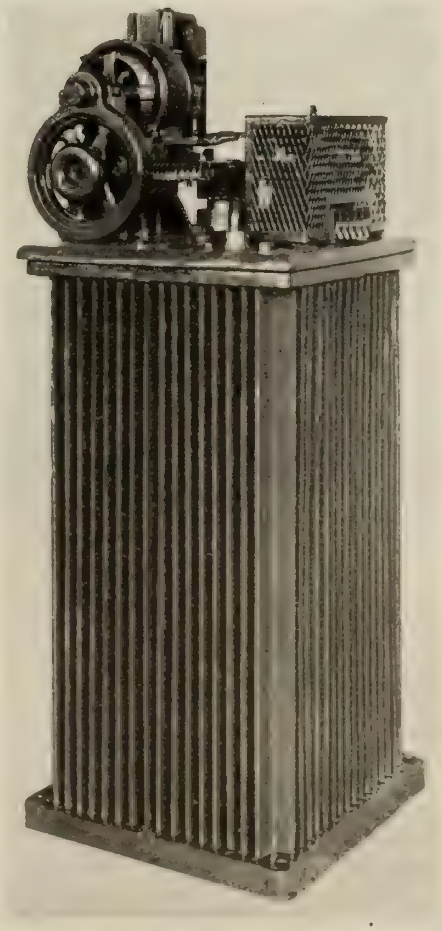


REGULATOR UNIT REMOVED FROM TANK.

The rotor is wound with form-wound coils, and constitutes the primary element. The short circuiting coils in the stator are formed from a large number of turns of relatively small size enamelled copper wire, thus reducing the watts loss in these windings without decreasing the neutralizing effect for which they are provided. The stator core is of the frameless construction so largely used in induction motors. With this form of construction the cross section of the stator core is increased without a corresponding increase in size of other parts and of floor space, resulting in a decrease of iron loss and exciting current. Further, the insulating oil in which the egulator is immersed in the tank comes n direct contact with all surfaces of the tator core with more efficient cooling ffect.

In a regulator the insulation of windngs is of vital importance because of he severe conditions of operation. The coils for both primary and secondary are, therefore, carefully insulated and impregnated, and are assembled in open slots. They are held by fibre wedges driven in small grooves at the top edges of the slots. Heavily insulated steel bracing rings are assembled around the exposed ends of the stator coils at both ends of the core. These rings are bound to the coils with cord, and greatly stiffen the coils against distortion from mechanical shock caused by current surges in the feeder during periods of line disturbance or short circuit. This feature is an important one, increasing the protection to the coil insulation and the factor of safety of the regulator in service.

An electrically controlled switch or auxiliary relay for the operating motor, formerly mounted separately from the regulator, is now mounted directly on the regulator top cover and includes the limit switch. This arrangement cuts down the number of wires required in the control circuit for automatic operation, and simplifies and lessens the expense of installation. The chance of failure in the control circuit is correspondingly lessened as well, and inspection of the wiring is made easy. The operating motor is provided with a quick acting magnetic brake as heretofore, but the operating mechanism has been changed, so that the regulator now requires only ten seconds for the complete range of travel from maximum buck to maximum boost, 20 per cent. regulation.



COMPLETE APPARATUS WITH REGULATOR UNIT IN POSITION.

The regulator is made as a unit, and may be quickly removed from the tank by simply unbolting the top cover, thus making inspection and repairs comparatively simple. The tank is formed from sheet steel walls with oxy-acetylene welded seams, and with top and bottom flanges cast on to the walls. This type of tank is the same as that used with Westinghouse oil insulated self-cooled transformers. It is strong without undue weight, and free from oil leakage. The radiation quality is necessarily very high.

◆

CANADA'S HUGE TRADE INCREASE

THE aggregate trade of Canada in four months has increased by more than 100 per cent. The July trade as shown in the monthly summary issued on August 24, the Hon. J. D. Reid, Minister of Customs, showed the phenomenal rise of 141 per cent., or $139,860,450. The total trade for the month amounted to $238,860,488, and for the four months ending July 31 it reached the total of $766,372,832, as against $371,646,906 in the corresponding period of last year.

Imports for consumption amounted in value to $63,622,587 in July as compared with $36,622,190 in July last year, while in the four months period they rose from $134,729,377 to $249,867,767. The July exports reached a value of $104,964,270 compared with $45,590,038. In the four months the exports have risen from $159,168,259 to $350,345,305. These are in the figures for domestic imports and exports only.

In the export of foreign merchandise there has been a notable increase, nearly one thousand per cent. The volume of these exports rose from $11,494,457 in the four months of last year to $122,627,072 in the same period this year.

An interesting feature of the statement is the substantial rise in the imports of free goods; there has been, however, a corresponding increase in the imports of dutiable merchandise, and the duty collected in the four months has risen from $28,085,471 to $46,063,507.

Shipments of Canadian manufactured products trebled in July amounting to $38,264,136, while the exports of farm products amounted to $38,585,309, or five times the total of July last year. Exports of foreign mine products, which were less than a million in July last year, reached a total of over fifty-four millions last month.

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The Government building at the Canadian National Exhibition has 48,000 square feet of exhibit space.

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AFTER WAR TRADE AND MERCHANT MARINE SUPREMACY

ONE phase of the after-war world trade and commerce possibilities that is being given much less attention than it deserves is that relating to the comparative strengths, or more properly speaking, deadweight carrying capacities, of the then British and German merchant fleets. Due to the fact that the bulk of Germany's mercantile marine has been harbor-locked in her own and in neutral ports since the war started, tonnage losses through sinking and capture by Allied ships of war may be said to be almost negligible. It is computed, on the other hand, that Great Britain's merchant fleet alone will at the end of the present year be in round figures something like 4,000,000 tons less than its total on the outbreak of hostilities.

A twofold cause has been and still is in operation towards such a development, i.e., the maintenance of her international trade and the precedence given war vessel over merchant vessel construction. In the case of the former it was naturally to be expected in view of the risks encountered that a large percentage of merchantmen of various types and tonnages must succumb in the struggle with even less ruthless enemy submarine warfare than what has actually been experienced. As regards the displacement of merchant shipbuilding by that of ships of war, while it may be possible that less drastic measures would have sufficed, our sea supremacy being so intensely vital, erring on the safe side has had everything to commend it.

Reference has been made in these columns on former occasions to the practically certain trade war which will ensue immediately that on the battlefields of Europe is halted. We, as already indicated, will enter the struggle with a handicap equivalent to 4,000,000 tons less shipping available, and, for that matter unprocurable for possibly a decade thereafter to come. Germany's merchant fleet as we have already observed will be practically intact, and ready to start operations, and having been in pre-war days our most formidable rival both as regards shipbuilding and shipowning, she, unless steps be taken otherwise, cannot fail to assume pride of place in international trade. Irrespective of the preservation of her pre-war merchant fleet with the exception of some 300,000 tons, she is reputed to have added, and to be still adding, materially to what, with the deduction of the above amount, may still be reckoned as an already respectable total of 5,250,000 tons.

It is computed that to make good Britain's 4,000,000 tonnage loss, ten years will elapse following the declaration of peace, and even then her normal annual output would have to be increased from 1,370,000 tons to 1,770,000 tons. The outlook, it must be admitted, is anything but reassuring, and when it is remembered that we will have to depend largely on our export trade to meet the cost of the war, and that arrangements have been made to blacklist entirely everything that savors of German origin, it becomes absolutely essential that we have on the sea a merchant marine as effective as that of its naval confrere, and as capable of victorious achievement as our armies now in the field.

To wait ten years to bring our shipping back to normal, is on the face of it ridiculous, for not only would Germany have been able to take advantage of the psychological moment, but she would, in the nature of things, at least be able to compete with us in producing new shipbuilding tonnage. As a remedy, and of course it must be a drastic one, it has been suggested that peace terms embody "a ship for ship" clause; incidentally, a money indemnity is thereby flouted. From every viewpoint, there will be few who will be found antagonistic to the proposal. We are familiar with the Old Testament dispensation which demands "an eye for an eye," a "tooth for a tooth," and "a life for a life," and making all due allowance for our living in a Christian era, the claim of "a ship for a ship" may easily both be pressed and satisfied.

Submarine piracy has deprived us of some of our largest and greatest masterpieces of naval architecture and marine engineering, as well as of a host of merchant vessels of varied type and size, and only by our demanding "ship for ship," in its type, tonnage and appointments, or their equivalent, will Germany be made to realize that she has been a party to submarine piracy.

Much of Britain's mercantile marine has been and still is employed in war-created service, which is equivalent to saying that such vessels have been subject to more or less reconstruction, and, on account of their exacting duties, will as a matter of fact be in line for more or less extensive overhauling when hostilities cease. Germany's bottled-up craft are, it is quite certain, being maintained at "concert" pitch. This is borne out by the statement—if true, of Herr Ballin, the German steamship magnate, which places the orders on the books of Fatherland shipyards at 1,250,000 tons. Such a total of itself comes within 120,000 tons of Britain's normal annual shipbuilding output. Its significance is more pronounced, however, when it is remembered that Britain's mercantile marine was in pre-war days four times as large as that of Germany. The idea is to have at least that ratio when the trade war begins, and no more effective way of reaching the objective is to be found than by Britain's peace terms making it essential that "ship for ship" be a front rank clause.

* * *

HIGHLY SIGNIFICANT!

THE fact that a debenture issue to the amount of one million sterling by Canadian Vickers, Ltd., has received the Imperial Treasury authorization, gives indication that not only is the importance of this enterprise highly appreciated in Home Government circles, but that considerable developments may be expected in the scope of its operations. Shipbuilding on a much more extensive scale than was perhaps originally planned will doubtless be the principal direction in which the additional capital will find an outlet.

INDUSTRIAL NOTABILITIES

WILLIAM JAMES CLUFF, president, Canada Pipe & Steel Co., 87 Church Street, Toronto; president, Cluff Bros., Ltd.; president Cluff Manufacturing Co.; president, Security Co.; director, Guardian Realty Co., was born at Toronto, March 20, 1877, son of James and Sarah (Perceley) Cluff. He received his education in Toronto public schools, and entered on a business career as clerk with the Toronto Radiator Company in 1892.

He took charge of the Canada Iron Pipe Co. in 1906; reorganized and re-established the Canada Pipe & Steel Co. in 1907; organized Cluff Bros., Ltd., in 1909; organized the Cluff Manufacturing Co. in 1912; and the Security Storage Co. in 1913.

WILLIAM JAMES CLUFF.

Mr. Cluff married Ruby Sullivan, daughter of James Sullivan, Toronto, on February 12, 1907, his family consisting of two daughters. His clubs are the Albany, Toronto; the Commercial, London, Ont.; and his recreations, fishing and boating. In matters of religion, Mr. Cluff is Anglican. His residence is 151 Springhurst Avenue, Toronto.

Photo, Courtesy British and Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$18 70
Lake Superior, charcoal, Chicago	19 75
Michigan Charcoal iron.	28 00
Ferro nickel pig iron (Soo)	25 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base, Toronto	3.50
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.50
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.10
Bars, 2 in. and up	4.00
Structural shapes	3.10
Plates	3.50

FREIGHT RATES

Pittsburgh to Following Points	Per 100 lbs.	
	C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$30 00
Electrolytic copper	31 00	30 00
Castings, copper	30 00	29 00
Tin	43 00	44 00
Spelter	14 00	14 00
Lead	8 50	8 50
Antimony	17 00	18 00
Aluminum	68 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4 25	$4 50
Heads	4 50	4 75
Tank plates, 3-16 in.	4 75	4 75

WROUGHT IRON PIPE

Prices in effect Aug. 1, 1916

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 06	5 25
½ in.	3 91	5 57
¾ in.	4 72	6 96
1 in.	6 97	10 29
1¼ in.	9 43	13 92
1½ in.	11 28	16 64
2 in.	15 17	22 39
2½ in.	23 99	35 39
3 in.	31 37	46 28
3¼ in.	37 72	55 66
4 in.	44 69	65 95

Lapweld

2 in.	$17 02	$24 24
2½ in.	25 16	36 56
3 in.	32 90	47 81
3½ in.	39 56	57 50
4 in.	46 87	68 13
4½ in.	57 15	83 19
5 in.	66 60	96 94
6 in.	86 40	125 80
7 in.	116 62	165 40
8 in. x 25 lbs. per ft	122 50	173 80
8 in. x 25 lbs. per ft.	141 12	200 20
9 in.	169 05	239 80
10 in. x 32 lbs. per ft.	156 80	322 40
10 in. x 40 lbs. per ft.	201 88	286 30

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$16 00	$16 00
Copper, crucible	19 00	19 00
Copper, heavy	19 00	19 00
Copper wire	19 00	19 00
No. 1 machine compos'n	14 50	14 00
No. 1 compos'n turnings	12 50	12 00
New brass clippings	13 50	13 50
No. 1 brass turnings	12 00	11 50
Heavy melting steel	9 00	9 00
Boiler plate	11 75	10 50
Axles, steel	14 50	15 00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	12 50
Shafting	16 50	16 00
Malleable scrap	10 00	11 00
Pipe, wrought iron	10 00	9 00
Stove plate	10 00	10 50
Heavy lead	6 00	6 00
Tea lead	5 00	5 00
Scrap zinc	7 50	8 00
Aluminium	34 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	50
Stove bolts	62½
Plate washers	25
Machine bolts, ⅜ and less	40
Machine bolts, 7-16 and over	30
Blank bolts	30
Bolt ends	30
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$4.85
Structural rivets, as above	4.75
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent.
Sq. & Hex Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	.65
Coupling bolts	net
Planer head bolts, without fillet	.15
Planer head bolts, with fillet	net
Planer head bolt nuts up to 1 in.	.60
Planer head bolt nuts, over 1 in.	.55
Planer bolt washers	list plus 10
Hollow set screws	list plus .20
Collar screws	list plus.20
Thumb screws	.20
Thumb nuts	.75

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$45 00
Open-hearth billets, Pittsburgh	45 00
O. H. sheet bars, Pittsburgh	45 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3.85	$3.80
Cut nails	3 40	3 40
Miscellaneous wire nails	65%	
Pressed spikes, ⅝ diam., 100 lbs.	$3 90	

MISCELLANEOUS

Solder, guaranteed	0.27½
Solder, strictly	0.25½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	13.95
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	030½
Pure turpentine, single bbls., gal.	0.69
Linseed oil, raw, single bbls.	0.84
Linseed oil, boiled, single bbls.	0.87
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.11
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	55
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	25
3-fluted drills over 1½ in.	15
Bit stock	55
Ratchet drills	15
Machine bits for wood	20
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	30
Sockets	30
Sleeves	50
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	4 60	4 80
Canada plates, dull, 52 sheets	4 50	4 50
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 45	6 15
Premier, 10¾ oz.	6 75	6 40

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$20 00	.....
1¼ in.	23 00	.....
1½ in.	26 00	22 50
1¾ in.	26 00	18 00
2 in.	27 00	17 50
2¼ in.	29 50	.....
2½ in.	32 50	23 00
3 in.	44 00	27 00
3¼ in.	.....	30 50
3½ in.	50 00	32 00
4 in.	57 00	40 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.35 to .37
Tin	.55 to .58
Zinc	.20 to 23

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 in.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	1.75 to 1.90
Polishing wheels, bullneck.	.90
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14-.18
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Que., Aug. 28, 1916.—Industrial conditions continue to reflect a gradually increasing development in domestic activity, in addition to that for war material and supplies. The shortage of labor, added to the increasing difficulty of procuring steel, will doubtless further affect prices of raw material; therefore, advances in some lines are not unlikely. Recent developments in the European situation will strengthen the cause of the Allies and increased activity is as a result looked for. The railroad situation in the United States is causing much uneasiness in commercial and industrial circles, affecting as it will, should a breach occur, the transportation of munitions and other needed supplies.

Pig Iron

No change is noted in the general situation. Steel-making pig is as active as ever; the foundry demand also shows a slight improvement.

Steel

With the holiday season drawing to a close, and the gradual return to cooler weather, the output from the mills and foundries is assuming capacity figures. The increased use of plates and short beams for trench supports and protections have resulted in a strong demand for these products. Deliveries of billets and sheet bars are showing improvement, but producers are still taxed to the limit in supplying the demand. The nominal quotation for Bessemer billets and sheet bars is $45, maker's mill, Pittsburg, with open-hearth bars $2 higher. In addition to the increasing demand for plates for army use, the requirements of shipbuilders show no abatement. The situation in sheets remains firm, the demand for blue annealed and specials being good. Galvanized are quiet, the return of spelter to a higher level having left the market a little unsettled. Galvanized sheets are quoted at $4.25 Pittsburgh. The demand for wire products has quietened down, but mills are active in filling booked orders for future requirements. The local situation is unchanged, and dealers report prices as last week.

Metals

The general situation is unchanged, business, if anything, having slowed up somewhat after recent activities. Copper is firm, but quiet, following heavy buying. Tin is unsteady, but inclined to become firmer. Spelter is quiet, following the recent good demand. Lead is again quiet, with an undertone of weakness. Antimony is steady, but uncertain.

Copper.—Insistent demand continues to keep the smelters and refiners working at very high pressure, and while the requirements for war purposes are very heavy, it is estimated that the greater portion of the mined metal is being absorbed by industries for domestic contracts. The future outlook, in this respect, is very encouraging, and it is expected that the present activity will continue for some time. The immediate demand has somewhat slackened, but it is anticipated that buying will be renewed shortly. Consumers have been taking an active interest of late, and are covering their early requirements. Present conditions point to a strong market, with sellers in control

The London market has shown weakness in standard, and strength in electro, owing to increased demand for the latter, which shows an advance of £5, being quoted at £129 per ton. Owing to the recent heavy buying, both for export and home consumption, the New York market is very strong, quotations having advanced 1 cent on lake and 1¼ cents on electrolytic; the nominal price being 27½ cents for prime lake and 28¼ cents for electrolytic. Dealers here, while reporting an active market, are holding firm on quotations, which are 31 cents for lake and electro, and 30 cents for castings.

Tin.—The market retains the position it has held for some time and while there is apparently an added interest to the situation, that tends to keep firm prices, recent activities do not indicate that a buying movement is imminent. The present situation is largely affected by the uncertainty that prevails regarding the future shipments of tin, which at any moment may be restricted owing to difficulty in obtaining permits. London reports a slightly easier market, while the New York situation is firm on a ⅛ cent advance, the nominal quotation being 38¾ cents per pound. The local situation is unchanged, with prices firm at 43 cents per pound .

Spelter.—The situation in spelter has quietened down after the recent activity, but the market remains comparatively firm. The buying which of late has been quite heavy, appears to have reduced the supply of metal held by second hands, and the feeling in the trade denotes an undertone that may ultimately develop into a stronger market The London situation has shown improvement with an advance of £9 on spot and £2 on futures, quotations being £58 and £45 respectively. An advance of ⅞ cents on the New York market places the nominal quotation at 9½ cents per pound. Local dealers, while realizing the recent activity and the present firm tendency, are content to retain their quotations at 14 cents per pound.

Lead.—The exceptionally heavy demand during the past two weeks has placed the lead situation on a much sounder basis, but it is not likely to show further strength; in fact, dealers are of the opinion that the market will again decline, as recent cables would tend to confirm reports that both Britain and Russia are well covered for the next six months at any rate. However, the domestic demand has been very good of late, which might indicate that consumers have allowed their supply to run low, resulting in the recent heavy inquiries. London reports a steady market with slight advances. Following the activity during the past two weeks, New York quotations are higher, the Trust price having advanced from 6 cents to 6½ cents, while the outside interests are quoting 6¾ cents, an advance of ¾ cents per pound. The demand here, while above the normal has not been sufficient for dealers to advance prices, which are unchanged at 8½ cents per pound.

Antimony.—The improvement noted last week has eased off a little, but interest is still being shown, and consumers and dealers are apparently awaiting the trend of events before making further purchases. However, it is only on exceptional demand that this metal could return to a higher position, as the production has for many months greatly exceeded the requirement, even with many plants running under capacity. During the past two weeks the New York quotation has shown an advance of 3¼ cents, the nominal price now being 13¾ cents per pound. Local dealers are quoting 17 cents, but anticipate an advance if the strength of the market continues.

Aluminum.—The market continues strong and very firm with quotations unchanged at 68 cents per pound.

Machine Tools and Supplies

Little change is noted in the machine tool situation. Shell making equipment is still in demand. The requirements of munition makers are becoming fewer every day, although there are still inquiries for standard or special machinery, but in single pieces. Deliveries on placed orders are much better, although manufacturers are feeling the effect of a shortage of help, which has been gradually increasing for the past two months. Small tool supplies are still in good demand, as these commodities are required continually and under present conditions, in large quantities.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

Scrap

The situation in the old metal market is quiet, with dealers quoting previous prices. Increased activity is shown in steel-making scrap and copper, while brass and lead are much stronger.

Toronto, Ont., Aug. 29.—The most important event locally is the Canadian National Exhibition, which opened last Saturday. There are, as usual, many interesting exhibits, industrial and engineering, while a new feature has been introduced this year in the form of a display of complete shells of various calibres showing the method of manufacture from the raw materials to the finished article.

A statement recently issued by the Customs Department shows that the trade of Canada in the first four months of the fiscal year has increased by more than 100 per cent. July was a remarkably satisfactory month, the returns showing an increase of 141 per cent. The shipments of Canadian manufactured products in July were three times the total for the corresponding month last year. Trade conditions in Canada are highly gratifying, and will help considerably in paying off the national indebtedness incurred owing to the war. The balance of trade is now exceptionally favorable.

Steel

The steel market is again very strong, and is unusually active for the time of the year. The enormous demand for steel for munitions and for other purposes connected with the war has resulted in a new buying movement in the United States and Canada. The mills have as much business booked as at any time before, and deliveries are getting as backward as ever, second quarter of 1917 delivery being about as early as can be promised now. Another upward movement has started in prices of steel products, the principal reasons being the shortage and increased cost of semi-finished material. The higher prices this week include an advance of 25c per 100 lbs. on steel bars, 25c per 100 lbs. on plates, and an increase of approximately 10 per cent. on boiler tubes. The situation as regards boiler tubes is perhaps tighter than in any other line, as the mills are sold up for eight to ten months on both locomotive and merchant tubes. Plates are also in heavy demand, particularly from the shipyards and boilermakers. The leading mills have their entire output sold for this year, and have taken large contracts for delivery in first quarter and first half of 1917. Prices of wire products continue very firm, and an advance is looked for about the 1st of September. The wrought iron pipe situation is unchanged, but prices may advance. Following the departure of the hot weather, production has materially improved, although the shortage of labor is adversely affecting the situation. The demand for shell steel, however, is so pressing that the mills are making a big effort to increase the output as much as possible.

The market on sheets is firmer and quotations have advanced on black sheets, but blue annealed are unchanged. The hot weather seriously hampered mill operations; the output, therefore, was curtailed and deliveries were further delayed. Prices of galvanized sheets are lower, due to the recent declines in spelter, but the high level of black sheets will tend to steady the market.

The steel market in the United States continues very firm, with prices advancing on some products and deliveries getting more backward. There has been an increase in domestic buying, but consumers are still inclined to be cautious on account of the present high prices. Steel bars are unchanged at 2.60c and shapes at 2.50c, but plates have advanced and are now being quoted at 4c f.o.b. Pittsburgh. Open-hearth sheet bars have declined $2, and are now quoted at $45 per ton Pittsburgh. Billets are unchanged, as are also Chicago warehouse prices.

Pig Iron

The situation in the pig iron market is unchanged, but it is believed that the next movement is likely to affect prices favorably. The heavy production of steel assures a big demand for pig iron for the rest of the year, and prices may accordingly advance.

Machine Tools

The active demand for munitions equipment continues, and local dealers report having received a number of interesting inquiries for machine tools for shell shops. Deliveries on large swing lathes are fairly satisfactory, although shipments are still being delayed in the local freight yards. American machine tool houses report that business booked by their agents in Great Britain is less desirable, due to the Order-in-Council, which calls for payment to the Government of 60 per cent. of the profits arising out of all business transacted in that country. One or two makers of grinders and shapers in the States have advanced their prices by approximately 10 per cent., and there is a possibility of an advance on planers in the near future.

Supplies

Business in machine shop supplies continues brisk, with prices of practically all lines very firm. Although there are few price changes of importance to note this week, higher prices on some lines, particularly in steel and brass goods are anticipated. Linseed oil is lower at 84c per gallon for raw and 87c for boiled oil. Crude oil continues weak but there has been no further decline in gasoline, while lubricating and lighting oils are also unchanged. An advance of 5 per cent. has been made on Disston hand saws.

Metals

The metal markets continue to display considerable activity and are firmer than they have been for some weeks. Although the markets generally are strong there have been no changes in prices with the exception of copper which has again advanced. Business locally continues very good for the time of the year and further improvement is anticipated. Metals for munitions are of course in good demand but ordinary business is keeping up well .

Copper.—The situation in the copper market is unchanged from last week and quotations are again a shade higher. Sales for November, and December are in large volume and export demand continues very heavy a great part, it is said, being for private consumers in the Allied Countries. The buying of the last three weeks is rapidly cleaning up the supplies for the current year. Quotations are higher and nominal at 30c per pound.

Tin.—The situation in the tin market is the same as last week and quotations locally are unchanged although London is higher. The market is quiet but firm with no feature of importance to note. Tin is quoted at 44c per pound.

Spelter.—The market is quiet, and it is reported that there have been some second hand offers at concessions. Producers are now well sold ahead and are not anxious to sell. Quotations unchanged at 14c per pound.

Lead.—The market is less excited now than it was at the beginning of the week, prices being firmly maintained. The Trust price of 6.50c New York, is unchanged but independent prices are higher at 6.75c New York. The demand for lead is now heavy and producers are sold farther ahead than ever before. Local price 8½c per pound .

Antimony.—The market is now dull following the recent heavy buying movement, quotations being firm but unchanged at 18c per pound.

Aluminum.—The market is dull and quiet and the situation unchanged. Local price 68c per pound.

U.S. INDUSTRIAL COMMISSION TO FRANCE

THE American Industrial Commission to visit France on the basis of unsolicited proposals made to the American Manufacturers' Export Association sailed therefor on Saturday, Aug. 23, on the steamship Lafayette. The object of the Commission is to make a technical investigation of present conditions in France looking to the reconstruction and reorganization of her communities and industries now and after the war. It is to determine also how the United States may contribute, as in largely increased purchases of French products. The French Government is to aid the Commission, partly through providing for transportation; the itinerary, will include some 25 cities. In the composition of the Commission as effort has been made to secure men of broad experience in some nine general classifications of industry and at the same time of a caliber calculated to lend dignity and standing to the enterprise. A printed report of the results of the commission's visit is promised.

W. W. Nicholas, assistant chairman Allis-Chalmers Mfg. Co., Inc., heads the commission as chairman. J. G. Butler, Jr., vice-president Brier Hill Steel Co., Youngstown, Ohio, and director of the Commercial National Bank, Youngstown, is scheduled to represent the iron and steel industry. Ambrose Swasey, Warner & Swasey Co., Cleveland, is also numbered in the party. Among others of the commission, some fifteen in all, are the following; A. B. Farquhar, president A. B. Farquhar Co., York, Pa.; James E. Sague, former vice-president American Locomotive Co. and Public Service Commissioner, New York; F. J. LeMaistre, consultant, E. I. du Pont de Nemours & Co., Wilmington, Del.; John R. MacArthur, MacArthur Brothers Co., New York; Dr. C. O. Mailloux, consulting engineer, New York; E. A. Warren, vice-president Universal Winding Co., Boston; Samuel W. Fairchild, vice-president Fairchild Brothers & Foster, chemists, 76 Laight Street, New York; Noble Foster Hoggson, president Hoggson Brothers, Inc., contractors, New York; E. E. Russell, J. I. Case Threshing Machine Co., Racine, Wis., and George Burdett Ford, Geo. B. Post & Sons, architects, New York. E. V. Douglass, secretary American Manufacturers' Export Association, 160 Broadway, New York, and secretary of the Commission, arrived in France last week.

LAKE SUPERIOR CORPORATION SUBSIDIARIES

AGGREGATE net earnings of the Lake Superior Corporation subsidiaries were $3,503,471, last year, as compared with $1,366,210 in the previous fiscal year. The larger income, however, did not go to the parent company, but remains in the hands of subsidiaries in the form of enlarged reserves and balances. The parent corporation's income consisted of interest on bonds of subsidiaries amounting to $290,000 and other income of $45,795, making a total of $335,759, as against one of $369,032 in the previous year. The disbursements out of income were somewhat less, being $310,305, leaving a net of $25,454. This added to the balance from last year leaves a sum of $50,526, of which $40,000 was applied to reserve for depreciation of securities and the balance carried forward.

Algoma Steel

The amount realized by the Algoma Steel from last year's sales compared favorably with the record year, 1913-1914. The tonnage in each of the last three years was as follows—

	1913-14	1914-15	1915-16
Pig iron, tons	311,904	212,917	258,504
Steel rails, tons	325,680	174,536	*215,416
Merchant. tons	15,576	8,903	......

*This figure includes rails, shell, and merchant steel.

The water power which the company owned has been disposed of for $1,000,000, which sum is held by trustees and is available for new construction.

IMPORTANCE OF INCREASED PRODUCTION

W. L. HICHENS, chairman of Cammell, Laird & Co., Birkenhead, England, delivered an address recently on "The Importance of Increased Production," at the outset of which he said that, as a large employer of labor, all questions of labor and capital interested him more than anything else, save that of the war. The war had given us a new angle of vision in regard to many things. Before the war we lived in an age of individualism.

The watchwords of the nineteenth century had been self-realization, survival of the fittest, laisser faire, and the interests of the individual. Employers organized themselves into a federation, and working people organized themselves into trade unions, and both were there for the purpose of seeking their own interests. That, of course, was not unnatural. The tendency was to think of their own interest as an individual first, and secondly of the interests of the class to which they belong. Politics wás regarded as a game in which each section played for its own ends, and justice was supposed to reside in numbers.

The war came, however, and straightway some three million men sacrificed their lives for their country. The clouds seemed to lift, the horizon became extended, and all realized that patriotism was opposed to individualism.

New Vision of Empire

The newer and wider outlook also applied in regard to their view of the Empire, and more particularly the Dominions. They realized that the life of the Empire was no mere sham, but was something that they realized with an intense keenness, and for which they were prepared to lay down their lives if necessary. Many of us had begun to dream dreams and to picture to ourselves the possible use of that wider form of patriotism after the war. We are surprised to find how far away we have drifted from the old individualism of pre-war days.

Before the war many men made it their ideal to put together a competence so that at the earliest possible moment they could retire and live happily ever afterwards, and how many young men and women there were who thought it no shame to live a life of idleness if they could afford to do so. Now, however, the oldest 'dugout'' in the country was rushing about to do his bit ashamed to be found idle when everybody had work to do. It is realized now that there in an unlimited demand for everything we can produce, and it was to be hoped that idea would not vanish when the war was over. It seemed that if it were a useful and essential thing for us to work to preserve our liberties, it would also be a valuable thing to work hard after the war for the sake of the happiness and welfare of the whole community.

To-day there was an unlimited demand for everything that could be produced. We wanted munitions for ourselves and for our Allies. We also wanted to produce as far as possible other things as well as munitions which could be exchanged abroad for something that would serve our immediate purpose. Munitions of war from abroad could be paid for in four different ways. First, by the selling of American Dollar Securities; second, by exporting gold; third, by raising loans with countries in which we wished to trade, although that was not an unlimited source of supply; fourth, and this was the most important of all, we could exchange goods exported for munitions and that was the most satisfactory way of achieving our object.

Development of Export Trade

A very great deal had already been done in the way of increasing their exports. The latest figures showed that the exports of Great Britain in May, 1916, were worth £47,000,000; in May, 1915, they were £33,500,000; and in August, 1914, they were only £24,000,000. That was, of course, a very large and satisfactory increase, and if we would only go on increasing at the same rate our national standing financially would quickly show substantial improvement.

There were two ways in which we could do more. The first way was to increase Government organization, but Mr. Hichens did not think a very great deal could be done in that way, because for his part he did not think the Government were very good organizers, and for another thing he did not think they had very good material to work upon. It was true they all had the defects of their qualities, but even so he preferred the truculence and the steady independence which characterized the Englishmen to the subservience of a more docile people. If they had to pay the penalty of being lovers of freedom it was a price worth paying.

The Shipping Problem

One of the things the Government could do was to direct with more practical thought the vital shipping interests of the country. Nearly a year ago he had tried to get a committee appointed of shipowners and Admiralty officials to organize the shipbuilding capacities of

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department is able to present the following list of the moreimportant British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL
Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE
Valparaiso, British Consul General.

COLOMBIA
Bogota, British Consul General.

ECUADOR
Quito, British Consul General.

EGYPT
Alexandria, British Consul General.

FRANCE
Havre, British Consul General.
Marseilles, British Consul General.

INDIA
Calcutta, Director General of Commercial Intelligence.

ITALY
Genoa, British Consul General.
Milan, British Consul.

MEXICO
Mexico, British Consul General.

NETHERLANDS
Amsterdam, British Consul.

PANAMA
Colon, British Consul.
Panama, British Vice-Consul.

PERU
Lima, British Vice-Consul.

PORTUGAL
Lisbon, British Consul.

RUSSIA
Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN
Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN
Stockholm, British Consul.

SWITZERLAND
Geneva, British Consul.

URUGUAY
Monte Video, British Vice-Consul.

VENEZUELA
Caracas, British Vice-Consul.

this country. It was obvious that additional ships were badly wanted. It seemed quite clear that such a committee could see that every shipbuilding yard was occupied on a type of work most suited for it. That would have been a very great gain to the country. He also thought it would have been a very great gain if the merchant shipping was more standardized in this country, so that they might concentrate more on quantity that on quality. He was told that such a plan would be very difficult of application if not impossible. However, they would notice that quite recently a powerful body of shipping experts had formed themselves together to produce just these same standardized ships, which the Government had said were impossible.

He was still in hopes that the Government would do something in the matter, but for the moment they had to depend in the main on their own individual enterprize and effort. He felt confident that production could be largely increased, because it was still in them to make a very much bigger effort than had yet been done. Before the war, statistics showed them that two and a half times as much work per working head was turned out in U.S.A., as compared with Great Britain. Of course there they had more labor-saving devices. The fault of this lay with British employers, who did not take the trouble to find out the best and newest appliances, because they felt that they could rely upon a cheap labor supply.

⁂

Trade Gossip

The Dominion Brake Shoe Co. has increased its capital stock to $200,000.

The Pembroke Electric Light Co., of Pembroke, Ont., has increased its capital stock to $250,000.

The Burlington Steel Co., of Hamilton, Ont., has been awarded a contract for the reinforcing steel for the new Parliament Buildings at Ottawa.

Montreal, Que.—Controller Coté suggests that makers of turbine machinery be asked to examine the proposed aqueduct power scheme which will cost one million dollars, before a consulting engineer is appointed.

William Phillips, European manager of the Canadian Northern, sailed for New York on the Saxonia last Saturday to assume duties in the head office at Toronto. Before leaving he received the thanks of the Lord Mayor of Bristol for the interest he had taken in that port's commercial shipping relations with Canada.

Canadian Union of Municipalities.—At the meeting of the Canadian Union of Municipalities, held at Montreal on August 23, the following officers were elected:—Honorary patron, Hon. Robert Rogers; honorary president, Mayor T. L. Church, Toronto; president, Ald. Leslie H .Boyd, K.C., Montreal; first vice-president, Mayor Stewart, Victoria, B.C. (where the next meeting of the union will be held); second vice-president, Mayor Stevenson, London; third vice-president, Mayor Hardie, Lethbridge; honorary secretary-treasurer, W. D. Lighthall, K.C., ex-Mayor of Westmount, Que.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia .

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Ploschad 9, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address. Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

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INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Montreal, Que.—The Montreal Tramways Co. will build an addition to the St. Denis sub-station.

Hamilton, Ont.—The Acme Stamping & Tool Co. contemplate building an extension to their plant.

Vancouver, B.C.—The management of the Hotel Vancouver here have decided to instal a power plant.

Niagara Falls, Ont.—Work has been commenced on the erection of a plant for the Canadian Aloxite Co.

London, Ont.—The George White & Sons Co. will build an extension to their plant here to cost about $12,000.

Thetford Mines, Que.—The foundry owned by La Fonderie de Thetford, Ltd., was recently destroyed by fire. Loss, $75,000.

Renfrew, Ont. — The International Molybdenum Co. is planning an electrically operated refining plant here at a cost of $150,000.

London, Ont.—London Rolling Mills Co., propose erecting an addition, to their plant to cost $50,000. New machinery will be installed.

Welland, Ont.—The Canadian Steel Foundries, Ltd., have purchased a property here adjoining their plant in view of extensions in the future.

Glenora, Ont.—J. C. Wilson & Co., are in the market for an overhead traveling crane, hand power or electric driven, capacity 5 to 10 tons, to span from 40 to 50 feet.

Toronto, Ont.—The plans for the William Davies Co. new abattoir, have been prepared by Henschien & McLaren, of Chicago. The buildings will cost about $200,000.

Toronto, Ont.—Lightning on Aug. 22 damaged the plant of the Interurban Electric Light Co., 215 Mavety Street, to the extent of about $5,000. The damage was confined principally to one of the large dynamos.

Toronto, Ont.—Earl Grey School on Jones Avenue will be heated next winter with crude oil. An oil burning apparatus has been installed in the school. It is the first school in which this has been adopted, and if it is successful other large schools and buildings may adopt this method of heating.

New Westminster, B.C. — Henry Schaake of the Schaake Machine Works, proposes to establish a modern machine shop and foundry here on the water front. The plans also include a ship repairing plant.

New Westminster, B.C.—The Saskatchewan Steel & Bridge Co., with plants at Moose Jaw and Medicine Hat, is planning to establish a plant on the coast with the ultimate intention of going into the steel shipbuilding business. A representative of the company recently visited this city with a view to selecting a suitable site.

Niagara Falls, Ont.—The Perfection Tire & Motor Co., manufacturers of automobile tires and mechanical rubber goods, will erect a factory in this city, providing the ratepayers ratify a by-law which will be presented to them in three weeks. The by-law provides that the city furnish the company with power at $10 a h.p. for a period of ten years, also give the company a fixed assessment for this time.

Brantford, Ont.—In sixty days it is expected that the new factory of the Dominion Steel Products Co. will be completed and ready for operation. The building will be 90 by 370 feet and will be entirely constructed of steel and glass. The new factory will be in close proximity to the L. E. and N. Railway track and the contract for its erection has been let to the Austin Co., of Cleveland, Ohio. The cost will be in the neighborhood of $65,000.

New Westminster, B.C.—A first-class steel shipbuilding plant and repair yard to be located here is the plan of John R. Duncan of the Vulcan Iron Works. It is proposed to establish at once a boiler shop and foundry and later on a steel shipbuilding plant. The plans call for an investment of $150,000 at once and about $200,000 more when the drydock is built. The equipment planned for the new establishment includes the heaviest plate rolls on the Pacific coast, weighing 55 tons and capable of handling steel plates one inch thick and 18 feet wide. The drydock will not be built while steel commands its present inflated price, although temporary marine ways may be built for proposed site adjoins the C. N. R. terminals in this city.

General Industrial

Port Stanley, Ont.—It is proposed t erect a grain elevator here at a cost o $100,000.

Windsor Mills, Que.—The Canad Paper Co. will build an extension t their mill here.

Kitchener, Ont.—The Canadian Co solidated Felt Co., propose building a addition to their factory.

St. Jerome, Que.—The Canadian Co solidated Rubber Co., of Montreal, wi build an extension to their factory her

Toronto. Ont.—Harry Webb & Co. wi erect a factory and bakery at Kend Avenue to cost $78,000. A building pe mit has been issued.

Brockville, Ont.—A grist mill Phillipsville owned by Reuben Haski was burned on August 24. The lo is heavy as no insurance was carried.

Drummondville, Que.—Fire on Augu 20 destroyed the blending house and large amount of powder at the Aet Chemical Co. plant here. The damage estimated at $20,000.

St. Thomas, Ont.—It is understo that the Monarch Knitting Co. will r move all the machinery, etc., from t spinning department at the local facto to the St. Catharines factory.

Hamilton, Ont.—A new industry w probably be located here, a meeting ha ing been held recently with the obje of forming a $100,000 company for t manufacture of plain and fancy b cuits.

Stratford, Ont.—At a special meeti of the city council on Saturday it w unanimously agreed that the city wou accept the $17,500 offered by the Kind Bed Co., of Toronto, for the Kemp fa tory. P. E. Kroehler is president a general manager of the firm.

Montreal, Que.—Thompson & Norr of Grand Falls, Mass., who have a bran here, propose building a factory on lorimer Avenue, to cost about $800,0 The Atlas Construction Co., of this ci are the general contractors.

Vermilion, Alta.—The Hayward Lu ber Co., of this place, will proceed once with the erection of a 30,000-bus grain elevator on the C.N.R., also of coal shed to have a capacity of 200 to of coal; this building will be alongsi

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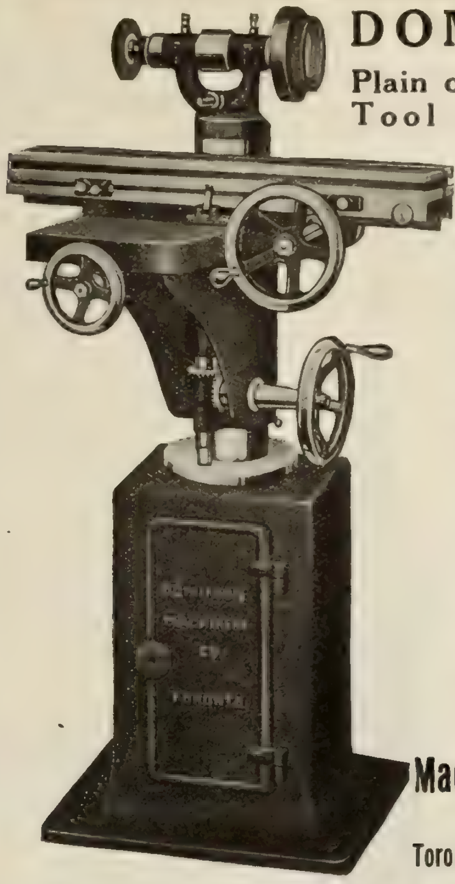

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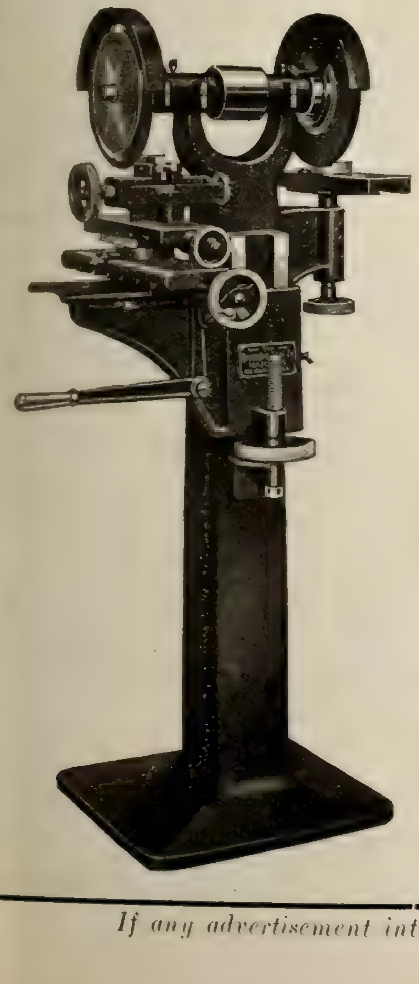

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is a machine carefully designed and constructed for the correct grinding of thread chasers and dies.

Its use is economy where threading tools are employed.

It not only keeps all the chasers of a set in condition for perfect work, but at the same time prevents excessive wear on one or two of the chasers.

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They are the only line of files from 3 to 24 inches made absolutely of crucible steel. The proof of the file is in the using. Try them.

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H. S. Howland, Sons & Co., Toronto;
Starke, Seybold, Montreal;
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All Leading Jobbers.

the elevator. The company will also erect an elevator at Kitscoty, both elevators having a capacity of about 30,000 bushels.

Vancouver, B.C.—The British Columbia Sugar Refinery has been granted a permit for the construction of an addition to its factory on Powell St.

Guelph, Ont.—A deal has been closed whereby the Partridge Rubber Co. will take over the business of the Standard Tire & Rubber Co., of this city, carry out the contracts, etc., and besides this will transfer the Montreal business to Guelph. The Montreal factory has been engaged in the manufacture of all sorts of small druggist rubber goods. The purchase price was about $150,000.

Electrical

Arthur, Ont.—The Town Council propose spending $15,000 on a hydro-electric system.

Scarborough Junction, Ont.—At a meeting of Scarboro Township residents on Monday, it was unanimously decided to request the Township Council to submit a contract to the Hydro-Electric Commission for the extension of the Hydro into several parts of the municipality.

Trade Gossip

Montreal, Que.—The Victoria Pier will be formally opened by H. R. H. the Duke of Connaught at the end of next month, on the occasion of the Duke's farewell visit to Montreal. This event will not only mark the completion of another important undertaking, but will be the forerunner of similar and extensive developments along all the harbor front.

Canal Co. Raises Rates.—The Manchester Ship Canal Co., which controls the port of Manchester, England, has announced that rates for discharging and loading vessels and for quay porterage, warehousing and storing in the open of merchandise and minerals, have been raised 12½ per cent. Ship canal tolls and wharfage and ship dues have been raised 5 per cent.

Quebec Bridge.—The final span of the Quebec bridge will be placed in position on September 11, weather permitting. At five a.m. the span will be floated from its present place on the bank of the river to the centre of the stream, under the bridge, and there raised and placed in position. The span weighs about four thousand tons and will be raised about 150 feet.

The Port Hope Sanitary Mfg. Co., which was recently organized to take over the Standard Ideal Co. of Port Hope, Ont., is capitalized at $1,250,000. The following directors have been appointed:—L. M. Wood, of J. & L. M. Wood, president; R. J. Cluff, president of the Cluff Manufacturing Co., vice-president; W. D. Ross, vice-president of the Nova Scotia Steel Co.; C. J. Cluff, president of the Canada Pipe & Steel Co., and M. L. Davies, vice-president of the Standard Chemical Co., directors.

New record Ore Shipments.—Great lakes ore carriers established a new record in the month of July, loading 4,750,157 tons, which exceeds by 242,581 tons the movement in June, which at that time was thought to have set a mark that could stand for a year. Up to Aug. 1 ore shipments for the season aggregated 29,365,724 tons, a gain of more than 5,000,000 tons over 1913, the banner year of the trade. Detroit vessel men predict that the year's movement will approximate 59,000,000 tons.

C.P.R. Orders Cars—The C.P.R. has ordered ten thousand new box cars, while at the same time it is keeping up its rail equipment by giving considerable orders to the Lake Superior Co., which now turns out as good rails as are manufactured anywhere on this continent. Thirty years ago the company had about 50 locomotives. To-day it has 3,000; it also has 100,000 freight cars, 2,500 first and second-class passenger cars, to which number it is always making additions.

Canadian War Purchases.—The purchasing department of the British War Office in Canada, organized under Lord Shaughnessy and employing systems and machinery of the C. P. R., had placed up to May 1, a total business in Canada for various general supplies, not including munitions, of $13,000,000. Since then the business placed has amounted to over $4,000,000, making a total of over $17,000,000, more than $7,000,000 of which represents transactions during the current year. About the most important business which has been received since last report covers additional orders for canned beans with pork to the extent of about 12,000,000 cans.

To Make Munitions—The St. Lawrence Bridge Co. has commenced the installation of about $500,000 worth of machinery for the preliminary order for $2,000,000, having been received from the Imperial Munitions Board. The company for the past few years has been concentrating upon construction work for the Quebec bridge. It is believed that in the course of a few months they will be one of the biggest producers of special war products in Canada. The St. Lawrence Bridge Company is controlled

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Send your general manager, your general superintendent, your purchasing agent and shop foreman—they'll return to your plant with ideas that will be of tremendous value to you.

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Lay your plans to attend now. Write us to make your hotel reservations.
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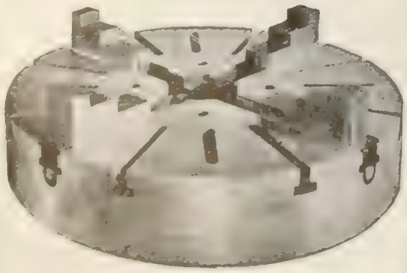

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by the Canadian Bridge Co., of Walkerville, Ont., and the Dominion Bridge Co., each owning 50 per cent. of the St. Lawrence Bridge Co. stock.

Blacklisted Firms' Insurance. — The Controller of the British Foreign Trade Department has made public a license issued to British underwriters and insurance companies to carry into effect marine insurance contracts made with persons in the United States, nothwithstanding such persons may be on the statutory blacklist, provided such contracts were made prior to these persons being placed on the list. According to a cablegram received by the Department of commerce from the American Consul-General at London, this license applies to any contract for marine insurance or insurace against fire, or any other risk of goods or merchandise during transit from the shipper's or manufacturer's warehouse until deposited in a warehouse on the termination of transit where any part of the routing is by sea.

Pulp Shipments to U. S.—Over two-thirds of the more than a billion pounds of wood pulp imported into the United States during the fiscal year ending June 30, 1916, and used in the manufacture of paper, came from Canada, according to a communication to the National Geographic Society, from John Oliver La Gorce, and issued by the Society as a bulletin in connection with the Government's inquiry into the increase in the cost of newspaper. The pulp importations for 1915-16 have been 180,000,000 pounds less than for the previous twelve months, yet the amount imported from Canada during the past year was 130,000,000 pounds in excess of her 1914-15 shipments. During the year just closed nearly 70 per cent. of the 1,135,000,000 pounds of U.S. imported pulp came from Canada, while most of the remaining 30 per cent. came from Norway and Sweden.

Nickel Refining Company Formed.—The Canadian branch of the International Nickel Co., which is to undertake the manufacture of nickel in Canada, has been incorporated at Ottawa by letters patented under the name of the International Nickel Co., of Canada. The new company is empowered to produce, refine, smelt, etc., nickel, copper, iron, steel, cobalt and other minerals, and to occupy and develop lands and concessions relating to or containing nickel, copper, iron, etc. The incorporators of the new company are Britton Osler, K. C., Toronto; W. A. J. Case, and the usual number of office employees. A meeting of representatives of the Ontario Government will be held in Ottawa very shortly, when the plans of the company and the question of the selection of a site will be taken up. The new plant

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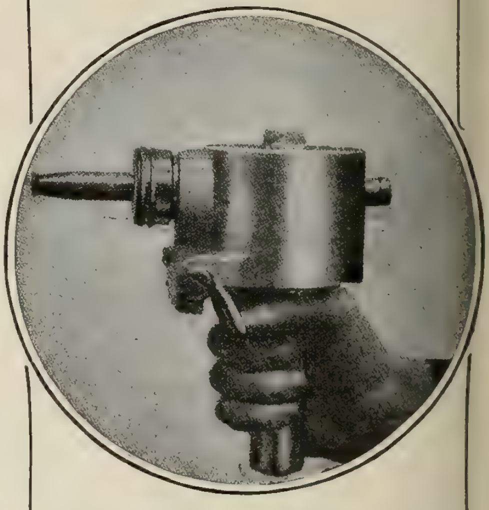

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Solves one of the greatest problems heretofore confronting the structural engineer, because it produces on iron or steel a permanent coating not susceptible to corrosion.

Carbons can be coated with copper, etc.

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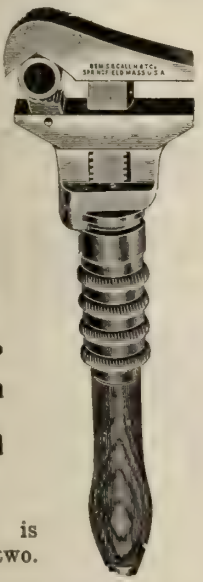
A TWO-IN-ONE WRENCH

Here's the Bemis & Call Combination Pipe and Nut Wrench. It is made with forged steel bar: case hardened throughout. All parts are interchangeable and it will stand the roughest usage. If you're looking for a wrench that has a grip that won't slip, your search is ended right here.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B. & C.
Combination
Wrench

One wrench is better than two.

The time saved in handling one wrench instead of two will enable your employees to do more work. The general utility and all-round convenience of this combination has no equal.

Write for our complete catalog on wrenches.

Bemis & Call
Hardware & Tool Co.
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will probably be built in units, and will provide a production of 12,000,000 to 15,000,000 pounds a year at the beginning.

Trade Inquiries.—The following inquiries relating to Canadian trade have been received by the Department of Trade and Commerce, Ottawa.

915.—Malleable Castings.—An Aberdeen firm will be glad to enter into correspondence with Canadian concerns prepared to quote for malleable castings cast to pattern.

922.—Kerosene or Petrol Engines.—A London firm of engineers wishes to purchase a number of kerosene or petrol engines; according to details obtainable from the Department, and invites offers, accompanied by full particulars, from Canadian manufacturers. The following is the specification given in their letter:—"The series of engines are required for electrical, agricultural and similar purposes, and should be of medium speed, not more than 1,400 to 1,500 in the small powers, and not lower than 600 in the larger sizes, the powers being from 1 horse-power up to 60 or 70, or even higher. Kerosene carburetters, etc., must be able to be fitted when required, otherwise petrol will be used, but should any engine answer to the above specification and yet be adapted only for petrol, we should still be pleased to have particulars. A separate price is required for bedplates, and blue-prints showing over-all dimensions should be submitted, together with delivery and prices."

The Tash-Orr Mines, Ltd., of Ontario, capitalized at $3,000,000, has been incorporated at Ottawa by Baltimore, Md., business men to develop gold-mining claims at Tashota, Ont., a new field. Joseph Castelberg, is president; Gustav H. Nachman is vice-president; John L. Orn, of Buffalo, N.Y., is general manager. The mines are located in the Kowkash mining district, about 300 miles west of Cochrane, on the new Transcontinental Railroad. William F. Green has been engaged as engineer and works manager. A compressor, boiler, hoist and air drills have been installed and the company will immediately erect a twenty-stamp mill, which will constitute a unit for other stamps to follow.

Granby Copper Output Increase.—Copper production of the Granby Consolidated Mining, Smelters & Power Co., in July amounted to 4,368,846 lbs. This compares with 4,011, 361 lbs. in June and 4,727,929 lbs., in May, which was the high record output.

Of last Month's total 3,092,274 lbs. were produced at Anyox, compared with 2,799,540 lbs. in June and 3,383,230 lbs.

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1. Puro Sanitary Drinking Fountains will give you a *better* water supply *cheaper*.
2. Puro will cut your water bills 15% to 35%.
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Are not these reasons enough? Then why hesitate lorger?
PURO equipment is not expensive—the first cost is *low* and the up-keep *nothing*. Easily attached; positively fool proof. Let us make you a special proposition for a try-out in one of your departments. Write us now—to-day—giving us the number of men; an inquiry will cost you nothing.

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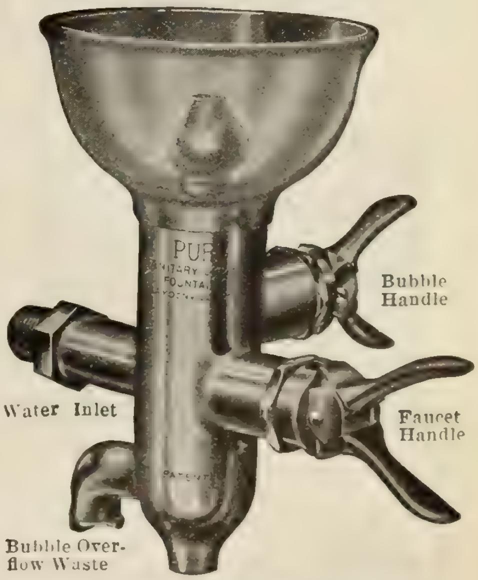

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are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

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Oil Tempered Stee Springs

—for every purpose and the best for each use.

Special styles of all kinds to order.

THE CLEVELAND WIRE SPRING COMPANY
Cleveland, Ohio
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in May, while 1,176,572 lbs. were turned out at Grand Forks, against 1,211,821 lbs. in June, and 1,344,699 lbs. in May. The output of copper at the properties since August of last year were as follows, figures in pounds:—

	Anyox	Grand Forks	Total
July, 1916	3,092,274	1,176.572	4,268,846
June, 1916	2,799,540	1,211,821	4,011,361
May, 1916	3,383,230	1,344,699	4,727,929
April, 1916	2,680,056	1,270,413	3,950,469
March, 1916	2,300,227	1,255,184	3,555,411
Feb., 1916	1,618,928	1,071,337	2,690,265
Jan., 1916	1,847,418	1,275,461	3,122,879
Dec., 1915	2,388,497	1,386,838	3,775,335
Nov., 1915	2,411,206	1,164,768	3,575,974
Oct., 1915	2,629,209	1,485,290	4,124,499
Sept., 1915	2,713,309	1,406,078	4,199,387
Aug., 1915	2,577,362	1,489,059	4,046,421

Personal

G. H. Duggan, vice-president of the Dominion Bridge Co., has been elected a director of the Royal Bank of Canada.

D. H. McDougall, general manager of the Dominion Steel Corporation, has been gazetted Honorary Colonel of the 187th Nova Scotia Highland Regiment.

William Hall representing Spear & Jackson, Ltd., Sheffield, England, is calling on the trade in Canada, en route to the far East.

Lieut. A. W. McKnight, late town engineer at Port Moody, B.C., has been killed in action. He was born 27 years ago at Owen Sound Ont.

Lawford Grant, sales manager of the Eugene F. Phillips Electrical Works, Montreal, has been appointed assistant general manager and assistant treasurer, with a seat on the board of directors.

C. J. Kavanagh, expert traffic director, of Chicago, and Superintendent of Toronto C. P. R. terminals, has been transferred to Montreal to take over the terminals there.

Fred Armstrong, a Toronto electrical contractor, has been elected a member of the board of the Port Hope Sanitary Manufacturing Co., and will in future act in the capacity of managing director.

Sir William Mackenzie, president and **D. B. Hanna**, vice-president of the C.N.R., have sailed from New York for London on the St. Paul. They are going to London in connection with C.N.R. affairs and expect to return in the first week of October

Raymond McLaughlin, for 17 years in the offices of the Union Works of the Carnegie Steel Co. at Youngstown, Ohio, has been appointed secretary to Ward B. Perley, vice-president and general manager of the Canadian Steel Corporation at Ojibway, Canada.

C. H. Easson, manager of the Bank of Nova Scotia at Toronto, Ont., and formerly occupying the same position at

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We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

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372 Pape Avenue, Toronto, Can.

St. John, N.B., has resigned to accept the position of vice-president of Brown's Copper & Brass Rolling Mills, Ltd. This company has recently made large additions to the plant, which is located at New Toronto, Ont.

Earl McIntyre, for 17 years connected with the Republic Iron & Steel Co., Youngstown, Ohio, but who resigned recently to take the position of field engineer for the Canadian Steel Corporation at Ojibway, Canada, was presented with a chest of silver by his associates in the Republic Company offices.

Charles Pascoe, formerly metallurgist for the Canadian Steel Foundries, Ltd., and recently connected with the Thomas Davidson Mfg. Co., Montreal, as consulting metallurgist, has joined the Snyder Electric Furnace Co., Chicago, as metallurgist in that company's electric furnace research plant, at Clearing, Ill. Mr. Pascoe's work in connection with the Thomas Davidson Mfg. Co. had to do with the production of shell billets from a Snyder electric acid steel furnace, and his work in this connection has been peculiarly successful, as evidenced by the fact that approximately 90 per cent. of the billets passed inspection.

Dr. Walter Alexander Riddell, late Director of Social Surveys for the Methodist and Presbyterian Churches in Canada, has been appointed Superintendent of the new Trade and Labor Department of the Province of Ontario, created by the legislation of last session. The department includes several branches of the service which formerly acted independently—the Boiler Inspection Branch, Factories Inspection, Stationary Engineers and Labor Bureau. Dr. Riddell will probably commence work by a tour of the United States, and possibly Great Britain, in order to study the methods of employment bureaus, the organization of which will form an important part of the task of the new department. The new superintendent is a native of Stratford, Ont., and is 36 years old.

Wood-Working

Quebec, Que.—The sawmill of Alex. Gagnon, of Chicoutimi, was destroyed by fire on August 22. The origin of the fire is unknown. The loss is estimated at about $40,000. The insurance carried amounted to $15,000.

New Westminster, B.C.—The Acorn Lumber & Shingle Co., which has recently been incorporated, is building a shingle mill here. The mill represents an investment of $10,000, and will have a capacity of 100,000 shingles per day. M. D. Irvine is at the head of the new concern.

Steel Shell Forgings or Billets of any size or weight will move any distance or about curves upon our specially constructed Gravity Carriers and Incline or Horizontal power devices. No labor required.

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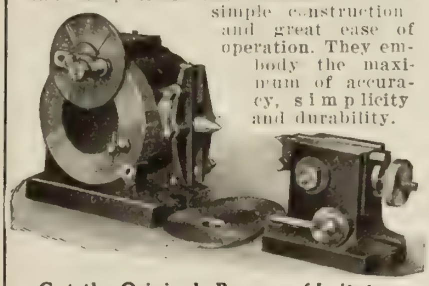

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Bridges, Buildings, Tanks, Penstocks, Smoke Flues, Stacks, Coal Bins, Refuse Burners, Air Receivers and other **Miscellaneous Steel Plate and Structural Steel Work.**

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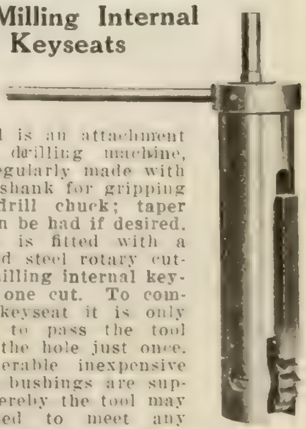

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This combination Tool and Clothes Locker will be very useful to the mechanic because it provides ample space for clothes and a safe place for his tools.

Built for life-time service. Supplied in unit or group construction.

We also manufacture STEEL SHELVING FOR ALL PURPOSES. Drop a line for full details.

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Eastern Representative: H. E. O. Bull
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Municipal

Milton, Ont.—The Town Council propose spending $5,000 on additional fire equipment.

Halifax, N.S.—The City Council contemplate the construction of an abattoir at an estimated cost of $25,000.

New Toronto, Ont.—By-law granting the Du Pont Fabrikoid Co. a fixed assessment, carried by the ratepayers 91 to 7 on August 19.

Maillardville, B.C.—A waterworks system will be installed here. F. L. Macpherson, engineer of Burnaby, B.C., has charge of the work.

Swift Current, Sask.—An additional unit will probably be installed in the municipal power plant Gas or steam power are being considered.

Chatham, Ont.—A by-law authorizing an expenditure of $16,600 for new water mains to the sugar factory and the cemetery has been passed by the council.

Winnipeg, Man.—The Board of Control may decide to purchase a number of motor trucks for the scavenging and street cleaning departments.

Lethbridge, Alta.—By-law favoring a filtration system was carried by a vote of 382 to 76. Money by-law will now be submitted in order to finance the scheme.

North Bay, Ont.—A by-law will be submitted to the ratepayers shortly to authorize a bond guarantee to the Queen Hat Mfg. Co., who propose building a factory here.

Peterborough, Ont.—The city council propose installing an activated sludge sewage disposal system which will cost $125,000. The Provincial Board of Health are dealing with the matter.

Dunnville, Ont.—A by-law will be submitted to the ratepayers on Sept. 25, to authorize a bond issue of $53,000 to pay for the installation of a hydro-electric system.

Hamilton, Ont.—The city will engage Engineer Milne, of Toronto, to report on the proposed waterworks plant and send a deputation to Buffalo, Cleveland, Detroit and other lake port cities where modern waterworks systems have been installed.

London, Ont.—Tenders for a motor tractor have been received by the Board of Control. They will be passed along to the City Council at its next session, and in the meantime no figures will be published. Two types, front drive three-wheeled, and rear drive four-wheeled, have been offered.

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PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R.R. SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
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VANADIUM
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WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

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It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

Hawkridge Brothers Company
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Railways—Bridges

Vernon, B.C.—The C.N.R. has started work upon its Kamloops-Kelowna line.

Guelph, Ont.—The Guelph Junction Railway Board has received an application from residents of Wellesley, in Waterloo county, to have a road extended to their town, a distance of nine miles from the county line.

Tenders

Winnipeg, Man.—Tenders addressed to the Chairman, Board of Control, will be received up to September 7, for the manufacture and delivery of one 100-light, 2 circuit, high efficiency street lighting equipment complete with lamps. Instructions to bidders, specification and form of tender may be obtained at the office of the City Light and Power Department, 54 King Street.

Contracts Awarded

The Canadian Fairbanks-Morse Co., Toronto, have been awarded a contract for the pumps for the Ridgetown, Ont., waterworks.

Pembroke, Ont.—The contract for the new sub-station which the Pembroke Electric Light Co. is preparing to erect here has been awarded to Markus & Co.

Edmonton, Alta.—The E. M. Nesbitt Co., of Edmonton, has received the contract for erecting a machine shop and storehouse here for the C. N. R., at a cost of $51,100.

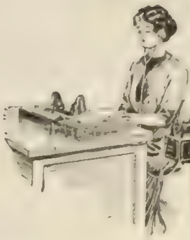
New Incorporations

The Colonial Knitting Co. has been incorporated at Ottawa with a capital of $100,000, to manufacture knitted goods of all kinds at Elmira, Ont. Incorporators are Conrad Steele, W. W. Cleghorn and A. Werner, all of Elmira, Ont.

National Bronze, Iron & Engineering Works, Ltd., has been incorporated at Ottawa with a capital of $750,000 to carry on the business of mechanical and electrical engineers at Montreal. Incorporators: L. A. David, J. S. Lamarre and E. C. Baker, all of Montreal.

CUNNINGHAM & SON
ST. CATHARINES, ONT.
MILL MACHINERY MACHINERY REPAIRS SPECIAL MACHINERY
MARINE ENGINES MADE TO ORDER
CASTINGS
OF EVERY DESCRIPTION

Here's the Whole Story of
The
Dictaphone



Both Ends of It.

YOUR END OF IT—
You start dictating the minute you are **ready** no waiting for anybody. You keep at it steadily or off and on, as you feel like. Full speed or as slow as you want. Correct yourself or repeat as often as you care to. In the meantime your typist is typewriting or doing other work—no part of her time is required for note-taking. If you have much dictation at a time, she has a lot of letters already written before you are through dictating.

YOUR TYPIST'S END OF IT—
She hears your words. She gets what you say; no deciphering shorthand notes of what you said. She does not have to stop and wait every time you stop and think. She controls the dictation she can make you repeat forty times without embarrassment to herself or annoyance to you. She dodges the nerve strain of taking shorthand notes, and the eye strain of "making them out." She gets through her work quicker, easier; writes better letters and more of them—and has time for other work. She writes your letters once, on the typewriter

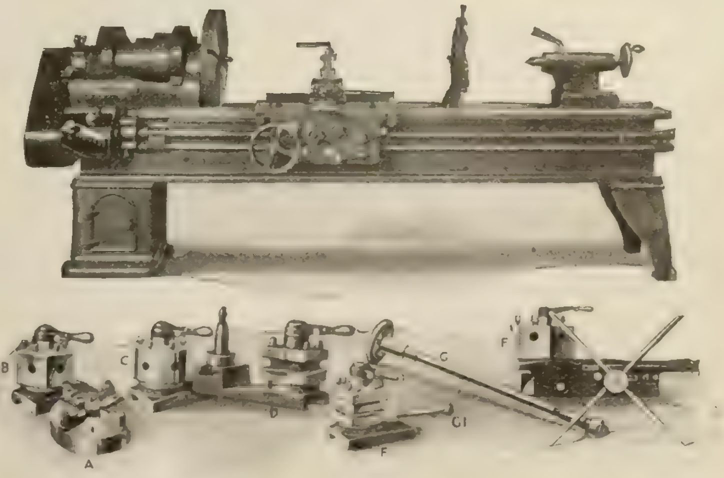
THE MONEY SIDE OF IT—
You save at least a third on the cost of every letter. Certainly that isn't the least important feature of dictating to the Dictaphone.

Our booklet, "How One Man Saved Money," mailed on request. Write to

THE DICTAPHONE
(REGISTERED)

Suite 2020, Stair Building - 123 Bay Street, Toronto, Ont.
Phone Main 1539
See practical demonstration at our booth, Main Manufacturers Building, Can. Nat. Exhibition.
This advertisement was dictated to "The Dictaphone."

"PERFECTION"
THE NAME THE DESCRIPTION



Sizes 16x6, 18x8, 20x10

Edgar Bloxham, Inc.
Grand Central Terminal Building NEW YORK, N.Y., U.S.A.

Prices lower than any other lathe of same specifications because of volume of manufacture and fixed low percentage of profit over actual cost of production.

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Five cents each insertion when box number is required. Each figure counts as one word. Display rates on application.

FOR SALE

HORIZONTAL GAS ENGINE 25 H.P. IN SERVICE at present time, $375.00 cash. Write Penberthy Injector Co., Limited, Windsor, Ontario. (5)

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

A SNAP IN TURRET LATHES SLIGHTLY used on shell work. Fourteen splendid machines at bargain prices. Do you need these machines? If so, drop a line to Box 953, Woodstock, Ont.

LATHE FOR SALE—ONE 39 x 17-FOOT Pond engine lathe, suitable for heavy shells; in good condition; $1,500.00. A. B. Ormsby Company, Limited, Toronto. (2)

A BARGAIN FOR QUICK SALE—30 H.P. 10 x 14 engine; guaranteed in first-class working condition; drive belt included. Hamilton Whip Co., Hamilton.

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make. used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

DROP PRESS FOR SALE—NO. 9 MINER & Peck drop press; anvil 2,000 lbs.; base 30,000 lbs.; 36" between uprights; 40" x 35" between poppets; 34" x 29" top of anvil; guaranteed as good as new. Can be shown in operation to any genuine prospective buyer. The Metallic Roofing Co., Limited, Toronto. (4)

MACHINE SHOP WITH MODERN EQUIPMENT manufacturing a good staple line; orders for months ahead; will bear the fullest investigation; satisfactory reason for selling. Box 220, Canadian Machinery.

For Sale Cheap

1—Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.

1—12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 2 tons capacity; complete, less the Hoist.

1—10" Single "I" Beam Overhead Hand Power Crane, 23' 0" span, 2 tons capacity; complete, less the Hoist.

1—Brantford (Gas) Bake Oven and 4 Racks.

1—Linderman 2 Spindle Boring Machine.

1—24" Drill, Bertram Company.

1—26" Drill, London Machine Tool Company.

1—Bowser 40 G 3 Varnish or Oil Pump and Tank.

M. BEATTY & SONS,
Limited
Welland, Ont.

FOR SALE

Fox Monitor Lathe, 18" x 5' 6", 9-hole turret, cross feed, hollow spindle, 5-step cone; good as new. Plating dynamo, 6 volts, 250 amp.; used only a short time.

PENDRITH MACHINERY COMPANY
970 Queen St. West, Toronto

FOR SALE—ONE 16" X 8' HENDEY LATHE, with taper attachment, $1,100.00; one 22" x 10' Blaisdell lathe, with taper attachment, $1,200.00; one 24" Gould & Eberhardt shaper, $800.00. The above machines are in first-class condition. For particulars apply Box 221, Canadian Machinery.

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

FOR SALE — SOIL PIPE AND FITTING plant; full range medium patterns; good assortment, standard and extra heavy; ten-ton cupola; complete modern equipment. with machine shop; on 2 acres land; railway siding. Would give lease of land now occupied. Reasonable price and easy terms. Fine opportunity for two or three practical foundry men. Apply The Vancouver Pipe and Foundry Co., Ltd., 572 Beatty Street, Vancouver, B.C.

SITUATIONS VACANT

TWO EXPERIENCED DIE SETTERS, TWO good die makers, and one experienced screw machine operator. Box 216, Canadian Machinery. (8)

SUPERINTENDENT FOR FACTORY EMPLOYING 150 men. Must be graduate mechanical engineer with practical experience in factory management. We have a modern plant and a growing business. None but Canadians or Americans with Canadian experience need apply. Address Box 214, Canadian Machinery. (tf)

SITUATIONS WANTED

SUPERINTENDENT OF SHELL FACTORY desires position at present employed, but wishes to change. Would accept general foremanship. Best references. Box 217, Canadian Machinery. (9)

POSITION WANTED AS MANAGER OR superintendent of manufacturing plant. At present manager of a large shell plant. Former experience, electrical, gasoline and steam engines. Member A.S.M.E. At liberty October 1st. Address Box No. 219 Canadian Machinery. (16)

FOR SALE

1 No. 10 Zeh & Hahneman Percussion Press.
1 No. 12 Zeh & Hahneman Percussion Press.
2 No. 4 Smurh & Kamen Geared Friction Head Turret Lathes.
1 24" David Turret Lathe.

Refer to
H. Mueller Mfg. Co., Limited
Sarnia, Ontario

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 40, 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN LAMP FACTORY
ST. CATHARINES, ONTARIO

WANTED

WANTED — 250-VOLT D.C. GENERATOR — 75 to 150 k.w., direct connected to steam engine; must be in good condition. Write to The Kaufman Rubber Co., Berlin, Ont. (13)

WANTED—ELECTRIC TRAVELLING GANTRY crane, span about 57 ft., clearance 50 ft., overhanging at one end; load 15 tons. State full particulars and price. Thor Iron Works, Limited, Toronto, Ont. (27)

WANTED—12" BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Apply Box 218, Canadian Machinery.

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

FOR SALE

■ ■

Two 24-inch standard Gisholt Turret Lathes, completely tooled for boring 4.5" H.E. Shells.

Box 212
Canadian Machinery
t.f.

FOR SALE

1 American Wood Working Machinery Company Tennoning Machine.

1 Dennis Tilting Table, wood drill, capacity 36".

1 No. 2 Gardiner Double Disc Grinder, with Press.

1 Pettongill Machinery Company Automobile Body Hammer.

1 American Wood Working Machinery Wood tp 36" x 56" Rip Saw.

1 Badger State Machinery Company No. 5 Tilting Table, cut-off saw.

1 Brown-Boggs 30" Foot Power Sheet Metal Shear.

1 16" Porter Joining Planer.

1 Fay & Egan Company Surfacing Planer, 24" knives.

1 Fay & Egan Double Spindle Wood Shaper.

1 Boring and Mortising Machine.

Some of the above machinery has never had a belt, but others have been used about sixty days; all are in splendid condition.

1 Modern Heavy Duty Bar Equipment Turret Lathe, 2¼" spindle.
1 Power Hack Saw.
Numerous Chucks and other Tools.
1 Bertram Waving and Undercutting Machine for 18" lathe, suitable for 18-pound H.E. or Shrapnel Shells.
1 Holden-Morgan Base Plug Milling Machine for 4.5 Shells.
1 Rochester High Power Riveting Hammer.

For prices and terms write to

Tate Electrics Limited
34 Dalhousie Street, TORONTO

(eow 12)

New Machines at Second-Hand Prices

1 only Foster, No. 1 Hand Screw Machine, with plain head, automatic chuck, wire feed, capacity 9 16, ...$500.00

1 only Hendy Type 18" stop Friction shaper, with Countershaft, with swivel vise, SECOND-HAND $300.00

1 only Puttnam Speed Lathe, 14" swing, 6-foot bed, 5-step cone, countershaft, SECOND-HAND (as good as new) $150.00

1 only Fox Monitor Lathe, No. 4, with Chaser attachment and standard equipment, SECOND-HAND $150.00

1 only 10 H.P. BRAND NEW Lincoln Motor, with Starting box, Pulley, etc., complete 25-cycle, 3-phase, 550 volts, 1,500 R.P.M. $250.00

1 only 1" Bolt Cutter, BRAND NEW, with lead screw, countershaft, no dies, National make.. ....$450.00

Ontario Metal Products Co., Ltd.
119 Adelaide St. W., Toronto

FOR SALE

Thirty horse-power four-cylinder Continental Motor, excellent condition. Stromberg Carburetor and Eisemann magneto. Will accept $300 if purchased immediately.

NATIONAL FIRE PROOFING CO. OF CANADA, LIMITED.
601 Dominion Bank Building, Toronto.

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

FOR SALE

We are offering, subject to prior sale,

Immediate Shipment

One slightly used

"TYCOS" RECORDING THERMOMETER

registering to 500 degrees F., manufactured by Taylor Instrument Co., Rochester, N.Y., with supply of indicator sheets, H. and M. divisions.

GUARANTEED IN FIRST CLASS CONDITION.

All castings for one

OIL FIRED 4.5 SHELL BAKING OVEN

Manufactured by Mech. Eng. Co., Montreal. P.Q.

ALL IN FIRST CLASS CONDITION
CAPACITY 200 SHELLS

Write for full particulars and Prices.

T. McAVITY & SONS, LIMITED
ST. JOHN, N.B.

(11)

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3¼" Gridley Automatic
40" x 16' Conradson, heavy duty
40" x 12' New Haven
26" x 8' Davis
24" x 8' Lodge & Shipley
20" x 10' American (2)
20" x 7' Fay & Scott
17" x 6' Garvin
16" x 6' Pratt & Whitney
16" x 5½' Warner & Swasey
16" x 5' Windsor, wire feed
15" x 5½' fox, American
2" x 24" Jones & Lamson flat turret
No. 22½ Garvin, wire feed
No. 2 Garvin, wire feed
8" x 31" Brown & Sharpe

Engine Lathes

36" x 16' Putnam
30" x 10½' Pond
26" x 40" x 20' London Gap
26" x 14' Hamilton, D.B.G. (4)
26" x 14' Gleason, D.B.G. (2)
24" x 10' LeBlonde
24" x 10' Peerless
24" x 10' Lodge & Shipley, patent head
21" x 12' Peerless
21" x 8' Back-geared single purpose (3)
20" x 12' Lodge & Shipley, patent head (2)
20" x 8' Walcott, D.B.G. (2)
20" x 8' Hercules, heavy duty
20" x 8' Bullard
20" x 8' Ames
19" x 8' LeBlonde, D.B.G.
18" x 10' MacGregor-Gourlay
18" x 8' Walcott, D.B.G. (2)
18" x 8' New Haven
18" x 8' Lodge & Davis
18" x 6' New Haven
17" x 8' Blaisdell
16" x 10' MacGregor-Gourlay, D.B.G
16" x 8' Back-geared single purpose (2)

Upright Drills

D4 Colburn, heavy duty
D3 Colburn, heavy duty (2)
24" Bickford, shaft-driven
24" London, back-geared, sliding head
24" Foote-Burt
20" Barnes, back-geared
20" Bertram, power feed
No. 10A Baush, 16 spindle
16" Avey, high speed, 4-spindle, sensitive
16" Canedy-Otto
15" Barnes
14" Excelsior
14" Garvin, 4-spindle
10" Barnes, friction
60" Bertram Semi-universal Radial
48" Gang, plain radial, tapping attachment
36" New Century plain radial
32" Fosdick, plain radial
32" Canedy-Otto wall radial

Iron Planers

30" x 30" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
20" x 20" x 5' Bertram

Milling Machines

No. 5 Becker-Brainard, plain
No. 25 Becker, plain
No. 12 Brown & Sharpe plain
No. 1½ Brown & Sharpe Universal
London Universal
24" Bertram, plain
Lees-Bradner Thread Miller
Holden-Morgan Thread Miller

Presses

No. 12 Geared Rhodes, roller feed
No. 1½ Bliss, double crank
No. 5 Waterbury inclinable
No. 159 Brown Boggs, inclinable

Miscellaneous

24" Gould & Eberhardt, B.G. Shapers (2)
24" MacGregor-Gourlay B.G. Shaper
No. 1 Racine Hack Saws (10)
Lo-Swing Lathes (2)
No. 14 Besly Grinder
32" x 9' Special Facing and Tapping Machine
40" Binse Horizontal Boring Mill
No. 60 Heald Cylinder Grinder
¾" La Salle Drill Grinder
No. 2 Garvin Automatic Tapping Machine
No. 1 Garvin Automatic Tapping Machine
No. 2 Cochrane Bly Filing Machine
¼" Shuster Riveters (3)
9½' Bertram Bending Rolls
4½" Davis Cutting-off Machine

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.
Front St. W., - - Toronto, Ont.

FOR SALE

GRINDING MACHINES

1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10″ x 36″ Landis Plain Grinder (new).
1 10″ x 20″ Landis Plain Grinder.
2 12″ x 24″ Modern Plain Grinders (nearly new).
1 14″ x 50″ Norton Plain Grinder (nearly new).
2 18″ - 30″ x 96″ Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16″ x 66″ Landis Crank Shaft Grinder (18 months old).
2 14″ Swing Special Internal Grinders, capacity ½″ to 14″ dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 360 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES

58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13″ Gisholt Semi-Automatic (12 mos. old).
20 21″ Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES

1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72″ table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES

1 8-spindle Bausch Multiple, 1″ capacity.
1 12″ Spindle Garden ½″ capacity.
6 Barnes 24″ 2-spindle All Gear Drive (new).
1 24″ Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D 4 (new).
1 26″ Rockford Sliding Head (fine condition).
3 4 spindle Dwight slate, 14″ swing, ¾″ capacity.
2 Peerless 20″ (new).
1 20″ Mechanics (new).
1 20″ Buffalo (new).
1 28″ Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25″ Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾″ x 14″ flute, 21″ over all (new).

RADIAL DRILLS

1 36″ Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES

38 16″ x 8′ Fairbanks-Morse (new).
1 18″ - 36″ x 8′ Fay & Scott Extension Gap (fine condition).
1 30″ x 12′ LeBlond.
1 12″ x 6′ American.
1 28″ x 14′ Fifield.
1 14″ x 4′ Blaisdell.
1 No. 4½ Barnes.
1 54″ x 21′ Detrick & Harvey.
1 26″ x 10′ Bradford.

MARKING MACHINES

2 Noble & Westbrook No. 1 (new).

PROFILERS

1 No. 3H Becker (new).

PLANERS

1 30″ x 30″ x 10′ Ohio with two heads (new).
1 44″ x 44″ x 12′ L W Pond with three heads.
1 40″ x 40″ x 12′ New Haven, with one or two heads.
1 36″ x 36″ x 12′ Sellers widened to 72″.

AUTOMATIC GEAR CUTTERS

1 No. 3 Brown & Sharpe 26″ (old machine).
1 36″ x 4″ Fellows Gear Shaper (fine condition).
1 18″ Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES

1 4″ Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20″ inserted tooth blades (new).

BELT LACING MACHINES

1 12″ Jackson (new).

KEY SEATERS

1 No. 1 Catlin (new).

SCREW MACHINES

1 No. 3 Stecher (new).
1 1″ x 8″ Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜″ capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2″ x 24″ Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼″ capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES

1 No. 3 La Pointe (nearly new).

BOLT CUTTERS

1 2″ Landis Double Head (nearly new).

BORING AND TURNING MACHINES

1 4′ Bickford Boring & Turning Mill (nearly new).
1 20″ swing 4-Spindle Moline Vertical Boring Machine with 18″ x 36″ table.

BULLDOZERS

1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES

1 Large Filing and Sawing Machine with 12″ stroke.

PUNCHES AND SHEARS

1 No. 3 Walsh Punch Press.
1 Moser 1½″ stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8″ throat capacity ¼″ x ¼″.
1 27½″ throat lever punch ½″ capacity 1¼″ stroke.
1 Thompson Bevel Shear ½″ capacity.

PIPE MACHINES

1 6″ Saunders.

SHAPERS

1 14″ Hendey Geared Friction.
1 20″ Hendey Geared Friction.

TAPPING MACHINES

1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2″ collapsible taps (new).

THREAD ROLLING MACHINES

1 Waterbury Farrell ⅜″ capacity (nearly new).

THREADING MACHINES

5 Special Threading Machines for threading 3″ steel shells (nearly new).

SPOT WELDERS

1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

Write us what you want new or second-hand.

32 North Clinton Street, Chicago
W. F. Davis Machine Tool Co.
403 Singer Building, New York City

MACHINE TOOLS - THE VERY BEST

GRINDERS.

Two (2) 14 x 72 Norton, plain, excellent condition, modern type, each	$2500
Two (2) 10 x 72 Norton, plain, excellent condition, modern type, each	2200
12 x 36 Cincinnati Universal	1250
No. 3 Brown & Sharpe Universal 12 x 50	2000
No. 60 Heald Cylinder	1000
Landis plain, 8 x 38	1400
Springfield Universal, 16 x 40	850
Two (2) No. 5 Rivet, each	550
No. 3 Brown & Sharpe Cutter Grinder	300
No. 7 Geo. Gorton, double end disc grinder with wheel chuck on one end, steel discs and tilting table	300
Diamond Side Type Shop Face Grinder, working surface of table 9″ wide x 2′ long, cup wheel 14″ dia	300
Wells Cutter Grinder	75
No. 1 Peerless Surfacing Machine, 10″ belt	75
Plain Grinders, Wet Tool Grinders, Polishing Machines, large and small.	

HAND MILLING MACHINES.

Two Chicago, each	200
Pratt & Whitney No. 2	175
Four Pratt & Whitney No. 1, each	125
Two No. 2 Garvin, each	150
Two No. 3 Garvin, each	175
Six Pratt & Whitney, No 1½, each	175
Two Pratt & Whitney Hand Millers	...
Reed	150
Pratt & Whitney	150
Pratt & Whitney, with vise	150
Two Pratt & Whitney	...

HORIZONTAL BORING MACHINES.

No. 2 Beaman & Smith Combination Boring, Drilling and Milling Machine; good as new	5000

HORIZONTAL BORING MACHINES (Continued)

Beaman & Smith No. 8, 5″ spindle	$3500
Bement & Dougherty No. 3, Knee Type, 3¾″ bar	1450

PLANERS.

48 x 48 x 20′ Putnam, 2 heads on rail; excellent condition.	3500
36 x 36 x 14′ Powell, 2 heads on rail	1750
32 x 32 x 10′ Gleason, single head; good as new	700

LATHES.

60 x 28′ Fifield, raising blocks to swing 75″, double back-geared, face plate drive, dia. of face plate 56″ x 8″; good as new	5000
50 x 20′ Fifield, Massive Pattern, 48″ four-jawed chuck	2750
52 x 16′ Gleason, heavy triple-geared, faced plate drive	2500
24 x 18′ Lodge & Shipley, quick-change gear, taper, motor driven, carriage control	2000
16 x 8′ Pratt & Whitney, quick-change gear, taper attachment, H.S., C.R.; good as new; latest type	1000

MULTIPLE SPINDLE DRILLS.

Bausch 8 spindle, 1¼″ joints	1150
Foote-Burt 8 spindle, spindles adjustable on rail, center to center outside spindle 6′ max	800
Snyder 28″ 4 spindle, back geared, sliding head, table 30″ long, 16½″ wide	300
Five (5) Gardan 4 spindle, each	250
No. 11 Pratt & Whitney 15 spindle	325
Two 14″ Barr 3 spindle Sensitive, each	90
No. 11 Pratt & Whitney, 10 spindle	325
2 spindle Barr	60
Bausch 16 spindle	750
Three 4 spindle Fenn Sensitive, adjustable heads, each	150
Allen 4 spindle	200
Henry & Wright 3 spindle	200

REMEMBER, THESE ARE ONLY SAMPLES ! ! ! WRITE FOR OUR STOCK LIST.

THE CO-OPERATIVE USED MACHINERY COMPANY

50 Church St., Suite 482, Telephone Cortlandt 665, New York
Warehouse, 408 Claremont Ave., Jersey City, N.J.

A SNAP

For Sale—Boiler Repair and Sheet Iron Works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars.

Box 213, Canadian Machinery

Canadian Agents Wanted

Agents wanted to represent a well-known British line of

Chain Belting,
Chain Gearing,
Etc.

Apply Box 222
CANADIAN MACHINERY

To Makers of Mark Seven

4.5 H.E. Shells

Our Patent applied for Special Water-Cooled Die is the only successful Die for the Mark Seven. Shop Licenses and Drawings, $100.00. Our Nosing Die, Water Jacket, Die and Pin (unfinished) will be supplied at $40.00 per set. Our form of Die is also applicable to 5 in. and 6 in. Shells.

OUR SPECIAL DIES HAVE THE LONGEST LIFE OF ANY ON THE MARKET. OUR LATEST DIE HAS PRESSED OVER SEVENTEEN THOUSAND SHELLS (17,000).

Toronto Type Foundry Co., Limited
50 Coleman Avenue, Toronto

High-Grade MACHINE TOOLS

The list below is a small portion of our present stock. Write for complete lists.

36" x 20' Fitchburgh lathes.
12 26" 48" x 14' new style McCabe double spindle heavy pattern new lathes.
2 26" 48" x 18' new style McCabe double spindle heavy pattern new lathes.
20" x 8' Prentice, H. S., C. R., T.A.
3-19" x 8' Sidney new lathes, swing, 21".
2-19" x 8' Sidney new lathes, quick change, swing 21".
2-17" x 8' Sidney new lathes, quick change, swing 19".
2-18" x 10' Rahn Mayer, H.S., C.R.
18" x 10' Cincinnati, H.S., C.R.
18" x 8' 6" Rahn Mayer H.S., C.R.
9-17" x 8' National, quick change, new.
14" x 10' Prentice, taper attachment.
- 13" x 7½' Carroll, Jamieson, new.
40" swing, 3¾" H.S. Conradson Semi Automatic turret.
1" x 8" New Pierce screw machine.
1-¼" Hartford Automatic screw machine with slotting attachment.
⅜" Pratt & Whitney screw machine.
36" Baker Bros. tapping and boring drill.
36" Currie & Snyder sliding head drill.
No. 3½ Fox Miller, vertical attachment, index head.
No. 210 Heald wet ring grinder.
12" x 66" Landis universal grinder.
20" Cincinnati B.G. Shaper.
20" Steptoe new S. G. Shaper.
24" American B. G. shaper.
18" x 18" x 5' Pond planer.

FRANK TOOMEY, INC.
127-131 North Third St., PHILADELPHIA, PA., U.S.A.

List of

Second-Hand Machinery

on hand for immediate delivery, subject to prior sale

1-No. 2 Brown & Sharpe Vertical Chucking and Boring Machine; excellent condition.
1—No. 4 Quint Vertical Turret Drilling and Chucking Machine; excellent condition.
1 24" x 24" x 7' Lodge & Davis Planer, fitted with full electric equipment and in good condition.
1—4¼" Belt-driven Gridley Automatic; excellent condition.
2—4¼" Motor-driven Gridley Automatics; excellent condition.
1—26" x 48" x 10' J. J. McCabe Lathe; good condition.
1—No. 12 16-spindle Pratt & Whitney Multiple Drill, ½" capacity in steel, ⅝" capacity in cast iron; excellent condition.
1—Foster Ring Turret; good condition.
1—22" x 22" x 4' Whitcomb Planer.
1—18" Warner & Swasey Plain Head Turret Lathe.
1 14" Flather Engine Lathe, rod and screw feed, plain rest, slip change gears.
1 14" Pratt & Whitney Engine Lathe, screw feed, plain rest, slip change gears.
1 No. 15 Toledo Punch, 18" throat.
1 No. 12 Badger Punch and Shear.
1 30" Collier Circular Shear.
1—16" Steptoe - McFarland Lathe.
1 12" Shepard Gap Lathe.
1-No. 2 Mitts & Merrill Key seater.
1 No. 2 10" Massillon Punch; new.
2—20" Barnes Drills.
1—¼" Shuster Riveter.
2—Marvel Hack Saws.
1—14" Fox Drill.
1—24" Ohio Shaper.
1—14" Steptoe Shaper.
1 Shinn Metal Band Saw.

C. E. Fales Machinery Co.
Kerr Building, Detroit, Mich.

Dependable Machines

MILLING MACHINES.

Beaman & Smith Planer Type Milling Machine, takes through housings 92" wide x 72" high, working surface 4' x 15', two milling heads, one boring head.
Ingersoll Slab Milling Machine, approximate weight 55,000 lbs., three heads, working surface 3' x 12'.
Newton Duplex Milling Machine, working surface 2' x 10'.
6' Newton Vertical Milling Machine, rotary table 4' diameter.
No. 22 Garvin Plain Miller, working surface 9" x 43".
No. 4 Garvin Profiler.
2—No. 1 Garvin 2-spindle Profilers.
2--No. 1 Pratt & Whitney Plain Millers.
No. 1 Cincinnati Plain Miller.
No. 1½ Cincinnati Universal Miller.
No. 1-B Milwaukee Plain Miller.
No. 9 Kempsmith Plain Miller.
No. 4½ Garvin Plain Miller.
No. 1 Brainard Plain Miller, table 13" x 46".

PLANERS

62" x 62" x 15' Sellers, four heads.
60" x 60" x 12' Pond, three heads.
44" x 44" x 16' Betts, two heads.
44" x 44" x 16' Niles, one head.
44" x 44' x 12' Niles, two heads.
42" x 42" x 13' Sellers, two heads.
42" x 42" x 10' New Haven, one head.
36" x 36" x 12' Chandler Heavy Duty, weight 35,000 lbs.
36" x 36" x 12' New Haven, one head.
30" x 30" x 16' Harrington, one head.
28" x 28" x 7' Putnam, one head.
22" x 22" x 5' Whitcomb, one head.

BORING MILLS

Newton Duplex Horizontal Boring Machine, 5" bars, motor driven
Barrett No. 2 Horizontal Boring Mill, 5" bar.
10' Betts Vertical, two heads.
6' Betts Vertical, two heads, extension to 8'.
66" Betts Vertical, two heads.
60" Niles-Bement-Pond Horizontal, 3⅛" bar.
60" Bement-Miles Vertical, two heads.
36" Niles Vertical, two heads.
30" Baush Vertical, turret head.

GRINDERS

Modern Landis Plain, 12" x 96".
No. 1 Brown & Sharpe Internal.
4—No. 1½ Landis Internal.
No. 1 Cincinnati Universal Cutter Grinder.

MISCELLANEOUS

16" Baker Bros. Tapping Machine.
6—Baker Bros. Heavy Duty Drill Presses.
8—Newton, Espen, Lucas and Pedrick & Ayer Cold Saws, blades from 18" to 40".
8" Lowell Slotter.
14" Putnam Slotter.
17" Miles Slotter.
8' Lennox Rotary Shear.
No. 2 Long & Alstatter Punch and Shear.
Cleveland Punch, 22" throat.
Bass Double End Punch and Shears, 20" throats.
Long & Alstatter Bar Shear, 3½" capacity.
Sellers Angle Shear, 8" x 8' x 1" capacity.
Bement Punch, 31" gap.
Kling Punch, 24" throat.
Wilson Double End Punch and Shear, 6" throats.
30" Morton Draw Cut Shaper.
Colburn 20" and 24" Keyseaters.

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These machines have been rebuilt and are in excellent condition.

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6—60" Boring Mills, 2 swivel heads. In excellent condition.

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6—84" Seller's Boring Mills, 2 swivel heads, excellent condition

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51" Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52" Niles Car Wheel Boring Mill.

DRILLS.

22" Aurora, S.H., B.G., P.F.
24" Hamilton, B.G., P.F.
25" Fitchburg, S.H., B.G., P.F.
26" Hoefer, B.G., P.F.
32" Hamilton, S.H., B.G., P.F.
32" Hoefer, S.H., B.G., P.F.
34" Barnes, S.H., B.G., P.F.
4" Baker Tapping and Drilling Machine.
2½' Dreses Radial
2½' Industrial Radial
12 Spindle Multiple
6 Spindle V.C.
No. 30C Baush, 12 spindles

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20" G. & E., for spur and bevel
24" x 7" G. & E., for spur
36" Walcott, for spur
No. 14 Brown & Sharpe

GRINDERS

No. 3 Landis Universal
14" x 20" B. & S. Universal
Gisholt Tool Grinder

LATHES

12" x 4' Hendey, C.R., Q.C.G., taper
12" x 5' Davis, C.R.
14" x 5' P. & W., R. and F., taper
14" x 6' Fairbanks, C.R., taper
15" x 6' Goddard, C.R., taper
16" x 6' Prentice, C.R.
16" x 6' Sebastian, P.R.
16" x 6' Walcott, C.R.
16" x 8' Lodge & Shipley Pat. Head, C.R., Q.C.G.
16" x 10' Greaves & Klusman, C.R.
17" x 10' Blaisdell, C.R.
18" x 6' Bradford, C.R., taper
18" x 8' Lodge & Shipley, Pat. Head, C.R., taper
18" x 12' American, C.R., Q.C.G.
18" x 12' Greaves & Klusman, C.R.
20" x 10' Flather, C.R.
21" x 12' New Haven, C.R.
24"-40" x 12' McCabe Double Spindle, C.R.
24" x 16' Schumacher & Boye, C.R.
30" x 14' Reed, C.R.
32" x 16' Blaisdell, C.R.
36" x 28' American, C.R.

MILLING MACHINES

No. 12 B. & S., plain
No. 34 Oesterlein, plain
No. 1½ Garvin Universal
No. 2 Cincinnati Universal
No. 2 Cincinnati Vertical, High Power
No. 32 Plain Kempsmith—Lincoln
No. 3 Cincinnati Universal
No. 13 P. & W. Lincoln
No. 4 Becker Vertical

PLANERS

Morton Portable
22" x 22" x 6' Gray, one head
30" x 30" x 8' Woodward & Powell, one head
30" x 30" x 12' Cincinnati, two heads
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Cincinnati, two heads
36" x 36" x 16' Sellers, one head
39" x 39" x 12' New Haven, one head
40" x 38" x 14' Putnam, one head
40" x 40" x 12' New Haven, one head, one side head

PRESSES

No. 3 Delivouk & George, O.B., Inc.
No. 30 A. Perkins, O.B., Inc.
No. 133 Ferracute, Double Action, O.B., Inc.
No. 5½ Walsh, O.B., Inc., geared
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No. 25 Toledo, O.B., Inc., Cam Drawing

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15" Hendey Friction
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16" Niles, B.G.
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26" Putnam

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No. 1 Chicago Automatic
1 3-16" Hartford Automatic
2" Cleveland Automatic
2¾" Cleveland Automatic
⅝" P. & W. Plain
1" B. & S. Plain
16" P. & W. Plain

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No. 2 Warner & Swasey Turret Lathe
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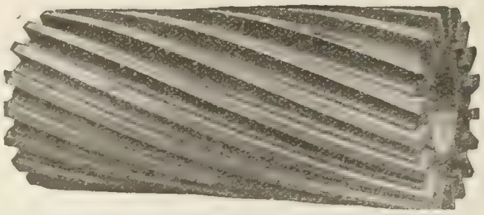

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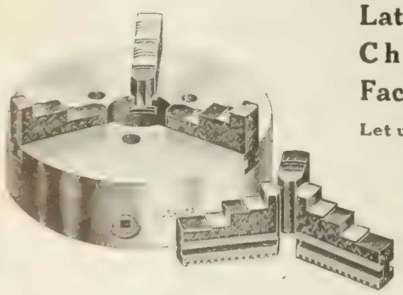

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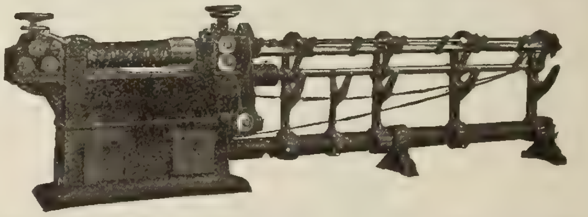

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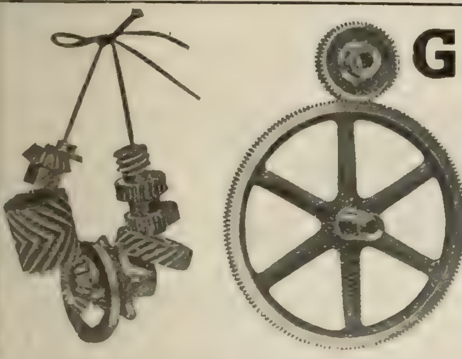

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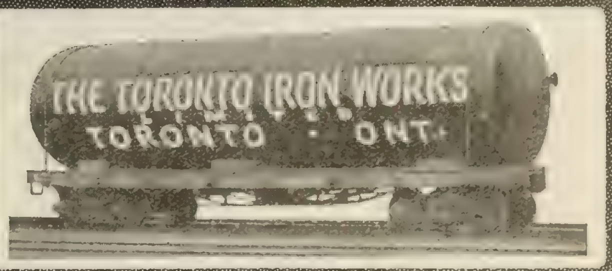

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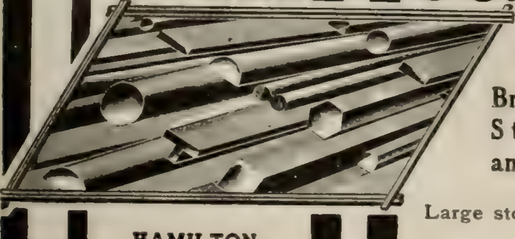

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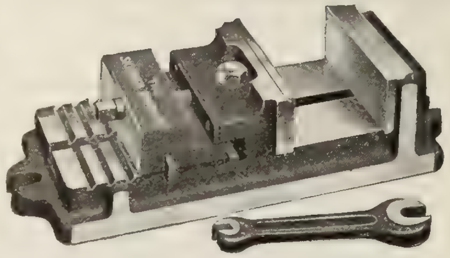

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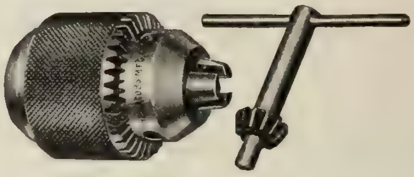

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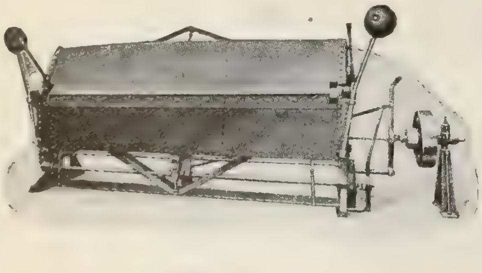

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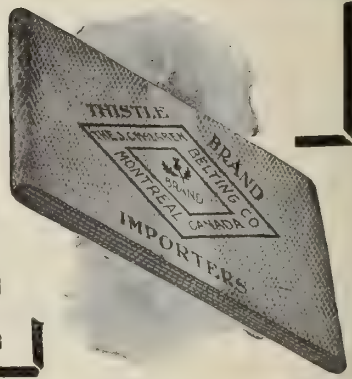

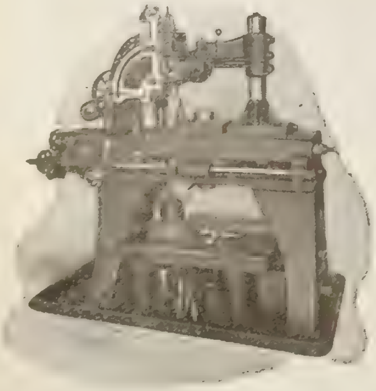

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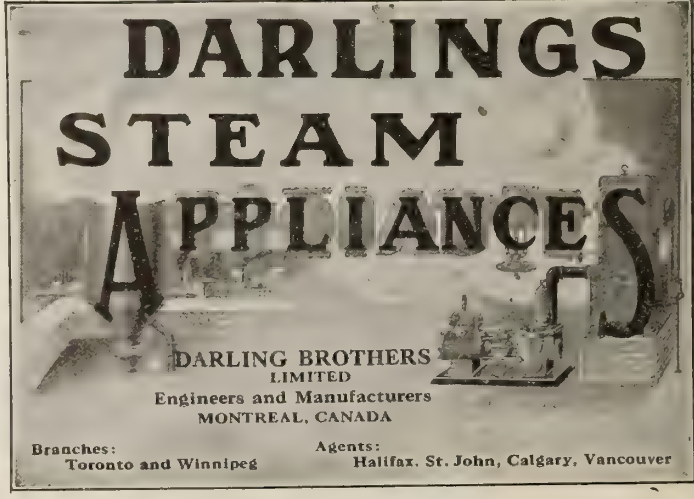

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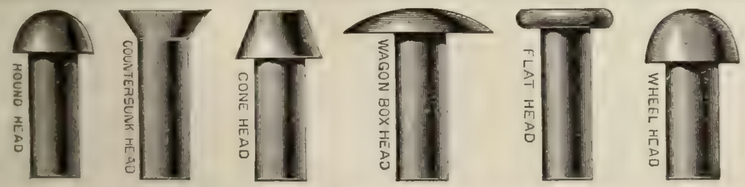

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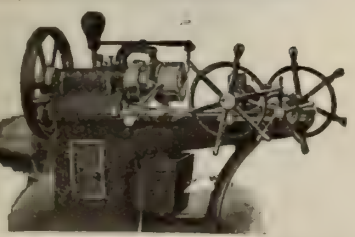

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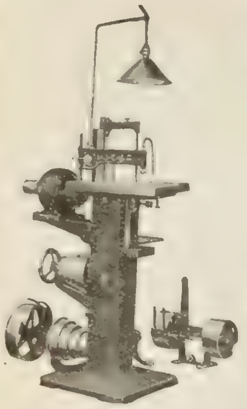

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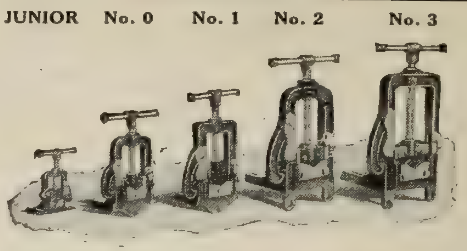

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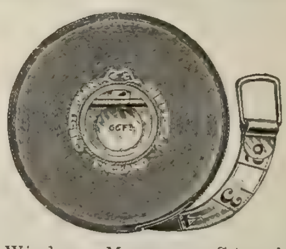

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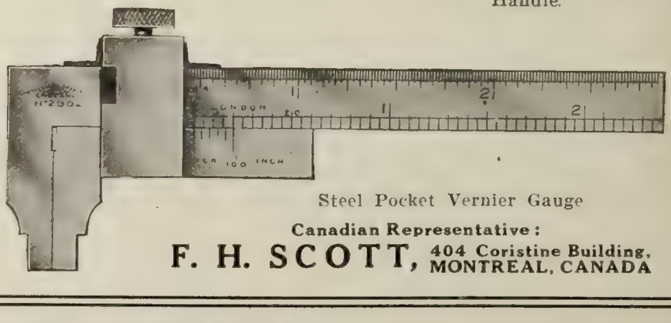

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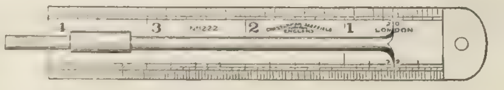

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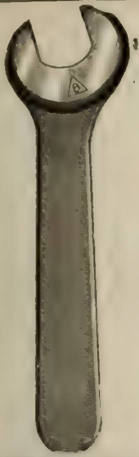

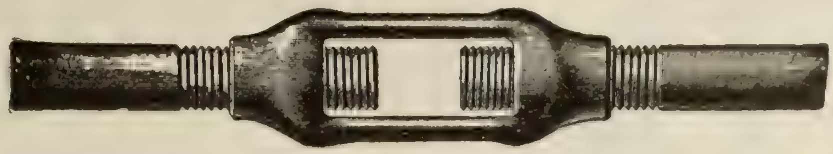

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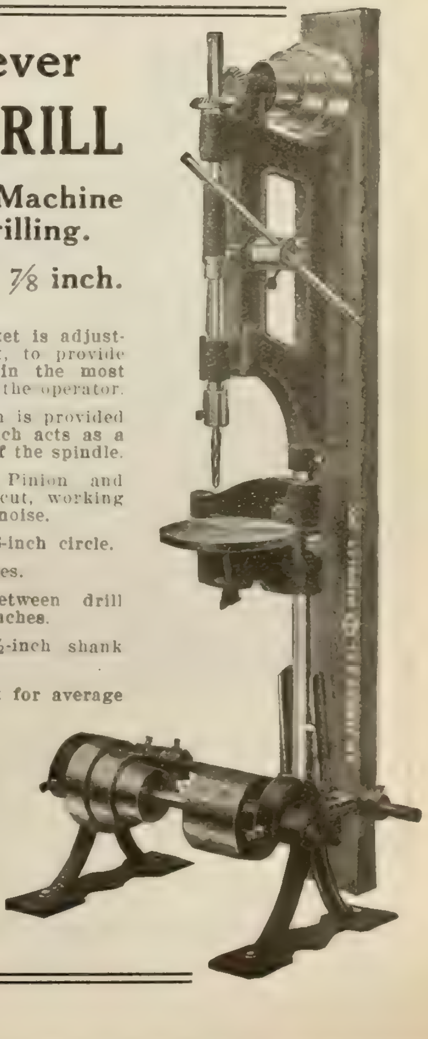

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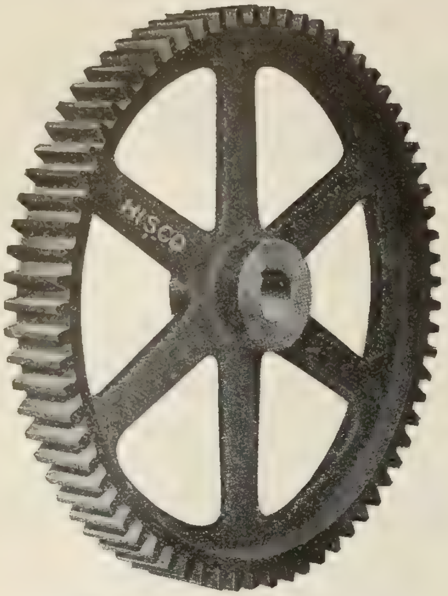

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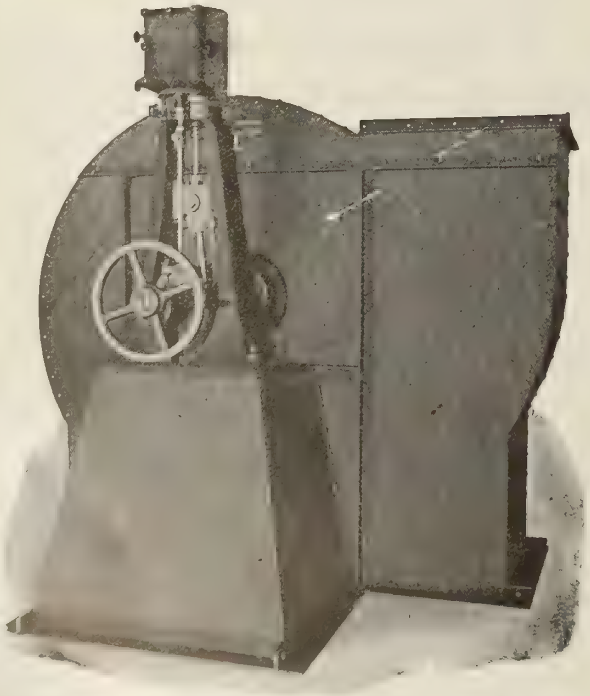

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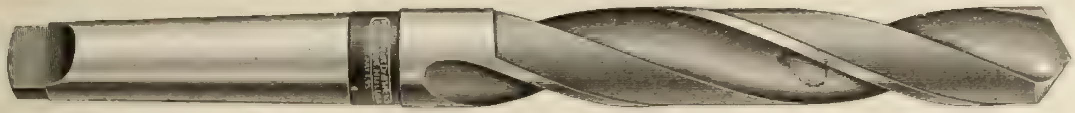

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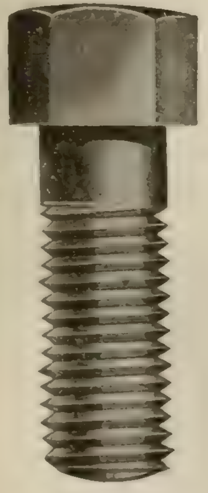

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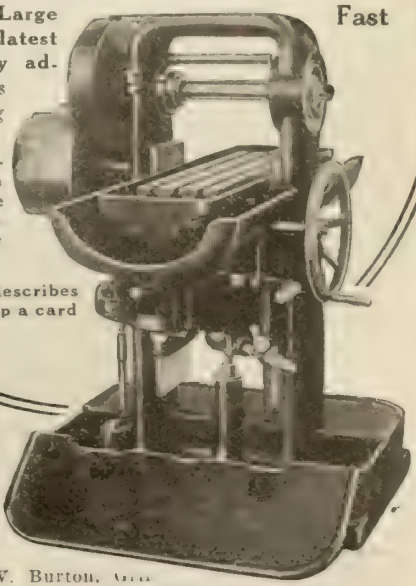

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Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Greenfield Machine Co., Greenfield, Mass.
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Tabor Mfg. Co., Philadelphia, Pa.

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Modern Tool Co., Erie, Pa.

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Pratt & Whitney Co., Dundas, Ont.

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Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
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Wisconsin Electric Co., Inc., Racine, Wis.

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Dennis Wire & Iron Works Co., Ltd., London, Canada.
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Boker & Co., H., Montreal, Que.
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Racine Tool & Machine Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
Victor Saw Works, Ltd., Hamilton, Canada.
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HACK SAW MACHINERY
Peerless Machine Co., Racine, Wis.

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Canadian Billings & Spencer, Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie; Pa.
High Speed Hammer Co., Rochester, N.Y.
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Niles-Bement-Pond Co., New York.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.

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HAMMERS, POWER
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Erie Foundry Co., Erie, Pa.
Peacock Bros., Montreal, Que.

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Cleveland Pneumatic Tool Co., of Canada Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.
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Matthews, Jas. H. & Co., Pittsburgh, Pa.

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HOPPERS
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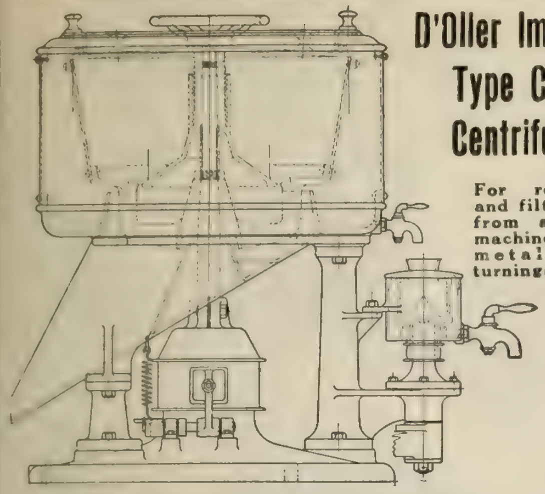

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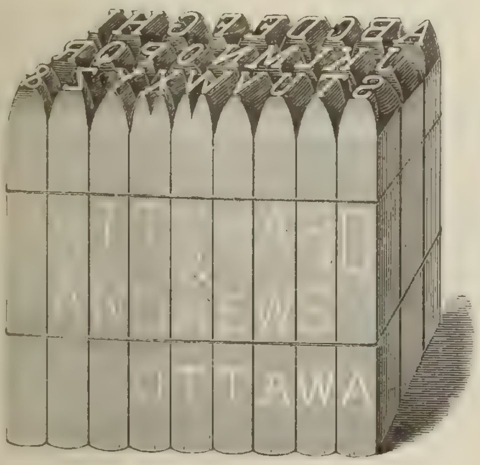

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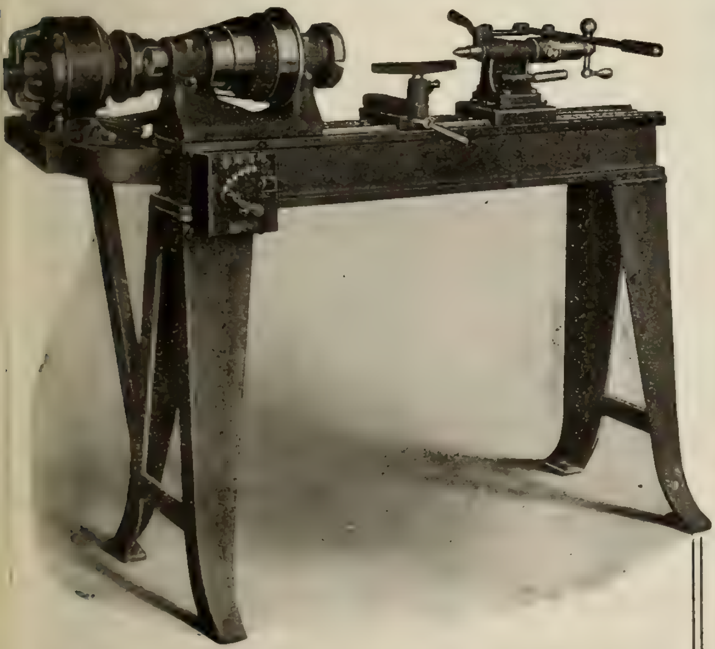

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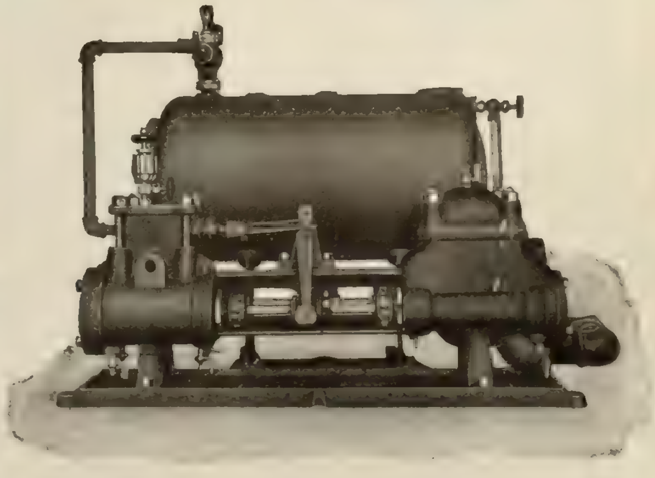

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Lachapelle, J. D., & Co., Montreal, Que.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Indianapolis, Ind.

OXYGEN (SEE ACETYLENE)

PACKINGS, LEATHER, HYDRAULICS, ETC.
Graton & Knight Mfg. Co., Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.

PANS, LATHE
Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

PAPER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

PATENT SOLICITORS
Babcock & Sons, Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Ross Thomson & Co., Ottawa, Ont.

PATTERNS
Galt Malleable Iron Co., Galt.

PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton.

PIG IRON
Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PIPE CUTTING AND THREADING MACHINES
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.

PIPE CUTTERS, ROLLING
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
John H. Hall & Sons, Ltd. Brantford, Ont.
H. W. Petrie, Ltd., Montreal.

PIPE, RIVETED STEEL
Toronto Iron Works, Ltd., Toronto.

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt. & Son, Montreal.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Oliver Machy. Co., Grand Rapids, Mich.
Peacock Bros., Montreal, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

PLANING MILL EXHAUSTERS
Can. Blower & Forge Co., Berlin, Canada.
Sheldons, Ltd., Galt, Ont.

PLIERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Billings & Spencer, Ltd., Welland.

PLUG MILLERS
Banfield, Edwin J., Toronto.

PRESSES, ARBOR
Atlas Press Co., Kalamazoo, Mich.

PRESSES, BANDING
Chapman Double Ball-Bearing Co., Toronto, Ont.
Perrin, Wm. K., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

PRESSES, HAND FORCING
Atlas Press Co., Kalamazoo, Mich.

PRESSES, BROACHING
E. W. Bliss Co., Brooklyn, N.Y.
Toledo Machine & Tool Co., Toledo.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo, O.

PRESSES FOR SHELLS
Atlas Press Co., Kalamazoo, Mich.
Charles F. Elmes Eng. Works, Chicago.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

PRESSES, DROP
W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can Boomer & Boschert Press Co., Montreal.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Toledo Machine & Tool Co., Toledo.

PRESSES, FILTER
Lymburner, Ltd., Montreal.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, FORGING
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago, Ill.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
Wm. R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

PRESSES, HYDRAULIC
Bawden Machine Co., Toronto, Ont.
John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Peacock Bros., Montreal, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, PNEUMATIC
Toledo Machine & Tool Co., Toledo.

PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo
A. R. Williams Machy. Co., Toronto.

PRESSES, BALING
William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

PRESSES, SCREW
Barnes, W. F. & John, Co., Rockford, Ill.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Erie Foundry Co., Erie, Pa.

PRESSURE REGULATORS
Can. Fairbanks-Morse Co., Montreal.

PROPELLERS
Ontario Specialties, Ltd., Ottawa, Can.

PULLERS, WHEEL
The Crane Puller Co., Arlington, Mass.

PULLEYS
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Dodge Mfg. Co., Toronto, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Ltd., Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PULLEY MACHINERY, DRILLING AND TAPPING
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.

PUMPS, AIR
Bawden Machine Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
Jenckes Mach. Co., Sherbrooke, Que.
Peacock Bros., Montreal, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL
Can. Blower & Forge Co., Berlin, Canada.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Darling Bros., Ltd., Montreal, Que.
D'Olier Centrifugal Pump & Machine Co., Phil
delphia, Pa.
Peacock Bros., Montreal, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

PUMPS, HIGH PRESSURE
Charles F. Elmes Eng. Works, Chicago.
Darling Bros., Ltd., Montreal, Que.
Peacock Bros., Montreal, Que.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

PUMPS, ALL KINDS
Bawden Machine Co., Toronto, Ont.
Can. Blower & Forge Co., Berlin, Canada.
Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PUMPS, HYDRAULIC
Charles F. Elmes Eng. Works, Chicago, Ill.
Darling Brothers, Montreal.
Peacock Bros., Montreal, Que.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto.

PUMPS, LUBRICANT AND OIL
Cincinnati Lubricant Pump Co., Cincinnati, O
Roper, C. F., Co., Hopedale, Mass.

PUMP LEATHERS
Graton & Knight Mfg. Co., Montreal.

PUNCHES AND DIES
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Coleman Fare Box Co., Toronto, Ont.
Scott Bros., Halifax, Eng.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

PUNCHES, PNEUMATIC
Jno. F. Allen Co., New York.

PUNCHING MACHINES, HORIZONTA
Bertrams, Ltd., Edinburgh, Scotland.
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Peacock Bros., Montreal, Que.
Niles-Bement-Pond Co., New York.

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Shore Instrument & Mfg. Co., New York City.
Thwing Instrument Co., Philadelphia, Pa.

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Niles-Bement-Pond Co., New York.

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Niles-Bement-Pond Co., New York.

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Keystone Mfg. Co., Buffalo, N.Y.

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Garvin Machine Co., New York.

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Cleveland Twist Drill Co., Cleveland.
McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedf
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines,

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Aikenhead Hardware Co., Toronto, Ont.
Boker & Co., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McKenna Bros, Brass Co., Pittsburgh.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Boker & Co., H. Montreal, Que.
Morse Twist Drill & Machine Co., New Bedfo
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedfo
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

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Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont
Wilt Twist Drill Co., of Canada, Ltd., Walkerville, Ont.

REAMING MACHINES, PNEUMATIC
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Lachapelle, J. D., & Co., Montreal, Que.
Peacock Bros., Montreal, Que.

RIVET MACHINES
Can. Blower & Forge Co., Berlin, Canada.
Cook, Asa S., Co., Hartford, Conn.
National Machinery Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

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Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
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Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.

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High-Speed Hammer Co., Rochester, N.Y.
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John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.

ROLLS, CRUSHING
Jenckes Mach. Co., Sherbrooke, Que.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
L. S. Starrett Co., Athol, Mass

SAND BLASTS
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Gray Mfg. & Machy. Co., Toronto, Ont.

SAND BLAST SYSTEMS
Whiting Foundry Equipment Co., Harvey Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt. & Son, Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

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H. A. Drury Co., Montreal.
Hunter Saw & Machine Co., Pittsburg, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)

SAWS, INSERTED TOOTH
Tabor Mfg. Co., Philadelphia, Pa.

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Shore Instrument & Mfg. Co., New York City.

SCRAP IRON
L. S. Tarshis & Sons, Montreal.

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SCREW MACHINES, HAND, AUTOMATIC
Bawden Machine Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler.
Milholland, W. K., Co., Indianapolis, Ind.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

SCREW MACHINES, MULTIPLE SPINDLE
New Britain Machine Co., New Britain, Conn.
Windsor Machine Co., Windsor, Vt.

SCREWS
Galt Machine Screw Co., Galt, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
Can. Tap & Die Co., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
Wells Bros. Co. of Canada, Galt, Ont.

SCREW SLOTTERS
Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
New York Machinery Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Simmons Machine Co., Albany, N.Y.
H. A. Stocker Co., Chicago, Ill.

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Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Hendey Machine Co., Torrington, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.

SHAFTING
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Dodge Mfg. Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
A. R. Williams Machy. Co., Toronto.

SHARPENING STONES
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

SHAVINGS, SEPARATORS
Can. Blower & Forge Co., Berlin, Canada.
Sheldons, Ltd., Galt, Ont.

SHEARING MACHINES, ANGLE IRON, BAR AND GATE
John Bertram & Sons Co., Dundas.
Bertrams, Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Niles-Bement-Pond Co., New York.
Scott Bros., Halifax, England.
Toledo Machine & Tool Co., Toledo.

SHEARS, POWER
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Berlin, Canada.
Canada Machinery Corp., Galt, Ont
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Scott Bros., Halifax, England.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

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John F. Allen Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada.

SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Fisher, A.D., Mfg. Co., Toronto, Ont.
Steel Bending Brake Works, Ltd., Chatham, Ont

SHEET METAL STAMPINGS
Coleman Fare Box Co., Toronto, Ont.
Dominion Forge & Stamping Co., Walkerville, Ont.

SHELL BANDING MACHINES, HYDRAULIC
Lymburner, Ltd., Montreal.
Perrin, Wm. R., Toronto.
West Tire Setter Co., Rochester, N.Y.

SHELL PAINTING MACHINE
Can. Blower & Forge Co., Berlin, Canada.

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Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.

SHRAPNEL SHELL MARKER
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Noble & Westbrook Mfg. Co., Hartford, Conn.

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Armstrong Bros. Tool Co., Chicago.

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Aikenhead Hardware Co., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

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Niles-Bement-Pond Co., New York.

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Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
J. H. Williams & Co., Brooklyn, N.Y.

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Brown, Boggs & Co., Hamilton, Can.

SOLDERS
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Tallman Brass & Metal Co., Hamilton.

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Baird Machine Co., Bridgeport, Conn.
Banfield, Edwin J., Toronto.
W. H. Banfield & Sons, Toronto.
John Bertram & Sons Co., Dundas.
Baird Machine Co., Bridgeport, Conn.
Bawden Machine Co., Toronto, Ont.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Brown Engineering Corp., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Coleman Fare Box Co., Toronto, Ont.
Cunningham & Sons, St. Catharines, Ont.
Charles F. Elmes Eng. Works, Chicago.
Fisher, A.D., Mfg. Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
Grant Mfg. & Machy. Co., Bridgeport, Conn
John H. Hall & Sons, Brantford.
Himoff Machine Co., New York, N.Y.
Jardine, A. B., & Co., Hespeler.
Jenckes Mach. Co., Sherbrooke, Que.
D. McKenzie Machinery Co., Guelph, Ont.
Peacock Bros., Montreal, Que.
Root & Van Dervoort Engineering Co., Ea Moline, Ill.
Smart-Turner Machine Co., Hamilton, Ont.
Webber Bros. Mach. Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.

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Garvin Machine Co., New York.

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Cleveland Wire Spring Co., Cleveland.
Jas. Steele, Ltd., Guelph, Ont.

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Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.

SPROCKET WHEELS, CAST
Perrin, Wm. R., Toronto.

STAIRS, IRON
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works Co., Ltd., London Canada.

STAMPINGS
Coleman Fare Box Co., Toronto, Ont.
Dominion Forge & Stamping Co., Walkerville Ont.

STAMPING MACHINERY
Coleman Fare Box Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.

STAMPS, STEEL ALPABETS AN FIGURES
Matthews, Jas. H. & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Can.

STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.
H. W. Petrie, Toronto.
Peacock Bros., Montreal, Que.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.

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Steel Bending Brake Works, Ltd., Chatham, Ont

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Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Zenith Coal & Steel Products, Ltd., Montreal Que.

STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Union Drawn Steel Co., Hamilton, Ont.

STEEL DRUMS
Smart-Turner Machine Co., Hamilton, Ont.

STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.

STEEL, HIGH SPEED
Armstrong Whitworth of Canada, Ltd., Montreal
Boker & Co., H., Montreal, Que.
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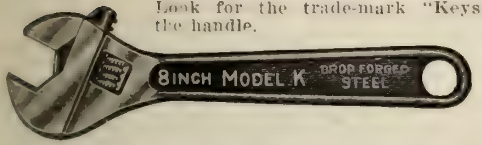

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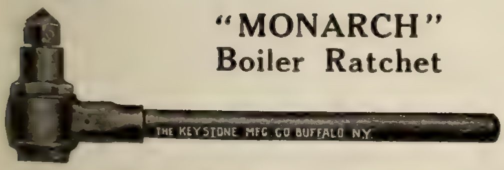

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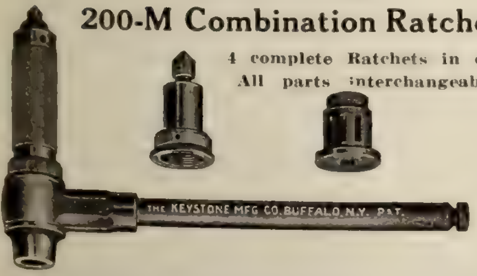

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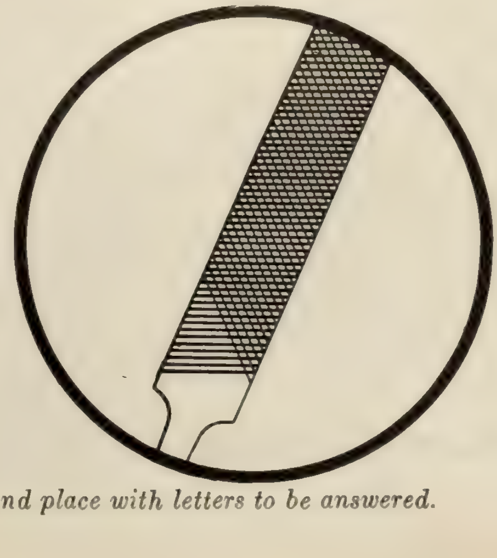

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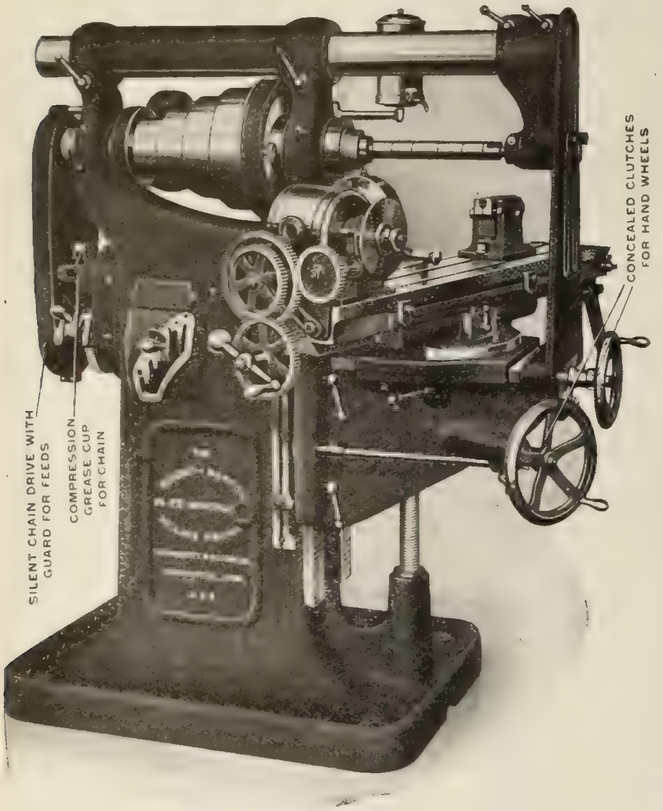
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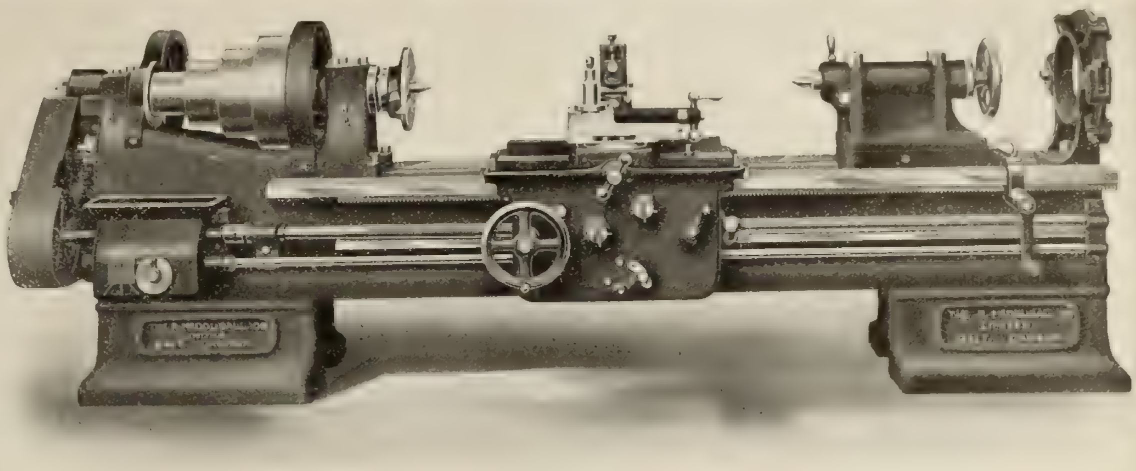
McDougall Lathes for Big Production

16, 18, 20, 22 and 26 inch Swing.



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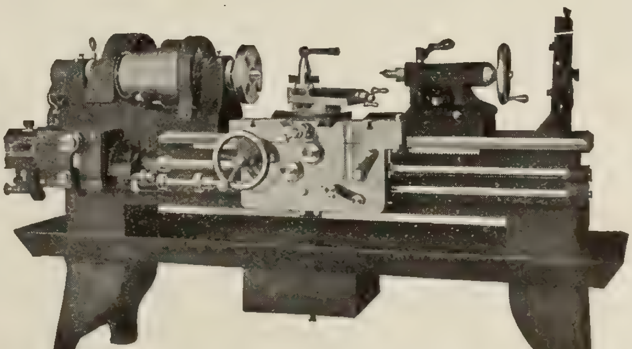

1 20 x 8 Foster Geared Friction Head Turret Lathe.
2 17 x 8 Sidney Quick Change Gear Lathes.
2 14 x 6 Monarch Standard Geared Engine Lathes.
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2 16 x 8 South Bend Screw Cutting Lathes.
1 18½ x 8 Cincinnati Quick Change Gear Lathe, double back-gear, double plate apron.
[illegible] 18 x 8 Mueller Lathes, three-step cone, double back-geared.
1 22 x 10 Milwaukee Semi-Quick Change Gear Lathe, double back gear and compound rest.
1 20 x 8 Walcott Lathe, quick-change gear, three-step cone, double back-gear.
1 24 x 8 National Quick Change Gear Lathe.
1 18 x 14 Boye & Emmes Lathe, quick-change gear, double back apron, double plate apron.

1 16" Sipp Quick Change Speed Sensitive Drill Press.
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1 26" Sibley Back-Geared, Sliding Head Drill Press
1 20" Buffalo Drill Press, worm and lever feed.
2 14" 4-spindle Drill Presses (Sensitive).
3 14" 3-spindle Drill Presses (Sensitive).
4 12" Single Spindle Drill Presses (Sensitive).
1 No. 2 Garvin Universal Milling Machine.
1 24 x 24 x 6 London Planer.
1 16" Ohio Std. Duty B.G. Shaper.
1 20" Smith & Mills B.G. Crank Shaper.
1—20" Kelley B.G. Crank Shaper.
1 24" Kelley B.G. Crank Shaper.
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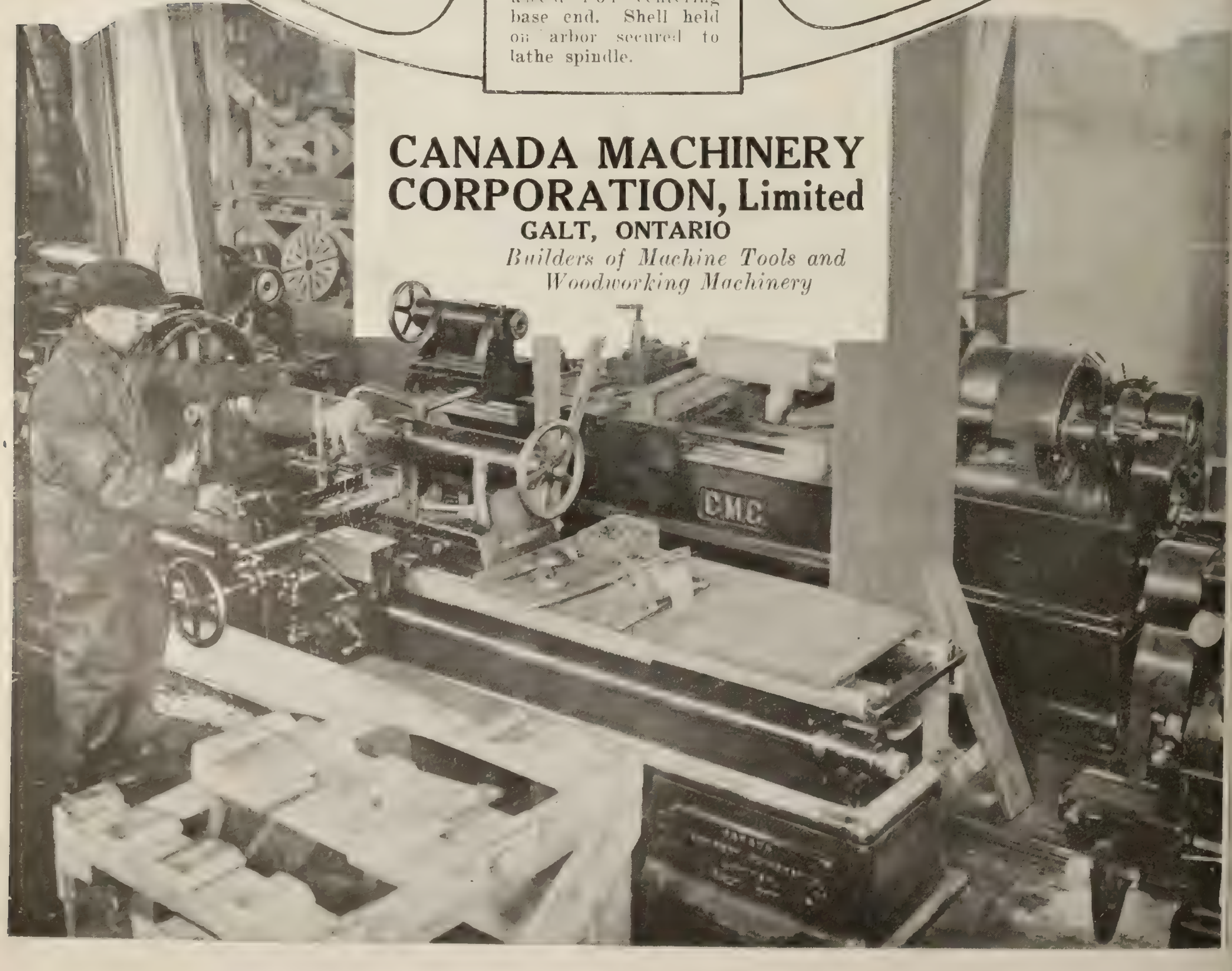
See our new 14" Engine Lathe on exhibition in Machinery Hall at the Canadian National Exhibition, Toronto, Ont.

For convenience of the trade we have opened Showrooms in Toronto at Brock Avenue Subway, where a full line of our Machinery can be inspected.

Facing off base of 6" H.E. Shells (in foreground) on 26" C.M.C. Lathe.

View in background shows 26" C.M.C. Lathe used for centering base end. Shell held on arbor secured to lathe spindle.



CANADA MACHINERY CORPORATION, Limited

GALT, ONTARIO

Builders of Machine Tools and Woodworking Machinery

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CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XVI—No. 10 Publication Office: Toronto, Sept. 7, 1916 Subscription Price $3.00 per Year

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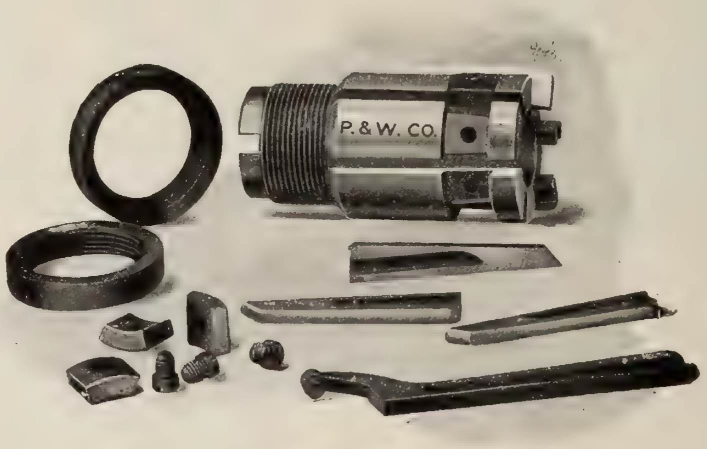

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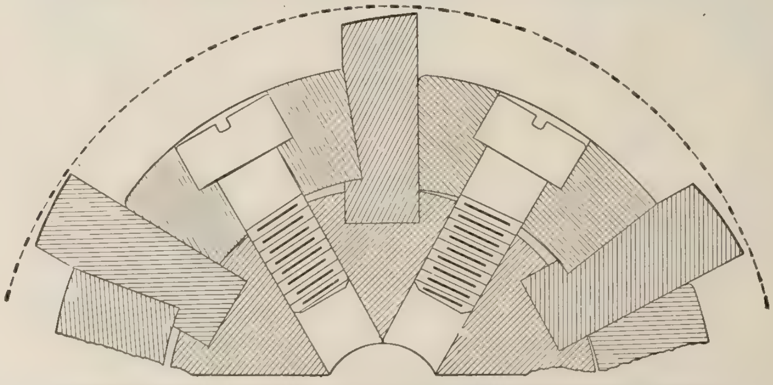

Section showing construction of P. & W. Adjustable Blade Reamers

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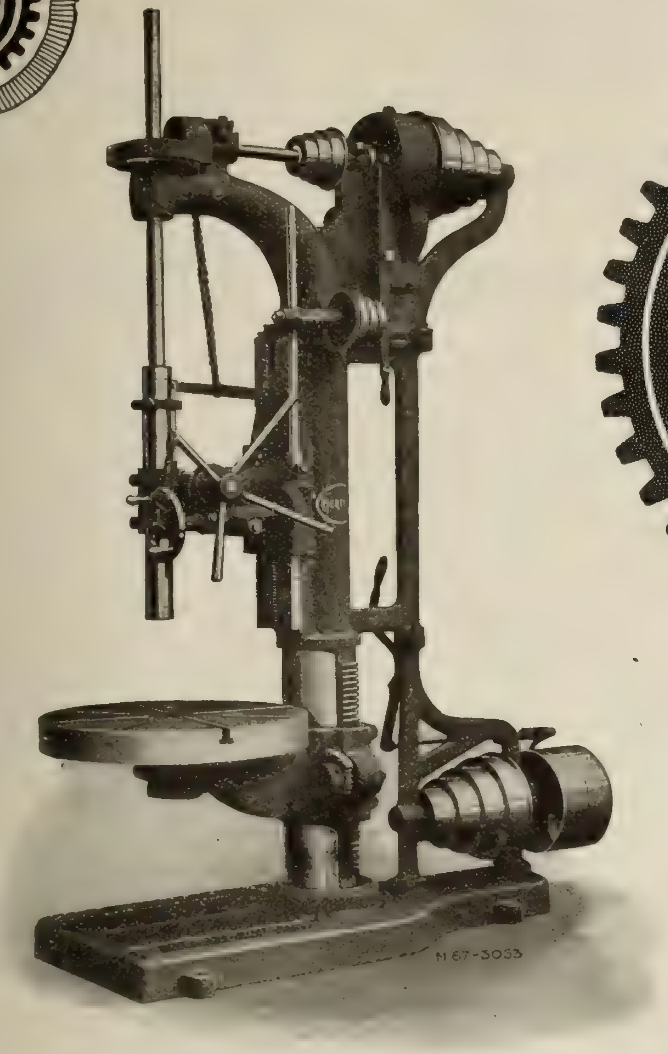

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The Publisher's Page

TORONTO **September 7, 1916**

Canada's Growing Trade

Despite the fact that Canada has raised and is maintaining a very respectable sized army, drawn from the very best of her manhood, and largely from the ranks of labor, her trade is increasing at an enormous rate.

* * *

The following statement prepared by the Minister of Customs, Ottawa, will, we believe, prove as illuminating to our readers abroad as it did to many at home when it appeared in the daily press two weeks ago.

* * *

Ottawa, Aug. 23.—The aggregate trade of Canada in four months has increased by more than 100 per cent.

The July trade as shown in the monthly summary issued to-day by the Hon. J. D. Reid, minister of customs, showed the phenomenal rise of 141 per cent., or $139,860,450. The total trade for the month amounted to $238,860,488, and for the four months ending July 31 it reached the total of $766,372,832, as against $371,646,906 in the corresponding period of last year.

* * *

The statement shows that both exports and imports have contributed to the aggregate increase, *with the larger figures in the export column.* Imports for consumption amounted in value to $63,622,587 in July as compared with $36,622,190 in July last year, while in the four months period they rose from $134,729,377 to $249,867,767. *The July exports reached a value of* $104,964,270 *compared with* $45,590,038.

* * *

In the four months the exports have risen from $159,168,259 to $350,345,305. These are the figures for domestic imports and exports only. In the movement of coin and bullion there has been a sharp decline as regards imports and, for the four months, of exports also, although the gold exports last month were slightly larger than in the same month of 1915.

* * *

In the export of foreign merchandise there has been a notable increase, nearly one thousand per cent. The volume of these exports rose from $11,494,457 in the four months of last year to $122,627,072 in the same period this year. In the month of July they jumped from $2,916,682 to $55,637,340.

* * *

An interesting feature of the statement is the substantial rise in the imports of free goods; there has been, however, a corresponding increase in the imports of dutiable merchandise, and the duty collected in the four months has risen from $28,085,471 to $46,063,507.

* * *

The detailed statement of exports shows that the shipments of Canadian manufactured products trebled in July, amounting to $38,264,136, while the exports of farm products amounted to $38,585,309, or five times the total of July last year. Exports of foreign mine products, which were less than a million in July last year, reached a total of over fifty-four millions last month.

* * *

Of course it will not be forgotten that a large proportion of our exports consisted of munitions and war supplies, although the more peaceful lines of manufacture undoubtedly showed up well in the increase.

* * *

The very fact that our manufacturers are able to produce munitions, and other war supplies, in compliance with the exacting requirements of the military authorities speaks volumes for their ability to satisfactorily handle export business of a purely commercial nature.

* * *

Canadian manufacturers are alive to their opportunities, but while quick to take advantage of same, they are developing an export trade along lines which will lead to permanency.

* * *

Our July trade statement will not only tend to inspire even greater confidence in Canada and Canadian goods, but will encourage Canadian manufacturers to redouble their efforts in extending their connections abroad.

* * *

This is the fourth Export Number of Canadian Machinery. The next will be published October 4th, and as usual a large number of copies will be distributed in Allied and Neutral Countries.

Canadian Machinery and Manufacturing News
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Angle Bars, Track Bolts, Tie Plates, Spikes, Tie Rods, Etc.

NAILS, SPIKES, RIVETS, ETC.

Wire, Cut, Boat and Horse Shoe Nails, Railway, Pressed and Drift Spikes. Tacks and Shoe Nails, Steel and Copper Rivets, and Burrs, Iron, Brass and Copper.

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Pole Steps, Cross Arm Braces, Guy Clamps and Guy Rods, Etc., Black and Galvanized.

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Machine, Carriage, Elevator, Stove, Tire and Sleigh Shoe Bolts, Blank, Tapped Nuts, and Washers.

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Black and Galvanized Nipples and Couplings.

SCREWS

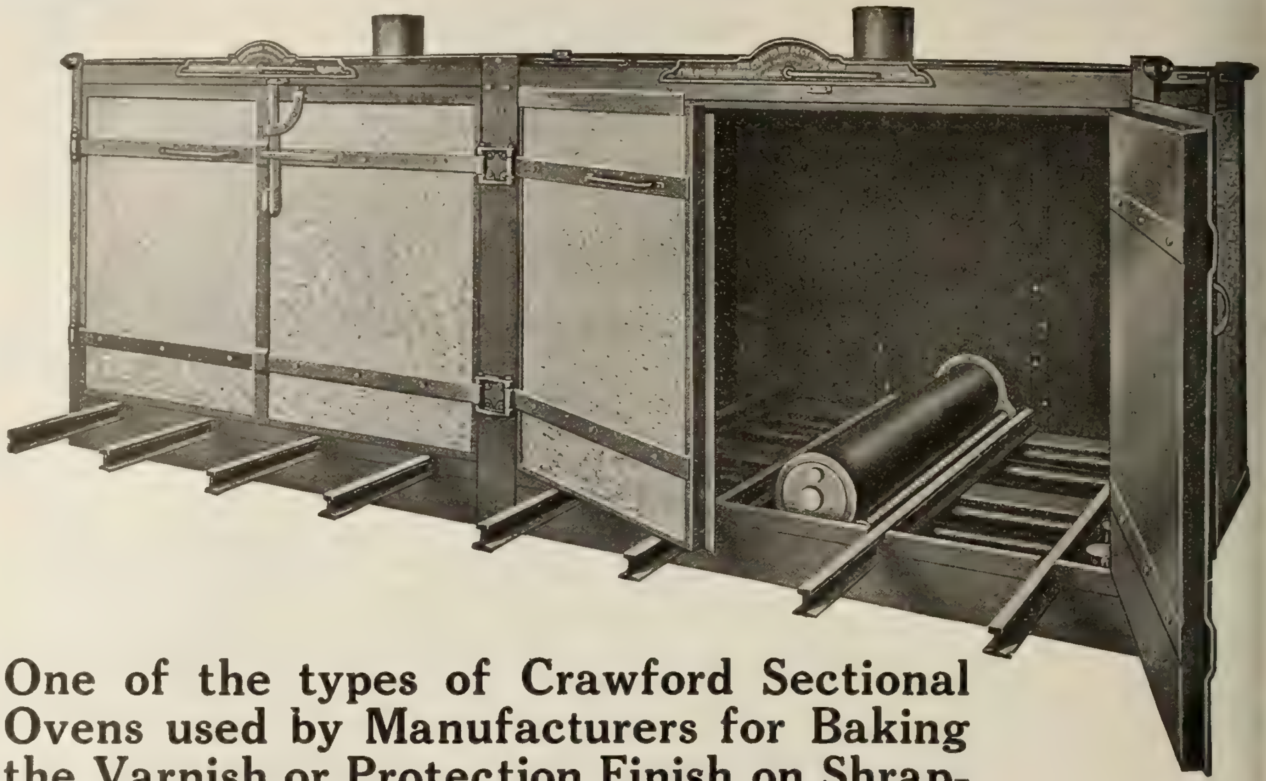
Wood and Machine Steel, Brass and Bronze.

LEAD PRODUCTS

Lead Pipe, White Lead, Shot and Putty.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG

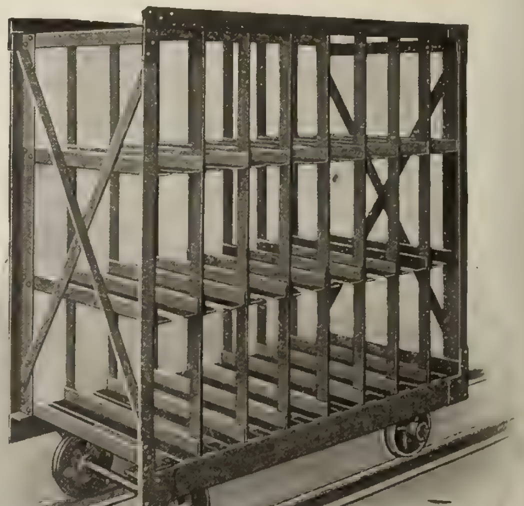


One of the types of Crawford Sectional Ovens used by Manufacturers for Baking the Varnish or Protection Finish on Shrapnel and High Explosive Shells.

These ovens are equipped with the only gas burner that gives a combined radiated heat and circulation of preheated air in the oven.

The gas and air are mixed and combustion in the large cylinder supported by air from a positive pressure blower which gives the highest efficiency and economy known for burning either city, natural, gasoline or producer gas, and there is no exposed flame in the oven.

The truck shown, holds (120) twenty-eight-pound shells and is planned to stand the shells on end, resting on angles. Other designs have been built for shells ranging in weight from fifteen to eight hundred pounds, the last mentioned shell being forty-eight inches high by twelve inches in diameter.



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Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA

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QUALITY
ROLLING MILLS

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IN SHEETS, ROLLS, PLATES
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SPECIAL MARINE BRONZE ROD
For Shafting and Bearings.

For Drilling and Free Turning, Order
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"SPINNING BRASS."

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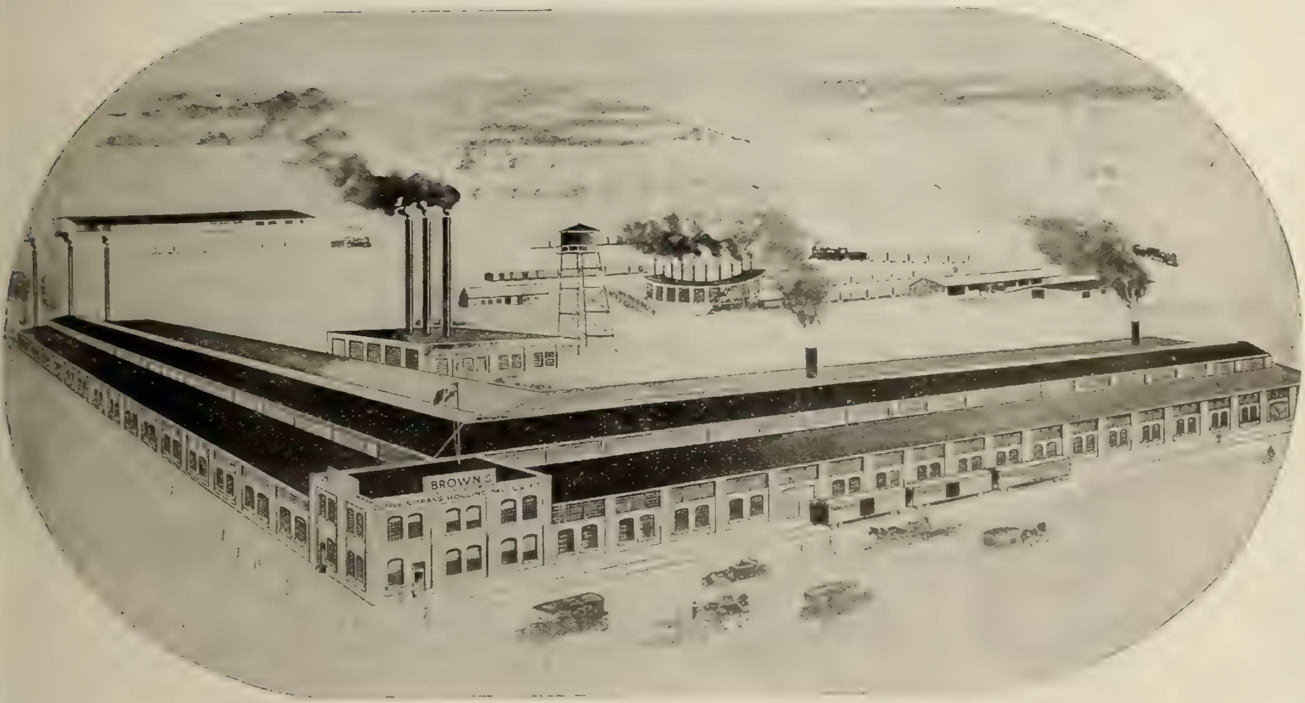
Send a Trial Order



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General Offices and Mills:
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THE IRON AGE

—and they certainly get results

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Write for Catalog No. 23. You'll find it interesting.

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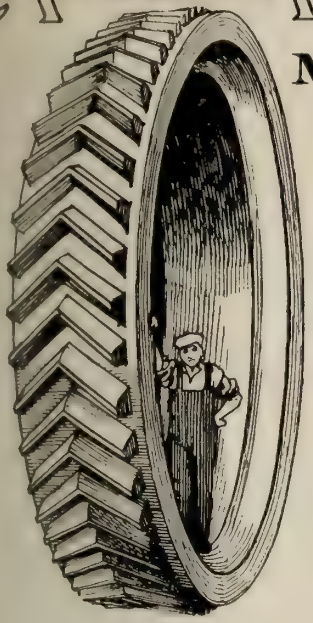

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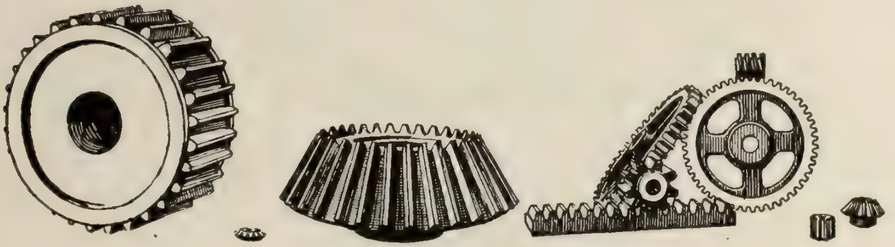

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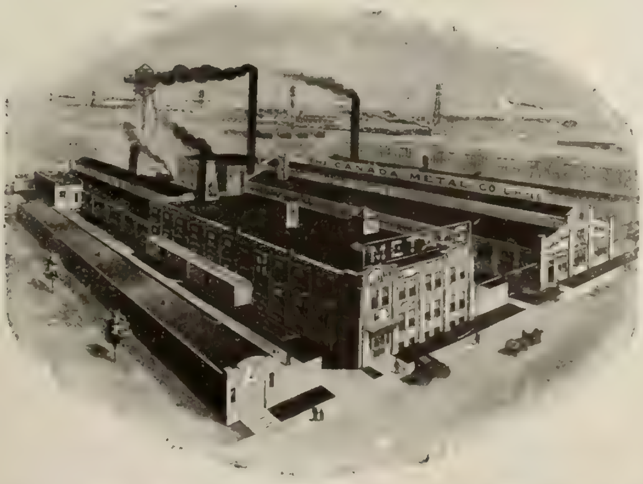

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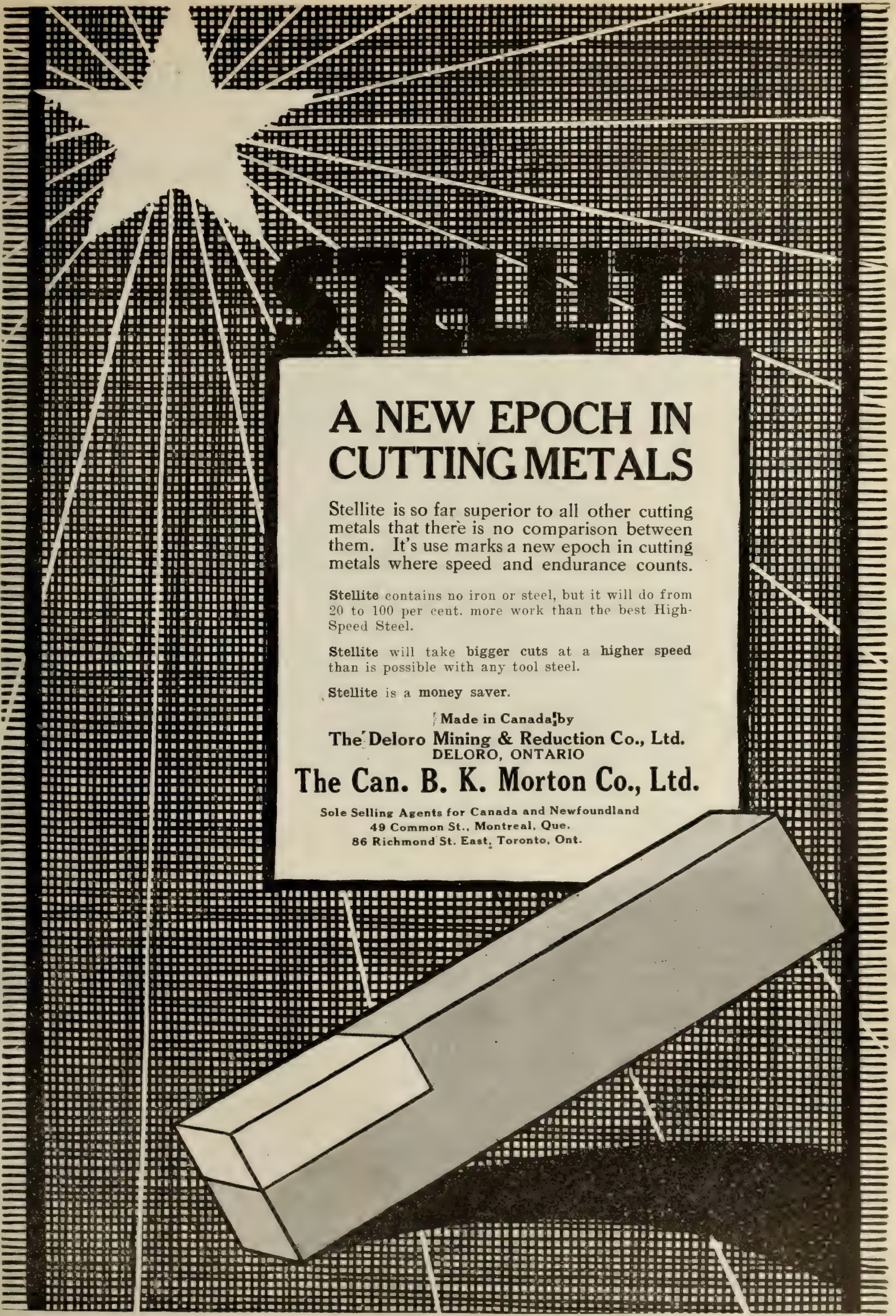

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Manufacturers of High-Grade Steel Specialties

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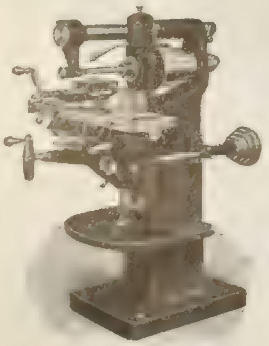

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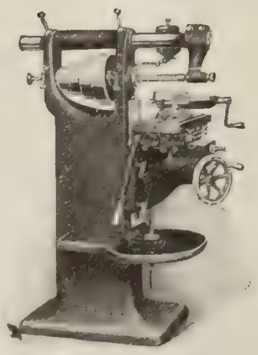

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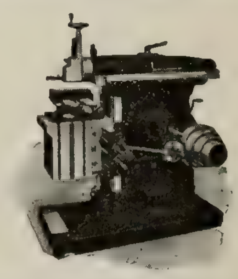

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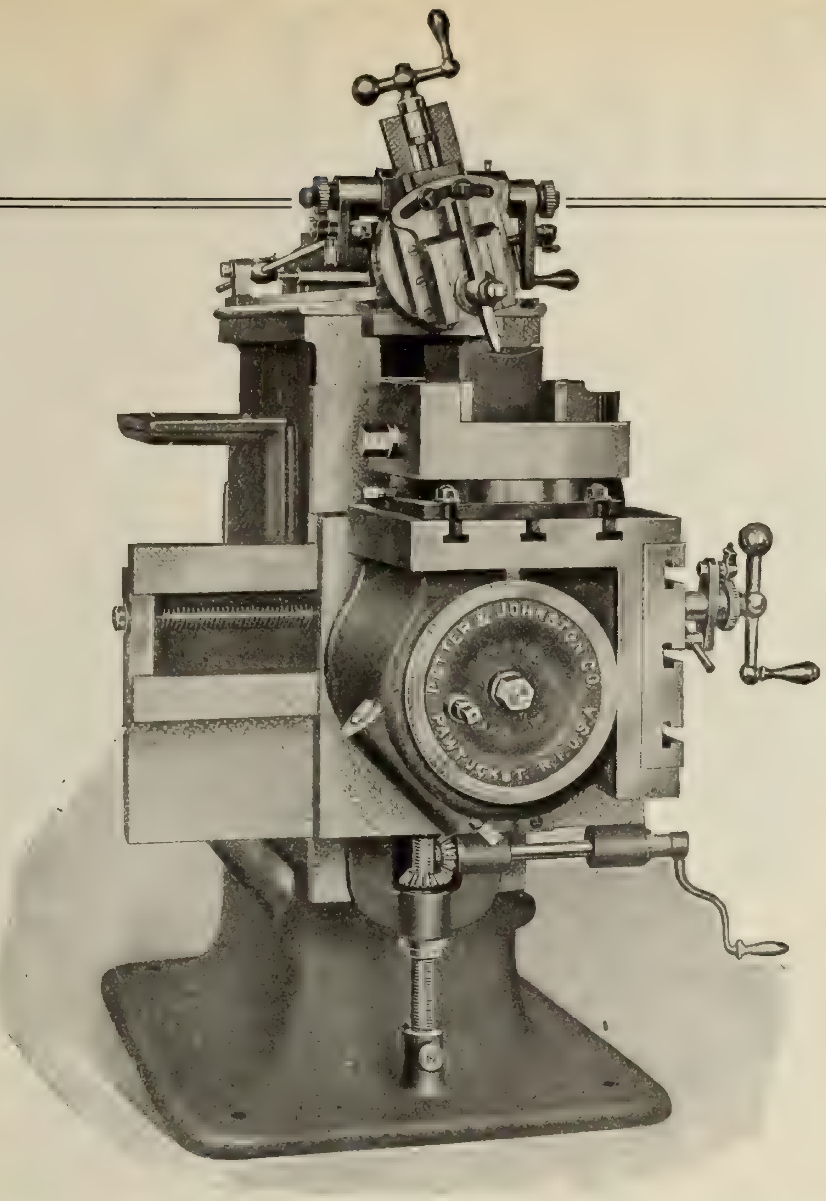

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Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

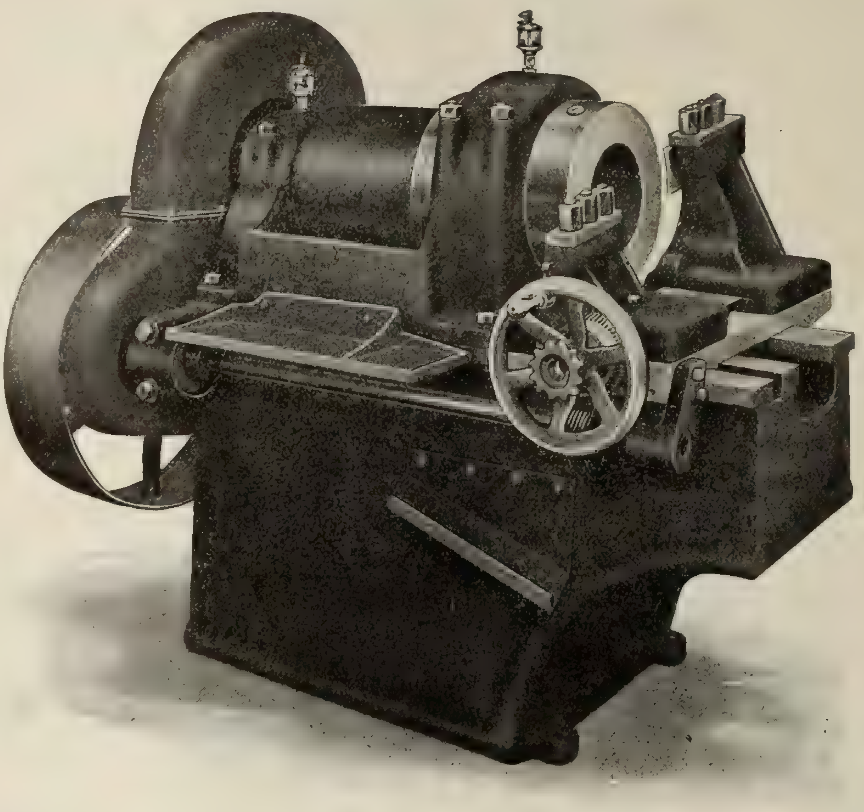
WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

It Bites Deep



R. & V. Cutting-Off Lathe

For 6, 8 and 9.2-in. Shells

We have brought out a line of Special Purpose Lathes for the manufacture of High Explosive Shells, specializing on

- **Cutting-Off Lathes**
- **Outside Roughing Lathes**
- **Inside Boring Lathes** (roughing and finishing)
- **Outside Finishing Lathes**
- **Waving and Undercutting Lathes**
- **Copper Band Turning Lathes**
- **Facing Lathes**
- **Turret Lathes**—for counterboring, necking, truing for thread, and adjusting to weight.

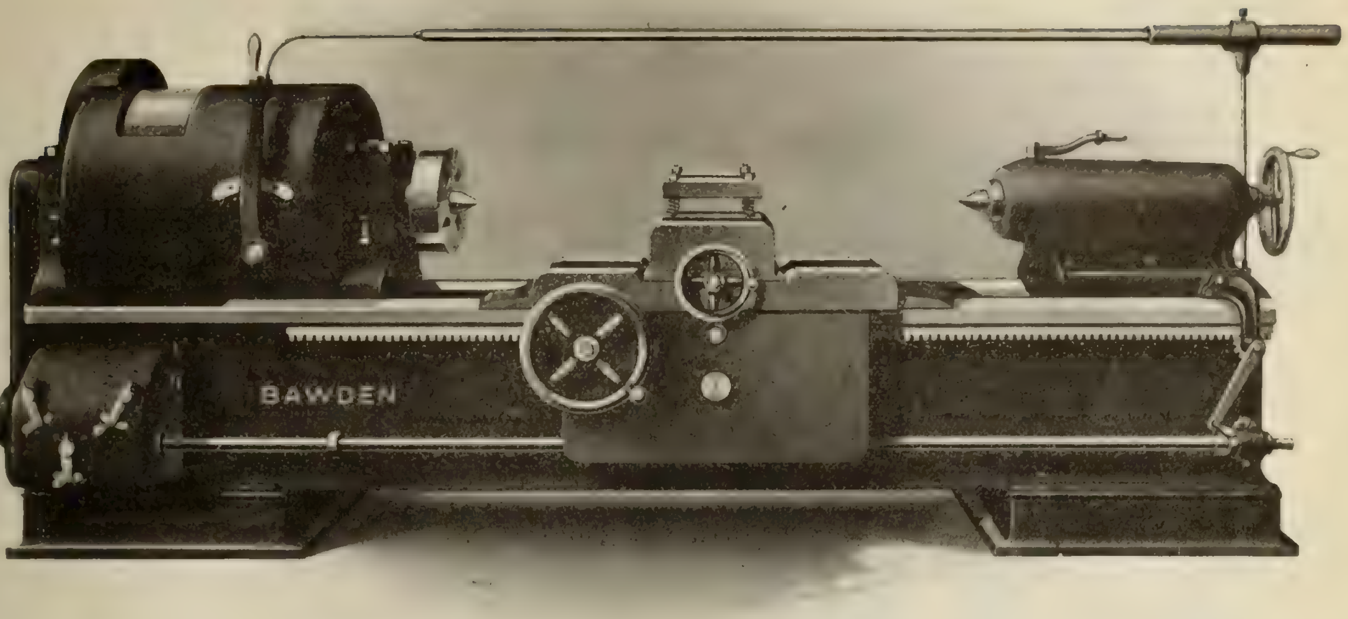
They are all of exceptionally heavy construction and simple design to meet the severe service and special requirements of the Munition manufacturers.

These machines are making records equalled by few, and are already favorably known.

If you are a manufacturer of, or contemplate making shells, write us for estimates and deliveries.

The Root & Van Dervoort Engineering Company

EAST MOLINE, ILLINOIS, U.S.A.

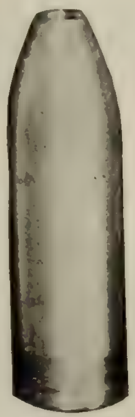


36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

SERVICE—

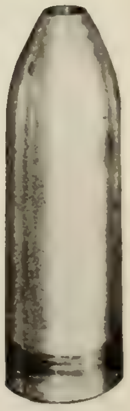
that you'll be proud of

The power, strength, rigidity and accuracy of



BAWDEN

Heavy Duty Shell Lathes



Make them really remarkable machine tools.

They give you big production and their accuracy assures the highest standard of machinery.

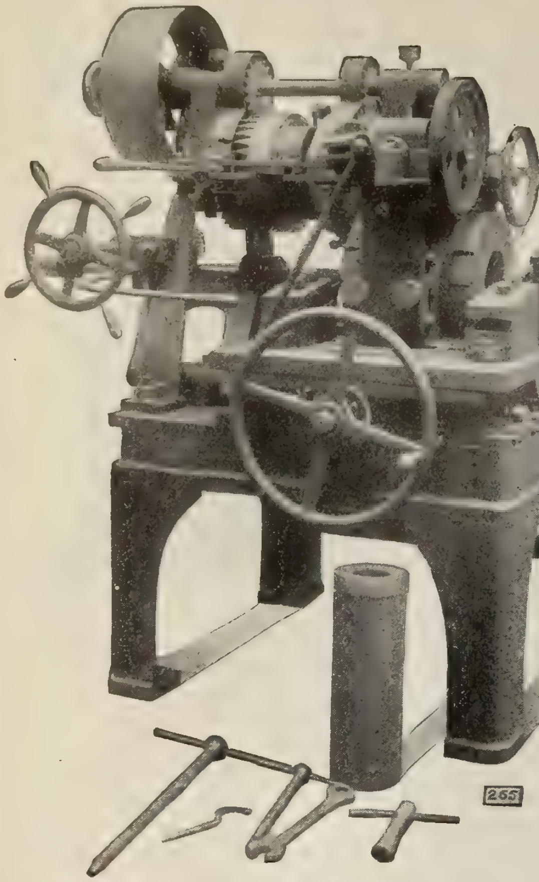
They'll be very useful tools to your shop on big jobs after the demand for shells is over. The investment is permanent.

Write for particulars and learn what Bawden Lathes are doing.

We manufacture a full line of gauges for all sizes of British, Russian and French Shells and component parts.

The Bawden Machine Co., Limited

TORONTO, CANADA



CUTTING-OFF MACHINES

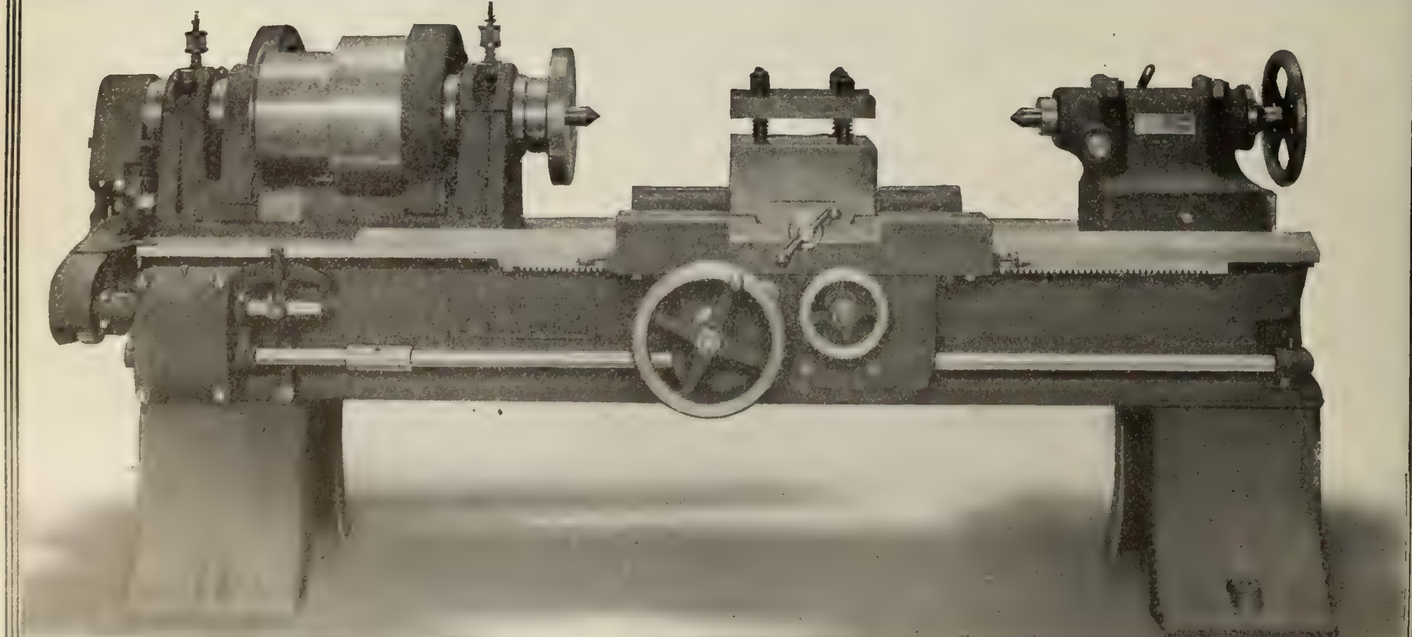
Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal



Petrie 20-inch Heavy Duty Manufacturing Lathe

A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

Made in Canada Reasonable Price Prompt Deliveries

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.

The Hepburn Heavy-Duty Shell Lathes

Illustration shows one of the Hepburn family of machine tools — a Turret Lathe for boring up to and including 6″ shells.

The Hepburn product ranks with the best on the market. Users say it is the *best* yet.

SPEED

ACCURACY

POWER

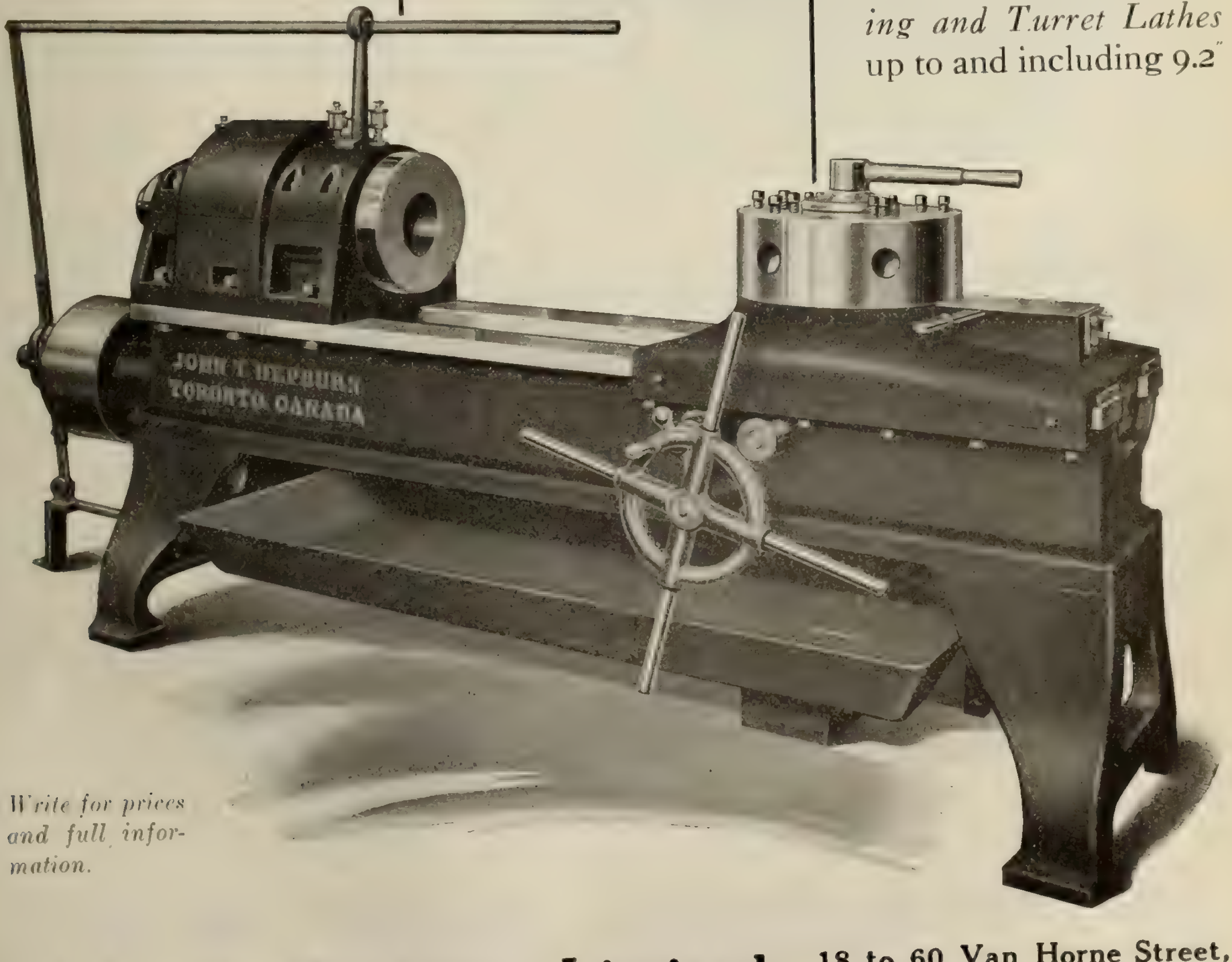
STRENGTH

SIMPLICITY

Hepburn Lathes have the production, power and service idea built right into them. They assure the buyer a remarkable investment.

Hepburn capacity gives you the advantage of *immediate delivery* and enables us to give the very best of service.

We manufacture Turning and Turret Lathes up to and including 9.2″

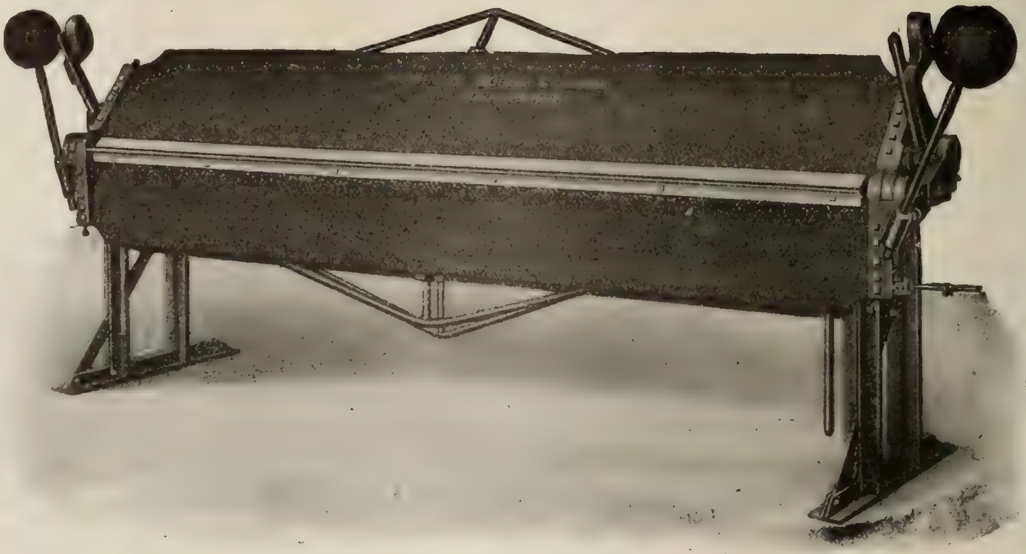


Write for prices and full information.

John T. Hepburn, Limited, 18 to 60 Van Horne Street,
TORONTO, CANADA

A GOOD INVESTMENT

A "B.B." STEEL BRAKE



FOR a Cheap Brake the "B.B." Steel Plate Machine is the best investment you can make. It is especially designed for rapid forming of sheets, and is suitable for a large variety of work, such as can be accomplished on an ordinary Cornice Brake. We can furnish these Brakes for bending all sizes and gauges of metal.

Write for Catalogue if Interested.

"ALWAYS, EVERYWHERE, SPECIFY 'B.B.' QUALITY."

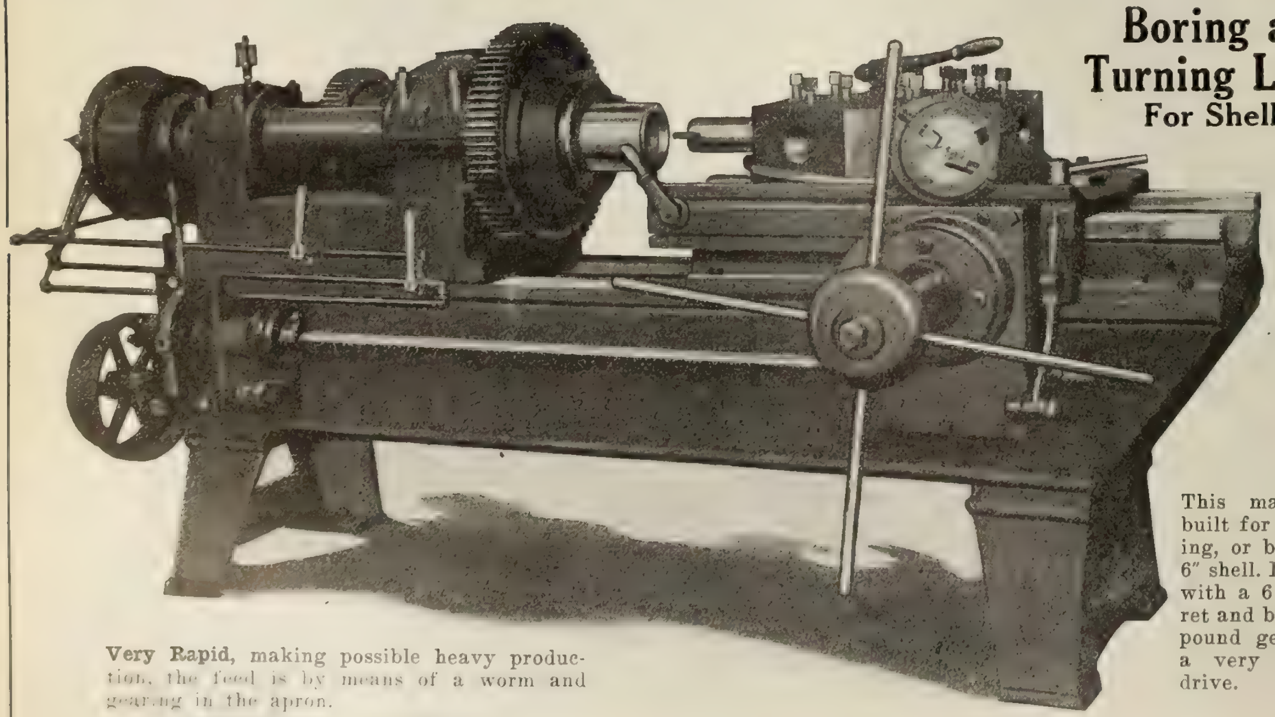
The Brown-Boggs Co., Limited, Hamilton, Canada

Tinsmiths' Tools, Sheet Metal Working Machinery, Dies, etc.

Western Representatives: MESSRS. BISSETT & WEBB, LIMITED, WINNIPEG AND EDMONTON

Boring and Turning Lathe

For Shell Work



This machine is built for base facing, or boring the 6" shell. It is made with a 6 side turret and being compound geared has a very powerful drive.

Very Rapid, making possible heavy production, the feed is by means of a worm and gearing in the apron.

WRITE FOR DELIVERIES.

THE JENCKES MACHINE COMPANY, LIMITED

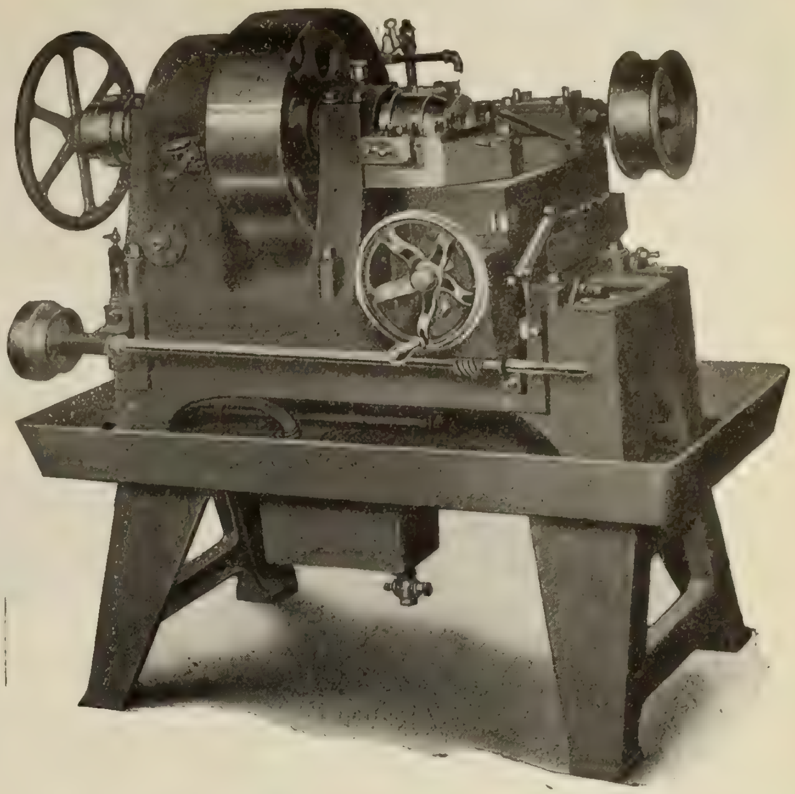
Works: SHERBROOKE, QUE.; ST. CATHARINES, ONT.

SALES OFFICES: 727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

A MACHINE especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States



For Turning, Facing and Milling the Thread on Gas Check Plugs for 6-inch High Explosive Shells.

is equipped with quick draw-in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds), having automatic stop. Power feed pump with relief valve driven from worm shaft (all drives direct from main line shaft). Rigidly built; simple and economical to operate.

Weight 1800 lbs.

For 18-pdr., 4.5 and 60-pdr. High Explosive Shells. Can furnish machines of same type but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

BASE PLUGS MACHINED TO GOVERNMENT SPECIFICATION

Have in stock for immediate shipment machined base plugs for 18-pdr., 4.5, 60-pdr. and 6" High Explosive Shells.

Capacity 3,000 per day. Write for prices.

EDWIN J. BANFIELD

STAIR BLDG. - - TORONTO, ONT.

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO. LIMITED

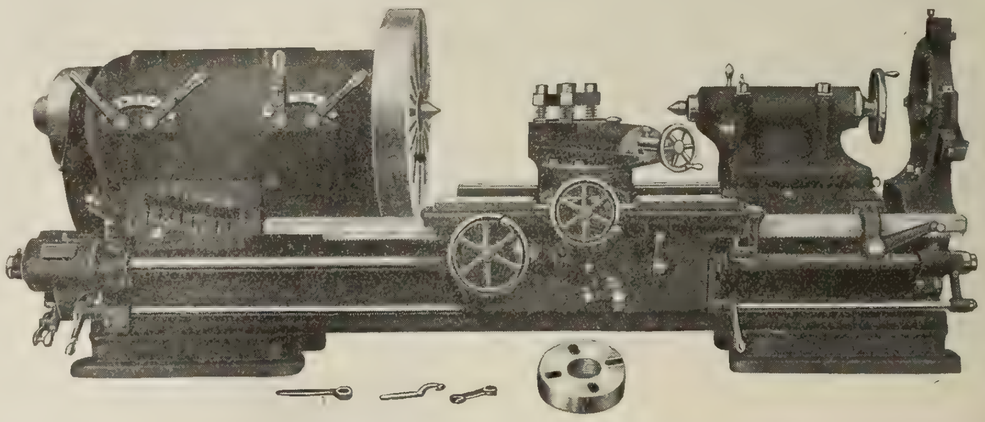
32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Lodge and Shipley—Selective Head—Triple Gear—36" Lathe—Good Delivery

Strong, speedy, accurate Machines for all operations on 6-in., 8-in., 9.2-in. and 12-in. Projectiles.

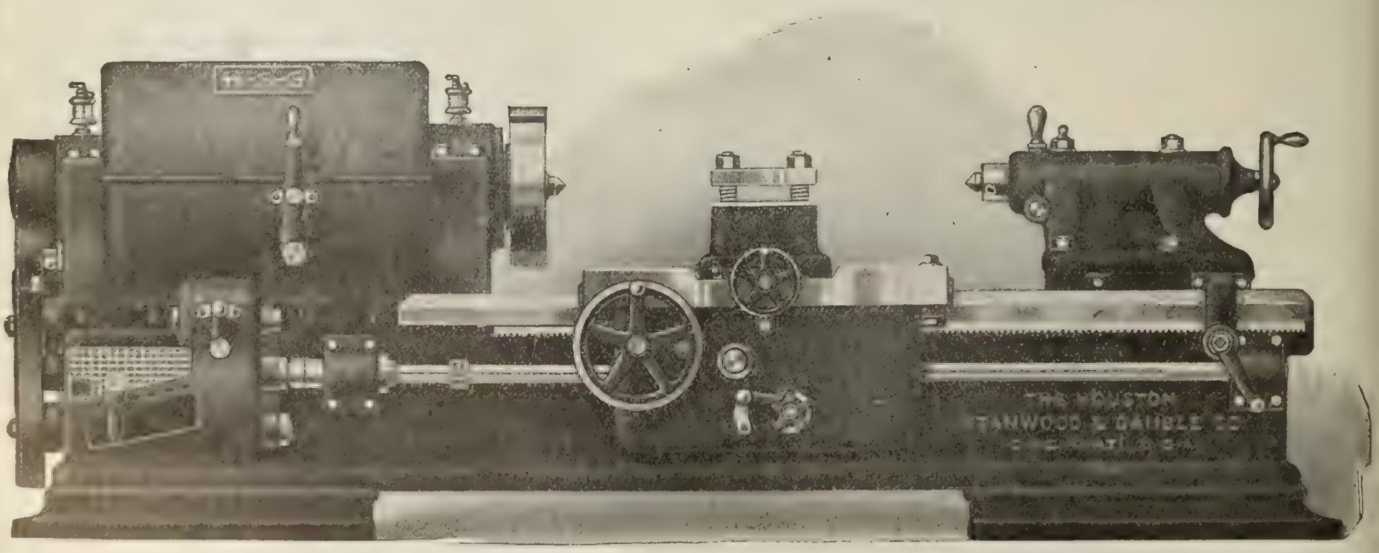
Unexcelled 18 in. and 20 in. Engine Lathes for Tool Room Equipment

Send us a list of machines required, and full particulars will come by return mail.



Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds



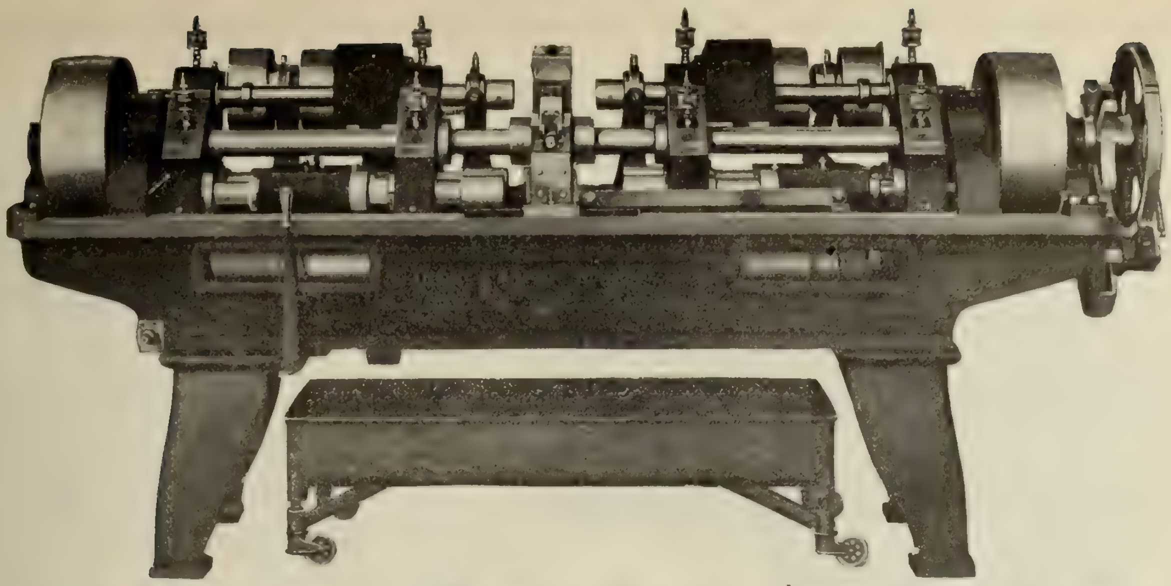
H-S-G TRADE MARK single-pulley, high-powered, all-geared engine lathe which can be shipped promptly in three sizes, 26", 30" and 36" swing.

This is a heavy duty lathe. For instance, the 30" swing lathe has 7" face drive pulley, 8" x 10" front spindle bearing and other parts of correspondingly liberal dimensions. The net weight with 12 ft. long bed is 15,000 pounds. Weight with profiling attachment and pot chuck for boring 18,000 pounds. All gears without exception are of steel. The design and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

CINCINNATI, U.S.A.

Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto



Finishing Both Ends At Once!

MALLEABLE IRON TURNBUCKLES:

Production:
300 Pieces Per Hour

Labor Cost:
1 c Per 100 Pieces

Operations: Drill, Ream and Tap

THE supremacy of the "NEW BRITAIN" for this class of work is evident.

ORDINARY methods of handling this piece would require two settings and six consecutive operations.

THE "NEW BRITAIN" way requires but one setting, all six operations being completed simultaneously.

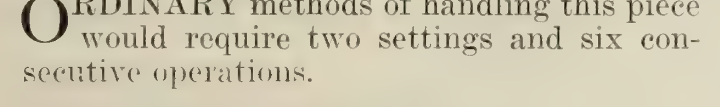
RESULT—8 to 10 times greater production!

Are you curious to know how much a "New Britain" would increase your production? Send us your blueprints for guaranteed estimates.

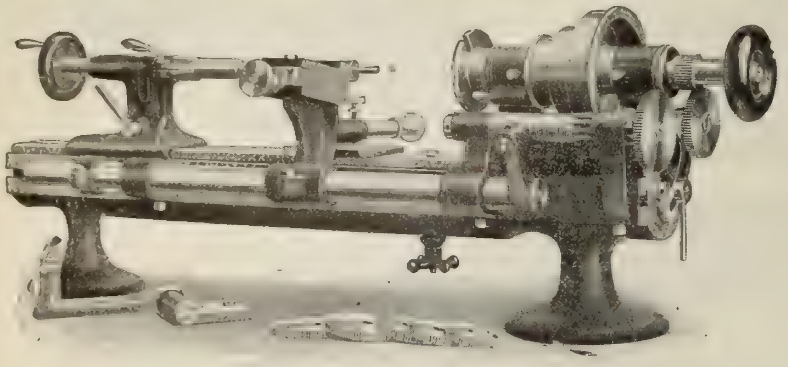
The New Britain Machine Co.

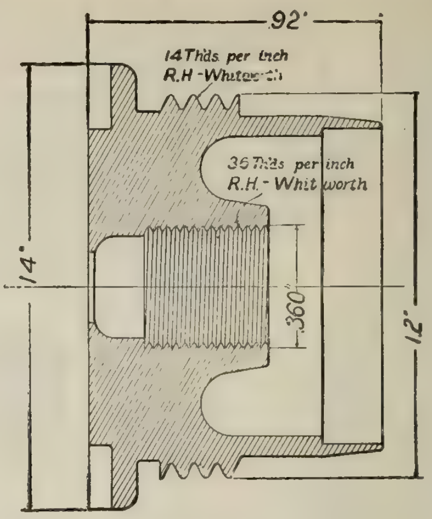
—Automatic Screw and Chucking Machines—

New Britain, Conn., U.S.A.



THE CATARACT BENCH LATHE WITH CHASING ATTACHMENTS





We have sold many of our lathes to Canadian concerns who are eminently satisfied with results. Will you be next?

For work requiring greatest accuracy and rapidity, THE HARDINGE CATARACT BENCH LATHE will not disappoint you. Machine equipped with Automatic Chuck Closer for rapid operation of chuck, and with chasing bar arranged with multiple point, chasing tool is producing from ten to twelve hundred 14-pitch Whitworth threads on primers in TEN HOURS. Prompt deliveries. Catalogue No. 15 is ready to mail TO YOU. You are invited to write for it to-day.

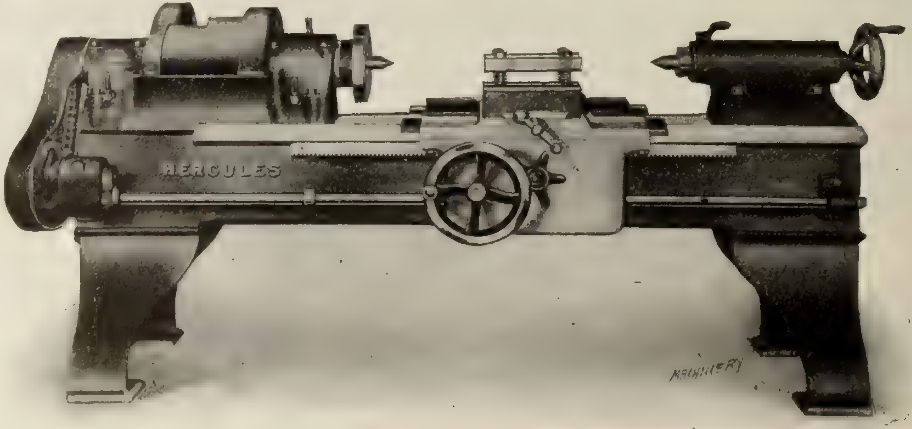
HARDINGE BROTHERS, Inc., 1770 Bertau Ave., CHICAGO, U.S.A.

How Lathe Simplicity Solves Labor Problems

The great simplicity, the compact, convenient design, make the Hercules Lathe an ideal single-purpose machine. To train an unskilled laborer to perform accurately one or two operations on this machine requires but a short time. The rugged, powerful construction then enables that laborer to turn out precise work continuously at the maximum speed.

Where skilled mechanics are not always available — the Hercules Single-Purpose Lathe is the logical machine tool.

At the present time, we can still make early deliveries. Write — at once—for full details.



HIMOFF MACHINE COMPANY, INC.

128 MOTT STREET, NEW YORK CITY

The Ford-Smith Machine Company

Ford-Smith

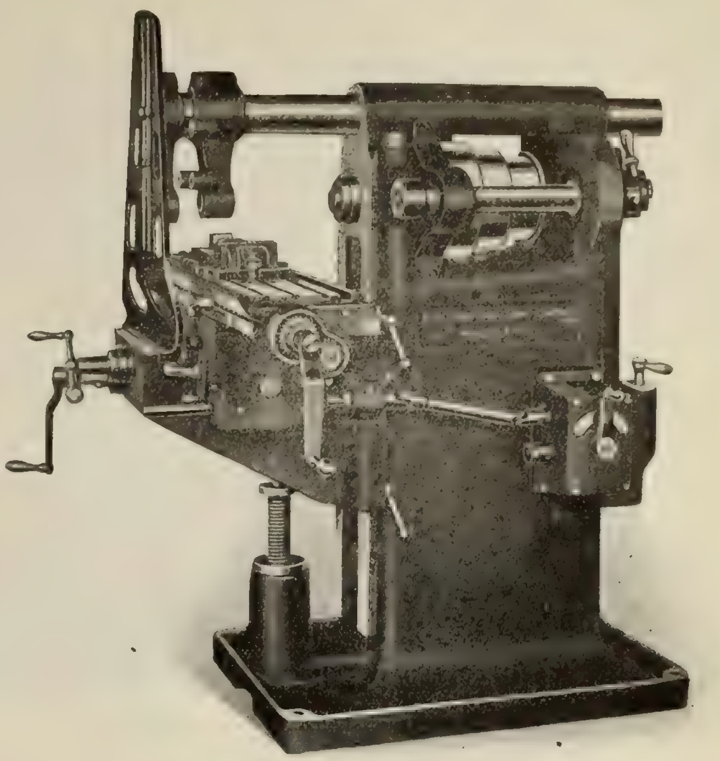
27" x 19" x 7½"

Milling Machines

We can make interesting deliveries on these machines, either through our regular dealers or direct from our plant.

Our Catalog illustrates various features exclusive with Ford-Smith Millers and will be gladly forwarded on request.

The Ford-Smith Machine Company
LIMITED
Hamilton Canada



KEMPSMITH

UNIVERSAL MILLING MACHINES

Every Kempsmith Milling Machine of whatever size, is provided with a slotted spindle nose for positive drive of arbor and for positive drive of face milling cutter in either direction.

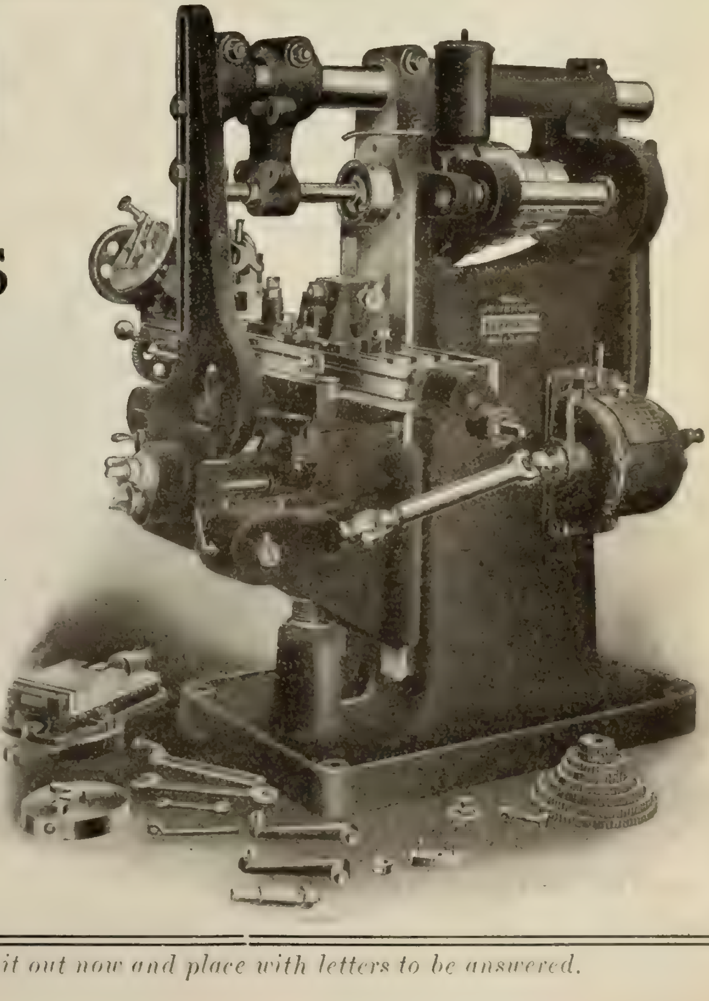
Every machine is equipped with our patented keyed overhanging arm which insures positive alignment of arbor and boring bar and also prevents the cutter being pounded out of line under cut.

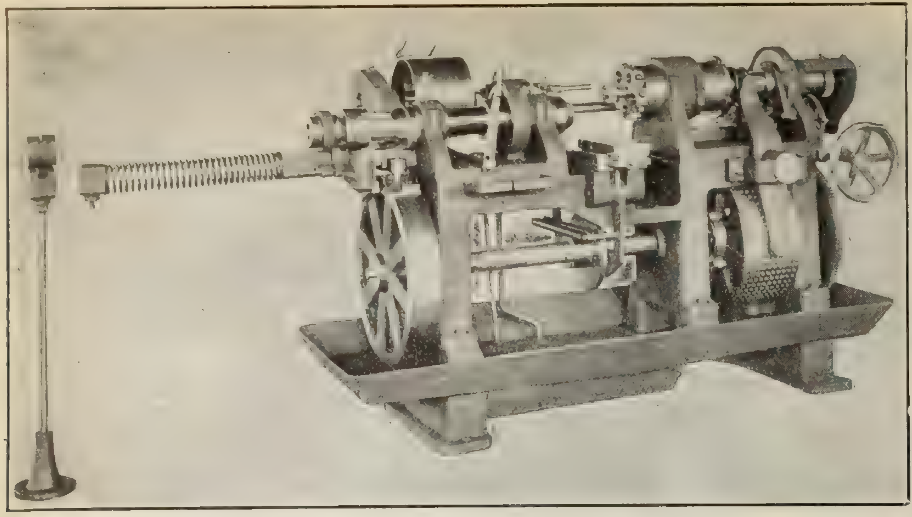
Kempsmith machines are heavy, with weight well distributed and their accuracy is guaranteed within very close limits.

Send for illustrated catalogue.

Kempsmith Manufacturing Co.
MILWAUKEE, U. S. A.

Agents:—Foss & Hill Machinery Co., Montreal
General Supply Company, Toronto and Ottawa
Western Supply and Equipment Co., Calgary



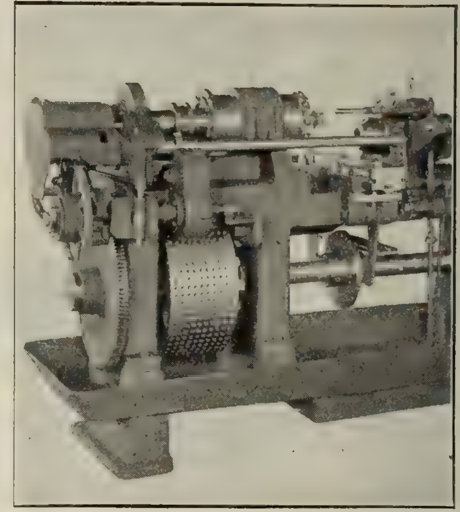


Quick Delivery

In less than six weeks from the time your order reaches us we can place

Chicago Automatic Screw Machines

in your plant ready for operation.



A New Departure in Turret Indexing

By an indexing device selective in type one or more idle holes—holes not carrying tools can be skipped in indexing without pause or loss of time—a feature that makes for increased production.

Chicago Automatics stand up under the strain of day and night service and economically turn out any screw machine product in minimum time.

They are the result of 10 years extensive screw machine manufacture.

Drop a card now for details and specifications.

The John Macnab Machinery Co.
90 West Street - New York

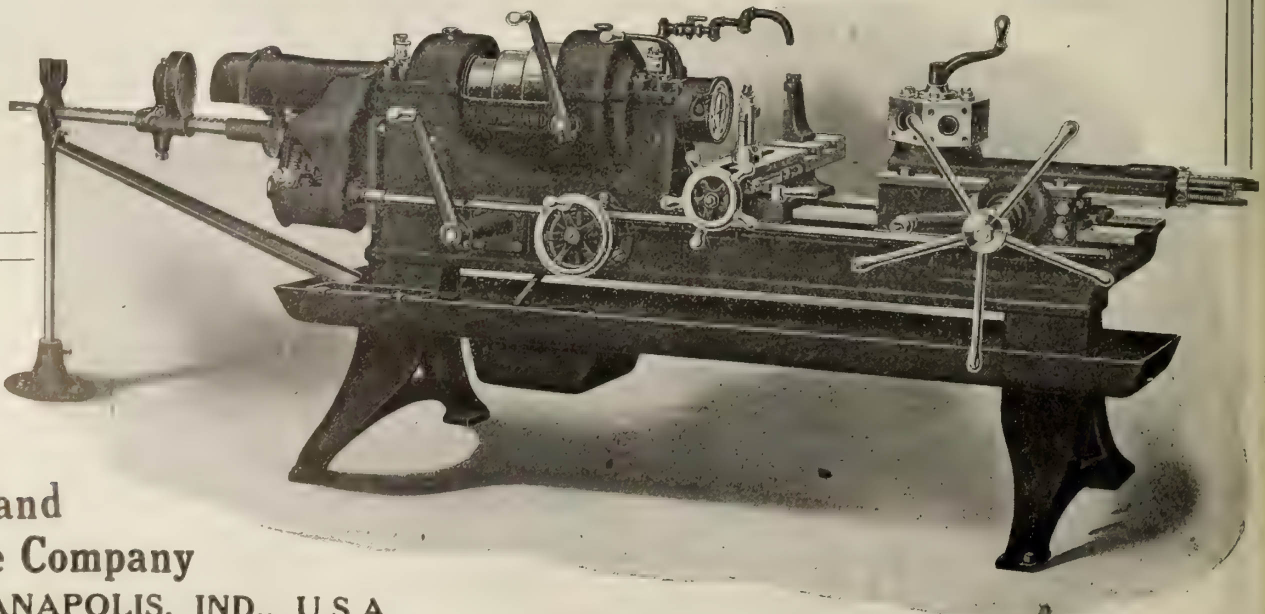
European Representative—JOHN MACNAB, Hyde, England

Millholland 1⅝ x 10 Turret Screw Machine

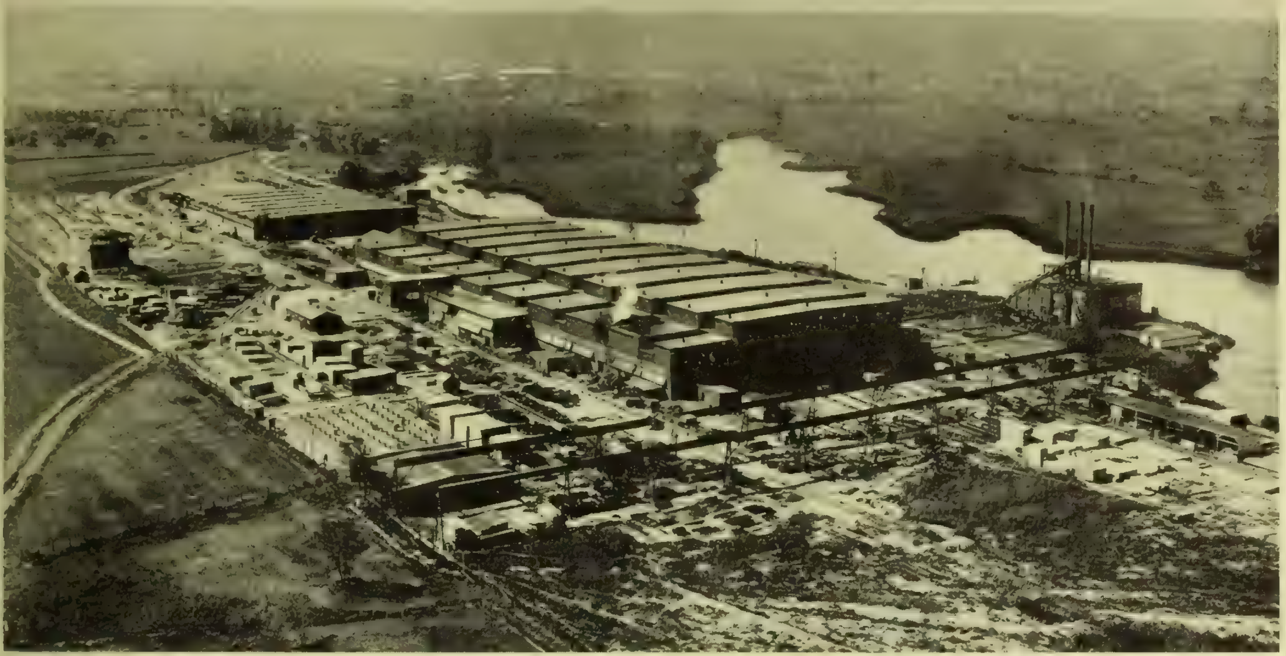
The combined result of two generations of engineering and mechanical experience. While, as a whole, it is no radical departure from established lines of the turret lathe, it has many original features, and with these features are combined well-known devices.

Safety, rigidity, convenience, production and durability are the ideas behind every step in their construction.

Your request will get you full details and specifications by early mail. Make it.



**W. K.
Millholland
Machine Company**
INDIANAPOLIS, IND., U.S.A.



THIS plant was built especially to manufacture under the most favorable conditions, all classes of transportation equipment. The Engineering Staff, the Mechanics, the Machine and Tool equipment are the best that can be secured.

We build passenger and freight cars of all types required by the leading railroad companies. We also supply Contractors' Dump Cars and Logging Car equipment.

We are prepared to submit designs and tenders on Steam and Railroad Passenger Cars, Sleeping Cars, Baggage and Express Cars, Suburban and Interurban Electric Cars, Freight Cars of all types and special transportation equipment.

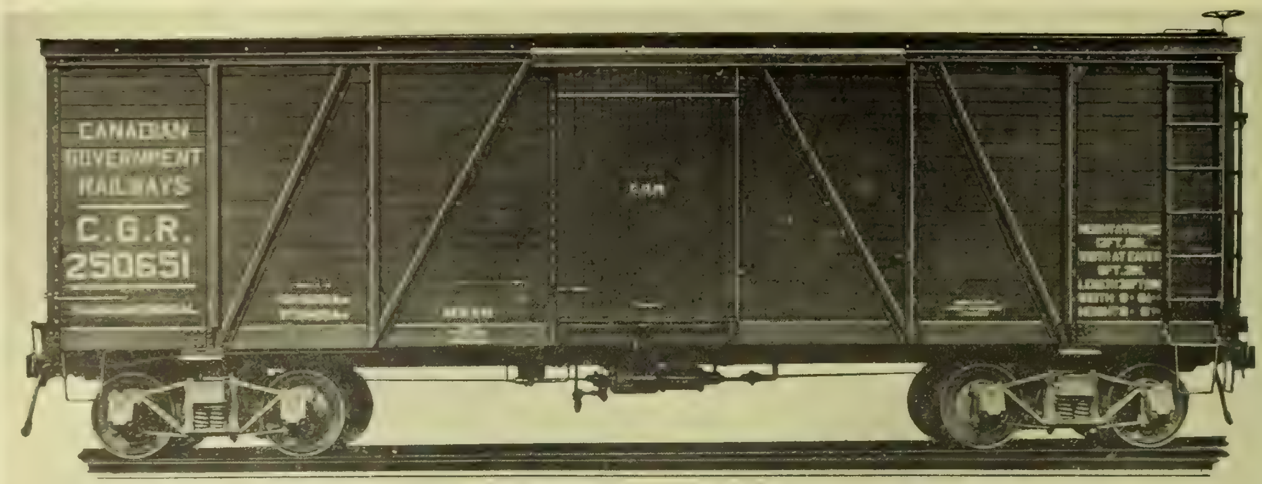
We invite enquiries.

NATIONAL STEEL CAR COMPANY Limited

Montreal Office
SHAUGHNESSY BLDG.

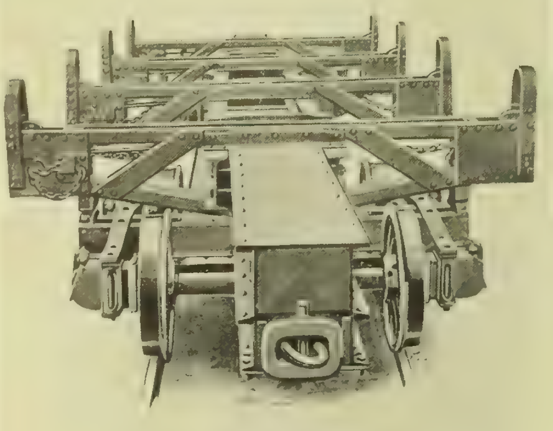
Works and Operating Offices
HAMILTON, CANADA

NATIONAL STEEL CAR COMPANY LIMITED HAMILTON, CANADA.

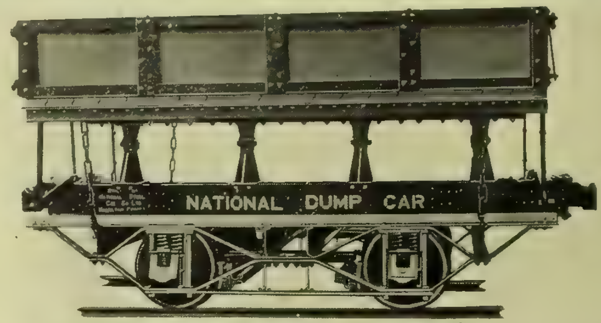

CANADIAN GOVERNMENT RAILWAYS
C.G.R.
250651

STANDARD FREIGHT CAR

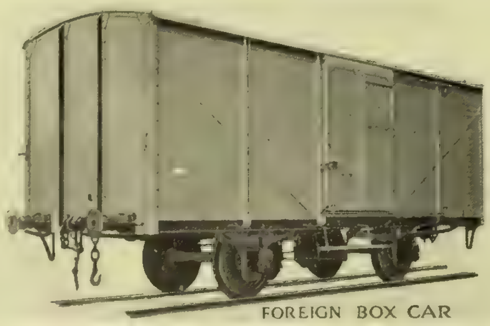
FLAT CAR



LOGGING CAR


NATIONAL DUMP CAR

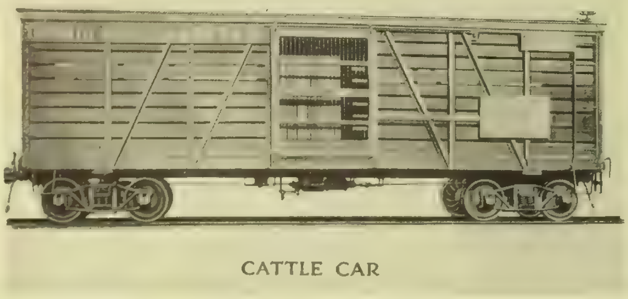
CONTRACTORS DUMP CAR



FOREIGN BOX CAR

PACIFIC GREAT EASTERN RAILWAY

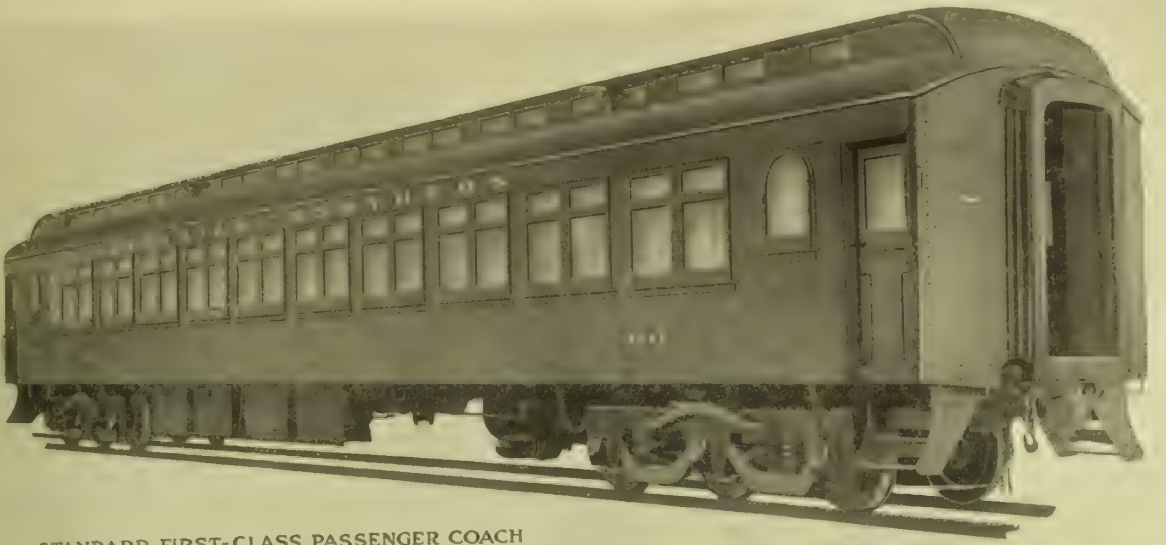
CABOOSE



CATTLE CAR

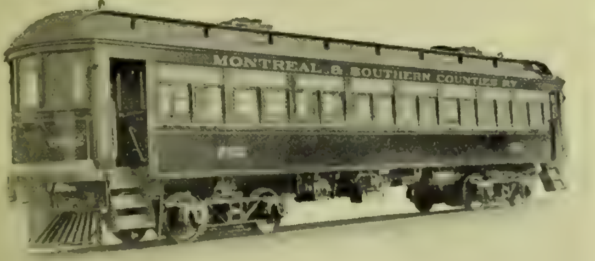
TYPE OF COAL CAR

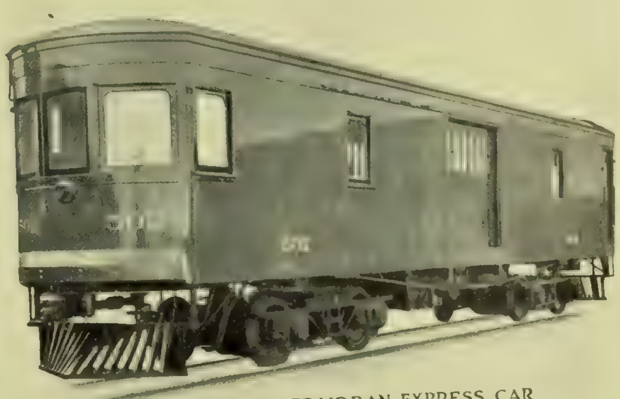
NATIONAL STEEL CAR COMPANY LIMITED HAMILTON, CANADA.



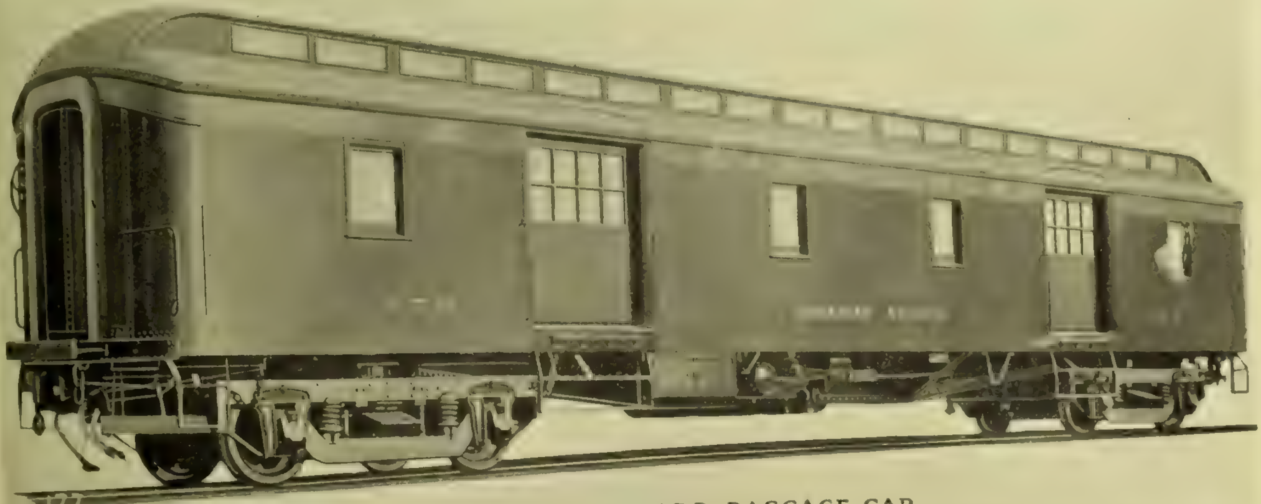
STANDARD FIRST-CLASS PASSENGER COACH

ELECTRIC INTERURBAN PASSENGER CAR



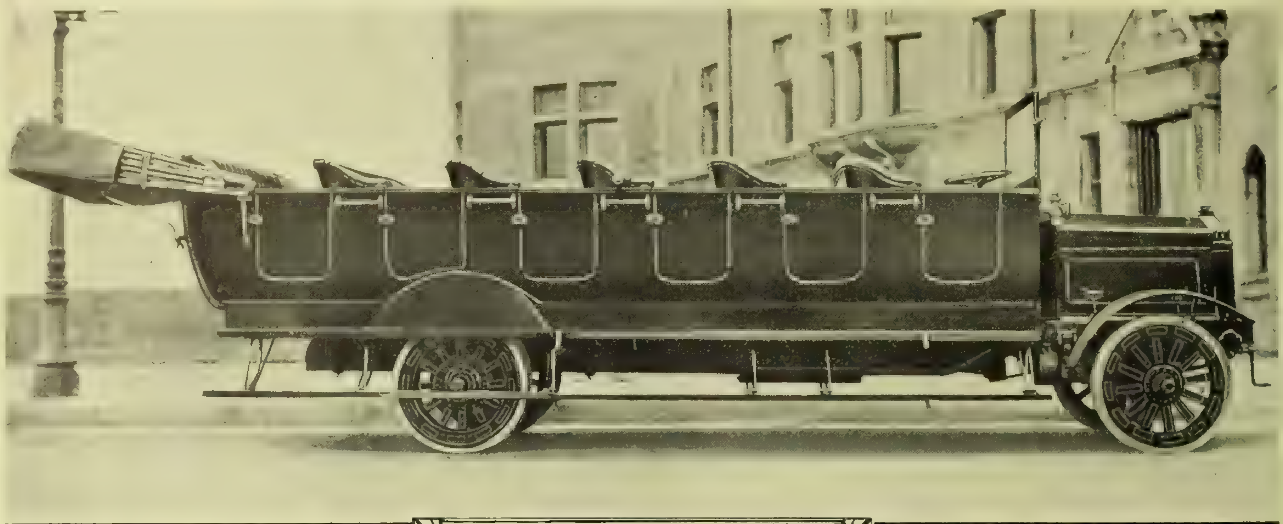


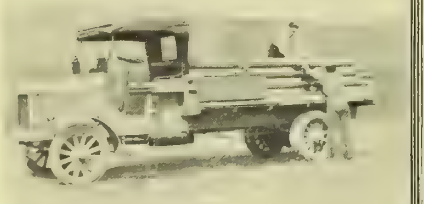
ELECTRIC INTERURBAN EXPRESS CAR



STANDARD BAGGAGE CAR

NATIONAL STEEL CAR COMPANY LIMITED HAMILTON, CANADA.





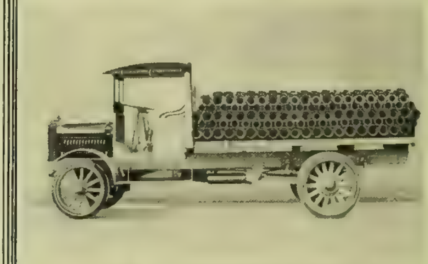
NATIONAL MOTOR TRUCKS

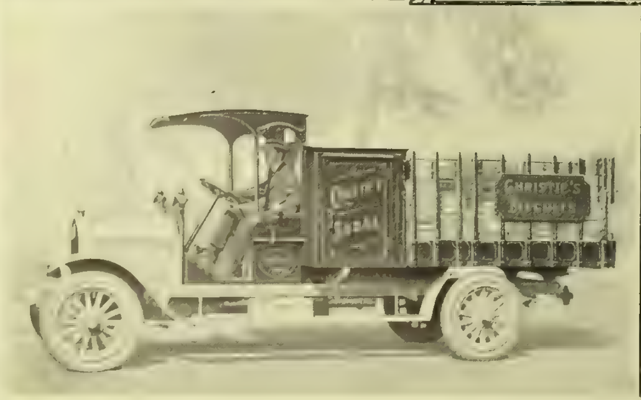
There are five models in the National line — 1500 2000, 3000, 4000 and 7000 pounds capacities. The illustrations on this page show National Trucks of different capacities in actual use.

National Trucks are powerful, economical in fuel consumption and upkeep, and have chassis strength amply sufficient to carry capacity loads over all conditions of roads.

A special Truck catalogue has been prepared for truck buyers. Copies are mailed, free of charge, upon request.

NATIONAL STEEL CAR COMPANY, LIMITED
HAMILTON - CANADA

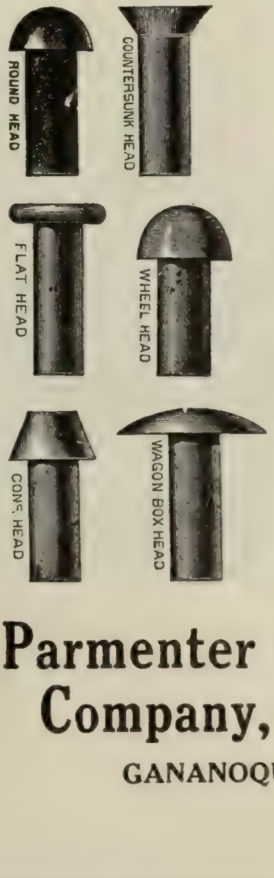




Rivets

ALL DESCRIPTIONS

½ inch dia. and smaller


ROUND HEAD
COUNTERSUNK HEAD
FLAT HEAD
WHEEL HEAD
CONE HEAD
WAGON BOX HEAD

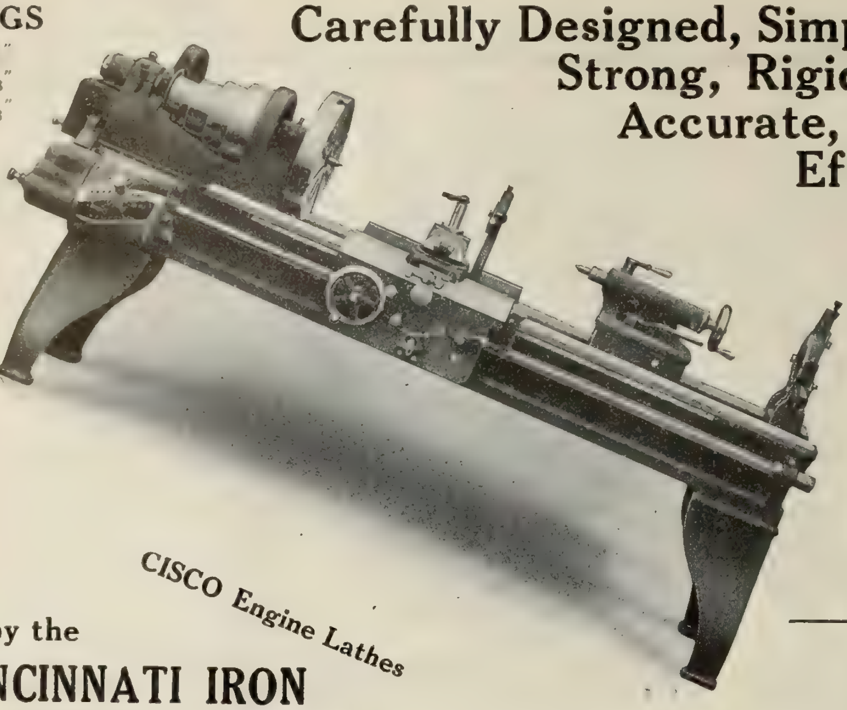
COPPER BELT RIVETS AND BURRS, COPPERED BELT RIVETS AND BURRS, BIFURCATED OR SLOTTED RIVETS, TUBULAR RIVETS.

The top-notch quality of our product — the reasonable price and our prompt service all go to make a value extraordinary.

Parmenter & Bulloch
Company, Limited
GANANOQUE, ONT.

THE LATHE WITH THE PULL

SWINGS
14", 16⅝"
16", 18⅝"
18", 20⅞"



Carefully Designed, Simple in Operation
Strong, Rigid, Heavy
Accurate, Well Made
Efficient
Economical

Best Lathe Made For the Money

Saves Money In Repairs

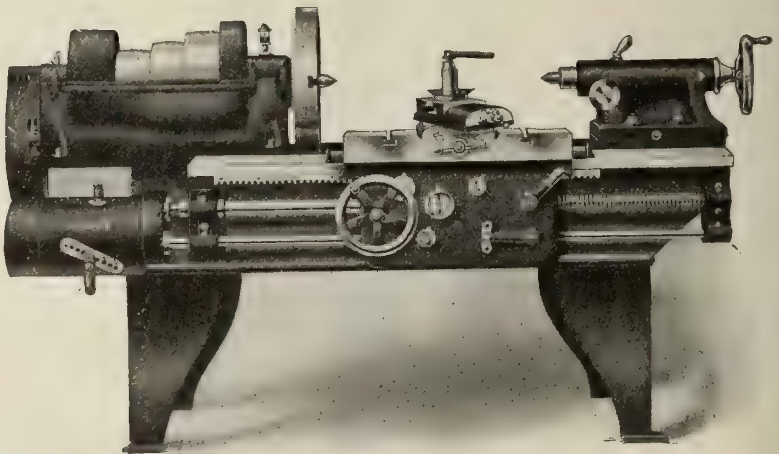
CISCO Engine Lathes

Made by the
CINCINNATI IRON AND STEEL COMPANY
CINCINNATI, U.S.A.

Sold in Canada
by
WILLIAMS

SIDNEY ENGINE LATHE

A "Heavy Turning" Tool of Wonderful Accuracy



17-inch and 19-inch plain change engine lathe, all double back geared. Built 8, 10 and 12-foot lengths of bed.

Some of the important features

20 per cent. steel mixture in bed casting. Heavy carriage vee 2½ inches wide.

High carbon rack pinned and bolted to bed.

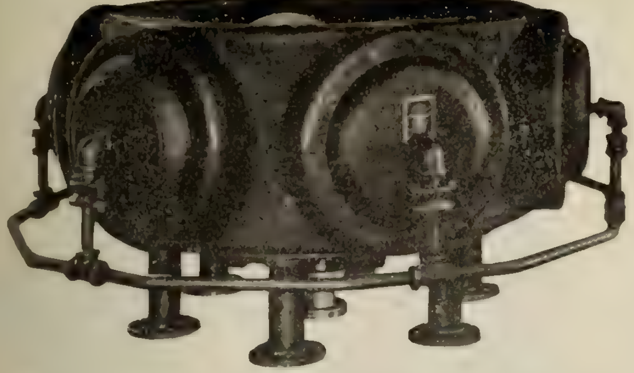
50-point carbon steel head stock spindle offset 1 inch off centres for heavy duty work.

40-point carbon lead screw 17-16 inch diameter, 2 pitch thread.

Let us tell you of the many other interesting details. Write for full particulars.

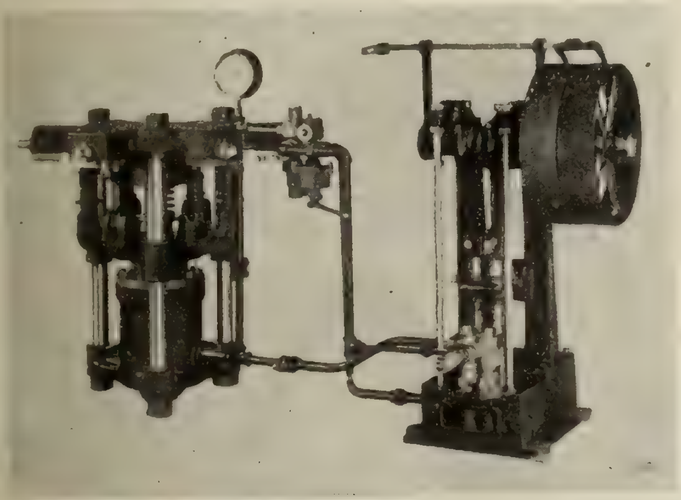
THE SIDNEY TOOL COMPANY, Sidney, Ohio, U.S.A.

Canadian Agents: ONTARIO: The A. R. Williams Machinery Co., Toronto; QUEBEC: The Foss & Hill Machinery Co.,



Capacity, 6 to 12-in. Shells

Capacity, 6 to 12″ shells—950 ton at 3,500 maximum pressure.
Rams—6—Semi-steel, 11″ diameter. Have bearings 9″ long. “U” packed. Chrome leather packing. Move of each ram ½″ or more if necessary.
All rams returned by means of levers on plate with heavy Vanadium steel spring, adjustable for tension.
Cylinder—Removable, of alloy steel. Hydraulic inlet to cylinder, 1¼″ pipe.
Distributing ring, 2″.
All pipe, seamles steel tubing; all fittings, drop forged steel.
All parts of press under stress or strain, alloy steel castings or forgings.
Dies, 6, of forged chrome nickel steel hardened, and removable without disturbing any part of press by loosening 2 nuts.
Weight: 9,500 lbs.
Can be operated either from accumulator or pump.



“Metalwood” Horizontal Banding Press for Shells from 3 to 6 in.

Press is combination Hydraulic and toggle with means of adjustment both for amount of pressure applied and stroke. Has six concentric dies coming to a common centre forming a complete circle when closed to required diameter of band.
All working parts are fully enclosed, at the same time easily accessible for changing of dies. Toggles are arranged with adjustment so that pressure delivered on dies can be varied to suit the pressure or pressures applied on hydraulic cylinder. 2,500 lb. approximate pressure required, developing 120 tons on 9″ ram.
Press driven with “METALWOOD” VERTICAL DUPLEX PUMP, or accumulator driven, giving capacity of 20 strokes per minute. Press throughout is made of steel. Pump has all bearings Phosphor Bronze lined.
Press and Pump Controlled by “METALWOOD” Patent Single Lever Valve which controls pressure applied and return of ram.
Weight of press is 2,450 lbs. Weight of pump is 1,200 lbs.

Metalwood Banding Presses

A BOON TO SHELL MAKING

While the price of the press in the above illustration is somewhat higher than other banding presses on the market, customers who have used both unhesitatingly prefer our machine, even to the point of discarding other types, for the reason that it is so sturdily constructed in every respect, that it withstands the most severe service and constant use, therefore the price becomes a secondary consideration.

The “Metalwood” Horizontal Banding Press (see bottom illustration) is a **very rapid worker**; in fact the operation of this press is so rapid that it is impossible for human operators to handle the work to and from as quickly as it completes its operations. It is impossible to utilize its full capacity.

We have a number of these presses that have been in hard service for many months past, and up to the present we have not as yet been called upon to supply a single repair part, even packings.

Drop a line for full particulars.

Metalwood Manufacturing Co.

Hydraulic Machinery and Equipment

LIEB AND WIGHT STREETS,
DETROIT, MICH., U.S.A.

Fastest and most Sensitive Tappers built

They produce work at higher speeds and lower cost.

R & S Tapping Machine

will give you more profit in the manufacture of fuse parts.

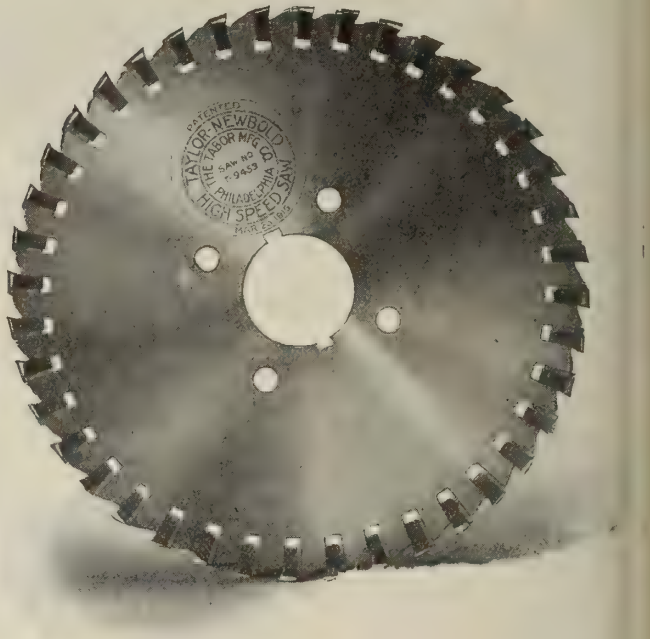
Look well into the merits of these machine tools if considering any tapping operation. You'll be money in pocket.

Write for catalog.

Rickert-Shafer Company
Erie, Penna. U.S.A.

Agents for Great Britain—ALFRED H. HERBERT, Limited, Coventry, England.

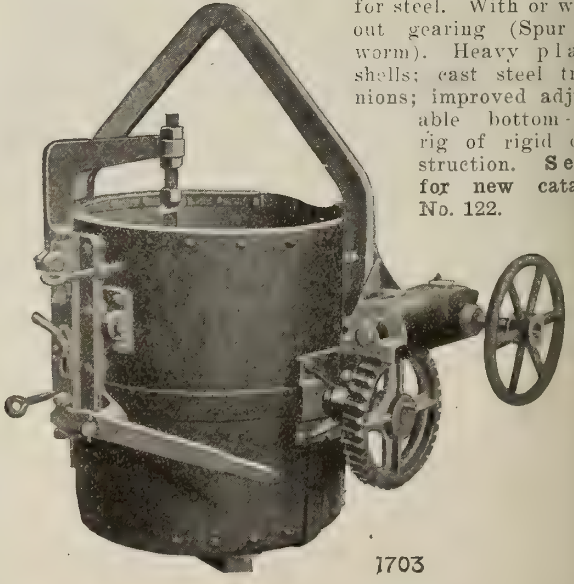
THE IMPROVED
TAYLOR-NEWBOLD



INSERTED TOOTH COLD SAW
Write for Bulletin T-S
Tabor Mfg. Co., Philadelphia, U.S.A.

Bottom Tap Ladles

for steel. With or without gearing (Spur or worm). Heavy plate shells; cast steel trunnions; improved adjustable bottom-tap rig of rigid construction. Send for new catalog No. 122.



1703

Complete Foundry Equipments

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB.

Cranes of All Types

One Paragraph From A Machinery Dealer's Letter:-

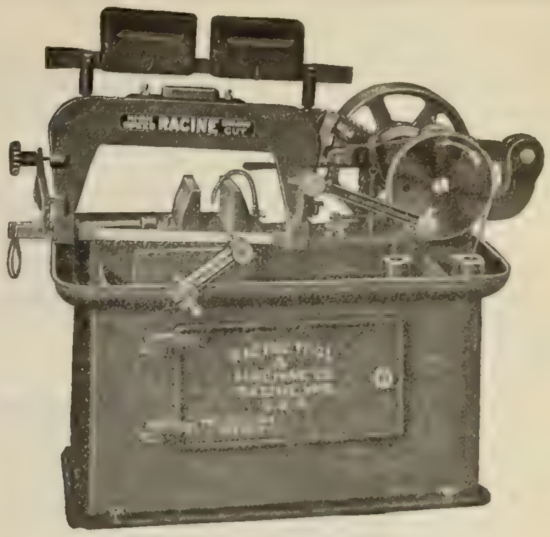
PEERLESS
PEERLESS MACHINE CO. RACINE, WIS.

"One of our customers has recently purchased from us two of your 6" PEERLESS High Speed Power Hack Saws, and they now wish to install several more, providing we can take some of their old hack saws in exchange. They claim these old machines are as good as new, but they consider the PEERLESS so far superior to the others that they would like to fully equip their factory with PEERLESS Machines."

The principle of construction in the PEERLESS High Speed Heavy Duty Cutting-off Machine admits of a cutting speed which cannot be approached by the ordinary type of machine. The output of this machine is controlled by the efficiency of the blade. At the maximum speed which this machine is guaranteed to operate it cuts off a 3 in. round cold rolled bar in 1½ minutes.

Bearings are extra large. The ones that are subject to excessive wear are made of steel, hardened and ground, which eliminates the continuous adjusting and repairing that ordinarily is the case when a machine is worked to its utmost.

PEERLESS MACHINE COMPANY
1607 Racine Street RACINE, WISCONSIN



WHY IS IT

That so many Canadian shops are now equipped and being equipped with

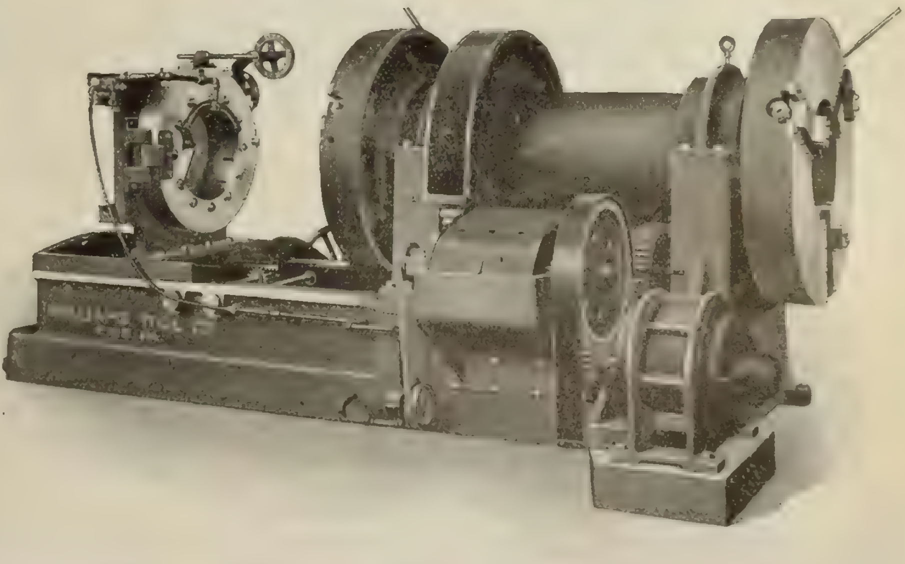
The Newly Improved Racine High Speed, Metal-Cutting Machine?

FOR MANY GOOD REASONS—among others—because for speed, accuracy, economy and ease of operation THE RACINE cannot be surpassed. You MAY NEED ONE NOW. We will send a RACINE on any trial basis that is fair. WRITE US or any good Canadian dealer.

Racine Tool & Machine Company
15 Melbourne Ave., Racine, Wisconsin, U.S.A.

WILLIAMS PIPE MACHINES

Received Highest Award at Panama Exposition



The Following Letter Explains Why:

Williams Tool Co., Erie, Pa.: Rochester, N.Y., 12-3-14.

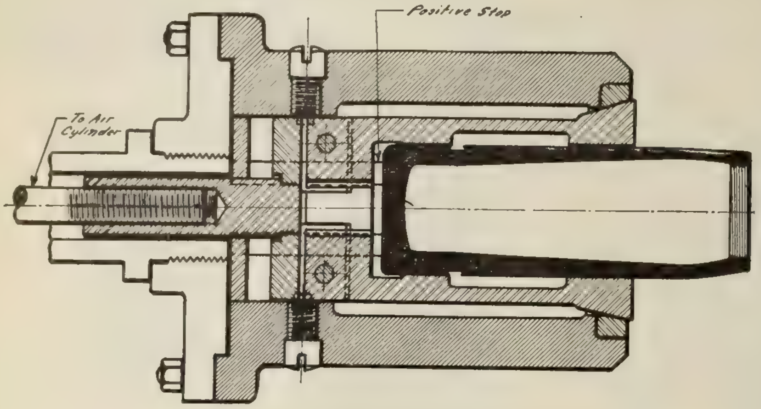
Gentlemen:—We are so pleased with our No. 3 Pipe Machine, and it is doing such splendid work for us at a minimum of expense that we are now considering the advisability of displacing two smaller machines for one of your No. 1½ or No. 2 motor drive.

The machines which we would displace, if we make a change, are belt drive, are (names of two of the oldest and best known machines on the market) equipped with nipple holders, extra dies, etc. Both of these machines are still in fairly good condition. On what basis could we make an exchange with you?

Yours very truly, SAMUEL SLOAN & CO.

WILLIAMS TOOL CO. - - - ERIE, PA.

You Can Produce More Shells Per Day



M. E. C. Air Operated Hinge Collet Chuck adapted for rough and finish boring operations.

If you are interested in Machining Fuse Plugs, Shells, Etc. the best Chuck and Taps are M. E. C.

These devices will increase your production from 25 to 40 per cent. over any other method now employed.

ONCE KNOWN—ALWAYS USED

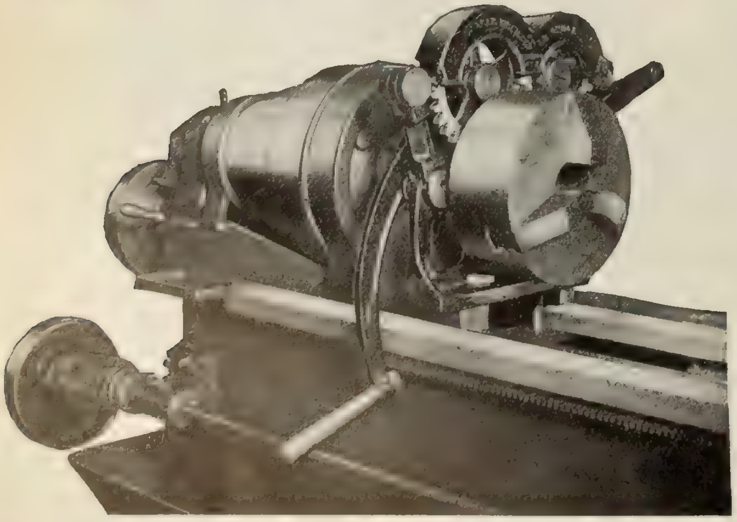
It will pay you to investigate at once.

Manufacturers Equipment Company

175-179 North Jefferson St., CHICAGO, ILL.

FOREIGN AGENTS: C. W. Burton Griffiths & Co., Ludgate Circus, Ludgate Hill, London, England.
Louis Besse, Bureaux & Caisse, 39 Rue de Lappe, Paris, France; Geo. A. Todd, 826 Traders Bank Bldg., Toronto, Canada

Speed Up! Production
With a Barker Wrenchless Chuck



You don't consider money spent, on something which will bring returns—it is invested.

A chuck which will cut the time of setting-up in half and at the same time not be prohibitive in initial cost or maintenance is a most worth-while investment in your plant —is it not?

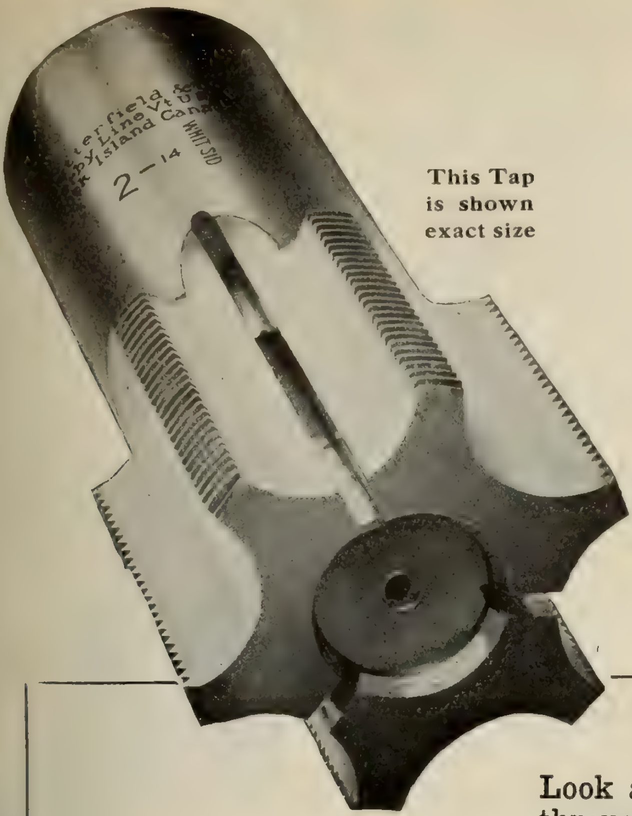
Barker Wrenchless Chucks are proving their worth as a investment in many plants where multiple chucking ha been a profitless bugaboo—perhaps your neighbor is Barker fan—let us send you a list of users in your territory.

An inquiry to-day will bring the Barker proposition to yo by return mail. You can't go wrong and you do not obligate yourself in any way whatsoever.

The entire opening and closing operation is accomplished with a short action of the hand lever— think what this means in saving of time.

THOMAS ELEVATOR COMPANY

22 South Hoyne Avenue - - CHICAGO, ILLINOIS, U.S.A



This Tap
is shown
exact size

For—

FASTER FEEDS
FASTER SPEEDS
LONGER SERVICE

Look at that solid strength through the shank of this tap — it means power that will stand up under the heavy strain of exceptional production.

BUTTERFIELD
TOOLS

are the highest development of over 35 years' experience.

Try them and you'll have a new idea of tap service, economy and efficiency.

Our new catalog illustrates and describes all the Butterfield Products. May we send you a copy?

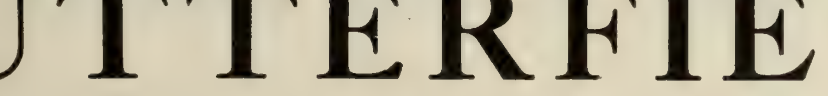
Butterfield & Company, Inc.

ROCK ISLAND, QUEBEC

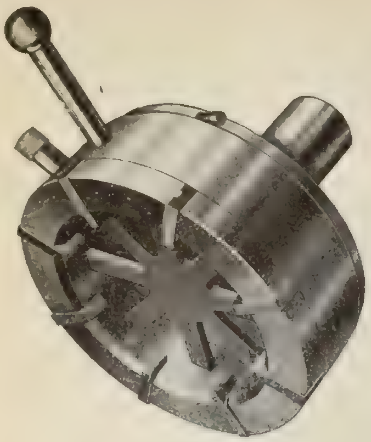
Toronto Office: 826 Traders Bank Bldg. - H. A. Harrison, *Manager*

PHONE MAIN 1382

Taps, Dies



Reamers, Etc.



Your Shop Welfare Work

Does It Include Your Tool Equipment

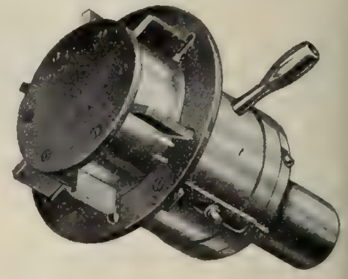
Was it one of your men who wrote us the following:—

> "I am using Geometric Taps and Dies almost continuously, and always get excellent results. Am always glad to find 'Geometric Collapsing Tap' or 'Geometric Automatic Die' called for on my operation card."

The Mechanic and the Shop Foreman endorse Geometric Thread-Cutting Tools. These tools can be arranged with shank to fit any make of Screw Machine. Tell us the class of thread-cutting that interests you, and we will send booklet describing tools to suit.

The Geometric Tool Company
NEW HAVEN, CONN., U.S.A.

Canadian Agents: Williams & Wilson, Ltd., Montreal. The A. R. Williams Mchy. Co., Ltd., Toronto, Winnipeg, St. John, N. B.



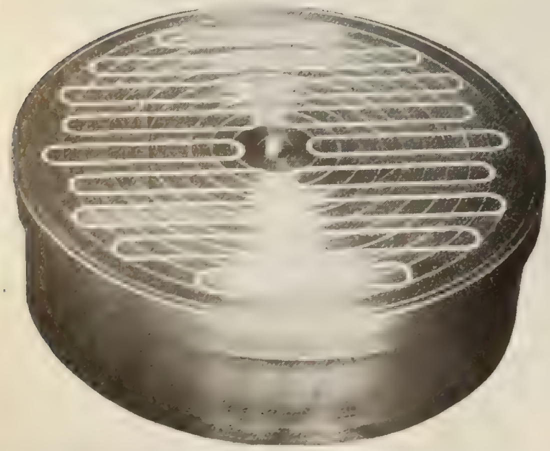
No Dead Space on This Magnetic Chuck

In examining the faces of the other types of magnetic chuck you are struck at the large amount of dead space resulting from the arrangement of the poles. But with the

HEALD MAGNETIC CHUCK

you see there is practically no *dead space,* due to the ingenious arrangement of poles. A further advantage is that either small or large work can be handled without change of face plate. The pull is *uniform* over the entire chuck, and the holding power is so great that very heavy cuts can readily be taken.

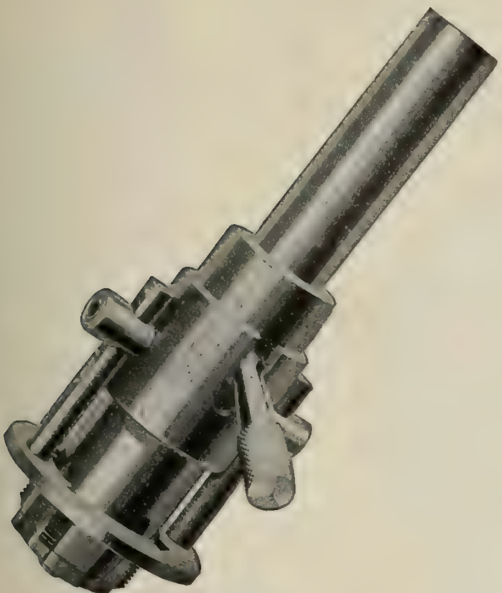
There are a dozen other advantages in this chuck we shall be glad to explain upon request. Write for full information.

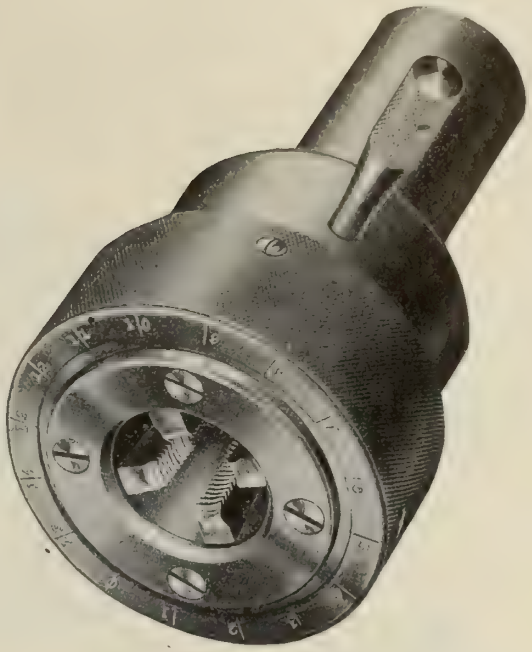


The HEALD Machine Compan
8 New Bond Street, Worcester, Mass.

Branches: Chicago, 24 So. Jefferson St. Cleveland, 710 Engineers Bldg. Cincinnati, 602 Provident Bank Detroit, 303 Majestic Bldg.

RUSSIAN SHELLS





MURCHEY TAPS AND DIES WIDELY USED

Makers are finding that Murchey Collapsing Taps and Automatic Self-Opening Dies are paying propositions on this kind of work. We can tap any size hole from 1 inch to 12 inches. All chasers used on shell work absolutely guaranteed to be made of the highest grade of high-speed steel. Get the benefit of our experience and the experience of some of the biggest shell manufacturers in the country. Let us tell you about the savings. Send blueprints. Write to-day for catalog.

Murchey Machine & Tool Company

DETROIT 75 PORTER STREET MICHIGAN

The Coats Machine Tool Company, Caxton House, Westminster, London, S.W., England, Glasgow, Newcastle-on-Tyne, and Fenwick, Freres & Company, 15 Rue Fenelon, Paris, France.

HEAVY DUTY

Ammunition Lathes

FOR

Immediate Delivery

FULL INFORMATION ON REQUEST TO

HYDE ENGINEERING WORKS

27 WILLIAM STREET - - - MONTREAL, P.Q.

RUMANIA NEEDS SHELLS

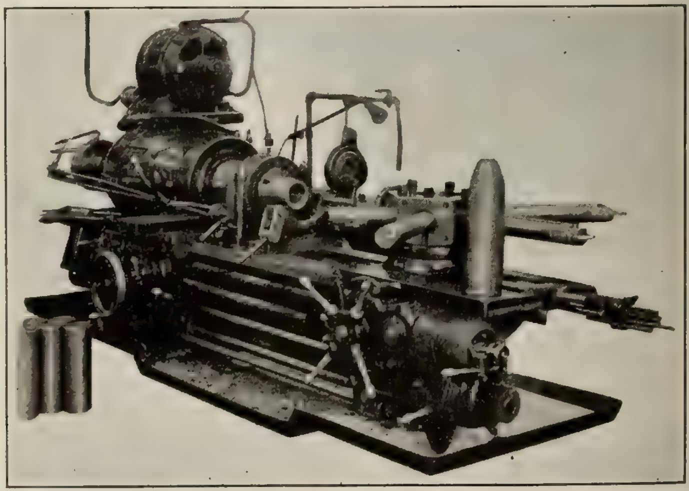
Increase your production 25% by installing our Air-operating Mandrels and special Projectile Collet Chucks.

THIS machine is turning out better than 30% more work since our air operating devices have been installed. These equipments are operating successfully in many of the large munition plants in both Canada and the United States.

WE have a thoroughly equipped plant devoted exclusively to the manufacture of Air Equipments.

Our experience extends over a period of eight years.

Mail blue-prints for estimates.



Machine above is performing second boring operation on shells.

J. R. Stone Tool & Supply Co.
DETROIT, MICH.

A Family Of

Steel Lettering Dies & Stamps

As Made By Matthews of Pittsburgh

MATTHEWS STEEL HAND STAMPS. Regular or standard forging, cut and tempered to suit the product to be marked.

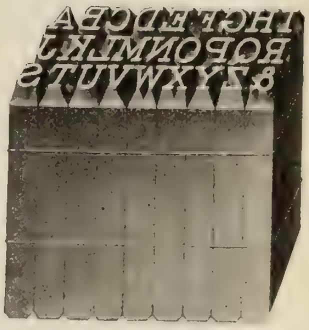
MATTHEWS OF PITTSBURGH

MATTHEWS STEEL ROLLER STAMPS. Designed to order for special marking requirements.

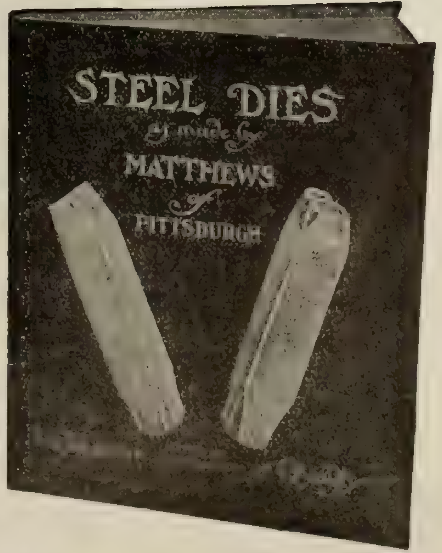
MATTHEWS EMBOSSING DIES. Be it large or small design or lettering, we can fill your wants in good embossing dies.

MATTHEWS "CHAMPION" STEEL TYPE and HOLDER. For rapid interchangeable marking by hand or machine.

MATTHEWS HAND-MADE STEEL FIGURES. Each stamp carefully cut from best tool steel.



MATTHEWS HAND-MADE STEEL LETTERS. Strictly hand cut from best tool steel. Furnished individually or in complete sets. Nothing better made in this class of steel stamp.



Astonishing Deliveries on Quantity Orders

On this page is illustrated a few of the many different kinds of steel lettering dies and stamps we manufacture. We operate the largest and most modernly equipped shop in the United States for making all classes of steel lettering dies and stamps—invite an investigation of our service.

For the purpose of numbering or dating tools or metal products or making parts in process we can furnish you the proper kind of steel dies and stamps.

We can make you a steel lettering die or stamp that will mark your name, address, trade-mark or any identification mark you desire to show on your product —a die or stamp that will mark clear, distinct, easily read impressions, making the substitution of your product impossible. Write to-day to our steel die department for a copy of our interesting steel die book. It illustrates the different kind of steel lettering dies and stamps we are shipping to all parts of the world.

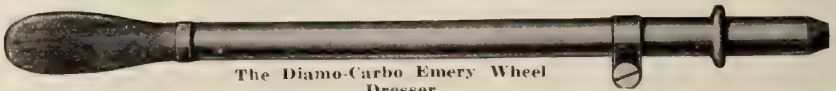
JAS. H. MATTHEWS & CO., Inc., Established 1850 PITTSBURGH, PA., U.S.A.

Distributors for Canada: The Canadian Fairbanks-Morse Co., Ltd.
Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Saskatoon, Victoria.

GRINDING WHEEL DRESSERS

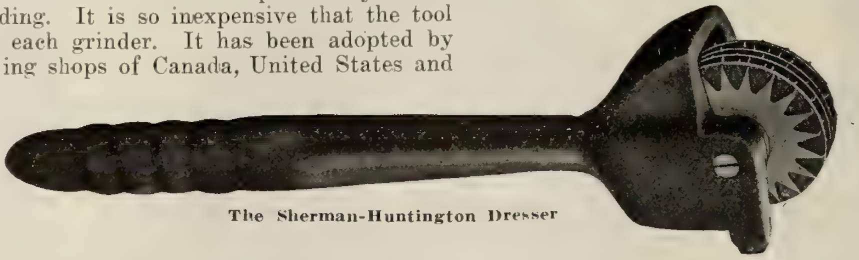
No one type of Grinding Wheel Dresser is adapted for all kinds of wheels, any more than one size or grade of wheel is adapted for all classes of work. We manufacture Dressers for every class of wheel, and, being specialists, are frequently in position to make valuable suggestions to customers as to the best type of Dresser for their particular needs.

Any of our Dressers will be cheerfully sent, subject to approval and can be returned should they not be found satisfactory.



The Diamo-Carbo Emery Wheel Dresser

Owing to the high price of Diamond Dressers, the Diamo-Carbo is rapidly coming into favor as an economical substitute for the Diamond. It will do practically the same work as will the Diamond, excepting in some instances of precision grinding. It is so inexpensive that the tool can be left with each grinder. It has been adopted by many of the leading shops of Canada, United States and Great Britain.



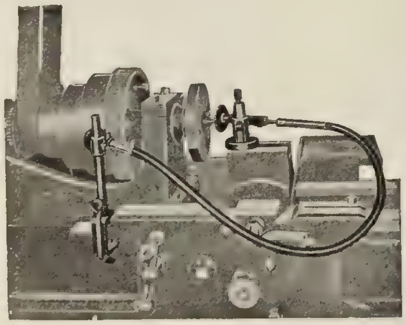
The Sherman-Huntington Dresser

For rough work the Huntington Dresser mounted on the bearings covered by our Sherman patent give the best results. They are made in two sizes: No. 1 with Cutters 1¼" diameter and No. 2 with cutters 2⅜" diameter. We also make the ordinary Huntington Cutters. All of our Dressers of this type are equipped with our protection hood which continually protects the face of the user from flying particles and is a very valuable feature at no added cost.

Write for booklet and trial offer.

THE CANADIAN DESMOND-STEPHAN MFG. CO., Limited, Hamilton, Ont., Can.

Alfred Herbert, Limited, Agents for Great Britain



CENTER GRINDER

(Improved)

CHEAP! PRACTICAL! DURABLE!

The most popular tool of its kind on the market. Adjusted in a moment.

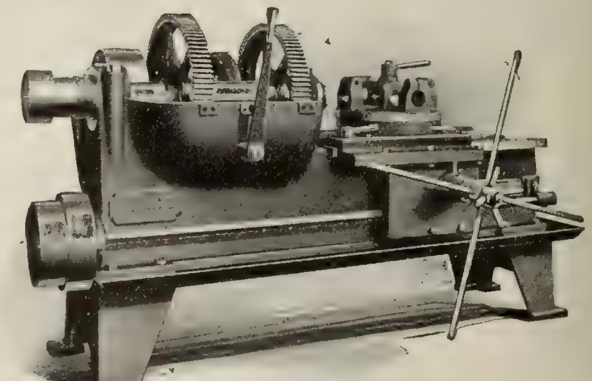
An occasional use will keep your Lathe centers in perfect order.

Stow Mfg. Co.

Binghamton, N.Y., U.S.A.

London, Eng., Stock, 85 Queen Victoria Street.
Oldest Portable Tool Manufacturers in America.

Unskilled Labor Can Produce High-Grade Work with the



CLEVELAND CHUCKING LATHE

This machine was designed for handling the various drilling, turning, boring and forming operations on 3" to 6" shrapnel and high-explosive shells. It is rugged, powerful, easy to handle, and will produce the same uniform, accurate results with unskilled labor as other machines with experienced mechanics. That's a big point to consider now that skilled men are hard to get. Let us show you the possibilities of these machines. We can make prompt deliveries of machines with solid turret, turret on cross slide, and with tail stock.

Circular on request.

CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE OHIO, U.S.A.

If You are Grinding Malleables, You Should Read This Announcement of the Improved Aloxite Wheel

WE have produced the Improved Aloxite Wheel to fill the need of a wheel to give *real* service in the grinding of malleables. We have produced this special wheel to help you to greater production at a lessened grinding cost. ¶ The Improved Aloxite Wheel is the result of long experiment and experience. ¶ We wanted to give you a wheel that would cut cleaner and faster—a wheel that would show much greater durability than any wheel you have ever had for the grinding of malleables. ¶ The results of exhaustive tests in many plants under varied grinding conditions have proven that the Improved Aloxite Wheel for malleables is the wheel that was wanted—*The Right Wheel in the Right Place.* ¶ It's a faster cutting wheel—a cleaner, freer cutting wheel that will stand up under the trying conditions—a wheel that will hold its shape, and require less dressing—an infinitely better wheel than we have ever produced for this class of work.

Visit the Carborundum Exhibit at the Foundry and Machine Exhibit, Cleveland, September 11th to 16th, and ask about it

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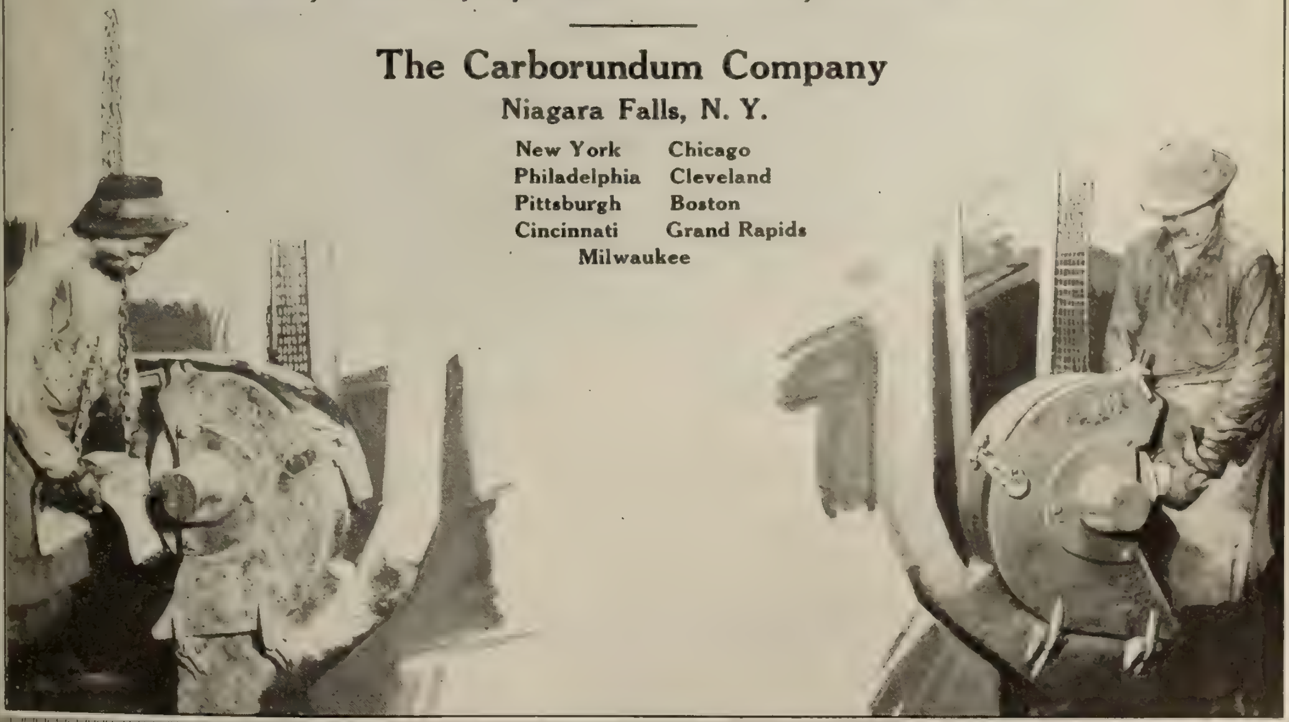
The Carborundum Company
Niagara Falls, N. Y.

New York **Chicago**
Philadelphia **Cleveland**
Pittsburgh **Boston**
Cincinnati **Grand Rapids**
Milwaukee

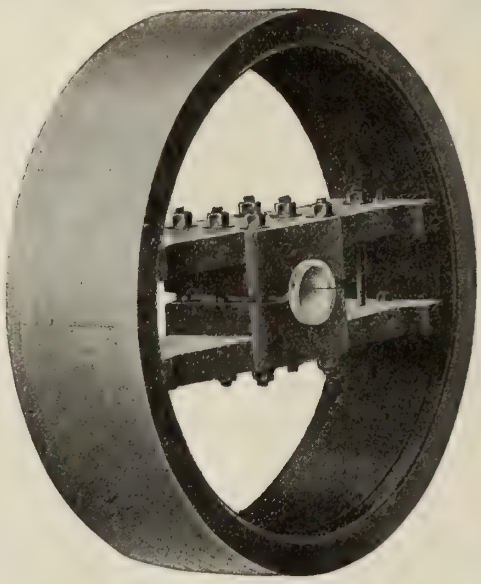


PULLEYS

No Keys

No Set Screws

In Perfect Balance



Lighter

Stronger

Better Belt Surface

The Dodge Standard Wood Split Pulley

The Wood Split Pulley is better than either cast iron split pulleys or steel split pulleys for the following reasons—

The wood pulley is lighter, stronger, better balanced, and provides a very much better belt surface. It costs 33 1-3% less money and provides 50% more returns in horse-power value. It may be run at very much higher speeds with no danger of bursting—also it may be had quicker and in a greater range of sizes.

It costs less to get—less to put on—and less to keep.

We make approximately 300 Dodge pulleys every day—everybody uses them.

There are more Dodge pulleys making ammunition than any other kind—you can get them quick.

Every pulley is thoroughly nailed. Every pulley is guaranteed for Double Belts.

We are Canada's greatest pulley makers.

If you have not our Books, write us.

DODGE MANUFACTURING COMPANY

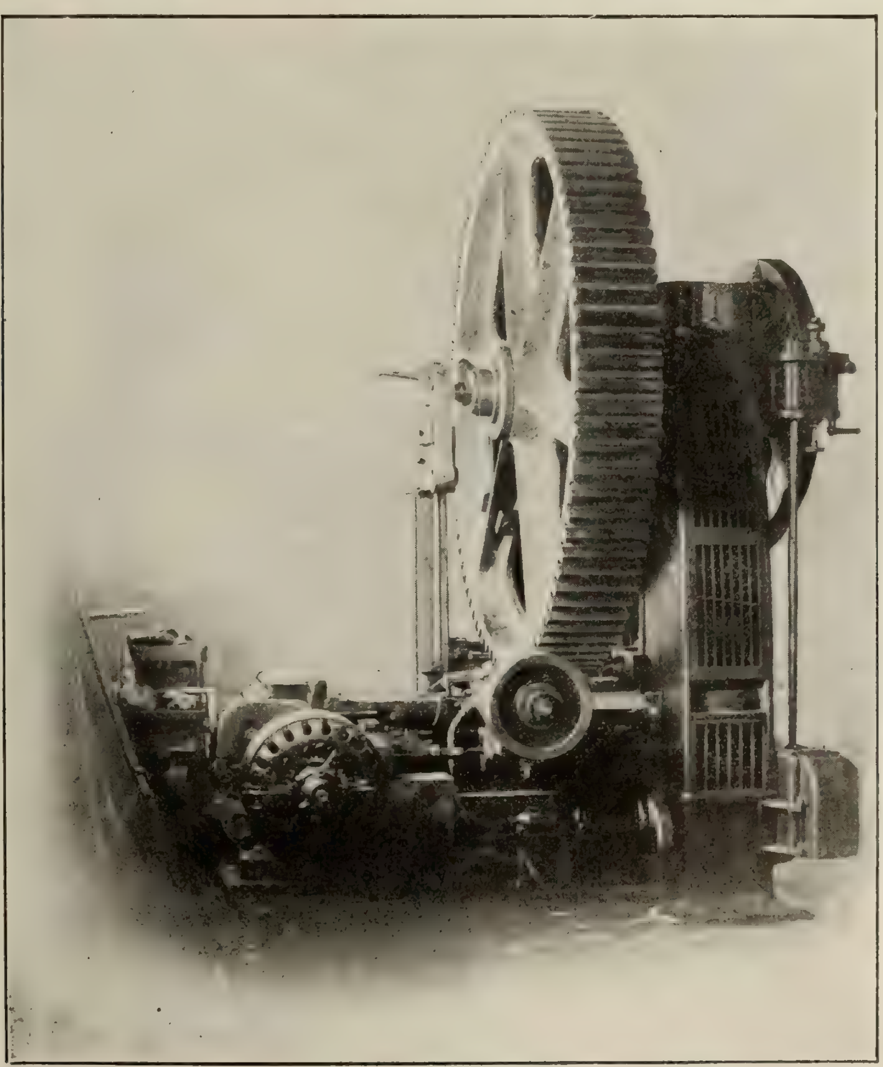
Toronto - - Montreal

CUT GEARS

CUT GEARS

ACCURATE GEARS

We are specialists in good cut gears of all kinds in a large range of sizes.



Large Spur Gear—90″ dia. 88 T., 1 d.p. 12″ F., 5700 lbs. weight.

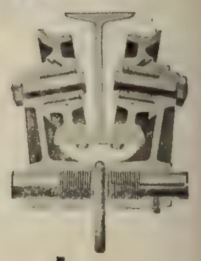
The best equipment and an experienced shop force is at your service. A trial of our product will be effective proof of this combination.

Spur Gears up to 91 in. diam. *Worm Gears up to 108 in. diam.*
Bevel Gears up to 61 in. diam. *Racks up to 10 ft. length.*
Spiral, Helical or Herringbone, 48 in. diam.

The Hamilton Gear & Machine Co.

(Chester B. Hamilton, Jr., B. A. Sc., Mechanical Engineer)

Cor. Concord and Van Horne - TORONTO



CURTIS, St. Louis, U.S.A.

AIR COMPRESSORS — AIR HOISTS — TROLLEYS AND TROLLEY SYSTEMS—SAND BLASTS—PNEUMATIC AND HYDRO-PNEUMATIC ELEVATORS—JIB AND TRAVELING CRANES.

We have specialized for over 22 years on pneumatic machinery. We have developed the simple air cylinder into a straight line motor with wonderful speed control and dependability capable of the widest application to hoisting problems.

Our new controlled-splash oiling system with regulatable sight feed cylinder oiling is something entirely new in air compressor design.

Complete catalogs and descriptive circulars on our entire line furnished on request.

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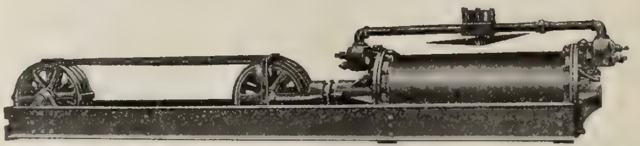

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LEVIATHAN AND ANACONDA
ELEVATING
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BELTING

means more than longest life. It means, just as strongly, greatest delivery, least take-up, greatest resistance to heat, cold and wet.

ANACONDA BELTS

are superior to any other of any kind in exactly that Dollars-Saving and Dollars-Making WAY.

Make us prove it. We are ready. Let us help you solve your belting troubles.

Main Belting Co. of Canada
Limited
10½ St. Peter St., Montreal

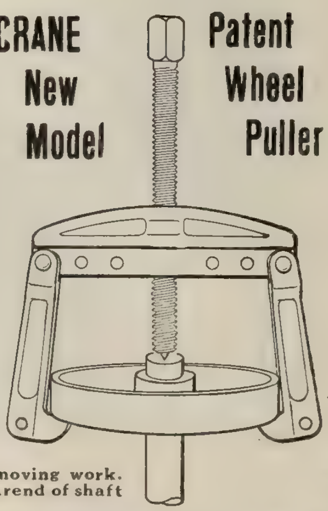
WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE

CRANE New Model Patent Wheel Puller

For Removing

Transmission and Cam Shaft Gears, Auto Wheels, Fly-Wheels, Sprockets, Collars, Couplings, Propellers, Universal Joints.

For straightening Shaft, Bending Pipe, etc.



Removing work. nearend of shaft

The Screw has a flat end with inserted tempered tool steel point that will not spread centres. Makes its own centre on work that has none. The strain is taken on the flat end of the screw. Grease to keep from cutting. The screws are made of high carbon steel and case-hardened all over. All Pullers are furnished with two sets of new combination hook extension arms.
The Pipe Bending Attachment is indispensible in a repair shop for straightening propeller and jack shafts, bending exhaust pipes, and removing universal joint yokes, etc. Drop a line for full particulars.

The Crane Puller Company
54 Lake St., Arlington, Mass., U.S.A.

Canadian Distributors: Canadian Fairbanks-Morse Co., Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary. John Millen & Son, Montreal, Toronto, Winnipeg, Vancouver.

Nova Scotia Steel & Coal Company

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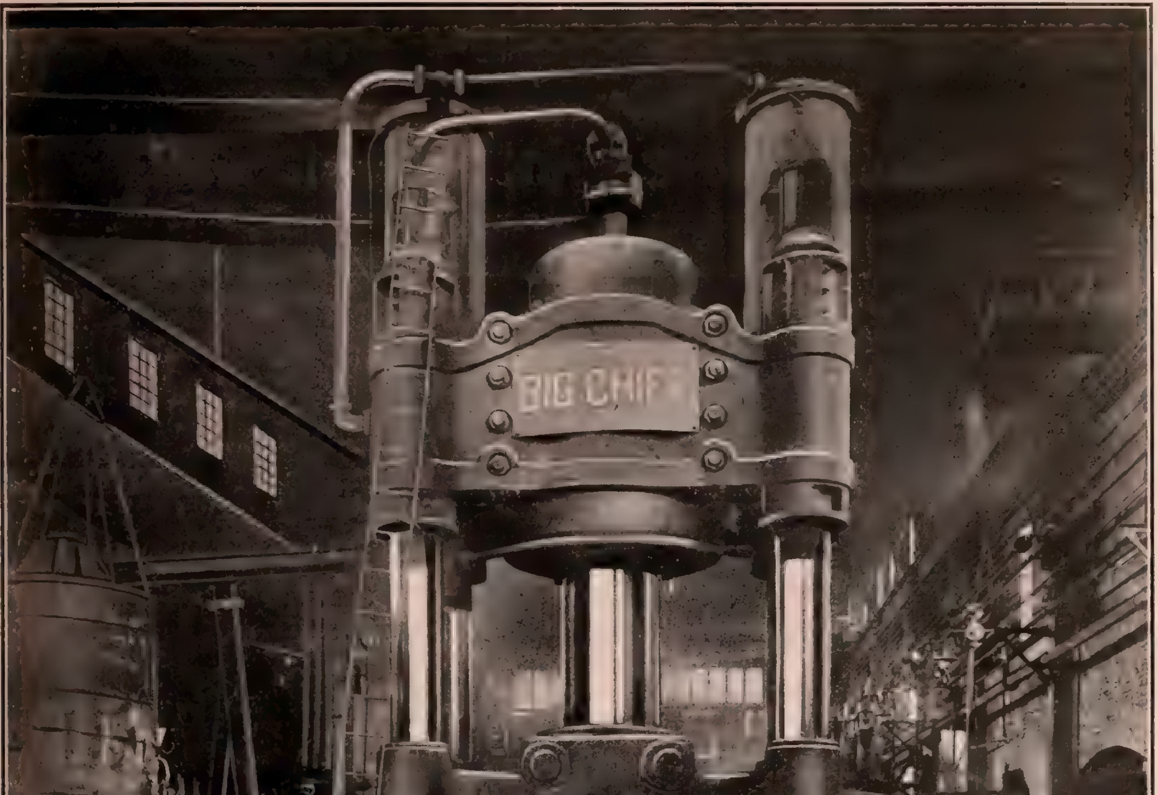
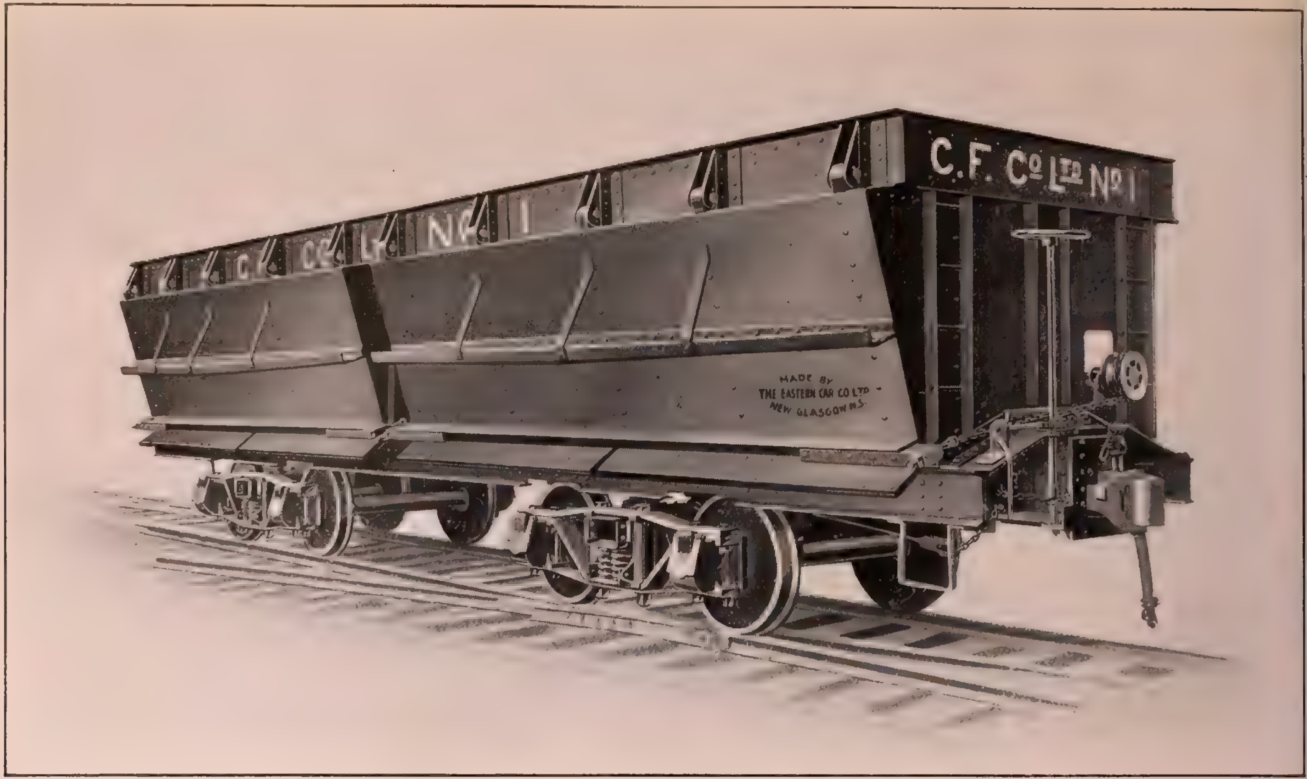
New Glasgow, Nova Scotia, Canada



4,000 TON STEAM HYDRAULIC FORGING PRESS FOR MARINE AND OTHER HEAVY FORGINGS.

The product of a modern steam-hydraulic press is denser and more homogeneous than can be obtained with the steam hammer, due to the effect of the blow of the latter not penetrating to the centre, in contradistinction to the uniform kneeding effect of the press; while the amount of work that can be done by the latter at one time with little variation in temperature, strongly tends towards a better product. The greater uniformity and reliability of steam hydraulic forgings make their use imperative wherever high-class products are required.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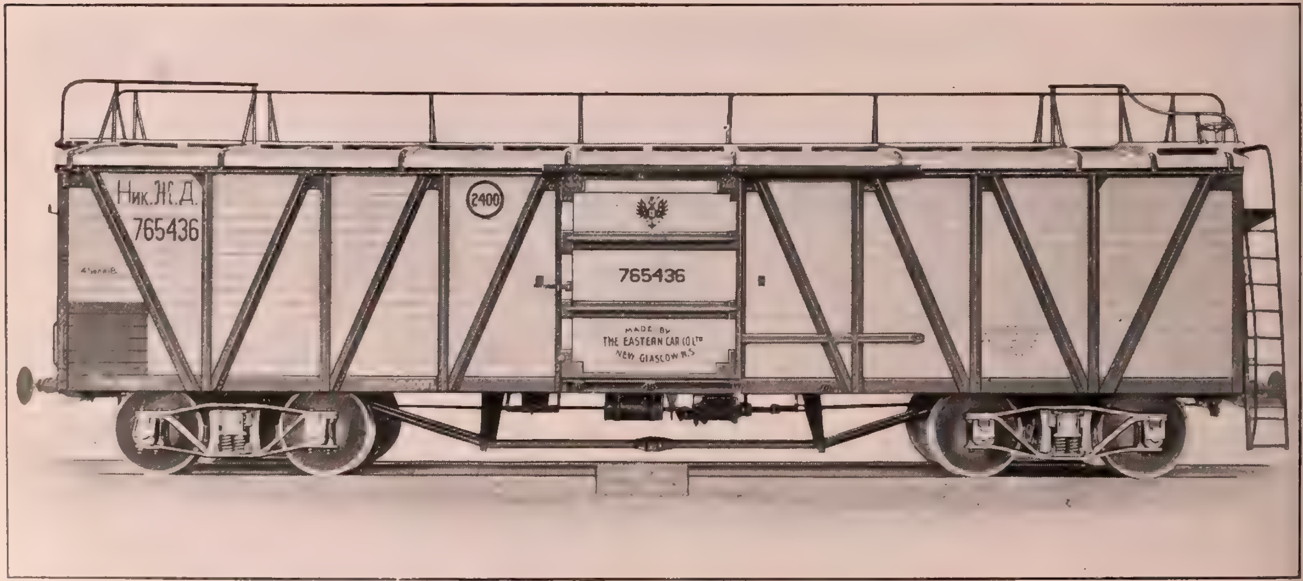
MADE BY THE EASTERN CAR CO LTD NEW GLASGOW N.S.

"ALL-STEEL" STANDARD CAR OF 100,000 LBS. CAPACITY.

"ALL-STEEL" CARS

We have recently installed three additional hydraulic presses, and are now in a position to manufacture "All-Steel" Cars to fill the most exacting specification requirements.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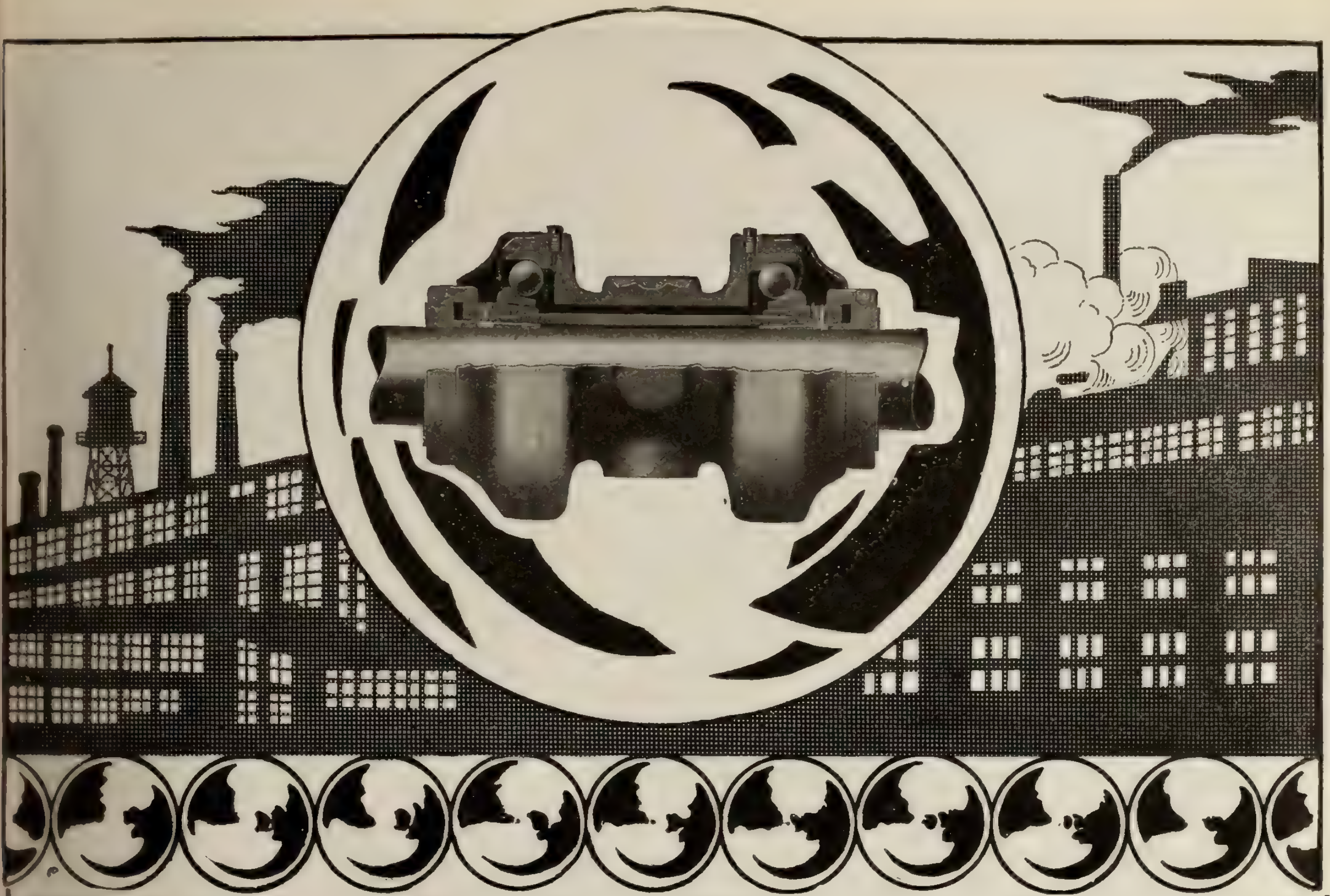
MADE BY THE EASTERN CAR CO LTD NEW GLASGOW N.S.

75-TON CAR BELONGING TO AN ORDER RECENTLY COMPLETED FOR 2,000 CARS FROM THE IMPERIAL RUSSIAN GOVERNMENT.

FREIGHT CARS TO ALL GAUGES

The Russian type car illustrated is exceptionally large, resembling the C. P. R. Type box car. It is unusually long—43 ft., and has a carrying capacity of 40 tons of grain. The track gauge is 5 ft., being $3\frac{1}{2}$ inches wider than Canadian railroad standard. The wheels are of cast iron, $41\frac{3}{8}$ inches in diameter. Steel frame construction is employed throughout. The design provides for "knock-down" shipment.

Eastern Car Co., Limited NEW GLASGOW, N.S.



Run your plant on

Chapman Double Ball Bearings

YOU'LL SAVE POWER

The ordinary line of shafting consumes and wastes from 15 to 60% of power developed.

But the line shafting that's equipped with Chapman Double Ball Bearings will save 75% of the friction loads, making an average total saving of power from 15% to 30%.

Chapman Double Ball Bearings will greatly reduce your power cost or if you are in need of more power they will give it to you at the present cost. They often eliminate the necssity of increasing the size of the power plant.

Oiling and attention are reduced to a minimum. Lubrication is only required twice a year.

Chapman Double Ball Bearings fit any adjustable hanger, and the change can be made with but little delay to you.

Used in over 2,000 Canadian Factories.

Write for full particulars.

The Chapman Double Ball Bearing Company
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If any advertisement interests you, tear it out now and place with letters to be answered.

CONTINUOUS SERVICE

To-day the aim of every manufacturer is to attain Uninterrupted Production. Maintenance of this Production is possible only through continuity of operation, and Transmission of Power is a prime factor in rendering Continuous Service.

In Great Beehives of Industry and in the smallest and most Remote Mills, G & K Belting is used as the means to Uninterrupted Production. Drives which were a constant source of trouble are now highly productive,—saving loss of time and cost of replacement,—increasing output and lowering unit cost.

You, too, will find that G & K Belting is more than just good belting, that it incorporates the quality, strength, pliability, and firmness, so essential to the day-in and day-out efficient transmission of power. You will find a brand for every drive, every condition of service,—you will find the belt especially suited to your requirements.

Catalog, Samples, Engineering Advice, and complete details furnished cheerfully upon request. May we assist you toward Continuous Belting Service?

THE GRATON & KNIGHT MFG. CO.

OAK LEATHER TANNERS AND BELT MAKERS

WORCESTER, MASS., U. S. A.

Branches In Principal Cities

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WE received Gold Medal of Honor, highest award granted Leather Belting at the Panama Exposition, 1915.

"FULFLO"
MACHINE TOOL
Lubricant
PUMP

You can drive your machines faster

but your cutting tools won't stand it — the speed burns them up.

A cutting tool will stand up to higher speed and heavier feeds, providing it is kept cool.

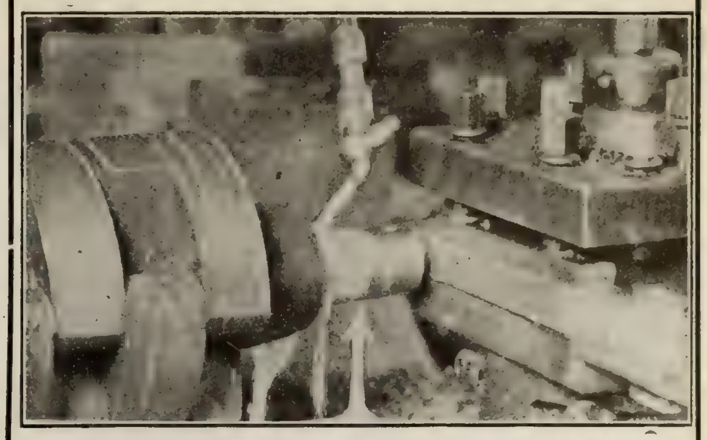
The "FULFLO" Machine Tool Lubricant Pump supplies a good "HEAVY" stream of compound sufficient to carry away all the heat.

No gears or other close-fitting parts to be affected by the grit, dirt, or small chips that are always present in the coolant. No clogging.

The only working part is the impellor. Since no check valve, reverse valve or any other kind of valve is present in the pump or pipe, other than the stop cock, the usual valve troubles are eliminated.

Easily attached to any machine. **Insist that the new machines you buy be equipped with the "FULFLO."**

The Cincinnati Lubricant Pump Co.
126 Opera Place **Cincinnati, U.S.A.**



ECONOMIC WATER OIL

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the **COST** of your **CUTTING MIXTURE** BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with **30 to 50** gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be **satisfactory**, but will produce very **ECONOMIC RESULTS.**

One TRIAL ORDER will **prove** our STATEMENT.

Made in Canada

Canadian Economic Lubricant Co.
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1040-1042 Durocher St. **MONTREAL**

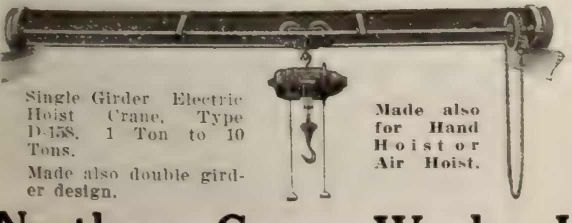
CANADIAN MADE CANADIAN MADE

Electric and Hand Traveling Cranes

Type E—3-Motor Electric Travelling Crane, 2 Tons to 100 Tons.

Northern Type E Crane Trolley, Rigid, Enclosed Construction .Patented in Canada.

We make a wide range of CRANE and HOIST designs. All sizes and capacities, 1 ton to 100 tons.



Single Girder Electric Hoist Crane, Type D-158, 1 Ton to 10 Tons.

Made also double girder design.

Made also for Hand Hoist or Air Hoist.

Get our prices and specifications before you buy.

In asking prices, state SERVICE, CAPACITY, SIZE OR SPAN POWER, and, if electric, KIND OF CURRENT.

Catalogs free.

Type D Electric Hoists —$\frac{1}{2}$ to 10 Tons.

Air Hoists, Trolleys and Tracks.

Type No. 20 Air Hoist.

Northern Crane Works, Limited
Walkerville, Ontario, Canada

AMERICAN STEEL SPLIT PULLEY WITH CORK INSETS

Over 60,000 pulleys—3 inches to 120 inches in diameter—stocked at centres named below. and additional thousands stocked by over 200 dealers insure prompt deliveries. Write for quotations and delivery dates.

American Pulley Co.
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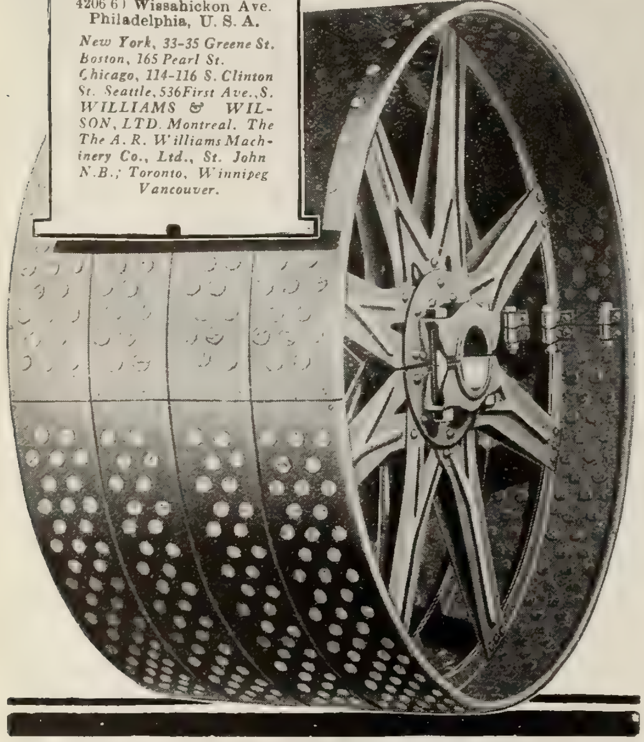
New York, 33-35 Greene St. Boston, 165 Pearl St. Chicago, 114-116 S. Clinton St. Seattle, 536 First Ave., S. WILLIAMS & WILSON, LTD. Montreal. The The A. R. Williams Machinery Co., Ltd., St. John N.B.; Toronto, Winnipeg Vancouver.

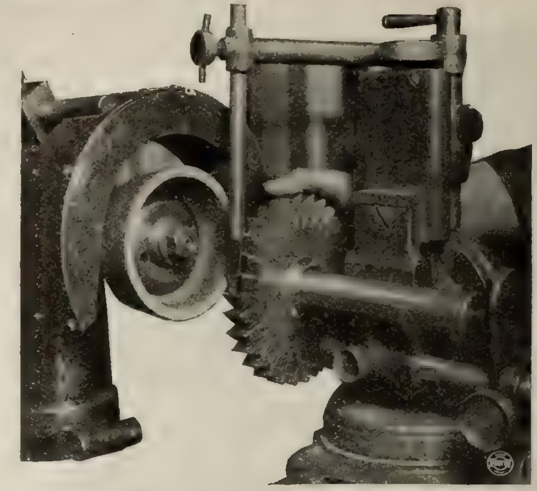


The Grip is almost Gearlike

Several years ago we designed this pulley for main belt drives because a *gearlike* grip was necessary.

The cork insets guarantee just that extra adhesion which removes the risk from that "one time in a thousand" when other pulleys *might* slip.

We have some extremely enlightening data on the differences between ordinary "Americans" and our Steel Split Cork Inset Pulleys on main drives. This information is of vital importance to every manufacturer. We will gladly give it to you if you will address any one of the offices above.



Set-up for Grinding Side Mill

Alundum in the Tool Room

One of the most popular wheels for grinding gear cutters is Alundum 3846 K, although 3850 J is a strong contender for first place. In the smaller wheels 3860 K is very satisfactory.

The wheel most commonly furnished for grinding inserted tooth milling cutters is 3846 grades J and K. Under certain conditions it has been found necessary to use a little coarser wheel, 3836 and a grade as soft as I.

Form cutters are usually ground with a saucer or dish wheel and the grain and grade in greatest demand is Alundum 3860, J and K.

It is a common fault to use a wheel that is too fine. For most classes of cutter grinding a medium coarse wheel about grain 46, never finer than 60, is best suited for both high-speed and carbon steel. The finer wheels are more likely to burn the work than the coarser.

NORTON COMPANY

WORCESTER, MASS., U.S.A.

Canadian Agents:

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED,
Montreal, Quebec, Toronto, Ottawa, St. John, N.B.;
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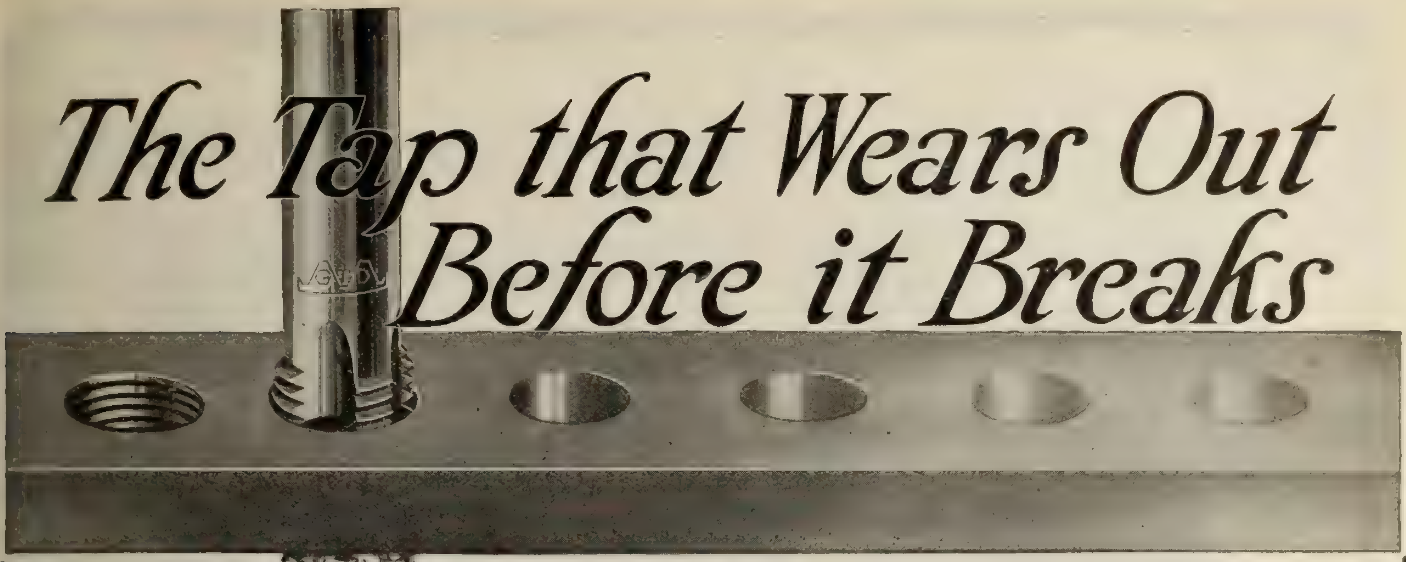
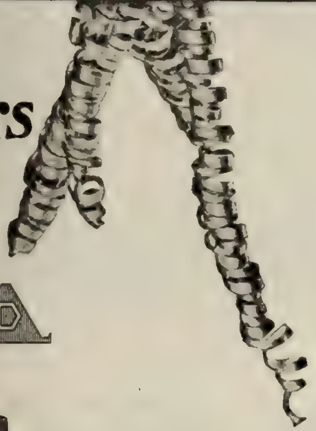
F. H. ANDREWS & SON, Quebec, P.Q.
Alundum and Crystolon Plants, Chippawa, Ontario, and Niagara Falls, N.Y.

Set-up for Spiral Milling Cutter. 836



The Tap that Wears Out Before it Breaks

It Shears



The G.T.D. "Gun" Tap

A brief summary of some of the qualifications of the "Gun" tap explains in part the sudden success and popularity of this remarkable tool.

The "Gun" tap is made of special tap steel—assuring uniformity in hardness, cutting size and lead.

It cuts true to size in any and all materials.

It shears and cuts instead of scraping, requiring 1-3 to 1-2 less cutting power.

All the cutting is done on the point—the cleanly cut, accurate threads are not marred by the balance of the threaded section.

Higher cutting speeds are practical—giving greater production.

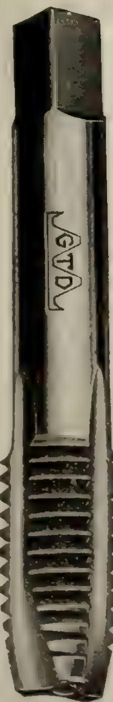
Method of regrinding insures long life and maintenance of cutting size.

Chips do not accumulate and clog in the flutes.

There is as much metal in the threaded section as in the shank.

These combinations of material, principles of design, strength and ease of cutting, makes possible **THE TAP THAT WEARS OUT BEFORE IT BREAKS** saving 90% of your tap bills besides giving you greater production and higher quality of work.

Send us your blue prints or samples of work on your tapping proposition. We will go over the work carefully and suggest the right tap, cutting speed, lubricant, size of drill hole, etc., for best results.



"Gun" Tap—

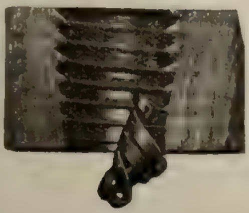
Works in just this way—the chips are sheared out and forced ahead of the tap.

All the cutting is done on the first few teeth—the balance of the threaded section acts as a lead screw.

The deflecting of the chips prevents the chips collecting in the flutes of the tap and does away with binding, cutting over size, and breaking.

The small cut below shows a section of threaded hole tapped with the "Gun" tap.

Note the angle at which the chips are cut—this explains the deflecting action which throws the chips ahead of the tap.



CLIP THIS CORNER NOW — and get the new bulletin that goes into detail—shows results of tests, etc.

GTD
GREENFIELD MASS.
PLEASE SEND THIS BOOKLET

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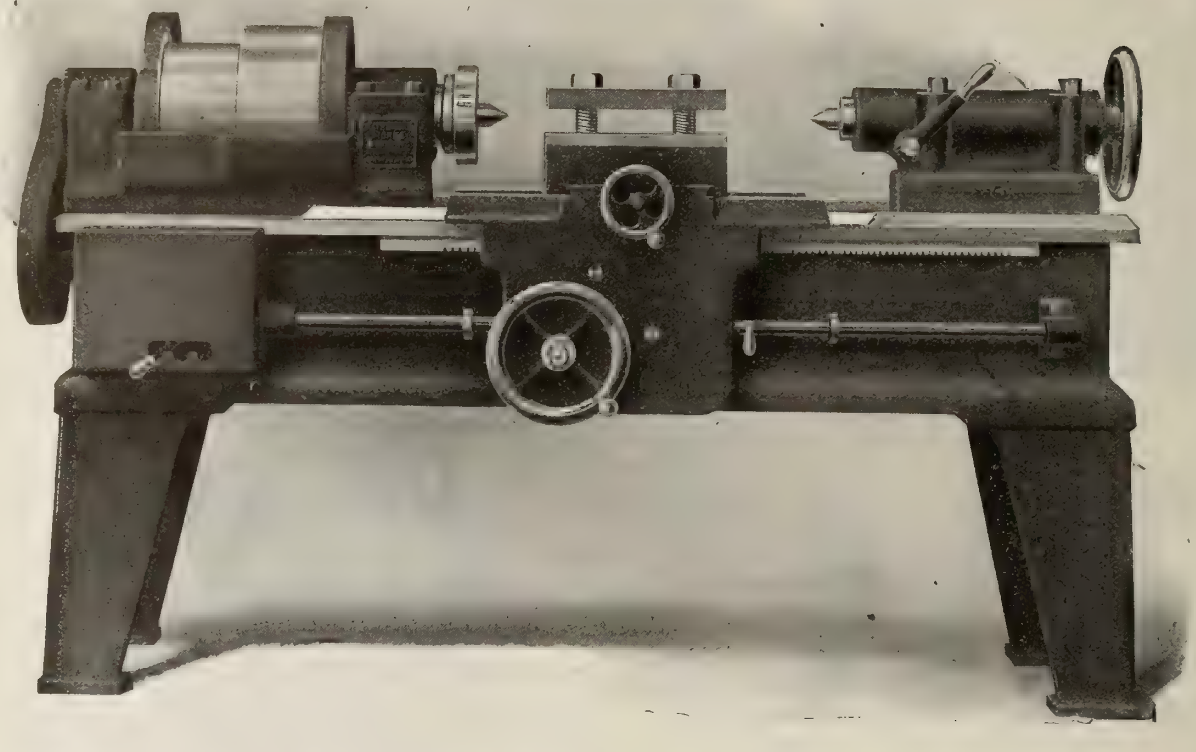
GREENFIELD TAP AND DIE CORPORATION

Greenfield, Mass.

NEW YORK, 28 Warren Street
CHICAGO, 13 South Clinton Street
PHILADELPHIA, 38 No. 6th Street
CANADA, Wells Brothers Company of Canada, Limited
Galt, Ontario



HEAVY SHELL LATHES

Limited Quantity for Immediate Delivery

These lathes are particularly adapted for the minor operations on all large shells, and all operations on smaller shells up to 5 in., with the application of various attachments, which we can supply. Ideal machines for rough and finish turning.

Greater efficiency and speed will be secured by the use of machines adapted for each particular operation.

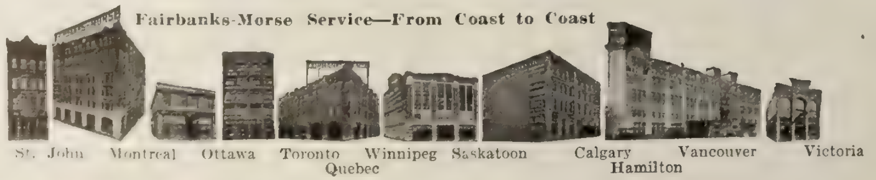
These machines as now manufactured embody many improvements over the first lot of lathes made.

Full Specifications on application.

The Canadian Fairbanks - Morse Co., Limited

CFM

Fairbanks-Morse Service—From Coast to Coast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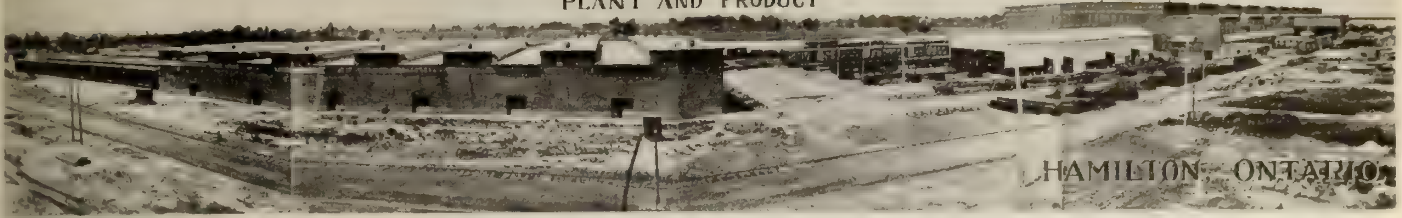
CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

THE NATIONAL STEEL CAR COMPANY LIMITED

PLANT AND PRODUCT



PANORAMIC VIEW OF CAR SHOPS AT HAMILTON INDICATING EXTENT OF GROUND OCCUPIED AND LAYOUT OF BUILDINGS.

The development of Canada's agricultural and mineral resources, and the broadening of the scope and multiplication of her manufacturing activities, are largely, if not altogether dependent, on the railroad mileage available; not main line altogether, important of course as that is, but particularly as to the main line feeders or branch lines. Next in importance to mileage is rolling stock—locomotives and cars. The accompanying article features a plant and equipment specially designed to produce the latter, and although of comparatively recent establishment, it will be seen to have embraced an opportunity and turned it to account.

Staff Article

ON the tenth day of September, nineteen hundred and twelve, several carloads of construction material arrived on a stretch of land on the eastern outskirts of the city of Hamilton, in the Province of Ontario, Canada. Such an occurrence has taken place on many occasions throughout the country and to the casual observer at that time, the incident was probably neither more nor less interesting than hundreds of other similar incidents. If the observer could have foreseen the extensive plant which was to arise on the surrounding land, and realized that within 4½ months the shipment of finished railroad cars would be an accomplished fact, he would have been constrained to pay more than passing attention to the seemingly ordinary event of a few freight cars arriving on a piece of vacant ground.

The land referred to is situated at the eastern end of Burlington bay, on the southern foreshore of that inlet and less than 30 minutes ride on the city cars from the Canadian Pacific or Grand Trunk Railway depots. It has an area of almost 58 acres, being 800 ft. wide and 3,150 ft. long. It is quite level naturally and being of rectangular shape is admirably adapted for the specific purpose of the plant erected on it.

GATE HOUSE AND EMPLOYMENT OFFICE AT ENTRANCE TO GROUNDS.

WOOD AND STEEL STOCK YARDS WITH GANTRY CRANE IN FOREGROUND.

Inception of the Company

Incorporated on July 11, 1912, the National Steel Car Co. was organized by a group of prominent Canadian capitalists to undertake the manufacture of all types of steam, electric and street railway passenger and freight car equipment. Taking place as it did when car works were being rushed for deliveries, the inception of the business was attended by some delay in obtaining the desired amount of trained help. Fully 90 per cent. of the workmen were recruited from the ranks of the local inhabitants and as it was necessary to train them in the art of car building, the desired state of efficiency was not obtained so quickly as it otherwise might have been.

Under these circumstances, therefore, the feat of erecting and equipping shops, organizing a force and making shipment of completed cars on Jan. 31, 1913, less than five months from the breaking of ground is deserving of more than passing remark.

General Features of Plant

The plant consists of two large buildings which contain the equipment for

MAIN OFFICE BUILDING.

accomplishing the principal manufacturing operations, while several buildings are provided for various purposes such as office buildings, storage, hospital and works offices. The two main buildings referred to are situated north and south of each other the northern one being known as the main shop in which are located the steel and woodworking plants. This building is of steel construction of the monitor type and consists of three bays, two of which are 75 feet, and one 50 ft. in width. The walls are built of hollow fireproof tile for a height of eight feet above ground, and are of continuous steel sash above.

VIEW OF STOCK YARD FROM SOUTH.

Reception of Raw Material

In strict conformity with modern practice, the equipment is laid out so that movement of the work is in one direction only, not in the buildings alone, but in the plant as a whole. When raw material is received by rail, it is immediately deposited in the northern end of the grounds. Here are the steel and lumber yards where immense quantities of steel shapes, wheels, shafts, and thousands of feet of lumber are held in readiness for consumption.

VIEW OF POWER HOUSE WITH SILO FOR WOOD WASTE.

Much of the lumber is stored in piles, where it is subject to natural seasoning, while material required for early use is passed through a dry kiln and thence to the dry kiln storage.

The dry kiln is 100 ft. long by 60 ft. wide, and contains five tracks, a traverser being provided to enable trucks from the lumber storage to be run right in without transferring the material from one truck to another. The kiln was designed and erected by L. Moore Dry Kiln Co., Jacksonville, Fla., and is heated by steam, the walls being of fireproof hollow tile.

After treatment in the kiln, the lumber is transferred to the dry kiln storage, from which it is transferred by overhead traveling crane to the planing mill department. This crane passes over the steel yard and can be observed in several of the photographs. It has a capacity of 10 tons with a span of 60 ft., and the runway on which it travels extends for a distance of 520 fet. By this arrangement heavy materials are quickly stored to the best advantage, and are yet within easy access of the various departments in which they are to be used.

Car Construction

The work of producing cars may be divided into three main classifications, running gear, structural work and woodwork. The first includes the making of forgings, stampings, bolts, nuts, rivets, pins, hooks, chains and other similar details; also wheel boring, axle turning and preparation of various components ready for assembling into finished trucks. The second classification embraces the cutting off, marking, punching, shearing and drilling of plates, beams and sections from which the steel frame work of the car is to be fabricated. Lastly, the wood must be selected and machined to size in readiness for building into bodies of various types with a minimum of labor.

Co-ordination of Departments

Work of these three descriptions proceeds along parallel lines both practically as well as theoretically. At the northern end of the three bays referred to, raw material enters from the stock yards of which mention has been made

Rough bars and rods of many shapes enter the forge department in the 50 ft. bay. In the adjacent 75 ft. bay beams and shapes of all sorts which have been cut to length in the cutting off department now make their appearance, along with plates which are trimmed to various shapes and sizes, and have holes punched or drilled to suit different templates. In the other 75 ft. bay, planers, moulders, cutting off saws and drills are engaged on woodwork as mentioned. These three departments are each the starting point for work of one classification which gradually assumes a more complete form with each succeeding stage until merging with the other product it becomes a complete piece of rolling stock ready to be stencilled with weights, lengths and the several hieroglyphics which decorate the modern freight car.

BASIL MAGOR,
Vice-President and General Manager.

Forging Department

Forgings used on railway rolling stock are subject to severe treatment both from work and weather. Their proportions must be ample, their quality good, and their dimensions accurate. Drop hammers and bulldozers therefore form a large part of the equipment, while much of the medium and light welding and forging is done in power-driven hammers. The equipment is all modern and of the most suitable type for this class of work. Among the principal items may be mentioned 1-5,000 lb. Chambersburg steam drop hammer; 1-3,000 lb. and 1-1,500 lb. Erie steam drop hammers; 3 Erie trimming presses, and 1 board hammer. Three Ajax bulldozers with independent motor drives and individual oil furnaces handle a large variety of hot stampings.

A feature of this department is a complete rivet making plant consisting of a continuous Ajax machine driven by a 20 horse-power C. G. E. induction motor. In line with the machine is an oil-fired furnace of sufficient length to receive stock lengths of rod, the capacity of the furnace being such that the machine can be kept constantly supplied with hot rods.

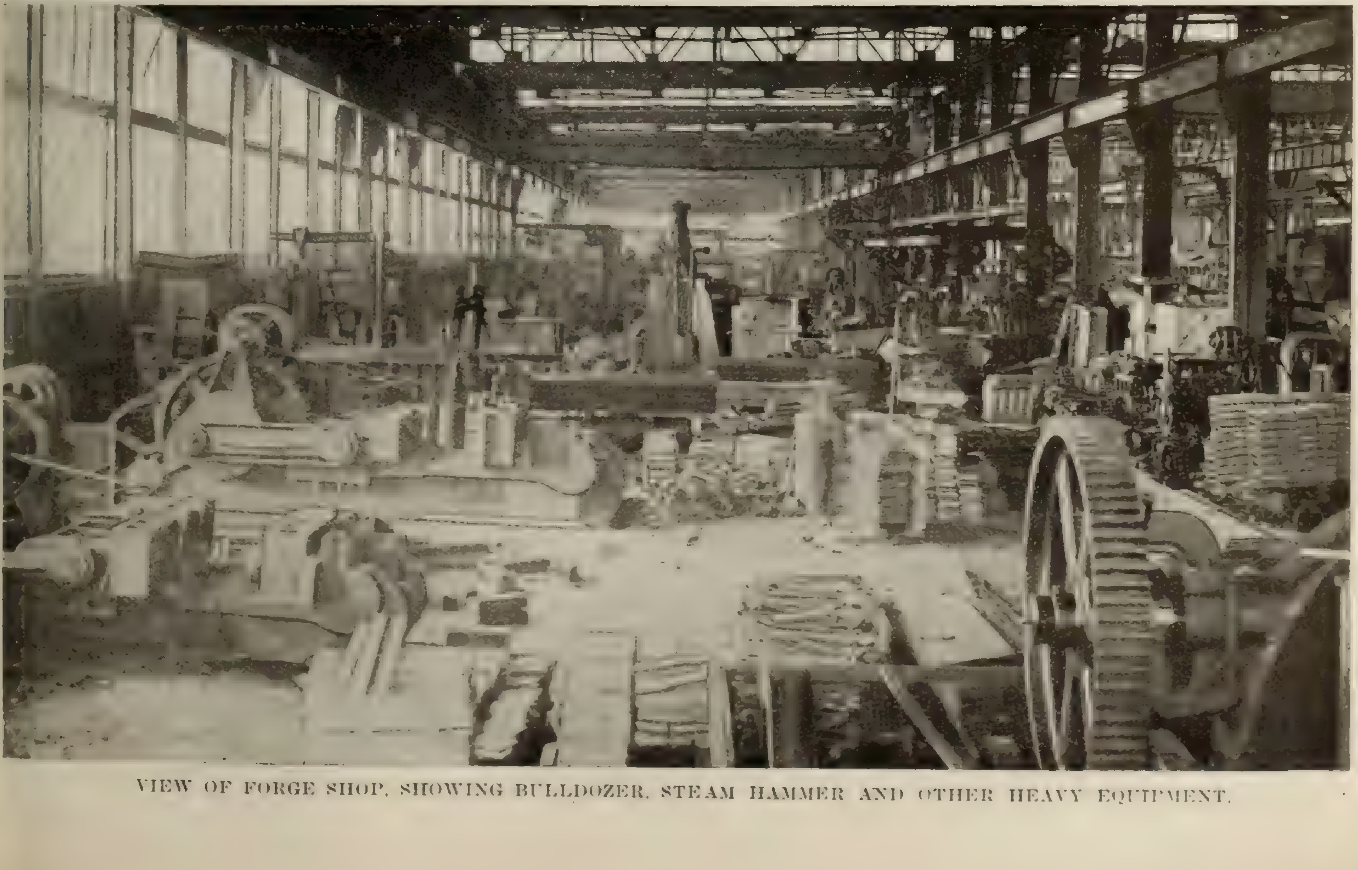
The general forging equipment is capable of handling a large variety of work, and includes one 1,500-lb. Chambersburg steam hammer; one 200-lb. and two 100-lb. Bradley cushioned helve hammers, and one No. 11 Baudry power hammer.

Drilling Department

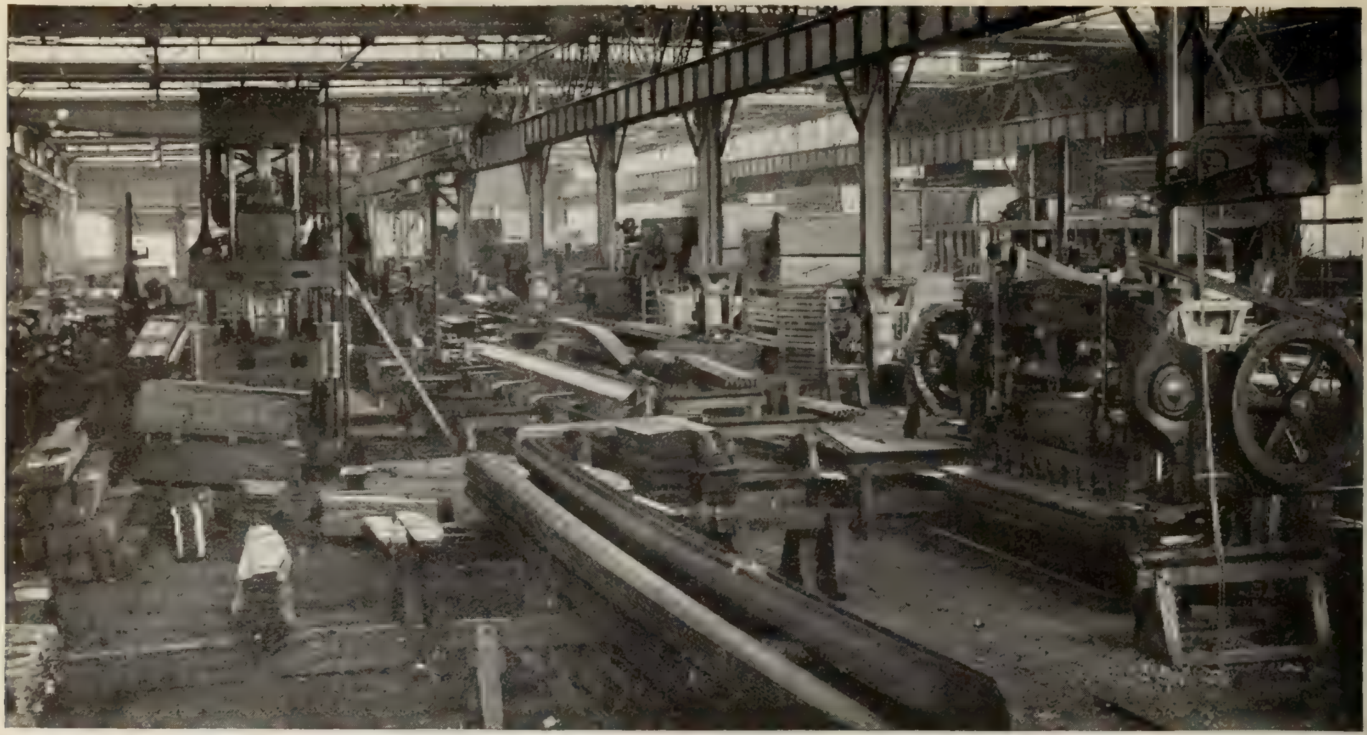
Some of the work as done in the forging department is ready for use, but a considerable part requires both drilling and machining. Many of the smaller parts from the steel preparation department also require drilling, so that a considerable equipment has been provided for this purpose. Approximately twenty machines are engaged in this department, consisting mostly of medium-sized vertical drill presses, with such special machines as 1-6 and 1-5 spindle multiple drill, and 1 Bausch 15 spindle drill for special repetition work. A Lapointe broaching machine is also installed, this type of machine being particularly adapted for machining slots, oval and irregular holes of all descriptions.

Machine Work

Owing to conditions existing during



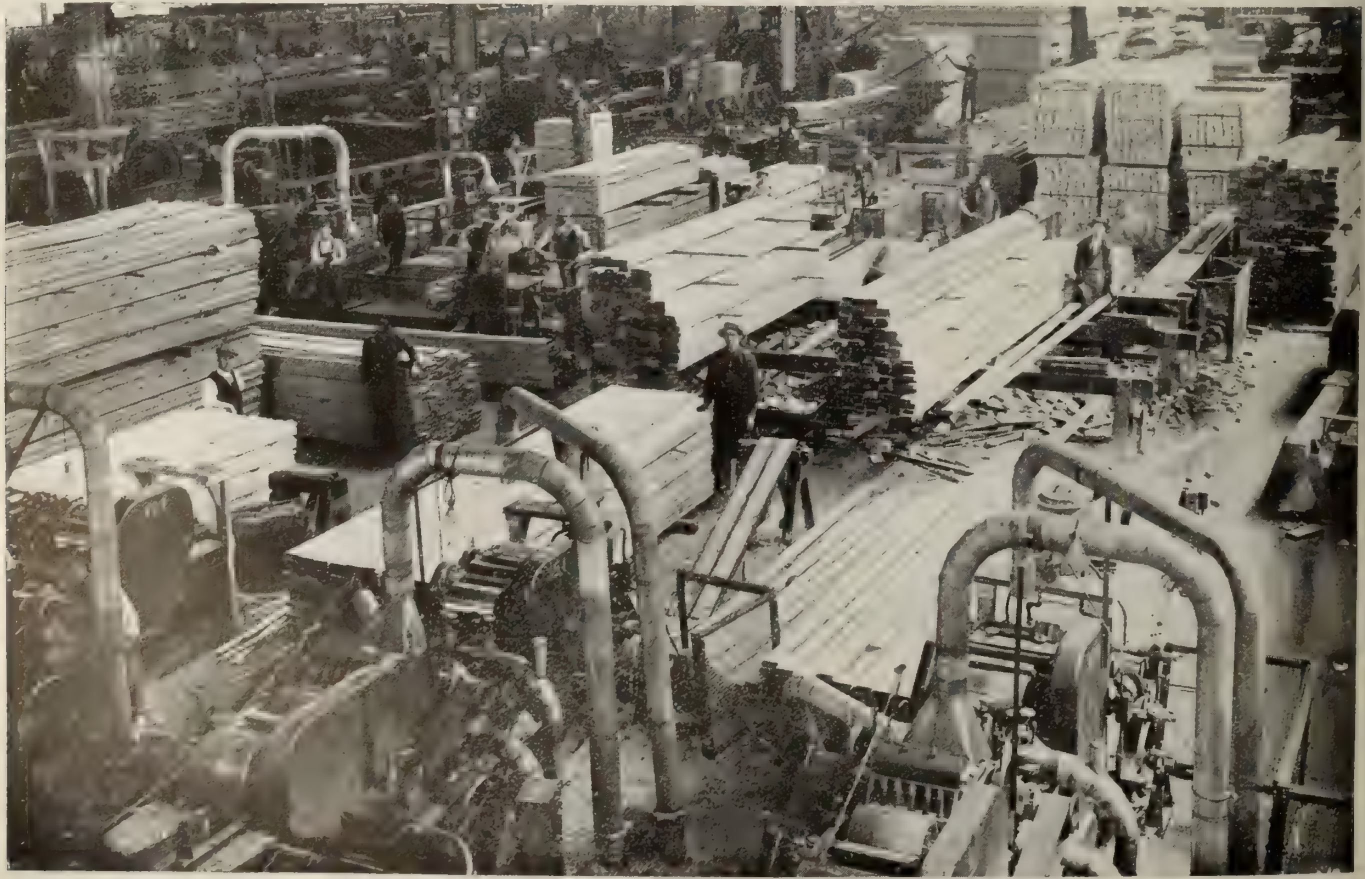
VIEW OF FORGE SHOP, SHOWING BULLDOZER, STEAM HAMMER AND OTHER HEAVY EQUIPMENT.



STEEL PREPARATION DEPARTMENT, SHOWING LARGE TWIN CYLINDER HYDRAULIC PRESS, PUNCHING AND SHEARING MACHINES AND WORK IN PROGRESS.

the past two years, work of a much greater variety has been undertaken than was originally anticipated. Deviations from standard designs have involved a greater variety of equipment in the machine shop than would have been the case had the class of work remained of a more or less specialized nature. The present machine shop which covers a floor space of about 50 ft. long by 75 ft. is being doubled in area. Approximately 50 tools are installed and these are being constantly added to. As the output of the plant during recent months has included such diverse products as steel sleeping cars and field kitchens, passenger coaches and trench trucks, freight cars and ammunition wagons, the varied nature of the machine shop equipment has been of particular value in handling the constantly changing type of work.

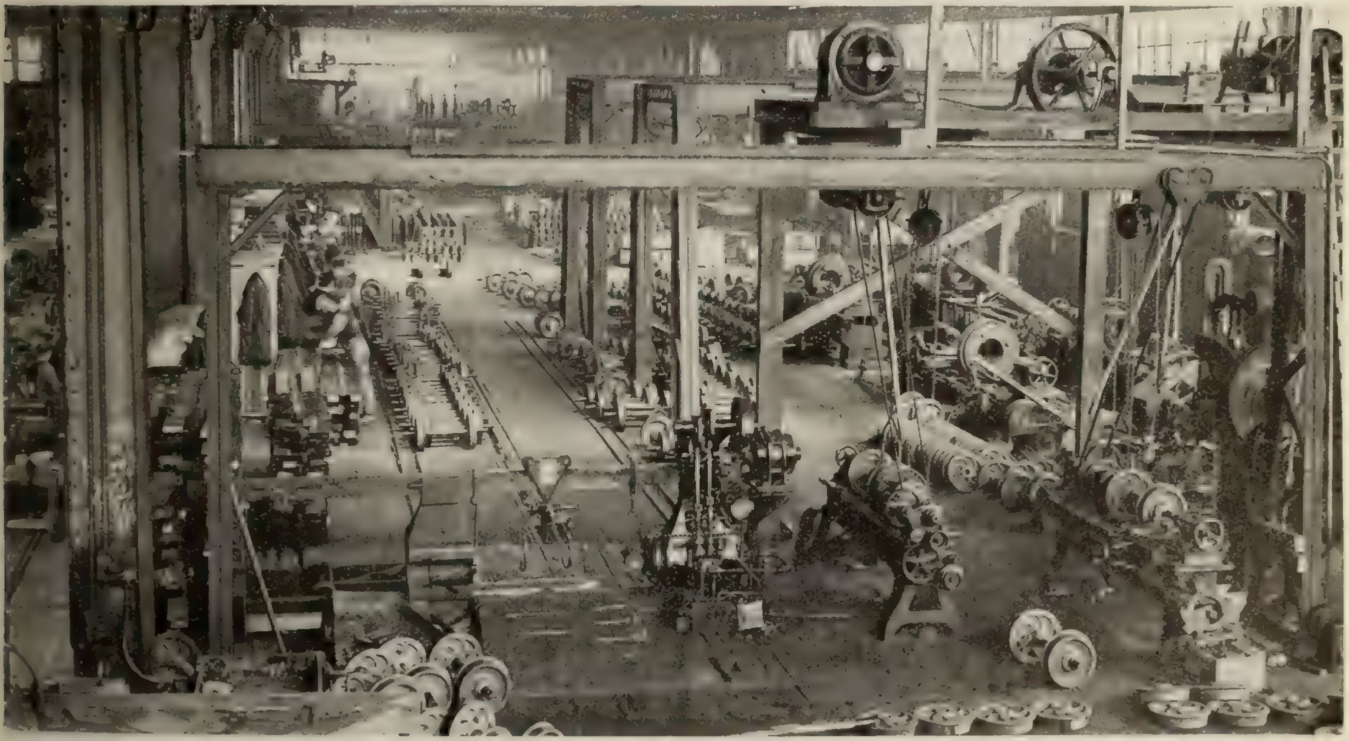
Among the tools in this department are the following:



PLANING MILL WHERE LUMBER IS MACHINED TO SIZE AND SHAPE READY FOR USE IN CAR ERECTION DEPARTMENT.

One 36x36x144 Butler planer.
One 36x36x144 Pond planer.
One 24x24x120 Bertram planer.
Three Bertram slotters, 20, 24 and 28 inches.
One Putnam slotter.
Two Bertram shapers.
One C.M.C. shaper.
One Besley horizontal disc grinder.
One Jones & Lamson turret lathe.
One Gisholt turret lathe.
Nine engine lathes.
Four C.M.C. axle lathes.
One C.M.C. car wheel boring mill.
One Bertram wheel boring mill.
One Newton horizontal milling machine.
Five plain milling machines.
Two Becker vertical milling machines.
One B. & S. No. 4 universal milling machine with constant speed drive.
Two Ford Smith grinding stands.

Where considerable repetition work is necessary, modern quantity production methods are made full use of, especially in milling operations on small links, rod ends, pins and other similar parts entering into the construction of trucks.



WHEEL SHOP WHERE WHEELS AND AXLES ARE ASSEMBLED READY FOR TRUCKS.

Wheel Shop

Wheels and axles are received in the rough state and require to be bored and turned before they can be assembled with the truck frames. One of the photographs shows the wheel shop in a state of normal activity, the pressing of the wheels on to the axles being done in a Bertram car wheel press, observable in the left foreground of the picture.

All of the parts which have originated in the forge or machine shops are now ready to build into trucks which is done in the centre bay. The various structural parts entering into the trucks have meantime been prepared in the steel preparation department where the steel underframes have also been fabricated.

Steel Preparation Department

A cutting-off shop is arranged close to the steel yard where preparatory operations are done on joists, beams, angles, etc., so that when they enter the centre bay of the main shop, the work of marking off holes, punching, drilling, rivetting, etc., can proceed right away. The cutting off shop contains four Lea-Simplex cold saws, which handle the structural sections, while two Cleveland automatics are engaged on bar stock, turning out shackle bolts, clevis pins and similar parts.

The steel preparation as already mentioned proceeds parallel with the forge and machine shop work. It occupies the north half of the bay which is 680 ft. in length, the south half being devoted to truck erection where the product already referred to awaits the arrival of the structural parts. The machinery consists principally of punches and shears, among them being the product of both Canadian and American tool builders. Bertram, C. M. C. and Brown-Boggs are well represented, the latter having a 10 ft. shear, while the two former makers have both punches and shears, many of the punches being of the multiple type. One large machine is equipped for punching numerous holes simultaneously at any part of a 10 ft. length of beam.

In the illustration of this department will be observed a large hydraulic press. This machine which was supplied by the R. D. Wood Co., is specially designed for car shop use, and is really two machines in one. It is similar in general construction to the hydraulic forging presses now so extensively used in shell manufacture, but has twin cylinders which can be operated simultaneously. When this is done the upper platens are bolted together so as to accommodate dies of considerable dimensions for pressing such articles as bolsters, side frames, etc. A large oil-fired furnace of suitable capacity is located to the left of this press, where the material to be stamped is heated up to the proper temperature.

Steel Erection and Truck Department

Having traveled along the 300 odd feet of this department, the various parts arrive at the truck department where riveting, bolting, and assembling proceeds. Pneumatic equipment is largely in evidence here, Cleveland hammers, drills, and similar apparatus being liberally provided.

It is now that the numerous parts begin to take on a semblance to familiar objects. Wheels are placed on tracks, and truck frames, springs, brake gear, etc., assume their various positions with wonderful rapidity until, with the placing of the main frame on the trucks, the car is ready to receive the particular type of body required to render it fit for service.

Wood Preparation

The planing mill department has meanwhile been preparing the lumber out of which the body is to be built. Here again design and organization make themselves apparent. Planers, moulders and matchers deliver the work in gradually advanced stages, being then cut to length in continuous feed cut-off saws, after which holes are drilled, morticed and recessed, special shapes formed and all work done so that the various pieces of lumber fit together exactly when they are built up on the underframe of the car.

CARS IN COURSE OF ERECTION IN FREIGHT CAR ERECTION DEPARTMENT.

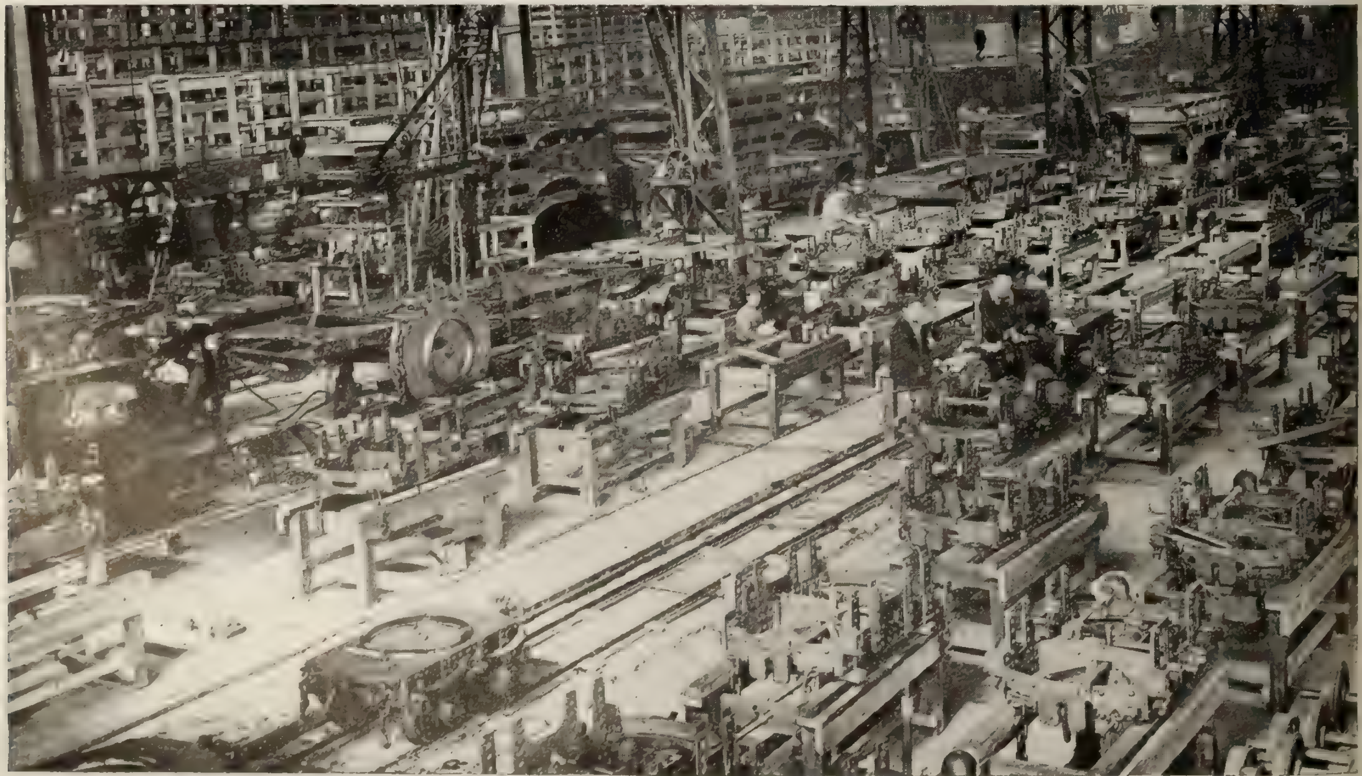
This department is equipped with a Sheldons exhaust system for removing all dust, shavings and similar refuse which are drawn through suction pipes by a powerful fan, and then forced a considerable distance through an overhead pipe to a silo on top of the power house, being then distributed to the furnaces of the boilers underneath.

The work done in the wood car department marks the practical completion of the car with the exception of painting. During the building of the body much detail work is done involving the use of purchased supplies, fittings, etc., and in order to have these promptly available an extensive stores department is provided. All of the rivets, bolts and nuts used in construction are made in the plant, and the stocking of these alone calls for considerable binnage.

Much of the lighter material and many detail parts and fittings are not suitable for manufacture in a plant of this description, and with the production of passenger coaches and sleeping cars, the variety and extent of material which it is necessary to carry in stock assume large proportions. The extent of the stores department will be unde stood when it is stated that upwards twenty employees, including a stores o fice staff, are required to handle, r ceive and deliver the goods passin through. Upholste ing material, ha springs, carpet lighting fixture lavatory and toil fittings, and sp cial equipment t meet different sp cifications, all hav to be secured wit in stated period and kept in prope condition for ulti mate use on the fin ished product.

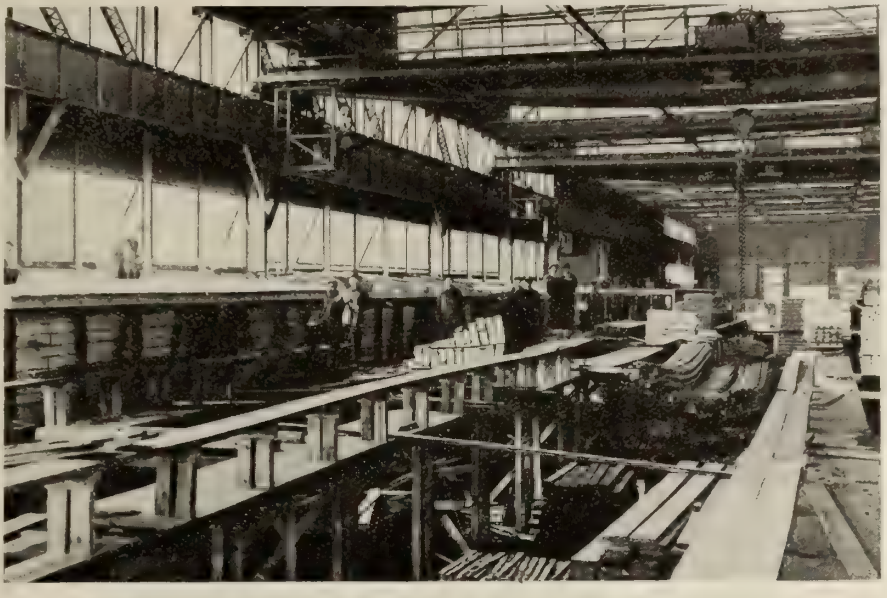
Passenger Rolling Stock

The production o modern passenge cars, whether o steel or wood, call for considerable de tail work involvin skilled labor of high order includ ing cabinet making upholstering, painting and decorating A special planing mill for perform ing machine work on car detail exclusively forms part of the sout building. It is completely equippe with morticers, band saw, sander, an drills and prepares all of the parts mad of rare and expensive woods which fur



NARROW GAUGE TRENCH TRUCKS IN COURSE OF CONSTRUCTION FOR A EUROPEAN GOVERNMENT.

nish and decorate the interiors of modern rolling stock. Here the bulkier parts are reduced to size and prepared as far as possible for the final fitting in the car. The smaller pieces and the making of seats, cushions, etc., is carried on in the cabinet department on the floor above. Window frames, sashes, seats, springs, etc., are here in profusion in all stages of completion. A special drying kiln and two veneer presses are installed on this floor so that close attention can be given to this important work.



FINISHING FREIGHT CAR BODIES IN ERECTION DEPARTMENT.

Meantime, the car bodies having been mounted on their trucks, the cars are moved into part of the south building where they are furnished with the details from the cabinet shop, and have all wiring for lights, plumbing fixtures, floors, carpets and other interior furnishings installed, the painting, varnishing and decorating being performed at such times as suit the progress of the work.

All-Steel Passenger Cars

The first all-steel sleeping car made in Canada has recently been completed in these works and has aroused considerable interest among railway officials as well as the general public. In these cars which have been built for the Government lines first consideration has been given to safety, comfort and appearance. The only inflammable materials in the car of this type are the berth curtains and the bedding, and as the steel construction renders it impervious to fire from outside causes, fire cannot seriously endanger the occupants. Other important safety features are the locking attachment which eliminates any possibility of the trucks being detached from the body of the car, and brakes of the clasp type which provide twice the braking power of the ordinary type.

The exterior of the car of which we reproduce two views, presents a handsome appearance, designed in the conventional type, and finished in the standard dark olive green of the Canadian Government Railways. An electric storage battery for lighting purposes is located midway between the trucks, the battery being maintained in a charged condition by a generator driven from one of the axles.

Interior Features

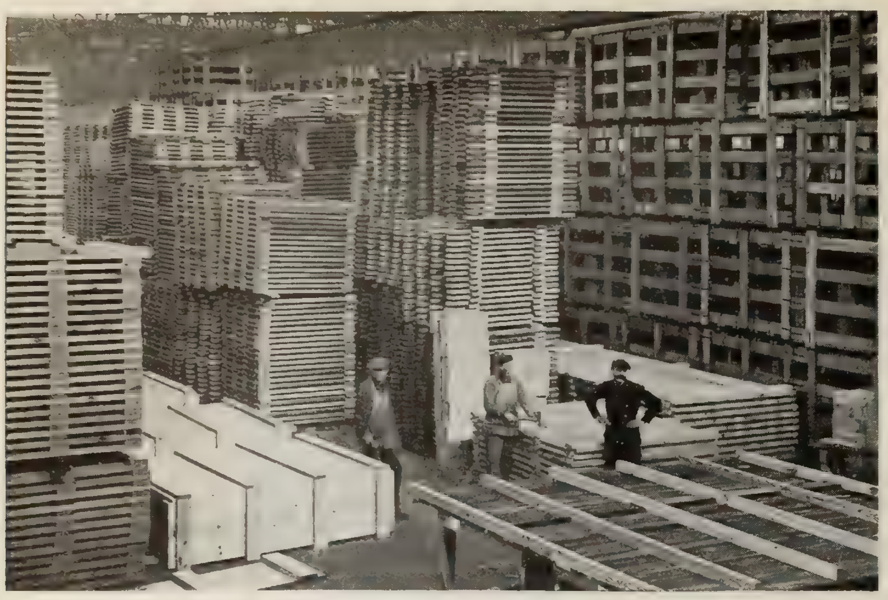
Internally the car is very attractive. The general treatment of walls, seat ends and other exposed parts is Cuban mahogany, while the seats are upholstered in the finest of green plush. The floor is of flexolith, a fireproof material resembling concrete, this in turn being covered with rubber matting. Wilton carpet is laid on the aisle and in the drawing rooms and salons. Ten compartments are provided, consisting of a lower and an upper berth. Lavatory accommodation is particularly tasteful, the ladies' lavatory being finished in white tiles on the floors and walls, with exceptionally large mirrors of finest French plate.

The mens' smoking room is finished in Koko wood, large lounge seats providing the maximum of comfort during long trips. Two very fine drawing rooms are included in the design, one being in Vermilion finish and the other in Old English.

Motor Truck Production

The extension of the company's activities in the direction of motor truck construction was but a natural sequence to

VIEW IN PASSENGER CAR ERECTION DEPARTMENT.



CRATING DEPARTMENT FOR FOREIGN SHIPMENTS.

the successful accomplishment of railroad car building. The public demand for satisfactory equipment in this line has had a steady and persistent growth which along with the growing experience of truck users pointed to the fact that a high-grade truck of moderate initial cost, built in a suitable range of sizes, and backed by satisfactory service, was the logical result to be expected from such a firm as this. The result of much careful preparation and investigation is apparent in the line of trucks offered.

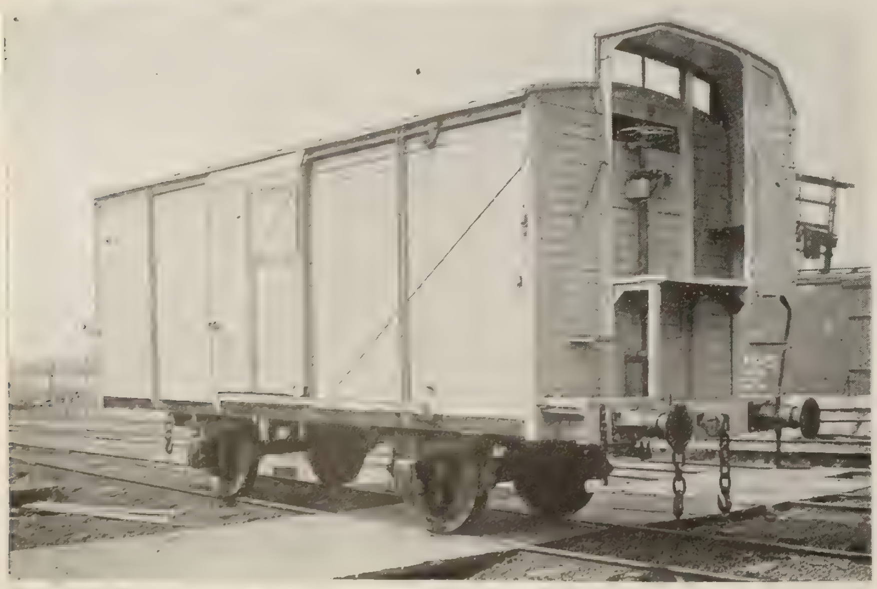
Five designs are made, the capacities being, 1, 1½, 2, 3½ and 5 tons respectively. Each model is a complete product in itself. Simplicity, accessibility and maximum service are the dominant features of all. That the efforts of the engineering staff toward this end have not been in vain will be gathered from a brief description of the trucks. Moderate speed motors of ample power are employed. They are all of the four-cylinder, water-cooled type with cylinders cast in pairs. In the 1-ton size the transmission forms a unit with the motor, but in the larger sizes it is o separate construction, both engine an transmission having three-point suspension. Power from the transmissio is carried to the worm-driven rear axl by a tubular propellor shaft of drawi steel, having a universal joint at eacl end. The transmission gears are ver large and are of heat-treated chrom nickel steel, a right-hand gear-shiftin lever operating in a selective quadran giving three speeds forward and on reverse.

Worm Drive and Other Features

All sizes of trucks are equipped witl worm-driven, full-floating axles of th David Brown type, in which the worm i mounted on top of the worm wheel, an the worm wheel and differential ar mounted as a unit in a cast-steel carrie bolted in position in the centre housin of the axle. This permits the read disassembling of the worm, worm wheel and differential, without removing th axle from under the truck, the weight o the vehicle and load being carried o heavy steel tubes, forced under hydrauli pressure into cast-steel housings.

ALL STEEL SLEEPING CAR FOR CANADIAN GOVERNMENT RAILWAYS.

A feature of interest to truck owner is the provision of a speed governo which automatically controls the maximum speed by means of a centrifuga governor, which forms an integral par of the motor, being enclosed in th motor casting and sealed. Where opportunity renders it desirable, th power from the motor may be utilize for such purposes as operating dum bodies, winches, cranes and so forth, b means of a suitable attachment designed for this purpose. Tungsten stee valves insure freedom from valve grinding while the pistons, which are tapere to provide for expansion, are fitted wit compound, leak-proof piston rings. A high-tension, waterproof magneto wit dual system of ignition, and a high grade automatic carburetor indicate th efforts which have been made to insur freedom from operating trouble.



EUROPEAN TYPE OF FOUR-WHEELED FREIGHT CAR.

Welding Shop

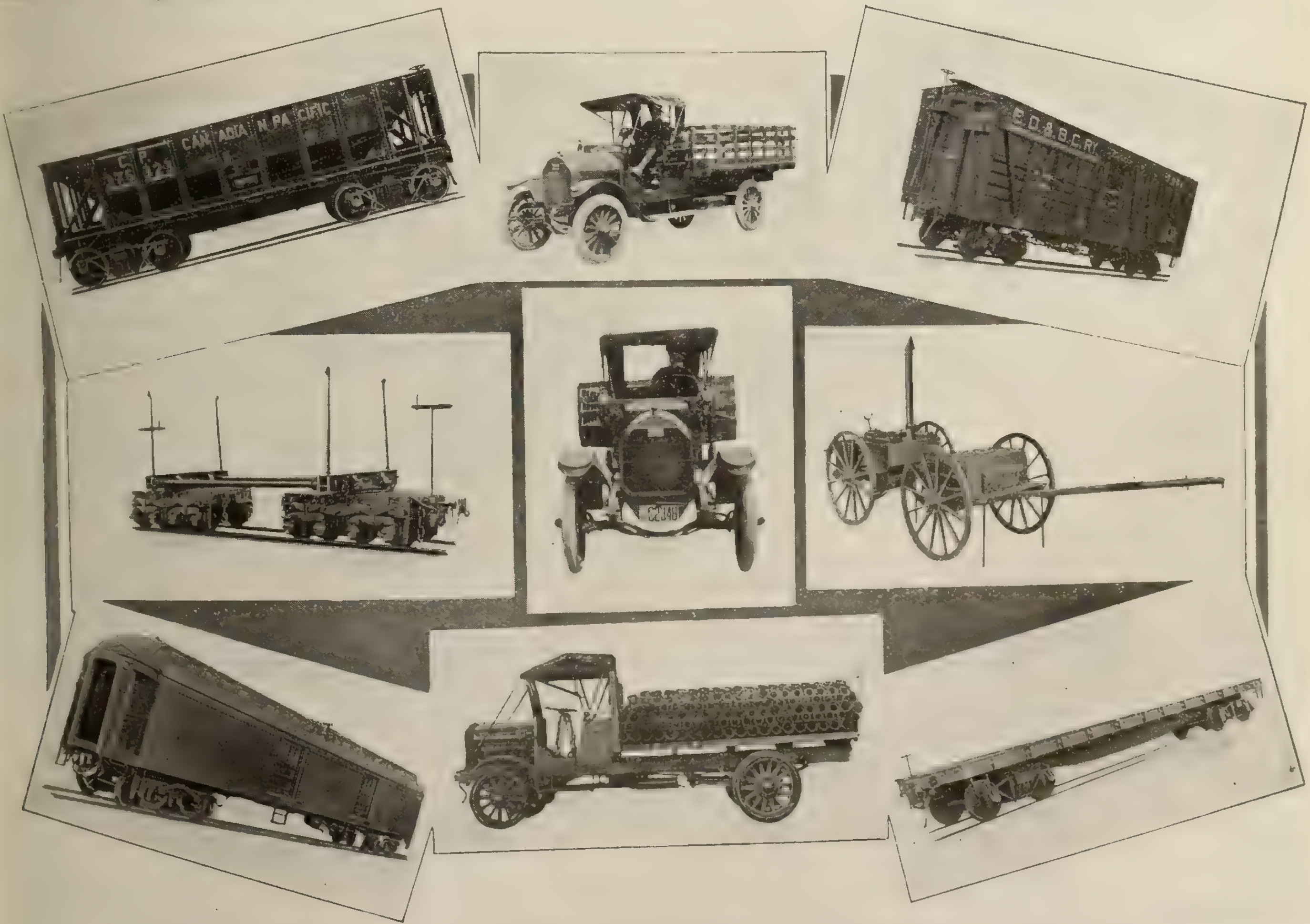
No development of modern science has been overlooked regarding its suitability for adoption as a manufacturing process, and it is not surprising, therefore, to find that oxy-acetylene welding has been adopted on a considerable scale as a manufacturing process. The rapidity and economy with which odd-shaped pieces can be produced with this apparatus have displaced much expensive forging work previously done by hand in the smiths' shop. Cutting stock of all sections to odd shapes, welding sheets, plates, straps and stampings to form standard items of car construction can be performed with an ease and economy previously unknown. The equipment in this department is of Canadian design and manufacture, the entire outfit being supplied by L'Air Liquid Society. Two large generators for producing acetylene gas from carbide are installed in a well-ventilated building about 75 ft. square, which provides ample room for ten or twelve operators to work in comfort. Part of the floor space is set apart for finishing, bench and grinder equipment being provided for three operators for dressing off rough edges, etc.

END VIEW OF STEEL SLEEPING CAR.

Power Plant

The supply of power for a plant of this nature is a problem of considerable importance, and has been solved by utilizing both steam and electricity wherever either of these systems proved better adapted than the other. The majority of the metal working machines are of large size and widely separated, being thus suited for individual drive by electric motor, while steam hammers, kilns, heating system and hydraulic pumps provide a considerable load for the boiler installation. The power house equipment consists, therefore, principally of steam driven apparatus.

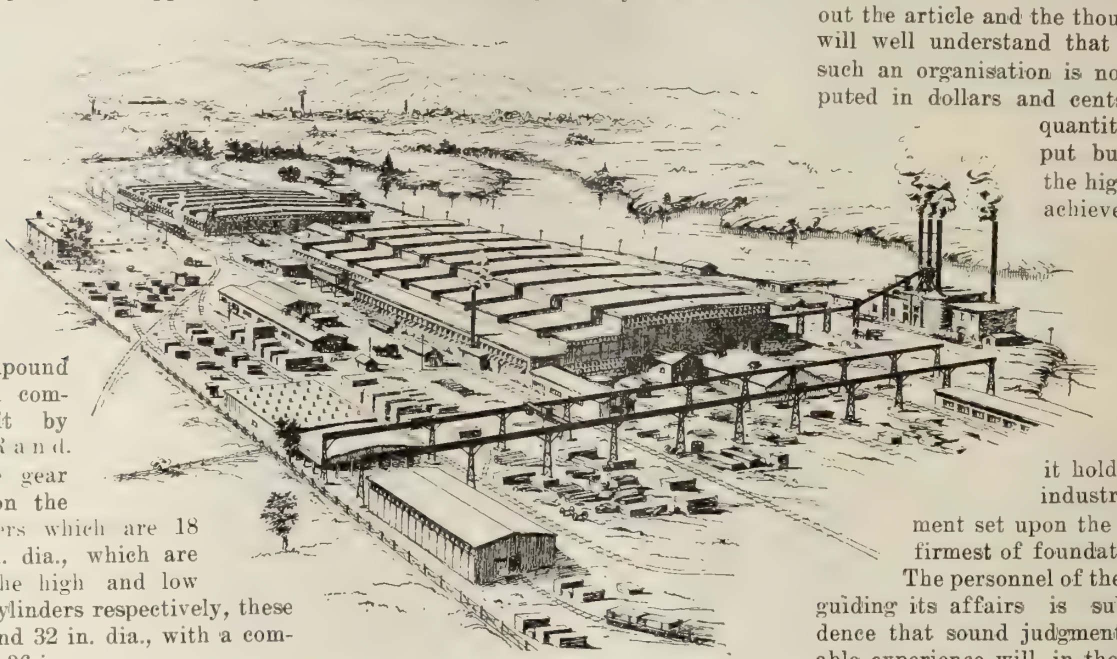
Hydraulic power is provided by 4 large Burnham compound pumps of the



PRODUCTS FOR RAIL, ROAD AND TRENCH PURPOSES BUILT BY THE NATIONAL STEEL CAR CO.

outside end packed plunger type working at a pressure of 1,500 lb. per sq. in. in conjunction with a 90 ton Wood accumulator. These pumps are served by a jet condenser supplied with water by a regular type of Burnham pump.

Pneumatic power is supplied by a cross compound steam driven compressor built by Canadian Rand. Corliss valve gear is provided on the steam cylinders which are 18 in. and 34 in. dia., which are coupled to the high and low pressure air cylinders respectively, these being 20 in. and 32 in. dia., with a common stroke of 36 in.



BIRD'S-EYE VIEW OF WORKS, SHOWING PRINCIPAL FEATURES REFERRED TO IN ARTICLE.

Boiler Equipment

The boiler equipment consists of five water tube boilers, three of those being built by the Erie City Iron Works and of 250 horse-power each. The other two are by Goldie McCulloch Co., and of 300 horse-power capacity each. Burnham feed pumps, and a Cochrane feed water heater complete the equipment. A conspicuous feature of the power house illustrations is the large exhaust pipe which carries shavings and other refuse into a silo well above the boilers from whence the fuel descends by gravity into the furnaces.

The office building is of utilitarian design and construction, being built of hollow tile, and furnished to suit the requirements of the different departments. Included in this building are the mechanical engineering, purchasing, accounting and treasury, executive and photographic. The company maintains its own emergency hospital and ambulance. Stretchers are located within a minute's distance of any part of the plant while notices in three foreign languages are posted in conspicuous positions where danger may arise. All minor injuries however slight are given immediate attention and that such efforts are fruitful is shown by the record of the past two years when as many as 2,000 men have been employed. During this period, no fatal accidents occurred, no legs were broken, one arm was amputated and two arms broken.

In the basement of the main office building is situated the restaurant for office staff and foreman. The necessity for such a facility was rendered evident by the distance of the plant from suitable establishments at which the employees could secure meals, also because experience has shown that makeshift efforts by the employees on their own behalf are not always maintained at a sufficiently high standard to conduce to the best state of efficiency physically or mentally. Permanent arrangements by the company resulted in the establishment of an up-to-date department including a fully equipped kitchen.

The nature and extent of the operations constantly proceeding will be apparent from the illustrations throughout the article and the thoughtful reader will well understand that the value of such an organisation is not to be computed in dollars and cents nor by the quantity of the output but because of the high standard of achievement which it holds forth as an industrial establishment set upon the broadest and firmest of foundations.

The personnel of the men who are guiding its affairs is substantial evidence that sound judgment and invaluable experience will, in the future as in the past, continue to characterize the policy of the company in all its affairs. The Board of Directors as at present constituted consists of the following gentlemen:—

President. — Sir John M. Gibson, K.C.M.G.

Mortimer B. Davis, President Imperial Tobacco Co., of Canada.

First Vice-President.—Basil Magor.

Second Vice-President.—Sir Henry M. Pellatt, C.V.O.

W. G. Ross, Chairman Montreal Harbour Commissioners.

C. H. Cahan, K.C., President Western Canada Power Co., Montreal.

R. J. Magor, Managing Director, Magor Car Co., New York.

J. J. Scott, K.C., Hamilton.

Murray H. Coggeshall, Coggeshall and Hicks, New York.

W. Kirkpatrick Brice, New York.

Samuel King, London, Ont.

NORTH SIDE OF SHOPS, WITH EMERGENCY HOSPITAL AND PRIVATE BOAT DOCK IN FOREGROUND.

The Mineral Production of British Columbia During 1915

By E. A. Haggen, M.E. *

The data here given details the salient features of the Annual Report of the Provincial Bureau of Mines for the year 1915, and incidentally constitutes the first authentic statement of the mineral production for that year. It will be observed that the aggregate output foi 1915 approaches the high records of 1912 and 1913. A noteworthy development is that of the establishment of local refining plants for the treat ment of copper and zinc ores.

THE annual report of the Provincial Bureau of Mines for 1915 is one of the best that has been issued by that department. It gives the first authentic statement of the mineral production for the past year, which stands third highest in the mining records of the Province. The total production is stated at $29,447,508, and was beaten in 1912, when the figures reached a total of $32,440,800; also in 1913, when the production reached $30,296,398. The figures are as follows for the year ending December 31, 1915:—

Mineral.	Quantity	Value	Increase over 1914	Decrease Under 1914
Gold, placer		$ 770,000	$ 15,000	
Gold lode, oz.	250,021	5,167,934	58,530	
Silver, oz.	3,366,506	1,588,991		$ 287,745
Lead, lbs.	46,503,590	1,939,200	167,323	
Copper, lbs.	56,918,405	9,835,500	3,714,181	
Zinc, lbs.	12,982,440	1,460,524	1,114,399	
Coal, tons	1,611,129	5,638,952		699,433
Coke, tons	245,871	1,475,226	67,764	
Miscellaneous		1,571,181		1,281,736
Total		$29,447,508	$5,237,197	$2,268,914

The net increase over the previous year is thus $3,058,685, due mainly to the output of copper and the exceptionally high prices for that metal ruling during the latter part of the period. The remarkable increase was in zinc, the production of which increased nearly 100 per cent., while the selling price showed an increase of over 400 per cent. With the increase of copper production, gold and silver might have been expected to show a greater increase, as these metals always accompany copper in this country.

The decrease in coal consumption is due to the inroads of fuel oil, a condition which the increasing price of oil and the additional cost due to the new tariff will no longer permit to continue.

It is interesting to note that the mineral production of the Province has exceeded the half billion mark, $516,270,253, to be exact. Of this amount gold accounts for $160,803,053, of about 35 per cent. Coal accounts for $156,928,640, or about 30 per cent. Copper ranks next with $96,774,870, or about 18 per cent. Silver comes next to copper in importance, with $39,298,273. Lead figures reach $33,407,662. Building material production, involving bricks and building stone, is valued at $25,398,282. Zinc production amounts to $3,659,473.

Placer Gold

The placer gold return for 1915 is the highest since 1907, and was mainly due to increases in Cariboo and Atlin, which two districts produced 90 per cent. of the total. Owing to the number of men out of work last summer there were more individual parties working than usual on the Fraser, Thompson and Quesnel Rivers. Atlin production is placed at $377,000; Cariboo at $215,000; Quesnel at $85,000; East Kootenay, where for some years placer gold mining has been negligible, produced $15,000, and Similkameen, Nicola and Vernon rose from $3,000 to $12,000; Nelson yielded $1,000; Revelstoke, Trout Lake and Lardeau, $2,000; Boundary and Yale, $2,000; Yale, Ashcroft and Kamloops, $10,000; Lillooet, $8,000; the coast districts, including Vancouver Island, are credited with $2,000.

Lode Gold

Increased ore production in Boundary and Rossland and opening of new properties in Skeena and Omineca accounted for the increase in lode gold, in which the Coast and Nelson districts showed a decrease.

The lode gold production was not so great as in some previous years, the output having been nearly half a million more in 1913, $150,000 more in 1912, $35,000 more in 1910, and nearly $100,000 more in 1908, so that lode gold mining is not making the progress it should. Rossland leads with 142,595 ozs., and Boundary ranks next with 87,870 ozs., mostly derived from the smelting of copper ores carrying gold. Nelson and the Coast districts show a falling off, the former of 6,000 ozs. Similkameen was the largest producer of free gold, the Hedley Gold Mining Co. output being 6,000 ozs. over previous years, and all valued at over $900,000. This district, however, is not specially given credit for the foregoing production, it being included in the Boundary returns. Nelson produced 9,233 ozs., Skeena 5,034 ozs., Coast districts 2,490 ozs., Omineca 1,524 ozs., and other districts combined 1,275 ozs. Rossland shows an increase of 4,027 ozs. over previous year, and Boundary an increase of 2,962 ozs., entirely due to the Granby production, which shows an increase of 8,000 ozs., but this is offset by the falling off in the gold output of the Greenwood smelter and the Jewel mine. Skeena shows an increase of 75 per cent. due to the production of copper ores at Anyox.

Silver Output

The silver production was the lowest in the last three years as regards quantity and the lowest in four previous years as regards value. This was the only metal which did not recover from the slump of prices following the declaration of war. The price was about 5c per oz. less than the previous year and about 10c. per oz. less than for 1913. Slocan produced 62.9 per cent. of the total and Fort Steele 14.3 per cent., the latter being almost entirely from the Sullivan mine. The following is the production of the various mining divisions: Slocan 1,812,550 ozs., Fort Steele 481,258 ozs., Ainsworth 289,565 ozs., Boundary 273,795 ozs., almost entirely as a by-product from the copper smelters; Skeena 175,179 ozs., Trail 159,584 ozs., almost entirely as a by-product of Rossland gold-copper ores; Omineca 79,155 ozs., Coast 66,033 ozs., mainly as a by-product of the copper ores from the Britannia mine; Trout Lake-Revelstoke 16,740 ozs., Nelson 9,405 ozs., mainly from Sheep Creek; and all other districts 3,242 ozs.

Lead Production

This metal showed a falling off of 4,121,458 pounds as compared with previous years, but owing to the price being three-quarters of a cent. per pound more, the value was greater by $167,323. Fort Steele division leads with 57 per cent. of the total production, mainly from the Sullivan mine. Slocan produced 32.10 per cent. of the total. The production of the various mining divisions was: Fort Steele, 26,582,050 pounds; Slocan, 14,925,345 pounds; Ainsworth, 3,436,184 pounds; Nelson, 967,775 pounds; Omineca, 249,279 pounds; all others, 342,957 pounds. The lead output was the lowest in the last three years. This is due to the fact that the lead production is mainly from argentiferous galena, and owing to the low price of silver, most of the Slocan mines were shut down for the first half of last year.

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*Editor, the Mining and Engineering Record.

Copper Shows Record

Copper was one of the two metals in which there is a record production for 1915, the amount being over 5,000,000 pounds greater than for 1912, the next highest year. The copper production of the province has doubled in the past fifteen years, and copper mining is making such rapid strides that the production should be doubled again within the next two years. The value was about $1,500,000 greater than for 1906, when the high copper prices of that cycle reached their climax. The exceptionally large production last year was due to the enterprise of the Granby Consolidated Mining, Smelting & Power Co., which provided 66½ per cent. of the total production.

Great changes are taking place in the source of the copper output. Boundary production has fallen off 50 per cent. as compared with 1912, due to lessened ore production and reduced grade of ore. Rossland output has doubled. The output of the Coast districts has more than doubled, owing to the operation of the Granby Co. new mine and plant at Anyox, and the increased production of the Britannia. Yale-Kamloops districts are increasing in importance as copper producers, their output showing an increase of 850 per cent. in three years. Nelson produced only 51,941 pounds, as compared with 586,764 pounds in the previous year, and 815,126 pounds for 1913.

The Coast districts produced 60.65 per cent. of the total for 1915, and Boundary districts produced 30.5 per cent. Coast areas were also the richest in copper, averaging 38 pounds per ton, while Boundary ores averaged only 14 pounds, and Rossland ores only 13½ pounds copper per ton. The ores of the latter camp are, however, gold rather than copper ores.

The growing importance of British Columbia as a copper producing country is evident from the fact that for the past year the value of this metal alone was almost as much as that of all the other metals put together. At the present time Japan is the world's largest copper producer, next to the United States, but at the present rate of progress this province will, within the next two or three years, displace Japan as the world's second largest producer. The history of copper mining, too, is that it affords the most reliable and permanent of all classes of mining, so that the towns being established in connection with the copper camps can, as a rule, look forward to becoming practically permanent communities.

The question of the local refining of copper has attracted much attention during the past two years. Hitherto all copper produced here has been refined in the United States, the Boundary blister copper going to the Nichols refinery in New York State, and the copper from Trail smelter, the Britannia mine and the smaller mines shipping to Tacoma smelter, going to the copper refinery operated in conjunction therewith. The present year will see the copper refining industry established for the first time in British Columbia, a refinery to produce about ten tons of refined copper per day having been almost completed at Trail smelter.

Zinc Production

The zinc production of British Columbia is showing important strides, the amount for 1915 being about double that of 1913, while the increase over the 1914 output was 65 per cent., and about 50 per cent. over 1909, the previous high record year in zinc. The price, too, was about 160 per cent. better than the average due to the exceptional war demand. Two-thirds of the production was from the Slocan mines; 25 per cent. from Nelson division, and the rest from Ainsworth and East Kootenay.

The principal producers were: Standard Silver Lead, 3,778,857 pounds; H B., on Sheep Creek, 2,387,514 pounds; Silverton Mines, 1,385,859 pounds; Zincton, on Sheep Creek, 739,695 pounds; Retallick Mine, Ainsworth, 576,000 pounds; Lucky Jim, 788,158 pounds; Rambler-Cariboo, 546,660 pounds.

Hitherto all the zinc ores produced in the Province had to be exported for treatment, mainly to the United States. The current year has seen the important addition to the metallurgical plants of British Columbia of a zinc refinery operated at the Trail smelter.

Other Metals

The only other metals of which there was any production were molybdenite and antimony. From the Molly group, on Lost Creek, south of Sheep Creek, in the Nelson district, there were shipped 24 tons averaging 12.26 per cent. molybdenite, and on this property are several thousand tons running from 2 per cent. to 4 per cent., which it will pay to mill, and ship the concentrate. The only other molybdenite property worked is at the Reil Camp, on Alice Arm, where a mill has been built, and shipments have been made to Seattle. Molybdenite, concentrated to a grade of between 85 per cent. to 90 per cent., brings from $2,500 to $3,000 a ton.

Antimony was another of the war metals that went skyrocketing in price to 55 cents per pound, though it is now back at the normal price of about 15 cents. This mineral is common in British Columbia, but only one property is reported to have made shipments last year, and that was the Alps-Alturas, on the North Fork of Carpenter Creek from which two cars were packed and shipped to Scotland, the content being 50 to 55 per cent. antimony.

Earthy Minerals

Building stone and brick show a heavy falling off, owing to the smal amount of new construction going on the output for the year being only about half that of recent years. Two new classes of deposits were developed and small shipments made. There were the hydromagnesite deposits at Atlin owned and operated by Armstrong & Morrison, of Vancouver, from which about 70 tons were mined and shipped There is likely to be an increasing demand for this mineral on account of the development of the pulp industry The other mineral deposit worked is at the Bitter Lakes in the Similkameen where Epsom Salts occur in nature Three hundred tons were mined and shipped to New York.

Coal and Coke

The output of coal was the lowest in nine years. The coke output showed an increase of about 11,000 tons over 1914 but was still below the returns for 1912 1913, 1909 and 1908. Vancouver Island produced more coal than the whole o the mines on the mainland put together The respective production was: Vancouver Island, 1,020,942 tons; Mainland 951,638 tons. Of the Mainland mine The Crows Nest produced 852,572 ton and Nicola and Similkameen 99,060 tons.

Of the coal production 361,451 ton went into the manufacture of coke fo the smelters. Of 245,871 tons of coke produced, 5,450 tons were made a Union Bay and 240,421 tons by the Crows Nest Pass Coal Co. While th British Columbia demand for Vancouver Island coal fell off 17 per cent., exports to the United States increased.

* * *

C.P.R. AND CANADIAN TIMBER

THE Canadian Pacific Railroad ha taken the lead in using Canadian wood in its car and hotel building. It conserves some 6,000,000 acres of timbe limits, and aids in every possible way to make known this source of almos uncountable wealth—knowing that timber wealth always constitutes an eloquent appeal to the settler, prospector or capitalist. The company has jus made up some figures which show th timber wealth of the country, an these, at the present juncture, will no be without interest: Lumber, laths an shingles, $67,500,000; firewood, $60,500 000; pulpwood, $15,500,000; posts an rails, $9,500,000; crossties, $9,000,000 square timber exported, $400,000; cooperage, $1,900,000; poles, $700,000; log exported, $850,000; tanning materia $22,000; round mining timber, $500,000 miscellaneous exports, $300,000; misce laneous products, $10,000,000.

Montreal Locomotive Works Plant and Equipment.

STAFF ARTICLE

In addition to the locomotive building and repair plants connected with Canada's principal railroad corporations, outside enterprise, by close attention to and observation of possibilities, has proved itself a valuable adjunct, and has contributed in no small measure to the high degree transportation achievement which the former have to their credit, and to the outstripping of which their efforts and activities conspire. What is indicated in the foregoing is readily applicable to the Montreal Locomotive Works, Longue Point, Quebec.

THE Montreal Locomotive Works was incorporated under the Dominion Companies Act in June, 1902, and in March, 1904, the first locomotive built entirely in every detail in the company's works was delivered to the purchaser, the Toronto, Hamilton & Buffalo Railway Co.

The plant is situated about six miles north-east of the heart of the City of Montreal, between the Canadian Northern Railway on the Northwest and the St. Lawrence river on the southeast and is intersected by the Quebec turnpike which is an extension of Notre Dame street, one of the principal streets of Montreal. The property has an area of 68.1 English acres. A system of tracks connects the buildings with the railway mentioned, and through same with all the lines that radiate from Montreal. Tracks also run from the works down to the river front, where the Government has constructed a dock and basin for the accommodation of ocean steamships. It will be seen, therefore, that this company possesses every facility for the import of the raw material and export of its finished product in any direction.

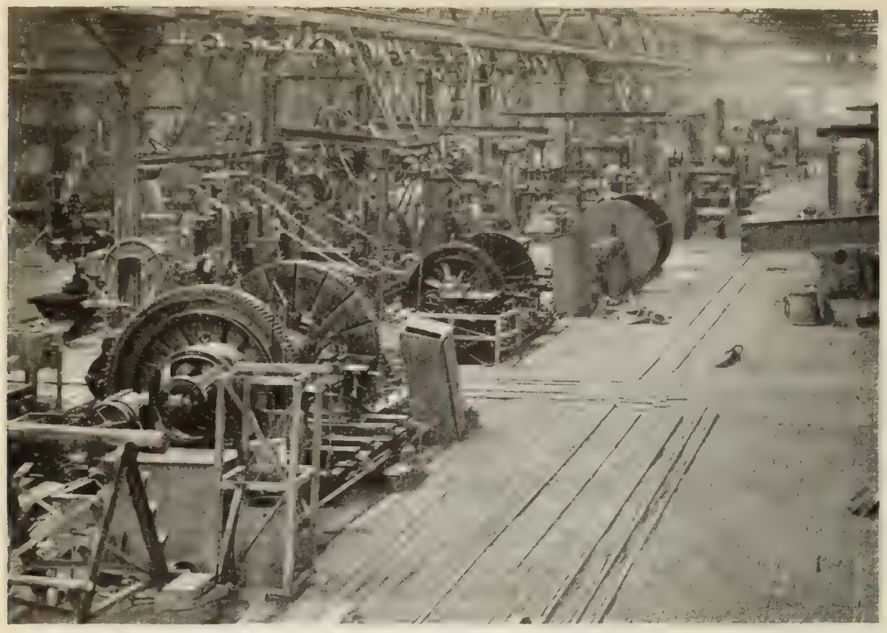
EXTREME EAST END OF NORTH BAY OF MACHINE SHOP, SHOWING PORTION OF FRAME DRILLING AND SLOTTING DEPARTMENT.

Plant Layout

The layout of the plant, which comprises 25 buildings, was the result of a careful study of the problems involved, and is believed to be unique for compactness and minimum distances of handling from raw material to the finished product. One of the distinguishing features of the arrangement is that all the principal shops necessary for the production of a locomotive are included under one roof. Objections raised against this style have been:—(1) A possible want of light. (2) Increased insurance; both of which have been met. Indeed, it is believed that no similar shop has been insured at a lower rate; the light shows for itself in the interior photographs. The main building is of structural steel framing, the columns being supported on iron pedestals which in turn stand on concrete base blocks. The side walls to a distance of four feet above the ground are of stone. At each column is a brick pilaster from the stone work to the roof, the space between the pilasters being largely of glass.

Machine Shop

The main building consists of seven different departments—hammer shop, boiler shop, tank shop, foundry, machine shop, erecting shop and running shed. The machine shop is 600 feet long and 169 feet wide, with an adjoining annex 222 feet long and 136 feet wide. The machinery in the shop as well as throughout the whole plant is electrically operated, and a large majority of the tools are equipped with individual motor drives. Tools which require frequent change of speed are



SOUTH BAY OF MACHINE SHOP LOOKING EAST, SHOWING INDIVIDUAL MOTOR-DRIVEN MACHINES, TOGETHER WITH MOTOR-DRIVEN GROUPS.

driven by variable speed motors, thus avoiding the shifting of belts and the changing of gears when change of speed is required. This results in a great saving in time and energy on the part of the operator, thereby increasing the efficiency of the shop. The tool equipment throughout the entire shop is modern and is constantly being enlarged; a liberal policy being in force by which new tools and devices which tend to accelerate the output or decrease the cost of production are installed as soon as their merits have been established.

Among some of the special machinery are several four-head planers having a bed 55 feet long and a clearance between housings of 5 feet; two triple head frame slotters—each head separately driven, having a bed 50 feet 1 inch long and 61 inches wide, and capable of slotting six bar frames at one time; universal and plain milling machines with tables running from 60 to 193 inches in length; and wheel and tire boring mills having swings from 51 to 90 inches. This shop is served by eight electric traveling cranes, five being of 10 tons capacity each, one of 16 tons, and two of 20 tons each. A large number of fixed radial cranes serve each tool where required, thus obviating waiting for the traveling cranes.

Hammer Shop

At right angles to the machine shop and on a line with the western end of it is the hammer shop. This building is 380 ft. long by 86 ft. wide. It is equipped with two large 6,000 lb. steam hammers for heavy forgings. Besides these are a number of smaller hammers for blacksmith and drop forging work, bulldozers and bolt forging machines, as well as hydraulic presses. Several radial jib cranes, with a range of 360 degrees, and equipped with air hoists or suitable chain blocks, are located at intervals along the centre of this department, and every facility is provided for the convenient and rapid handling of material and shop equipment.

BOILER SHOP, WEST BAY.

Boiler Shop

Next to the hammer shop is the boiler shop 380 ft. long by 135 ft. wide. At the south end of the shop is a riveting tower 66 ft. high, 40 ft. wide and 65 ft. 6 in. long. The riveting tower contains one 17 ft. gap, 125 ton pressure hydraulic riveter, and one 10 ft. 6 in. gap, 80 ton pressure hydraulic riveter. This shop is equipped with the latest improved machinery, including a hydraulic flanging press capable of 450 tons pressure, served by an oil furnace with capacity sufficient to take any size sheet. There are also two large bending rolls, one 12 ft. 3 ins. between housings and the other 16 ft. 4 in. between housings; a plate planer and a number of large

SMITH SHOP SHOWING PART OF DROP-FORGING FLOOR.

punches and shearing machines. One of the main features of this shop is the plate drilling equipment consisting of several large radial drills having special heads. All holes subjected to steam pressure are drilled instead of being punched. The several fires in the shop are served by fixed radial cranes. For traveling heavy pieces through the shop, cars are used on a centre track. This shop is also served by five electric traveling cranes, one of 10 tons capacity, one of 20 tons, one of 25 tons and two of 60 tons each. Alongside the boiler shop is the tank shop 380 ft. long by 66 ft. wide.

SMITH SHOP, LOOKING SOUTH.

Erecting Shop

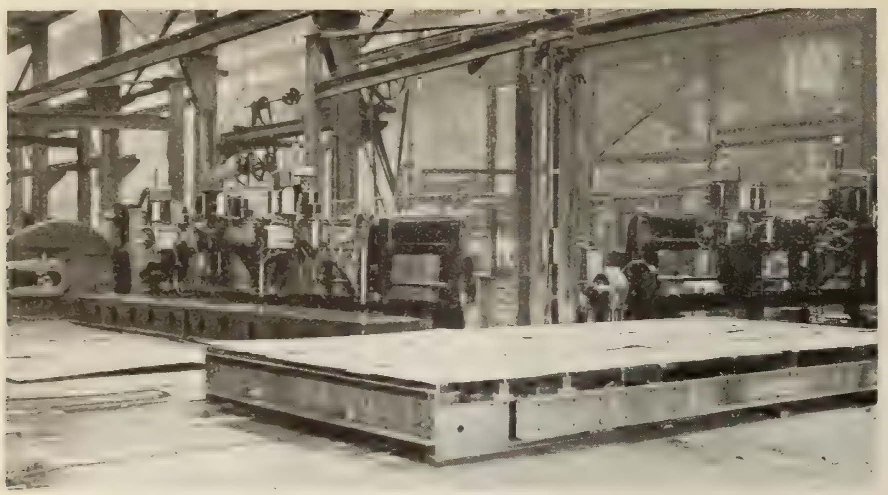
Adjoining the machine shop is the erecting shop 182 ft. wide by 120 ft. long, served by two electric traveling cranes, one being of 20 tons capacity, and one of 150 tons capacity. This shop has eight erecting pits and one testing pit and thoroughfare, giving a capacity of nine to ten large locomotives in process of erection at one time. Three tracks run from the erecting shop into the running shed which is 123 ft. long by 65 ft. wide. This shop will hold nine large locomotives under steam at one time. Adjustable smoke jacks have been installed through which is induced by means of an exhaust fan the smoke from locomotives under immediate test.

The pattern and carpenter shops are together in a two-storey brick building 65 ft. wide by 111 ft. long. Back of this building is the pattern storage house, a single storey building 65 ft. wide by 98 ft. long.

The Foundry

Southeast and alongside of the machine shop extension is the foundry 280 ft. long by 220 ft. wide, having two cupolas with capacities of 15 and 20 tons per hour respectively. It will be noticed that ample space is provided on either side of the units shown for additional cupolas. The hot air heating system is also clearly indicated, pipes extending down alongside each main column. At the north end of the moulding department for heavy castings is seen one of the hot air distributing units. A large fan operated by a small vertical engine draws its supply of heated air from the chamber at the right, which is provided with steam coils. The moulding floor occupies a space 280 ft. in length and 63 ft. in width, of which a space 42 ft. by 80 ft. is devoted to machine moulding. By referring to the illustrations it will be seen that all large moulding boxes are designed for their particular purpose. Both in this and in the small castings departments, the equipment is of modern and up-to-date design, every facility being provided, also labor-saving apparatus for the rapid and economic production of all classes of locomotive and grey iron castings. Two large ovens are located in the east end of the foundry for drying cylinder and other large cores, each oven being 8 ft. 6 in. wide, 10 ft high, and 34 ft. long, inside measurements. In addition, there are four core ovens, each 8 ft. 6 in. wide, 8 ft. 5 in. high and 23 ft. long, as well as two reel type ovens for small cores, each 60 in. by 70 in. Six overhead traveling cranes serve this department, there being two of 5 tons capacity each, three of 10 tons,

SMITH SHOP, LOOKING NORTH, SHOWING FORGING MACHINE FLOOR.



NORTH END OF BOILER SHOP SHOWING PART OF THE ELECTRICALLY-DRIVEN, HYDRO-PNEUMATIC DRILLS FOR DRILLING RIVET HOLES.

and one of 20 tons. The controlling cage in most cases is located at the middle of the crane, as this position permits the operator a clearer view of all sections of the floor, and offers increased facilities for locating the ladle and heavy moulding boxes. In addition to the travelling cranes, the heavy casting department is equipped with a number of wall cranes, one being located at every other main column. These swinging cranes are provided with one-ton Peerless chain blocks. Owing to the severe weather conditions prevailing in Montreal in winter, all foundry supplies are kept under cover in a large supply storage room adjacent to the main bay and convenient to the charging floor. Such materials as moulding sand, coke, pig iron and scrap are housed therein. The charging floor is served from the storage room by means of skips handled by a 10 ton electric traveling crane.

The various materials are taken as required from the supply in the storage department, loaded into skips and elevated to the extended section of the charging floor shown in the upper right hand corner of the storage bay. The skips, which are constructed of sheet steel and steel angle, are so designed that when placed on the tracks, the flanged edges prevent them from slipping when the load is discharged from the tilting platform located in front of the charging door of the cupola.

Power Plant

Owing to the abundance of hydro-electric power in the Province of Quebec, a large part of the electrical energy required is purchased, but a power-house is provided, conveniently situated for economical distribution to all the departments. The boiler equipment consists of six water-tube boilers of 250 horse-power, each fitted with superheaters, arranged in three batteries. The boilers have automatic underfeed stokers and induced draft. Overhead are two coal hoppers, each of 20 tons capacity, from which pipes lead to the automatic stokers. The coal is hauled upon a trestle to the top of the building and dumped into a coal breaker from which it drops into the bins. The engine room equipment includes one cross-compound Corliss condensing engine of 600 horse-power belted to a 400-kilowatt generator; one 710 horse-power motor generator set; and three air compressors having a total capacity of 6,000 cubic feet per minute, which maintain an air line pressure of 100 lbs. per sq. inch distributed to all departments. There is also located in this building a 1,000 gallon per minute Underwriter fire pump.

NEW GREY IRON FOUNDRY, NORTH END OF MOLDING FLOOR FOR HEAVY CASTINGS.

NEW GREY IRON FOUNDRY, STORAGE BAY FOR RAW MATERIALS SHOWING CHARGING FLOOR UNDER RIGHT-HAND END OF TRAVELING CRANE.

Water Supply

The water supply for drinking purposes is taken from a drilled well 500 ft. in depth, and is distributed throughout the works by a steam-driven deep-well pump. All the roof drainage, the overflow from the condensers, hot-well,

EAST HALF OF SOUTH BAY, SHOWING NEW TRUCK AND CYLINDER SHOP.

etc., drain into a reservoir of 300,000 gallons capacity. On the river bank are located two 2-stage centrifugal pumps, each having a capacity of 600 gallons per minute, connected to the distribution mains and the reservoir. Ordinarily they keep the reservoir full, but in emergencies can pump direct into the fire-protection service. The 1,000 gallon Underwriter pump in the power-house takes its supply from this reservoir and distributes the water about the works. There is also a 50,000 gallon tank elevated on a steel tower 100 feet in height directly connected with the mains and upon which the sprinkler system depends for a steady supply and head. It should be noted that all of the shops are fully equipped with automatic sprinklers.

Locomotive Production

A complete system of gauges and templets is in force by which parts of locomotives of the same class are made in duplicate and interchangeable. The plant is equipped to build locomotives regardless of type or size. At present the works have a capacity of about 460 locomotives per year, the latter having an average weight of 200,000 pounds each. In addition to the locomotive output this company also builds a rotary snow plow, which has a high reputation for handling deep snow.

* * *

SOME INTERESTING FIGURES

DURING the past year the C.P.R. received from passengers $24,690,652; from freight, $89,654,405; from sleeping cars, express, telegraphs, and miscellaneous, $13,752,260.

The transportation expenses came to $38,915,381; maintenance of way and structures, $14,071,791; maintenance of equipment, $16,695,955; traffic expenses, $21,798,699; parlor and sleeping car expenses, $990,410; expenses of lake and river steamers, $829,811; general expenses, $4,014,753; commercial telegraphs, $1,339,161.

The number of passengers carried one mile was 1,255,561,198, as compared with 1,164,488,630 last year. Tons of freight carried one mile, 14,050,685,773. Last year the C.P.R. carried 126,909,828 bushels of grain; this year it carried 276,788,209 bushels.

NEW GREY IRON FOUNDRY, SOUTH END OF MACHINE MOLDING FLOOR.

With such an army of workers, the pension figures of the C.P.R. are always interesting. Last fiscal year there was $240,222 distributed to retired employes all over the system. This money is forwarded in cheques to the place of residence. It comes as regular as clockwork. It costs the recipient nothing. There are, as the annual report just to hand shows, 60 on the pension rolls under 60 years of age; 445 between 60 and 70, and 329 over 70, making a total of 834 enjoying pensions. The amount which the company contributed during the last fiscal year was $125,000. There is a balance of $585,548 up to the end of the present fiscal year.

ERECTING SHOP FROM WEST END, LOOKING EAST.

HOW TO GET EXPORT TRADE

THE manufacturer who proposes to enter some sphere of export trade must at least have a general knowledge of the conditions under which same should be sought and catered for. He should be in a position to determine clearly what classes of buyers exist so as to choose definitely on which of them it will be best to concentrate his selling efforts. More than that, he must learn what different forms his selling efforts must take, and also what forms he must avoid, says the Exporter's Handbook.

Concentration and Specialization

The manufacturer must make up his mind definitely, for good or ill, which branch of the export trade he will enter. It will be useless for him to think that he can safely snap up orders from any and every direction, attempting to supply all markets through all channels, yet concentrating on none. System, and a certain conservative adherence to the apparently arbitrary conditions which exist, are essential. The established order of things—call it a congerie of vested interests or what you like, cannot be defied with impunity, not only because those vested interests are powerful, but because they are the interests of every section of the shipping trade, and not merely of privileged groups or individuals, being based on vital business necessities, and not on selfish monopolistic grounds at all. The insistence on indents from the great colonial and other established markets going solely through the hands of merchant-shippers or commission buyers is a case in point.

Organisation of Export Department

The manufacturer must decide to create a properly organised export department, to be run by an expert untroubled by considerations of home trade, and to have an equal call on the service of the factory with that exercised by the home sales department. Above all, the export department should be given full and constant consideration, and not treated in an opportunist spirit as a mere adjunct or a non-essential speculation, to be pushed or neglected at convenience, or to be subservient to the exigencies of the home trade.

Special Treatment Feature

The markets to be catered for must be definitely selected, and for sound reasons in each case. The world generally is not prepared to accept and adopt the standard requirements of any particular nationality product or products. Each market rightly insists, and will do so increasingly in the future, on having its own particular tastes and requirements specially catered for; therefore, a manufacturer will not be justified in allowing his export ambitions to expand unduly on the strength of selling a good article. It is useless to say that what is good enough for the home trade ought to be in favour anywhere else in the world. The wise policy is to discover what oversea markets a particular firm's products are most suited for, and its facilities for production, most easily adaptable to, and to confine attention to those markets. Indeed, a sound rule for the beginner in export trade is to select one market only, and to work it thoroughly, not necessarily refusing shipper's orders for other destinations, but consistently directing the active catering and selling policy to the satisfaction of the chosen market. That is a system which can easily be extended as circumstances require, whereas to diffuse uninstructed energy over all markets, and to hit the mark in none, is a course of action which deliberately invites failure.

Export Salesmanship

There is the modus operandi of export salesmanship to be studied. The indenter abroad must be discreetly canvassed without antagonising the home merchant and buying houses upon whom the financial responsibility for the business rests. This work, as has been shown, depends upon the employment of one or more various types of selling agents, and it is in the selection of and relations with, these that many manufacturers make their worst and most costly mistakes. Much patience and care must be exercised in finding the right firms or individuals and, indeed, the building up of a successful agency system abroad often involves a series of disappointing failures, though persistence always ends in a satisfactory and permanent appointment or appointments being made.

Further, the entire onus of showing results should not be thrown upon the agent when appointed. It is futile to expect him to create business if not vigorously and intelligently supported by his principals. He can do nothing unless he has the right goods to sell, and unless his customers can rely on having their representations, complaints and instructions to him promptly and properly attended to by the manufacturer with whose interests he has been entrusted. In fact special vigilence should be displayed by the manufacturer in seeing that the distant overseas representative is not ignored and neglected for the benefit of the firm's home travellers, who, being on the spot, can make their demands on the factory and dispatching room, more clamorous and insistent.

A keen and experienced representative is required in London, and probably in other centres, to get confirmation from the shipping and buying houses of t largest possible percentage of t orders notified by the overseas rep sentative , and also to be alert to pi up any open orders that may be offer. It is a gross mistake to suppo as so many firms appear to do, that under-paid junior will do this work.

Manufacturer's Personal Interest Vi

Finally it remains for the manuf turer himself to take a keen perso interest in his export business, to pu it by advertising and other gene means, to utilise to the full such offic assistance as may be available, and the earliest convenient moment to ma a personal tour of investigation in market or markets he is serving. It an invariable experience that the pearance on the scene of operations the principal of a manufacturing fi does more than anything else to stir late and encourage agents, to consolid relations with importers, and, not le important to bring about an intellig and vitalised treatment of shipp orders in the factory and office after return home. These in outline are guiding principles to be followed establishing an export connection th will be worth while.

* * *

GRAND TRUNK PACIFIC BRIDG

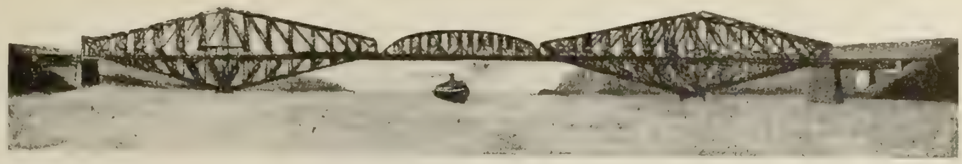
A FEATURE of the Grand Trunk cific Railroad is the series of splen bridges on the line are on the pra pert—65, to be exact. In other wor there are 5.4 miles of steel bridging that vast stretch. Three of the larg bridge on the line are on the pra section, these being South Saskatc wan Bridge at Saskatoon, 150 feet l and 71 feet high; Battle River Bri 5,410 feet long, including approacl and 190 feet high; and Clover Ri Bridge, over the North Saskatchev River, 1,653 feet long and 138 feet hi There are also three bridges on mountain division, over 1,000 feet length, namely, McLeod River Bri 1,055 feet long and 116 feet high; Schiswap Crossing, 1,030 feet long 190 feet high; Fraser River, Fou Crossing, 2,,650 feet long and 36 high.

The highest bridge on the systen that over Pembina River, 860 miles fr Winnipeg, 208 feet high. The Fr River is crossed four times, steel bric being at miles 1073, 1189, 1233, 1276 from Winnipeg. The roadbed the system is 18 feet wide, with r weighing 80 pounds per yard. The dients through the mountains are aln as easy as the prairies themselves. W these outstanding features, the sys is equipped to secure a remarkable gree of efficiency.

NEW QUEBEC BRIDGE

"MAKING ENDS MEET"

STAFF ARTICLE



It will be noted from what follows that most elaborate detail arrangements have been made to ensure success in the operation now imminent of linking-up through its ultimate member the highway of steel which will connect the North and South shores of the St. Lawrence River just west of Quebec City. May wind and tide harmonize with the human element and thereby render less onerous the normally stupendous nature of the task.

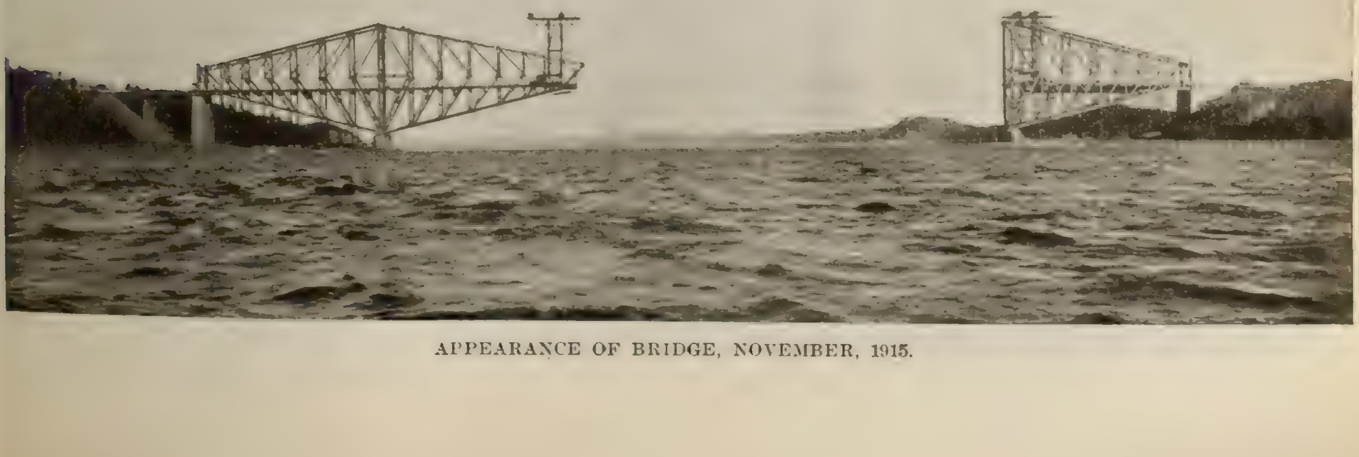
THE Quebec Bridge, one of the greatest engineering feats of its kind in the history of bridge construction, is fast approaching successful completion. The placing of the centre span, which is expected to be one of the most interesting and important features in connection with the entire structure, is awaited with deep interest by the engineering fraternity the world over, the hoisting and connecting of this middle section being conceded as marking the culmination of engineering achievement in the spanning of marine highways.

During the season of 1915, the North shore truss was entirely completed, the false work removed, and the travelling crane dismantled and transprted to the site where the centre or suspended span was to be erected. Simultaneously with the erection of the North shore cantilever arm, the South shore anchor arm was being put together. In order to insure accurate alignment of the two sections of the bridge, calculations and observations were taken at stated periods of construction; same constituting essential factors in connection with this huge and world-unique undertaking.

1916 Operations.

During the winter months, the fabricated material for the suspended span was finished in the works of the St. Lawrence Bridge Co., who are the contractors for the construction and erection of the bridge. About the first of April, 1916, operations were started on the river arm of the South shore section, which was practically completed about the first of August. The actual working days were 92, about 27 days being lost from inclement weather, Sundays, and Legal Holidays. An average gang of 200 men was constantly employed during this period. The total weight of steel placed in position this season amounts to about 13,000 tons; which, with that contained in the suspended span, will total approximately 19,000 tons. Owing to the experience gained on the North shore section, the work this season has been accomplished in 25 per cent. less time than the corresponding work of last year; as a result, erection has progressed so rapidly that the South shore section has been finished one month ahead of schedule time. Fig. 1 shows the South shore cantilever as it appeared on August 6, with the travelling crane still in position; it being used for the placing of the mooring frame and hoisting equipment.

For the past four or five weeks, workmen have been engaged in installing the mechanical equipment and other apparatus required for the floating of the span and the hoisting of same to its final position between the two cantilever trusses. While the date for floating the span has been arranged for September 11, the actual day on which the supreme operation will take place will depend largely, if not entirely, upon weather conditions. The St. Lawrence River, at the bridge site, has a current of six or eight miles an hour, and a twelve to sixteen foot tide, therefore it is essential, that a time be selected—at high tide, when the wind is not excessive; weather disturbances would naturally



APPEARANCE OF BRIDGE, NOVEMBER, 1915.

increase the already known contingencies of tide and current. The hour of proposed floating has been set for between four and five in the morning, at which time the tide is most favorable. This will also give a long day for the operation, and, in order to prevent interruption, the Department of Marine and Fisheries, Ottawa, have issued notices to the shipping interests, that river traffic will be suspended on that date.

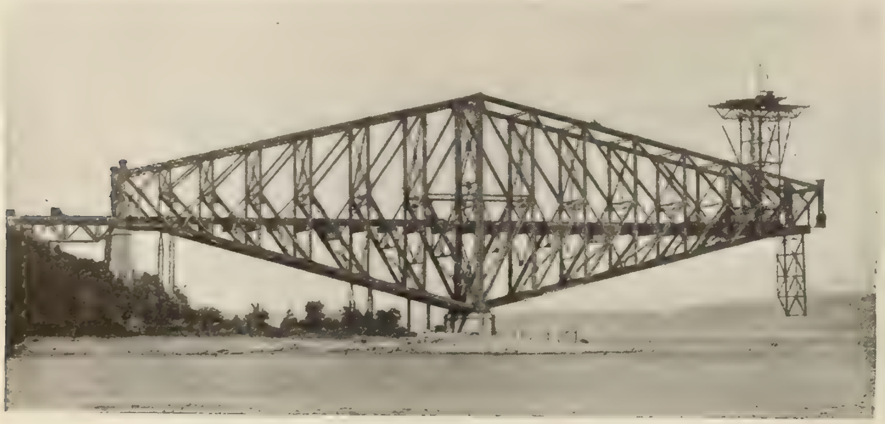


FIG. 1. SOUTH SHORE CANTILEVER, AUG. 6, 1916.

Centre Span Construction

Work on the construction of the centre span, which has a length of 640 feet, a width of 88 feet, a height at the centre of 110 feet, and weighs approximately 5,500 tons floated, commenced about the middle of April of this year, and was completed during the latter part of July. The site chosen for building the span was at Sillery Cove, about three miles below the point at which the bridge is being erected. Following the construction of the temporary approach, the actual work on the span was started; the false work and flooring with the lower side members being placed in position as the crane travelled outward. The upper side and top members were erected as the crane returned to the shore end of the structure. Fig 2 shows the span as it appeared on July 25, just prior to completion. Fig. 3, taken on August 7, shows a large portion of the false work removed; the outer end of the span resting on the steel towers at either corner of the structure, with the pontoons being placed in position. At the time of writing, the remaining false work has been taken out and preparations are almost completed in readiness for the supreme hour when the pontoons will be permitted to raise the structure from the four corner supports.

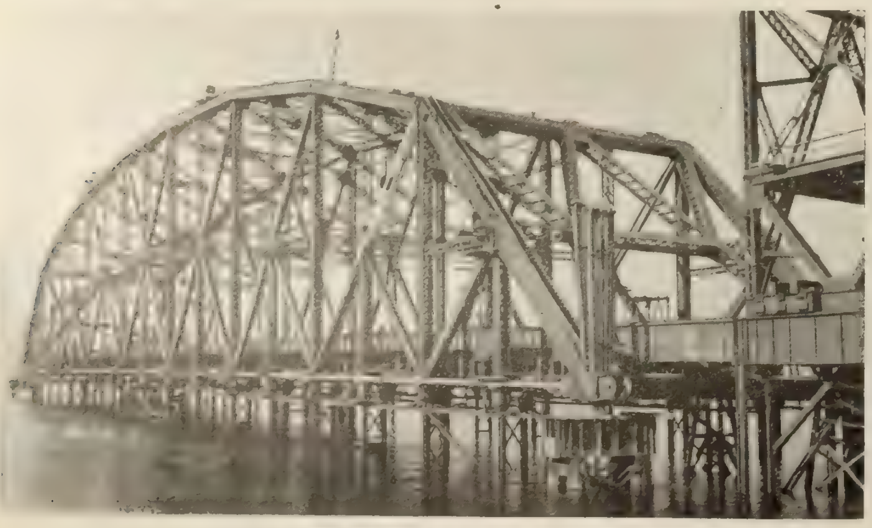


FIG. 2. CENTRE SPAN, JULY 25, 1916.

Pontoon Features

The pontoons, three of which will be placed at either end of the span, are 165 feet long, 32 feet wide, and have a depth of 11½ feet. These are so constructed that the air tight compartments can fill and empty of water with the rise and fall of the tide, but, when desired, can be entirely drained at low tide, and, when the valves—one for each compartment—are closed, the rising tide will cause the scows to take the weight of the span and elevate it from its meantime resting place. This operation, however, will not be accomplished until a definite time of floating has been decided on. When all final arrangements have been determined, tugs will be provided, to tow the floated structure to the middle of the stream.

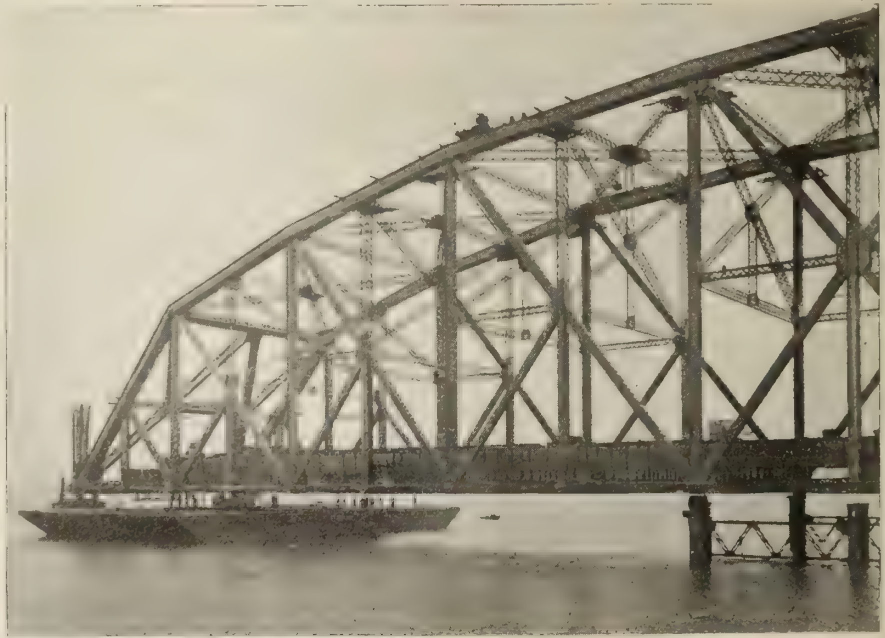


FIG. 3. OUTER END OF CENTRE SPAN SHOWING PONTOONS BEING PLACED IN POSITION.

The tugs however, will not be required to tow the central span up the river, as the flow of the incoming tide is considered sufficient to float the scows with the structure to its position at the bridge. The chief duty of the tugs will be to guide the suspended span during its passage up the river and to hold it stationary, while being secured to the mooring frames. It is this feature of the proceedings that necessitates moderate weather conditions for the successful locating of the span. The exposed area is so great that even a light wind would add greatly to the natural difficulties already mentioned. Once the floating structure is secured to the mooring frames, one of which is shown suspended from the outer end of either truss, the danger from the various elements is largely eliminated, as the mooring device is so designed as to withstand the effects of the highest winds.

Raising the Centre Span

The method adopted for elevating the central span, from the pontoons to its final position is by means of eight 1,000 ton hydraulic jacks, two of which are located at each corner of both cantilever arms and supported on specially designed girders hung from the upper chord of each main structure. On the lower end of these hangers there is a special fixed girder which contains two hydraulic jacks, the plungers of the latter pressing against the moveable girder located directly above. The arrangement of the mechanism is such that the lifting strain is always on the lower member of the supporting girder, being taken directly through the connecting pins when in a stationary position; and indirectly through the jack when the weight is being raised.

The working lift of the jacks is two feet. Three holes for the 12-inch diameter locking pins are located 24 inches apart in the special girders; the corresponding holes in the hanger chains being placed six feet apart; this provides for a lift of 2 feet at each operation of the jacks. The hanger chains, made in thirty foot lengths, are composed of two plates 30 inches wide and 2¼ inches thick. With calculations based on a start being made at full tide, the 70 cycles required to lift the span 140 feet are expected to take about 16 consecutive hours of actual operation. The exact time is, however, only problematical, as it is altogether dependable upon the speed at which the hydraulic pumps can be operated by compressed air, with the addition of other possible contingencies.

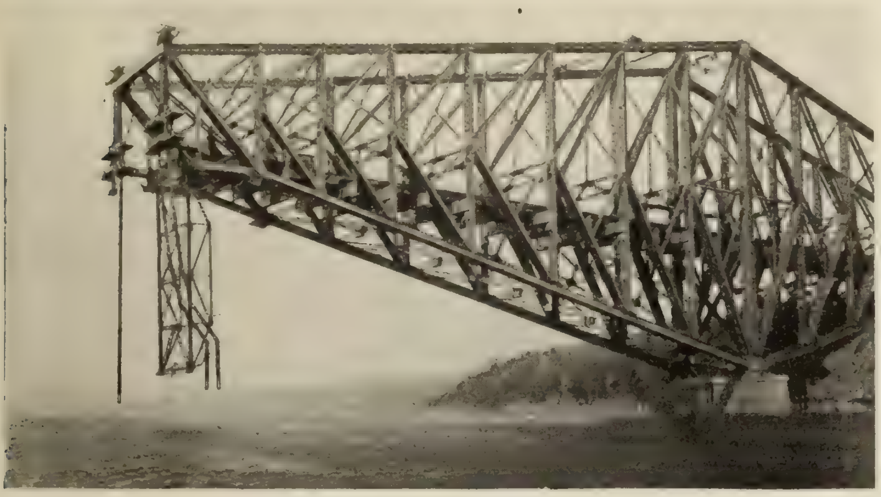


FIG. 4. NORTH SHORE CANTILEVER WITH CENTRE SPAN LIFTING APPARATUS AT OUTER END.

Emergency Provisions

To provide for any emergency through the possible failure of any of the hydraulic jacks, etc., large screw jacks are located on the inner side of each supporting girder. These screw jacks, each 12 inches in diameter, are not used to facilitate the elevation of the suspended span, but are for the purpose of constant adjustment by hand to the increasing space, as each separate lifting operation progresses. As shown in the various illustrations, platforms are constructed adjacent to the link connections for the workmen aperating the locking pins and emergency jacks.

Power Equipment

The hydraulic equipment, necessary for the operation of the lifting jacks is located at the outer end of each cantilever arm. The cylinders of the jacks are made of steel castings 22 inches inside diameter, and an outside diameter of 33½ inches, with rams of chilled cast iron. The pumps are of direct acting plunger type, and are operated by compressed air, supplied by compressors located on the shore at either end of the main approach. The air is delivered to the pumps at a pressure of 100 lbs. per square inch; the pump cylinders are 18 inches in diameter, and the water plungers of 2 inches diameter. Pumps, jacks, and all piping connections have been tested to 5,000 pounds pressure, but the actual working pressure is not expected to exceed 4,000 pounds per square inch. The installation is so designed that a uniform pressure will be

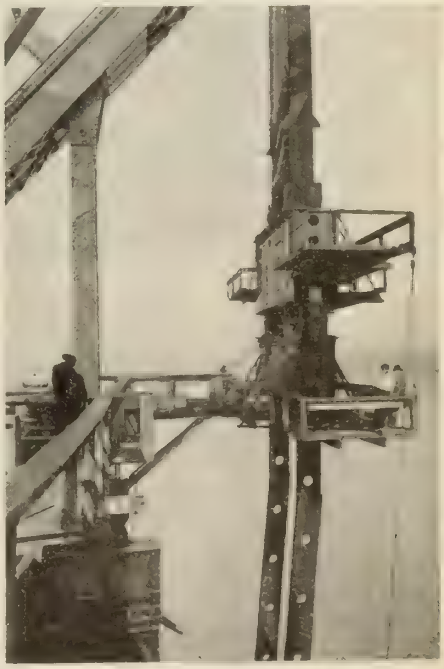


FIG. 6. JACKING GIRDERS, HANGER CHAINS AND LIFTING JACKS.

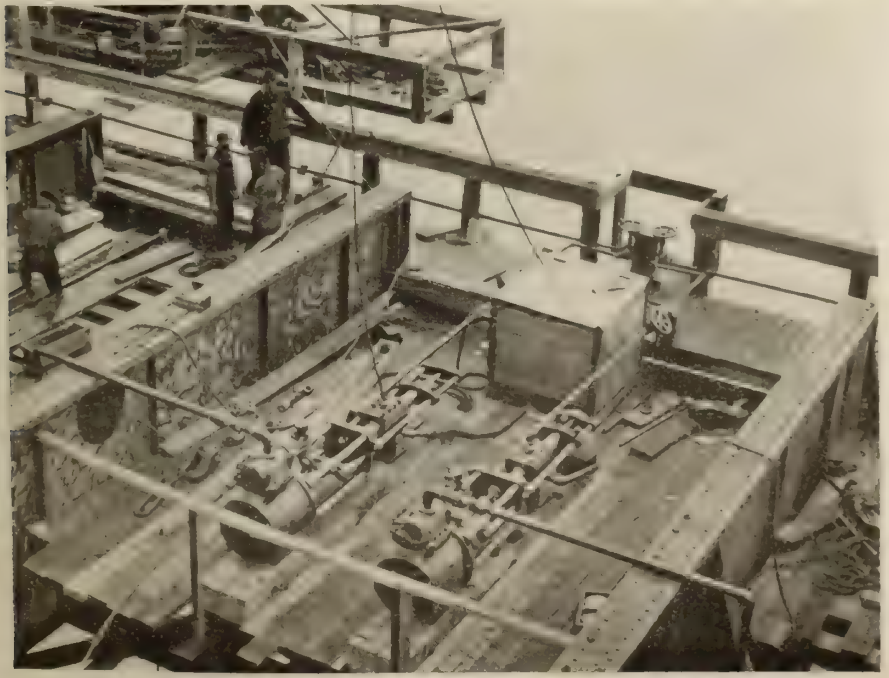


FIG. 5. HYDRAULIC PUMPS AND PIPE LINE TO LIFTING JACKS.

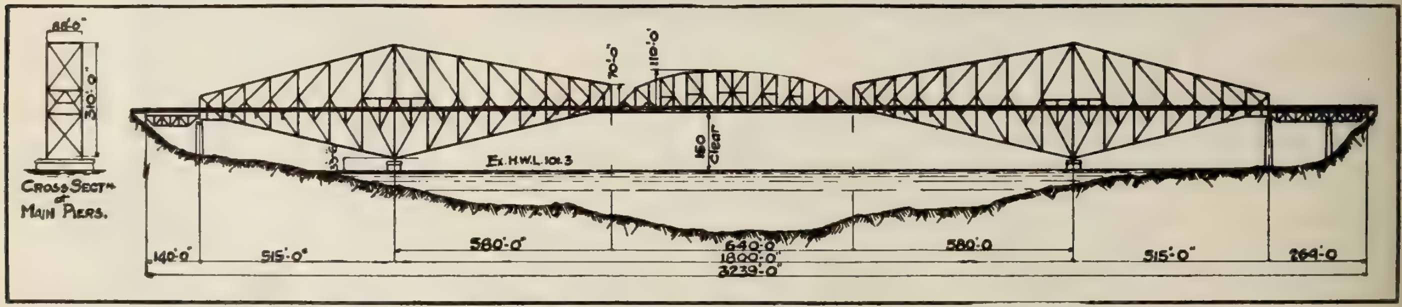
maintained upon all four cylinders, to insure equalization of stress at the various points of support. Provision, however, is made by an ample installation of balanced valves in the pipe line to control any particular unit.

General Observation

When the suspended span is in position, the total weight of steel in the bridge will be approximately 65,000 tons, 55,000 tons being fabricated material. Owing to the climate conditions, and the wide range of temperature between midwinter and midsummer, which is from 130 to 150 degrees F., about 30 inches has been allowed for expansion and contraction in the total length of the bridge.

It is difficult to conceive the magnitude of this great undertaking. To appreciate the many problems of design and construction, it is necessary to have viewed the various component parts while erection was proceeding.

The design, construction and erection of this bridge form one of the great engineering achievements of modern times, and the official opening of this imposing and wonderful structure, which will take place early in 1917, will mark the completion of the last link in an unbroken Canadian railroad highway, which will extend from ocean to ocean. A noteworthy feature of the work which reflects much credit upon the engineers in charge, has been the immunity from accident during erection. From the nature of the undertaking, many minor casualties were to be expected, but the number of fatalities has been surprisingly few; only one being recorded during the past season. A boatman has been kept constantly in the river, immediately below the bridge, for rescue purposes should necessity arise. The efforts of the company to provide comfortable and attractive camp life for the men, have met with deserved success, the special arrangements made having doubtless exerted a restraining and beneficial influence on the workmen in the matter of exercising more than ordinary care in the performance of their varied and hazardous duties.



SKELETON VIEW OF QUEBEC BRIDGE, SHOWING PRINCIPAL DIMENSIONS.

The work has been carried out under the supervision of a Board of Engineers composed of Messrs. C. N. Monserrat (chairman and chief engineer), Ralph Modjeska, and H. P. Borden. The St. Lawrence Bridge Co. are the contractors for the superstructure; George F. Porter, engineer of construction; W. B. Fortune, superintendent of erection; and S. P. Mitchell, consulting engineer of erection.

Observation Facilities.

Owing to the limited space on the bridge and the necessity of keeping that portion of the river in which the tugs will be operating clear of all vessels not engaged upon the work, no one will be allowed upon the bridge who is not engaged in the placing of the span, nor will any steamers, small boats, or other craft be allowed within a considerable distance of the span being floated until it is suspended from the links by which it will be hoisted.

There will be ample space open to the public close to the bridge on the South shore and on the North shore from about half a mile below the bridge as far as Sillery Cove, where the suspened span has been erected. All of these view points are, however, so far removed from the actual work that it will be impossible to see any of the details of the mechanism or more than the general operation of floating and hoisting. At the suggestion of the officers of the St. Lawrence Bridge Co., the Council of the Canadian Society of Civil Engineers has arranged a special excursion for the 8th and 9th of September, when all the arrangements will be completed, and when the members of the society will be afforded every opportunity to see the details of the arrangements and be given an explanation of the proposed operations.

It is felt that in this way those engineers who are resident in Quebec, or who can spend a few days there, will have a much better appreciation of the actual operations than if these were only seen from a distance for the first time, and that those engineers who are only able to spend a short time in Quebec will get an opportunity of examining the structure and the mechanism that would not be practicable if they were only there at the time it is being floated. The St. Lawrence Bridge Co. will provide transportation from Quebec to the site, and it is hoped that arrangements can be made for a special train from Montreal to Quebec. Fuller details of the programme will be announced later.

* * *

OUT FOR WORLD MARKETS

THE outline plan for the National Trade and Commerce Convention of Canadian Business Men, called by Sir George Foster, Minister of Trade and Commerce, for October or November, has been prepared, and the Department is now communicating with Boards of Trade all over the Dominion asking them to appoint committees to give the matter consideration. Letters are being also sent to Canadians abroad requesting their co-operation in the work of the Convention, which involves serious consideration of the industrial and commercial problems with which Canada will be faced at the termination of the war.

The memorandum which has been prepared for submission to business men all over the Dominion preparatory to the conference, assumes two standpoints from which the problems before the business interests of the country may be studied. The first of these will take account of the various factors which enter into the upbuilding of trade, such as market opportunities at home and abroad, credit information and banking facilities, commercial training, transportation facilities, labor, immigration, industrial equipment, and the study of raw materials; and, secondly, the various class of goods to the production of which the country naturally or specifically lends itself. It is suggested that committees of business men be appointed and assigned to certain definite problems, developing same from each of these viewpoints.

* * *

The results of the silent victory of the British navy are voiced by Rutledge Rutherford, the American economist and writer, who has recently toured Germany. He says: "(German) shipping is paralyzed, and in all the harbors there are great ships—passenger boats and freighters—being devoured by rust. The great free port of Hamburg . . . looks like a city of the dead."

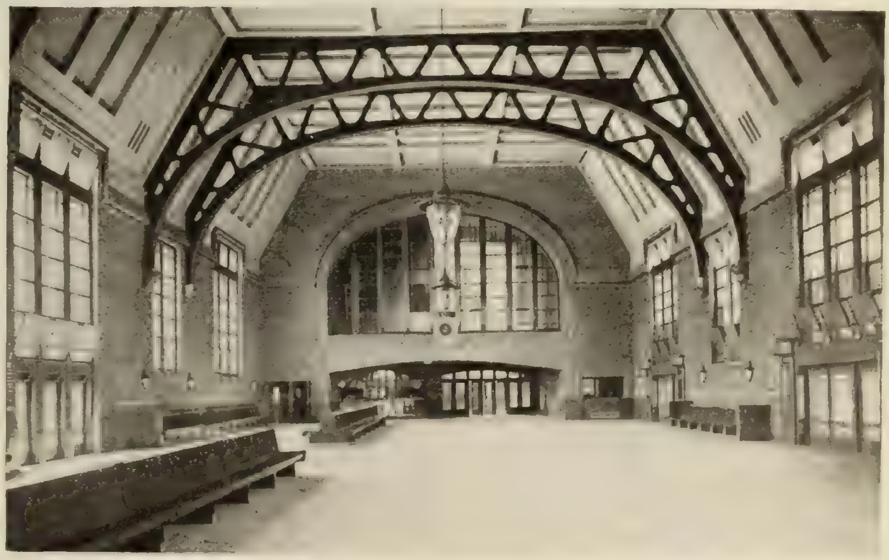
New Station of the Canadian Pacific Railway at Quebec

By C. T. R.

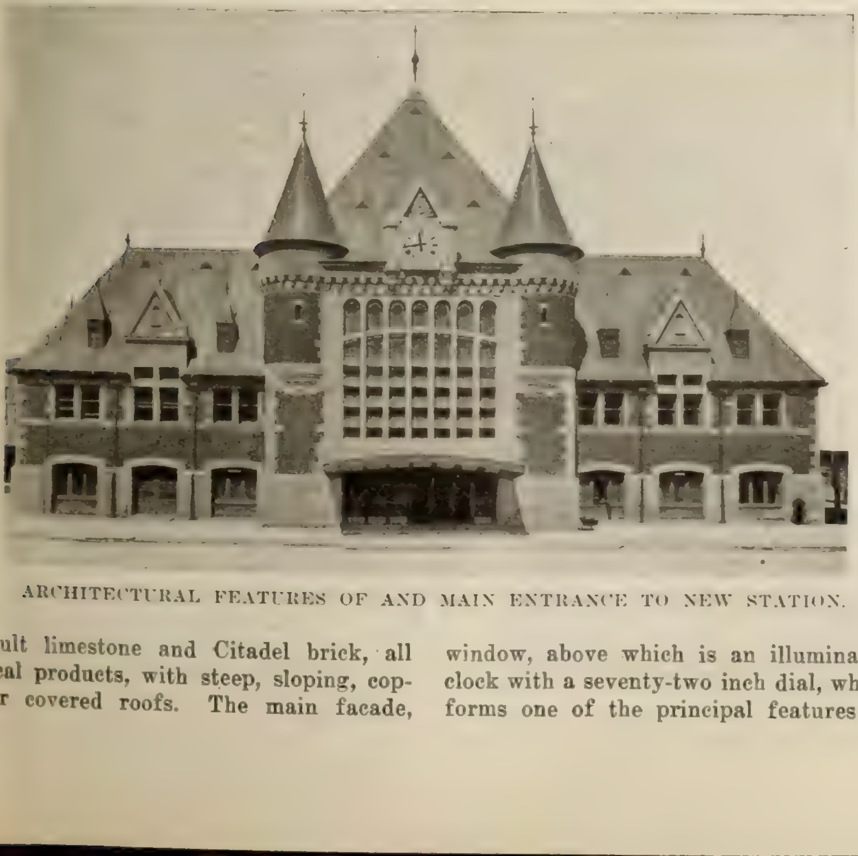
The management of the Canadian Pacific Railroad is nothing if not progressive. Whether in anticipating or grasping opportunity, and giving the latter practical application or scope, it matters little. The growth and development of this big institution has been spectacular in many ways, yet accomplishment has been secured with an absence of loud display. Betterment with regard to employees' welfare, modern, effective, and comfortable rolling stock, efficient public service, attractive en route and terminal buildings and equipment, indicate some outstanding factors which have contributed to the high international reputation of the system. The new terminal depot at Quebec enhances the latter still further.

THE new C.P.R. station at Quebec, which was declared open last month, by the Mayor of Quebec is a triumph of modern railway station construction, besides being admirably located at the corner of St. Paul and Henderson Street just north of the old station. The latter will be removed to make room for the plaza, 350 ft. by 285 ft., which will form an attractive foreground with a large grass plot planted with shrubs and a sixty-foot roadway, flanked by sidewalks, planting spaces, Lombardy poplars, ornamental lighting standards, and two ornamental flagpoles. There will be thus transformed a once ugly portion of the city to a beauty spot which will not only be appreciated by the residents of Quebec, but will give the visitor a favorable first impression of the city.

The station building, which consists of a central block with two wings, is a modern adaption of the old French Chateau Style of architecture and admirably harmonizes with and helps to perpetuate the quaintness and historic traditions of the city. The exterior is faced with Argenteuil granite, Deschambault limestone and Citadel brick, all local products, with steep, sloping, copper covered roofs. The main facade, which faces the plaza, is dominated by a central motif containing the main entrance and is flanked by two tourelles and protected by a glass and iron marquise the full width of the sidewalk. Over the main entrance is a large window, above which is an illuminated clock with a seventy-two inch dial, which forms one of the principal features of the facade. The pediment over the clock bears the arms of the City of Quebec.



THE ATTRACTIVE AND SPACIOUS CONCOURSE.



ARCHITECTURAL FEATURES OF AND MAIN ENTRANCE TO NEW STATION.

In plan, the building is L shaped, the main block being 142 ft. x 65 ft., the concourse wing extending along Henderson Street, 142 ft. x 65 ft., and the baggage and express wing parallel to St. Paul Street, 130 ft. x 44 ft. Entering the building through the 24 ft., wide main entrance and vestibule, one is agreeably impressed with the spacious, light, ticket lobby, 45 ft. wide x 65 ft. long, which rises to a height of 60 feet. This lobby is finished through the medium of grey tapestry brick walls with Lepanto marble base, faience cornices, cartouches and balustrades, and sloping mosaic ceiling with leaded glass ceiling lights, the rich colorings of the faience and leaded glass lending an attractive tone to the decorations. The faience clock dial set in the balustrade at the first floor level with its flanking lion and unicorn is a feature of the room.

On the right side of the ticket lobby are the information wicket, four ticket wickets, the entrance to the women's rest room, and the news stand. On the left, are the baggage and parcel checking counters, customs office, public telephone booths and telegraph counter, while the Transfer Company's office opens off the entrance vestibule. Opposite the main entrance is a series of seven doors opening into the concourse.

The Concourse

The concourse, 125 ft. long x 62 ft. wide, and 40 ft. high, is similarly finished with grey brick walls, having faience inserts, marble wainscot, faience cornices and tinted ceiling, while the huge iron trusses, elliptical in form, which support the roof, spring from ornamental faience cartouches. On the left side of the concourse three sets of gates open to the midway and track platforms. On either side of each gateway is a mechanical indicator which shows the track number, time and destination of the departing trains. A massive train bulletin board has been provided on which the time of arrival of all incoming trains will be posted, while glass-covered bulletin boards have been provided for special announcements and posters.

On the right hand side of the concourse is an exit to Henderson Street, while at each end is a handsome faience dial clock. Comfortable seats have been provided, as the concourse serves also as the main waiting room of the station. The men's smoking room and lavatories are located at the North or far end of the concourse wing. The women's rest room is attractively furnished with rugs, table, chairs, and couch, and is conveniently located and easily reached from both the ticket and lobby concourse. The smoking room and women's room are wainscotted with wood panelling and the lavatories with marble. A feature of the lavatories are the pay toilets and dressing rooms which are provided with all the accessories necessary for the comfort of the traveller and equipped with coin locks which automatically operate by the insertion of a ten-cent piece.

A CORNER OF THE WOMEN'S REST ROOM.

Baggage and Express Arrangements

Ample accommodation is provided for handling the baggage and express matter in a separate wing which has a covered trucking platform on each side. Everything necessary for the comfort and convenience of the travelling public, as well as the efficient operation of the train service, has been installed. The second floor of the main building, which is reached by a stairway from the main entrance vestibule, is devoted principally to the Company's offices and a museum in which an interesting and instructive exhibit of Canada's natural resources will be open to the public. The office corridors and museums surround the ticket lobby and are separated therefrom by open arches and balustrades which afford a splendid view of the lobby as well as provide an abundance of light and air. Rooms for conductors and trainmen with stairway direct from the midway are also provided on this floor. The decorative scheme of the interior is simple and artistic. The motifs in the richy-colored faience depict and symbolize emblems of our national life, and the Tudor rose, shamrock, thistle, fleur de lys, dolphin and trident are freely used and interwined. The ceiling light over the ticket lobby contains the provincial shields and a map of the North American continent showing the Canadian Pacific Railway lines from coast to coast. The large window over the main entrance, which helps to light the ticket lobby contains the arms of the seven great men of Canadian history, viz —Montmagny, the first Governor of Canada—1636-1647; DeTracy, Viceroy of Canada—1665; Beauharnois, Governor of Canada—1726-1747; Montcalm and Wolfe, the famous French and English generals whose names are familiar to all; Frontenac, Governor of Canada— 1672; and Talon, the first Intendant of New France—1665-1672.

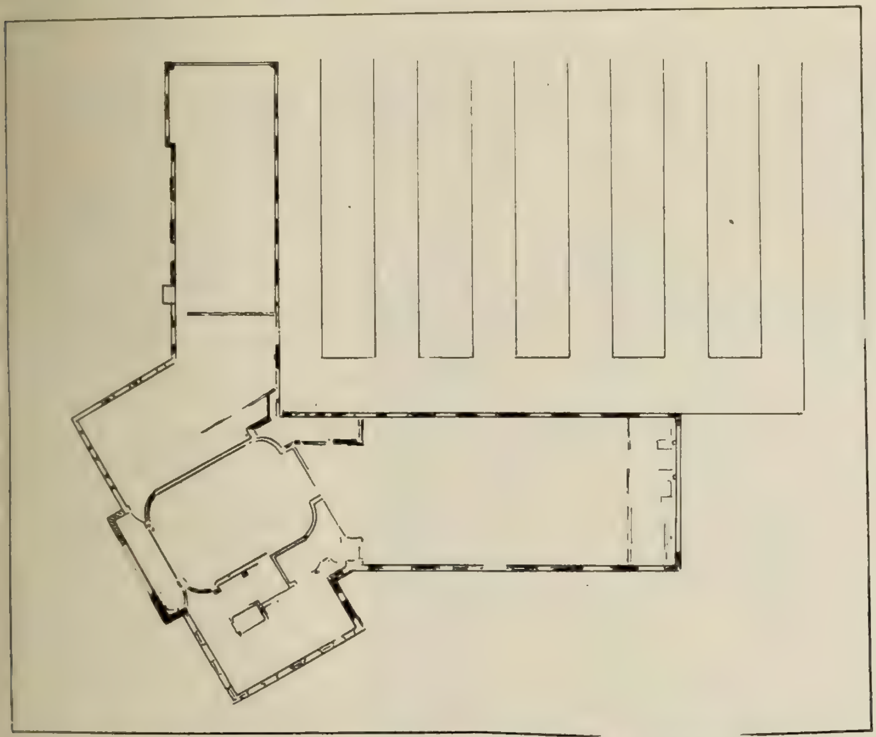
EXPRESS AND BAGGAGE DEPARTMENT ACCOMMODATION.

Materials of Construction

The building was designed by H. E. Prindle, architect, of Montreal, and erected by the Downing Cook Co. of Montreal, under the supervision of D. H. Mapes, Engineer of Buildings of the C.P.R. In the construction of the building, which rests on 430 concrete piles, 400 tons of structural steel, 2,000 yards of reinforced concrete, 400,000 common brick, 75,000 exterior face brick, 125,000 interior face brick, and 10,000 cubic feet of exterior cut-stone, were used. Local labor and materials have been employed wherever possible. The concrete pile foundations were driven by the McArthur Pedestal Pile Co.; the structural work was furnished and erected by the Eastern Canada Steel Co.; the exterior face brick were made by the Citadel Brick Co.; the granite came from the Argenteuil quarries and the limestone from the Deschambault quarries. The interior marble and terrazzo work was done by the Missisquoi Marble Co.; the ornamental iron by the Dominion Architectural Iron Works. The plumbing and heating were installed by Vandry and Matte, the electrical work by the L. K. Comstock Co., and the clocks by the Self Winding Clock Co.

The woodwork throughout, of which, however, there is but little, is

Canadian birch, the railway company having recently adopted the policy of using Canadian woods exclusively for the finish of its buildings and cars. While the Station is the dominating feature of the improvements made by the Canadian Pacific, notice should be taken of the new freight office building and sheds constructed north of the station last year, the new power house located just west of the station and the re-arrangement of the coach yard, all of which has been done on the same comprehensive sale as, and in keeping with, the station building. Quebec can well be proud of its new station, which in design, finish and appointments is second to none in Canada.



SKELETON PLAN OF STATION BUILDING AND RAILROAD TRACKS.

The Opening Ceremony

A notable company, representative of the political, commercial and industrial life of Quebec Province, was present when the new station was formally opened, on August 10, by Mayor Lavigueur. Before the actual ceremony took place, several hundred ladies and gentlemen gathered at the station and proceeded to inspect the same.

After luncheon had been partaken of, A. D. MacTier, general manager of the C.P.R., and chairman of the meeting, made a few remarks regarding the auspicious occasion. The growing business, he observed, demanded this new structure, which he knew would be acceptable to the Quebec people, and the company had always stood willing to meet the people of Quebec in every way. The station was a proof of the latter. He asked the mayor to accept a silver key as a souvenir of the occasion, a souvenir which might be regarded as a link uniting the city to the company.

His Worship the Mayor, in formally declaring the station open, made a happy little speech, in which he referred to the energy and prescience of the C.P.R., which was always ready to be in advance of the times. It was incumbent that it should have the necessary facilities to handle the overseas business which now showed such promise of increase. The C.P.R. had not failed to take note of what was happening. It did not exist for sentiment, but for commercial considerations. Yet it had a long vision; it had patriotism; it had ambition, and it was not afraid of large things. He praised such men as Lord Shaughnessy, Mr. MacTier, and Mr. Wanklyn, who believed in doing things and were not timid about taking opportunity by the hand. He concluded: "Remember, the C.P.R. wants to make dividends, but it also wants to develop the country, and all concerned should be pleased with the outcome in this particular direction."

The Hon. J. D. Reid, Acting Minister of Railways and Canals, said he was delighted to notice that the business interest of the city and Province of Quebec were growing—that the Province was prosperous, and that the city was being provided with additional railway facilities. The Government had not been remiss in this matter. It had operated the Transcontinental, and when the bridge was finished there would be closer relations with the lower provinces, as there would be a direct connection across the continent. The Government had done much in the building of new wharves and docks on the riverfront to facilitate trade, and he could assure them that everything possible would be done by the Government to aid in the success of Quebec, which was now a most progressive city, and had considerably added to its manufactures in the last few years.

J. Picard, ex-president of the Quebec Board of Trade, followed with some interesting remarks, referring to the difficulties and hardships of the early times in Quebec, when communications were crude and slight and people had to put up with privations they could not think of to-day. He made a vivid contrast between that time and the present and gave great credit to the C.P.R. for what it had done in the interval. Of course, there was the initiative and energy of the people to be considered. They were living in times when efficiency was the primary note in business, and when it was necessary to put the shoulder to the wheel, using every facility.

The concluding speech was made by Sir Lomer Gouin, Premier of the Province, who aroused enthusiasm by enumerating the activities of the C.P.R., and especially the large governmental action which resulted in the building of the Transcontinental.

F. L. Wanklyn, of the C.P.R. Executive, followed, with a few brief remarks appropriate to the occasion.

Those Present.

Those present included: A. D. MacTier, general manager Canadian Pacific Railway, who presided; Mayor Lavigueur and Madame Lavigueur, Hon. T. Chase Casgrain, Hon. L. A. Taschereau, Minister of Quebec Public Works; Hon. N. Perodeau, M.L.C.; D. O. Lesperance, chairman of the Quebec Harbor Commission; Hon. Dr. J. D. Reid, Minister of Customs and Acting Minister of Railways; Madame Casgrain, Sir Lomer Gouin, Premier of Quebec, and Lady Gouin, Hon. J. C. Kaine, Hon. George McCorkill, F. L. Wanklyn, executive assistant to the president of the C.P.R.; A. W. Campbell, R. B. Fraser, Mr. and Mrs. H. E. Pringle, Montreal; Mr. and Mrs. Dowling Cook, T. B. Ross, W. M. Dobell, M. Bancroft, O. W. Bedard, vice-president of the Quebec Board of Trade; T. Levasseur, Jas Picard, representing the Quebec Board of Trade; A. O. Gravel, St. George Boswell, Rev. A. S. Love, Hon. J. B. Caron, Minister of Agriculture; Sir George Garneau, J. B. Chouinard, Capt. Emile Trudel, Capt. P. Hamel, G. Madden, Duncan Robertson, Col. H. H. McLean, Lt.-Col. Fages, Lt.-Col. Chabot, Lt.-Col. Lafferty, Lt.-Elliott, Hon. Sir F. X. Lemieux

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PAPER SHORTAGE AND COST EFFECTS

THE publishing business in Canada and elsewhere is facing a serious crisis. Since the first of the present year there has been a growing scarcity of paper and a corresponding advance all along the line in prices. During that period the best grades of paper—white coated, have gone up fifty per cent. A medium grade of coated paper which cost 6 cents per pound previously cannot now be bought for less than 9 cents; and the mills are dodging orders at any price. Super-calender paper which formerly sold at from $4.35 to $4.50 is now quoted anywhere from $7.00 to $8.25. Newsprint—the rough surfaced paper on which newspapers are printed—has advanced nearly fifty per cent. Many of the best grades of paper have been taken off the market altogether, the manufacturers finding it impossible to keep up the quality. There is, in fact, a very general depreciation in paper quality despite the staggering jump in prices, and, notwithstanding the latter, manufacturers are being compelled to refuse business or to defer shipments for long periods.

Eliminating Non-Essential Matter

This condition is operating in two directions in its bearing on the publishing business. It is forcing publishers to economize on paper in every conceivable way. They are finding it necessary to reduce the number of pages printed. Lavish supplements, containing features whose scope of appeal is limited, have had to be excised. "Extras" are put out only when the news really warrants it. Newspapers, magazines, class papers, are all concentrating on the important problem of printing the really essential matter in the least space and eliminating all non-essentials. In this one respect, the paper shortage will prove a blessing in disguise. Publishers are examining their mailing lists closely, cutting off unprofitable "exchanges" and "dead heads" and are doing everything in their power to economize in other similar directions. In these days of scarcity only the man who wants his paper sufficiently and is willing and ready to pay for it promptly should get his copy.

Increased Subscription Rates

The situation is reacting in another direction. It is forcing publishers to raise their subscription rates; many newspapers and class publications have already done so. Subscription rates in Canada have, in the past, been hammered down to a more or less ridiculous minimum by strenuous competition, but now it is clearly impossible for publishers to continue to supply their product at such low prices in face of the sudden advance of paper cost.

The reader should bear the foregoing facts in mind. If he is inclined to complain when his favorite periodical comes to him a little thinner, and when his renewal notice quotes a higher figure, let him pause to consider that it is only by such measures that the publisher is able to continue to send him the paper at all.

RAILROAD DEVELOPMENT AND ITS EQUIPMENT MANUFACTURE

THE present issue of Canadian Machinery features in its editorial contents in a more than usually comprehensive manner, the large place that railroad progress and development fill in making available Canada's agricultural and mineral wealth. Incidentally, there is given probably equal prominence to its kindred aspect—her commercial and industrial enterprise. Of our four leading articles, two of these deal specifically with manufacturing plants and their equipment for the production of railroad rolling stock—cars and locomotives of every type and for every service; a third demonstrates the stupendous nature of the work which has occasionally to be undertaken to enable the "laying of steel" where it will best serve a predetermined purpose, while a fourth gives unquestionable evidence that there must needs be adequate and modern terminal facilities if the en route equipment is to secure its proper measure of patronage—both freight and passenger.

Larger Business in Sight

The now imminent spanning of the St. Lawrence by what is known as the New Quebec Bridge, naturally claims the larger share of popular interest at the moment, because marking the culmination of a Canadian engineering achievement which will command world-wide repute. In view, however, of the already available and yet to be secured opportunities to manufacture for export trade, the reader cannot otherwise than be impressed with the idea that the locomotive and car building plants illustrated and described in this issue are admirably planned and equipped for such eventualities. As a result of the opening to traffic of the New Quebec Bridge early in 1917, there is sure to develop an increased demand for rolling stock, comprising locomotives and cars. That the National Steel Car Co., and the Montreal Locomotive Works are prepared to take care of a still further domestic requirement and at the same time that arising from sources abroad is, we think, a quite justifiable conclusion to be reached from a perusal of the data presented.

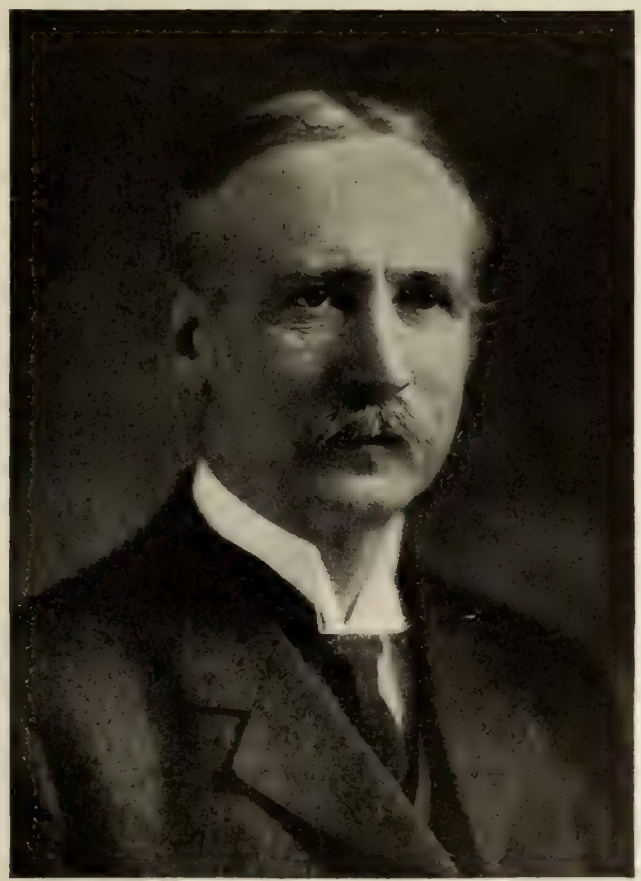
* * *

Thanksgiving Day has, by an Order in Council, been definitely fixed for Monday, October 9.

INDUSTRIAL NOTABILITIES

GEORGE HERRICK DUGGAN, vice-president and general manager, Dominion Bridge Co., Montreal, Que.; chief engineer, St. Lawrence Bridge Co. (contractors for steel work, new Quebec Bridge); vice-president, Montreal Ammunition Co.; president, Dominion Copper Products Co.; director, Montreal Trust Co.; director, Hillcrest Collieries, Ltd.; director, Royal Bank of Canada; was born at Toronto Sept. 6, 1862, only son of the late John Duggan, Q.C., and Amelia (Tulloh) Duggan. He was educated at Upper Canada College and in the School of Practical Science, Toronto University (1883), taking the post-graduate course in 1884.

Entering on a business career by joining the engineering department of the C.P.R. during the year 1884, Mr. Duggan, in the interval right up to the present, has held not a few specially responsible as well as publicly prominent appointments with a number of leading Canadian engineering and allied corporations and enterprises. Enumeration of several of these follows: Engineering department Dominion Bridge Co., 1886-1901; chief engineer, 1891-1901; assistant to president and consulting engineer, Dominion Steel Co. and Dominion Coal Co., 1902-1903; second vice-president and general manager, Dominion Coal Co., 1904-10; present position since 1910.



GEORGE HERRICK DUGGAN.

He is a member, The Institution of Civil Engineers, England; member and president, Canadian Society of Civil Engineers; member American Society Civil Engineers; member Canadian Mining Instituton (vice-president, 1906, councillor, 1911-1913); one of the founders Toronto and Royal St. Lawrence Yacht Clubs; amateur yacht designer, designed and sailed winners "Seawanaka" International Cup, 1896-1901; captain, Toronto Yacht Club, 1883-1884; commodore, Royal Cape Breton Yacht Squadron, 1905-1910; commodore, Royal St. Lawrence Yacht Club, 1889-1890; honorary commodore, 1915-1916.

He was awarded Royal Humane Society's Bronze Medal and Certificate, 1893. It has been said that "he carries as much sporting blood in him as can safely be carried by a man who must temper sport with business."

Mr. Duggan married Mildred Scarth, daughter of Pilans Stevenson, Montreal, October, 1888, there being two sons and one daughter of the union. One of his sons, H. S. Duggan, R.E., was killed in action Oct. 21, 1915. His clubs are the Mount Royal, St. James, Engineers, Forest and Stream, and University (Montreal); Royal Canadian Yacht (Toronto); Royal Cape Breton Yacht (Sydney); Royal St. Lawrence Yacht and Garrison (Quebec). In religion Mr. Duggan is Anglican. His residence is 120 McTavish Street, Montreal, Que. —Photo courtesy International Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$18 70
Lake Superior, charcoal, Chicago	19 75
Michigan Charcoal iron	28 00
Ferro nickel pig iron (Soo)	25 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria. No. 2X	26 00	24 00
Victoria, No. 2 plain	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base, Toronto	3.50
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars. base	3.50
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.10
Bars, 2 in. and up	4.00
Structural shapes	3.10
Plates	3.50

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$30 00
Electrolytic copper	31 00	30 00
Castings, copper	30 00	29 00
Tin	44 00	44 00
Spelter	14 00	14 00
Lead	8 75	8 50
Antimony	17 00	18 00
Aluminum	68 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4 25	$4 50
Heads	4 50	4 75
Tank plates, 3-16 in.	4 75	4 75

WROUGHT IRON PIPE

Prices in effect Aug. 1, 1916

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 06	5 25
½ in.	3 91	5 57
¾ in.	4 72	6 96
1 in.	6 97	10 29
1¼ in.	9 43	13 92
1½ in.	11 28	16 64
2 in.	15 17	22 39
2½ in.	23 99	35 39
3 in.	31 37	46 28
3¼ in.	37 72	55 66
4 in.	44 69	65 95

Lapweld

2 in.	$17 02	$24 24
2½ in.	25 16	36 56
3 in.	32 90	47 81
3½ in.	39 56	57 50
4 in.	46 87	68 13
4½ in.	57 15	83 19
5 in.	66 60	96 94
6 in.	86 40	125 80
7 in.	116 62	165 40
8 in. x 25 lbs. per ft	122 50	173 80
8 in. x 25 lbs. per ft.	141 12	200 20
9 in.	169 05	239 80
10 in. x 32 lbs. per ft.	156 80	322 40
10 in. x 40 lbs. per ft.	201 88	286 30

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$16 25	$16 00
Copper, crucible	19 25	19 00
Copper, heavy	19 25	19 00
Copper wire	19 25	19 00
No. 1 machine compos'n	14 75	14 00
No. 1 compos'n turnings	12 75	12 00
New brass clippings	13 75	13 50
No. 1 brass turnings	12 25	11 50
Heavy melting steel	9 00	9 00
Boiler plate	11 75	10 50
Axles, steel	14 50	15 00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	12 50
Shafting	16 50	16 00
Malleable scrap	10 00	11 00
Pipe, wrought iron	10 00	9 00
Stove plate	10 00	10 50
Heavy lead	6 00	6 00
Tea lead	5 00	5 00
Scrap zinc	7 75	8 00
Aluminum	35 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cen
Coach and lag screws	50
Stove bolts	62½
Plate washers	25
Machine bolts, ⅜ and less	40
Machine bolts, 7-16 and over	30
Blank bolts	30
Bolt ends	30
Machine screws, flat head, iron	66 &
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. o
Nuts hex., over 1 in.	$2.00 per lb. o
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$4.8
Structural rivets, as above	4.7
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	4

MILLED PRODUCTS

	Per Cen
Sq. & Hex Head Cap Screws	5
Sq. Head Set Screws	5
Rd. & Fil. Head Cap Screws	2
Flat & But. Head Cap Screws	n
Finished Nuts up to 1 in.	5
Finished Nuts over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	5
Semi-Fin. Nuts over 1 in.	37½
Studs	4
Taper pins	.6
Coupling bolts	n
Planer head bolts, without fillet	.1
Planer head bolts, with fillet	n
Planer head bolt nuts up to 1 in.	.6
Planer head bolt nuts, over 1 in.	.5
Planer bolt washers	list plus 1
Hollow set screws	list plus .2
Collar screws	list plus.5
Thumb screws	.2
Thumb nuts	.

BILLETS

	Per gross t
Bessemer billets, Pittsburgh	$45
Open-hearth billets, Pittsburgh	45
O. H. sheet bars, Pittsburgh	45
Forging billets, Pittsburgh	69
Wire rods, Pittsburgh	55

NAILS AND SPIKES

Standard steel wire nails, base	$3.85	$3.80
Cut nails	3 40	3 40
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs.		$3 90

MISCELLANEOUS

Solder, guaranteed	0.27½
Solder, strictly	0.25½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	13.95
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	030½
Pure turpentine, single bbls., gal.	0.69
Linseed oil, raw, single bbls.	0.84
Linseed oil, boiled, single bbls.	0.87
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.11
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	55
Standard drills over 1½ in.	20
Fluted drills to 1½ in.	25
Fluted drills over 1½ in.	15
Bit stock	55
Ratchet drills	15
Machine bits for wood	20
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	30
Sockets	30
Sleeves	50
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	4 60	4 80
Canada plates, dull, 52 sheets	4 50	4 50
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 45	6 15
Premier, 10¾ oz.	6 75	6 40

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$20 00	.....
1¼ in.	23 00	.....
1½ in.	26 00	22 50
1¾ in.	26 00	18 00
2 in.	27 00	17 50
2¼ in.	29 50	.....
2½ in.	32 50	23 00
3 in.	44 00	27 00
3¼ in.	.....	30 50
3½ in.	50 00	32 00
4 in.	57 00	40 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.35 to .37
Tin	.50 to .53
Zinc	.18 to .21

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck	1.10
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.

Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Que., Sept. 4, 1916.—Industrial and commercial interests have been somewhat disturbed, owing to the unsettled condition arising out of the possible tie up of American railroads. The strike, if it should go into effect, would not only dislocate United States trade. but would seriously affect conditions in this country. The situation in the war zone is gradually assuming a stage where the future outlook is much more encouraging. although an early ending seems very improbable. Industrial conditions continue to indicate the prosperous condition of Canadian trade, with domestic activities showing continual improvement.

Steel

The possibility of an extensive strike upon the railroads throughout the United States has placed the market in an unsettled condition, and efforts have been made to provide material for the steel mills to continue operations. If, however, the strike should materialize, which at the moment is still difficult to determine, it would place the producers in a serious position, as the supply of raw materials would soon become exhausted. Theembargoes, placed on several roads, will not be lifted until some satisfactory settlement has been made between the contending parties. The past week has been featureless in regard to price changes, and the market is quiet pen the outcome of the present indust unrest. The demands for all classes o steel and iron products is heavy, and in many respects the quirements are greatly in excess of supply. Local dealers report a q situation, but showing uneasiness o the labor situation.

Metals

With the exception of copper, t metal situation is unchanged. The g- eral market has been affected by t developments of the railroad strike, embargoes have been placed upon ma of the roads, which will continue un the situation warrants them being lift . Copper has stiffened considerably, ow g to the impending placing of large exp t orders. The demand for tin has beco e lighter. Spelter is showing anoth r weak spell, with declining prices. Le d is very quiet. Antimony is dull a d weak.

Copper.—The market at present s very firm, owing to the report that ne- tiations for large tonnage, on extend delivery, have been under considerati for some time. Actual contracts ha not yet been made, as producers ha been asking stiffer prices on the streng of this additional business, with the r sult that prospective buyers have te- porarily withdrawn from the mark . The situation is likewise being affect by the unsettled condition of transpo- tation facilities. As most of the lar consumers are well covered for imm diate requirements, they can afford await the outcome of the present cris London reports the standard situation little easier, with a decline of £1 on sp and £2 on futures. Electro is strong on a £1 advance. New York continu very firm, with market quotations nor inal at 27½c for prime lake, 25¼c f castings, and 28c for electrolytic; th latter showing a decline of ¼c p pound. Local dealers report a very fir market, with quotations unchanged 31c for lake and electrolytic, and 30c f castings.

Tin.—No special developments ar noted in the week's tin market, and th situation is practically unchanged. I the absence of heavy buying, stocks ar accumulating and a weaker tendency being shown. The London situation i unchanged, with a slight falling off i quotations on futures. The New Yor market is firm, showing a ⅛c advanc but little business is being done. Th quotation this week is 38⅞c per pound Local dealers have advanced their price 1c, and are now quoting 44c per pound

Spelter.—All efforts to place the spel- ter upon a better footing seem to hav failed, as the fluctuations of the pas four or five weeks have apparently show that a return to its high position of few months ago will be long delayed

The demand, which of late has given rise to the expectation of renewed activity in spelter, has never continued long enough to indicate a return to former interest. The situation has, therefore, developed into one of apparent dullness, with dealers and consumers showing little interest in the market. London reports show a decline in spelter prices, spot having declined £6 and futures £2. New York, on a decline of ¾c, is quoting 8 4-5c per pound. Local dealers are still quoting 14c on a quiet market.

Lead.—No activity is shown in lead, and the market is very dull. Owing to the falling off in demand, the independents are inclined to lower their quotations. The trade is, however, awaiting the outcome of the labor situation, and nothing can be said until some understanding is arrived at. London is a little stronger, while New York is quiet, but firm. The situation here is practically unchanged, although dealers are asking 8¾c, an advance of ¼c per pound.

Antimony.—The market at present is very dull and the demand very light. In an effort to make sales, some dealers are reported to have offered metal at low figures, but the only result has been to weaken the general market. The reported orders for additional shrapnel have created a little interest, and indications point to a steadier market. A decline of 1¼c on the New York market has lowered the quotation to 12½c. The situation here is quiet and unchanged, with prices firm at 17c per pound.

Aluminum.—No change is reported, and quotations are firm at 68c per pound.

Machine Tools and Supplies

The requirements of the munition makers, in regard to machine tools, have reached a stage where the demand is only for individual tools to supplement their present equipment. Tool builders are, however kept fairly busy, but delivery is much better; in fact, almost normal. The quantity of re-sale machinery is constantly increasing, owing to some of the plants having completed their orders on the smaller shells. The demand for small tools and machine supplies continues very heavy.

Scrap

The market has taken on increased activity, and the demand is good; dealers reporting fair business. Old and scrap copper has been advanced ¼c per pound, quotations running from 16¼c for light and 19¼c for heavy. An advance of ¼c has been placed on machine turnings and compositions, the former being quoted at 12¾c and the latter at 14¾c. Brass clippings and turnings show a similar increase, being 13¾c and 12¼c respectively. Scrap zinc at 7¾c shows an advance of ¼c per pound. Aluminum is now 35c, an advance of 1c per pound.

Toronto, Ont., Sept. 5.—The situation in manufacturing circles continues satisfactory and the outlook is favorable as regards getting business, although the shortage of labor and probably further increase in cost of raw materials are causing considerable anxiety among manufacturers. While production is being curtailed on this account, business continues to expand, which is proved by the marked increase in railway earnings, trade returns, bank clearings ,etc. The increases shown each month reveal the substantial and progressive improvement in the industrial situation. The Customs returns for August, recently issued, show an increase of $3,610,000, the total revenue for the month being $11,941,000. The returns each month have shown increases, which are indicative of the phenomenal expansion in trade.

The threatened railway strike in the United States, which would have had far-reaching effects, even in Canada, has fortunately been averted. Embargoes had already been placed on shipments to United States points, but were withdrawn a few hours after the notice had been issued. The local freight yards are already sufficiently congested without any further troubles. The first week of the Canadian National Exhibition has been a great success, being favored with exceptionally fine weather. The exhibits in the Machinery Hall are well up to previous years, while the exhibit of munitions in the Educational Building is a new feature which has proved both interesting and instructive, particularly to the general public.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

Steel

The steel trade continues extremely active, with an increase in production, now that the weather has become cooler. The demand for steel is, and will continue to be for many months, so great that the steel mills are assured of capacity business for some time to come. The steel companies are devoting themselves principally to the manufacture of steel for munitions and other war material, with the result that domestic trade has suffered and deliveries consequently have fallen behind. On this account some consumers have had to defer buying, and work is being held up pending a return to more normal conditions. Several buildings have been delayed, and some held up indefinitely owing to the difficulty of getting steel. There are no price changes to note this week, but the market continues very firm, and further advances in steel products may be looked for. Boiler tubes and plates are firm at the advance announced last week, and deliveries are as backward as ever, owing to the sold-up condition of the mills. The wrought iron pipe situation is unchanged with quotations very firm on both black and galvanized pipe. The high-speed tool steel situation is easier owing to the increase in available supplies of tungsten. The demand for tool steel continues heavy, supplies still being difficult to obtain, although prices have an easier tendency. There has been no further change in prices of steel bars, and present quotations will probably be maintained for some time.

There has been no change during the week in the sheet situation. With the high price and scarcity of sheet bars, prices of sheets have been well maintained, and no decline may be expected for some considerable time. The output of the sheet mills has improved with the cooler weather, but deliveries are still backward. The galvanized sheet situation is more settled following the improved tone in the spelter market, but with the continued high price of black sheets, acids, etc., and also increase in wages, lower prices on galvanized sheets do not appear at all likely in the meantime.

In the United States, production in August was about equal to July, in spite of the hot weather, etc. New business, however, was larger, and at the end of the month will probably show an increase in unfilled orders. The steel market has been active during the past week with the buying of large amounts of rails, car plates and general steel products. Export business continues large, while the domestic demand is also heavier. Prices on all steel products are very firm, with no changes of importance to note.

Pig Iron

There is nothing of particular importance to note in the pig iron market this week, and quotations are unchanged The heavy demand for steel-making pig iron continues, and the consumption this year will break all previous records. An indication of the heavy consumption of pig iron in the United States and Canada is shown in the iron ore shipments on the Great Lakes, which for August created a record. In August there were loaded 9,850,140 tons, which was nearly two million tons greater than for the corresponding month last year.

Machine Tools

The machine tool market continues active, the situation being practically the same as during the past few weeks. The demand is still confined almost entirely to tools for munition plants, although there is fair inquiry for toolmakers' equipment. Reference has previously been made to the fact that American machine tool houses have to pay a war tax on profits arising out of business transacted in Great Britain. Large concerns, however, say that this will not cause them to close their branch offices in Great Britain, as they will be useful in looking after business previously booked as well as that placed in the future.

Supplies

The increase in cost of raw materials has resulted in a tendency to higher prices on practically all steel and brass goods, some lines having already been affected. Shurley & Dietrich hand saws now carry a discount of 15 per cent. Those saws, which were formerly 25 per cent., are now 13 per cent., while lines that used to be 30 per cent., now carry a discount of 21½ per cent.; canvas belting has advanced, the new discount being 50 and 10 per cent. Carpenters' chalk has advanced, due to the difficulty of getting chalk from England, and also the high cost of dyes for the colored chalks. Turpentine is unchanged, but linseed oil has declined, and is now quoted at 86c for raw and 89c for boiled oil per gallon.

Metals

Quotations on most metals have been well maintained, particularly copper, which, although unchanged, is strong, with an upward tendency. The demand continues good for metals for munitions, while ordinary business during August was above normal.

Copper.—The market continues strong at unchanged prices, which are still nominal. Domestic buying is improving and the export business continues heavy, but it is reported that the enormous sales predicted for export recently have not materialized as yet. However, without the large buying for the Allies, which had been expected, practically all available supplies for the remainder of the year have been disposed of. Local quotations are firm at 30c per pound.

Tin.—The market is unsettled and lower in London, but unchanged locally. The local market is quiet, tin being quoted at 44c per pound.

Spelter.—The demand has fallen off, and the market is quieter, with quotations nominal. Local quotations are unchanged at 14c per pound.

Lead.—The market is very dull, and easier. The Trust price of 6.50c New York has been maintained, but the independents' quotations are a shade easier at 6.67½c New York. Local quotations are unchanged at 8½c per pound.

Antimony.—There has been practically no demand for antimony during the week, and the market is stagnant. Quotations, however, are unchanged at 17c per pound.

Aluminum.—The situation in this metal is unchanged. Local quotations, 68c per pound.

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CANADA AND BRITISH WEST INDIES

E. L. PEASE, vice-president and managing director of the Royal Bank of Canada, in a statement to The Financial Post regarding the benefits of closer relations between Canada and the British West Indies, says in part:

"Annexation or some other form of political union would undoubtedly prove very advantageous to both countries. The entire business element and native population of the British West Indies being srongly pro-British, favors the idea. Jamaica did not come into the recent tariff agreement with Canada, owing to fear of the loss of her banana trade with the United States; but if the movement now on foot in Great Britain to increase the production of sugar within the Empire by means of a preference is achieved, little fear of opposition on the part of the West Indies to annexation need be entertained. Owing to the geographical situation, government from this side of the Atlantic would be more practical than from England.

W. I. Trade Neglected

"The trade of the West Indies has been almost criminally neglected in the past. The sugar industry, which at one time was the main industry, nearly suffered extinction, owing to the impossibility of competing with the bounty-fed production of Continental Europe and the preference given to Cuba by the United States. The antiquated mills in use in the West Indies accentuated this condition. Canada, which absorbs their entire production, which was about 200,000 tons last year, revived the industry somewhat by granting a preference two or three years ago. Possessing, however, the elements that would tend to cheap production—namely, a rich soil and cheap labor, it is estimated that the British West Indies are capable of producing 3,000,000 tons per annum, enough to supply the requirements of the United Kingdom. The phenomenal prosperity of Cuba is due to the preferential sugar tariff of the United States. In 1901 Cuba produced about 500,000 tons of sugar; last year she produced 3,000,000 tons. Porto Rico, whose sugars enter free into the United States, produc less than 100,000 tons in 1901, and ov 400,000 tons last year, double the pr duction of the entire British We Indies. The volume of trade of th little island is also in excess of th entire trade of the British West Indie

Mutual Benefit

"Much as the West Indies woul benefit commercially and politically t union with Canada, the advantage would not all lie with that countr The more general interchange of trad that would result would be of incal able benefit to Canada. Last year ou tropical imports exceeded $30,000,00 of which only $6,000,000 came from th West Indies. Canada's exports to th West Indies are steadily increasing, a increased prosperity within the Wes Indies would naturally greatly increas the demand for our exports. At present the exports of fish aggregate £500,000, and our flour has, owing to th preferential tariff largely supplante American flour."

⁂

LACHINE CANAL AUGUST TRAFFIC

WHILE there is a decrease in the amount of wheat, and consequently in the total amount of grain, to come down the Lachine Canal in the past month, when compared with the corresponding month of last year, still there are substantial increases in the amount of produce, coal, number of passengers, and in the number of ships and the total tonnage.

During last month only 1,128,406 bushels of wheat came down the canal, while for the same month last year there were 3,107,618 bushels, a difference of 1,978,212 bushels. This however is largely compensated for by the large increases in other grains. There was an increase of 1,706,116 bushels of oats, 366,000 of corn, 199,740 of barley and 81,000 of rye. The decrease in the amount of all grains for the month is 318,678 bushels, and this added to the decreases for the other months of the present season, make a total decrease of 8,674,761 bushels, compared with the amount for last year.

The decrease it is said, is in part due to the fact that many of the ships in former years were grain have been commandeered by the Government and are at present transporting other commodities; as a result, a large portion of the grain that came down the St. Lawrence for exportation now finds its way to American ports.

No flour was brought down during the past month, but the same is true of August last year. There were 39,873 boxes of cheese, an increase of 7,700 er last year; 1,292 barrels of apples, increase of 924; 1,040 boxes of butr, and increase of 179; and 1,460 cases eggs, a decrease of 469 cases. There s also a substantial increase in the mount of coal to pass down the canal. the past month the total of 277,667 s, compared with 158,710 for August, 15.

There were 1,217 vessel trips made rough the canal in the last month, hich is 101 more than during the same onth last year. The increase in tonage is even more marked last month, aving been 687,037, while a year ago was 589,317. The total number of assengers to come down the canal, or own the Rapids, in the past month was 7,263, which is an increase of 6,910. n the total cargo there is also an inrease, the figures for last month being 38,988, compared with 470,931 for August last year. This year was an inrease in the number of ships to pass hrough the canal light the figure being August, 1916, 406; August, 1915, 69.

* * *

WILL ENLARGE HYDRO SYSTEM

EXTENSIONS and improvements involving an expenditure of well over a million and a quarter dollars are being undertaken by the Provincial Hydro-Electric Commission to meet the ever-increasing demand for Hydro power. The announcement was made recently by Sir Adam Beck and preliminary work is already under way.

Double Transmission Line

The chief item of new work is the doubling of plant and equipment from Dandas to Toronto. Largely to meet the needs of Toronto the Commission has decided to go ahead with the construction of a new double transmission line between Toronto and Dundas, and practically to duplicate the Toronto station—the expenditure being estimated at something over a million dollars. At Dundas the Commission is also practically duplicating the big inter-switching station there at a cost of approximately $250,000. At Niagara Falls new switches and other equipment to handle the 50,000 additional horse-power being secured from the Canadian Niagara Power Co. will be installed.

The first instalment of power received from the Canadian Niagara Co. has now been added to by a second 12,500 h.p., which was taken over within the past week. For the new double line out of Toronto the plans and specifications have been completed and the right of way is being acquired. The new right of way, it is stated, will include sufficient room for the construction of a radial railway between Toronto and Dundas when in the future it is decided to go ahead with it.

Will Link Up Plants

The attention being given the Niagara district does not leave other districts neglected. The Commission undertaking at once the building of two connecting lines in the Owen Sound-Collingwood district to pool the power resources of the four development plants now operated by the Commission there—the Big Chute, Eugenia Falls, Swift Rapids and Wasdell Falls plants.

The Commission is building thirty-five miles of transmission line from Collingwood to tap the Eugenia Falls line to Owen Sound, thus linking up the Falls development with the Big Chute. A six-mile line from Wasdell Falls meeting the Orillia line from the Big Chute completes the circuit. Eugenia Falls has a power surplus of 4,000 h.p., while Wasdell Falls has 1,000 h.p. more than is being used in that district. This surplus gives the Commission almost immediately the added supply needed to serve the municipalities hitherto depending upon the Big Chute, or a total supply from all four developments of 15,000 h.p. The Commission estimates that with the increased development possible at the Big Chute and the developments yet to be made on the Saugeen and Severn Rivers there is an ultimate development in the district of 25,000 h.p. When this is all in use at some future date the northern municipalities can be linked up with the Niagara system by a six-mile line at Forest.

The tremendous increase in consumption is heavy, due to the demand from all over the system. New municipalities are being added, and those already in are increasing consumption steadily. A part of the increase is due to the manufacture of munitions.

* * *

DOMINION BRIDGE CO. SUBSIDIARIES

The Dominion Copper Products Co., one of the two successful subsidiaries organized by the Dominion Bridge Co., since manufacture of munitions was started in Canada, has secured authority to increase its capital from $400,000 to $1,000,000.

Both the Montreal Ammunition Co. and the Dominion Copper Products, organized through the Bridge company to manufacture parts required in shell making, were given a capitalization little more than nominal to the volume of

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department is able to present the following list of the moreimportant British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL

Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE

Valparaiso, British Consul General.

COLOMBIA

Bagota, British Consul General.

ECUADOR

Quito, British Consul General.

EGYPT

Alexandria, British Consul General.

FRANCE

Havre, British Consul General.
Marseilles, British Consul General.

INDIA

Calcutta, Director General of Commercial Intelligence.

ITALY

Genoa, British Consul General.
Milan, British Consul.

MEXICO

Mexico, British Consul General.

NETHERLANDS

Amsterdam, British Consul.

PANAMA

Colon, British Consul.
Panama, British Vice-Consul.

PERU

Lima, British Vice-Consul.

PORTUGAL

Lisbon, British Consul.

RUSSIA

Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN

Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN

Stockholm, British Consul.

SWITZERLAND

Geneva, British Consul.

URUGUAY

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Initiation of Marine Insurance

In the year 1670 a society of shipowners and master marines, meeting at Lloyd's coffee house in Cornhill, London, formed a marine intelligence department, issuing a shipping bulletin three times a week, which exists to-day under the well-known form of Lloyd's list of British and Foreign Shipping. About 100 years later the same society formulated the marine insurance policy which is now in use all over the world. Many other companies besides Lloyd's underwriters are handling marine insurance, but the form of policy and the warranties are practically universal.

Insurance Scope

The scope of insurance has been greatly extended, for, although it was the original intention of marine insurance to cover only the risks of the sea which no skill or care could prevent, policies may now be taken out to cover any conceivable risk. The underwriters have always reserved certain "warranties" or stipulations by which they exclude certain risks. For instance, a clause will be found at the foot of a marine policy stating "Corn, fish, salt, fruit, flour and seed are warranted free from average except general, unless the ship be stranded, sunk, burnt or on fire." Put in other words, this means that the above commodities are excluded from insurance except in the case of jettison or the ship be lost, in which case it is most probable that a total loss could be claimed. The object of the clause is apparent, as the above mentioned articles are peculiarly liable to damage, and hence not a good risk. This is the F.P.A. (free of particular average) clause which normally appears on every policy, but which may by arrangement with the underwriters be over-ridden.

A further warranty states: "Sugar, tobacco, hemp, flax, hides and skins as warranted free from average under five pounds per cent." This was designed to relieve the underwriters from having to settle petty claims for particular average amounting to less than 5 per cent. of the value of the goods insured. A similar clause related to the vessel itself, the limit in this case being 3 per cent. With a large and valuable cargo, 5 per cent. would amount to quite a large sum; it is, therefore, customary for shippers to protect themselves by dividing up the cargo into £100 blocks. By this means damage, which would amount to less than 5 per cent. on the whole cargo, will, if localized, probably reach very much more on the smaller lot, then particular average can be claimed and paid.

Two other warranties which are not mentioned, but are implied in the policy, are "Seaworthiness and Legality." The first covers absence of overloading, proper stowage, efficient manning, absence of cargoes of unusual risk, etc., whilst legality would be affected by the carriage of contraband or the insurance of a foreign vessel against war risks.

Insurance Comparisons

Comparing marine insurance with fire or theft insurance on land, it will be seen that there are certain distinctions. On land, a policy is a contract of indemnity by which the insurance company undertakes to restore the original condition of the property insured. It can hardly be said that marine insurance is of the same nature because there is no burden on the insured to prove the value of the loss, and in many cases it would be impossible to do so. Further, the issue of P.P.I. (policy proof of interest) policies to some extent lends itself to speculation. Nevertheless good faith is essential to the policy, and misrepresentation or concealment immediately render the insurance void. If the misrepresentation is accidental, it is customary to return the premiums otherwise they are forfeit. At the time of taking out the policy, all circumstances liable to influence the underwriters must be divulged, default in this regard being equivalent to concealment.

"Sailing" Clause

Besides the F. P. A. clause and the implied warranties already mentioned there are certain other warranties which are expressed in the policy. One is the warranty to sail on a certain date. To "sail" in this case is to cast off moorings or to weigh anchor and does not necessitate clearing the port. The insurance in this case would cover stranding of the vessel after castings off but before the port was cleared. If, however, the policy contains the words "sail from the port of ———————," the port must be cleared, otherwise the policy is void. This is an important point in war time as it is possible that the ship might be lost by a mine or infernal machine before clearing her port. The F.C.S. (free of capture, seizure, detention and the consequences thereof) clause is one which practically eliminates war risk and therefore in times like the present is usually over-ridden by being omitted or the words "including war risk," inserted in the body of the policy. Warranties sometimes given to the underwriters with the object of securing better rates are "part value uninsured," and "no iron or ore in excess of registered tonnage is carried."

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Payment of Insurance

When insurance has to be paid, the necessary investigations and apportionments are made, not by the underwriters themselves, but by an entirely independent body of highly specialized professional men, the average adjustors. Their work is frequently very difficult, particularly where general average is paid. It will easily be seen that if ten thousand dollars worth of a fifty thousand-dollar cargo were jettisoned the adjustment of the average payable by each of the separate shippers is no simple matter. In order to avoid detention of cargo it is usual, where a G.A. has been incurred, for the cargo owners to sign an average bond undertaking to pay their share of the G.A., when it has been computed, and they are called upon. Upon this understanding the cargo is delivered to the consignee. The average bond usually calls for a bank deposit as security. In order to avoid ambiguity as to the laws of general average which vary in different countries, the policy usually specifies that the York-Antwerp rules shall govern both G.A. and salvage. The foreign general average clause over-rides this and stipulates that the laws governing G.A. shall be those of the country of destination.

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The shipowner's liability is limited, and the shipper's only really satisfactory indemnification is afforded by a policy of marine insurance.

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CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia .

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Ploschad 9, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
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CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia .

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Ploschad 9, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address. Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Chatham, Ont.—The Gray Dort Motor Co. will build an addition to its plant here.

Hanover, Ont.—The Hanover Cement Co., proposes to purchase additional machinery and equipment for its plant.

St. John, N.B.—The new plant which is being built for McAvity & Sons is almost completed and will soon be in operation.

New Westminster, B.C.—The Western Marine Railway Co., has commenced work on the new shipyards on Poplar Island. The plant will cost about $80,000.

Windsor, Ont.—The Maxwell Motor Car Co. expects to start shortly on the erection of a plant to cost $60,000. A site was purchased from the city last spring.

Estevan, Sask.—The Lignite Briquette & Power Co., propose establishing a brick and tile plant. A plant for making briquettes from lignite is also contemplated.

St. John, N.B.—The City Council has decided to proceed with the construction of a power house and laundry of the General Public Hospital at an estimated cost of $46,000.

Welland, Ont.—The Canadian Steel Foundries, Ltd., are building an addition 40 ft. by 100 ft., to the muck bar mill, and will install hydraulic forging presses and gas furnaces.

Orangeville, Ont. — The Canadian Clock Co., propose to build a factory, estimated to cose $30,000, and a by-law will be submitted to authorize a loan of $15,000 to the company.

Port Moody, B.C.—Construction work will be started at once on the erection of a shipbuilding plant for Boyds, Ltd., of Port Moody, to include engineering and wood-working plants, foundry etc.

Sherbrooke, Que.—The Iron & Metal Supply Co., Montreal, propose to erect a factory, at an approximate cost of $15,000. A by-law will be submitted to the ratepayers to sanction certain concessions.

Brantford, Ont.—The contractors have commenced to break ground for the erection of the plant of the Dominion Steel Products Co. The main building, including the office, will be 370 feet by 90 feet. The company has a capital of $500,000.

Fredericton, N.B.—A new pumping station is to be erected at the Experimental Farm to take the place of the station destroyed by fire in March, 1915. The new building is to be two stories high and will cost about $3,000. William Richards has been awarded the contract for the concrete work. J. A. Grisdale, of Ottawa, is Director of Experimental Farms.

Ottawa, Ont.—The contract for the new Dominion Arsenal at Lindsay, Ont., has been awarded to the Westinghouse-Church-Kerr Co., of New York and Montreal. The total cost of the buildings, equipment and plant is not available at the present moment. The estimated cost, however, of the buildings and certain parts of the plant closely associated therewith will be approximately $675,000. The work is being done through this company upon the same basis on which they carry on all their undertakings. The materials and plant are purchased on the tender basis, the contracts going to the lowest tenderer, all of which are submitted for the approval of the proper officials of the Government. The company are allowed a percentage on the total value of the work, the rate varying in accordance with the amount of engineering services employed.

Electrical

Elmwood, Ont.—The Village Council are considering installing a hydro-electric system.

Dundas, Ont.—The Hydro-Electric Commission propose duplicating the equipment at the distributing station here.

Lethbridge, Alta.—On September 15, the ratepayers will vote on a by-law to provide further extensions to the electric light system.

E. P. Coleman, general manager of the Dominion Power & Transmission Co., of Hamilton, Ont., has been elected president of the Canadian Electric Railway Association.

Collingwood, Ont.—The Hydro-Electric transmission line to Eugenia Falls is already in course of construction. The line will be 35 miles in length and will cost at least $4,000 per mile.

Hanover, Ont.—The Light Commission is considering the extension of the existing lighting plant, or, as an alternative, the construction of a new system. Estimates will be got immediately. Chairman, Dr. Mearns.

Brantford, Ont.—The Hydro-Electric Commission will install interswitching apparatus here and also at the Woodstock station. These interswitching stations will break the lines between Dundas and London into three sections. They will eliminate breaks in the service such as have occurred recently.

New Westminster, B.C.—By changing from arc lights to the new nitrogen lamps, the cost of the arc lighting system of the city can be reduced from $12,914 to $4,673, a substantial saving of $8,241. This was the report made tc the City Council in committee by City Electrician Digby. The change was authorized.

General Industrial

St. Jerome, Que.—The Regent Spinners, Ltd., will build a mill here.

Renfrew, Ont.—The Renfrew Textile Co., will build an extension to their factory.

Wingham, Ont.—The Wingham Salt Works will shortly install machinery at their new brine well.

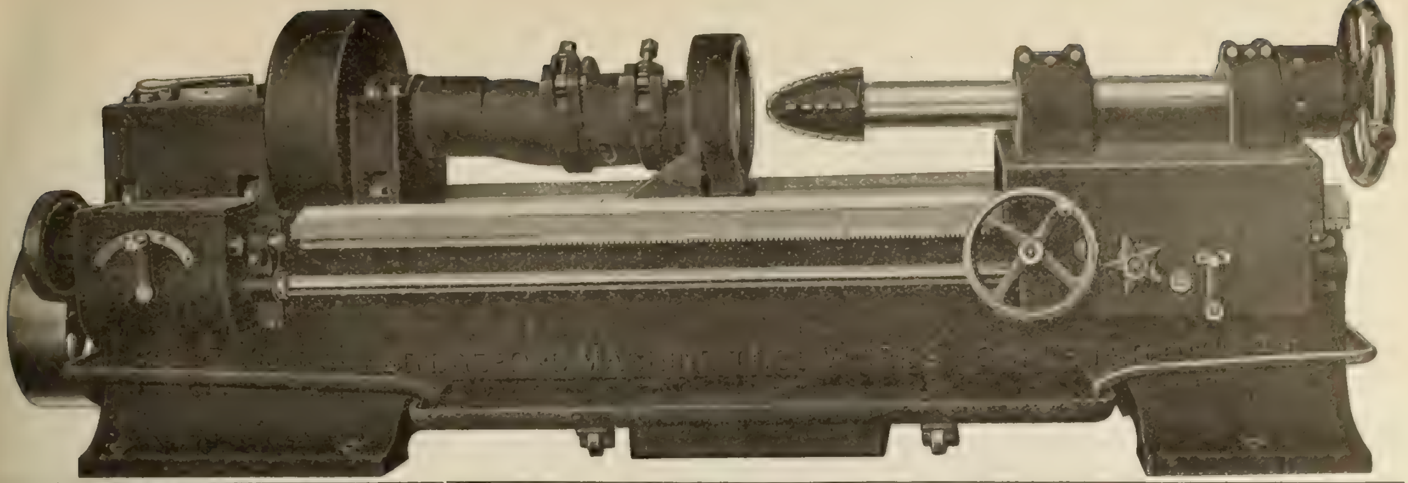
London, Ont.—The Hunt Milling Co. are contemplating the erection of an addition to their flour mill here, to cost $50,000.

Toronto, Ont.—The Corrugated Paper Co., has let a contract for the erection of a brick and steel addition to its plant to cost $12,000.

Medicine Hat, Alta.—It is expected that the new mill being constructed by the Lake of the Woods Milling Co., will be completed this year.

London, Ont.—The Canadian Cereal & Flour Mills Co. propose to erect an addition to their premises on Talbot street, at an estimated cost of $10,000

St. Jerome, Que.—The Canadian Consolidated Rubber Co., will build a large addition to its plant at St. Jerome, Que., and has awarded the contract to Gray & Dunn, Montreal.



Rough Bore, Straight Diameter

Rough Bore, Inside Radius

Finish Bore, Straight Diameter

Finish Bore, Inside Radius

Boring Economy

Two great factors in economic boring operations are the Bridgeford Boring Lathe and the Davis Boring Heads. Combining the massive strength of this Bridgeford Lathe and the tough, superior quality of a specially constructed Boring Head and you have an ideal combination that will save you at least 25 per cent. to 50 per cent. on your Boring operations. The lathe is a machine of ideal proportionate strength, the stresses have been scientifically calculated, the vital points strengthened, resulting in a smooth-running, perfectly balanced unit that ensures efficiency, economy, speed and superior production.

Bridgeford 9.2" Boring Lathe

The lathe is of the heavy duty, low swing type, having a specially designed carriage with auxiliary hand feed for internal profile. Carries a 6 inch steel bar with male taper, allowing for light designs of cutter heads; 3 automobile style speed changes, all running in oil bath. A chip tray is attached and is used in conjunction with stationary lubricant tank. Regular equipment comprises everything except chuck, steady rest and cutter.

Davis Boring Heads

The boring heads are a new construction. Having benefited by the experiences of the "pioneering days" this type of head has been constructed, making a direct cut in the cost of boring operations of 25 per cent. to 50 per cent. Being made of that superior quality high speed steel you will have boring heads that will last, that will prove to you their saving power.

A 25% to 50% saving on boring operations will be welcomed by shell manufacturers. Illustrated here are four boring heads: Rough bore, straight diameter; finish bore, straight diameter; rough bore, inside radius; finish bore, inside radius. These heads may be adapted to any lathe and will give you economical, speedy and efficient service.

Write us for particulars.

The A. R. Williams Machinery Co.
64-66 Front St. W. - Toronto, Ont., Canada

St. Thomas, Ont.—The Neal Bread Co., of London, Ont., will in the near future erect a modern bakery in this city. The location or size of the building was not stated.

London, Ont.—The J. R. Shuttleworth Co., hat manufacturers, are preparing plans for an addition to their factory on Dundas street. The building will be of brick construction and will cost about $10,000.

London, Ont.—The H. S. Hall Co., of Jersey City, have opened factory premises here and will manufacture lisle and chamoisette gloves. The company propose building a factory in the spring at a cost of $25,000, to weave the fabric required in the manufacture of the gloves. Chas. Phillips, of Toronto, represents the company.

Brantford, Ont.—Two Hamilton men will have joint management of the Brantford Carriage Co., which was recently amalgamated with the Baynes Carriage Co., of Hamilton. The managers will be Messrs. McTaggart and Jex, both of the Baynes Co. The stock in trade of the Baynes Co. is now being transferred to this city.

Niagara Falls, Ont.—A by-law will be submitted to the ratepayers on Sept 18, to grant a remission of taxes for ten years and necessary electric power at $10 per h.p., to the Perfection Tire & Motor Co., of Madison, Wis., who propose establishing a factory here. A site covering 15 acres has been secured. Richard T. Evans, of Madison, Wis., is vice-president of the company.

London, Ont.—The Middlesex Mills, Ltd., which has a capital of $250,000, has purchased a factory building here and will manufacture cotton, linen, silk and woollen goods. The building has over 25,000 square feet of floor space. The company will handle everything connected with the manufacture of the product except the spinning of the yarn. They have their own dye plant and will make their own chemicals for bleaching purposes.

Peterboro, Ont.—The contract for the erection of the Lambton Flax Co. plant has been let to the J. J. Kerr Co., of this town, for $15,000. Work will be begun at once, and some of the buildings and the retting tanks are to be completed this fall, the balance next spring. The buildings will be of the most modern type for flax mill purposes and are intended to serve as a Government model for flax factories.

Municipal

Edmonton, Alta.—The City Council propose purchasing additional fire fighting apparatus.

Merrickville, Ont.—A by-law to grant a loan of $30,000 to the Rideau Power Co., was defeated by a majority of 85 to 6.

New Glasgow, N.S. — The Town Council contemplate extending the waterworks system. E. S. Fraser is town engineer.

St. Thomas, Ont.—The City Council are considering the construction of a sewage disposal system. M. Ferguson, City engineer.

Dunnville, Ont.—A by-law will be noted on by the ratepayers on Sept. 25 to raise $53,000 for installation of a hydro-electric plont.

Bassano, Alta.—A by-law will be voted on to raise $7,000 for the purchase of the electric light and power plant of the Alberta Electric Co.

New Glasgow, N.S. — The Town Council propose extending the waterworks system at a cost of $100,000. E. S. Fraser of New Glasgow is preparing plans.

North Bay, Ont.—On Sept. 18, a by-law will be voted on to authorize a $15,000 guarantee of bonds of the North Bay Hat Mfg. Co., with other concessions.

Aurora, Ont.—The Town Council have engaged James, Loudon & Hertzberg, consulting engineers of Toronto, to prepare plans for a sewerage disposal system.

Aylmer, Que.—The lowest tender recently received for the proposed water filteration plant was submitted by the Norwood Engineering Co., of Cowansville, Que., at $33,000.

Lethbridge, Alta.—A by-law will be submitted to the ratepayers on Sept. 15 to raise $9,375.66 for extension of electric light system; $1,000 for extension of ash flue at electric power house; $6,700 for extending electrical system.

Winnipeg, Man.—A tender for the entire completion of the capital building was submitted by J. McDiarmid & Co., for $3,128,018. The lowest tender for the steel work in the dome was submitted by the Manitoba Bridge & Iron Works at $169,960 and for the plumbing, heating and ventilating Green & Litsten at $203,981.

St. Mary's, Ont.—At a special meeting of the Council on Aug. 28, a resolution was passed urging the Water and Light Board to install the gasoline pumping plant recommended by the inspector of the Underwriters' Association on his visit here last March. The sum of $4,000 has been voted for the purpose. It is proposed to drill new wells, making the new plant entirely independent.

Wood-Working

Harriston, Ont.—The casket factory here was destroyed by fire on Aug. 30. The loss is heavy.

Windsor, Ont.—The Windsor Lumber Co. are building a large addition to their mill on Cameron Ave.

New Westminster, B.C.—The Dominion Cedar & Shingle Co. are clearing the site for their new shingle mill next the Lulu Island bridge on water frontage leased from the city.

New Westminster, B.C.—The Marsh Hutton Powers Co. propose to build a shingle mill on Lulu Island, and have leased a site from the city. Approximate cost, $30,000.

New Westminster, B.C.—Fire, on Aug. 24, completely destroyed the shingle mill and boiler room of the Brunette Sawmills Co., in Sapperton, causing damage estimated at $20,000, covered by insurance. It is expected that the company will proceed at once to rebuild the shingle mill.

Railways -- Bridges

Victoria, B.C.—Agreements have been concluded whereby the construction of the proposed Johnson street bridge will be proceeded with.

St. John, N.B.—The C. P. R. are reclaiming a large area on the western side of the harbor, to be utilized as a freight yard, with accommodation for 1,800 cars. A 200,000-gallon water tank is also being erected by the railway.

Montreal, Que.—The Montreal and Southern Counties Railway intends to construct a number of new terminals along the route between this city and Granby for the accommodation of the increasing business that is now offering.

Tenders

Ottawa, Ont.—Tenders will be received up to Friday, September 8, for the following material: One portable gasoline-driven air-compressor, 100 cubic feet capacity; four pneumatic caulking hammers; two 5-ton chain blocks. Specifications may be obtained on application to A. F. Macallum, Commissioner of Works.

Ottawa, Ont.—Tenders will be received until September 29, for the construction of an extension to the west breakwater at Port Stanley, Elgin County, Ont. Plans and forms of con-

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ASK THE ENGINEERS OF THE INTERNATIONAL NICKEL CO.

They spent two months in examining industrial sites from the Atlantic to Lake Huron. Now they are building their big plant covering 25 acres in the Welland Canal Zone. Why?

Because of abundant cheap power

Because of unrivalled rail facilities

Because of the advantages of Lake shipping

The Welland Canal Zone has the strongest combination of Industrial Facilities in Canada. Twenty-five big industries of continental reputation have proved it in the last five years.

RAILROAD RATES

Rates from Welland to the North-West and Pacific Coast, all rail, are the same as from all other manufacturing points in Eastern Canada lying between the Detroit River and Montreal. These rates are fixed by the Board of Railway Commissioners for Canada.

On account of the close proximity to the border, Welland is in the Buffalo switching group and takes the Buffalo rate from the east and south, and enjoys quick delivery on all raw material imported from the United States.

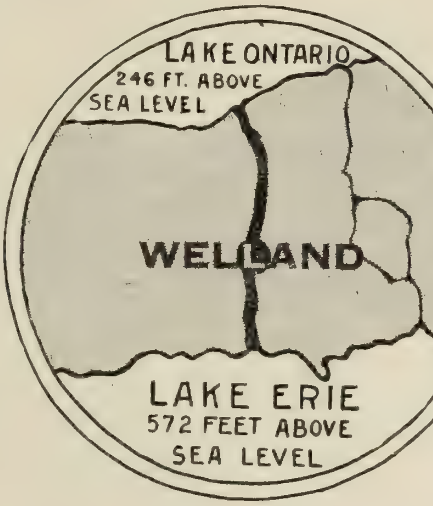
The fact that all of these roads centre here creates competition, and is the biggest lever the manufacturers have for securing efficient service from the railroads.

The seven railroads are as follows:

Grand Trunk -- Michigan Central - Toronto, Hamilton & Buffalo—Canadian Northern —Pere Marquette -- Canadian Pacific—Wabash.

Switches or spurs are constructed on the basis of cost, the manufacturing firm paying the cost price and the railroads refunding a fixed sum for every car switched over the spur until the full amount is rebated. This rule prevails throughout the entire Dominion of Canada, and no one district has any advantage in this matter.

The WELLAND WAY



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POWER RATES

Welland is the industrial hub of the Niagara Peninsula, where an unlimited amount of electric power is available and sold at competitive prices, owing to the numerous power companies represented there.

Every factory in Welland is driven by electric power supplied by the Ontario Power Company, of Niagara Falls, which is about twelve miles east of Welland, or from the Dominion Power Company of DeCew Falls, which is about twelve miles north of Welland. The fact that we have competitive companies operating in this district gives us competitive prices on power.

LAKE SHIPPING

Welland is situated on the Welland Canal, the great Marine highway, between tide water and the Canadian Northwest,. with daily freight service both ways.

The canal carries boats of fourteen-foot draft, but work has now begun on canal enlargement to the amount of fifty million dollars to provide for twenty five foot draft.

In these days of keen competition, water transportation has become an absolute necessity to manufacturers, and Welland holds the distinct position of being the only municipality in the entire Dominion of Canada, owning and operating its own municipal wharf, accessible by all shippers and steamboat lines alike, without charges of any kind.

Welland is a port of entry for all upper lake lines of steamers giving low rates and quick dispatch, the advantages of which are enormous.

Send for Booklet that tells the story of Welland from the Manufacturer's standpoint.

Louis Blake Duff,
Industrial Commissioner, WELLAND, CANADA

tract can be seen, and specification and forms of tender obtained at the Department of Public Works, Ottawa, at the offices of the District Engineers at Windsor, Ont., and Equity Building, Toronto, Ont., also on application to the Postmaster at Port Stanley, Ont.

Ottawa, Ont.—Tenders addressed to J. W. Pugsley, Secretary Department of Railways and Canals, Ottawa, Ont., will be received up to September 18, for the construction of foundations for 500,000 bushel storage capacity grain elevator, working house and track shed at St. John, N.B. Plans, specifications and blank form of contract may be seen at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa; at the office of the Chief Engineer, Moncton, N.B.; at the office of the Terminal Agent, St. John, N.B., and at the office of the John S. Metcalfe Co., Ltd., Engineers, Montreal, P.Q.

Ottawa, Ont.—Tenders will be received up to October 2, for the undermentioned metal supplies for delivery to H.M.C. Dockyards at Halifax, N.S., and Esquimalt, B.C.: Items 1, steel angles, bars, sheets and plates; 2, iron bars, fire bar; 3, brass bars and sheets; 4, copper sheets and bars; 5, solder, tin, and alloys; 6, tubes, brass and copper. Forms of tender and full information may be obtained by application to the Department at Ottawa, or to the Naval Store Officers, at H.M.C. Dockyard, Halifax, N.S., and Esquimalt, B.C. In making application for forms, the particular item or items for which forms are required should be clearly stated.

Chesley, Ont.—Tenders will be received until September 11, for the following material taken from the Chesley Electric Light Co.'s plant, which was bought by the town and rebuilt by the Hydro Commission: 1,661 lbs. .03 heavy plain copper wire, unburned; 4,192 lbs. scrap copper wire, large sizes; 1 120-kw. 125-cycle, 2,300-volt, single-phase C. G. E. alternator; 1 3-kw., 125-cycle exciter; 1 marble switchboard for generator; 1 100-light arc generator; 1 30-light Reliance arc generator; 1 25-light Reliance arc generator; 14 133-cycle transformers; about 40 arc lamps. For further information apply H. S. Sanderson, Clerk.

Contracts Awarded

Port Arthur, Ont.—The C. N. R. have awarded a contract for the proposed machine shop to J. H. Simmons, of Winnipeg.

Vancouver, B.C.—Contracts for the new Pantages Theatre have been awarded to Skene & Christie for the masonry and terra cotta work, at $95,980, and to Coghlan & Sons for the steel work, at $35,000. The heating and ventilating contracts have not been let. The entire cost of the building will be about $300,000. B. M. Priteca, of this city, is the architect.

Marine

Ottawa, Ont.—The Marine Department will notify shipping to suspend traffic above Quebec on September 11, the day on which the middle span of the Quebec bridge is to be floated into place.

St. John N.B.—The Norton Griffith Co. are proceeding with harbor development work at East St. John. Three dredges are at work, in addition to crews employed in finishing a breakwater and in excavating for a dry dock.

Port Arthur, Ont.—The Western Drydock & Shipbuilding Co., have signed contracts for two more freighters the same size and type as the two at present under construction. The company has also in sight four other freighters of the same design.

St. John, N.B.—The Maritime Dredging Co. are proceeding with the reclamation work in connection with new piers on the western side of the harbor. The total fill will be about 475,000 cub. yds., of which 150,000 cub. yds. have already been dumped.

Breakwater Completed.—A notice issued by the Marine Department, Ottawa, on Aug. 30, is to the effect that the breakwater at Goderich, Ont., has been completed to its full length of 1,400 feet, and the check water removed so that vessels can use the harbor on a direct course between the two entrance piers.

Kingston, Ont.—The steamers Rideau King and Rideau Queen, which have for years plied between Kingston and Ottawa on the Rideau River, have been taken to Belleville, where an effort will be made to sell them. Since the death of Capt. Daniel Noonan more than a year ago they have not been operated.

Icebreaker Burned.—The car ferry icebreaker St. Ignace, owned by the Canadian Towing & Wrecking Co., of Port Arthur, was destroyed by fire on August 30, in drydock at Port Arthur, Ont., where she had been recently taken for repairs. The St. Ignace was a 600-ton vessel, built in 1888. The loss represents about $50,000.

C.G.S. "Burleigh".—The schooner Burleigh will not be sold. She is a trim little vessel and in view of the shortage of tonnage on the Atlantic, it has been urged by maritime interests in Halifax that the Naval Service Department should sell her. The Department agreed, and a number of bids were received. None of them corresponded with the value of the ship, however, and the tenders have been notified that there will be no sale.

Quebec, Que.—Messrs. J. S. Thom, M. J. Hackett and W. J. Hackett, hitherto joint owners of the Quebec Transportation & Forwarding Co., have sold their interests over the entire fleet of tugs and barges of the company to the Canada Shipping Co., of Montreal. The fleet consists of the sea-going tug Margaret, the A. H. Hackett, the J. H. Hackett, and Florence, as well as the barges Zapotic, Gladys, Hackett, Katie Hackett, Frank D. Ewen, and A. D. It is understood that the selling price was $150,000.

Windsor, Ont.—United States engineers will not remove the wreck of the steamer Topeka, sunk abreast of the Mullen's coal dock, Sandwich, a week ago. The wreck lies in 30 feet of water on the Canadian side, and must be removed by the Canadian Government. Vessels navigating the river may pass on either side of the hull, but the wreck is a menace to navigation. The owners have not decided what they will do with the steamer, but should they abandon her, her cargo of coal would well repay wreckers for removing the obstruction.

Vancouver, B.C.—The C. P. R. announced recently that it had let a contract to W. D. Grant, of Vancouver, for the carrying out of a comprehensive dredging scheme on the waterfront between sheds 3 and 7. The contract will include the berth in front of the depot shed and the berths immediately east of that part now used by the Pacific Coast Steamship Co.'s steamers and others. The intention is to have a depth of water of not less than 33 feet, and it is very probable that when this work has been finished even bigger steamers than those at present running here will be employed in the service. Orders have been given to have the dredging work carried out with every expedition, and it is expected that a start will be made next week. The contract will entail an outlay of some $200,000.

British Masters and Mates.—A new policy with regard to the admission of mates on British ships has been adopted by the British Board of Trade, according to a notification which has reached the Marine Department, Ottawa. Where formerly any candidate was admitted to the examination for masters and mates certificates and was qualified to take charge of ships of British register if successful, a new rule has been made. From now till the war is over every applicant for a certificate must be a

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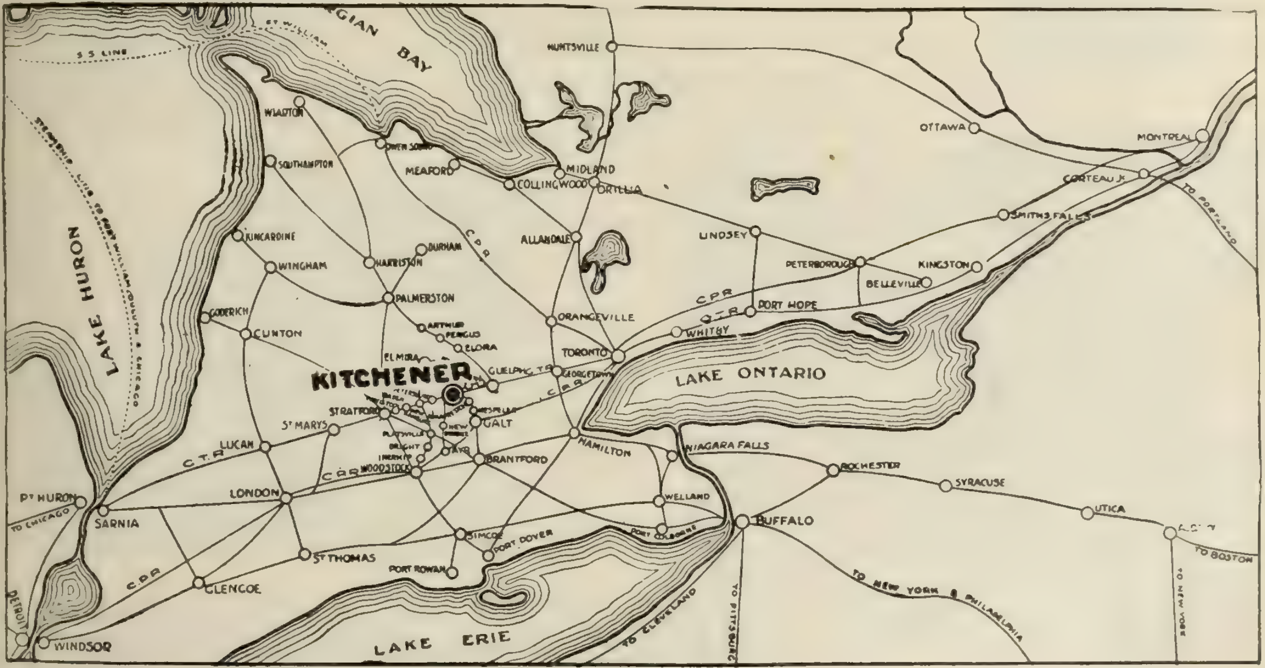
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GALT
LUCAN
HAMILTON
NIAGARA FALLS
ROCHESTER
SYRACUSE
BRANTFORD
WOODSTOCK
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TO CHICAGO
LONDON
WELLAND
SARNIA
BUFFALO
UTICA
TO BOSTON
SIMCOE
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TO CLEVELAND
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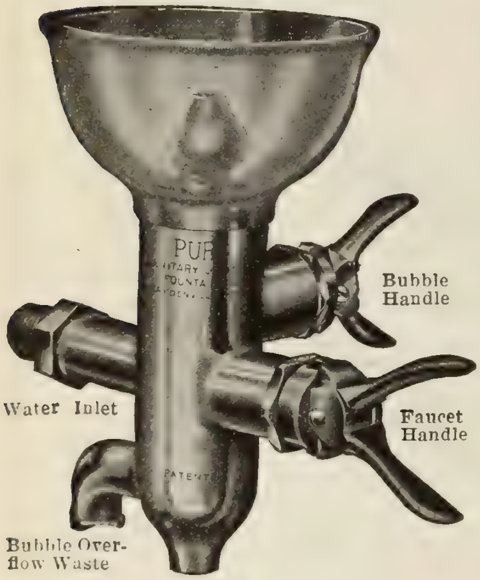

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We have the plant and equipment for turning out stampings of the highest quality in brass, copper, aluminum, tin and steel, and are prepared to undertake the manufacture of metal specialties of any description.

PUNCHES, DIES, TOOLS.

COLEMAN FARE BOX COMPANY, LTD.
70 Bond St., Toronto

British subject, and at the time of his birth each parent must have also been a British subject. It is understood, however, that the Canadian authorities will not adopt the same regulations, but will follow the same practice as formerly, admitting only British subjects to the examinations.

Trade Gossip

The Wilt Twist Drill Co., of Walkerville, Ont., are moving into their new factory shortly. The buildings are of concrete and steel construction and are equipped with the most modern machinery, enabling the company to largely increase their output.

Toronto, Ont.—The two-days' sessions of the Ontario Municipal Association, holding its Eighteenth Annual Convention in Toronto, was opened by the presidet, A. K. Bunnell, City Treasurer of Brantford, on Aug. 30, in the Council Chamber of the City Hall.

Large Order for Shirts.—An order for 500,000 shirts, received from the Italian Government, has been awarded by the Department of Trade and Commerce to the Knit Goods Association, of Hamilton. This is one of a number of orders for shirts and blankets received from the French and Italian Governments.

Ottawa, Ont.—The Government has refused to accept any of the tenders for the construction of the station buildings in connection with the new Intercolonial terminals at Halifax. The prices quoted were too high, apparetly owing to the high cost of materials and labor.

The Canadian Hoskins Co., of Walkerville, Ont., are moving in October to the premises at present occupied by the Wilt Twist Drill Co. The most complete and up-to-date equipment will be installed and will give this growing concern more adequate room for the manufacture of their product, which consists of furnaces and electric pyrometers.

Britain Gets Whale Oil.—When the Arctic whalers transferred their trade to the Antarctic, Great Britain obtained control of the whole of that trade by giving out licenses. This carried with it command over an important supply of glycerine, an essential ingredient in the manufacture of the explosive cordite. In return for supplies of coal and other necessaries of their business, the licenses were endorsed with the condition that the product of the catch be sold in the United Kingdom. Result: England has received this year 600,000 barrels of whale oil, one-tenth of which was glycerine.

Record Ore Shipments. — Anoth record in iron ore shipments on t Great Lakes was made in August a cording to figures just made publi There were loaded last month 9,850,1 tons, which was nearly two million to greater than in August a year ago. F the season to Sept. 1, shipments aggr gated 39,215,864 tons, an increase more than 12,000,000 tons over the sa period in 1915, and 7,000,000 tons mo than the total movement in 1914. Vesse men are confident the total shipmen for 1916 will reach 60,000,000 tons.

Customs Receipts.—A further phe omenal rise in customs receipts indica ing the maintenance of this year's r markable trade increase is shown in th monthly statement issued on August 3 by Hon. J. D. Reid, Minister of Custom The August revenue from custom reached a total of $11,941,000 as com pared with $8,330,000, an increase o $3,610,000. For the five months of th fiscal year, the increase in custom revenue has been $21,723,000, the re ceipts having risen from $36,731,000 i 1915 to $58,454,000 during the presen year.

Exhibit of Enemy Products.—Si George Foster, Minister of Trade an Commerce announced recently that very complete collection of German an Austrian products sold largely befor the war has been made by the Britis Government and following the Britis tour the assortment will be brought t Canada. It will be displayed in Toront and Montreal and probably at othe centres. Canadian manufacturers, merchants and consumers alike will find an inspection profitable. Materials, prices, cost estimates, etc., will be made clear.

Personal

Hon. F. T. Frost, president of Frost & Wood Co., Smith's Falls, died recently.

R. A. Pyne, superintendent of the C. P. R. shops for the past five years at Winnipeg, has been appointed to the position of superintendent of motive power on the same railway at Montreal.

T. R. Rieder, vice-president and general manager of the Canadian Consolidated Rubber Co., has been elected to the Board of Directors of Ames-Holden-McCready, Ltd. His election fills the vacancy left by the recent resignation of. A. L. Johnson, who was vice-president and general sales manager of the company. **I. L. Dildine** has been appointed to the position of general sales manager.

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Made in Canada

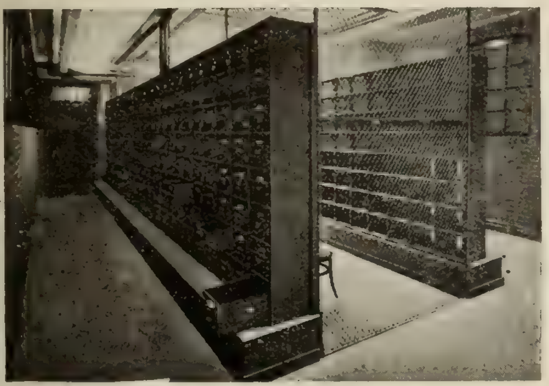
LOCKERS AND SHELVING

Must Save You Money

THAT is the experience of every firm using our Steel Lockers and shelving.

We want to prove our case to you; also to send you some very interesting illustrated folders.

The few examples shown here do not convey an adequate idea of the DENNISTEEL LINE.



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Steel Factory Furniture

Indestructible, Sanitary, Fireproof.
Write for illustrated folders and prices.

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LONDON
CANADA

WEBBER BROS. MACHINE COMPANY

Gear Blanks, Shell Punches, Boring Bars, Special Tools.

Machinery of all kinds built to your specifications.

Better Work. Reasonable Prices.
848 Dupont St., Toronto.
Phone Hill. 2746

"HAWK'D" CHROME VANADIUM STEEL

Will Give You Exceptional

Shell Forging
Production

WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

There are many cases where each punch has turned out over 2,000 shells.

It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

Hawkridge Brothers Company
303 Congress St., BOSTON, MASS.
U.S.A.

E. B. Plewes of E. B. Plewes & Co., manufacturers' agents of Winnipeg, Man., is visiting Eastern Canada and the United States in Connection with his business. Mr. Plewes represents William Hall, Ltd., Alma Works, Sheffield, England, file manufacturers.

Hugh Wilkinson, former mechanical superintendent of the Brockville branch of the Canadian Northern Railway, and for many years previously an employee of the Grand Trunk, died at Brockville, Ont., on August 27. He had long since retired, having reached the age of 28.

H. R. MacMillan, Chief Forester of the Province of British Columbia, who recently returned from a sixteen months' trip to Europe, South Africa, the Antipodes, and India, in the capacity of Special Trade Commissioner for the Dominion Department of Trade and Commerce, with a view of investigating opportunities for the Canadian lumber export trade, has sailed from Victoria, en route to China, Japan, and Russia, to pursue his investigations. He will be absent for about five months. Mr. MacMillan's trip to Great Britain resulted in a number of important war orders for lumber and lumber products being directed to the British Columbia mills, and only the inability to secure adequate ocean transportation facilities prevented this business from assuming very large proportions.

New Incorporations

The Beacon Match Co. has been incorporated at Toronto to manufacture matches, with head office at Toronto, with a capital of $75,000. Incorporators: R. M. Melville, F. C. W. Wagner and K. Campbell, all of Toronto.

Martin Aeroplanes, Ltd., has been incorporated at Toronto, with a capital of $100,000, to manufacture aeroplanes of all kinds at Windsor, Ont. Incorporators: C. S. King, W. L. McGregor and W. R. Bonds, all of Windsor, Ont.

Montreal Machinery & Supplies, Ltd., has been incorporated at Ottawa with a capital of $50,000, to manufacture and deal in Machinery of all kinds at Montreal. Incorporators are: F. G. Bush, W. R. L. Sharrk and M. J. O'Brien, all of Montreal.

The Oxford Knitting Co. has been incorporated at Ottawa with a capital of $50,000 to construct and operate cotton and woolen factories. Head office at Woodstock, Ont. Incorporators: William Taylor, Ralph E. Allen and B. S. Crombie, all of Montreal, Que.

The Toronto Furniture Co., has been incorporated at Toronto with a capital of $500,000 to manufacture furniture of

PATENT ATTORNEYS

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ESTAB. 1877
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IN ALL COUNTRIES
Book "Patent Protection"—free. Master of Patent Laws. Formerly Patent Office Examiner.
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Patent Solicitors. Head Office, Royal Bank Bldg., Toronto. Ottawa Office, 5 Elgin St. Send for our Plain Practical Pointers. Copy of National Progress, in which our patents are advertised, mailed free.

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Merchants Bank Building, corner St. Catherine St., MONTREAL, Phone Up. 6474 and Washington, D.C., U.S.A.

METAL STAMPINGS

We are manufacturers of stamped-parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS
372 Pape Avenue, Toronto, Can.

all kinds at Toronto, Ont. The provisional directors are Joseph M. Bullen, James H. Fraser and Percy Shulman all of Toronto.

Hanna Bros., Planing Mill, Ltd., has been incorporated at Toronto, with a capital of $75,000, to manufacture sashes, blinds and doors at Fort Erie, Ont. The incorporators are: A. J. Hanna, of Bridgeburg, Fred Hanna and A. R. Ellis, of Fort Erie, Ont.

The Cushman Motor Works of Canada, Ltd., have been incorporated at Ottawa with a capital of $100,000, to take over the concern of the same name located at Winnipeg, Man., and to carry on business as engineers and machinists, etc. Incorporators: A. E. Donovan, F. K. Hamilton and H. E. Kennedy, all of Winnipeg.

Catalogues

The Gray Mfg. & Machine Co., Toronto, are distributing to the trade a new bulletin No. 14, dealing with the "Gray" power pumps and water supply systems. The bulletin contains a brief description of the systems and specifications covering the various sizes of pumps and tanks, etc., with price list. The bulletin is illustrated.

Lathes.—Lodge & Shipley Machine Tool Co., Cincinnati, Ohio, have issued a complete loose leaf catalogue in which the illustrations and descriptive matter explain the operation of the company's lathes and the various uses to which they may be put. The leaves are arranged so that the several parts of the lathes are illustrated and described first, followed by pages dealing with the completed tool. The lathes listed include engine lathes with cone pulley and selective head arrangements for securing different spindle speeds, a portable lathe and one for heavy forgings. A bulletin giving examples of work done on the various machines is included.

Pumping Machinery.—Catalogue No. 29 deals with an interesting line of pumping machinery and air compressors made by the National Steam Pump Co., Upper Sandusky, Ohio. Simplex and duplex pumps for a large variety of purposes, also vacuum pumps, are dealt with, while automatic feed pumps and receivers and air compressors are also included. A general description is given of each type, with special reference to the principal features embodied in their construction. Each type of equipment is illustrated, and tables are included giving the principal dimensions and capacity of each size. The catalogue concludes with a list of parts for several types of pumps, accompanied by diagrams.

To Makers of Mark Seven
4.5 H.E. Shells

Our "Patent applied for" Special Water-Cooled Die is the only successful Die for the Mark Seven. Shop Licenses and Drawings, $100.00. Our Nosing Die, Water Jacket, Die and Pin (unfinished) will be supplied at $40.00 per set. Our form of Die is also applicable to 5 in. and 6 in. Shells.

OUR SPECIAL DIES HAVE THE LONGEST LIFE OF ANY ON THE MARKET. OUR LATEST DIE HAS PRESSED OVER SEVENTEEN THOUSAND SHELLS (17,000).

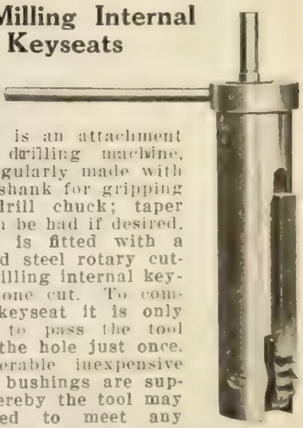
Toronto Type Foundry Co., Limited
50 Coleman Avenue, Toronto

MORTON MANUFACTURING CO.
PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R.R SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE AND WORKS: MUSKEGON HEIGHTS USA

We are qualified Tool, Die, Jig, Gauge and Fixture Makers.
WRITE US.
Windsor Machine & Tool Works.
WINDSOR, ONT.

"Barnes-made"
SPRINGS
are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.
Write for booklet No. 7-T.
Established 1857.
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U.S.A.
Man'f'rs of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire

KEYSEATER
for Milling Internal Keyseats



This tool is an attachment for the drilling machine, and is regularly made with straight shank for gripping in the drill chuck; taper shank can be had if desired. The tool is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. To complete a keyseat it is only required to pass the tool through the hole just once. Innumerable inexpensive eccentric bushings are supplied whereby the tool may be bushed to meet any diameter above its own.
Write for Catalog C for full detail.
NATIONAL MACHINE TOOL CO.
2270-2272 Spring Grove Avenue, Cincinnati, Ohio, U.S.A.
Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria.

This space $1.00 per insertion on yearly order.

That WILT TWIST DRILLS

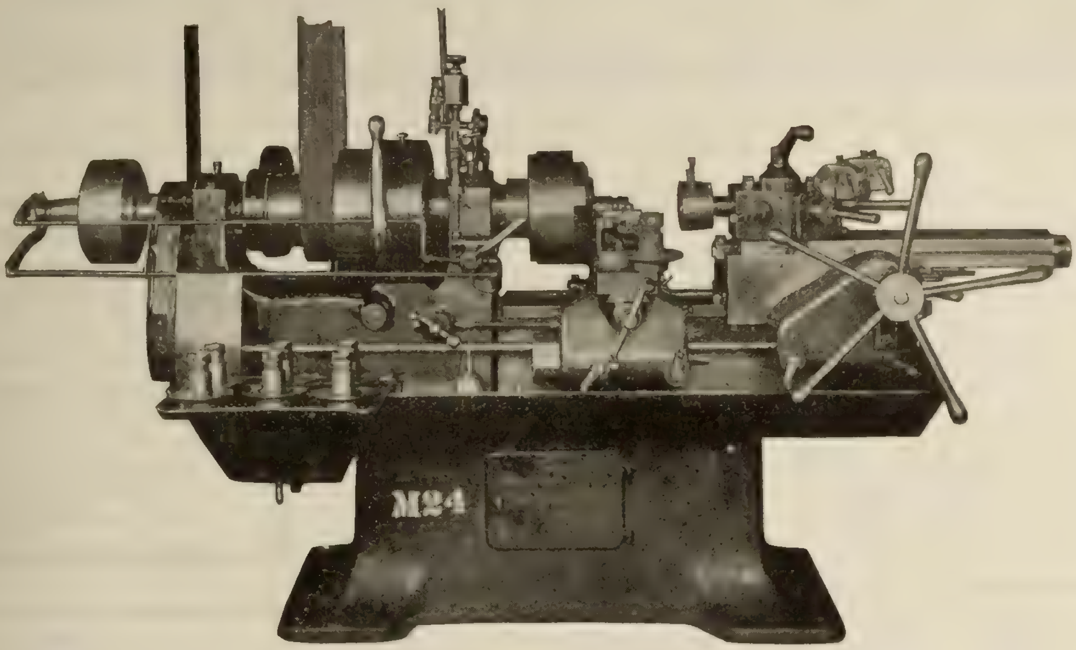
have gained the confidence of the majority of Canadian drill users is evidenced by the above picture of the new

Modern Glass-Roofed Plant

of

The Wilt Twist Drill Co. of Canada, Ltd.

WALKERVILLE, ONTARIO



Are you making Shells, Shrapnel, Fuses or Piston Rings?

If you are making any of the above, get in touch with us. We want to lay a cost-cutting plan before you. We want to prove to you that

Detroit Pneumatic Chucks

will chuck a piece of work in five seconds. This is just about 55 seconds quicker than it can be chucked by hand.

The shorter the operation the more chucking and the greater the saving with Detroit "Air Grip" Chucks.

They fit all hollow spindles and are made entirely of steel.

Gripping Power is adjustable.

Made in two-jaw and three-jaw types.

All sizes from 8″ to 18″ diameter.

Write for free trial offer.

Detroit Pneumatic Chuck Company
DETROIT, MICHIGAN

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Five cents each insertion when box number is required. Each figure counts as one word. Display rates on application.

FOR SALE

HORIZONTAL GAS ENGINE 25 H.P. IN SERvice at present time, $375.00 cash. Write Penberthy Injector Co., Limited, Windsor, Ontario. (5)

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

A SNAP IN TURRET LATHES SLIGHTLY used on shell work. Fourteen splendid machines at bargain prices. Do you need these machines? If so, drop a line to Box 953, Woodstock, Ont.

LATHE FOR SALE—ONE 39 x 17-FOOT Pond engine lathe, suitable for heavy shells; in good condition; $1,500.00. A. B. Ormsby Company, Limited, Toronto. (2)

A BARGAIN FOR QUICK SALE—30 H.P. 10 x 14 engine; guaranteed in first-class working condition; drive belt included. Hamilton Whip Co., Hamilton.

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make. used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

DROP PRESS FOR SALE—NO. 9 MINER & Peck drop press; anvil 2,000 lbs.; base 30,000 lbs.; 36" between uprights; 40" x 35" between poppets; 34" x 29" top of anvil; guaranteed as good as new. Can be shown in operation to any genuine prospective buyer. The Metallic Roofing Co., Limited, Toronto. (4)

MACHINE SHOP WITH MODERN EQUIPment manufacturing a good staple line; orders for months ahead; will bear the fullest investigation; satisfactory reason for selling. Box 220, Canadian Machinery.

FOR SALE—ONE 16" X 8' HENDEY LATHE, with taper attachment, $1,100.00; one 22" x 10' Blaisdell lathe, with taper attachment, $1,200.00; one 24" Gould & Eberhardt shaper, $800.00. The above machines are in first-class condition. For particulars apply Box 221, Canadian Machinery.

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

FOR SALE — SOIL PIPE AND FITTING plant; full range medium patterns; good assortment, standard and extra heavy; ten-ton cupola; complete modern equipment, with machine shop; on 2 acres land; railway siding. Would give lease of land now occupied. Reasonable price and easy terms. Fine opportunity for two or three practical foundry men. Apply The Vancouver Pipe and Foundry Co., Ltd., 572 Beatty Street, Vancouver, B.C.

SITUATIONS VACANT

TWO EXPERIENCED DIE SETTERS, TWO good die makers, and one experienced screw machine operator. Box 216, Canadian Machinery. (8)

SUPERINTENDENT FOR FACTORY EMploying 150 men. Must be graduate mechanical engineer with practical experience in factory management. We have a modern plant and a growing business. None but Canadians or Americans with Canadian experience need apply. Address Box 214, Canadian Machinery. (tf)

SITUATIONS WANTED

SUPERINTENDENT OF SHELL FACTORY desires position—at present employed, but wishes to change. Would accept general foremanship. Best references. Box 217, Canadian Machinery. (9)

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 40, 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN LAMP FACTORY
ST. CATHARINES, ONTARIO

WANTED

WANTED — 250-VOLT D.C. GENERATOR — 75 to 150 k.w., direct connected to steam engine; must be in good condition. Write to The Kaufman Rubber Co., Berlin, Ont. (13)

WANTED—ELECTRIC TRAVELLING GANtry crane, span about 57 ft., clearance 50 ft. overhanging at one end; load 15 tons. State full particulars and price. Thor Iron Works Limited, Toronto, Ont. (27)

WANTED—12" BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Apply Box 218, Canadian Machinery.

REPAIRING

ALL KINDS OF MACHINERY REPAIRED rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

For Sale Cheap

- 1—Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.
- 1—12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 3 tons capacity; complete, less the Hoist.
- 1—10" Single "I" Beam Overhead Hand Power Crane, 23' 0" span, 2 tons capacity; complete, less the Hoist.
- 1—Brantford (Gas) Bake Oven and 4 Racks.
- 1—Linderman 2-Spindle Boring Machine.
- 1—24" Drill. Bertram Company.
- 1—26" Drill, London Machine Tool Company.
- 1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

M. BEATTY & SONS,
Limited
Welland, Ont.

FOR SALE

- 1—No. 10 Zeh & Hahneman Percussion Press.
- 1—No. 12 Zeh & Hahneman Percussion Press.
- 2—No. 4 Smurh & Kamen Geared Friction Head Turret Lathes.
- 1—24" David Turret Lathe.

Refer to
H. Mueller Mfg. Co., Limited
Sarnia, Ontario

Kindly mention this paper when writing advertiser

FOR SALE

■ ■

Two 24-inch standard Gisholt Turret Lathes, completely tooled for boring 4.5" H.E. Shells.

Box 212
Canadian Machinery
t.f.

A SNAP

For Sale—Boiler Repair and Sheet Iron Works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars.

Box 213, Canadian Machinery

New Machines at Second-Hand Prices

1 only Foster, No. 1 Hand Screw Machine, with plain head, automatic chuck, wire feed, capacity 9/16, ...$500.00

1 only Hendy Type 18" stop Friction shaper, with Countershaft, with swivel vise, SECOND-HAND $300.00

1 only Puttnam Speed Lathe, 14" swing, 6-foot bed, 5-step cone, countershaft, SECOND-HAND (as good as new) $150.00

1 only Fox Monitor Lathe, No. 4, with Chaser attachment and standard equipment, SECOND-HAND $150.00

1 only 10 H.P. BRAND NEW Lincoln Motor, with Starting box, Pulley, etc., complete 25-cycle, 3-phase, 550 volts, 1,500 R.P.M. $250.00

1 only 1" Bolt Cutter, BRAND NEW, with lead screw, countershaft, no dies, National make.. ....$450.00

Ontario Metal Products Co., Ltd.
119 Adelaide St. W., Toronto

Wanted to buy or sell Scrap Iron, Metals, etc.

At the present time we are paying the following prices:

No. 1 Scrap Wrought Iron, $13.75 gross ton.
Heavy Scrap Copper, $20.00 per cwt.
Mixed Heavy Scrap Brass, $13.00 per cwt.
Heavy Scrap Lead, $5.75 per cwt.
Scrap Aluminum, $32.00 per cwt.
Scrap Babbitt, $8.00 per cwt.

Our Motto: Honest dealings and prompt settlements. Make us a trial shipment.

L. S. TARSHIS & SON
88-98 Wellington Street, Montreal

Canadian Agents Wanted

Agents wanted to represent a well-known British line of

Chain Belting, Chain Gearing, Etc.

Apply Box 222
CANADIAN MACHINERY

A want ad. in this paper will bring replies from all parts of Canada.

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3¼" Gridley Automatic
40" x 16' Conradson, heavy duty
40" x 12' New Haven
26" x 8' Davis
24" x 8' Lodge & Shipley
21" x 10' LeBlonde, D.B.G.
20" x 10' American (2)
20" x 7' Fay & Scott
17" x 6' Garvin
16" x 6' Pratt & Whitney
16" x 5' Windsor, wire feed
15" x 5½' fox, American
2" x 24" Jones & Lamson flat turret
No. 22½ Garvin, wire feed
No. 2 Garvin, wire feed
8" x 31" Brown & Sharpe

Engine Lathes

42" x 20' Fifield
36" x 16' Putnam
30" x 16½' Pond
26" x 40" x 20' London Gap
26" x 14' Hamilton, D.B.G. (4)
26" x 14' Gleason, D.B.G. (2)
24" x 16' LeBlonde
24" x 10' Peerless
24" x 10' Lodge & Shipley, patent head
22" x 12' American, all-geared head
21" x 12' Peerless
21" x 8' Back-geared single purpose (3)
20" x 12' Lodge & Shipley, patent head (2)
20" x 10' Reed
20" x 8' Walcott, D.B.G. (2)
20" x 8' Hercules, heavy duty
20" x 8' American
20" x 8' Ames
19" x 8' LeBlonde, D.B.G.
18" x 10' MacGregor-Gourlay
18" x 8' Walcott, D.B.G. (2)
18" x 8' New Haven
18" x 6' New Haven
17" x 8' Blaisdell
16" x 10' MacGregor-Gourlay, D.B.G
16" x 8' Back-geared single purpose (2)

Upright Drills

D4 Colburn, heavy duty
24" Bickford, shaft-driven
24" London, back geared, sliding head
24" Foote-Burt, back-geared
20" Barnes, back-geared
20" Bertram, power feed
No. 10A Baush, 16 spindle
16" Avey, high speed, 4 spindle, sensitive
16" Canedy-Otto
15" Barnes
14" Excelsior
14" Garvin, 4-spindle
13" Perfect, 3-spindle
10" Barnes, friction
60" Bertram Semi-universal Radial
48" Gang, plain radial, tapping attachment
36" New Century, plain radial
32" Canedy-Otto wall radial

Iron Planers

30" x 30" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
20" x 20" x 5' Bertram

Milling Machines

No. 5 Becker-Brainard, plain
No. 2 LeBlonde Universal
No. 12 Brown & Sharpe plain
No. 1½ Brown & Sharpe Universal
London Universal
24" Bertram, plain
Holden-Morgan Thread Miller

Presses

No. 12 Geared Rhodes, roller feed
No. 4½ Bliss, double crank
No. 5 Waterbury inclinable
No. 15 Brown Boggs, inclinable

Miscellaneous

24" Gould & Eberhardt, B.G. Shapers (2)
24" MacGregor Gourlay B.G. Shaper
No 1 Racine Hack Saws (10)
Lo Swing Lathes (2)
32" x 9' Special Facing and Tapping Machine
40" Binsse Horizontal Boring Mill
No. 14 Besly Grinder
No. 60 Heald Cylinder Grinder
2¼" La Salle Drill Grinder
No. 2 Garvin Automatic Tapping Machine
No. 1 Garvin Automatic Tapping Machine
No. 2 Cochrane-Bly Filing Machine
¾" Shuster Riveters (3)
11' Bertram Bending Rolls
20" Pels Punch and Shear
60" Hanna Yoke Riveter

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.
Front St. W., - - Toronto, Ont.

FAIRBANKS-MORSE
New and Used Machinery

In Stock at Toronto

1—5' Bickford Universal Radial Drill; used.
1—¾" 4-spindle National Acme Automatic; used.
2—No. 3 Foster Hand Screw Machines; new.
4—No. 4 Smurr & Kamen Turret Lathes; new.
2—14" x 5' Seneca Falls Lathes; used.
1—1[illegible]" x 5' Seneca Falls Lathe; used.
2—18" x 8' Springfield Lathes; new.
5—2[illegible]" x 7' and 9' Fairbanks-Morse Lathes; new.
1—Gisholt Universal Tool Grinder.
2—No. 1 Racine Hacksaws; new.
1—No. 3¼ A Oster Pipe Machine; new.
1—2[illegible]" x 8' Hendey Lathe; used.
1—Gisholt 16" Special Lathe, type C, 6½ bore.
2—Walcott 8" and 20" x 8' Lathes.

In Stock at Montreal

2—16" F. M. Single Purpose Lathes; used.
1—Hendey 16" x 8' Lathe, taper attachment, Q.C.G.; used.
2—American 16" x 6' Tool-room Lathes; new.
2—Barnes 18" x 8' Lathes; new.
1—Walcott 20" Lathe, 3-step cone, D.B.G. and Q.C.G.; new.
3—Walcott 18" Lathes, 3-step cone, D.B.G. and Q.C.G.; new.
1—Rivett Precision Lathe; used.
1—Seneca Falls 9" x 4' Star Q.C.G. Tool-room Lathe.
1—Brown & Sharpe No. 1½ Universal Miller; used.
1—Ford-Smith Plain Miller; new.
W. & M. Drill Grinder; new.
1—Hall No. 6 Cutting-off Machine, 6" Shells; new.

This is only a partial list of our stock of Machine Tools.

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

Milling Machines

Slab Millers

Beaman & Smith, 92" between housings, 72" under adjustable swivel rail, 2 heads on rail, platen 48" x 15', also has side boring head.

Ingersoll, 3 heads, adjustable rail, 42" between housings, working surface platen 36" x 12', approximate weight 55,000 lbs.

Newton Duplex Horizontal Milling Machine, extreme distance between heads 42", platen 20" x 10'.

Detrick & Harvey Milling, Drilling and Boring Machine, power feed to head in all directions, power feed to boring bar, two tables on side of base, tables raised and lowered by power; weight 16,000 lbs.

Newton Heavy Duty Vertical, rotary table, 48" diameter, 38" from centre of table to column, nose of spindle 5½" diameter, for motor drive, approximate weight 20,000 lbs.

Horizontal Millers.

No. 1½ Cincinnati Universal.

No. 1-B Milwaukee Plain, with dividing heads, vise and chuck.

No. 1 Cincinnati Plain

No. 9 Kempsmith Plain.

No. 4 Garvin Profiler.

No. 1 Garvin 2 spindle profiler.

No. 3 Brown & Sharpe Plain

No. 22 Garvin Plain, table 9" x 44'.

Presses—Shears.

Toledo Double-Crank Geared Forging Press, approximate weight 20,000 lbs.
DG-56 Ferracute, Straight Column Redrawing Press, 13,700 lbs.
Farrell Double Crank, Back Geared Straight Sided Press, 9,000 lbs.
No. 4 Bliss Straight Sided Double Crank Geared Press.
No. 2 Bliss Straight Sided Double Crank Press.
PG-6 Ferracute Punching Press, 12,000 lbs.
Bliss Straight Sided Press, 7" stroke, weight 3,000 lbs.
No. 3 Manville Straight Sided Press, 1" stroke.
Bliss Straight Sided Press, 8" stroke, 4,000 lbs.
No. 4 Farrell Punching Press, 1½" stroke.
No. 24 Zeh & Hahnemann Horning Press.
350-ton Hoe Hydraulic Press.
Cleveland Combination Punch and Shear, 26" throat, also has angle knives.
Size "D" Long & Alstatter Bar Iron Shear, 3½" capacity.
No. 2 Long & Alstatter Double End Punch and Shear, punches 1" hole through 1" metal, shears 6 x 1" flat bars, or 1¾" round bars.

Cleveland Single End Punch, 22" throat, will punch 1" in 1" metal.

Bass Double End Punch and Shears, 20" throats, will punch 1¼" in ¾" metal, will shear ⅝" plate.

Bement Splitting Shear, 26" throat, ⅝" plate capacity.
Sellers Double Angle Shear, 8" x 8" x 1" capacity.
Cockburn Direct Acting Punch, capacity 1" in 1" metal.
Bement Single End Punch, 30" gap, capacity, 2" in 1" metal.
Kling Punch, 24" throat, capacity 1¼" in 1" metal.
Wilson Double End Punch and Shear, 6" throats, capacity ¼" hole in ½" metal.
8 ft. Lennox Rotary Splitting Shear, capacity ⅝" plates.

Large Lathes.

76" x 22' Pond, blocked to 114", quadrupled geared, face plate drive, screw cutting.
50" x 24' Johnson, face plate drive, screw cutting
48" x 25' Putnam, screw cutting
42" x 24' New Haven, screw cutting.
38" x 24' Putnam, screw cutting.
36" x 15' New Haven, screw cutting.
34" x 16' Perkins, screw cutting.
32" x 14' Bogert, screw cutting
30" x 28' Pond, screw cutting.
28" x 18' Gray, screw cutting.
24" x 24' Pond, screw cutting.
24" x 20' Pond, screw cutting.

New York Machinery Exchange

50 Church St., NEW YORK CITY

NEW AND RE-BUILT MACHINERY

Why buy these tools from Commission Houses? We own every tool that we advertise and guarantee each and every one to be as represented. You can secure immediate shipments by buying direct from us and save the middleman's profits.

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18—6 x 32 Plain Grinders.

12—10 x 22 Plain Grinders.

These machines have been rebuilt and are in excellent condition.

1—8 x 30 Walker Surface Grinder.

2—10 x 36 Plain Grinders, used only three months. In exceptionally good condition.

BEMENT-MILES BORING MILLS

6—60" Boring Mills, 2 swivel heads. In excellent condition.

SELLER'S BORING MILLS

6—60" Seller's Boring Mills, 2 swivel heads—only slightly used—in first-class condition.

6—84" Seller's Boring Mills, 2 swivel heads, excellent condition

AMERICAN LATHES

6—20 x 8 actual swing, 22 American High Duty Lathes with Quick-Change Gears, Double Back-Geared, Four-Sided Turret Post, $1050.00 each, F.O.B. Albany, N.Y.

48 x 12 G. & Eberhart Gear Cutter (bevel and spur gears).

Simmons Machine Company, Inc.

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We are offering subject to prior sale,

Immediate Shipment

One slightly used

"TYCOS" RECORDING THERMOMETER

registering to 500 degrees F., manufactured by Taylor Instrument Co., Rochester, N.Y., with supply of indicator sheets, H. and M. divisions.

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All castings for one

OIL FIRED 4.5 SHELL BAKING OVEN

Manufactured by Mech. Eng. Co., Montreal. P.Q.

ALL IN FIRST CLASS CONDITION

CAPACITY 200 SHELLS

Write for full particulars and Prices.

T. McAVITY & SONS, LIMITED

ST. JOHN, N.B.

(11)

List of Second-Hand Machinery

On hand for immediate delivery, subject to prior sale

1—No. 2 Brown & Sharpe Vertical Chucking and Boring Machine; excellent condition.
1—No. 4 Quint Vertical Turret Drilling and Chucking Machine; excellent condition.
1—24" x 24" x 7' Lodge & Davis Planer, fitted with full electric equipment and in good condition.
1—4¼" Belt-driven Gridley Automatic; excellent condition.
2—4¼" Motor-driven Gridley Automatics; excellent condition.
1—26" x 48" x 10' J. J. McCabe Lathe; good condition.
1—No. 12 16-spindle Pratt & Whitney Multiple Drill, ½" capacity in steel, ⅝" capacity in cast iron; excellent condition.
1—Foster Ring Turret; good condition.
1—22" x 22" x 4' Whitcomb Planer.
1—18" Warner & Swasey Plain Head Turret Lathe.
1—14" Flather Engine Lathe, rod and screw feed, plain rest, slip change gears.
1—14" Pratt & Whitney Engine Lathe, screw feed, plain rest, slip change gears
1—No. 15 Toledo Punch, 18" throat.
1—No. 12 Badger Punch and Shear.
1—30" Collier Circular Shear.
1—16" Steptoe-McFarland Lathe.
1—12" Shepard Gap Lathe.
1—No. 2 Mitts & Merrill Keyseater.
1—No. 2 10" Massillon Punch; new.
2—20" Barnes Drills.
1—¼" Shuster Riveter.
2—Marvel Hack Saws.
1—14" Fox Drill.
1—24" Ohio Shaper.
1—14" Steptoe Shaper.
1—Shinn Metal Band Saw.

C. E. FALES MACHINERY COMPANY

KERR BUILDING, DETROIT, MICH.

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited

CHATHAM, ONTARIO

IF what you want isn't advertised in this issue, consult our Buyers' Directory, Page 117.

MACHINERY FOR SALE

2—70 Gallon Hydraulic Pumps.

1—100 Gallon Hydraulic Pump. Offer Bargain on above.

1—125 H.P. Motor, 3 Phase, 60 Cycle, 220 Volts, General Electric. Price—$1200.00.

2—90 H.P. General Electric Motors, 3 Phase, 60 Cycle, 220 Volt. Price $700.00 each.

2—Sheldons No. 3 Cast Iron Fans.

NATIONAL STEEL CAR COMPANY LIMITED

HAMILTON, CANADA

(13)

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Your second-hand machinery.

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Classified Advertising Section

CANADIAN FOUNDRYMAN

The paper for Foundrymen in Canada.

Subscription Price 2 years for $1.00

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153 University Avenue, Toronto

FOR SALE

GRINDING MACHINES

1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16" x 66" Landis Crank Shaft Grinder (18 months old).
2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES

58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13" Gisholt Semi-Automatic (12 mos. old).
20 21" Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES

1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES

1 8-spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.
2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS

1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES

38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES

2 Noble & Westbrook No. 1 (new).

PROFILERS

1 No. 3H Becker (new).

PLANERS

1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 40" x 40" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS

1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES

1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES

1 12" Jackson (new).

KEY SEATERS

1 No. 1 Catlin (new).

SCREW MACHINES

1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2" x 24" Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼" capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES

1 No. 3 La Pointe (nearly new).

BOLT CUTTERS

1 2" Landis Double Head (nearly new).

BORING AND TURNING MACHINES

1 4' Bickford Boring & Turning Mill (nearly new).
1 20" swing 4-Spindle Moline Vertical Boring Machine with 18" x 36" table.

BULLDOZERS

1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES

1 Large Filing and Sawing Machine with 12" stroke.

PUNCHES AND SHEARS

1 No. 3 Walsh Punch Press.
1 Moser 1½" stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8" throat capacity ¼" x ¼".
1 27½" throat lever punch ½" capacity 1¼" stroke.
1 Thompson Bevel Shear ½" capacity.

PIPE MACHINES

1 6" Saunders.

SHAPERS

1 14" Hendey Geared Friction.
1 20" Hendey Geared Friction.

TAPPING MACHINES

1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2" collapsible taps (new).

THREAD ROLLING MACHINES

1 Waterbury Farrell ⅜" capacity (nearly new).

THREADING MACHINES

5 Special Threading Machines for threading 3" steel shells (nearly new).

SPOT WELDERS

1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

Write us what you want new or second-hand.

32 North Clinton Street, Chicago **W. F. Davis Machine Tool Co.** **403 Singer Building, New York City**

USED
MACHINE TOOLS
ALL KINDS

THE MOTCH AND MERRYWEATHER MACHINERY Co
CLEVELAND OHIO

EACH PIECE
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NEW STEAM ENGINES

Two 5 x 6 Vertical steam engines, 8 horse	$105.00	each
Two 6 x 6 Vertical steam engines, 10 horse	125.00	"
One 7 x 8 Vertical steam engine, 15 horse	175.00	
One 8 x 8 Vertical steam engine, 20 horse	200.00	
Two 4 x 6 Horizontal steam engines, 6 horse, with base	100.00	"
One 5 x 6 Horizontal steam engine, 8 horse, with base	125.00	
Five 6 x 6 Horizontal steam engines, 10 horse, with base	135.00	"
Five 6 stroke engines, with base, 10-15 H.P.	150.00	"
Two 6 x 6 Automatic, with base, 12-20 H.P.	250.00	"
Two 7 x 6 Automatics, with base, 15-25 H.P.	275.00	"
One 8 x 8 Automatic, with base, 20-42 H.P.	500.00	
One 10 x 10 Automatic, with base, 39-82 H.P.	700.00	
One 11 x 10 Automatic, with base, 47-85 H.P.	725.00	

YOUNG, CORLEY & DOLAN, Inc.
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Telephone: Rector 7866

(tf)

Used Machinery for Immediate Delivery

BORING MILLS.

51″ Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52″ Niles Car Wheel Boring Mill.

DRILLS.

22″ Aurora, S.H., B.G., P.F.
24″ Hamilton, B.G., P.F.
25″ Fitchburg, S.H., B.G., P.F.
26″ Hoefer, B.G., P.F.
32″ Hamilton, S.H., B.G., P.F.
32″ Hoefer, S.H., B.G., P.F.
34″ Barnes, S.H., B.G., P.F.
4″ Baker Tapping and Drilling Machine.
2½′ Dreses Radial
2½′ Industrial Radial
12 Spindle Multiple
6 Spindle V.C.
No. 30C Baush, 12 spindles

GEAR CUTTERS

20″ G. & E., for spur and bevel
24″ x 7″ G. & E., for spur
36″ Walcott, for spur
No. 14 Brown & Sharpe

GRINDERS

No. 3 Landis Universal
14″ x 20″ B. & S. Universal
Gisholt Tool Grinder

LATHES

12″ x 4′ Hendey, C.R., Q.C.G., taper
12″ x 5′ Davis, C.R.
14″ x 5′ P. & W., R. and F., taper
14″ x 6′ Fairbanks, C.R., taper
15″ x 6′ Goddard, C.R., taper
16″ x 6′ Prentice, C.R.
16″ x 6′ Sebastian, P.R.
16″ x 6′ Walcott, C.R.
16″ x 8′ Lodge & Shipley Pat. Head, C.R., Q.C.G.
16″ x 10′ Greaves & Klusman, C.R.
17″ x 10′ Blaisdell, C.R.
18″ x 6′ Bradford, C.R., taper
18″ x 8′ Lodge & Shipley, Pat. Head, C.R., taper
18″ x 12′ American, C.R., Q.C.G.
18″ x 12′ Greaves & Klusman, C.R.
20″ x 10′ Flather, C.R.
21″ x 12′ New Haven, C.R.
24″-40″ x 12′ McCabe Double Spindle, C.R.
24″ x 16′ Schumacher & Boye, C.R.
30″ x 14′ Reed, C.R.
32″ x 16′ Blaisdell, C.R.
36″ x 28′ American, C.R.

MILLING MACHINES

No. 12 B. & S., plain
No. 34 Oesterlein, plain
No. 1½ Garvin Universal
No. 2 Cincinnati Universal
No. 2 Cincinnati Vertical, High Power
No. 32 Plain Kempsmith—Lincoln
No. 3 Cincinnati Universal
No. 13 P. & W. Lincoln
No. 4 Becker Vertical

PLANERS

Morton Portable
22″ x 22″ x 6′ Gray, one head
30″ x 30″ x 8′ Woodward & Powell, one head
30″ x 30″ x 12′ Cincinnati, two heads
36″ x 36″ x 12′ Pond, one head, arranged for two
36″ x 36″ x 12′ Pond, one head, arranged for two
36″ x 36″ x 12′ Cincinnati, two heads
36″ x 36″ x 16′ Sellers, one head
39″ x 39″ x 12′ New Haven, one head
40″ x 38″ x 14′ Putnam, one head
40″ x 40″ x 12′ New Haven, one head, one side head

PRESSES

No. 3 Delivouk & George, O.B., Inc.
No. 30 A. Perkins, O.B., Inc.
No. 133 Ferracute, Double Action, O.B., Inc.
No. 5½ Walsh, O.B., Inc., geared
No. 174 Consolidated Double Crank
No. 25 Toledo, O.B., Inc., Cam Drawing

SHAPERS

15″ Hendey Friction
16″ Walcott
16″ Niles, B.G.
16″ Rockford, B.G.
20″ Rockford, B.G.
26″ Putnam

SCREW MACHINES

No. 1 Chicago Automatic
1 3-16″ Hartford Automatic
2″ Cleveland Automatic
2¾″ Cleveland Automatic
⅝″ P. & W. Plain
1″ B. & S. Plain
16″ P. & W. Plain

MISCELLANEOUS

No. 4 Warner & Swasey Turret Lathe
No. 2 Warner & Swasey Turret Lathe
No. 2 Baker Keyseater
Whitton Centering Machine
1½″ Acme Bolt Cutter
2—Springfield Stud Lathes
Blount Speed Lathe

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The H. A. Stocker Machinery Company, 566-572 W. Randolph St., CHICAGO, ILL.

MACHINE TOOLS - THE VERY BEST

GRINDERS.

Two (2) 14 x 72 Norton, plain, excellent condition, modern type, each	$2500
Two (2) 10 x 72 Norton, plain, excellent condition, modern type, each	2200
12 x 36 Cincinnati Universal	1250
No. 3 Brown & Sharpe Universal 12 x 50	2000
No. 60 Heald Cylinder	1000
Landis plain, 8 x 38	1400
Springfield Universal, 16 x 40	850
Two (2) No. 5 Rivet, each	550
No. 3 Brown & Sharpe Cutter Grinder	300
No. 7 Geo. Gorton, double end disc grinder with wheel chuck on one end, steel discs and tilting table	300
Diamond Side Type Shop Face Grinder, working surface of table 9″ wide x 2′ long, cup wheel 14″ dia	300
Wells Cutter Grinder	75
No. 1 Peerless Surfacing Machine, 10″ belt	75
Plain Grinders, Wet Tool Grinders, Polishing Machines, large and small.	

HAND MILLING MACHINES.

Two Chicago, each	200
Pratt & Whitney No. 2	175
Four Pratt & Whitney No. 1, each	125
Two No. 2 Garvin, each	150
Two No. 3 Garvin, each	175
Six Pratt & Whitney, No. 1½, each	175
Two Pratt & Whitney Hand Millers	...
Reed	150
Pratt & Whitney	150
Pratt & Whitney, with vise	150
Two Pratt & Whitney	...

HORIZONTAL BORING MACHINES.

No. 2 Beaman & Smith Combination Boring, Drilling and Milling Machine; good as new	5000

HORIZONTAL BORING MACHINES (Continued)

Beaman & Smith No. 8, 5″ spindle	$3500
Bement & Dougherty No. 3, Knee Type, 3¾″ bar	1450

PLANERS.

48 x 48 x 20′ Putnam, 2 heads on rail; excellent condition.	3500
36 x 36 x 14′ Powell, 2 heads on rail	1750
32 x 32 x 10′ Gleason, single head; good as new	700

LATHES.

60 x 28′ Fifield, raising blocks to swing 75″, double back-geared, face plate drive, dia. of face plate 56″ x 8″; good as new	5000
50 x 20′ Fifield, Massive Pattern, 48″ four-jawed chuck	2750
52 x 16′ Gleason, heavy triple-geared, faced plate drive	2500
24 x 18′ Lodge & Shipley, quick-change gear, taper, motor driven, carriage control	2000
16 x 8′ Pratt & Whitney, quick-change gear, taper attachment, H.S., C.R.; good as new; latest type	1000

MULTIPLE SPINDLE DRILLS.

Bausch 8 spindle, 1¼″ joints	1150
Foote-Burt 8 spindle, spindles adjustable on rail, center to center outside spindle 6′ max.	800
Snyder 28″ 4 spindle, back geared, sliding head, table 30″ long, 16½″ wide	300
Five (5) Gardan 4 spindle, each	250
No. 11 Pratt & Whitney 15 spindle	325
Two 14″ Barr 3 spindle Sensitive, each	90
No. 11 Pratt & Whitney, 10 spindle	325
2 spindle Barr	60
Bausch 16 spindle	750
Three 4 spindle Fenn Sensitive, adjustable heads, each	150
Allen 4 spindle	200
Henry & Wright 3 spindle	200

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BAIRD'S MACHINE TOOL LIST

Every Machine Listed Can Be Seen in Our Warehouse

LATHES.

2—20" x 8' Walcott Quick Change Gear Lathes.
1—20" x 12' Bradford Lathe plain change gears complete with chuck.
1—14" x 10' Lodge & Shipley Lathe, quick change, turret on carriage.
1—10" x 4½' Imperial Lathe with compound rest and C.S.
1—16" x 12' Lathe rise and fall rest with chuck.
1—20" x 12' New Haven Lathe and countershaft, face plates, chucks follow and steady rests, plain change gears.
1—32" x 12' Shepard Lathe Quick Change, light pattern.
1—10" x 4½' Shepard Quick Change foot power lathe.
3—18" x 8' Walcott Quick Change Double Back Geared Lathes (new).
1—18" x 8' South Bend Plain Lathe.
1—17" x 7' Street Semi-quick change Lathe.
1—16"—36" x 9½' Fay Scott Gap Lathe complete with chuck.
1—18" x 10' Draper Plain Heavy Duty Engine Lathe.
1—36" Double side Pulley Lathe.
1—14" x 6' Prentice Plain Engine Lathe.
1—14" x 6' Carroll-Jamieson Plain Engine Lathe.
1—15" x 6' Rockford Plain Engine Lathe.
1—15" x 6' South Bend Engine Lathe.
1—16" x 10' Perkins Plain Engine Lathe.

SCREW MACHINES.

2—No. 3 Screw Machines complete with wire feed, automatic chuck hand feed to turret.
2—No. 4 Screw Machines geared friction head complete with wire feed, automatic chuck hand feed to turret.
1—No. 4 Geared friction head screw machine complete with wire feed, automatic chuck power feed to turret.
1—2¼ Capacity Modern Flat Turret Lathe with bar and chucking equipment.
1—3¼ Gridley Automatic.

SPEED AND TURRET LATHES.

2—22" New Turret Lathes, heavy duty type.
1—No. 6 Bliss Spinning Lathe (almost new).
1—Lodge Baker Speed Lathe.
1—Small Lathe rise and fall rest and C.S.
2—Small Speed Lathes.
1—1" Capacity Garvin Turret Lathe.

SHAPERS.

1—32" Walcott Shaper
1—18" Barker Shaper single back gear.
1—24" Cincinnati Back geared Crank Shaper.

MILLERS AND GEAR CUTTERS.

1—Farwell Quick Change Hand Miller.
1—No. 1 Farwell Automatic Gear Hobbing Machine.
1—Keyseating Miller with long table.
2—U.S. Hand Millers.
2—Warner & Swasey Single Spindle Profilers.
1—No. 2 Cincinnati Vertical Milling Machine (almost new).
1—Farwell Gear Testing Machine.

DRILL PRESSES.

1—36" Mueller Radial Drill with tapping attachment, cone drive swinging table.
1—36" American Sensitive Radial Drill.
2—1 Spindle High Speed Ball Bearing Reed Drills.
1—Double Head Taylor & Fenn Sensitive Drill with tapping attachment.
1—22" Hoefer Drill Power Feed Back Geared.
3—4 Spindle Drill Presses.
1—13" Reed Sensitive Drill.
1—48" Drill Press, screw feed with hand wheel.
1—4 Spindle Drill Press, capacity ¼ drill.
1—32" 4 Spindle National Turret Drill Press No. 4 Taper in spindles.
1—Foot Burte 3 spindle Sensitive Drill.
1—1 spindle Allen Sensitive Drill High speed ball bearing.

ELECTRIC DRILLS.

1—¾ Electric Drill 110 volts D.C.
1—Standard Type Electric Drill 110 D.C. ¾ capacity.
1—Hisey Wolf Friction Motor Bench Drill 110 volt D.C.
1—Thor Universal Electric Drill, capacity ¼" 110 volts.
1—Style G.I.U.S. Electric Drill 1¼ capacity.

SCREW AND PUNCH PRESSES.

1—No. 2 Rockford Inclinable Press.
1—No. 1 Springfield Straightening Press.
1—No. 1 Verdin & Knappes Inclinable Press.
1—No. 2 Barnes Screw Arbor Press.
1—No. 5 Eames Mandrel Press.
1—Small double crank press, adjustable crank size of table 14" x 20".
1—No. 30 Bliss Straight Sided Press.
1—No. 3 Eames Arbor Press.
1—No. 3 Advance Inclinable Press.
1—Foot Press.

PLANERS.

1—17" x 17" x 20" Crank Planer, one head.

SAWS.

1—Millers Falls Hack Saw 12" Blade.
1—12" Millers Falls Power Hack Saw.
1—12" Hack Saw.
1—12" Millers Falls Hack Saw.
5—No 1 Marvel Hack Saws.
1—West Haven Power Hack Saw.
1—No. 11 Higley Circular Saw.

KEYSEATERS.

1—No. 2 Mitts & Merrill Keyseater.
1—No. 0 Giant Mitts & Merrill Keyseater.
1—No. 1 Catlin Keyseater.
1—No. 0 Catlin Keyseater.

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1—40" Danielson Power Squaring Shear complete with two large wood pulleys.

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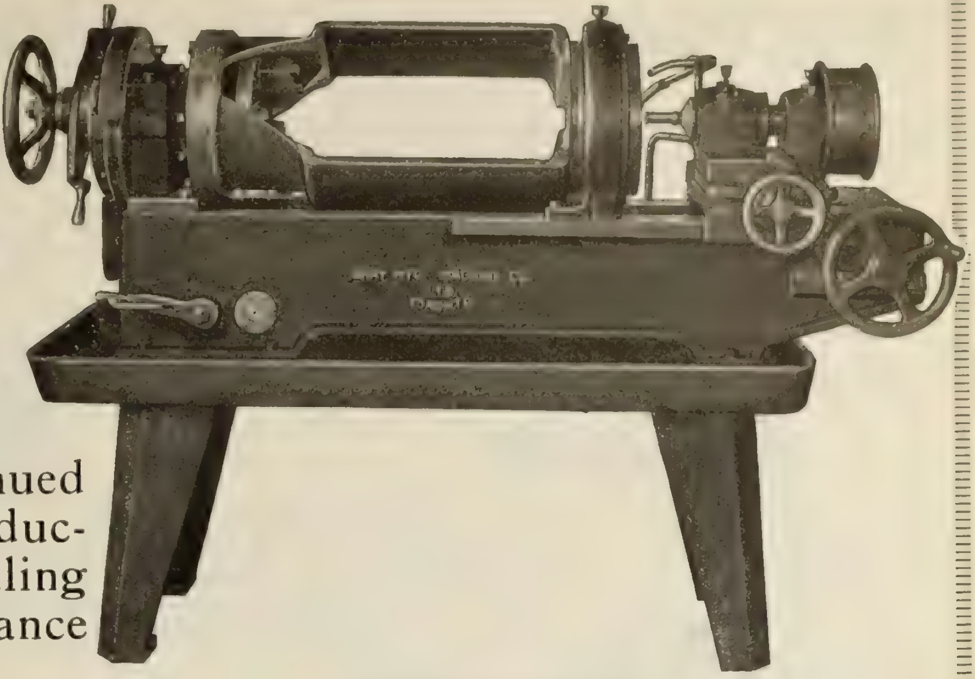

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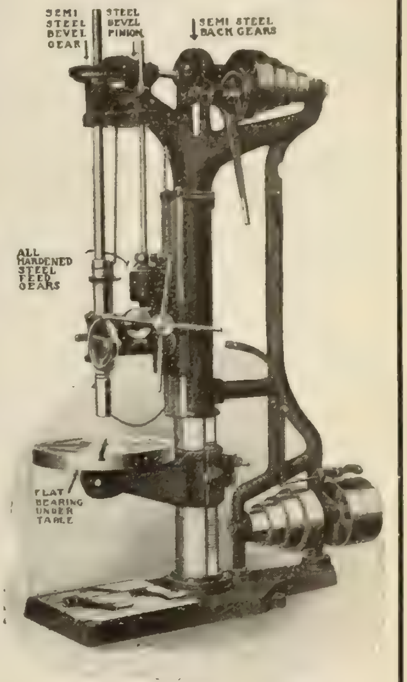

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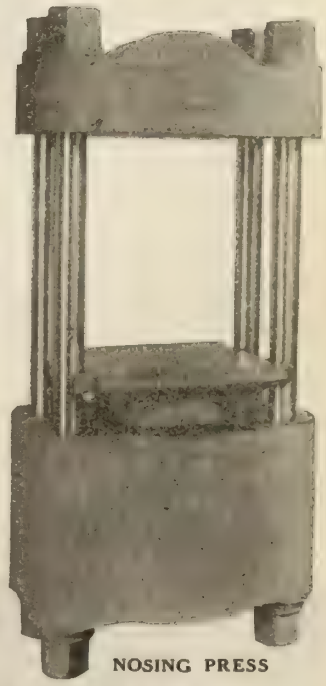

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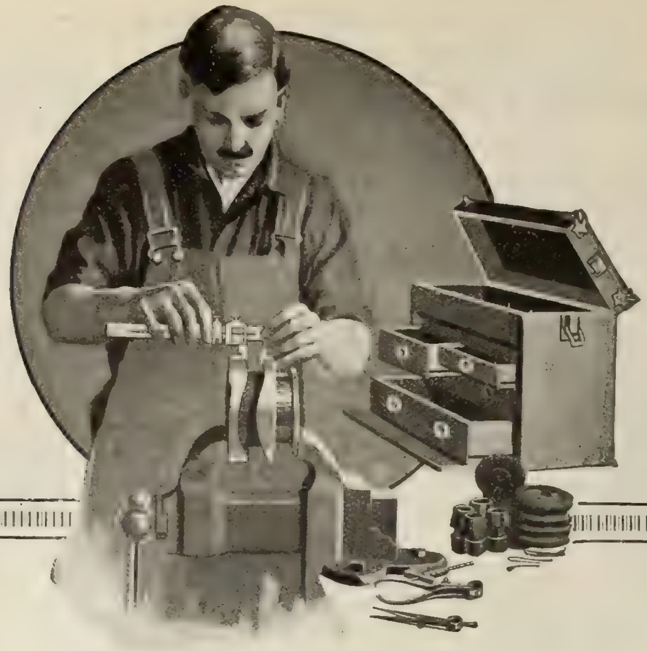

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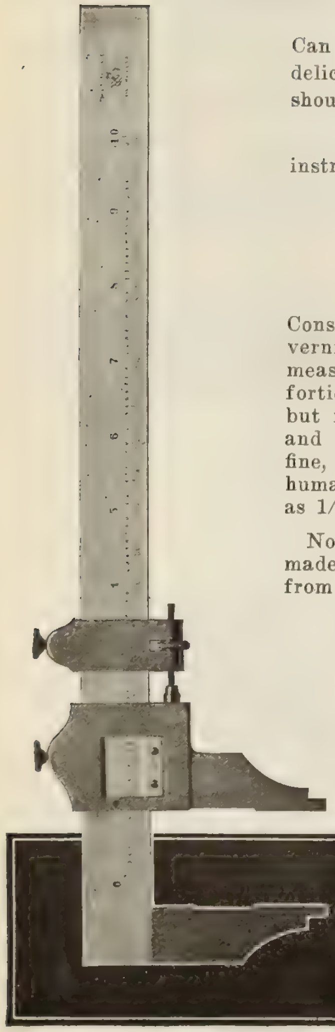

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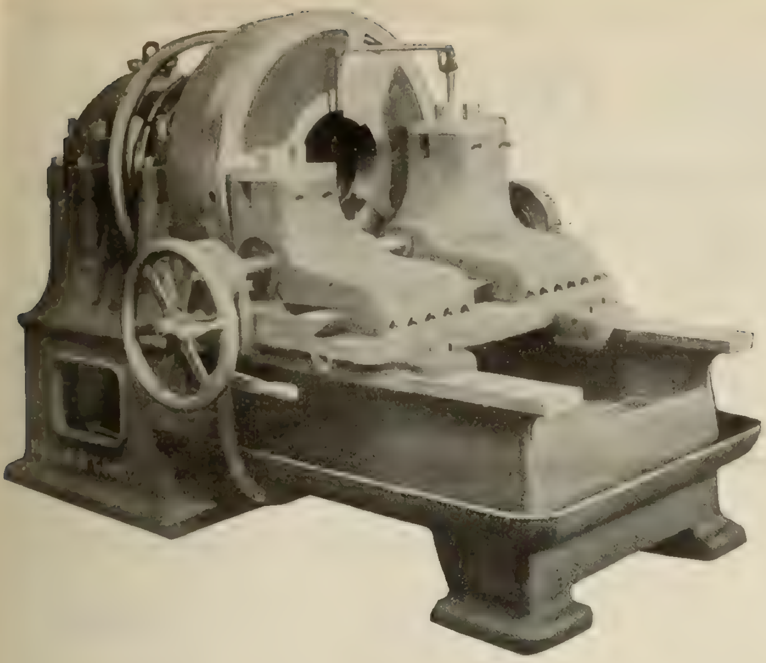

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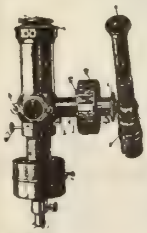

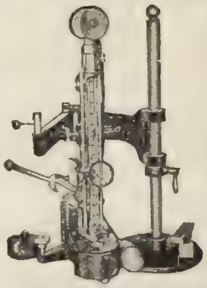

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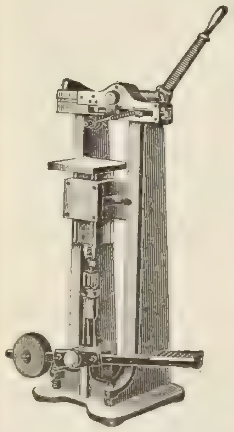

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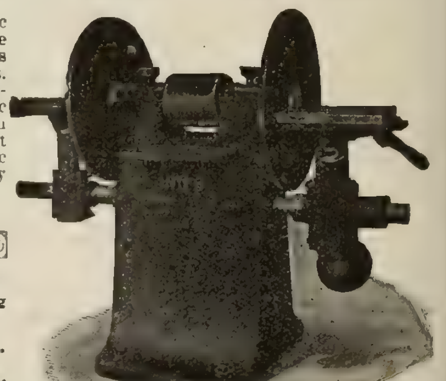

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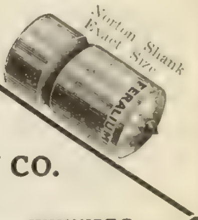

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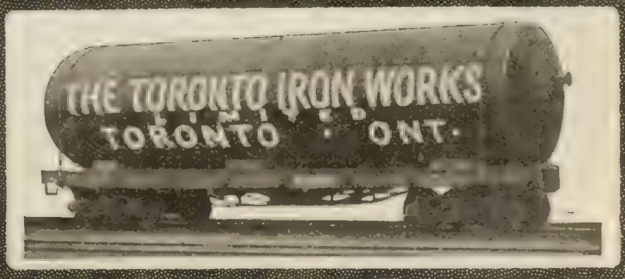

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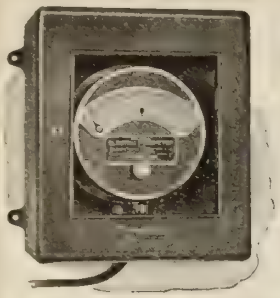

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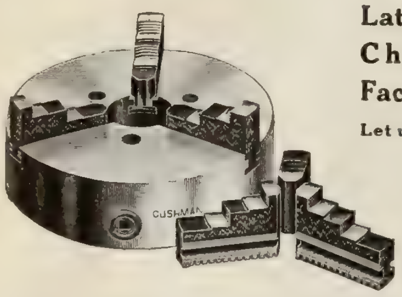

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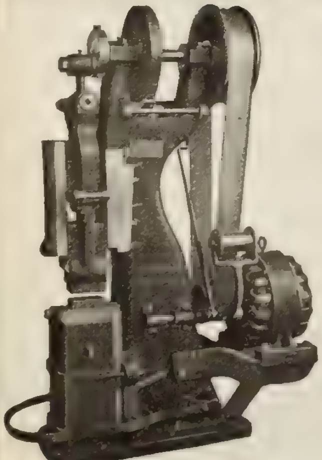

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Morse Chain Co., Ithaca, N.Y.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

BELTING, STITCHED COTTON DUCK
Dominion Belting Co., Hamilton, Ont.
Main Belting Co., Montreal.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

BENCH LEGS, STEEL
New Britain Mach. Co., New Britain, Conn.

BENCH DRAWERS, FRICTIONLESS
New Britain Mach. Co., New Britain, Conn.

BENDING MACHINERY
John Bertram & Sons Co., Dundas.
Bertrams, Limited, Edinburgh, Scotland.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Berlin, Canada.
Dominion Machinery Co., Toronto.
Charles F. Elmes Eng. Works, Chicago.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo, O.
Steel Bending Brake Works, Chatham, Ont.

BILLET MARKERS
Matthews, Jas. H., & Co., Pittsburgh, Pa.

BINS, STEEL
Dennis Wire & Iron Works, London, Canada.
MacKinnon, Holmes Co., Sherbrooke.
Toronto Iron Works, Ltd., Toronto, Ont.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
H. W. Petrie, Ltd., Montreal.

BLOW PIPES AND REGULATORS
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.

BOARTZ
Geo. A. Joyce Co., Ltd., New York, N.Y.

BOILERS
MacKinnon, Holmes Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

BOILER MAKERS' SUPPLIES
Jno. F. Allen Co., New York.

BOLT CUTTERS AND NUT TAPERS
Aikenhead Hardware Co., Toronto, Ont.
Canada Machinery Corp., Galt, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
Galt Machine Screw Co., Galt, Ont.
London Bolt & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

BOLT AND NUT MACHINERY
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machinery Co., Toronto.

BOLT THREADING MACHINERY
Cook, Asa S., Co., Hartford, Conn.

BORING MACHINES, PNEUMATIC CYLINDER
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghampton, N.Y.

BORING MACHINES, UPRIGHT AND HORIZONTAL
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Dominion Machinery Co., Toronto.
Garlock-Walker Machy. Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Roelofson Machine & Tool Co., Toronto, Ont.
Stow Mfg. Co., Binghampton, N.Y.

BORING AND TURNING MILLS
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy Co., Montreal.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

BRACKETS, ADJUSTABLE ELECTRIC LIGHT
Darling Bros., Ltd., Montreal, Que.
McCroskey Reamer Co., Meadville, Pa.

BRAKES
Brown, Boggs & Co., Hamilton, Can.
Steel Bending Brake Works, Ltd., Chatham, Ont.

BRASS RODS
Brown's Copper & Brass Rolling Mills, New Toronto.

BRASS WORKING MACHINERY
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Warner & Swasey Co., Cleveland.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

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Brown's Copper & Brass Rolling Mills, New Toronto.

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Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

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Ford Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
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New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.

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John Bertram & Sons Co., Dundas.
E. W. Bliss Co., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.

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Lachapelle, J. D., & Co., Montreal, Que.
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Oven Equipment & Mfg. Co., New Haven, Conn.

BURRING REAMERS.
Wells Bros. Co. of Canada, Galt, Ont.

BURRS, IRON AND COPPER.
Parmenter & Bulloch Co., Gananoque.

BUTTERISERS.
Wells Brothers Co. of Canada, Galt, Ont.

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Lachapelle, J. D., & Co., Montreal, Que.

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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.

CARS, ELECTRIC
National Steel Car Co., Hamilton, Ont.

CARS, INDUSTRIAL.
Can. Blower & Forge Co., Berlin, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
National Steel Car Co., Hamilton, Ont.
Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CARS, RAILWAY (FREIGHT, PASSENGER, BAGGAGE)
Eastern Car Co., New Glasgow, N.S.
National Steel Car Co., Hamilton, Ont.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER
Bawden Machine Co., Toronto, Ont.
Cunningham & Son, St. Catharines, Ont.
Alexander Fleck, Ltd., Ottawa.
Ontario Specialties, Ltd., Ottawa, Can.
Tallman Brass & Metal Co., Hamilton.

CASTINGS, GRAY IRON.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Steel Foundries, Ltd., Montreal, Que.
Alexander Fleck, Ltd., Ottawa.
Gardner, Robt., & Son, Montreal.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Wm. Kennedy & Sons, Ltd., Owen Sound.
Plessisville Foundry Co., Plessisville, Que.

CASTINGS, STEEL CHROME AND MANGANESE STEEL.
Can. Steel Foundries, Ltd., Montreal, Que.
Dominion Steel Foundry Co., Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Wm. Kennedy & Sons, Ltd., Owen Sound.
Galt Malleable Iron Co., Galt.
Ontario Specialties, Ltd., Ottawa, Can.
Peacock Bros., Montreal, Que.

CASTINGS, MALLEABLE.
Can. Steel Foundries, Ltd., Montreal, Que.
Galt Malleable Iron Co., Galt.

CASTINGS, NICKEL STEEL.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.

CEMENT, IRON.
Shelton Metallic Filler Co., Derby, O.

CEMENT MACHINERY.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son, Montreal.
H. W. Petrie, Toronto.

CENTRE REAMERS.
Wells Brothers Co., Greenfield, Mass.
John Bertram & Sons Co., Dundas.
Gardner, Robt., & Son, Montreal.
Hurlbut, Rogers Machy. Co., South Sudbury, Mass.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.

CENTRIFUGAL PUMPS
D'Olier Centrifugal Pump & Machine Co., Philadelphia, Pa.
H. W. Petrie, Ltd., Montreal.

CHAIN BLOCKS.
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Foss & Hill Machy. Co., Montreal.
Lyman Tube & Supply Co., Montreal, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

CHEMISTS.
Can. Inspection & Testing Lab., Montreal, Que.
Toronto Testing Laboratory, Ltd., Toronto.

CHIP CENTRIFUGALS.
D'Olier Centrifugal Pump & Machine Co., Philadelphia, Pa.

CHUCKS, AERO, AUTOMATIC.
Garvin Machine Co., New York.

CHUCKS, DRILL, LATHE AND UNIVERSAL.
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John Bertram & Sons Co., Dundas, Ont.
Can. Blower & Forge Co., Berlin, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Cushman Chuck Co., Hartford, Conn.
Detroit Pneumatic Chuck Co., Detroit, Mich.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford.
Manufacturers Equipment Co., Chicago, Ill.
Milholland, W. K., Co., Indianapolis, Ind.
McCrosky Reamer Co., Meadville, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Skinner Chuck Co., New Britain, Conn.
Thomas Elevator Co., Chicago, Ill.
D. E. Whiton Machine Co., New London, Conn.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS.
Can. Blower & Forge Co., Kitchener, Ont.
Aikenhead Hardware Co., Toronto, Ont.

CHUCKS, FRICTION AND TAP
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC.
Heald Machine Co., Worcester, Mass.

CHUCKS, RING WHEEL.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKING MACHINES.
Garvin Machine Co., New York.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Turner Machine Co., Danbury, Conn.
Warner & Swasey Co., Cleveland, O.

CLUTCHES.
Positive Clutch & Pulley Works, Ltd., Toronto.

COAL HANDLING MACHINERY.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

COKE AND COAL.
Hanna & Co., M. A., Cleveland, O.
Zenith Steel & Coal Products, Montreal, Que.

COLLECTORS, PNEUMATIC.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt.

COLLETS
Manufacturers' Equipment Co., Chicago, Ill.
McCrosky Reamer Co., Meadville, Pa.
Stone Tool & Supply Co., J. R., Detroit, Mich.

COMPRESSORS, AIR.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Jenckes Mach. Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W Petrie, Toronto.
The Smart-Turner Machine Co., Hamilton.

CONDENSERS.
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Darling Bros., Ltd., Montreal, Que.

CONTROLLERS AND STARTERS, ELECTRIC MOTORS
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Lachapelle, J. D., & Co., Montreal, Que.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

CONVERTERS, STEEL SLIDE-BLOW
Whiting Foundry Equipment Co., Harvey, Ill.

COPING MACHINES.
Can. Blower & Forge Co., Kitchener, Ont.
John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

COUNTERBORES AND COUNTERSINKS.
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.

COUNTERSHAFTS.
Baird Machine Co., Bridgeport, Conn.
Webber Bros. Mach. Co., Toronto, Ont.

COUPLINGS.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.

CRANE PULLERS.
Crane Puller Co., Hopedale, Mass.

CRANES, LOCOMOTIVE.
Davenport Locomotive Works, Davenport, Iowa.
Northern Crane Works, Walkerville.

CRANES, GANTRY.
Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, GOLIATH AND PNEUMATIC
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, PORTABLE.
Aikenhead Hardware Co., Toronto, Ont.
Davenport Locomotive Works, Davenport, Iowa.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

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Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRIMPS, LEATHER.
Graton & Knight Mfg. Co., Montreal.

CUPOLAS.
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CUPOLA BLAST GAUGES & BLOWERS.
Sheldon's, Ltd., Galt, Ont.

CUTTER GRINDERS AND ATTACHMENTS.
Cincinnati Milling Machine Co., Cincinnati.
Garvin Machine Co., New York.
H. W. Petrie, Ltd., Montreal.

CUTTERS, FLUE.
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machinery Co., Montreal.
Garvin Machine Co., New York.
Morse Twist Drill aud Machine Co., New Bedford
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.

CUTTING AND WELDING PLANTS
Prest-O-Lite Co., Inc., Indianapolis, Ind.

CUTTING COMPOUND AND CUTTING OIL.
Can. Economic Lubricant Co., Montreal.
Cataract Refining & Mfg. Co., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.

CUTTING-OFF MACHINES.
Armstrong Bros. Tool Co., Chicago.
John Bertram & Sons Co., Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Foss & Hill Machy. Co., Montreal.
Garlock-Machinery, Toronto.
Garvin Machine Co., New York.
Hurlbut, Rogers Machinery Co., South Sudbury, Mass.
John H. Hall & Sons, Brantford, Ont.
Wm. Kennedy & Sons, Owen Sound, Ont.
Peerless Machine Co., Racine, Wis.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Racine Tool & Machine Co., Racine, Wis.
Root & Van Dervoort Engr. Co., East Moline, Ill.
Tabor Mfg. Co., Philadelphia, Pa.

DAMPER REGULATORS.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Darling Bros., Ltd., Montreal, Que.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co., Montreal.

DIAMONDS, BLACK AND ROUGH
Geo. A. Joyce Co., Ltd., New York.

DIAMOND TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Geo. A. Joyce Co., Ltd., New York.

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Matthews, Jas. H. & Co., Pittsburgh, Pa.

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Armstrong Mfg. Co., Bridgeport, Conn.
Banfield, W. H., & Son, Toronto.
Butterfield & Co., Rock Island, Que.
Brown, Boggs & Co., Hamilton, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rickert-Shafer Co., Erie, Pa.
Wells Brothers Co. of Canada, Galt, Ont.

DIES FOR BIT BRACE USE
Wells Brothers Co. of Canada, Galt, Ont.

DIE SINKERS
Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.
H. W. Petrie, Ltd., Montreal.

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Wells Bros. Co. of Canada, Galt, Ont.

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Charles F. Elmes Eng. Works, Chicago.

DIES, SELF-OPENING
Geometric Tool Co., New Haven.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Wells Brothers Co. of Canada, Galt, Ont.

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Wells Brothers Co. of Canada, Galt, Ont.

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Modern Tool Co., Erie, Pa.
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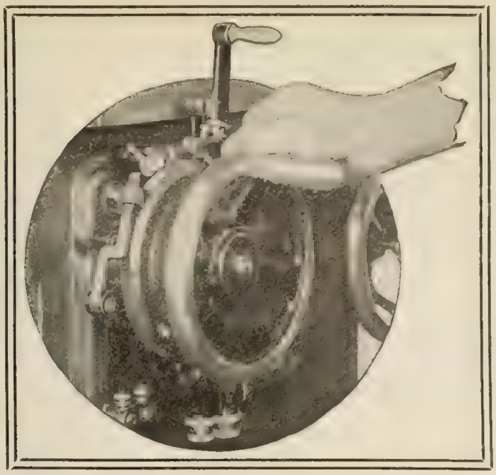

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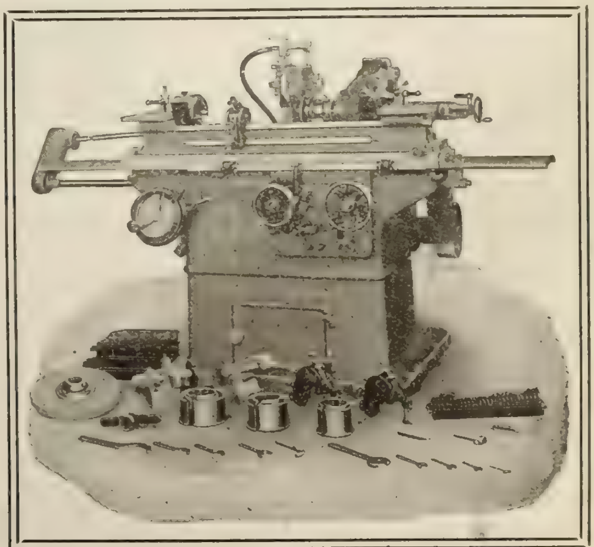

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Foss & Hill Machy. Co., Montreal.
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A. R. Williams Machinery Co., Toronto.

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Modern Tool Co., Erie, Pa.
Wilt Twist Drill Co., Walkerville, Ont.

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Canada Machinery Corporation, Galt, Ont.

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Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corporation, Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rockford Driling Mach. Co., Rockford, Ill.

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John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Dominion Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Turner Machine Co., Danbury, Conn.

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Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.

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Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rockford Driling Mach. Co., Rockford, Ill.
A. R. Williams Machy. Co., Toronto.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.

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Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.
United States Electrical Tool Co., Cincinnati.

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Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy. Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Celfor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
L. S. Starrett Co., Athol, Mass.
Wilt Twist Drill Co., Walkerville, Ont.

DRILLS, CORNER (PNEUMATIC)
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Lachapelle, J. D., & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.
A. R. Williams Machy. Co., Toronto.
Wisconsin Electric Co., Inc., Racine, Wis.

DRILLS, HIGH SPEED
Aikenhead Hardware Co., Toronto, Ont.
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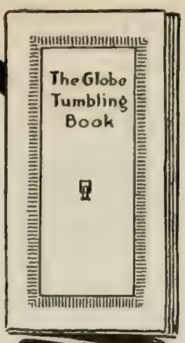

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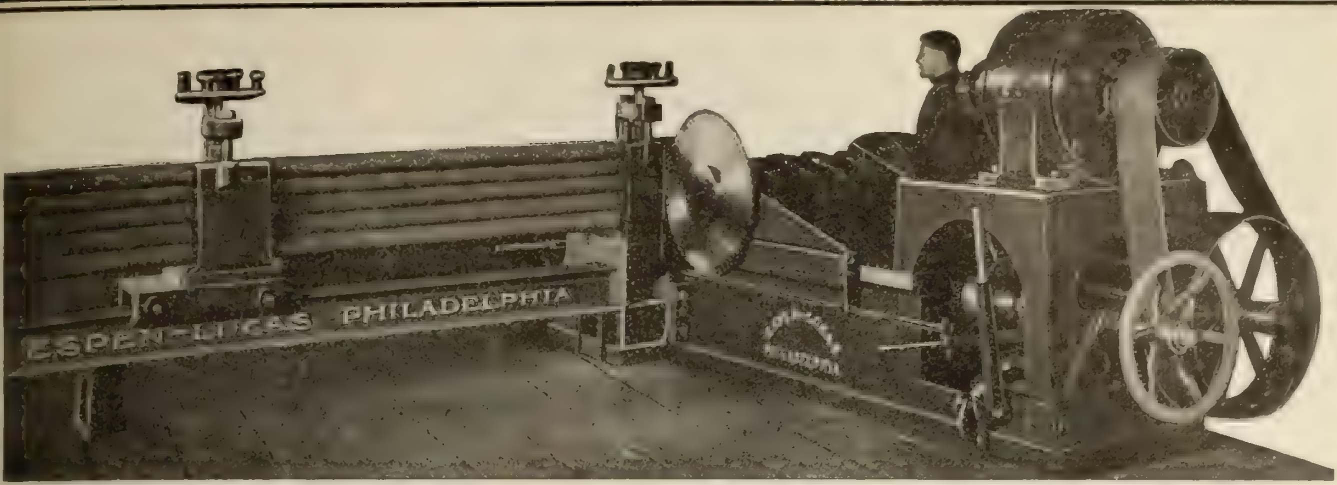
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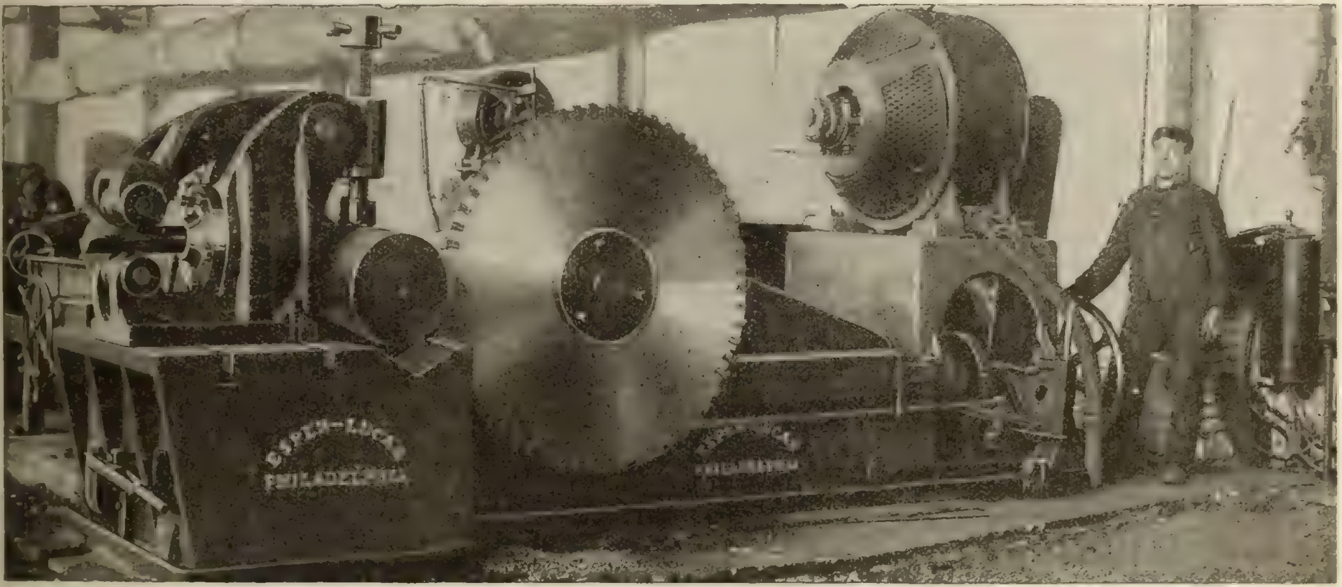
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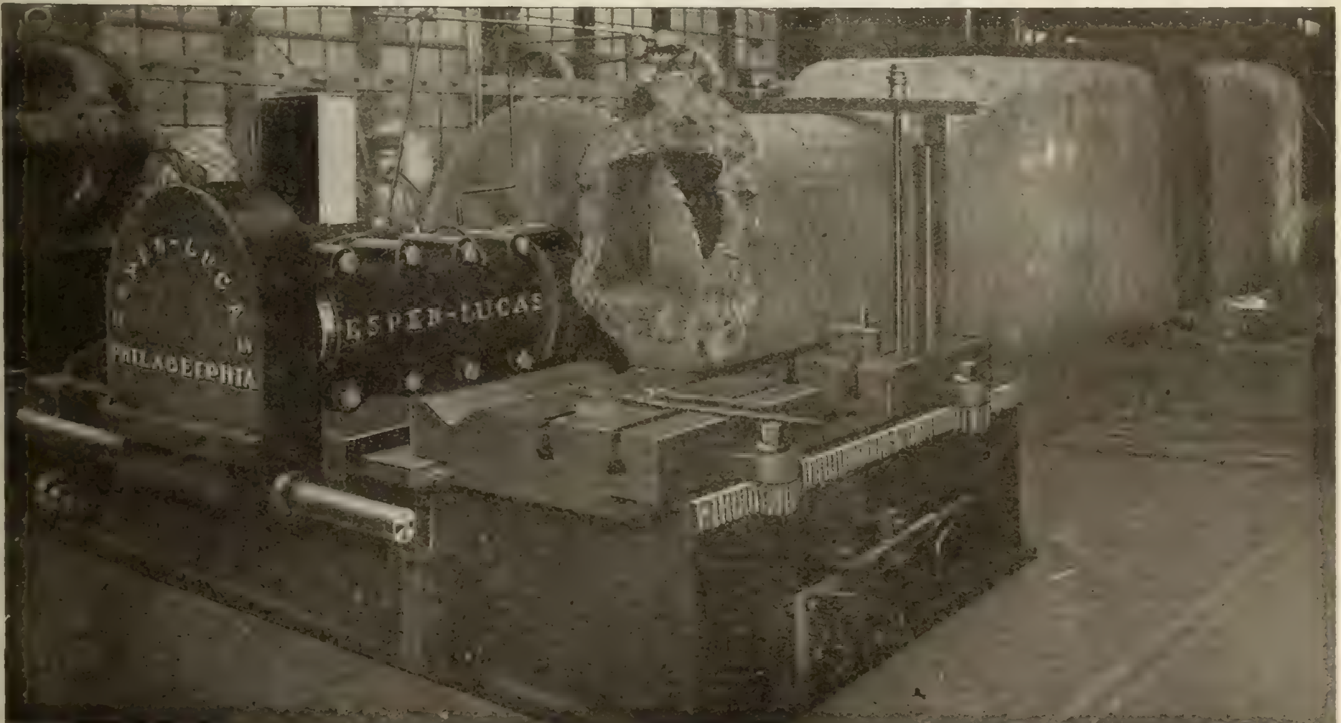
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Foss & Hill Machy Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Gisholt Mach. Co., Madison, Wis.
Hendey Machine Co., Torrington, Conn.
Hepburn, John T., Ltd., Toronto, Ont.
Himoff Machine Co., New York.
Houston, Stanwood & Gamble Co., Cincinnati, Ohio.
Hyde Engineering Works, Montreal, Que.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
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Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Jenckes Mach. Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

LATHES, SINGLE PURPOSE
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Can. Fairbanks-Morse Co., Montreal, Que.
Hepburn, John T., Ltd., Toronto.
Himoff Machine Co., Inc., New York, N.Y.
Roelofson Mach. & Tool Co., Toronto, Can.
Root & Van Dervoort Engr. Co., East Moline, Ill.

LATHES, SCREW CUTTING
John Bertram & Sons Co., Dundas.
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Cincinnati Iron & Steel Co., Cincinnati, O.
Davenport Locomotive Works, Davenport, Iowa.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Gisholt Mach. Co., Madison, Wis.
Hepburn, John T., Ltd., Toronto, Ont.
Niles-Bement-Bond Co., New York.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

LATHES, SPINNING
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Bliss, E. W., Co., Brookln, N.Y.
Toledo Mach. & Tool Co., Toledo.

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Cincinnati Iron & Steel Co., Cincinnati, O.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
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New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
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Graton & Knight Mfg. Co., Montreal.

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Bertrams, Ltd., Edinburgh, Scotland.

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L'Air Liquide Society, Montreal, Toronto.
Lyman Tube & Supply Co., Montreal, Que.

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LOCOMOTIVES
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Cataract Refining & Mfg. Co., Toronto.

LUBRICATORS.
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Roper, C. F., & Co., Hopedale, Mass.

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Stocker, H. A., Machinery Co., Chicago, Ill.
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Sumbling Mach. Co., W. H., Toronto, Ont.

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H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

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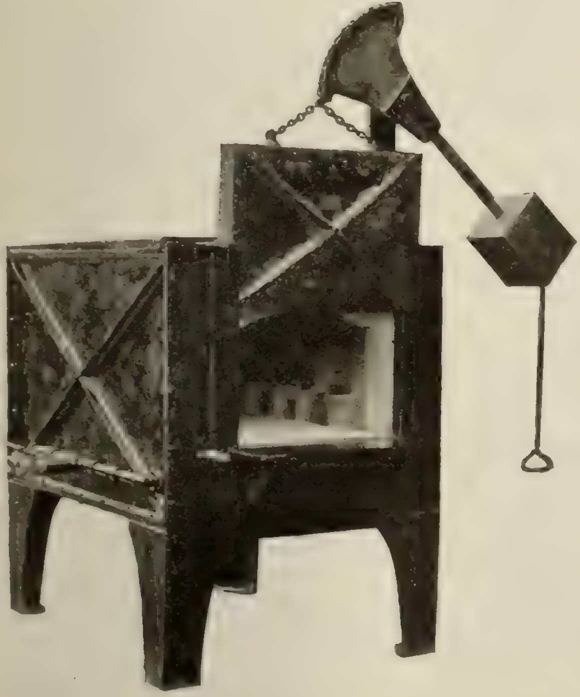

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West Tire Setter Co., Rochester, N.Y.

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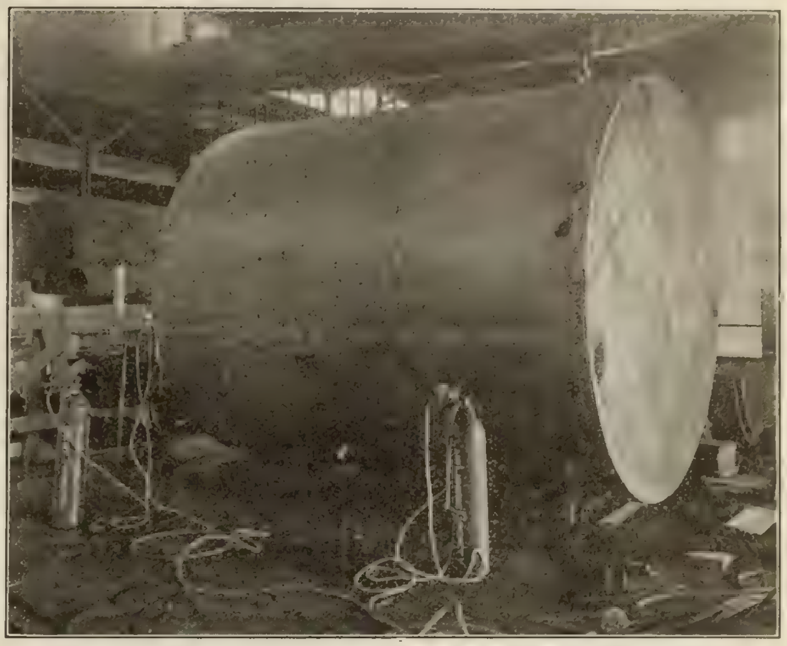

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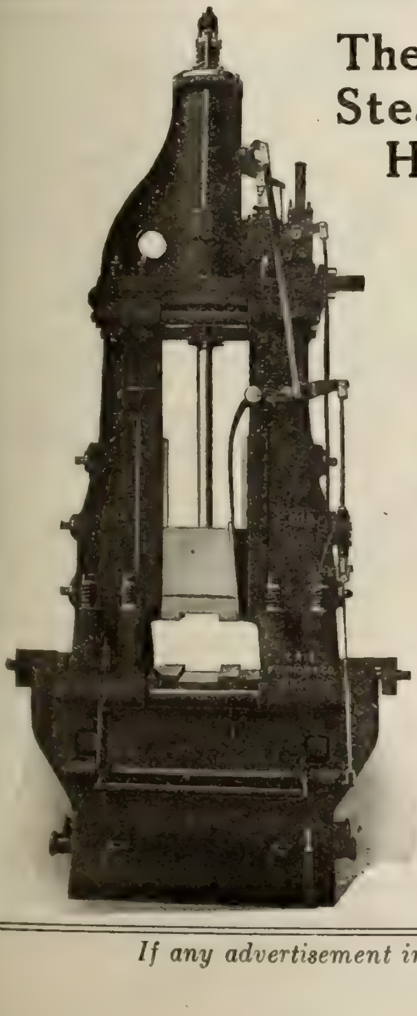

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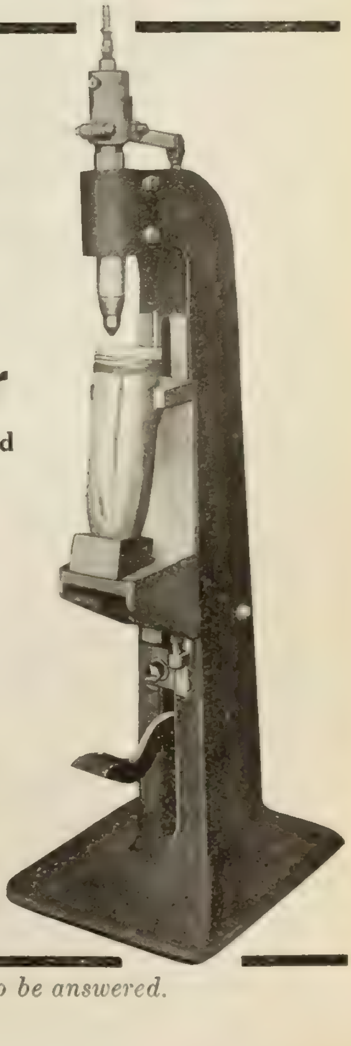

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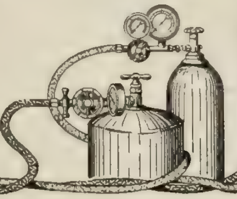

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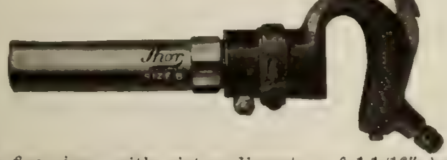

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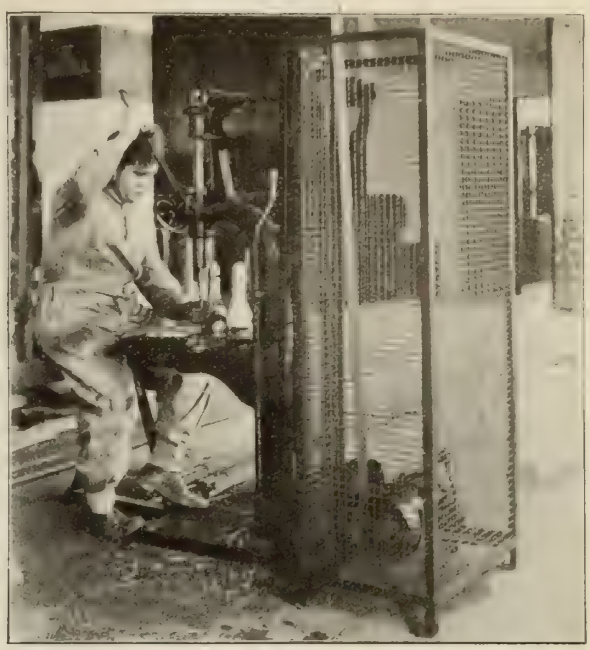

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CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XVI. TORONTO, SEPTEMBER 7, 1916 No. 10

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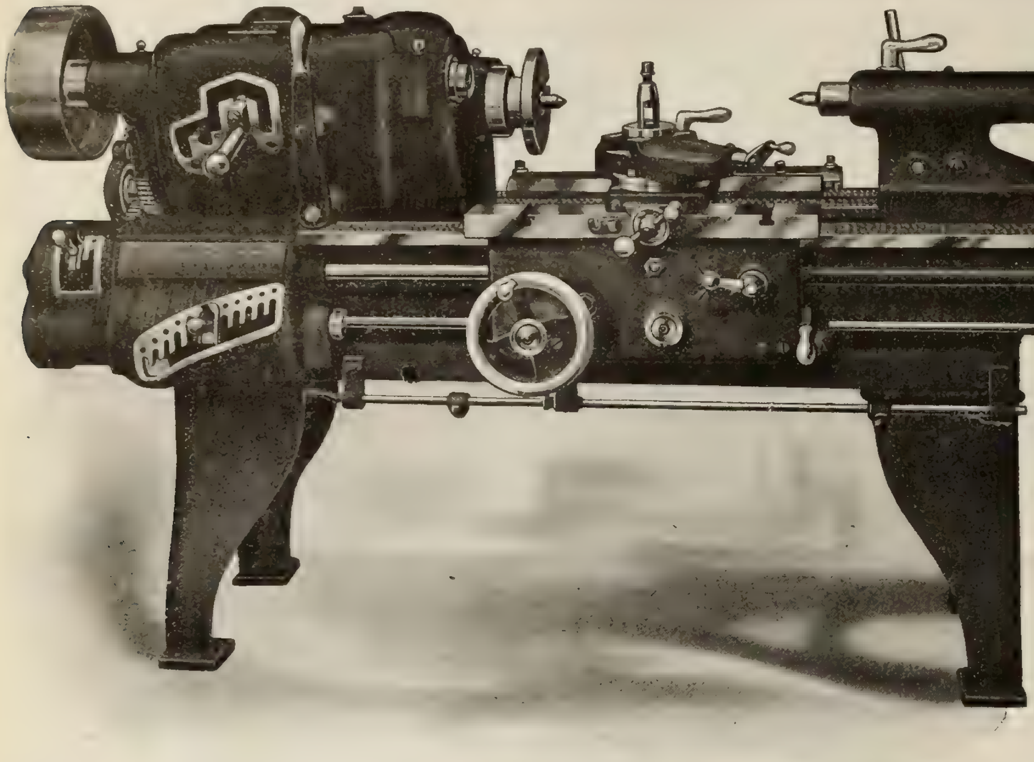

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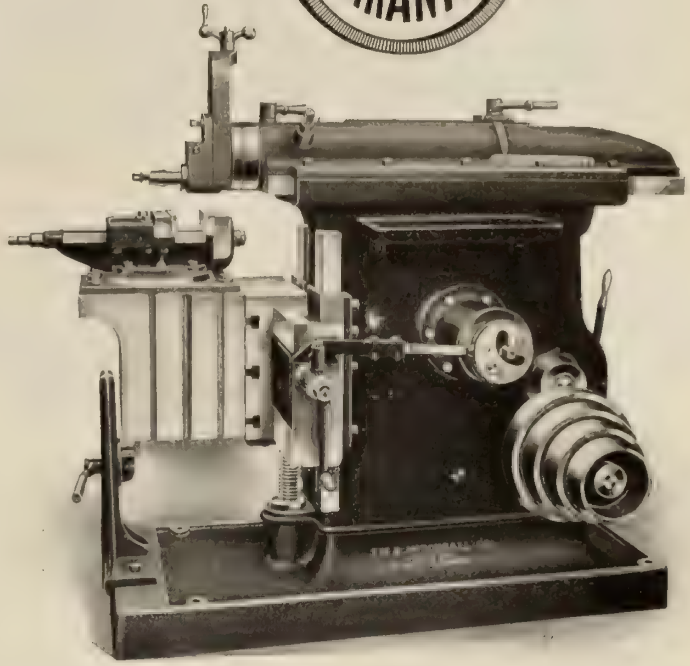

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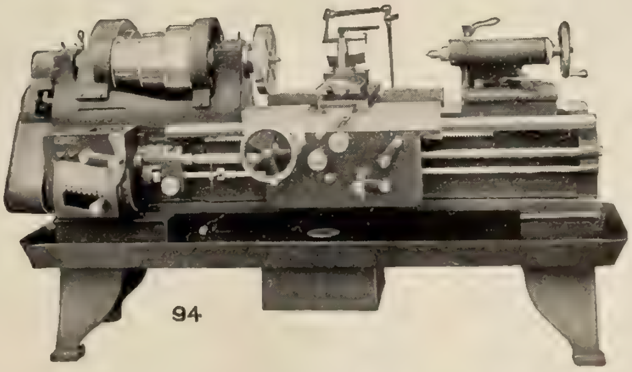

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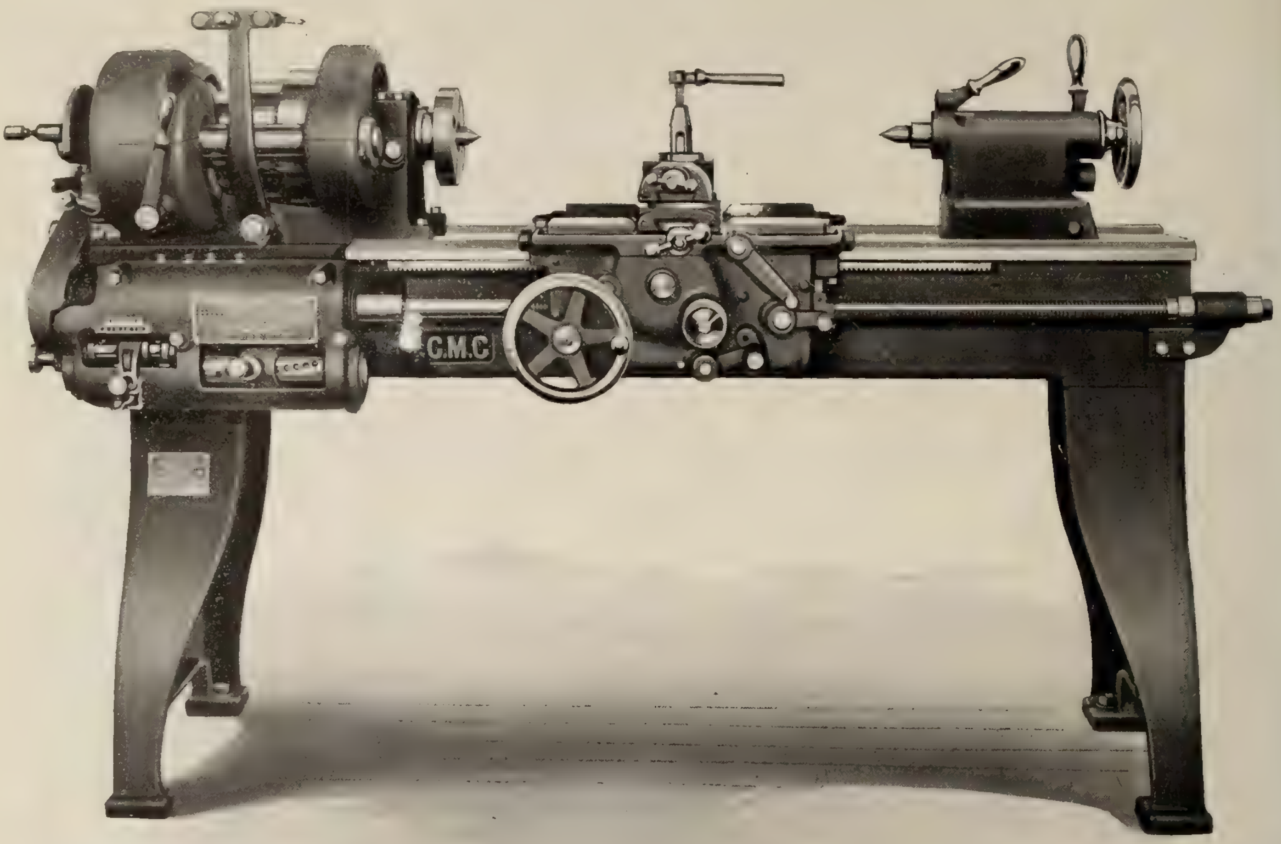

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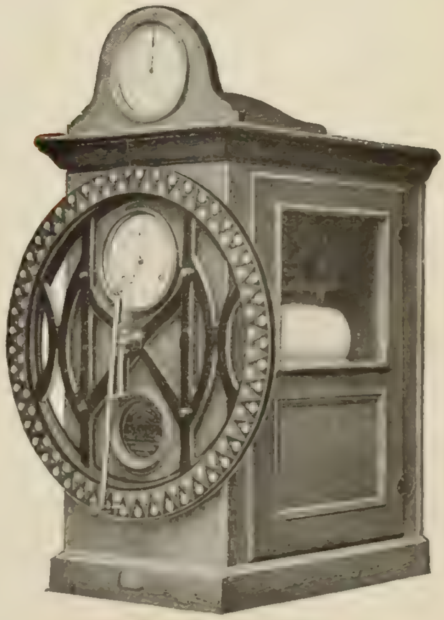

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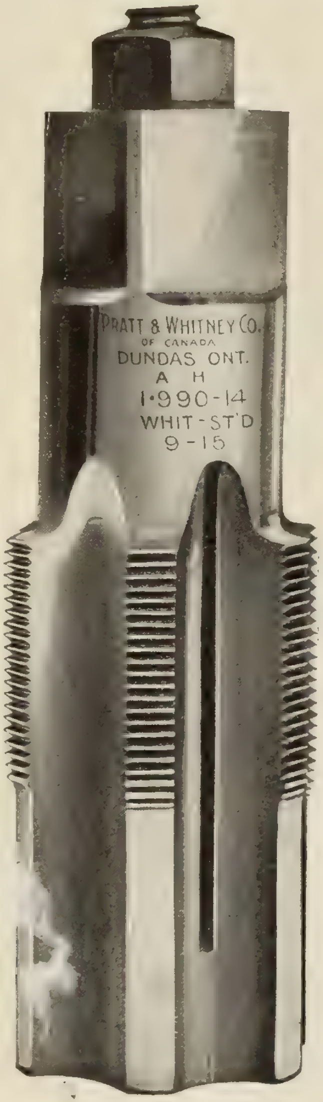
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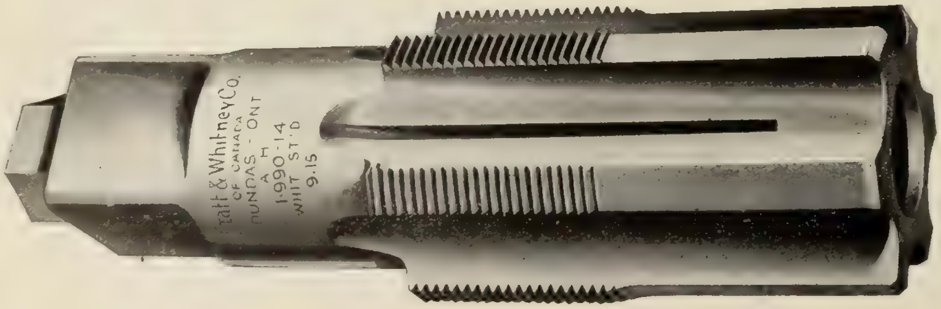
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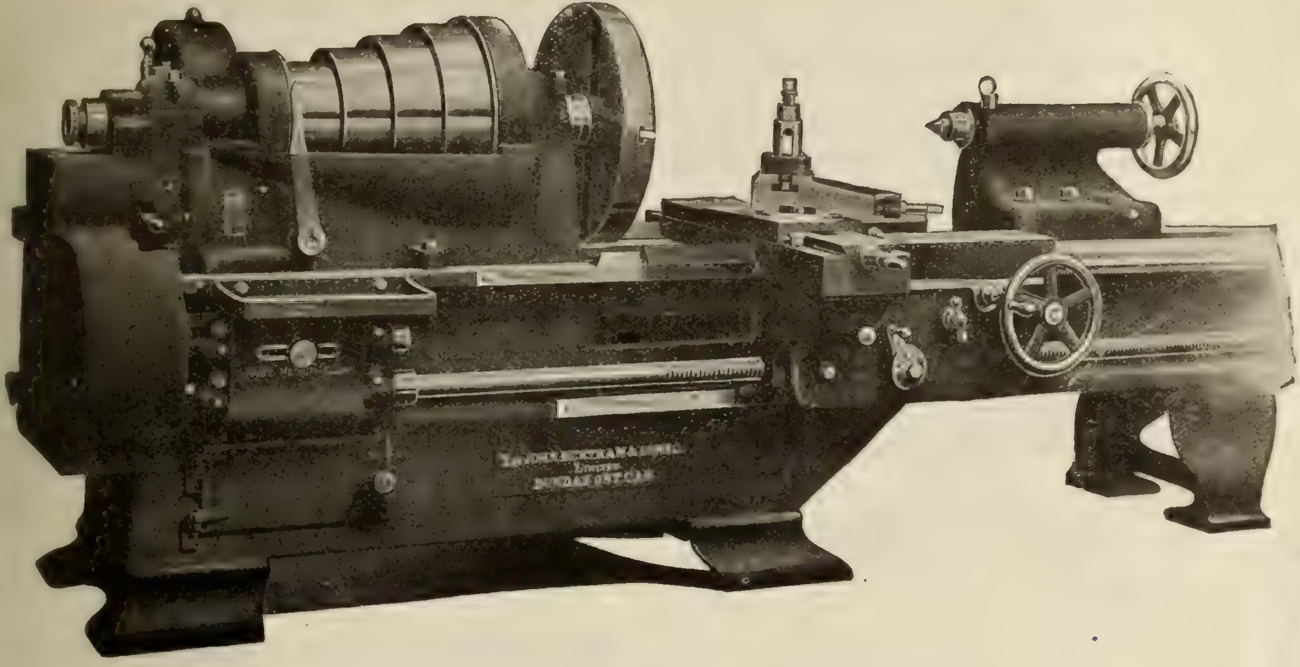

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The Publisher's Page

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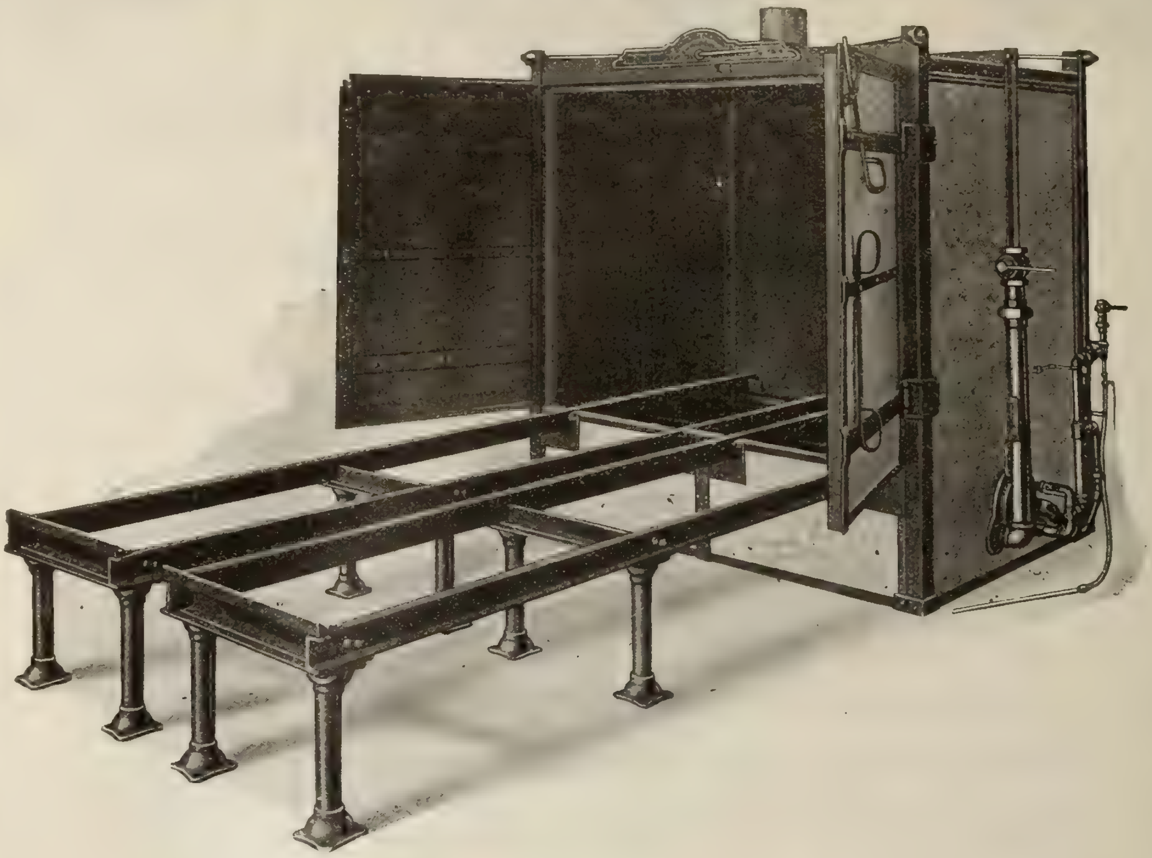
We are large producers of Hamilton Pig Iron and our output of Open Hearth Steel Blooms and Billets, Iron and Steel Bars of all shapes and size runs into enormous tonnage.

The products of our mills include practically everything that can be manufactured from Iron and Steel and these we distribute to thousands of satisfied customers.

Our business is an extensive one and a successful one. The World is our market: but our prosperity and success in the future, as in the past, depend upon the continued confidence, co-operation and good-will of the people we serve.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG



A convenient type of Crawford Sectional Oven largely used by manufacturers turning out Shells up to twenty-eight pounds each.

The method of heating explained in previous issues is the same with all types of Crawford Ovens—no direct flame coming in contact with the material in the oven.

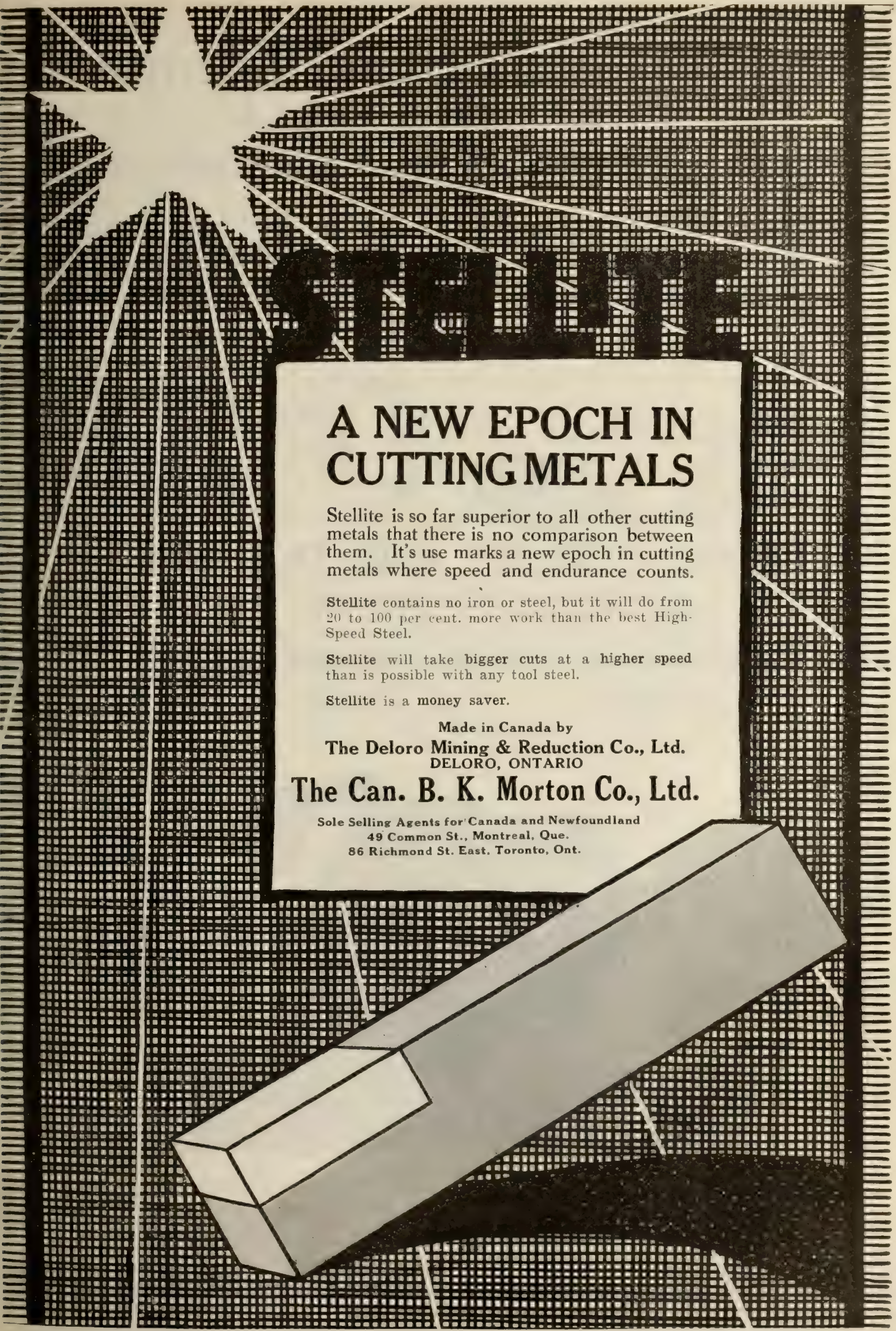
Either city, natural, gasoline or producer gas can be used with either type of oven.

Ovens and trucks built for baking the varnish or finish on any number or size of shells required at a time.

The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN., U. S. A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA



A NEW EPOCH IN CUTTING METALS

Stellite is so far superior to all other cutting metals that there is no comparison between them. It's use marks a new epoch in cutting metals where speed and endurance counts.

Stellite contains no iron or steel, but it will do from 20 to 100 per cent. more work than the best High-Speed Steel.

Stellite will take **bigger cuts** at a **higher speed** than is possible with any tool steel.

Stellite is a **money saver.**

Made in Canada by
The Deloro Mining & Reduction Co., Ltd.
DELORO, ONTARIO

The Can. B. K. Morton Co., Ltd.

Sole Selling Agents for Canada and Newfoundland
49 Common St., Montreal, Que.
86 Richmond St. East, Toronto, Ont.

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX	Carbon Tool Steel
High Speed Steel, Atlas LX	"Deward" Oil Tempering, Non-Shrinking
Chrome Vanadium Steel	

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

YOUNG, CORLEY AND DOLAN, Inc.

115 BROADWAY, NEW YORK CITY, U.S.A.

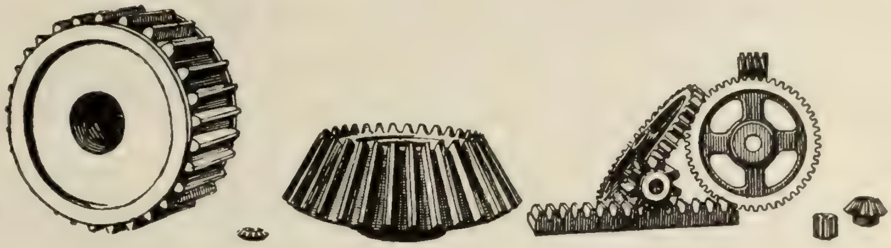
ARMSTRONG, WHITWORTH OF CANADA, LIMITED
"T.Y.R."
Highspeed Steel
(Made in Canada)
Works: LONGUEUIL, Que.
22 VICTORIA SQ.
MONTREAL
P.Q.
DOMINION BANK
BLD'G
TORONTO

Immediate shipment of all standard sizes and shell-turning sizes can be made from stock.

MADE IN CANADA

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL & WELLAND.

Machine - moulded Gears made without the use of patterns, insuring quick delivery in case of breakdown.



JAMES McKAY COMPANY
PITTSBURGH, PENNA., U.S.A.
Manufacturers of
Shell Forgings
We have the Equipment and Experience and can execute orders for
Nose Sockets Base Plates
Adapter Plates
for any size shells. Can execute orders promptly.
SPECIAL FORGINGS—We can make any forging that can be made under Drop Hammers. CHAINS AND ACCESSORY FORGINGS.—We have a complete line.
ADDRESS OUR REPRESENTATIVE:
John A. Buchanan, King Edward Hotel, Toronto

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO, LIMITED, SHEFFIELD, ENGLAND

Sole Agents for Canada:

H. BOKER & CO., Inc.

(Formerly Hermann Boker & Co.)

332 St. James Street, Montreal, P.Q.

Established 1837 Incorporated 1914

Don't make patterns for your Gears

We make

Machine Moulded Gears

Any size up to 18 feet in diameter, in either steel, semi-steel or grey iron. No patterns required.

TRADE MARK

Also manufacturers of all parts pertaining to Cement Mill Machinery, Crushing, Mining and Dredging Plants in "Adamantine," Chrome, Manganese and Nickel Steel.

Let us figure on your requirements. Write

HULL IRON & STEEL FOUNDRIES, Limited

HULL, P.Q., CANADA

EXTRA
Die Steel

is produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

You get extra service from "EXTRA" DIE STEEL. A trial is convincing.

H-A-DRURY COMPANY
LIMITED
STEEL
MONTREAL TORONTO NEW YORK

Manufactured by SANDERSON BROTHERS & NEWBOULD, Limited
SHEFFIELD, ENGLAND

Red Cut
Superior
High Speed
Steel

Quality First
THE BEST FOR MACHINING
ALL HARD MATERIALS
Are your tools made of **Red Cut**?
Send for folder
VANADIUM-ALLOYS
STEEL COMPANY
PITTSBURGH, PA.
Works at Latrobe. Pa.

HAMMOND
DIE BLOCKS

FOR
Difficult Dies and Record Runs
Speed in Machining
Safety in Hardening

SPECIAL
Trimmer Tool Steels
for hot and cold work

HAMMERED crucible cold trimmer Die Tool Steel means longer runs between grindings—less wasted time dragging down production.

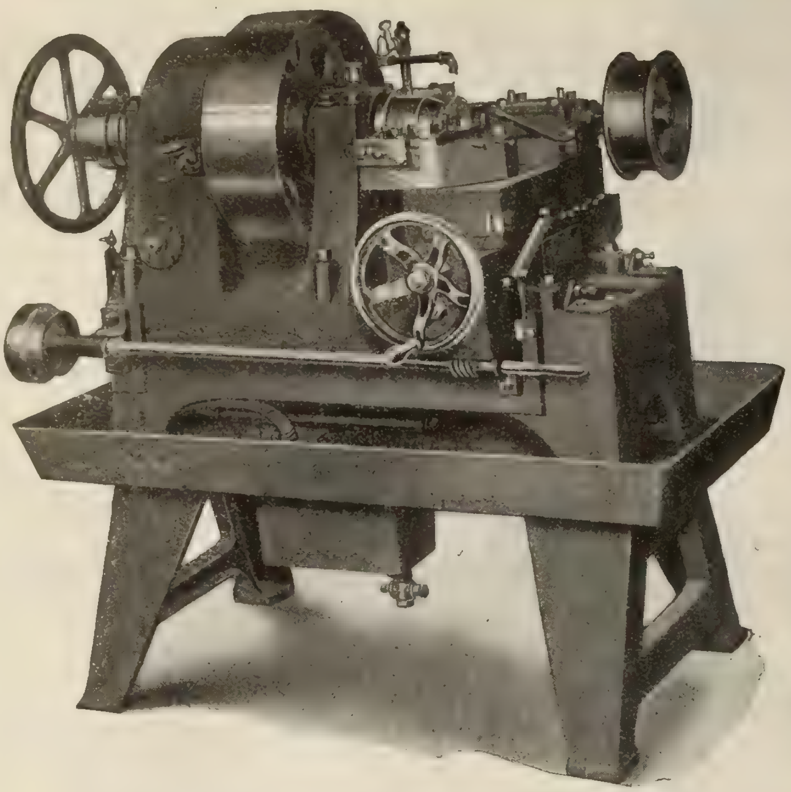
Our Products
"Hammered from Ingot to Finished Bar"

HAMMOND STEEL & FORGING CO.

FINE TOOL STEELS
Specialists in Manufacture of
HIGH GRADE HAMMERED FORGINGS
WELDLESS RINGS, HAMMERED ALLOY
STEELS, SPECIAL SHAPES

DETROIT OFFICE:
1257 David Whitney Bldg.
Phone: CHERRY 1898

MAIN OFFICES
and MILLS:
Syracuse, N. Y.



THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft (**all drives direct from main line shaft**). Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells, Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

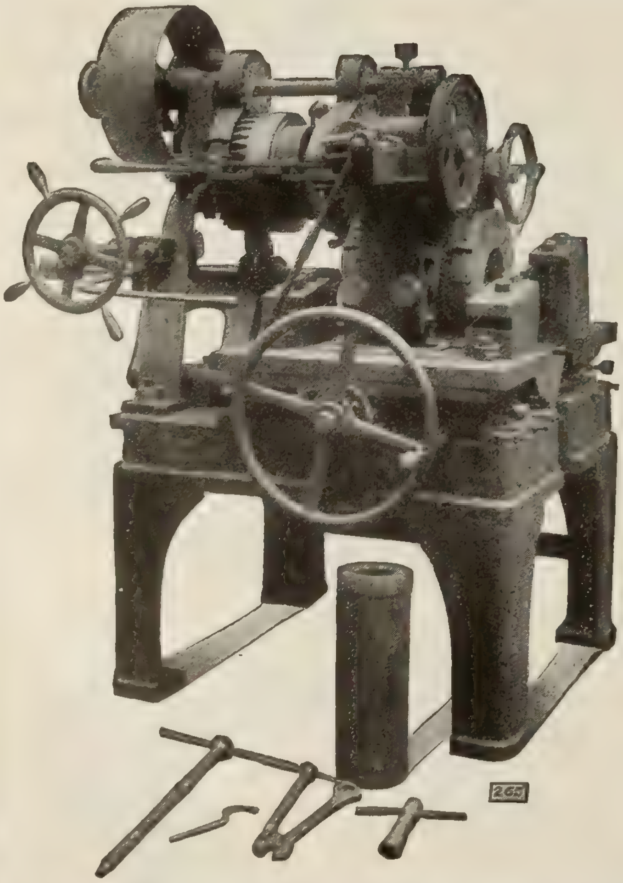
Prompt Shipment

BUILT EXCLUSIVELY BY

For Turning, Facing and Milling the thread on Gas Check Plugs for 6-inch High Explosive Shells.

Edwin J. Banfield

STAIR BUILDING, TORONTO, ONT.



CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE

Wm. Kennedy & Sons

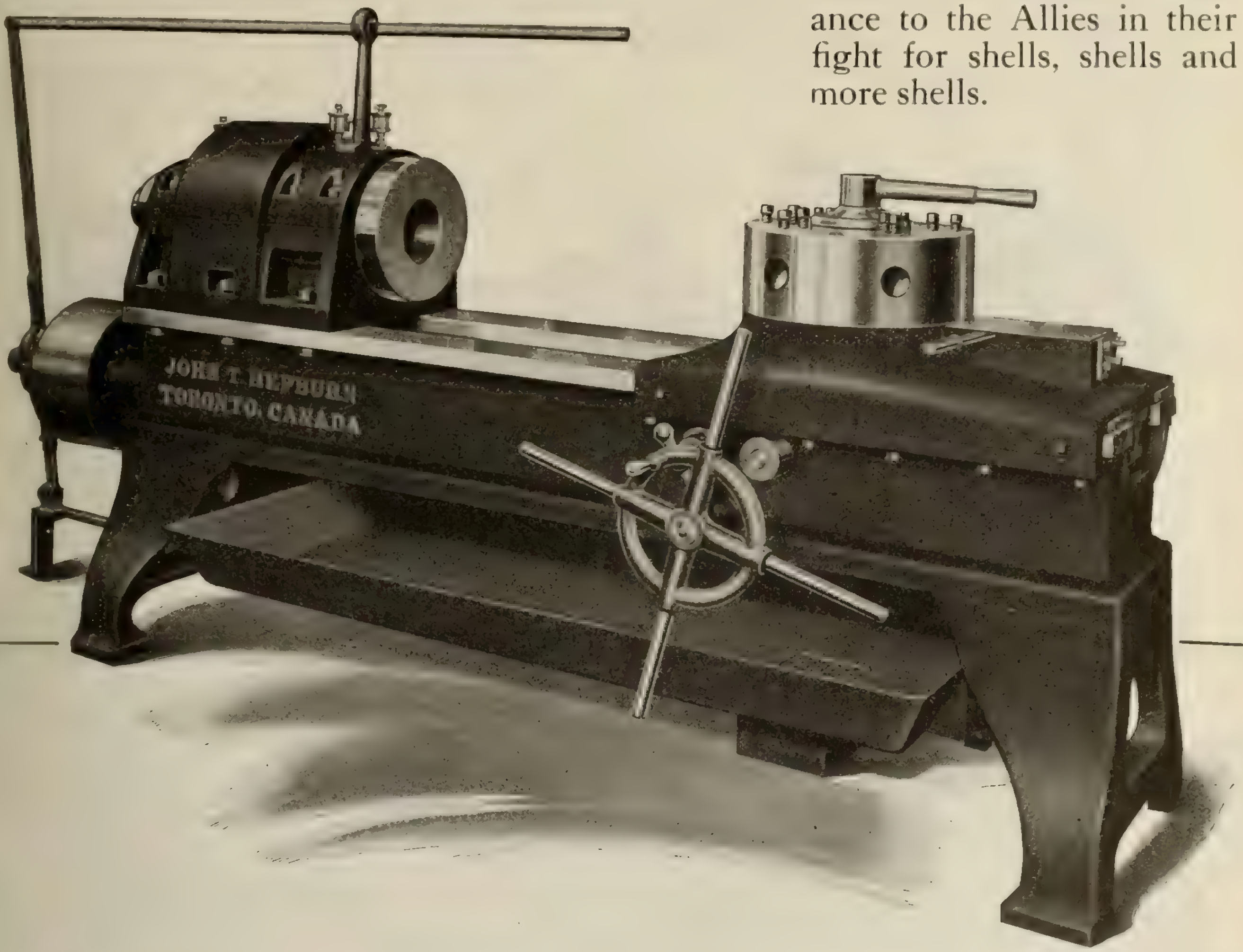
LIMITED

OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal

A machine tool that's doing a big bit in the war—

It is of remarkable assistance to the Allies in their fight for shells, shells and more shells.



Hepburn Heavy-Duty Shell Lathes

are invaluable to manufacturers of munitions. More speed means increased profit.

Hepburn speed, power and accuracy should be investigated by you right now.

Hepburn capacity gives you the advantage of *immediate delivery* and enables us to give the very best of service.

We manufacture Turning and Turret Lathes up to and including 9.2"

Speed, Accuracy, Power, Strength, Simplicity

John T. Hepburn, Limited, 18 to 60 Van Horne Street,
TORONTO, CANADA

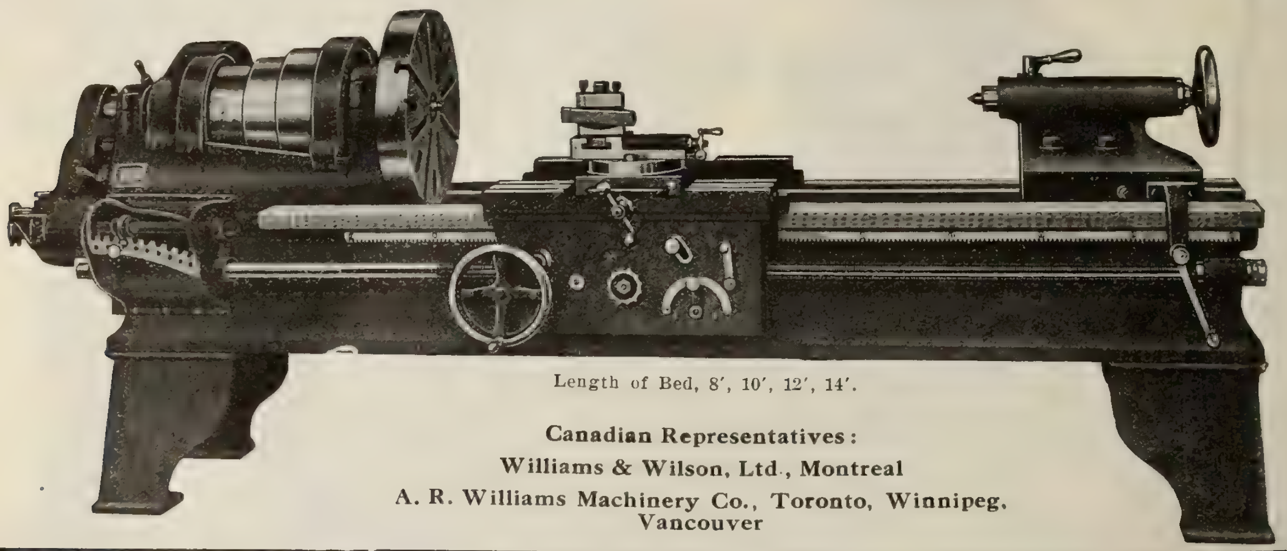
Davenport 22-Inch Lathe — For Extra Heavy Service

These lathes are built exceptionally rigid and heavy. No feature has been omitted, to secure great strength and power. The bed, the headstock, the tailstock, the carriage—every detail has been designed and constructed with a view to driving the heaviest cut that any tool will stand up against. At present we can make quick deliveries on this machine.

Built with ordinary change gears unless otherwise specified.

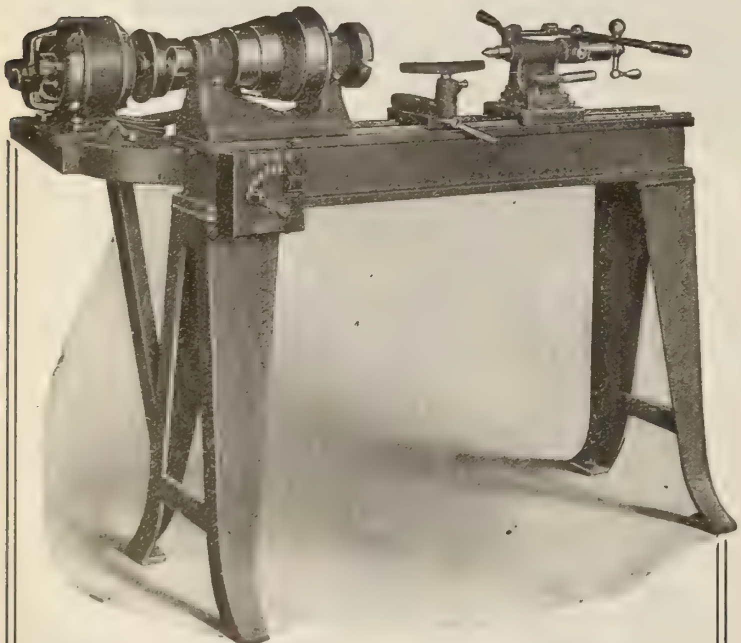
Write at once for Bulletin. It gives full details of construction.

DAVENPORT LOCOMOTIVE WORKS
DAVENPORT, IOWA



Length of Bed, 8′, 10′, 12′, 14′.

Canadian Representatives:
Williams & Wilson, Ltd., Montreal
A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver



Motor Driven Speed Lathe

This style of motor drive employs a constant speed motor mounted on a plate having an extension arm to support a bearing for the outer end of the motor shaft. The motor plate is fitted to a slide on a shelf which is securely fastened to the back of the lathe bed. The motor plate is moved by means of a screw which tightens or loosens the belt. A four-step cone pulley on the motor shaft is belted to a four-step cone pulley on the spindle. This gives the same speed variation as when a countershaft is used, and by means of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is crossed braced and all clamping levers are above the ways.

J. G. BLOUNT CO. - Everett, Mass., U.S.A.

For Rapid Production and Accurate Work

USE THE

"BRIGGS"

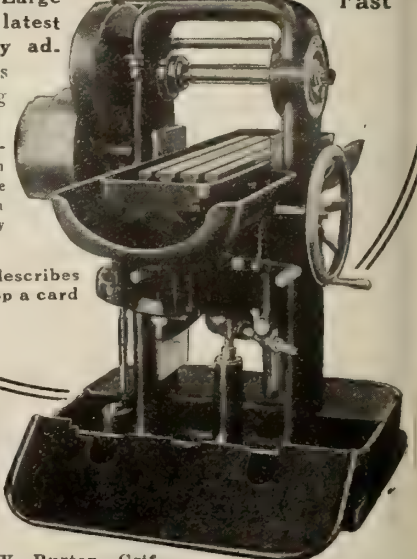
The Briggs Miller handles work no other machine of its size can touch. It is a manufacturing machine. On account of its rigid construction it will produce accurate work when running at a high rate of speed and feed.

Fast

The Base Tank and Large Gear Pump is the latest addition to its many advantages. Tank holds 20 gallons of cutting lubricant.

Pump never requires priming and will deliver ten gallons per minute to the cutters, keeping them cool when run at very high speed.

Our booklet describes fully. Drop a card for it.

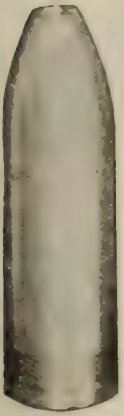


Gooley & Edlund
Inc.
Cortland, N.Y., U.S.A

Foreign Agents: Allied Machinery Company of America, France, Belgium, Italy, Switzerland, Russia, Scandinavia, C. W. Burton, Griffiths & Co., London, Manchester and Glasgow; Barandiaran, Metivier, Gazeau & Cia, San Sebastian, Spain.

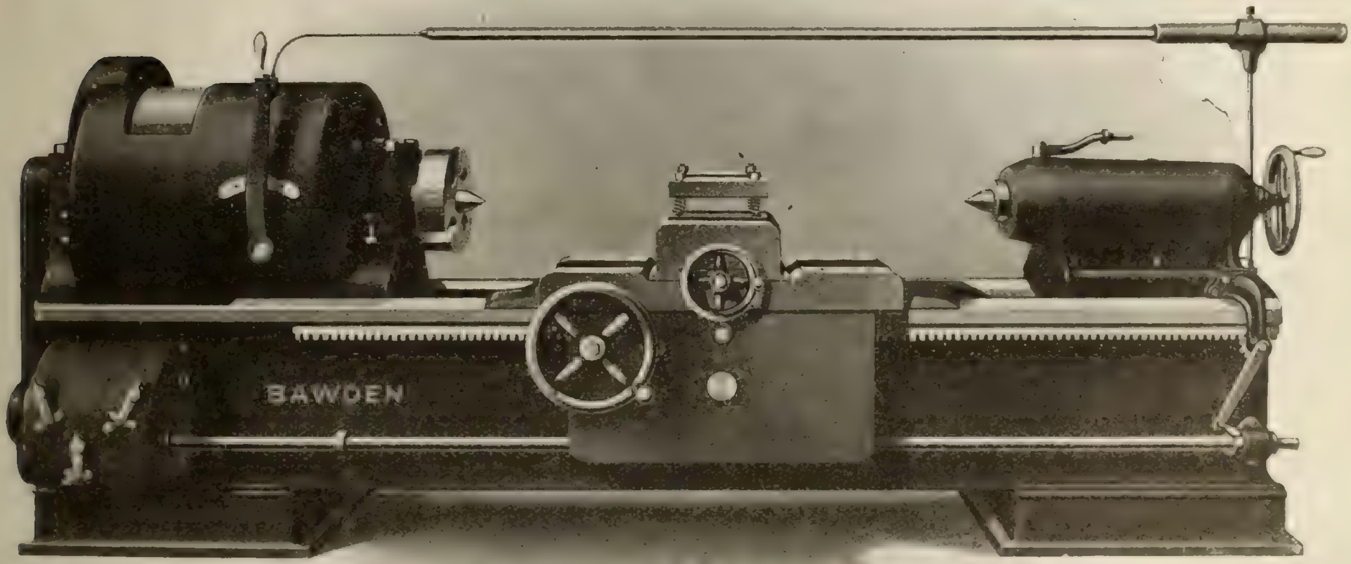
BAWDEN

Heavy Duty Shell Lathes



The Name "BAWDEN"

on a Lathe or any other machine is an immediate indication of all round goodness. In this Heavy Duty Shell Lathe, as illustrated below, the Bawden name is a sign and pledge of fine achievement and performance.



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

Tremendous Strength, complete rigidity and the perfection of **accuracy** combine to make this Bawden Lathe a machine of the highest utility.

Better than our own claims from the buyer's point of view are the shop records of Bawden Lathes—in munition factories; we gladly supply you with names of factories where the Bawden is at work, and you may write these for independent opinion.

We manufacture a **full line of gauges for all sizes of British, Russian and French Shells and component parts.**

The Bawden Machine Co., Limited

TORONTO, CANADA

A New Thing in Shell Gauges

A snap gauge for calipering all outside diameters, with absolute accuracy.

Can be furnished suitable for waving, grooving, rough or finish turning—all sizes of shells, from 9.2" down.

Note the improvement on this gauge for holding.

In ordering, specify diameter and part to be calipered.

Immediate shipment can be made from stock.

Note the hole for handling when using.

Save the Operators' Fingers

The Foundry & Machine Co., Limited
1167 Carriere Road
MONTREAL, CANADA

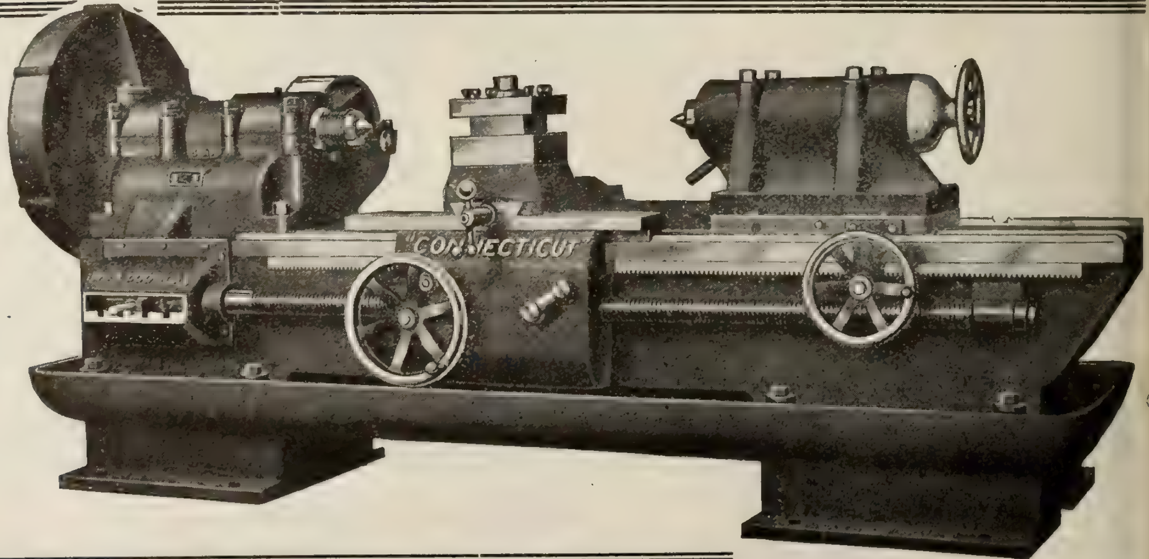
Machining High-Carbon Steel with a Connecticut

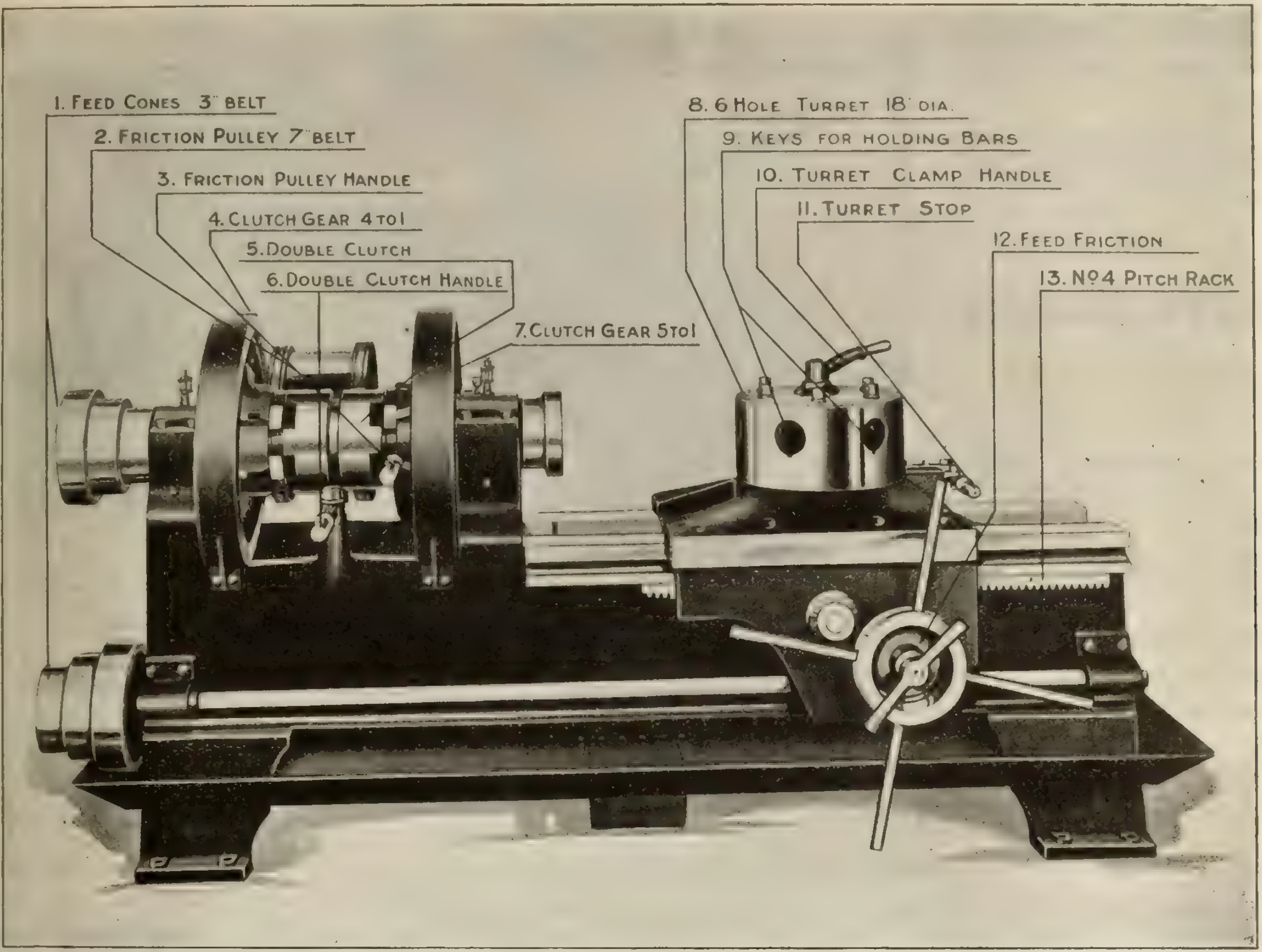
THE Connecticut Lathe illustrated below is for the machining and high-carbon steel at maximum speed—this lathe combines power, accuracy and rigidity in fullest measure.

The bed is cross ribbed with heavy box shaped girths 15 inches apart. All gears and pinions are of steel excep the big gear which is semi-steel with 4-inch face. The head stock the tailstock—every detail from pulley to base are built to the most lineral dimensions. The utmost power is built right into Connecticut Lathes.

Get the Details of this Machine

W. & B. DOUGLAS, ***Middletown, Conn***




1. FEED CONES 3" BELT
2. FRICTION PULLEY 7" BELT
3. FRICTION PULLEY HANDLE
4. CLUTCH GEAR 4 TO 1
5. DOUBLE CLUTCH
6. DOUBLE CLUTCH HANDLE
7. CLUTCH GEAR 5 TO 1
8. 6 HOLE TURRET 18" DIA.
9. KEYS FOR HOLDING BARS
10. TURRET CLAMP HANDLE
11. TURRET STOP
12. FEED FRICTION
13. Nº 4 PITCH RACK

SPECIAL SHELL LATHE

For boring and turning shells from 9.2 down. Above cut shows bed turret for boring operations. We have them in stock for both boring and turning.

Among other good features, note the following:—

No. 1—3" belt on feed.	Note Sheet Steel Oil Pan.
" 2—7" belt and 75 H.P. friction.	No countershaft required.
" 8—18" turret.	Bronze bearings throughout.
" 9—Keys for boring bars.	Sight feed oilers.
" 12—External Feed friction.	Hardened and ground thrust collars.
" 13—Four-pitch rack.	An overplus of strength throughout.
Note ratio of gearing.	Workmanship guaranteed.

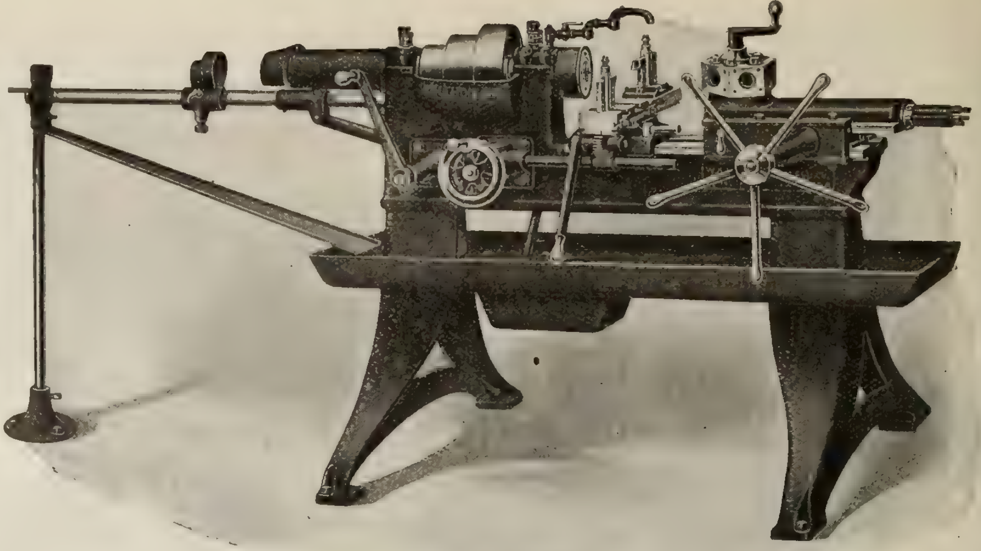
This lathe will give you satisfaction.

Immediate Shipment From Stock
(Subject to Prior Sale)

The Foundry & Machine Co., Limited
1167 Carriere Road
Montreal, Canada

Every Feature to secure strength and stiffness on the heavy cuts is embodied in

Millholland 1"x7" Screw Machine



The Bed is of box construction well ribbed, and with the headstock cast solid.

The Headstock is made with plain head three-step cone. The steps of the cone pulley are of large diameter and wide face and are so proportioned as to transmit the maximum power with proper spindle speeds.

The Spindle, high-carbon steel with hardened and ground thrust washers.

The Cut-off Slide, with broad, flat, well-gibbed bearings.

The Turret is of heavy construction and mounted on a large steel stud.

The Automatic Chuck and Bar Feed, operated by the long lever on the front of the bed, grips or releases the work instantly. The operator with one movement opens the chuck and feeds the bar without stopping the machine.

DROP A LINE FOR FULL DETAILS AND SPECIFICATIONS.

Manufactured by
W. K. Millholland Machine Company
INDIANAPOLIS, IND.

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO. LIMITED

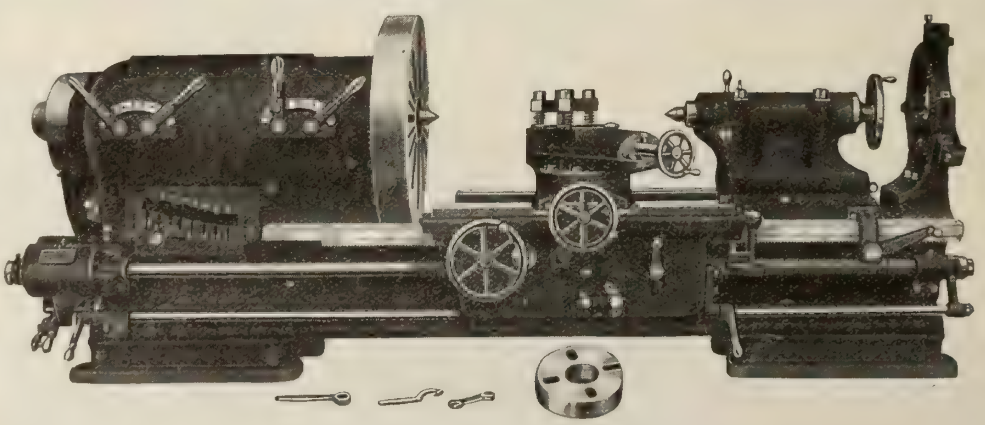
32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Lodge and Shipley—Selective Head—Triple Gear 36" Lathe—Good Delivery

Strong, speedy, accurate Machines for all operations on 6-in., 8-in., 9.2-in. and 12-in. Projectiles.

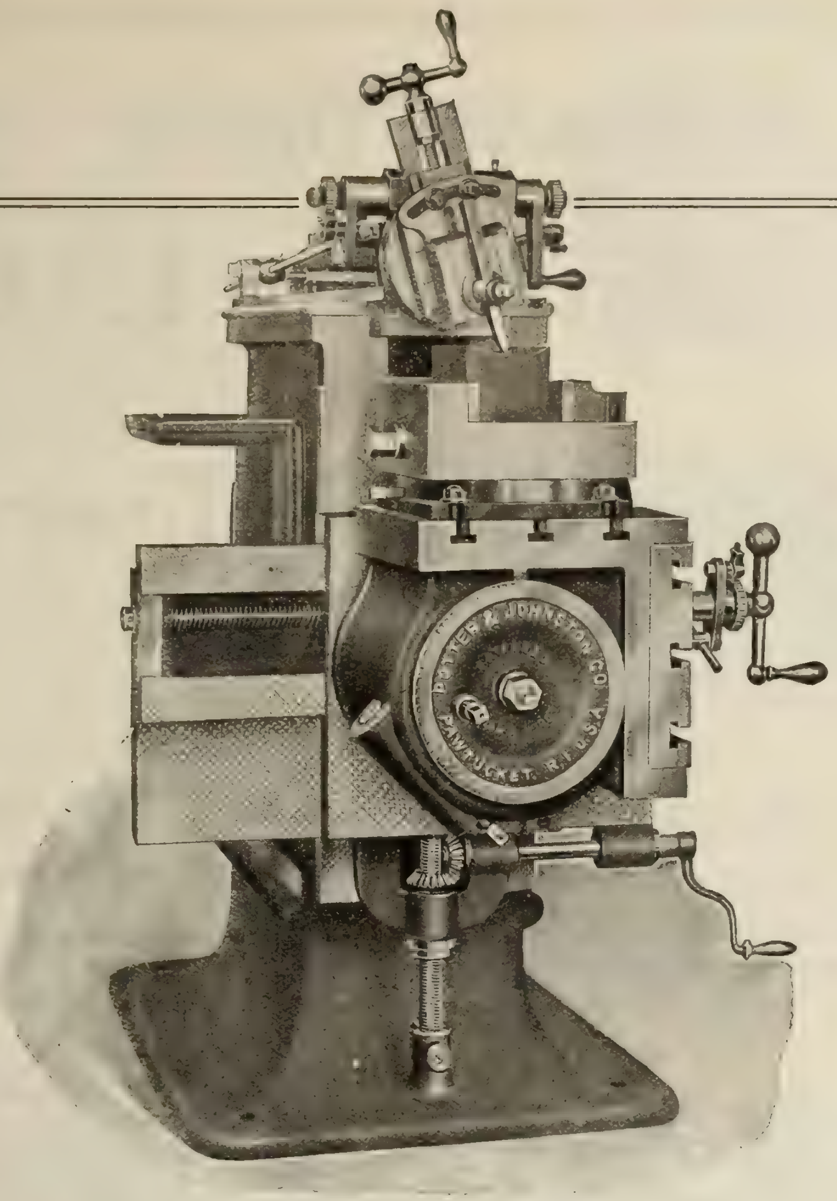
Unexcelled 18 in. and 20 in. Engine Lathes for Tool Room Equipment

Send us a list of machines required, and full particulars will come by return mail.



Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

HEAVY DUTY

Ammunition Lathes

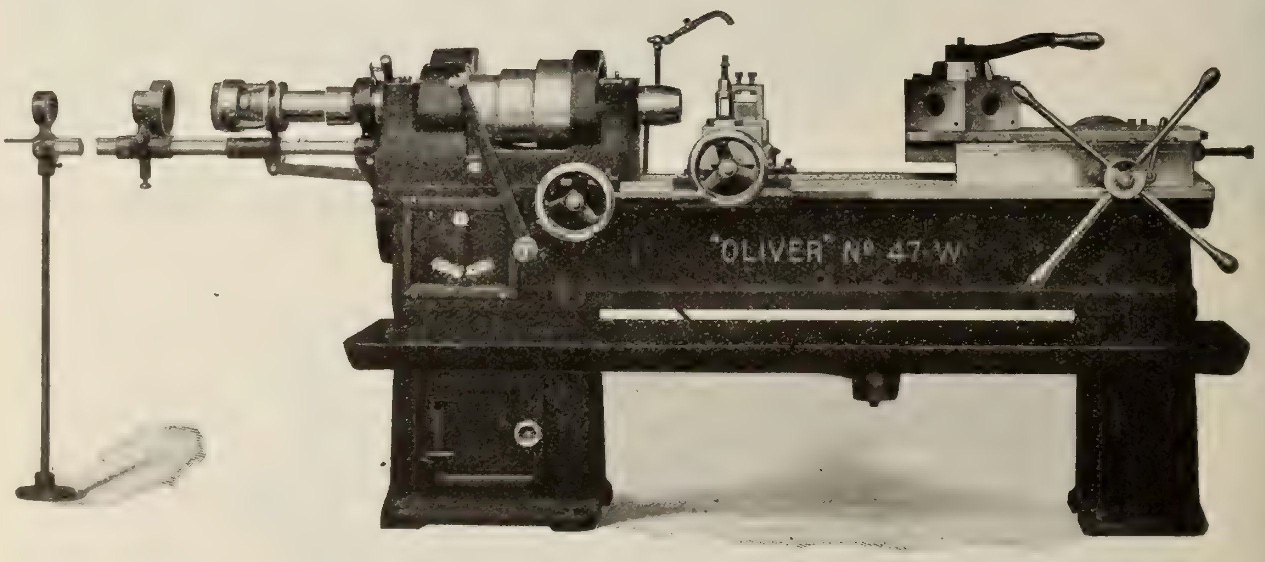
FOR

Immediate Delivery

FULL INFORMATION ON REQUEST TO

HYDE ENGINEERING WORKS

27 WILLIAM STREET - - - MONTREAL, P.Q.



"OLIVER" NO. 47-W HEAVY DUTY SCREW MACHINE 2¼"—SWING 16".

A HEAVY TOOL FOR HEAVY WORK—A MODERN MACHINE—OLIVER QUALITY—PROMPT DELIVERIES.

WRITE FOR FULL INFORMATION.

OLIVER MACHINERY COMPANY, Grand Rapids, Mich.

Two Cuts at One Time

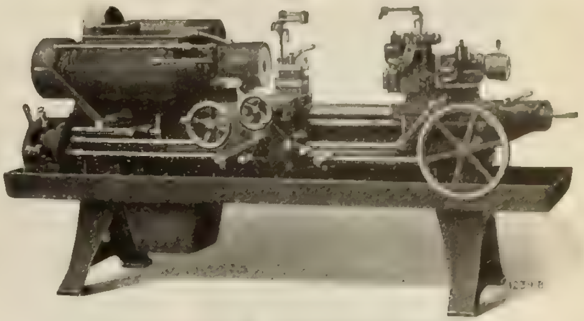
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

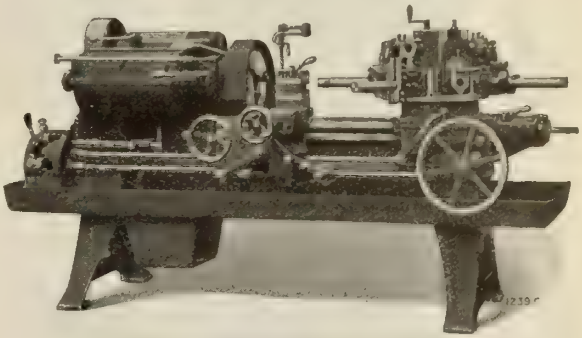
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



No. 2-A—With "Bar Equipment"



No. 2-A—With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal

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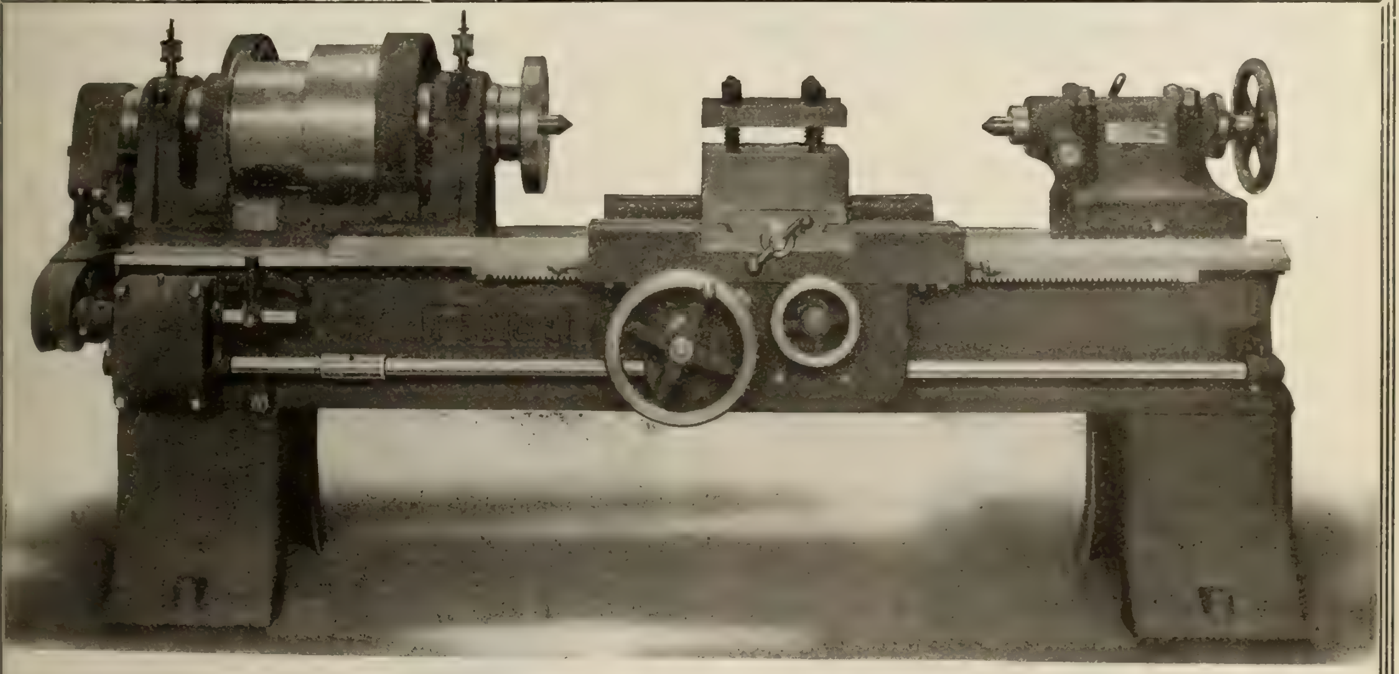


Petrie 20-inch Heavy Duty Manufacturing Lathe

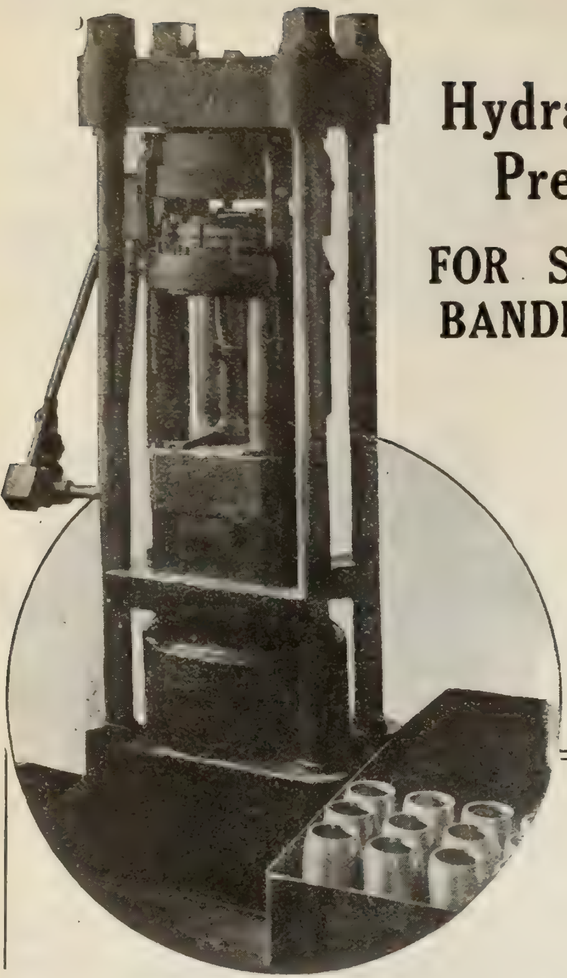
A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

Made in Canada **Reasonable Price** **Prompt Deliveries**

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.

If any advertisement interests you, tear it out now and place with letters to be answered.



Hydraulic Press

FOR SHELL BANDING

Simple, Strong, Reliable, Low Cost

Power is obtained from continuous running belt-driven pump located near the press and is applied to the ram underneath the table.

Table Rises and Forces Steel Taper Wedges, eight in number, up into the Hollow Steel Forging at the top, the wedges conforming to the shape of the shell and are thus pressed in equally against the copper band; pressure is then released, the shell is readily taken out.

Operates by lever shown on the left-hand side. Pressure gauge behind.

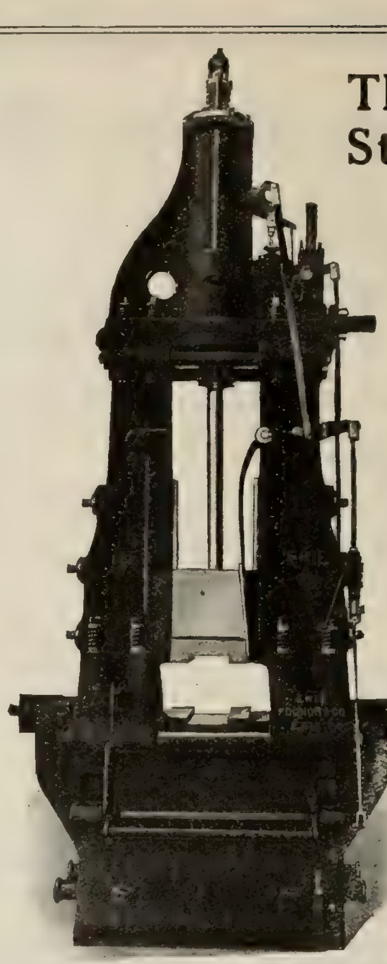
As this machine is a standard Hydraulic Press, it can be used in any other capacity.

SEE OUR BIG TIME AND LABOR-SAVING ELEVATING TRUCK in next week's ad. It is proving indispensable everywhere.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises.**

We shall be pleased to submit prices and give any particulars required.

THE CHAPMAN DOUBLE BALL BEARING CO. OF CANADA
LIMITED
330-351 Sorauren Avenue, TORONTO, CANADA
TRANSMISSION BALL BEARING CO. Inc.
1407 West Avenue, Buffalo, N.Y.



The "ERIE" Steam Drop Hammer

is the last word in Hammer construction. Ask any user.

A list will be supplied upon request.

We also build Trimming Presses.

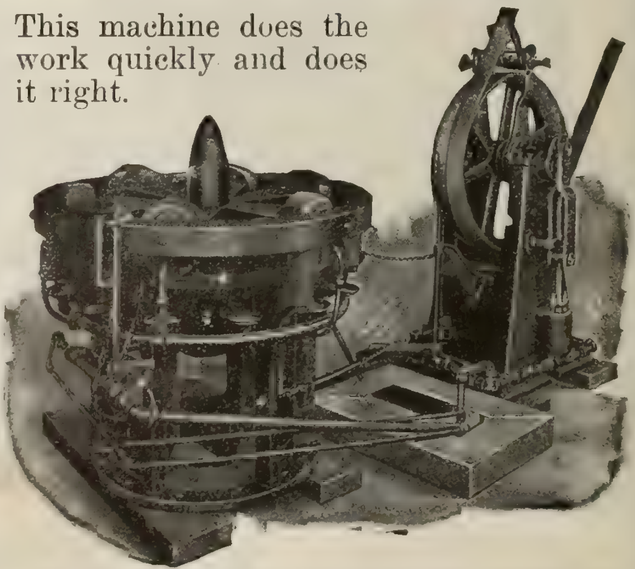
Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

Erie Foundry Co.
ERIE, PA.

Hydraulic Banding Machine

For compressing bands on shrapnel shells and other projectiles

This machine does the work quickly and does it right.



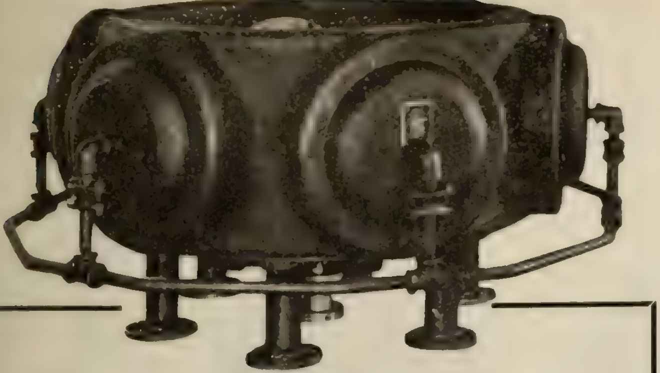
In writing for information or quotation please advise width and thickness of bands and diameter of shells to be handled.

Machines for our Canadian Customers are built in Hamilton, Ont.

We also manufacture machines for setting wagon and carriage tires, cold.

Please address all communications to our Rochester Office

THE WEST TIRE SETTER COMPANY
ROCHESTER, NEW YORK, U.S.A.



"Metalwood" Banding Press

Capacity, 6 to 12-in. Shells

While the price of this press is somewhat higher than others on the market, customers who have used both unhesitatingly prefer our machine, even to the point of discarding other types, for the reason that it is so sturdily constructed it withstands the most severe service and constant use.

Rams 6- Semi-steel 11" diameter. Move of each ram ½" or more if necessary. All rams returned by levers on plate with heavy Vanadium steel spring. Cylinder—Removable, of alloy steel.

Hydraulic inlet to cylinder, 1¼ pipe. Distributing ring 2".

All pipe, seamless steel tubing; all fittings, drop-forged steel. All parts under strain, alloy steel castings or forgings.

Dies, 6, forged chrome nickel steel, hardened and removable without disturbing any part of press by loosening 2 nuts.

Weight, 9,500 lbs.

Can be operated either from accumulator or pump.

Metalwood Manufacturing Co.

Leib and Wight Sts., DETROIT, MICH.

A Combination of Rigidity, Accuracy, Simplicity and Ease of Operation

Bodies are inclinable and convenient for handling dies and material. Slides are long and well gibbed.

BLISS

Inclinable Power Presses

reduce the maintenance cost of both machine and tools.

Built in eighteen sizes.

Adapted for many operations in the manufacture of tin cans, pieced tinware, metal packages, brass goods, electrical goods, trimmings, etc.

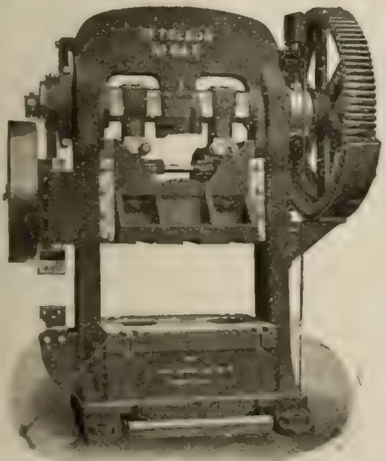
Catalog 2-G, describing them, sent on request.

E. W. Bliss Co., 20 Adams Street Brooklyn, N.Y., U.S.A.

Chicago Office: 622 West Washing Boulevard
Detroit Office: Dime Bank Building

A Tangible Record of Accomplishment behind "TOLEDO"

Double Crank Presses



No. 94C—Will cut a complete stove front at each stroke. Used for a wide range of cutting, drawing, forming, embossing and perforating.

They embody engineering innovations that have proven not only successful but to be practical necessities which insure them against future depreciation because of radical changes in design.

Over 150 sizes, ranging from 1,000 to 500,000 lbs. in weight and adapted to every variety of sheet metal and drop forging work. Many of the dimensions can be changed for special requirements.

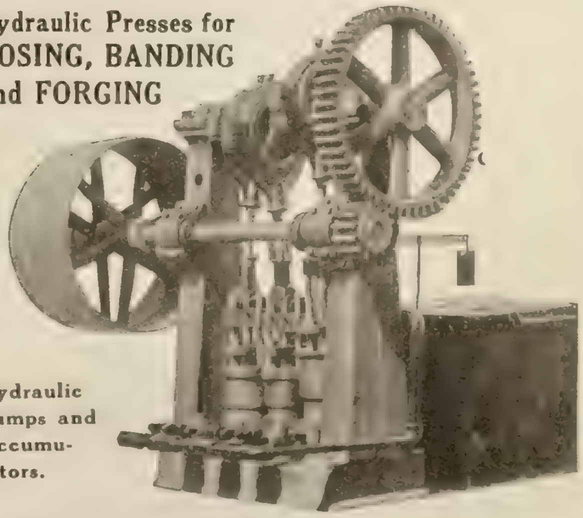
The clutch, slide construction, connection, etc., on Toledo Presses, express our engineers' skill, knowledge of requirements, and long experience.

The Toledo Machine & Tool Co.

Toledo, Ohio, U.S.A.

PRESSES FOR SHELLS

Hydraulic Presses for NOSING, BANDING and FORGING



Hydraulic Pumps and Accumulators.

Hydraulic Presses for all purposes.

WRITE FOR FULL DETAILS NOW.

William R. Perrin, Limited

TORONTO, ONTARIO

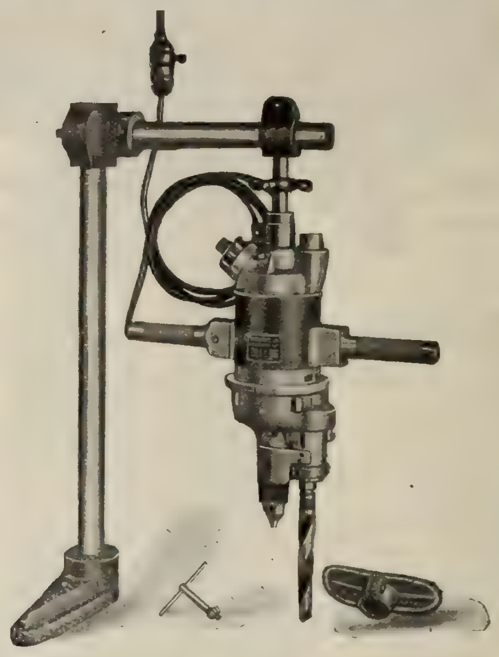
WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only $60 Complete

The Blake & Johnson Co., Waterbury, Conn.

Stow Two Speed Two Spindle Drill



The only tool of its kind on the market. Fills a long-felt want. Will cut your cost.

We make drills of every size.

STOW MFG. CO., Binghamton, N.Y., U.S.A.
London, England, Stock: 85 Queen Victoria Street
Oldest Portable Tool Manufacturers in America.

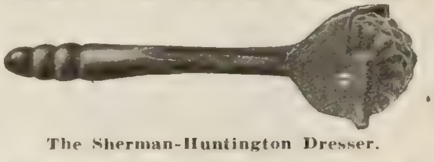
Grinding Wheel Dressers

No one type of Grinding Wheel Dresser is adapted for all kinds of wheels, any more than one size or grade of wheel is adapted for all classes of work. We manufacture Dressers for every class of wheel, and, being specialists, are frequently in position to make valuable suggestions to customers as to the best type of Dresser for their particular needs.

Any of our Dressers will be cheerfully sent, subject to approval and can be returned should they not be found satisfactory.

The Diamo-Carbo Emery Wheel Dresser.

Owing to the high price of Diamond Dressers, the Diamo-Carbo is rapidly coming into favor as an economical substitute for the Diamond. It will do practically the same work as will the Diamond, excepting in some instances of precision grinding. It is so inexpensive that the tool can be left with each grinder. It has been adopted by many of the leading shops of Canada, United States and Great Britain.



The Sherman-Huntington Dresser.

For rough work the Huntington Dresser mounted on the bearings covered by our Sherman patent gives the best results. They are made in two sizes: No. 1 with Cutters 1¼" diameter and No. 2 with cutters 2⅜" diameter. We also make the ordinary Huntington Cutters. All of our Dressers of this type are equipped with our protection hood which continually protects the face of the user from flying particles and is a very valuable feature at no added cost.

Write for booklet and trial offer.

The Canadian Desmond-Stephan Mfg. Co.,
LIMITED
HAMILTON ONT., CAN.
Alfred Herbert, Ltd., Coventry, Agents for Great Britain.

ACCURACY

Good screws must have good threads—in both fit and finish.

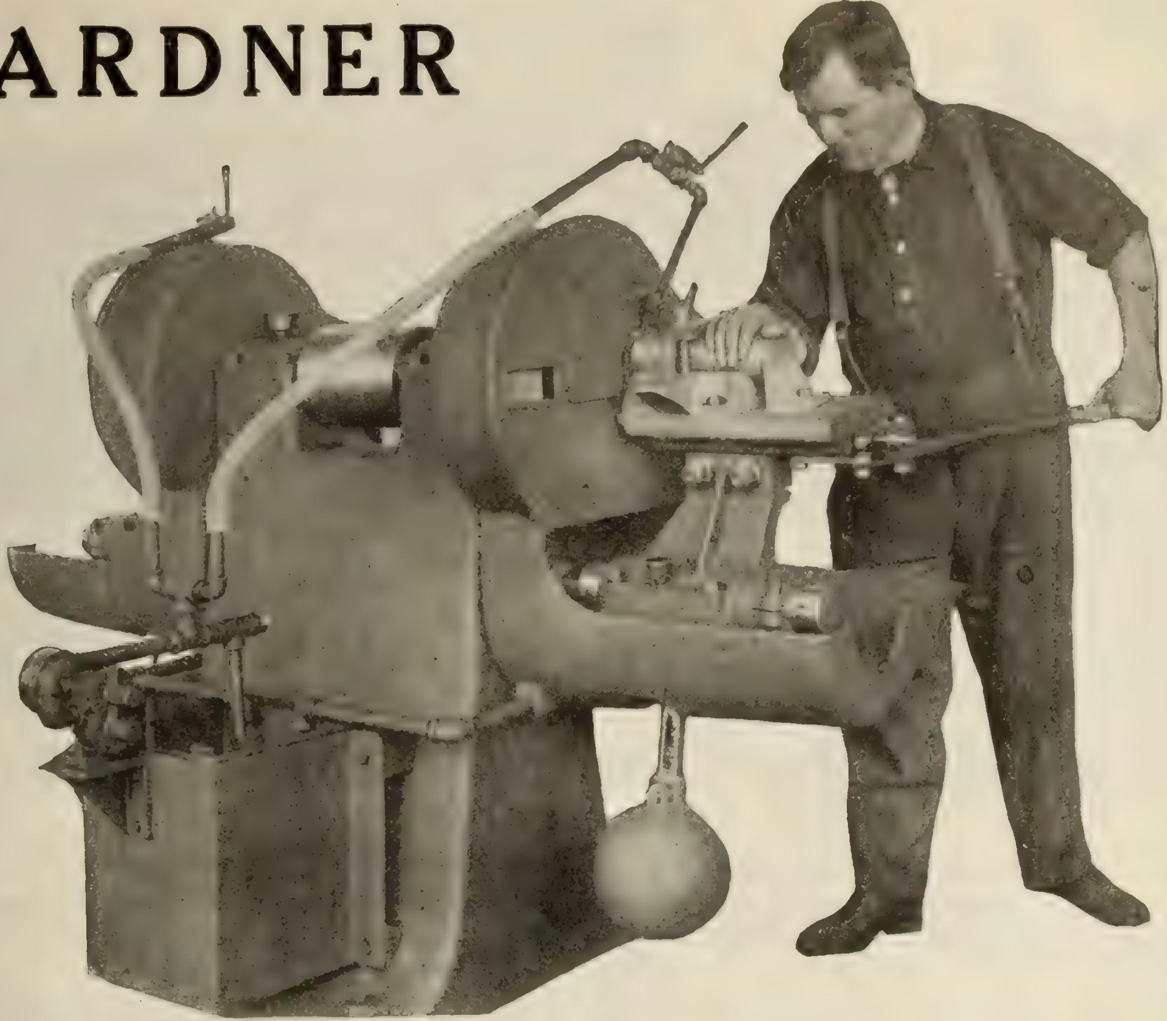
When nuts are added and drawn up tight, the contact is even. **"GALT"** Cap and Set Screws are always accurate.

Specialists in Cap and Set Screws.

THE
GALT MACHINE SCREW CO.,
LIMITED
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company, Limited, 49 Common St., Montreal, Que.

GARDNER GRINDERS



For Grinding Ends of Shells

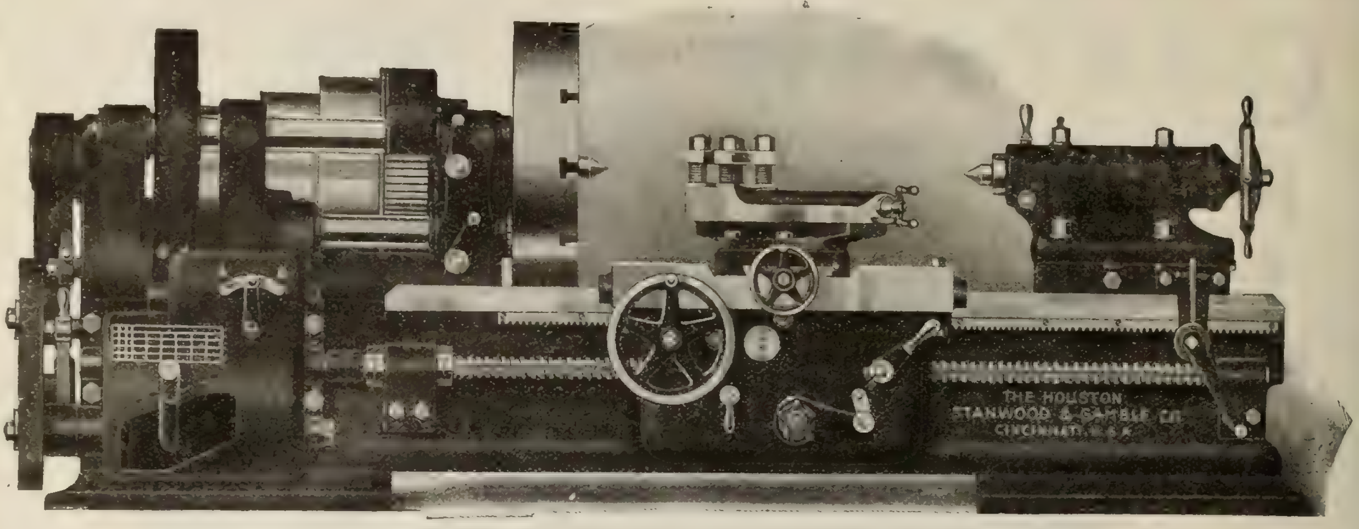
We have developed a Special Grinding Machine for removing the hub or centre projection from the ends of shells. This grinder is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates.
We build as well a much heavier and more Powerful Grinder to be used for these same operations on 6" Shells.

FEATURES

- High-Grade Babbitt Bearings and Lever Feed.
- Rapid clamping of Shell into "V" fixture.
- Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.
- Can be equipped and operated at both ends for double output.
- Output, according to size of projection to be removed, from 40 to 100 per hour.
- Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments.
- Weight, 4,500 lbs.

For further particulars write

The Gardner Machine Company, Beloit, Wis., U.S.A.



H-S-G TRADE MARK

Heavy Duty Engine Lathe, triple-geared into internal gear on face plate. Prompt shipment in 30″ and 36″ sizes.

This is a well-designed lathe. The cone has 7″ face for 6″ belt. Spindle has 8″ x 10″ front bearing. All parts are of correspondingly liberal proportions. Absolutely all gears are of steel. The net weight of the 30″ lathe with 14′ length of bed is 16,500 pounds. The design, materials and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

CINCINNATI, U.S.A.

Represented by Rudel-Belnap Co., Ltd , of Montreal and Toronto

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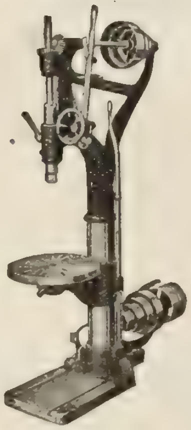
TRADE W.F. & J. Co. B MARK

The BARNES DRILLS



Complete line. 8-incht o 50-inch swing

Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

W. F. & JOHN BARNES CO.

104 Ruby Street - ROCKFORD, ILL.
Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal

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16 in. Lever POST DRILL

A Giant Little Machine For Light Drilling.

Will drill up to 7/8 inch.

The Feed Lever Socket is adjustable on the feed shaft, to provide for setting the lever in the most convenient position for the operator.

An adjustable friction is provided for the feed shaft, which acts as a balance to the weight of the spindle.

Bevel Gears, . Feed Pinion and Rack are all machine cut, working smoothly and without noise.

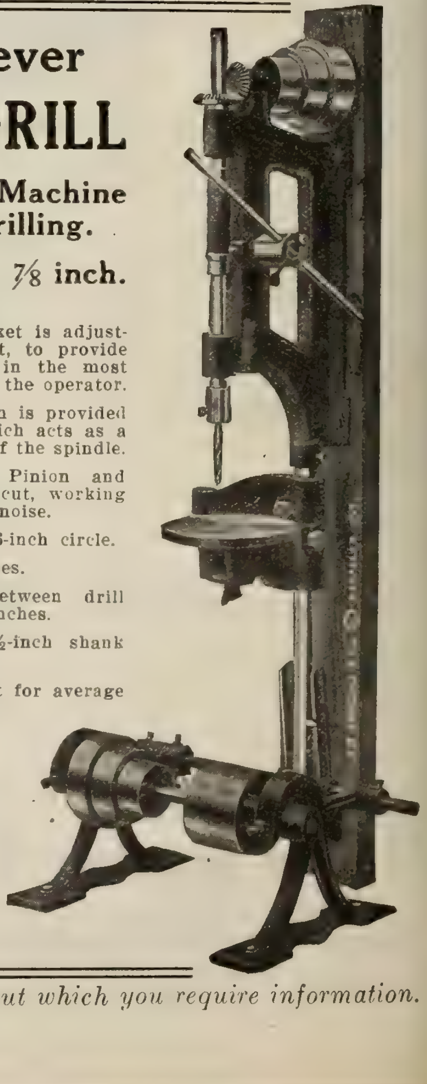
Drills to centre of 16-inch circle.

Run of feed 5¼ inches.

Greatest distance between drill spindle and table, 22 inches.

Spindle bored for ½-inch shank twist drills.

Speed of countershaft for average work, 300 per minute.



A. B. Jardine & Co.

Hespeler, Ontario

One Paragraph From A Machinery Dealer's Letter:-

"One of our customers has recently purchased from us two of your 6" PEERLESS High Speed Power Hack Saws, and they now wish to install several more, providing we can take some ot their old hack saws in exchange. They claim these old machines are as good as new, but they consider the PEERLESS so far superior to the others that they would like to fully equip their factory with PEERLESS Machines."

The principle of construction in the PEERLESS High Speed Heavy Duty Cutting off Machine admits of a cutting speed which cannot be approached by the ordinary type of machine. The output of this machine is controlled by the efficiency of the blade. At the maximum speed which this machine is guaranteed to operate it cuts off a 3 in. round cold rolled bar in 1½ minutes.

Bearings are extra large. The ones that are subject to excessive wear are made of steel, hardened and ground, which eliminates the continuous adjusting and repairing that ordinarily is the case when a machine is worked to its utmost.

PEERLESS MACHINE COMPANY

1607 Racine Street RACINE, WISCONSIN

MORE SPEED LESS BLADES

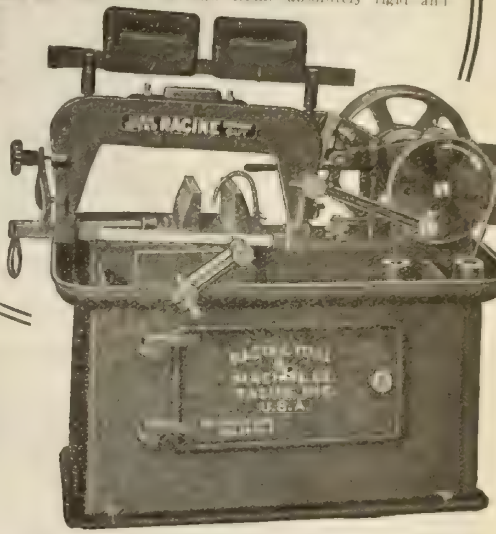
One Canadian Steel Company uses 120

RACINE METAL CUTTERS

and has saved $11,019.50. Particulars on request.

These machines are popular everywhere because they work fast and are easy on the blades because springing is absolutely prevented by the mechanically correct design and construction.

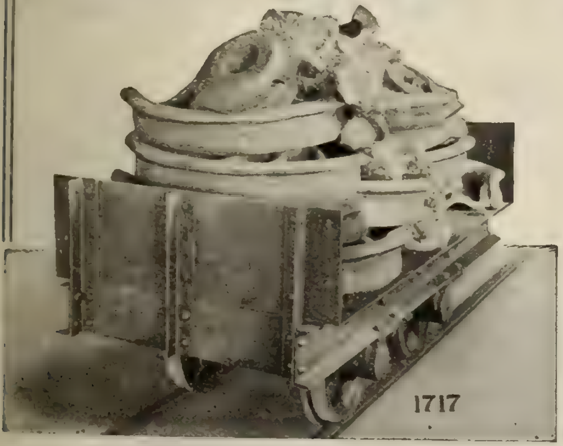
The heavy, rigid saw frame guide of the Racine is made of the best grade of semi-steel and will hold the saw frame absolutely rigid and work at all times, insuring a straight cut with the least possible waste of material.



There are other Racine features well worth investigation — the **Positive Automatic Lifting Device, the Combination Vise, the Cooling System, etc.** May we tell you about them and about our unusual trial offer?

RACINE TOOL & MACHINE COMPANY

15 Melbourne Avenue, Racine, Wis., U.S.A.



1717

Cars and Truck

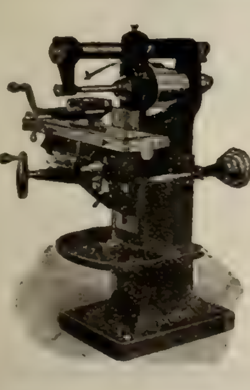
Built for severe service in the foundry, shop or yard. Heavy steel frames and castings of ample section give long life. Our design of roller bearings results in a very light-running truck. **Send for catalog 78.**

Complete Foundry Equipments

WHITING FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB.

Cranes of all Types

Don't Crowd Your Large Machines

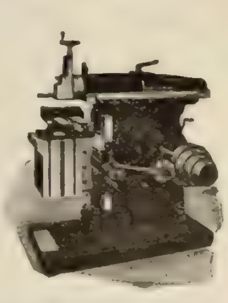


You cannot manufacture small parts economically on a large machine. Steptoe Small Power Feed Millers and Hand Millers are especially adapted for that kind of work, a stiff, heavy tool that can be quickly handled and crowded to the limit. That is the machine to buy for small parts.

If your Planers are crowded take the small jobs and put them on a Steptoe Shaper and you will do them quicker and you will have less money invested in equipment.

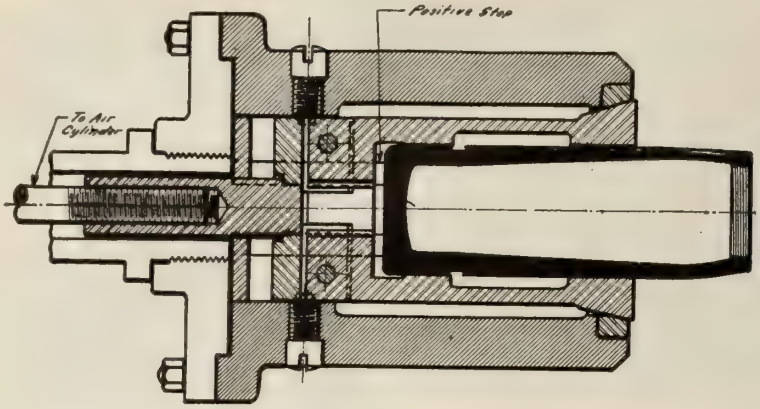
STEPTOE SHAPERS "Just a Little Better."

CIRCULAR ON REQUEST.



John Steptoe Co., CUMMINSVILLE CINCINNATI, OHIO, U.S.A.

You Can Produce More Shells Per Day



M. E. C. Air Operated Hinge Collet Chuck adapted for rough and finish boring operations.

If you are interested in Machining Fuse Plugs, Shells, Etc. the best Chuck and Taps are M. E. C.

These devices will increase your production from 25 to 40 per cent. over any other method now employed.

ONCE KNOWN—ALWAYS USED

It will pay you to investigate at once.

Manufacturers Equipment Company

175-179 North Jefferson St., CHICAGO, ILL.

FOREIGN AGENTS: C. W. Burton Griffiths & Co., Ludgate Circus, Ludgate Hill, London, England.
Louis Besse, Bureaux & Caisse, 39 Rue de Lappe, Paris, France; Geo. A. Todd, 826 Traders Bank Bldg., Toronto, Canada

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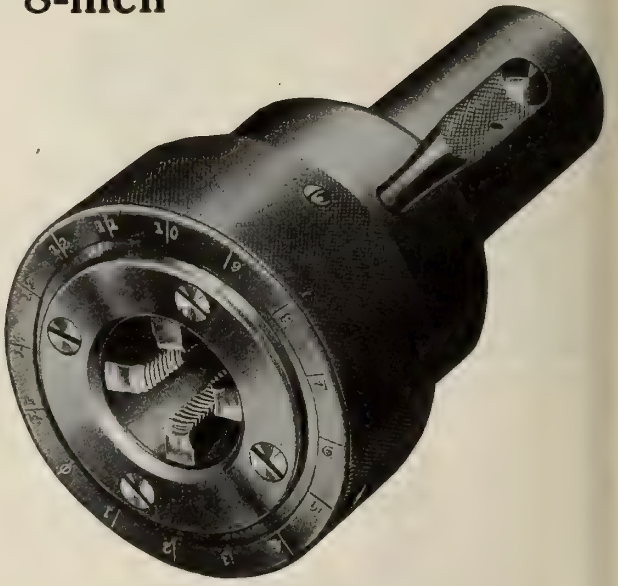
MURCHEY TAPS AND DIES

Very extensively used on 6-inch, 8-inch and 9.2-inch shells

MAKERS ARE finding that Murchey Collapsing Taps and Automatic Self-Opening Dies are paying propositions on this kind of work. We can tap any size hole from 1 inch to 12 inches. All chasers used on shell work absolutely guaranteed to be made of the highest grade of high-speed steel. Get the benefit of our experience and the experience of some of the biggest shell manufacturers in the country. Let us tell you about the savings. Send blueprints. Write to-day for catalog.

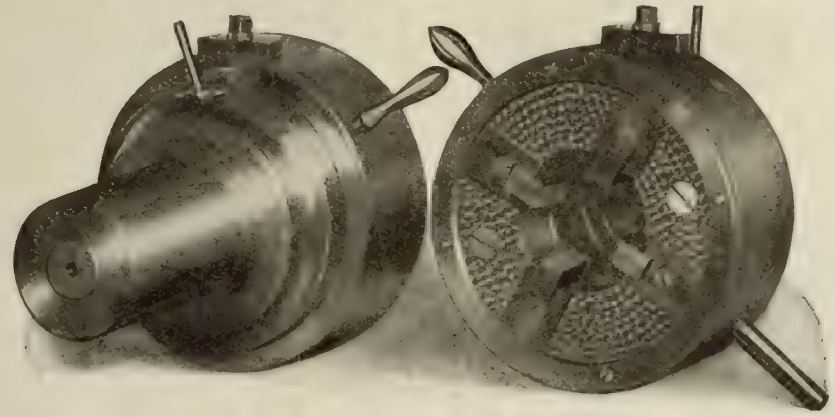


The Coats Machine Tool Company, Caxton House, Westminster, London, S.W., England, Glasgow, Newcastle-on-Tyne, and Fenwick, Freres & Company, 15 Rue Fenelon, Paris, France.

Murchey Machine & Tool Company

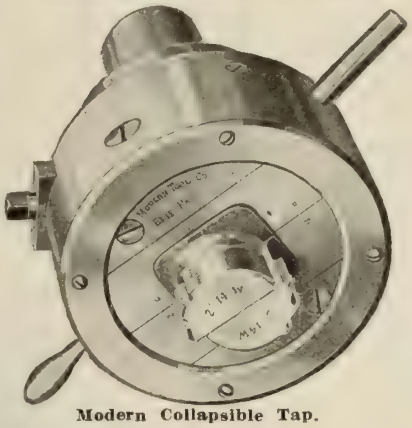
DETROIT 75 PORTER STREET MICHIGAN

Modern Self-Opening Adjustable Die Heads and Collapsible Taps



Modern Self-Opening Die Head.

"Modern," Self-Opening Die Heads and Collapsible Taps in your thread-cutting department mean efficiency and accuracy. With "Modern" Dies and Taps it is not necessary to take a roughing cut—a single cut gives a finished thread of absolute accuracy in diameter, form, lead and pitch. They are properly supported to insure the cutting of a perfectly straight thread of full size and accurate lead, and will not clog with chips, necessitating frequent cleaning. Cuts close to a shoulder.

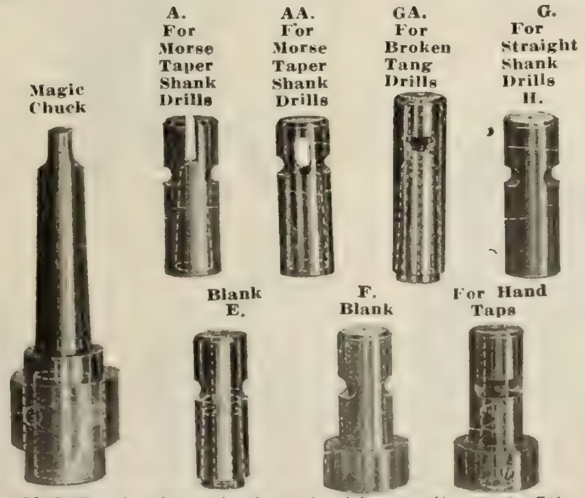


Modern Collapsible Tap.

"Modern" Die Heads and Collapsible Taps are used on all styles of Hand and Automatic Screw Machines, Turret Lathes, Chucking Machines, Drill Presses, in fact on any Machine that is used for thread-cutting.

Magic Chuck Equipment

The simplest, safest, easiest to operate and most adaptable chuck on the market. For use on Drill Press, Lathe, Screw Machines and other Revolving Spindle Machines.


Magic Chuck
A. For Morse Taper Shank Drills
AA. For Morse Taper Shank Drills
GA. For Broken Tang Drills
G. For Straight Shank Drills
H.
Blank E.
F. Blank
For Hand Taps

Made in six sizes—the largest with capacity up to 5% diam. drills.

Handles such operations as Drilling, Reaming, End Milling, Counter Boring, Tapping, in fact any operation that can be done on a Drill Press, increasing the output from 20% to 100%.

MODERN TOOL COMPANY

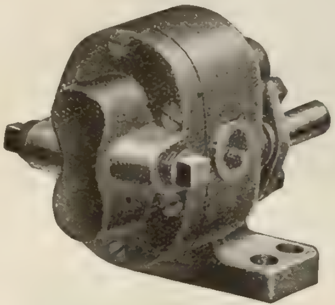
Main Office and Works: STATE and PEACH STREETS, ERIE, PENNSYLVANIA, U.S.A.

New York Office: 50 Church Street

Chicago Office: 32 N. Clinton Street

ROPER Circulating OIL PUMPS

The ideal in a circulating oil pump is that it shall deliver a steady, non-pulsating stream delivered in proportion to the speed of the machine.



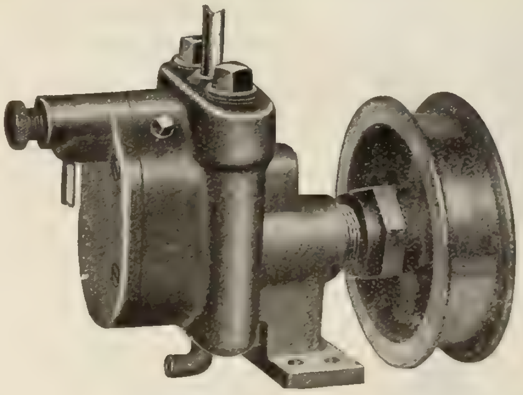
Type 2 One-way

PERFECT SERVICE

THE Roper Types include the simple one-way pump, the economical Type 2, one-way pump with integral relief valve and by-pass, and the self-priming, low-cost reversing pump. The choice depends on the buyer and to some extent on the requirements of the service desired.

Roper pumps are made in five sizes, suitable for use on any machine. Their action is the acme of simplicity consisting of two accurately cut steel gears, running in a tight chamber. They cannot get out of order.

Type 1. One Way, is for use on machines in which the cutting tools operate constantly in one direction. **Type 2. One Way** is for use where delivery is cut off or varied. **Type 1 Reversing** are self-reversing and self-priming.



Type 1 Reversing

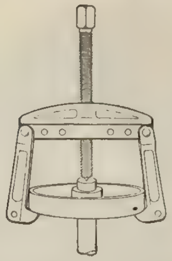
Our pumps cost less to buy and less to instal since they eliminate the usual separate relief valve and piping.

Send for fuller details.

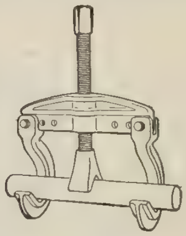
C. F. Roper & Co.

Hopedale, Mass., U.S.A.

Crane's New Model Patent Wheel Puller



Removing Work Near End of Shaft



Pipe Bending and Shaft Straightening Attachment

The screw has a flat end with inserted tempered tool steel point that will not spread cutters. Makes its own centre on work that has none. The strain is taken on the flat end of the screw. Grease to keep from cutting. The screws are made of high carbon steel and case-hardened all over.

The pipe-bending attachment consists of a pair of arms and forked end for the screw. Two sizes to fit the No. 2 and No. 3 Two-Arm Puller. **It is indispensable in a repair shop** for straightening propeller and jack shafts, banding exhaust pipes, and removing universal joint yokes, etc.

We absolutely guarantee the workmanship and material in our tools.

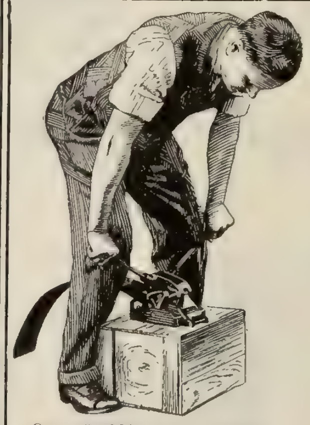
Write for full particulars.

The Crane Puller Co.

54 Lake Street

ARLINGTON, MASS., U. S. A.

Canadian Distributors: Canadian Fairbanks-Morse Co., Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary; John Millen & Son, Montreal, Toronto, Winnipeg, Vancouver.



Over 23,000 now in use.

THE CLIPPER GOES TO YOU FOR A FREE TRIAL MERELY FOR THE ASKING.

For sale by all leading supply houses in Canada.

The CLIPPER Belt Lacer

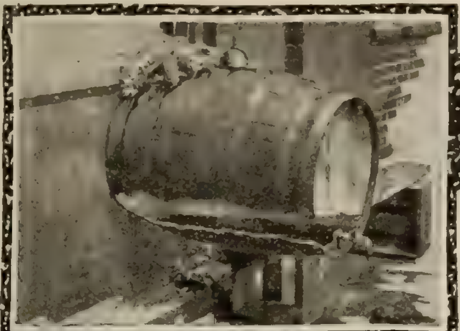
Makes belt lacing easy, quick and durable.

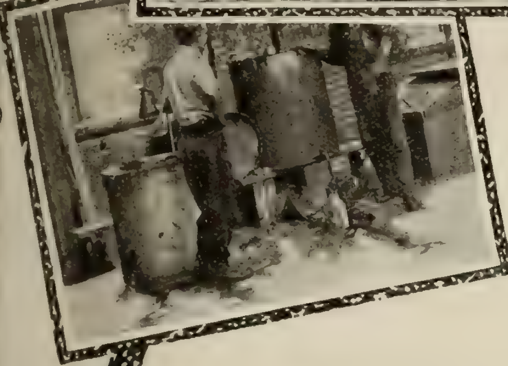
Can be carried to the broken or stretched belt, set on the floor or a box and the lacing done in **THREE MINUTES** without removing belt from shaft.

Laces any width or thickness. Each hook will stand a pulling strain of 60 lbs., equal to 400 lbs. per inch belt.

Clipper Belt Lacer Co.

1 Front Ave.,
Grand Rapids,
Mich.





What Do You Pay For Oil?

The yearly sum you pay for oils. Is it so small, so insignificant that you can afford loose handling methods? Does it make no difference the amount of oil which never reaches your machines? Are you wasting it recklessly? These are questions which involve the same careful methods of economy applied elsewhere throughout your plant. Glance at the two sets of plates. Which illustrates the practice you are following? Total the money expended last year for the lubricants you consumed. Check up the amount you waste, isn't it well worth saving? Now, consider the value of proper storage equipment. Sum up the actual money you would save if **every drop** you buy were used for the purposes you intend it. At many times their cost you would still save by installing

BOWSER ESTABLISHED 1885 Oil Storage Systems

All grades of oil are higher than a year ago. Present indications do not point to lower prices. **Now** is the time to provide against needless costly waste; to insure yourself against it in the future.

Whether they be heavy oils, paint oils, varnishes, dryers, asphaltum, turpentine, lubricating oils, car oils, machine oils, valve oils or other grades, some equipment in the Bowser line has been designed to handle them correctly.

BOWSER SYSTEMS can be adapted exactly to your particular requirements and will meet unusual conditions satisfactorily. As evidence of this they may be seen to-day in thousands of industrial plants covering all lines of manufacturing work. One concern saves $10,000 a year on a system whose original cost was $6,267.00. Suppose the opportunity for economy in *your* plant was only a fraction of this, can you afford to continue the wasteful method any longer?

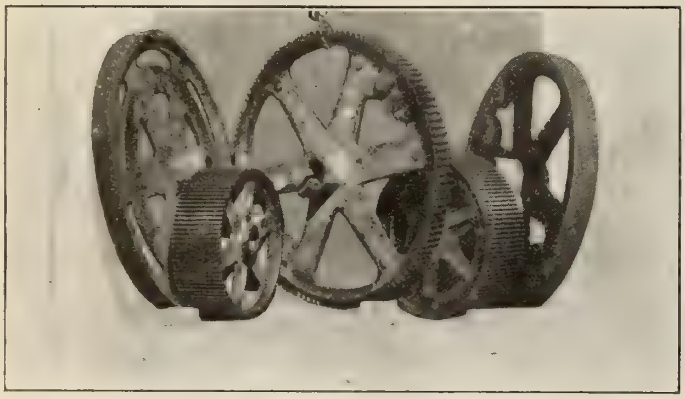
Our Engineering Department is acknowledged as the foremost authority on subjects pertaining to the storing, filtering, metering, circulating and handling of oils of all kinds. An inquiry for descriptive matter or information on anything along this line will not obligate you in the least.

S. F. BOWSER CO., INC.
Engineers, Manufacturers and Original Patentees of Oil Handling Devices
Sales Offices in all Centres. TORONTO, ONT. Representatives Everywhere

L.4

CUT GEARS

CUT
GEARS



Heavy Steel Gears For Specially Severe Service, Heavy Duty or High Speed.

Write us for quotations.

Hamilton Gear & Machine Co.

COR. CONCORD
VAN HORNE
TORONTO

--Good Files
Promote Efficiency

You cannot get away from the fact that when a man is working with a good tool his pride in his work increases. A file worn smooth irritates the most even-tempered workman, while the high-strung, skilled mechanic who works with a bad file for half an hour costs his employer more in wasted mental and physical energy than possibly a dozen files may cost him—in the final results.

Educate your men to throw away their files when they reach their "inefficient point." It is economy. It is efficiency. It promotes good temper at the bench.

The Famous Five Are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(Made in Canada)

NICHOLSON FILE CO.
PORT HOPE
ONTARIO

"New Departure" Ball Bearings

For Autos, Motor Trucks and Machine Tools

"New Departure" Ball Bearings are produced in the largest ball-bearing manufacturing plant in the world, and are used in over 75% of the motor cars on this continent.

The "New Departure" line is most complete, comprising the regular annular single row ball-bearings, cup-and-cone or "take-up" bearings, and the

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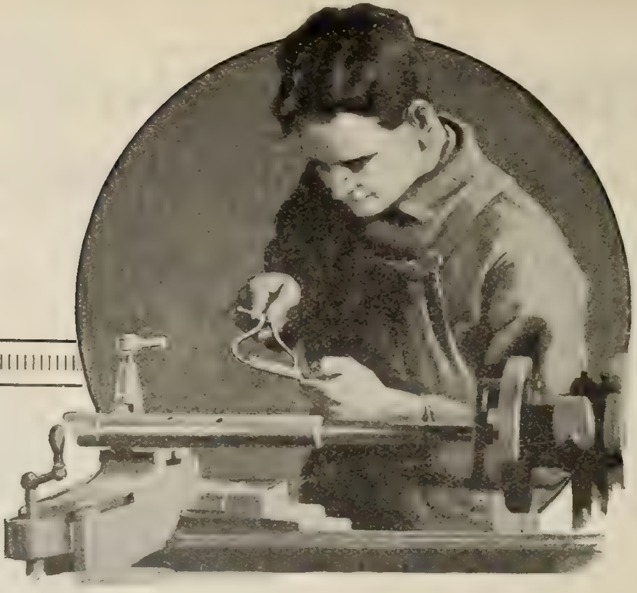

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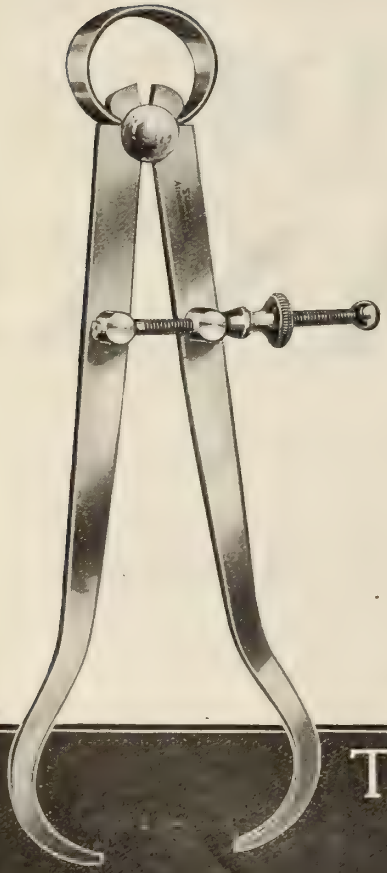

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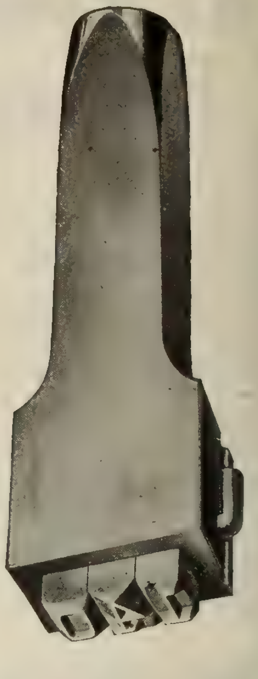

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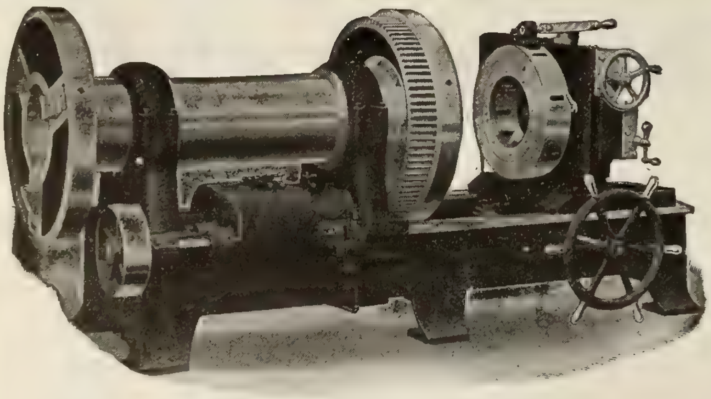

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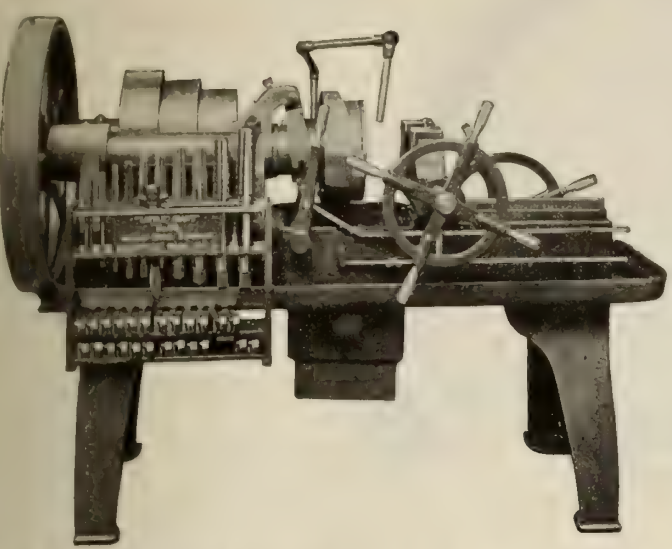

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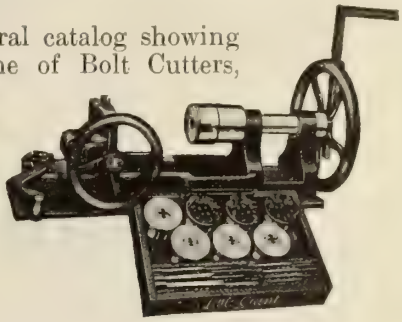

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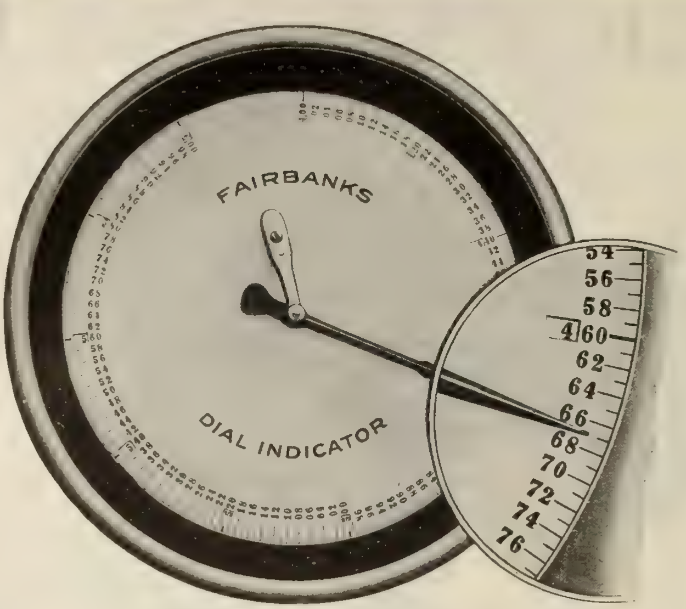

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Effect of Gravitation on the Flight of Projectiles

Staff Article

Power and weight of gun-fire without the relative precision of aim are, it is needless to say, in their results largely, if not altogether, valueless. Notwithstanding the fact that experienced gunners are a sine quo non in order that local conditions and atmospheric vagaries be provided for, gun-fire—be the weapon light or heavy, is in essence, based on well-known and more or less elementary scientific principles. Discussion of these latter, illustrated with typical examples of their practical application, forms the subject matter of the accompanying article.

THE difficulty of placing a shot with any degree of accuracy, when firing at a moving object, does not lie so much in the motion of the target, but in the short space of time generally permitted to make the necessary calculations for determining the exact relation of the moving object to the path of the "aimed" projectile. It is estimated that over 50 per cent. of the ammunition fired from field pieces at possibly unseen, but stationary objects, is practically wasted in plowing up open ground, and that in many cases less than 10 per cent. ever hits the intended mark. In raids recently made over England by invading Zeppelins, although a rain of shells was discharged at and about the intruders, the percentage of hits was exceedingly small. Such results from this class of warfare are, however, not surprising, when the particular circumstances are considered; in fact, the success that has been attained by experienced gunners is more or less remarkable.

1	$V = gT$	=	$32{\cdot}16 \times 1$	=	$32{\cdot}16$ ft. per sec.
2	$T = \frac{V}{g}$	=	$\frac{32{\cdot}16}{32{\cdot}16}$	=	1 second.
3	$H = \frac{V^2}{2g}$	=	$\frac{32{\cdot}16^2}{2 \times 32{\cdot}16}$	=	$16{\cdot}08$ ft.
4	$V = \sqrt{2gH}$	=	$\sqrt{2 \times 32{\cdot}16 \times 16{\cdot}08}$	=	$32{\cdot}16$ ft. per sec.
5	$H = \frac{1}{2}gT^2$	=	$\frac{32{\cdot}16 \times 1^2}{2}$	=	$16{\cdot}08$ ft.
6	$T = \sqrt{\frac{2H}{g}}$	=	$\sqrt{\frac{2 \times 16{\cdot}08}{32{\cdot}16}}$	=	1 second.

FIG. 1. FORMULAE FOR FALLING BODIES.

Range Elevation Angle

With few exceptions, it is necessary to elevate the gun barrel to an angle with the horizontal, in order to obtain the proper range. If no other forces were acting on the projectile but that of the propelling charge, it would only be necessary to set the bore of the gun in direct line with the target in order to make a hit. However, nature has decreed otherwise, and in addition to local faults (contained in the shells themselves), the two chief factors that necessitate careful consideration are the force of gravity and its uncertain action on the shell, due to atmospheric disturbances. The latter is of variable character, and is generally left to the judgment of the gunner, who makes his calculations from existing conditions. The force which more than any other controls the flight of an object in its passage through the air is that of gravitation. This force of gravity is practically constant in its operation and constitutes the attraction between the earth and all objects on or near its surface.

Action of Gravity on Falling Bodies.

In order, therefore, to convey to the reader the action of the shell in its passage from the gun chamber to the target, it may be well to briefly describe the action of this force. Just what causes this attraction is not clearly known, but like electricity and other unseen forces, we are generally more concerned in what it does than what it is. If an object is allowed to fall from a state of rest, it will continue to fall in a direct line towards the centre of the earth, unless acted upon by some other force. The constant attraction of the earth for the falling body causes it to gradually increase its speed as it travels downwards. This change of velocity is termed the constant accelerating force due to the action of gravity. It has been determined from careful experiments, that a freely falling body will attain a velocity of 32.16 feet at the end of the first second, and descend a distance of 16.08 feet from the starting point. This number 32.16 is called the force of gravity, and is generally designated by the letter "g" in all engineering formulae. From this constant, the various formulae for the solution of falling bodies have been derived.

1. The velocity attained by a freely falling body, will be 32.16 multiplied by the time of fall in seconds. 2. The time, in seconds, during which a body falls and attains a given velocity, will equal the velocity in feet per second divided by 32.16. 3. The height that a body falls to attain a given velocity will equal the square of the velocity, divided by twice 32.16. 4. The velocity attained by a body falling freely from a given height will equal the square root of twice the force of gravity and the given height. 5. The height from which a body will fall in a given time will equal one-half the force of gravity times the square of the number of seconds. 6. The time required for a body to fall from a given height will equal the square root of twice the height divided by the force of gravity.

The above rules are given to more clearly describe the formulae appearing in Fig. 1, where V equals the velocity at end of time T, and H equals the distance that body falls in time T. The number of seconds during which the body is falling is represented by T.

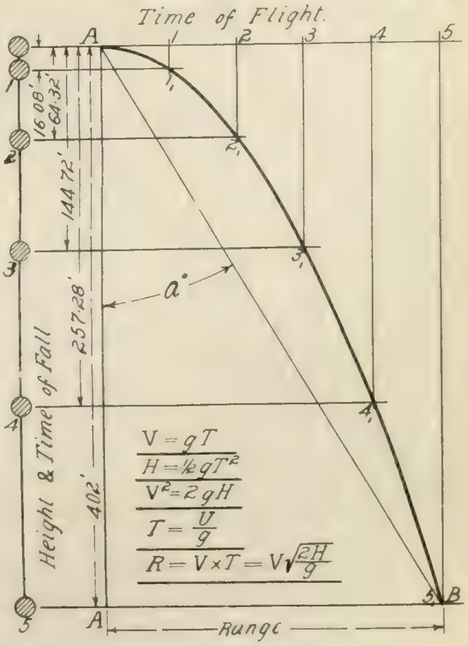


FIG. 2. VERTICAL AND HORIZONTAL PROJECTION.

To show the principle of the formulae, the solutions are made on a basis of one second duration of fall.

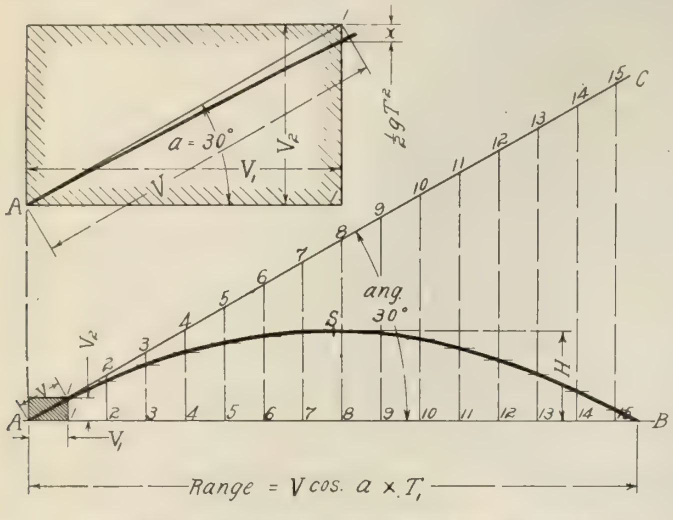


FIG. 3. TRAJECTORY DIAGRAM AT 30 DEGREES PROJECTION.

Vertical and Horizontal Projection.

The point at which a body will strike when falling freely from a state of rest (action of the air being neglected), will be directly below, and on the same radial line from the earth's centre; but, in the case of projectiles, the striking point or the range must be determined. To the action of gravity (which is the same in all cases), the additional force necessary to propel the body must be taken into consideration in order to solve the range, etc. If an object is projected in a vertical direction, the action of the body will be exactly similar to that of falling bodies, with the exception that the object starts with an initial velocity, ascends with a constant retarding force to a given height, and falls to its original position, attaining a velocity equal to that of projection. For instance, an object is projected vertically, and at the end of 10 seconds returns to the starting point, to what height did it go? As the time of flight is twice that taken for the fall, the height will be from formula (5),

$$H = \frac{1}{2}gT^2 = \frac{32.16 \times 5^2}{2} = 402 \text{ feet.}$$

If, on the other hand, an object is projected in a horizontal direction, the time of flight will be the same as if the object had fallen freely at the moment of projection. If, as shown in Fig. 2, an object is projected from a point A, in a horizontal direction, the height being 402 feet, the elapsed time before the object strikes the ground, will be found to be just 5 seconds, and the range will equal the velocity times the duration of flight in seconds.

Suppose an airship is travelling at a speed of thirty miles an hour at a height of one mile, and wishes to drop a bomb on a certain position. If travelling directly for the object, at what distance in front, would the shot require to be dropped? The time required for the shot to drop, neglecting the air resistance, would be, from formula (6),

$$T = \sqrt{\frac{2H}{g}} = \sqrt{\frac{2 \times 5280}{g}} = 18.1 \text{ seconds.}$$

Therefore, as the airship is travelling 30 miles an hour, the shot would require to be dropped

$$\frac{30 \times 5280}{60 \times 60} \times \frac{18.1}{1} = 796 \text{ feet.}$$

in front of the intended object. To overcome the difficulty of judging the distance, it is determined by means of instruments which give the desired angle for that height and speed. Thus, from the formula: Tangent equals $\frac{\text{side adjacent}}{\text{side opposite}}$, we get $\frac{5280}{796} = 15076$; and the angle (a), Fig. 2. corresponding will be approximately 8 degrees and 34½ seconds.

While the possibility of hitting stationary positions from moving objects, even when previous calculations have been made, are very uncertain, the difficulties of "winging" an air machine from land batteries are considerably greater, as it is practically impossible to make provision for the exact location of a raider, owing to the unlimited working area.

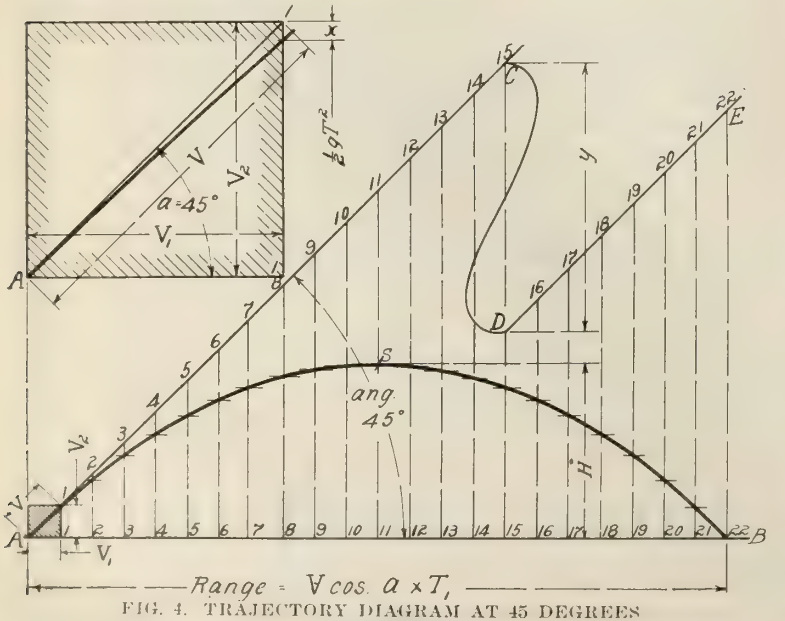


FIG. 4. TRAJECTORY DIAGRAM AT 45 DEGREES PROJECTION.

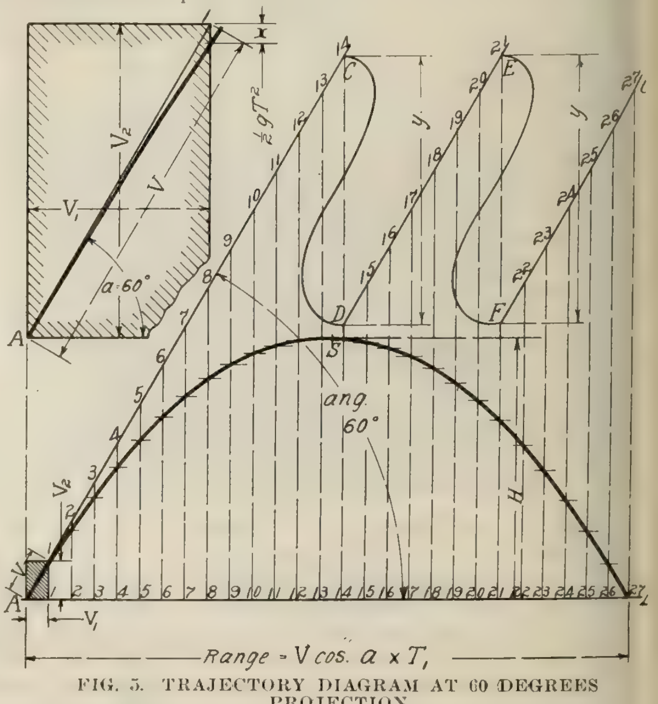


FIG. 5. TRAJECTORY DIAGRAM AT 60 DEGREES PROJECTION.

Angular Projection.

From the foregoing it is evident that field or naval artillery must invariably be fired at an angle with the horizonal to meet the range requirements. With a known muzzle velocity, it is possible to calculate within very close limits, the range of a projectile and also the height of the highest point of its path or trajectory. The muzzle velocity of different ordnance varies according to their size and purpose, often exceeding 2,000 feet per second; but, for convenience of chart making, the velocity here considered is an initial velocity of 500 feet per second.

The path of a shell, at a given muzzle velocity, can be graphically constructed, showing the height to which the shell will ascend and the range for that angle. As the only variation in the three charts is that of angular construction, the following description will refer to all; each one having been drawn to the same scale of time and distance. The action of the first second of projection is shown shaded, with an enlarged view in the upper left hand corner to more clearly illustrate the force of gravity upon the shell travel. The initial or muzzle velocity V, is represented by the diagonal line, and the horizontal and vertical velocities V_1 and V_2 are represented by the two components AI and II It is obvious that the value of these two components will vary according to th angle of inclination or projection. Neglecting the resistance of the air, the horizontal value V_1 will remain constant, but the vertical V_2 will be governed by the position of the shell and the time of flight; that is, the path of the projectile will be controlled by the action of gravity working in conjunction with the propelling force.

As shown by the diagram, the shell, instead of continuing in a straight line, will take the path indicated by the heavy curved line; the fall, by gravitation, during the first second being shown by the distance (x), which equals $\frac{1}{2}gT^2$. Thus, the path of a projectile can be graphically plotted if the initial velocity and angle of projection are known. From the point A, on the horizontal line AB, erect the diagonal line AC, at the desired angle, and on this line lay off the divisions 1, 2, 3, etc., to represent the velocity in feet per second and to a given scale (in this instance, 500 feet per second for each division). From these points, drop vertical lines cutting the base line as shown, and mark off from the diagonal point, a distance equal to the value found by the formula $\frac{1}{2}gT^2$, for that particular second, and measured to the scale of the drawing. In constructing the diagrams, Figs. 4 and 5, it was necessary to divide the diagonal A'C as shown, the extension being represented by the short sections DE and FG; the distance (y) being the vertical drop from the preceding section. When the various distances, as found by the formula, have been marked on their respective vertical lines, the trajectory can be traced through the intersections, as shown by the heavy line.

The height H of the highest point S in the trajectory can be found by dividing the product of the square of the velocity V and the square of the sine of the angle of projection by twice the force of gravity, as shown by formula (10), Fig. 6. The three charts, Figs. 3, 4 and 5, are all drawn to the same scale of time, distance and velocity, the different angles of projection indicating the relative height, range and duration of flight. It will be seen that the longest range is obtained when firing at an elevation of 45 degrees. The shell will, however, attain a higher altitude and remain longer in flight when fired at an angle exceeding 45 degrees, as shown in Fig. 5. The various formulae, for the solution of bodies projected at an angle are given in Fig. 6, with the following notation:—

T_1 equals the total time of flight.

V equals the initial or muzzle velocity.

R equals the range.

H equals the altitude of the highest point of flight.

U equals vertical velocity at end of T seconds.

T equals the elapsed time from instant of projection.

Solutions to formulae are made on a basis of 500 feet per second initial velocity, and an angle of projection of 45 degrees, as shown in Fig. 4. The value for U at the highest point in the trajectory will be:—

$V \sin. (a) - gT = 500 \times .707 - 32.16 \times 10.95 = 1.4$ feet.

7	$T_1 = \frac{2V \sin a}{g} = \frac{2 \times 500 \times \cdot 707}{32 \cdot 16} = 21 \cdot 9$ sec.
8	$R = V \cos a \times T_1 = 500 \times \cdot 707 \times 22 = 7777$ ft.
9	$R = \frac{2V^2 \sin a \cos a}{g} = \frac{2 \times 500^2 \times \cdot 707^2}{32 \cdot 16} = 7772$ ft.
10	$H = \frac{V^2 (\sin a)^2}{2g} = \frac{500^2 \times \cdot 707^2}{64 \cdot 32} = 1943$ ft.
11	$U = V \sin a - gT$

FIG. 6. FORMULAE FOR ANGULAR PROJECTION.

This calculation should figure out even, but owing to the impossibility of obtaining the exact time, a slight variation is shown. However, it is clear that the shell is travelling at its slowest speed when at its highest altitude, having lost all vertical velocity, and retaining only the horizontal velocity V_1.

Examples Worked Out.

A shell having a muzzle velocity of 1,800 feet per second is discharged from a gun having an elevation of 45 degrees; what is the range and total time of flight?

The total time of flight will be found by dividing the product of twice the velocity and sine of the angle by the force of gravity, or by formula (7),

$$\frac{2V \sin. (a)}{g} = \frac{2 \times 1800 \times .707}{32.16} = 79.1 \text{ sec.}$$

By formula (8), the range will be the velocity multiplied by the cosine of the angle times the duration of flight, or $R = V \cos. (a) \times T_1 = 19.04$ miles.

Suppose, however, the time of flight was not known and it was required to find the range of a gun elevated to an angle of 30 degrees with the horizontal and a muzzle velocity of 1,500 feet per second, it could be found from formula (9), where

$$R = \frac{2V^2 \sin. (a) \cos. (a)}{g}$$

$$\frac{2 \times 1500^2 \times 5 \times .866}{32.16} = 11.47 \text{ miles.}$$

In the above question, what would be the highest point to which the shell would ascend?

The height point can be found form. the formula (10) where

$$H = \frac{V^2 (\sin. a)^2}{2g} \quad \frac{1500 \times 1500 \times .5 \times .5}{2 \times 32.16}$$

$= 8745$ feet, or 1.66 miles.

A gun is discharged at an angle of 35 degrees with the horizontal, and the shell hits an object at a distance of eight miles, striking 22 seconds after discharge, what is the initial velocity?

From formula (7), $T_1 \frac{2V \sin. (a)}{g}$,

$$\text{therefore, } V = \frac{T}{2 \sin. (a) \div g}$$

$$= \frac{22}{2 \times .57358 \div 32.16} = 617 \text{ feet per sec.}$$

* * *

MODERN STEEL PLANT IN INDIA.

A RECENT issue of the Ironmonger contains some interesting information relative to the Tata Iron & Steel Co. of Sakchi, India, of which we reproduce the following more or less essential notes and operation data. The blast furnace plant consists of two furnaces 77 ft. by 19 ft. with 12 ft. 6 in. hearth, equipped with up-to-date charging and weighing apparatus and four Cowper-Kennedy stoves. The first pig iron was made in December, 1911, all the staff being Americans. The estimated capacity of the furnaces is 160,000 tons per year, and during 1914 the monthly output averaged, roughly, 14,000 tons per month.

Analyses of the coke used are by no means ideal, since they reveal an ash content ranging from 20.94 to 23-74 with moisture 5.52 to 10.22. The sulphur is not excessive, ranging from 0.59 to 0.74, whilst the phosphorus in the ash runs from 0.85 to 1.08 per cent. The approximate cost of the coke during the first six months of 1914 was $2.50 per ton, and the consumption of coke per ton of iron averaged 21 to 22 cwt. The coke consumption appears low, but this is accounted for by the exceptionally high iron content of the ore. The Gurmasini ore contains about 61 per cent. iron and about .090 per cent. phosphorus, whilst the Chanda ore contains about 68 per cent. iron with .035 phosphorus. The Gurmasini ore is mostly used, being conveniently situated for the works, and the average cost of this ore delivered at the blast furnace bins was 50 cents per ton. Coking coal is obtained at an approximate cost of one dollar per ton. A good grade of manganese ore is also available, the approximate manganese content being 48 per cent. Perhaps the most interesting figure in connection with the blast furnaces in the regularity and excellence of the pig-iron analyses. The approximate average for the six months for each furnace is as follows:—

	Manganese	Silicon	Sulphur	Phosphorus
A Furnace	1.80	0.95	0.025	0.35
B Furnace	1.50	2.5	0.025	0.35

The pig iron was produced at an approximate works cost of $6.50 per ton, and the selling price averaged approximately $14.50 per ton. In regard to coke ovens, the original plant consisted of 180 Coppee non-by-product ovens, supplemented later by a number of Beehive ovens. Recently, however, a battery of Kopper by-product ovens has been installed.

Open Hearth Furnaces

The steel works comprises four 50-ton open hearth furnaces, each having an independent plant of four producers. The writer states that the steel works gave the most serious trouble owing to the failure of the German staff to operate them successfully. Considerable trouble was experienced owing to the short life of the furnaces due to faulty manipulation, and also arising from the irregular analysis of the steel stated to be due to the use of coke dust in recarburising. It is very gratifying to read that the steel making was put on a proper basis when, at the request of the Company, Professor A. MacWilliam was allowed by the Government to place his metallurgical knowledge and experience at the Company's service.

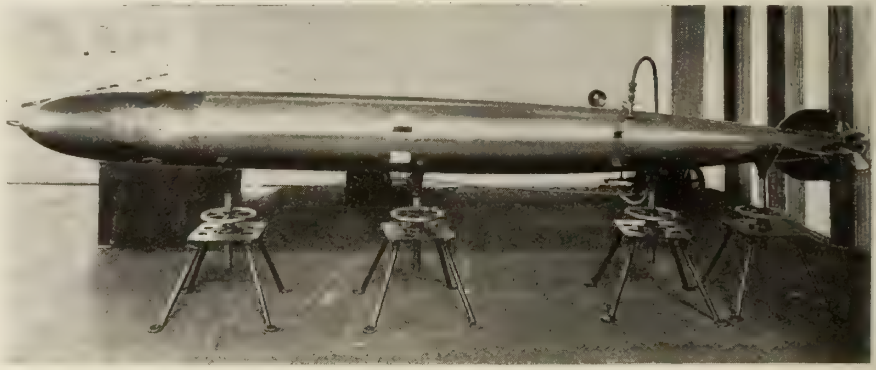
The cost of bricks was one of the most serious items, and experiments were being made with local bricks. The output of steel ingots early in 1914 was between 8,000 and 9,000 tons per month, at a works cost of approximately $15.75 per ton. Two more furnaces have recently been constructed, and a greatly increased output should result. The ingots are reheated in soaking pits, and are first rolled into blooms in a 36-in. pinioned reversing blooming mill. After cogging, the ingot is brought back and cut to length, and then charged into reheating furnaces. When rolling 90-lb. rails and other large sections it is possible to roll direct without reheating. The 28-in. finishing mill consisted of three sets of rolls, the first set having a balanced top roll, which was very useful when rolling joists and channels.

In regard to the testing of the steel, the works possess a well-equipped laboratory with the usual testing plant. All structural sections are required to pass the British standard specification, whilst rails and fish plates have to pass the Indian States Railway specification. The inspection is carried out by Professor MacWilliam. A table of analyses taken from representative heats gives an idea of the excellent quality of the finished product. An average analysis for 12 in. by 6 in. blooms showed the following:—

Carbon	0.29
Manganese	0.53
Sulphur	0.025
Phosphorus	0.024

The tensile strength is 30.06 tons per square inch, with 26.56 per cent. elongation in 8 inches. The approximate average selling price at the works during the first six months of 1914 for rails and structural sections was $31.75 per ton, the principal markets being India and Japan.

From the foregoing it will be seen that the works of the Tata Iron & Steel Co. have developed on very sound lines, and there is no doubt that the wonderful resources at the disposal of the Company will render the developments of steel making at Sakchi an important feature in the metallurgical future of India.


18 IN. WHITEHEAD TORPEDO EXHIBITED AT CANADIAN NATIONAL EXHIBITION.

* * *

ENEMY PRODUCTS EXHIBITION

A collection of 8,000 samples of enemy industry, collected in 70 different world markets, will be put on exhibit in Montreal towards the end of this month. The samples will arrive in Canada on September 20, and after some ten days of arrangement, will be exhibited in Montreal. Only two cities in Canada are to be so favored, Toronto being the other, and it is the hope of the Trade and Commerce Department that manufacturers will avail themselves of the privilege which they will be accorded through the courtesy of the British Board of Trade.

The exhibit was secured for Canada through the immediate offices of Sir George Foster, during his recent visit to the Old Country. It comprises, as stated, over 8,000 articles, the products of German and Austrian industry, which were collected by the Commercial Intelligence Branch of the British Board of Trade, with the object of capturing enemy trade. Wherever shown in Great Britain there has been excited great interest on the part of manufacturers. The idea of bringing the exhibit here is to ascertain whether Canadian manufacturers are making, or can make, articles of the kind shown, either for foreign or home markets. It is desired to assist them to capture as large a share of enemy trade as possible. In most cases the prices at which the various articles have been sold by German or Austrian merchants are attached.

It was possible to secure the exhibit for Canada for only a limited time, and for this reason it was decided to exhibit it only at Montreal and Toronto, as the largest and most convenient manufacturing centres. It will be on view two weeks in each city. Mr. Kershaw, of the Commercial Intelligence Branch of the British Board of Trade, will accompany the exhibit, and Watson Griffin, Acting Commissioner of Commerce, will have charge of arrangements in Canada. Mr. Griffin will secure suitable accommodation for the exhibit, from 7,000 to 10,000 square feet of floor space being required.

While this will be only a temporary exhibit, arrangements are under way by the Trade and Commerce Department for the establishment of a permanent sample museum at Ottawa. Instruc-

Evolving Standard Cutting Tools After a Definite Plan--I.

"Herbert's Monthly Review"

This series of articles dealing with the practical side of the subject of cutting tools may be said to be supplemental to what appeared in our issues of July 20 and 27; cutting tools from the theoretical and analytical viewpoint were then discussed. As efficiency in the machine shop depends largely on the character of the tools used, it is believed to be easily worth while for those concerned to not only sift this tool question to its fundamentals, but for each individual shop to establish a standard tool scheme to suit its own special conditions.

An adequate supply means that no machine need ever be kept standing for want of a cutting tool any longer than is necessary to obtain one from the stores. Efficient cutting tools mean that for every operation on every machine there is a tool available that will give the desired result with the least expenditure of power, in the shortest possible time, and with the maximum of durability. Cheaply made and easily maintained means that the adopted system of tool making must be itself efficient.

Lumsden System of Tool Making

The following remarks, it may be asserted at the outset, are based on the Lumsden system of tool making and upon the chart which is furnished with every Lumsden oscillating tool grinder. The Lumsden chart has been compiled by men who for many years have given their whole time to the intimate study of tools; it is based on the results of countless experiments and a wide experience gained in shops of all descriptions, both in the British Isles and on the Continent. A reproduction of this chart is given in Fig. 1. It is not presumed that the 25 tools shown in this chart cover every requirement of every shop, but it will serve very well as the basis of a set of standard tools for any average shop. Each one of these 25 tools will be dealt with separately. Reasons will be given for its existence on the chart, the work for which it is suited will be specified, also the variations it can assume without destroying its individuality. In addition, full detailed instructions will be given for manufacture and maintenance.

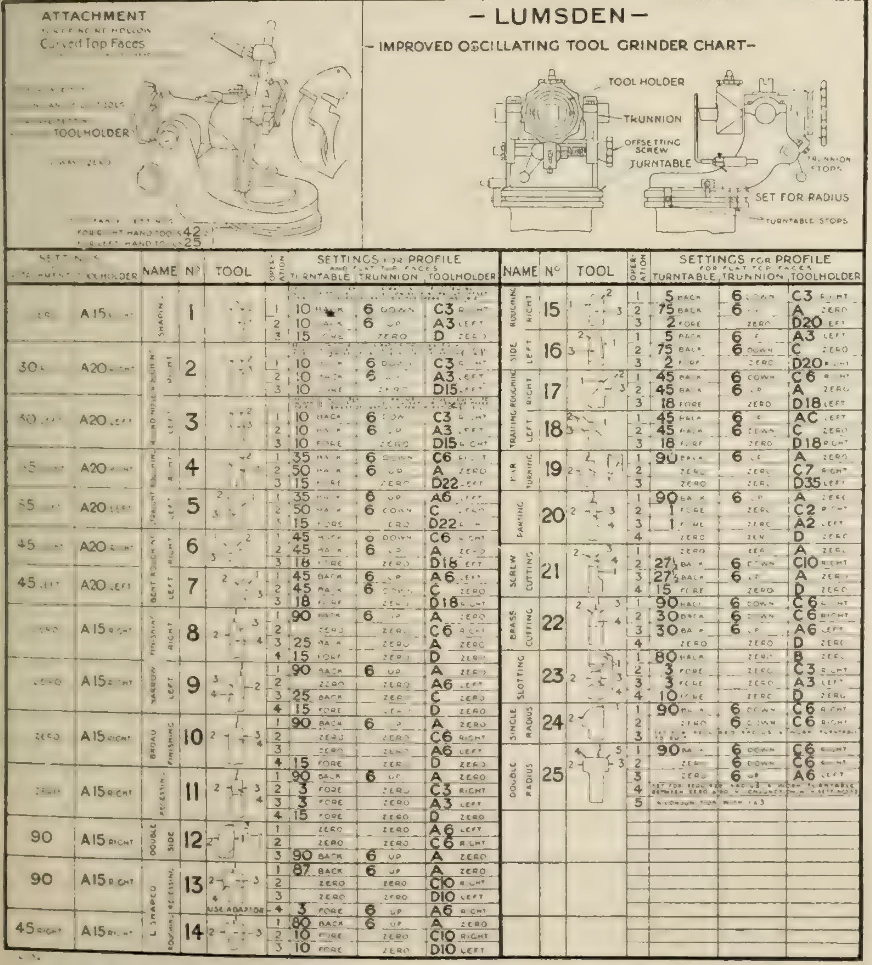
The Lumsden Grinder

It is not the purpose of this article to give a catalogue description of the Lumsden oscillating tool grinder, but it is necessary to give a brief summary of its features and the method of operating it. Briefly, the machine provides a means by which the entire nose of any shaped tool can be presented with ease to the flat face of an oscillating cup wheel. It is absolutely necessary for either the tool being ground or the wheel on which it is ground to be reciprocated across the face of the other; if not, the wheel will rapidly glaze and refuse to cut. In the Lumsden oscillator the reciprocatory movement is done by power instead of muscular effort. All the adjustments of the tool and the wheel are easily made from the working position, and the operator can at all times see what is happening without stopping for inspection.

Thus, the first elements of an efficient tool making system are assured, viz., easy operation, easy control, with the minimum of effort on the part of the operator. For all tools with flat faces no attachment, template or former is required, all the adjustments necessary being obtained in the universal tool holder. For those tools that have hollow curved top faces a simple and easily understood attachment is furnished. This is secured in the tool holder of the machine, while the tool is reciprocated across the corner of the grinding wheel, the combination of angular positions of tool and holder giving any desired amount of curvature.

The Tool Holder

The tool to be shaped is gripped in a simple chuck, which can be rotated through a complete circle on its own axis. The barrel which contains the chuck is carried in two trunnion bearings, so that the tool can be swung through an arc of about 10 degrees up or down. The trunnions have endwise adjustment in their bearings for use when grinding radius tools in which the centre of the radius does not coincide with the centre of the spindle. The whole tool holder can rotate on a vertical axis, enabling any side or the end of the tool to be presented to the wheel at any predetermined angle. An inspection of the line drawing of the tool holder in Fig. 1


ATTACHMENT
Curved Top Faces
TOOLHOLDER
42
25
– LUMSDEN –
– IMPROVED OSCILLATING TOOL GRINDER CHART –
TOOL HOLDER
TRUNNION
OFFSETTING SCREW
TURNTABLE
TRUNNION STOPS
SET FOR RADIUS
TURNTABLE STOPS

Settings Attachment	Settings Toolholder	Name	Nº	Tool	Operation	Settings for Profile and Flat Top Faces: Turntable	Trunnion	Toolholder
[illegible]	A15 [illegible]	SHAPING	1		1	10 BACK	6 DOWN	C3 RIGHT
					2	10 BACK	6 UP	A3 LEFT
					3	15 FORE	ZERO	D ZERO
30 RIGHT	A20 RIGHT	ROUND NOSE ROUGHING RIGHT	2		1	10 BACK	6 DOWN	C3 RIGHT
					2	10 BACK	6 UP	A3 LEFT
					3	10 FORE	ZERO	D15 LEFT
30 LEFT	A20 LEFT	ROUND NOSE ROUGHING LEFT	3		1	10 BACK	6 DOWN	C3 RIGHT
					2	10 BACK	6 UP	A3 LEFT
					3	10 FORE	ZERO	D15 RIGHT
55 RIGHT	A20 RIGHT	STRAIGHT ROUGHING RIGHT	4		1	35 BACK	6 DOWN	C6 RIGHT
					2	50 BACK	6 UP	A ZERO
					3	15 FORE	ZERO	D22 LEFT
55 LEFT	A20 LEFT	STRAIGHT ROUGHING LEFT	5		1	35 BACK	6 UP	A6 LEFT
					2	50 BACK	6 DOWN	C ZERO
					3	15 FORE	ZERO	D22 RIGHT
45 RIGHT	A20 RIGHT	BENT ROUGHING RIGHT	6		1	45 BACK	6 DOWN	C6 RIGHT
					2	45 BACK	6 UP	A ZERO
					3	18 FORE	ZERO	D18 LEFT
45 LEFT	A20 LEFT	BENT ROUGHING LEFT	7		1	45 BACK	6 UP	A6 LEFT
					2	45 BACK	6 DOWN	C ZERO
					3	18 FORE	ZERO	D18 RIGHT
ZERO	A15 RIGHT	FINISHING RIGHT	8		1	90 BACK	6 UP	A ZERO
					2	ZERO	ZERO	C6 RIGHT
					3	25 BACK	ZERO	A ZERO
					4	15 FORE	ZERO	D ZERO
ZERO	A15 RIGHT	NARROW LEFT	9		1	90 BACK	6 UP	A ZERO
					2	ZERO	ZERO	A6 LEFT
					3	25 BACK	ZERO	C ZERO
					4	15 FORE	ZERO	D ZERO
ZERO	A15 RIGHT	BROAD FINISHING	10		1	90 BACK	6 UP	A ZERO
					2	ZERO	ZERO	C6 RIGHT
					3	ZERO	ZERO	A6 LEFT
					4	15 FORE	ZERO	D ZERO
ZERO	A15 RIGHT	RECESSING	11		1	90 BACK	6 UP	A ZERO
					2	3 FORE	ZERO	C3 RIGHT
					3	3 FORE	ZERO	A3 LEFT
					4	15 FORE	ZERO	D ZERO
90	A15 RIGHT	DOUBLE SIDE	12		1	ZERO	ZERO	A6 LEFT
					2	ZERO	ZERO	C6 RIGHT
					3	90 BACK	6 UP	A ZERO
90	A15 RIGHT	L SHAPED RECESSING	13		1	87 BACK	6 UP	A ZERO
					2	ZERO	ZERO	C10 RIGHT
					3	ZERO	ZERO	D10 LEFT
				USE ADAPTOR	4	3 FORE	6 UP	A6 RIGHT
45 RIGHT	A15 RIGHT	ROUGHING	14		1	80 BACK	6 UP	A ZERO
					2	10 FORE	ZERO	C10 RIGHT
					3	10 FORE	ZERO	D10 LEFT

Name	Nº	Tool	Operation	Settings for Profile for Flat Top Faces: Turntable	Trunnion	Toolholder
ROUGHING RIGHT	15		1	5 BACK	6 DOWN	C3 RIGHT
			2	75 BACK	6 UP	A ZERO
			3	2 FORE	ZERO	D20 LEFT
SIDE LEFT	16		1	5 BACK	6 UP	A3 LEFT
			2	75 BACK	6 DOWN	C ZERO
			3	2 FORE	ZERO	D20 RIGHT
TRAILING ROUGHING RIGHT	17		1	45 BACK	6 DOWN	C6 RIGHT
			2	45 BACK	6 UP	A ZERO
			3	18 FORE	ZERO	D18 LEFT
TRAILING ROUGHING LEFT	18		1	45 BACK	6 UP	AC LEFT
			2	45 BACK	6 DOWN	C ZERO
			3	18 FORE	ZERO	D18 RIGHT
[illegible] TURNING	19		1	90 BACK	6 UP	A ZERO
			2	ZERO	ZERO	C7 RIGHT
			3	ZERO	ZERO	D35 LEFT
PARTING	20		1	90 BACK	6 UP	A ZERO
			2	1 FORE	ZERO	C2 RIGHT
			3	1 FORE	ZERO	A2 LEFT
			4	ZERO	ZERO	D ZERO
SCREW CUTTING	21		1	ZERO	ZERO	A ZERO
			2	27½ BACK	6 DOWN	C10 RIGHT
			3	27½ BACK	6 UP	A ZERO
			4	15 FORE	ZERO	D ZERO
BRASS CUTTING	22		1	90 BACK	6 DOWN	C6 RIGHT
			2	30 BACK	6 DOWN	C6 RIGHT
			3	30 BACK	6 UP	A6 LEFT
			4	ZERO	ZERO	D ZERO
SLOTTING	23		1	80 BACK	ZERO	B ZERO
			2	3 FORE	ZERO	C3 RIGHT
			3	3 FORE	ZERO	A3 LEFT
			4	10 FORE	ZERO	D ZERO
SINGLE RADIUS	24		1	90 BACK	6 DOWN	C6 RIGHT
			2	ZERO	6 DOWN	C6 RIGHT
			3	[illegible]		
DOUBLE RADIUS	25		1	90 BACK	6 DOWN	C6 RIGHT
			2	ZERO	6 DOWN	C6 RIGHT
			3	ZERO	6 UP	A6 LEFT
			4	[illegible]		
			5	[illegible]		

FIG. 1. THE LUMSDEN TOOL GRINDING CHART, A COPY OF WHICH IS FURNISHED WITH EVERY LUMSDEN OSCILLATING TOOL GRINDER.

will reveal the universality of these movements.

The Lumsden Tool Chart

It is desirable that the instructions given in any tool grinding chart should be not only intelligible, but also incapable of wrong construction by the most inexperienced operator. For this reason the Lumsden Chart gives the settings of the tool only; there are no alternatives, so that if the chart is followed the correct angles are given to the tool. In other words, the chart tells the operator what to do, which from his point of view is what he most wants to know.

The actual angles reproduced on the tool are those given in the chart. The one point where they appear to differ is in the designation of the angles given to the front of a tool; but even in this case the chart angles are the same as those actually given to the tool, if measured from the side instead of the front of the tool.

The naming of tool angles, such as rake, top angle, side slope, front slope, clearance, and so on, is liable to misinterpretation, and has been abolished in the present Lumsden Chart. Instead, each tool is sketched, and the tool faces numbered to correspond with the sequence of the grinding operations. Thus, confusion is entirely eliminated, and the chart can be easily read, easily understood, and easily interpreted on the machine.

There are three angular adjustments on the Lumsden Oscillator, each graduated in degrees. These are designated as the turntable, the trunnion and the tool holder respectively. The positions of all three are separately specified for each tool face to be ground. The turntable graduations read so many degrees "back" or "fore" from the zero position. The trunnion graduations read so many degrees "up" or "down," thus indicating the actual movement of the tool nose from the horizontal.

The tool holder has four arrow marks labelled respectively A, B, C, and D. The barrel in which it rotates is graduated so many degrees "left" or "right" of the zero. The four marks, A, B, C, and D, correspond to the four sides of the tool; when arrow mark A is covered by the graduations, the top face of the tool is uppermost, provided the base is flat on the base of the tool chuck. The marks B and D then correspond to the two side flanks, while C corresponds to the base, on which no grinding is done.

Curved Top Faces

The advantages of the hollow curved top face were set out in the previous articles, so it is not necessary to reiterate them here. A curved top face can be ground by the Lumsden Oscillator almost as easily as a flat face. The profile of the tool, that is the shape seen from the top, is first ground without the use of the attachment. When a batch of similar tools have been thus "profiled" they can be finished with curved top faces by means of the curved face attachment furnished with each machine in very little more time than would be required if they were ground with flat top faces. The degree of curvature given to the tool, and consequently the rake at the cutting edge, can be varied by commencing the grinding nearer to or farther from the cutting edge. This will be readily comprehended by referring to Fig. 2.

This method of increasing the keenness of the cutting edge, however, may not be desirable owing to the resulting length of the ground face from the tool nose. Another method is open in such a case, and that is swivelling the attachment slide more towards a vertical position, a method which causes the tool to be reciprocated more on the corner of the wheel.

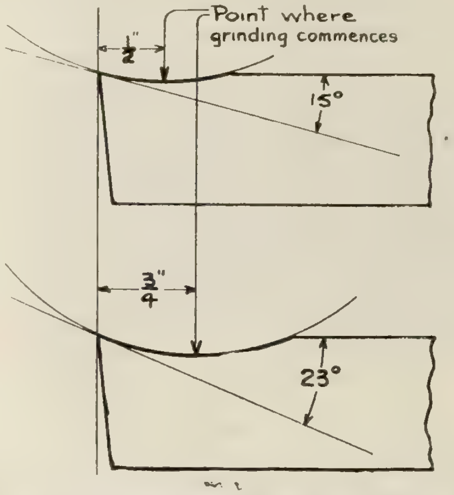


FIG. 2. DIAGRAM SHOWING EFFECT OF COMMENCING GRINDING OF A CURVED TOP FACE AT DIFFERENT DISTANCES FROM THE CUTTING EDGE.

When using the attachment, the trunnion setting must be at zero, that is, the barrel in which the attachment is gripped must be horizontal. For right-hand tools the position of the turntable has been found by experiment to give the best results when set at 42½ degrees back, so that the front and the side of the wheel make equal angles with the tool. When grinding left-hand tools, owing to the position of the tool nose relative to the movements of the wheel, the turntable should be set at 25 degrees back. These two settings need never be altered for any shape of tool.

The tool is secured in the holder of the attachment in such a position that the cutting edge is parallel with the slide. A tool having a curved cutting edge is set so that a tangent with the average centre of the cutting edge is similarly parallel to the slide. The slide is set to 15 or 20 degrees (see chart, Fig. 1) from the vertical, and clamped in that position. Grinding takes place without the oscillating motion of the wheel. The wheel is then advanced and adjusted sideways until it just touches the tool at a point distant from the cutting edge, the amount varying with the size of the tool and the degree of curvature required. This amount is decided by the ultimate position of the deepest part of the grinding. For a small tool, say, ¾ in. x ½ in., it can be about ⅜ in.; for a large tool, say, 3 in. x 2 in., about 2 in. will be necessary. A good rule to follow is to make the length of the top face equal to the width of the tool. In any case, it will soon be seen as grinding proceeds whether the desired effect is obtained or not, and correction made accordingly.

The tool is next passed up and down across the corner of the wheel by means of the lever at the top of the slide. While grinding proceeds, the wheel should be fed alternately forward and sideways by means of the two hand wheels which control these movements. Grinding continues until the cutting edge is reached. It should always be the endeavor of the man in charge to have tools ground in batches; this decreases the cost of making the various settings, and encourages greater efficiency in the operator.

Grinding Radii

The swivelling movement of the turntable on its vertical axis is extremely handy for grinding radius and round-nosed tools. To do this, the tool is set so that the centre of the desired radius is exactly over the axis of the turntable; then, with the wheel stationary or oscillating but slightly, the turntable is rotated back and forth until the desired curve merges into the sides and end of the tool.

To facilitate setting, a radius gauge is provided, the procedure being as follows: First grind the end of the tool with the necessary clearance, then the side of the tool, also with clearance. Run the wheel back and reset the tool in the chuck, using the radius gauge to determine the forward position of the tool nose. Next adjust the barrel of the chuck sideways in the trunnion bearings, using the graduated scale to bring the centre of the desired radius over the axis of the turntable. Set the turntable to 90 degrees back, bring the wheel up till it just touches the tool, and set the stop which limits the forward motion of the wheel. Run the wheel back again, then commence grinding, swivelling the turntable and feeding the wheel forward till the stop is reached, when it will be found that the radius is completed.

Standard Tools

In deciding on the set of tools incorporated on the Lumsden Chart, the authors have had in mind the elimination of forging as far as possible. Sixteen out of the 25 tools shown can be roughed to shape from a piece of straight bar. Four of the remaining nine only need bending, a very simple operation. The two tools for finishing fillets, Nos. 24 and 25, only need forging when the radii are larger than, say, half the tool width. The 25 tools shown cover the majority of the requirements of the average shop, as will be seen later when their purposes are described.

Tools numbered 1 to 14 can be ground with a hollow curved top face, and it is strongly recommended that they should be so ground, for the reasons previously advanced. The requisite settings for grinding these tools to such a shape that they will be suitable for machining mild and the lower carbon steels are given on the left of the chart. These settings replace those otherwise used for grinding the top face flat, and do not affect the shaping of the tool profile.

All the other settings given have been chosen, as the result of a very wide experience, to give a tool suitable for 30-ton steel, with the exception of the last four, which are intended for special purposes. The resulting rake of the top face can, of course, be varied to suit the material to be achieved, the keenness being increased for softer materials and decreased for harder materials.

Tool No. 1

No. 1 is a round-nosed tool intended mainly for planing and shaping. The top face slopes away from the point, there being no side cutting angle at all; it also has clearance on both sides, so that it can be used for feeding in either direction. It is in addition a useful tool for necking the journals of axles and shafts. The roundness of the nose can be varied to suit different conditions. For instance, for turning a slender cam-shaft between the cams, the point should be made fairly slender, say, 1/8 in. radius, whereas when turning railway carriage axles, where chatter is not likely to occur, the nose can be much blunter, say, 1/4 in. up to 1/2 in. radius, depending on the size of the tool. This tool is preferably made from steel of a depth about one and a half times its width.

Grinding Instructions Tool No. 1

Set the end of the tool blank by means of the radius gauge to give a radius equal to the width of the tool section. Adjust the trunnion to the right an amount also equal to the width of the tool.

The two sides of the tool should be ground complete in two distinct operations. In grinding face 1, the tool holder is rotated till the base of the tool is uppermost. Set the turntable to 10 degrees "back," and grind the side of the tool away for a length equal to the tool width; then, without altering any adjustment and while the tool is still in contact with the wheel, unclamp the turntable and slowly sweep it round to the left till the tool leaves the wheel. Repeat this operation on face 2 without removing the tool from the tool holder; this time, however, the base of the tool will be downwards.

Note particularly that, to obtain the correct clearance on the two sides, the trunnion is set to 26 degrees "down" and the tool holder to C.3 degrees "right" for face 1. Both these settings are reversed for face 2, that is, the trunnion is set to 6 degrees "up" and the tool holder to A.3 degrees "left." The point should be just touched up, giving 6 degrees of clearance, the setting being (though not given in the chart):

Turntable.	Trunnion.	Toolholder.
90 back.	6 up.	A zero.

The point can be rounded off later by hand on a plain grinder, although on large tools, which require a large radius on the point, it can be done in the oscillating grinder by setting for the desired radius.

The top face is next ground to give the desired rake—in the Chart this is given as 15 degrees, as any greater keenness would cut too deep into the tool. It is, therefore, strongly recommended that this tool be always ground with a hollow curved top face, as a keener rake is obtained without weakening the tool. For hard materials, such as cast iron, however, a flat top face with 10 degrees rake is better, the settings for operation 3 being:

Turntable.	Trunnion.	Toolholder.
10 fore.	Zero.	D zero.

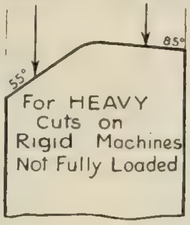
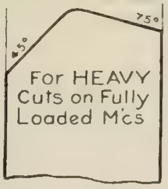
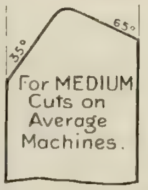
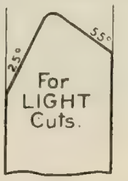
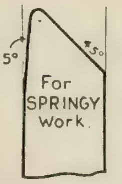
PROFILE.			RAKE.		
SIDE ANGLE FRONT ANGLE	SIDE ANGLE.	FRONT ANGLE.	For STEEL with a Tensile Strength of	SIDE CUTTING ANGLE Toolholder Setting	FRONT CUTTING ANGLE Turntable Setting
 55° 85° For HEAVY Cuts on Rigid Machines Not Fully Loaded	TURNTABLE		20 TONS	D.18. LEFT	25 FORE.
	55 BACK	85 BACK	30 TONS	D.15. LEFT	21 FORE.
	TRUNNION.		40 TONS	D.12. LEFT	17 FORE.
	6 DOWN	6 UP	50 TONS	D.9. LEFT	12 FORE.
	TOOLHOLDER.				
	C.6. RIGHT	A. ZERO.	FOR CAST IRON	D.6. LEFT	8 FORE
	TURNTABLE.		20 TONS	D.22. LEFT	22 FORE.
	45 BACK	75 BACK	30 TONS	D.18. LEFT	18 FORE.
	TRUNNION.		40 TONS	D.14. LEFT	14 FORE.
	6 DOWN	6 UP	50 TONS	D.11. LEFT	11 FORE.
	TOOLHOLDER.				
	C.6 RIGHT	A. ZERO.	FOR CAST IRON	D.7. LEFT.	7 FORE
	TURNTABLE.		20 TONS	D.25. LEFT.	18 FORE.
	35 BACK	65 BACK	30 TONS	D.21. LEFT	15 FORE.
	TRUNNION.		40 TONS	D.17. LEFT	12 FORE.
	6 DOWN	6 UP	50 TONS	D.12. LEFT.	9 FORE.
	TOOLHOLDER.				
	C 6 RIGHT	A. ZERO.	FOR CAST IRON	D.8. LEFT.	6 FORE.
	TURNTABLE.		20 TONS	D.28. LEFT.	14 FORE.
	25 BACK	55 BACK	30 TONS	D 23 LEFT.	11 FORE.
	TRUNNION.		40 TONS	D.18. LEFT.	9 FORE.
	6 DOWN	6 UP	50 TONS	D.14. LEFT.	7 FORE.
	TOOLHOLDER.				
	C.6 RIGHT	A. ZERO.	FOR CAST IRON	D.9 LEFT.	4 FORE.
	TURNTABLE		20 TONS	D.30. LEFT.	3 FORE.
	5 BACK	45 BACK	30 TONS	D.25. LEFT.	2 FORE.
	TRUNNION		40 TONS	D.20. LEFT	2 FORE.
	6 DOWN	6 UP	50 TONS	D 15. LEFT	1 FORE.
	TOOLHOLDER				
	C.6. RIGHT.	A ZERO	FOR CAST IRON	D 10 LEFT	1 FORE

FIG. 3. CHART SHOWING VARIATIONS OF TOOL NO. 4, WITH THE SETTINGS NECESSARY TO GIVE EACH SHAPE AND THE CLASS OF WORK FOR WHICH EACH IS SUITED.

RAILWAY EMPLOYES PROTECTION

ANOTHER step forward in the matter of safety for railway employes in Canada is embodied in an order just issued by the Railway Commission regarding handrails on locomotives.

It is ordered that all railways subject to the jurisdiction of the Board shall equip all locomotives of 100,000 pounds or over with handrails on the side of the cabs above the windows, running the whole length of the cab, and that the tenders of all such locomotives shall be equipped with railings on both sides on the top of the coping.

The rails on the tenders are to run the full length of the fuel storage. Foot-rests in the cabs are also ordered. This applies to all locomotives of the class described except those used in international traffic and merely passing through Canada.

The order is the outcome of a hearing a year ago when representatives of the Brotherhood of Locomotive Engineers and the Brotherhood of Locomotive Firemen and Enginemen asked for such protection. Representatives of the Canadian railroads were also present.

TO ENCOURAGE BUILDING OF SHIPS

THE Dominion Goernment has under consideration a plan for the encouragement of shipbuilding in Canada by an extension of the present system of State aid toward the construction of drydocks.

ONE OF THE NUMEROUS C.N.E. AVENUES LINED WITH EXHIBITS FROM CANADA'S MANY ENGINEERING ESTABLISHMENTS.

The desirability of reviving Canadian shipbuilding by some form of Federal aid was discussed at the last session of Parliament, and a sub-committee of the Cabinet was subsequently formed to study the situation. It is learned that the most likely course to be adopted and that on which the committee is at present bending its energies will not provide for direct State aid for shipbuilding, but will attain the same end by a relaxation of the conditions under which drydock subsidies are now granted. Two drydocks are already under way in Halifax and St. John but conditions have arisen which have made it impossible for the full benefit of the subsidy allowance to be secured for these enterprises. These will be made less stringent, and it is hoped in this way to take the first step towards encouraging shipbuilding in the Dominion.

NEW "DAY LETTER" SERVICES

THERE was inaugurated on August 28, by the C. P. R. Telegraphs Department a new day letter service which in its essential features makes a rate of transmission of messages available at a considerable reduction when compared with the previously existing commercial rush telegram.

It is believed that many of those who send telegrams would be quite satisfied if these arrived on the same day. Again, a proportion of the cost of the rush telegram is due to the cost of speedy delivery. The day letter of fifty words will be rated at one and a half times the cost of a regular rush message of ten words, and will still bring an answer the same day, which is as quick as many people desire.

There are sixteen hundred C.P.R. telegraph offices throughout Canada, at each of which the new service is in force, so that this will be a Dominion-wide service stretching from Louisburg, N.S. to Victoria, B.C. Messages will be taken in either French or English, code words not being permissible.

tI is also announced that there will be accepted and forwarded between all points on lines over which the G. T. P. Telegraph Co. operates i.e., Grand Trunk Pacific, Transcontinental, and Canada Atlantic Railways, day lettergrams, which will be treated as a deferred service subordinate to the priority of the transmission and delivery of regular telegrams, and charge being one and one-half times the ten word day message rate per 50 words or less, and one-fifth the initial rate for each additional ten words or less. Day lettergrams may be written in English or French. Code words are not permitted.

CANADIAN GOODS FOR PACIFIC ISLES.

THE Canadian High Commissioner's Office, London, England, has received an enquiry through the Colonial Office on behalf of the Australian Government as to whether Canadian firms desire to export goods direct to the Pacific Islands, being former German colonies which have been captured and are being occupied by Australia. The Australian Government states that any importation of goods into these Islands from Canada is at present made only through the Commonwealth. The Pacific Islands were taken from Germany in the first two months of the war by the Australians and Japanese and comprise groups of small islands stretching across the Pacific from the Phillippines to the French Marquesas. They are known as Kaiser Wilhelm's Land, Bismark Archipelago and the Caroline, Pelew, Marianne and Marshall Islands.

CANADIAN VESSEL REGISTRY

A DECLINE in the number of vessels in Canadian registry is shown by the figures for last year, which have been compiled at the Marine and Fisheries Department. The total number of vessels so registered was 8,757, of which 4,132 were steamers. The total net tonnage was 929,312. The decline is not so great as would appear from a comparison of the figures with those of the preceding year, owing to the fact that a revision of the list resulted in the elimination of the names of a number of vessels which had been carried, but were no longer in commission. The number of new vessels constructed was less. It totalled 246 last year, of 18,832 tons, as compared with 329 the previous year of 43,000 tons. Although the number of ships decreased there was an increase in the number of sailors serving on board them. The figures were 45,461 as compared with about 42,000 the year before.

* * *

The Hudson Bay Railway offices have been removed from Winnipeg to The Pas, Man.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data
and Ideas Evolved from Actual Practical Application and Experience

RECLAIMING RUSSIAN THREE-INCH SHRAPNEL FUSE BODIES

By H. M.

It is a well-known fact that the inspections for the Russian fuse are most rigid. Many manufacturers, not realizing that this high degree of accuracy could not be consistently attained by using makeshift tools, found much of the work was rejected in the early stages of their manufacture owing to the manufacture of the fuse not yet having reached a commercial basis where a high degree of accuracy could be obtained. This being the case many producers are now turning their attention to the reclaiming of some of the rejected work. Of course, much of the work which has been rejected either cannot be saved, or the parts being so simple it is not worth the trouble. However, one of the most expensive parts of the fuse is the body which is shown in Fig. 1, this in the case of the three inch fuse being made from an aluminum composition casting which is compressed and is machined all over.

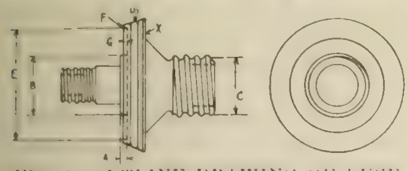


FIG. 1. OUTLINE DRAWING OF FUSE BODY.

A large number of these bodies having been rejected owing to the shoulder A being too short, they were picked out and if the diameter B had sufficient stock to permit, this diameter was rolled with a tool such as is shown in Fig. 2. This compressed the metal lengthwise thereby lengthening the shoulder A. The tool Fig. 2, consists merely of a roll A mounted on a stud B in a suitable holder C which is sufficiently strong to resist the pressure of rolling the aluminum over. During this operation the work is held on the large diameter in chuck jaws D and is supported by the back rest E.

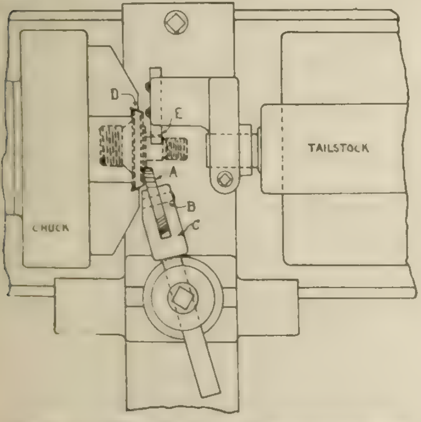


FIG. 2. METHOD OF LENGTHENING SHOULDER "A," FIG. 1.

Another trouble experienced was from the pitch diameter C, Fig. 1 being small, this error was always very slight and as the tolerance on the outside diameter of the thread was greater than that allowed on the pitch diameter an attempt was made to reclaim bodies rejected from this cause by rolling the thread with the tool Fig. 3. This tool was made with the idea of jamming the top of the thread thereby causing the metal to be squeezed outward at the pitch diameter.

This tool is similar in construction to that illustrated by Fig. 2, with the exception that it was made straight instead of off-set, an off-set tool not being considered necessary to prevent interference with the chuck because the work at this setting was held on the diameter A, Fig. 3, with a back rest at B, and a revolving centre in the holder C. From this application of rolling very good results were obtained and many fuse bodies were thus saved.

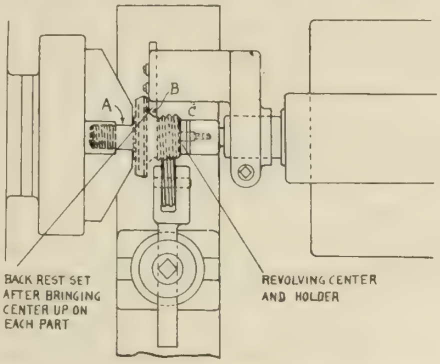

A
B
C
BACK REST SET AFTER BRINGING CENTER UP ON EACH PART
REVOLVING CENTER AND HOLDER

FIG. 3. SHOWING METHOD OF ROLLING THREAD TO INCREASE PITCH PITCH DIAMETER.

To save bodies which had the diameter E bored out too large, it was found that there were two chances to save them, namely, if the diameter D had sufficient stock to permit of rolling with the tool Fig. 4, the top diameter was squeezed thereby causing the metal to be compressed sufficiently to allow of boring the diameter E to the correct size. When this method was resorted to, it was usually found necessary to trim up the face X, at the bevel side although the roll shown in Fig. 4, has a shoulder X which supports this side to a certain extent while rolling. The manner of holding the work for this operation is clearly shown by the illustration and consists of, holding the work in chuck with a back rest of the single jaw type backing up the work at the bevel surface Z, while a revolving pad Y helps to take the end thrust.

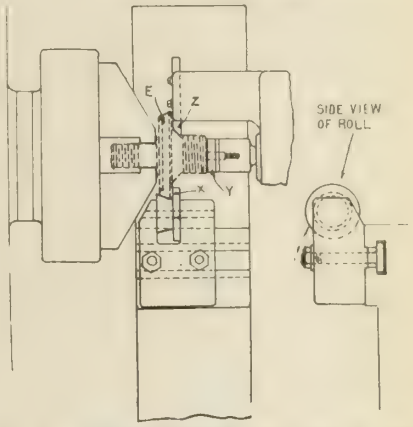


FIG. 4. ARRANGEMENT OF TOOLS USED FOR ROLLING OUTSIDE DIAMETER

The other chance of reclaiming the bodies when the diameter E is large is preferable to the one just mentioned. This is to apply a roll on the surface F, provided the depth G is long enough to permit this. The roll for accomplishing this is shown in Fig. 5, where the work is gripped in chuck jaws A, while the roll B, held in holder C, is forced against F thus rolling the metal in and causing the diameter E to contract.

It will be obvious from the foregoing descriptions that the work of reclaiming is a matter which calls for considerable good judgment on the part of the man who is doing it, and while every attempt will not result in success it has been found that many of the bodies can be saved from the scrap heap by intelligent effort and this saving is sufficient to make the expense of the rolling tools a very good investment, as in most cases the cause for rejecting the bodies was found to be but a very slight error in the examples noted.

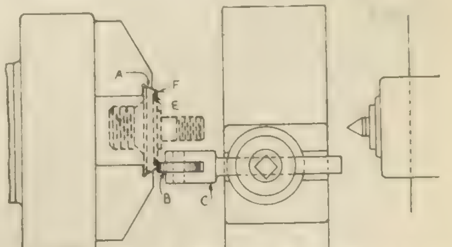


FIG. 5. SECOND METHOD OF INCREASING DIAMETER "E," FIG. 1.

GRINDING BRASS VALVES

By D. A. Hampson.

WITH the automobile came the process of valve grinding on such a scale that it has been brought home to most mechanics who, if told to grind in any kind of a valve, would straightway start the work with emery and oil or one of the various compounds of these. There is, however, a class of valve grinding met with in shops of supply manufactures and in certain branches of repair work that is quite different and little known outside of these lines. In this class are pet and stop cocks, valves used on bar and restaurant fixtures, shut off cocks for house water systems, and valves used in bottle filling work in various kinds of food production and packing.

All of these "valves" have a cylindrical core turned to a taper of approximately one inch to the foot and fitting in a body reamed to the same taper. The core is held to its seat by a "D" washer and nut at the small end. The material is cast brass of the best grade.

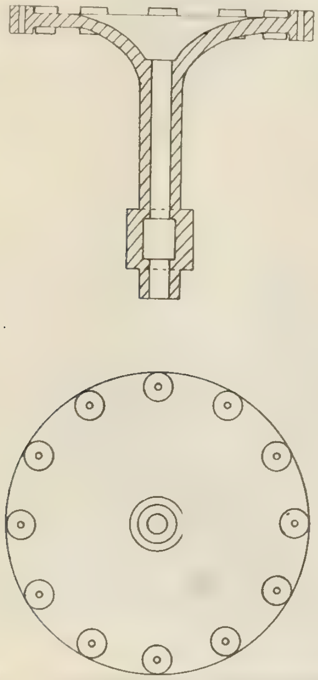


FIG 1. PATTERN TO BE MOULDED.

In the manufacture of these valves the taper of the two parts is made to correspond exactly, thereby reducing the amount of grinding; in repair work, circumstances may compel all the re-fitting to be done by hand grinding or grinding after awkward shaped pieces have been machined, perhaps none too well because of their shape.

Grinding is imperative—a perfect fit cannot be secured in any other way—for liquids such as gasoline, the familiar lead pencil mark and other visual tests, are not good enough, and the valves are tested by suction. In manufacturing this is done by applying the valve to a quick acting connection on the shop vacuum system—if the valve holds its weight, it is ready for any service—and a corresponding test for heavier valves. On a repair job the rather unsanitary method of testing is to put one of the connection ends in the mouth, close the lips tightly around it, and with a deep inward breath place the tongue over the opening. If the tongue is held fast, the valve is sure to be tight — tight enough for gasoline. Another less positive way is to oil valve and core and then blow in the connection looking for bubbles at the joint as an indication of a leak.

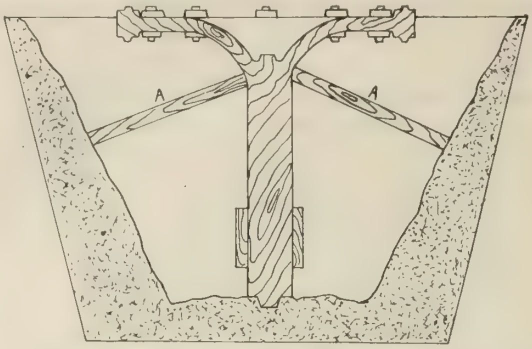


FIG. 2. ILLUSTRATING FORMER METHOD OF MOULDING PATTERN.

Sand is by far the best grinding medium for brass valves; emery or corundum should be used only when no sand is obtainable, for it is well night impossible for even a skilled grinder to keep from scoring the surfaces—something impossible with sand of the right kind, though the greenest boy in the shop does the work. White sands are used for valve grinding—sea sands or certain sands produced by glacial action—dry, sharp, and free from loam and vegetable matter. In general, any sand which is good for locomotive work will do for valve grinding.

The valve grinder oils the core, rolls it in sand and thrusts it, coated, into the valve. The actual work is as with any valve—turning the core through a small arc, shifting to another position and repeating with additions of oil as the work gets dry. Any of the common shop oils will do the work. The parts are cleaned in a pail of kerosene and the experienced grinder does not remove the core when the test shows a perfect seat, he simply washes the sand out through the ports. The sand is better used sifted, but if not, the larger particles or pebbles are shaken off after the oiled core is rolled in it.

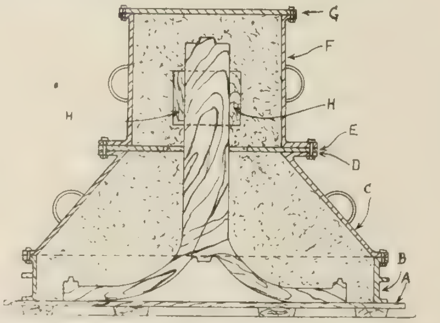


FIG. 3. PATTERN MOULDED ON FLOOR BOARD READY FOR TURNING OVER.

* * *

COST-CUTTING ON A TURNTABLE COLUMN

By J. H. Eastham.

THE demand for quick delivery along with high quality of product was very marked during the revival of trade after the South African war, extensive orders being placed with British firms specializing in railroad equipment, such as cranes, turntables, etc. Pressure from purchasers caused many changes to be made in former methods of manufacture, the turntable column described herewith being one instance where the time was not only reduced, but a better job done at the same time.

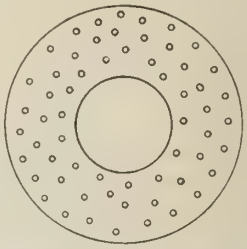


FIG. 4. CIRCULAR PLATE BETWEEN DRAG AND CONICAL FLASK.

The column weighs 4,000 lbs. and is shown in section and plan in Fig. 1. Owing to lack of suitable equipment, the casting was made in green sand, being moulded in a pit as shown in Fig. 2. The pattern had to be shored up from the sides of the pit previous to the base being rammed to a height sufficient to prevent the top heavy pattern from falling sideways. The cost of production by this method was a serious matter while the resulting quality of the castings was indifferent.

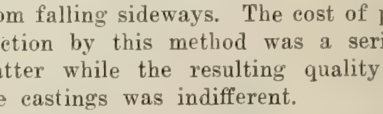


FIG. 5. CONICAL SECTION OF FLASK AFTER DRAWING PATTERN.

A reduction of one third of the time spent on each casting was called for along with an improvement in quality at the heavy or root end of the pillar, these demands being successfully met by improved methods.

Referring to Fig. 3, the pattern was placed on the face board A, surrounded by section B of flask, which was rammed full after which conical section C was placed in position and rammed up level with flange D, where a parting was made. The circular plate E, Fig 4 was then lowered to place, stamped down, and bolted to section C, after which cylindrical section F was placed over the root of the pattern, secured by bolts to plate E, rammed up and surmounted by drag plate G which was bolted in place.

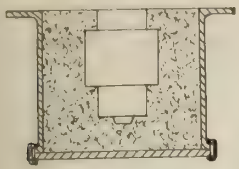


FIG. 6. DRAG PART ON LOWER END OF COLUMN.

The whole structure was now rolled over carefully into a pit about three feet deep formed by the removal of the sand in the flask, after which the parting on the top of the pattern was made in the usual way. A special circular sunk-barred cope was rammed up and removed for finishing after which the pattern was drawn to permit removal of the centre conical section of the flask as shown in Fig. 5, the plate E being still secured in place. Six belt sections H, Fig. 3, were now removed from the drag Fig. 6, which was given a coat of black wash and dried over night on the stove car, while the upper green sand portions of the mould were finished and faced off with plumbago.

The assembled mould ready for pouring is shown in section in Fig. 7, the method of pouring being indicated at J. K. while three risers L are placed around the flange to relieve the pressure developed in a mould of this design.

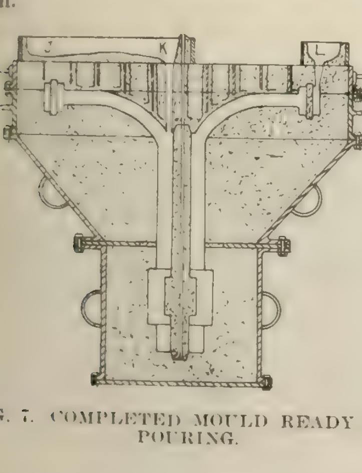


FIG. 7. COMPLETED MOULD READY FOR POURING.

Under previously existing conditions, two moulders took three days to each casting of this type, while with the equipment and methods described, a much superior article was produced in 15 hours, a saving of 50 per cent. instead of the 33 1-3 per cent. asked for.

THE VALUE OF A NOTE-BOOK

By J. Edgar.

THE writer, in a somewhat long and varied experience in pattern shops and foundries, has met very few men who have kept a private note-book or taken notes of their work or the work going on around them. Even men who are keen on their craft, and in many cases who have acquired a sound, technical education, depend entirely on their memory. A good memory is as valuable to the foundryman as it is to most men, but there is no reason why the mind should be burdened with details that could be more accurately stored in a note-book. In class work, students are invariably impressed with the importance of making voluminous notes, and it seems even more important that notes should be taken on practical shop work, as it is always more easy to track abstract subjects through text books. Valuable trade hints passed on by old hands never in many cases see print, and are very apt to be forgotten in time. The apprentice—and the journeyman no less—should cultivate a habit of making notes.

It need not be a laborious business, nor need it occupy much time. It should not be allowed to stand until the end of the day's work, but should be done at the moment when the occasion arises. A small pocket note-book into which can be jotted the many little tit-bits of a day's work is sufficient, although the more painstaking man will rewrite them carefully and collate them later. If it is not possible to get particulars of other work which is being done in the shop, observation will show many methods which cannot be hidden.

Pattern Shop and Foundry Notes

The noting of hints is not all that ought to be done. The patternmaker should make a sketch of each job he finishes, stating whether it is a one-off pattern, a good skeleton, or a solid pattern, and underneath should be noted the cubic measurement of the timber used and the number of hours he has been on the job. In the foundry similar particulars should be noted, say, whether the job has been made in green or dry sand, or in loam from boards, and the weight of the casting. The patternmaker in this respect has a decided pull over the moulder, for he can watch the job from the beginning, and usually having access to the foundry he can compute the total cost of the casting more nearly.

Technical Journal Cuttings

Akin to notetaking is the practice of keeping cuttings from technical journals. Space or other considerations may prevent the student or craftsmen from binding these journals, but if he is wise he will file articles which convey useful information for use at some future date. It is surprising the amount of knowledge we allow to wantonly slip from us in quite a short time, and this practice of gathering information will not only be found invaluable to the mechanic while he is such, but, if he aspires to a foremanship and succeeds, he will find it even more valuable.

It is the custom with many firms nowadays, especially with patternmaking, to get quotations from outside firms against which their own foremen have to compete. The foreman is then in a somewhat similar position to the rate fixer in a premium bonus shop. He has to refer to similar jobs which have been made in the past, giving the cost of labor and material. Shop management expenses can be added. It is when placed in this position that a young foreman appreciates his note-books. It also gives him confidence in dealing with men, and a better understanding of what a reasonable day's work is.—Foundry Trade Journal.

* * *

ARMSTRONG, WHITWORTH, OF CANADA STEEL PRODUCTS

THE very great importance attached to high-speed steel as a result of the development of munition manufacture impart peculiar interest to the fact that this material is now "Made in Canada." The fact that it is produced by Armstrong, Whitworth is sufficient guarantee that it will measure up to requirements, and if visible evidence is necessary, the interested visitor may inspect samples of work done by it at the leading munitions plants of this country. The proportions and color of the cuttings, which might be termed chunks rather than chips, will convince the practical inquirer without any further argument. A manufacturing department has been established at the works at Longueuil, Que., equipped in the most modern manner, which enables the firm to offer a range of miscellaneous shop tools heretofore not made in Canada. Numerous samples of milling cutters, inserted tooth saws, worm hobs, gauges, etc., made of the company's high-speed and carbon steel were tastefully displayed at the Canadian National Exhibition. Other products of the plant include electric furnace steel in all grades of carbon and alloy, locomotive and car wheel tires, rolled steel wheels and heavy forgings to specifications.

* * *

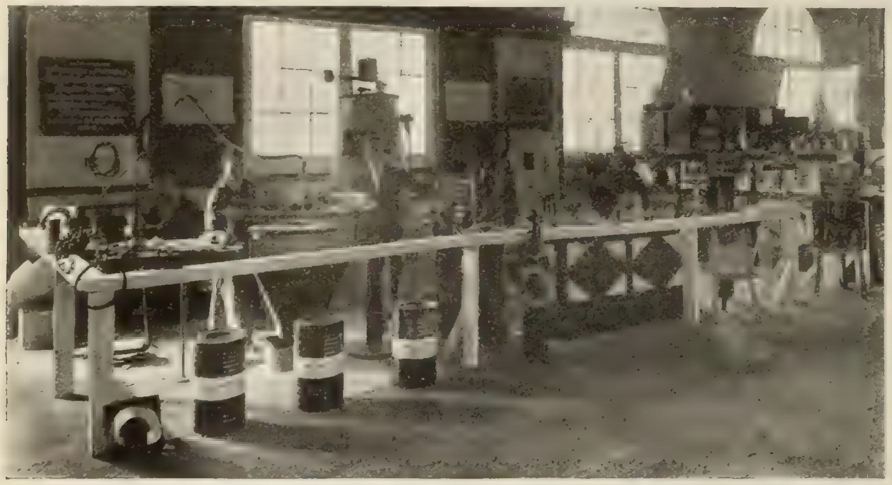
THE PRESIDENT of the Board of Trade has appointed a Committee to consider the best means of meeting the needs of British firms after the war with regard to financial facilities for trade, particularly with reference to the financing of large overseas contracts; the committee will prepare a detailed scheme for that purpose.

CONTEMPORARY WAR ARTICLES

Embracing Information and Data Drawn from a Variety of Sources Relative to and Arising from the Prosecution of this Many-Sided European War

BRITISH AND FRENCH MUNITIONS OUTPUT

In the course of a long and exhaustive speech in the British House of Commons recently, by the Hon. Mr. Montagu, Imperial Minister of Munitions, much interesting and highly informative data relative to the production of war supplies in Great Britain was made publicly available. The following statistical synopsis will be found to embody the more important features discussed:—


ARMSTRONG, WHITWORTH SHOWED SAMPLES OF WORK DONE BY THEIR HIGH-SPEED STEEL ALONG WITH SPECIMENS OF SMALL TOOLS, CUTTERS, ETC., CANADIAN NATIONAL EXHIBITION.

British Output

Shells.—An output which in 1914-15 took twelve whole months to produce is now attained in Great Britain in the following periods:—18-pounder ammunition, 3 weeks; field howitzer ammunition, 2 weeks; medium-sized shell, 11 days; heavy shell, 4 days; or, lumping all natures of gun and howitzer ammunition together, we are now manufacturing and issuing to France every week about as much as the whole pre-war stock of land service ammunition in the country.

Artillery.—Our present monthly output of big guns is about twice as many as were in existence for land service when the Ministry of Munitions started. The monthly output of heavy guns increased more than six-fold between June, 1915, and June, 1916, and will soon be nearly doubled.

Machine Guns.—The weekly output has increased, since the Ministry of Munitions was founded, fourteen-fold, and is still increasing. Soon we will have overtaken all the requirements of the British Army, and will then be able to turn our manufacture exclusively to supply our Allies.

Rifles.—Nearly three times as many new rifles were accepted in the first year of the Ministry of Munitions' activities as in 1914-15. The equipment of our army now overseas, both in machine guns and in rifles, has been accomplished from home sources alone.

Small-Arms Ammunition.—The home production is now three times as much a week as a year ago. We meet all demands made by the War Office, and yet have built up a stock for the future.

High Explosives.—The production is now 66 times as much as it was at the beginning of 1915. The weekly consumption is between 11,000 and 12,000 times the amount required for land service ammunition manufactured in September, 1914.

OXY-ACETYLENE WELDING MACHINES, APPARATUS AND SUPPLIES EXHIBITED BY CARTER WELDING CO. AT CANADIAN NATIONAL EXHIBITION.

Weapons for Trench Warfare.—The output of bombs increased 33-fold between May, 1915, and May, 1916. We have also supplied a large quantity of steel helmets and also some experimental body armour.

Transport and Finance

The overseas transport of munitions has reached 1,300,000 tons.

There are now ninety-five national munition factories, and one of them fills twice as much as Woolwich.

Last year the United States supplied 70 per cent. of light shells; this year we shall make our own.

American heavy shell supply was invaluable, but we hope, with Canada's help, to be independent of it.

The finance department of the Ministry of Munitions controls an expenditure of $5,000,000 a day. Its supervision has saved $100,000,000 a year on shells; it has reduced American contract prices by 15 per cent.

Forty-five thousand soldiers have been recalled for munition work.

A year ago 1,635,000 persons were employed; to-day there are 2,250,000, and of these 400,000 are women.

French Output

Since the beginning of August, 1914, the following increases in the manufacture of guns and shells have been secured in France:—

Machine Guns.—At the end of March, 1916, the production was 98½ times greater; at the beginning of June 131½ times; and a month later over 136½ times.

Guns.—The output of 75 mm. guns is 27 times, and of 75 mm. gun carriages, 91½ times greater.

Heavy Guns.—Progress has been made

in the manufacture of heavy guns, which is certainly not inferior to that of "75's," and new models are in process of production from which great results are expected.

Rifles.—At the end of March, 1916, the output was 237 times greater; at the beginning of June, 267½ times, and a month later 290 times.

SPECIMENS OF WORK DONE BY VARIOUS FIRMS WITH THEIR EQUIPMENT WERE A FEATURE OF L'AIR LIQUID SOCIETY'S EXHIBIT.

Shells.—The manufacture of empty 75 mm. shells was 35 times greater in March and 38½ times at the beginning of July; of empty shells of greater calibres 54½ times and 79 times greater. At the present the output of these shells is 80 times larger than it was at the beginning of the war.

◆

BRITISH MERCANTILE SHIPBUILDING.

THERE are indications that the British shipbuilding situation is undergoing a change wheh will be very welcome not only to shipowners, but also to the nation, to both of whom the shortage of merchant tonnage has become a serious problem.

For two years now, says the Liverpool Journal of Commerce, leading shipbuilders and marine engineers have devoted the best of their energies to naval work, the urgency and pressure of which would brook no delay, and as a consequence, the construction of merchant ships has been relegated very much to the background. The output of naval work by private yards has as a result been magnificent. We shall not know its full extent until the war is over, but we know already that it has called forth all the best forces of adaptability and organisation of which the industry is capable, and has involved an amount of strain on employers and employees alike that has been willingly, even cheerfully borne to the credit of all concerned.

Partial Release from Naval Work.

The net result of this great national effort is that the British Navy has been strengthened beyond all comparison, and is evidently regarded as now so supreme that the Admiralty is able to relax the pressure and free many of the yards to proceed with the construction of much needed merchant shipping. This is the change which has been inaugurated and, in the interests of our carrying trade, it has come none too soon. The output of mercantile tonnage has suffered severely during the concentration on naval work, and war losses at sea, as everybody knows, have been heavy. There is imperative need to hurry forward the production of cargo-carrying vessels. This is now to be done; is, indeed, already being done in many yards, and we may look for a steady increase in tonnage output during the remainder of the year.

With four months to go, our yards in that time will give a good account of themselves, for their resources have been increased and reorganized during the war period to an extent that will enable them to produce at a quicker rate than formerly, while in addition to the new shipyard on the Wye, there are several important extensions of premises in hand at Belfast, on the Clyde, and on the North-East Coast, all which will mean increased output in the near future. Moreover, a marked tendency is observed among shipowners to order duplicate ships, often several duplicates, which must necessarily save time and facilitate rapid construction.

Pre-War Orders Still Nnfilled.

There are vessels which were ordered in the later months of 1914—i.e., just before and after the outbreak of the war—which have yet to be completed. These are making progress and will be launched very soon, making the berths left vacant free for the keels of ships since contracted for. There has been much trouble in completing these pre-war contracts, for they were placed

ARMSTRONG WHITWORTH OF CANADA

EXHIBIT OF THE GARLOCK-WALKER MACHINERY CO., CONSISTING OF SPECIAL WOODWORKING MACHINES AND SHELL LATHES AT CANADIAN NATIONAL EXHIBITION originally at low prices, and the cost of turning out the ships with labour and materials at their present inflated values meant a serious loss to the builders and constituted a problem which required mutual good-will and agreement on the part alike of builders and owners to solve. Happily, in the main, it has been solved, chiefly by concessions on the part of the owners, most of whom were only too glad to see delivery of their ships in sight, even at augmented cost.

All new contracts placed during the last two years and particularly during the past twelve months, were naturally at very high prices—up to $100 a ton for large cargo carriers and considerably more for smaller vessels—but these figures extravagant as they are, have not prevented owners from ordering ships, and, as a matter of fact, more orders have been offered to builders than they could accept. Many recent contracts, however, could only be placed on an actual cost plus a percentage for profit basis and it is highly probable that these will work out to a price per ton still higher than indicated. In some cases where several ships have been ordered by one firm, the prices are regulated on a descending scale according to the date—one might almost say according to year of delivery, for most shipbuilders have already two years work on hand, and few yards can entertain further orders for delivery before the end of 1918.

Long Continued Activity Assured.

It emerges, therefore, that pronounced activity in the shipbuilding trade is already assured for two years to come, but with falling prices after the war is over, and so much leeway in construction to make good, it may be assumed that the period of activity will be much longer than two years, probably nearer five. If capital and labour can agree, the outlook is excellent.

There has been, and still is, considerable difficulty in getting engines for the ships turned out. All the marine engineers practically without exception, have been assisting the Government by turning out munitions of one sort or another, and the pressure of this work has forced private contracts far into arrears. Ships already launched are still waiting, and likely to wait, for their machinery before they can be completed, and until the "shops" are freed from munition work, which cannot be just yet, the delay in turning out engines must retard the completion of contracts in the shipbuilding trade. There are known to be large firms of engineers and shipbuilders who are willing to build hulls, but cannot undertake to deliver the machinery for them, and in authenticated instances the engines have had to be arranged for elsewhere. Time of course, will settle this difficulty, but not before the demand for munitions begins to slacken—a contingency which naturally depends upon the progress of the war.

The point to note meanwhile is, that the process of returning to normal conditions is under way. It may prove tedious, but it has begun, and, properly viewed, may be considered a great industrial achievement after the tremendous dislocation caused by the war.

* * *

BRITAIN'S MUNITIONS ENGINEERING

THE story told the British House of Commons a few days ago concerning a year's work of the Ministry of Munitions is one that will forever live, and one that should be enshrined as completely in the country's engineering records as in its history books, says the technical correspondent of the Daily Telegraph. It touches the very vitals of everything that is of interest, fundamental and otherwise, to the engineer; and were that story other than one succession of astounding records of engineering achievements, such as have been made during the past twelve months, it is safe to say that another story—that of the triumph of the Hun—would have had to be told.

The mobilization of the machinery of Britain and America saved the world from horrors unimaginable. It enabled incredible increases in our munitions supply to be made with equally unbelievable rapidity—to the fatal undoing of Prussian plans. Whereas a year ago we were so short of munitions that we ran an "appalling danger" of the Germans breaking through, now we have actually a superfluity of certain classes of field guns, and soon shall have not only heavy shells "quite adequate for the enormous increase in guns of the larger calibre, but be able to spare a very considerable quantity of both shells and guns for our Allies"—to quote the words of the War Minister himself.

It is in the class of ammunition where the increase is the most difficult—that is, heavy shells—that the greatest increase of all has been made. Whereas the average weekly production of heavy shells in 1915-16 was twenty-two times as great as in the previous year, it is now ninety-four times as great!

Big Gun Production

How to provide the big guns to consume these shells—guns that, providentially, Mr. Lloyd George ordered on his own initiative in larger quantities than the military authorities thought necessary—was a great problem, owing to the fact that a year or so ago the navy required all the big gun plant that was available. To get over this difficulty new buildings with an area of 1,000,000 square feet, were erected and equipped with 2,500 special machines. As a result, we are now turning out in a month nearly twice as many big guns for land service as we were in the year before the Ministry of Munitions was formed — and that while half the engineering capacity of the country has been engaged entirely on work for the navy!

It is on these huge pieces of ordnance—undreamed of before the present cataclysm burst upon the world—that we have to depend, ultimately, for getting the Germans out of their defensive works. The new guns represent the quintessence of British engineering skill. They have acquitted themselves admirably in the recent fighting, and have won the unstinted admiration of the technical experts at the French Ministry of Munitions. The fact that not one of these monsters was in existence a year ago is all in our favor. It means that they embody the very latest improvements in design and material, whereas a considerable proportion of the German big guns are comparatively "old stock," having been made before the war at a time when the data now available were necessarily non-existent. This fact enables us to account for the superiority, for instance, of the British 16-in. gun over enemy artillery having a much greater calibre.

The information given by Mr. Montagu relative to the national shell factories must have been very surprising to the general public. Apart from the eighteen filling factories there are twelve factories for the production of large shells. These factories, which cover seventy acres, have fifteen miles of bays, 10,000 machine tools, seventeen miles of shafting, 25,000 horse-power, and a daily output that would fill a train a mile long! No wonder it is hoped before long to do without American shells altogether. It has been estimated that the saving should be sufficient soon to pay for the shell factories and their equipment.

A National Machine Tool Factory

One of the national factories, it is specially interesting to note, is devoted entirely to the production of machine tools. Practically every weapon used in the war has been fashioned with the aid of a machine tool, but, unfortunately, the greater proportion of these tools is of foreign origin. During the war it has been necessary to secure scores of thousands of machine tools in order to enable the munitions output of the Allies first to approach, and then to surpass, that of the enemy. Millions and millions of pounds' worth of machine tools have been bought in America during the war period to ensure adequate supplies of munitions from our factories—national and otherwise. It would have

(Continued on page 295.)

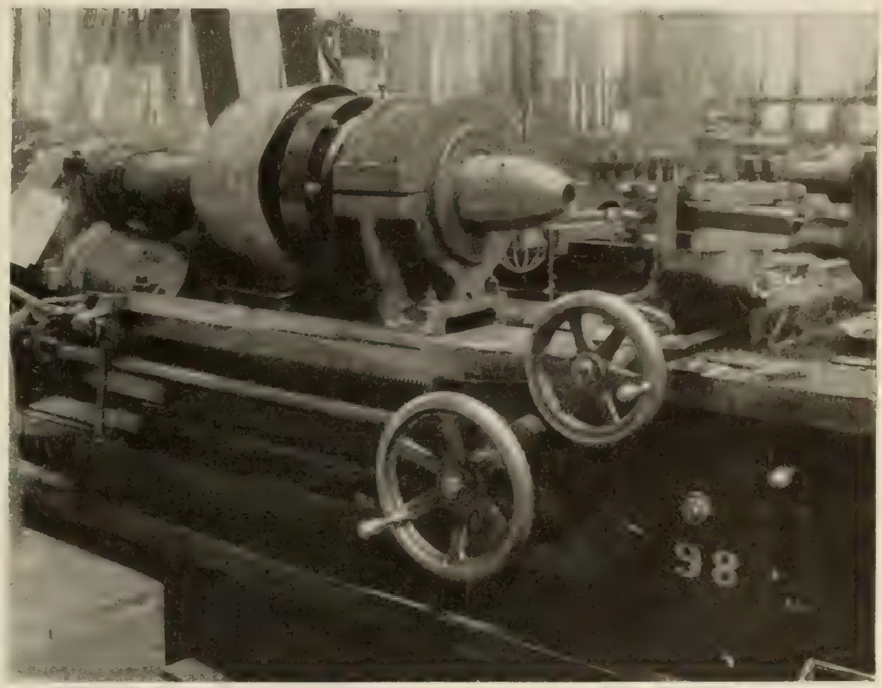
PROGRESS IN NEW EQUIPMENT

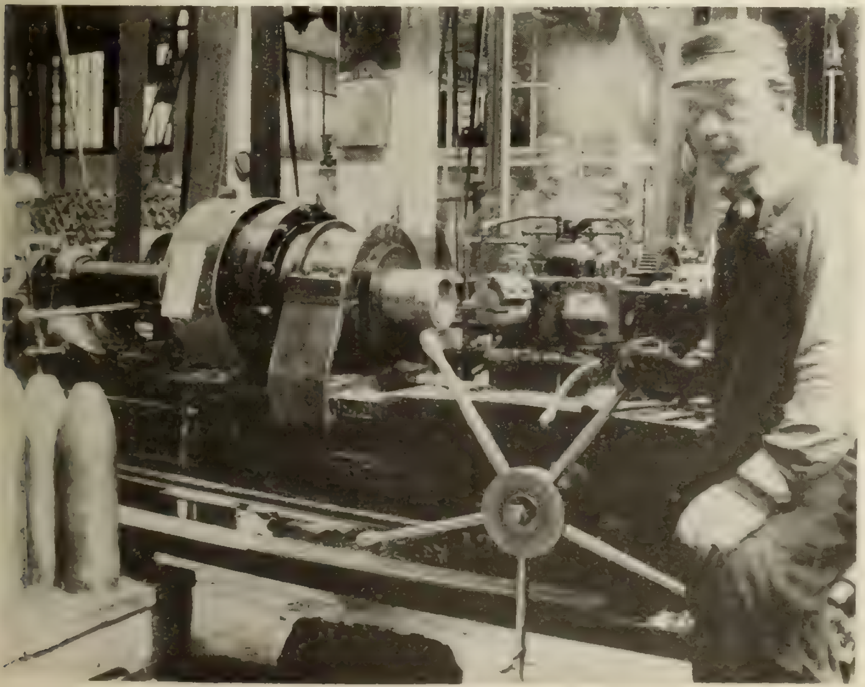
A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

NEW DESIGN COMPRESSED AIR CHUCK.

ONE of the many difficulties that manufacturers have had to contend with in the making of munitions has been the lack of suitable facilities for holding the shell securely while the machining operations were being performed. In an effort to increase production, or produce on a more economic basis, many more or less novel and useful devices have been designed and constructed. The chief drawback to the majority of these devices has been their inability to obtain sufficient gripping power on the shell to prevent it turning in the chuck, when excessive pressure was placed upon the cutting tools.

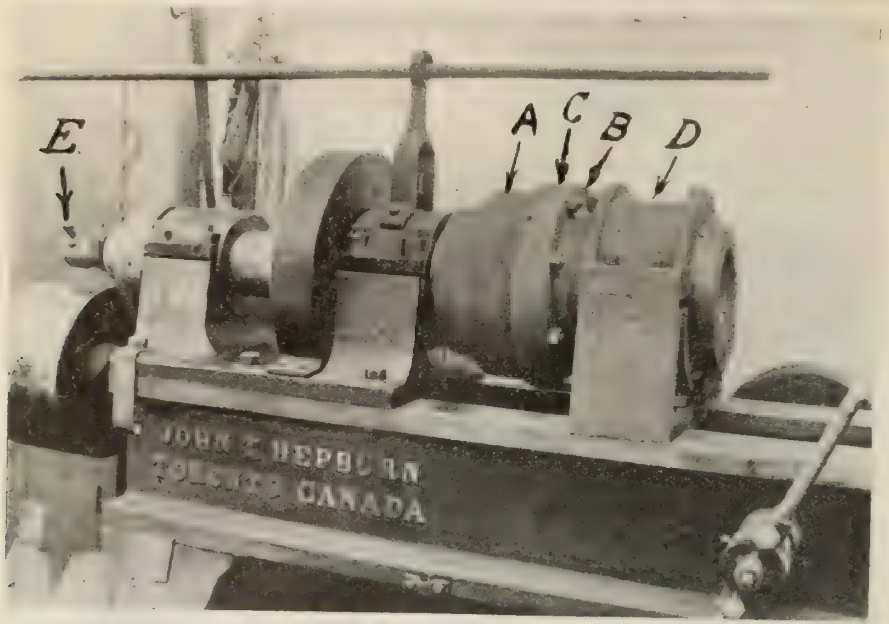
The accompanying illustrations show a single unit combination pneumatic chuck, recently designed by A. J. Lavoie of Montreal, which has been the means of greatly increasing the efficiency of operation and rate of shell production. The chuck is self-contained, very rigid, simple in construction and can be attached to any make of lathe with little loss of time in the operation of the machine. Instead of the cylinder being located at the outer end of the headstock, the air chamber is contained in the body of the chuck, thus reducing to a minimum the possibility of spring or play in the operating mechanism. The cylinder of the device is secured to the face plate of the lathe; or if desired, can be screwed directly to lathe spindle, as shown at A. The piston has a stroke of about $\frac{1}{4}$ inch, and is so designed that only one packing is required. Secured to this movable piston are the wedge pieces that control the operation of the cast steel gripping jaws, these being made in sections, suitable to the diameter of the work, the 6 inch size having six in the set. By means of a flange one inch thick, operating in a groove in the outer diameter of the steel jaws, lateral movement is eliminated, and no sliding action takes place on the surface of the shell, when the chuck is being operated.


CHUCK USED ON A YEATES LATHE. CYLINDER SECURED TO MAIN GEAR OF LATHE.


CHUCK ATTACHED TO BULLARD LATHE.

The adjustable stops, for gauging the position of the work, are screwed into a spider C located between the two outer portions A and B, of the chuck body. These spiders which receive the thrust as the shells are being placed in position are steel castings and can be of any desired form to meet the special requirements of the work. A noteworthy feature in connection with this arrangement is the entire elimination of all lateral motion, either in the stops, shells or gripping jaws, while the chuck is in action. The design of the chuck is such that the gauging of the shells can be accomplished from either the inner or outer surfaces. A number of coil springs are utilized to return the piston and operating wedges to the released position when the pressure of air is removed; the gripping jaws being forced back by two one inch flat springs located in recesses on the inner diameter. The jaws have an extra long bearing surface both on the shell and the taper portion.

The main steady-head D which supports the outer portion of the chuck is of extra heavy design and is made in various styles and sizes to suit the swing of the lathe. All chucks are made on the duplicate system, the various parts being machined in special jigs, so that accurate alignment is always assured. Another feature of this chuck is the high efficiency maintained when operating on the low pressure system; 60 lbs. pressure being sufficient to meet the heaviest requirements. It can be placed on any machine; the only provision being a passage through the spindle for the inlet of air. The air box E, is attached to the feed pipe that passes through the spindle.



CHUCK ATTACHED TO HEPBURN LATHE. CYLINDER SCREWED DIRECT TO SPINDLE.

When the chuck is entirely assembled, it is placed on the lathe and the bearing portion of the outer case given a final skim. The heavy duty steady-head is then located on the lathe bed and babbitted in position, after which the jaws are locked by special liners, and with the pressure of air on the piston, the jaws are bored to the proper diameter. By using different sets of jaws, various sizes of shells can be handled in the one chuck. The steady-rest is supplied with a self-oiling arrangement, that insures a well lubricated bearing at all times.

Designs are now under way for incorporating this pneumatic chuck into the head-stock of a special lathe. These chucks are being placed on the market by the Montreal General Tool Co., Montreal, P.Q.

CENTRE DRIVE CAR WHEEL LATHE.

Several improved features have been incorporated in the centre drive car wheel lathe, illustrated in Figs. 1 and 2 and built by the Niles Bement Pond Co., at Hamilton, O. All of the well known time and labor saving devices which have been evolved in previous models are retained.

Motor drive is provided from a 50 horse power A. C. motor of the usual type, the final drive to each wheel being through two face plates mounted on the ends of the driving spool or spindle which revolves in large bearings on the central part of the bed and is driven by a large steel herringbone driving gear, which, along with its casing, is a prominent feature of the design. The pinion which drives this gear is located in the lower part of the bed on the front or operating side, Fig. 1, the pinion shaft extending along the side of the bed to the motor drive gearing as shown.

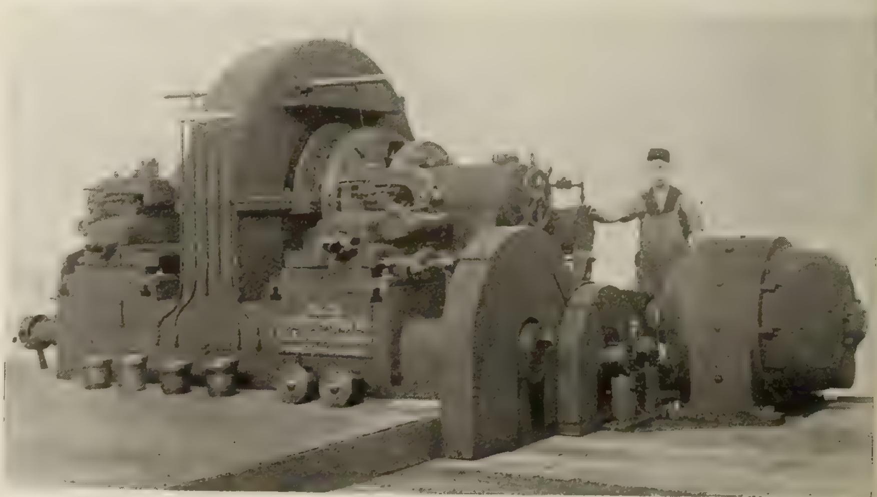


FIG. 1. OPERATING SIDE OF WHEEL LATHE SHOWING PNEUMATIC TOOL CLAMPS AND CENTRAL LUBRICATING SYSTEM.

For transmitting heavy torque as required in this class of work, the herringbone gear offers several advantages such as the elimination of all end thrusts a the smoothness of operation due to th helical form of teeth employed.

The method of inserting the work the driving spool is indicated in Fig. where the spool and gear are in positi to receive a pair of wheels which a rolled along elevated rails not show The driving gear has a hinged segme which automatically closes and locks the wheels are rolled into the lathe, an unlocks and opens as they are roll out, no manipulation of the segment the workman being necessary. Th opening in the spool is 10 in., whic takes axles up to 9½ in. dia., with i side journals. The largest M.C.B. axl with outside journals up to 6½ in. dia are also accommodated.

The wheels are brought up to the cen tre of the tailstocks by an elevating de vice driven by a 5 horse-power consta speed motor, and are centered by tai stocks which are moved on and clampe to the bed by powerful air cylinder The tailstocks are under perfect contr by means of air valves within easy reac of the operator.

For wheels on axles with outside jou nals there are furnished collapsible bus ings which fit over the journals and ar tapered to fit the tailstock spindle; thi method ensures the treads of the wheel being concentric with the journals. Fou sets of these bushings are supplied fo different sizes of journals, while f wheels on axles with inside journal centres are furnished for centering th ends of the axle.

Each face-plate of the driving spoo is equipped with three Sure-Grip dri vers, which engage the inside of th wheels near the circumference. Th tailstock face-plates are provided with independent chuck jaws which engag the outside of the wheels and suppor them against the thrust of the drivers The wheels are thus held with absolut rigidity; the tendency to chatter is eli minated and the axles are relieved of all deflecting or torsional strains.

Pneumatic tool clamps are provided on the tool rests, see Fig. 1, which enable the operator to change and clamp the tools in a few seconds without the use of a wrench. These clamps have been a most important factor in the great reduction in time and labor of wheel turning. The tools are clamped by means of a wedge action operated by a pneumatic cylinder in the body of the tool rest. The clamping bar swivels against a heavy wing nut on a stud carried by the tool rest, the end opposite the tool having a roller which contacts with a wedge block on the piston rod, a similar roller mounted on an extension of the tool rest supporting the reaction from the clamping bar.

The tool slides have in and out adjustment for setting depths of cuts and also hand longitudinal traverse. Ball thrust bearings are fitted to the tool slide screws, and the rests can be swiveled to provide for the taper of the wheel treads.

Power feed is obtained by direct gearing and is positive in action, the range being from ⅛ in. to ⅝ in. per rev. of the faceplates.

All driving gears are steel and are fully enclosed. The driving spool is fitted with guards and wipers to prevent chips and dirt from getting into the bearings, wipers being also attached to the tailstocks to keep the tracks free from chips and dirt. Suitable shields protect the tool slides.

When direct curent is used, a variable speed motor with 3 to 1 variation and dynamic breaking is employed.

The lathe will turn wheels from 26 in. to 42 in. dia. on the tread, with a maximum distance between centres of 94 in. Floor space occupied—length, 20 ft. 6 in.; width, 10 ft. 2 in.; height, 6 ft. 6 in.

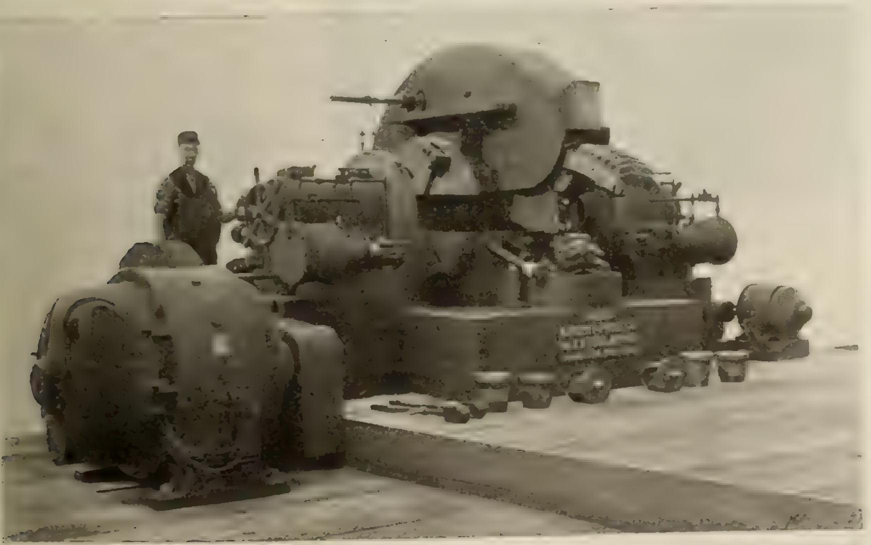


FIG. 2. REAR SIDE OF LATHE, SHOWING DRIVING WHEEL SEGMENT OPENED TO RECEIVE A PAIR OF WHEELS.

BRITAIN'S MUNITIONS ENGINEERING

(Continued from page 292.)

been a very grave matter if Britain and her Allies had been unable to secure these supplies from America.

Without imported machine tools we could not have thought of winning the war. Our own facilities for producing these machines were totally inadequate at the commencement of hostilities. The British machine tool trade was being steadily squeezed out by German and American competition. We exported in the year before the war less than $3,750,000 worth of machine tools, as compared with Germany's export of over $15,000,000 worth in 1913. The greater proportion of the machine tools in our factories is of foreign origin. This must not and cannot continue. The war has at least pointed out the urgent necessity for an awakening to the need for different methods and greater cooperation among manufacturers, in order to secure for Great Britain after the war a better share of the machine-tool trade — and there are many other branches of the engineering industry to which this applies with equal force.

In the case of such a "key" industry as that of machine tools—the indispensable basis of all engineer-manufactures, from a tin-tack to a battleship—we simply must aim at becoming self-supporting. Only by succeeding in this aim can we assure ourselves of ascendancy in days to come—both in the warfare of commerce and, if needs be, on the battlefield.

Munition Workers' Holiday

Turning, in conclusion, to a brief consideration of the personnel that has wrought such a change in Britain's munitions output, we find that it numbers the tremendous total of 2,250,000, of whom 400,000 are women; there is also the central staff of 5,000 of the Ministry of Munitions and a departmental administrative staff of 30,000, including 14,000 women. Of the two and a quarter million workers, the majority are employed on machine tools, to which they came without any previous engineering training. After the war their experience should be invaluable in connection with the trade war in which we shall then be involved.

At the present time, however, our munition workers have no thought for the future—their only object is to "deliver the goods," and so to speed the coming of peace. They have worked splendidly without a break since Easter, and it is, therefore, good news that it has been found practicable to allow a rest period from Sept. 15-19 for these workers. It has been calculated that as a result of the holiday the physical efficiency of the workers will be so increased as to make it likely that the resulting loss in output will soon be made good.

Besides, the machines will have their efficiency increased, too.Many munitions plants are being worked dangerously near the limit of safety, and the long week-end will enable boilers, flues, power plant, shafting, machines, lighting, ventilation, and other equipment to be overhauled in a manner that would be impossible if holidays were taken in relays.

* * *

MOST of the packings used in England for steam jointings have been in the past made abroad, and in consequence of the difficulty of obtaining supplies, several British firms have been endeavouring to make in that country packings of equally good quality. The chief difficulty has been to obtain packings which can be used for joints in superheated steam pipes. Several samples have been tested in the apparatus for testing the blowing-out pressure of joints at the National Physical Laboratory, and according to the report of that institution, the makers have been so far successful in producing joint rings varying from 1-32-in. to ⅛-in. in thickness which will stand a pressure of 250 lb. per square inch at a temperature of 1000 deg. Fah. to 1100 deg. Fah., without any signs of breaking down.

* * *

DURING a recent visit by representatives of the Dominion Parliaments to the East Hecla Works of Hadfields, Ltd., at Sheffield, Sir Robert Hadfield stated that no firm had made more use of science than Hadfields, and Germany had copied many of their achievements. He deplored the lack of appreciation of science by the State, and asserted that there is nothing our enemies can do that Britons could not do better.

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THE QUEBEC BRIDGE TRAGEDY

IF we might so express it, misfortune appears to dog the effort to bring to completion the work of spanning the St. Lawrence River by what is known as the Quebec Bridge. In spite of the elaborate arrangements made and the most carefully and skilfully devised precautionary measures taken, to "make North and South Shore ends meet," disaster supervened, with the result that the centre span or that piece which would have joined shore to shore now lies at the river bottom. As we go to press only the most meagre details of the tragic occurrence are available, therefore exactly what occurred may be said to be more or less problematical. This much may be said, however, regarding the method of procedure adopted—ultimate successful accomplishment of the object in view had begun to demonstrate itself ere misfortune overtook the effort.

Just a week ago we were privileged to present to our readers a specially detailed statement together with illustrations covering the bridge generally, and the centre span raising operation specifically. To those who took the trouble to read the article intelligently, it could not be otherwise than borne in upon them that every untoward contingency that high-grade human skill and inventive genius was capable of foreseeing and meeting had been amply provided for. Criticism of the method of "making ends meet," there may have been, nevertheless sufficient demonstration was made before the collapse came to justify successful attainment in the manner chosen.

The calamity comes home to us with a much more direct keenness than did that which befel the predecessor of the present structure some nine years ago, being, if we might so say, just a trifle more national in its application. The loss of life fortunately is less than might have been expected, although to those to whom bereavement has come, the burden of the disaster is thereby not less lightened. To others again, escape with life has perhaps meant more or less serious injury. To the bridge engineers, the contractors and their operative staffs most closely allied with the work of planning a successful issue to the whole big undertaking, and on whose shoulders the great task bore still more heavily as September 11, 1916 approached, a measure of sympathy equally large with the bereaved and the injured seems unstintingly due. The disappointment, although a national one, will operate most severely within the individually circumscribed area referred to above, the intense anxiety of recent weeks and days accentuating its tragic side.

Just what effect the disaster will have on the navigation of the St. Lawrence between Montreal, Quebec and the sea is not yet determined, although it doubtless will suspend such traffic for the time being at least. The menace to navigation, if such there be, will be removed with the least possible delay after investigation has been made of a clue to the disaster and a line of action determined upon relative to the sunken and wrecked span. The raising or removal of the latter will be subjects for consideration, and, incidental to either, a new method of "making ends meet" may be developed. Monday's abrupt interference with the closing of the gap will postpone by a good many months both the latter eventuality and the subsequent official opening to traffic of the completed structure. Realizing the onerous nature of the task, the tremendousness of the risks involved, and the unexpected and unfortunate outcome of the present proceedings, may it not be possible to fill the breach by building the centre span in place, either whole or part?

* * *

BRITAIN'S WAR ENGINEERING ACHIEVEMENT

IT is impossible, even from the most cursory perusal of the data embodied in the recent speech in the British Parliament by the Minister of Munitions—a synopsis of which appears in this issue, to feel otherwise than satisfied, not only with accomplishment to date as regards variety, type, quality and quantity of our munitions production and its contributory accessories, but to be disposed to look forward to continuous and still greater achievement as each succeeding day unfolds itself. The comparisons made—whether these be taken from a peace-time establishment point of view or from the period covering the early months of the conflict, bear an almost miraculous interpretation in the light of the knowledge now available. Not only is a master hand apparent in the mobilization, in the first instance, of our industrial resources, and more particularly those relating directly to engineering and metalworking, but the latter themselves in the spheres of management and operative skill have mobilized in no less degree a creative genius, and have given same a practical exemplification without parallel perhaps as to either time or place industrially.

Since the data referred to became public property, a clearer vision of the ultimate outcome of the struggle has been secured, and not only so, but an added inspiration has been given our people to persist in their meantime war-directed effort. It is also gratifying to note that our Ally, France, is in the same happy position as ourselves as regards munitions output, and that in her case too, the limit of achievement is still being extended. Side by side with our munitions production, may be placed that of our warship building and fleet maintenance, in which latter respects it may be said that we are even more comfortably circumstanced. Just what our naval strength is now is more or less of a profound secret, however, we know that peace time or early war month comparisons are equally disproportionate with those of munitions production. Although our fleet strength has been procured at what may be termed the expense of our merchant shipbuilding, evidences now point to a relaxation regarding the former, and to a transfer of energy and effort to the latter. That conditions are such as to warrant this step is particularly gratifying, anticipations being that the closing months of the present year are likely to see material increases in our shipyard outputs that will offset in large degree the meagre tonnage of the earlier months.

INDUSTRIAL NOTABILITIES

CLIFTON W. SHERMAN, president, Dominion Steel Foundry Co., was born at Scroom Lake, Essex County, New York, Aug. 25, 1872, the son of Z. C. Sherman. He was educated in the Public Schools, taking the Academy Course at Crown Point, New York. Since entering upon a business career, he has been chemist and metallurgist, Illinois Steel Co., and Griffin Wheel Co., Chicago; general manager in the foundry of the Pressed Steel Car Co., including Pennsylvania Car Wheel Co., Malleable Co., and Central Car Wheel Co., Pittsburg; general manager and director for eight years of Pratt & Letchworth Co., Buffalo, N.Y. He organized and financed the Dominion Steel Foundry Co., Hamilton, becoming president in 1912.

CLIFTON W. SHERMAN.

Mr. Sherman married Ella Wingert, daughter of C. O. Wingert, the family consisting of one daughter. His clubs are the Buffalo and Park, Buffalo; Hamilton; Railroad (New York); Engineers (Montreal). His society, the 32° Scottish Rite, and his recreations, motoring and golf. In religion he is Presbyterian. His residence is at 35 Proctor Boulevard, Hamilton, Ont.

—Photo. courtesy International Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$18 70
Lake Superior, charcoal, Chicago	19 75
Michigan Charcoal iron.	28 00
Ferro nickel pig iron (Soo)	25 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain ..	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base, Toronto	3.50
Steel bars, 2 in. and larger, base..	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base ..	3.30
Bessemer rails, heavy, at mill....	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh....	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.50
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.10
Bars, 2 in. and up	4.00
Structural shapes	3.10
Plates	3.50

FREIGHT RATES

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload ..	$31 00	$30 00
Electrolytic copper	31 00	30 00
Castings, copper	30 00	29 00
Tin	44 00	44 00
Spelter	13 00	14 00
Lead	8 75	8 50
Antimony	16 00	18 00
Aluminum	68 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4 75	$4 50
Heads	5 00	4 75
Tank plates, 3-16 in.	5 25	4 75

WROUGHT IRON PIPE

Prices in effect Aug. 1, 1916

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 06	5 25
½ in.	3 91	5 57
¾ in.	4 72	6 96
1 in.	6 97	10 29
1¼ in.	9 43	13 92
1½ in.	11 28	16 64
2 in.	15 17	22 39
2½ in.	23 99	35 39
3 in.	31 37	46 28
3¼ in.	37 72	55 66
4 in.	44 69	65 95

Lapweld

2 in.	$17 02	$24 24
2½ in.	25 16	36 56
3 in.	32 90	47 81
3½ in.	39 56	57 50
4 in.	46 87	68 13
4½ in.	57 15	83 19
5 in.	66 60	96 94
6 in.	86 40	125 80
7 in.	116 62	165 40
8 in. x 25 lbs. per ft ..	122 50	173 80
8 in. x 25 lbs. per ft. ..	141 12	200 20
9 in.	169 05	239 80
10 in. x 32 lbs. per ft.	156 80	322 40
10 in. x 40 lbs. per ft.	201 88	286 30

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$16 25	$18 00
Copper, crucible	19 25	21 00
Copper, heavy	19 25	20 80
Copper wire	19 25	21 00
No. 1 machine compos'n	14 75	17 00
No. 1 compos'n turings	12 75	14 00
New brass slippings ..	13 75	15 00
No. 1 brass turnings ..	12 25	12 00
Heavy melting steel ..	9 00	10 00
Boiler plate	11 75	10 50
Axles, steel	15 50	15 00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	13 00
Shafting	16 50	16 00
Malleable scrap	10 00	11 00
Pipe, wrought iron....	10 00	9 00
Stove plate	10 00	10 50
Heavy lead	6 00	6 00
Tea lead	5 00	5 00
Scrap zinc	7 75	7 75
Aluminum	35 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	45
Stove bolts	62½
Plate washers	25
Machine bolts, and less	35
Machine bolts, 7-16 and over ..	25
Blank bolts	30
Bolt ends	25
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron....	25
Machine screws, fil. head, brass..	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$5.10
Structural rivets, as above	5.00
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent.
Sq. & Hex Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	.65
Coupling bolts	net
Planer head bolts, without fillet	.15
Planer head bolts, with fillet	net
Planer head bolt nuts up to 1 in. ..	.60
Planer head bolt nuts, over 1 in. ..	.55
Planer bolt washers	list plus 10
Hollow set screws	list plus .20
Collar screws	list plus .20
Thumb screws	.20
Thumb nuts	.75

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh ...	$45 00
Open-hearth billets, Pittsburgh..	45 00
O. H. sheet bars, Pittsburgh ..	45 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3.85	$3.80
Cut nails	3 40	3 40
Miscellaneous wire nails	65%	
Pressed spikes, ⅝ diam., 100 lbs.	$3 90	

MISCELLANEOUS

Solder, guaranteed	0.27½
Solder, strictly	0.25½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	13.95
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	030½
Pure turpentine, single bbls., gal.	0.69
Linseed oil, raw, single bbls.	0.84
Linseed oil, boiled, single bbls.	0.87
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.11
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	55
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	25
3-fluted drills over 1½ in.	15
Bit stock	55
Ratchet drills	15
Machine bits for wood	20
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	30
Sockets	30
Sleeves	50
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	5 25	4 80
Canada plates, dull, 52 sheets	4 50	4 50
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 4g	6 15
Premier, 10¾ oz.	6 75	6 40

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch.	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$20 00	.....
1¼ in.	23 00	.....
1½ in.	26 00	22 50
1¾ in.	26 00	18 00
2 in.	27 00	17 50
2¼ in.	29 50	.....
2½ in.	32 50	23 00
3 in.	44 00	27 00
3¼ in.	.....	30 50
3½ in.	50 00	32 00
4 in.	57 00	40 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.35 to .37
Tin	.50 to .53
Zinc	.18 to .21

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.10
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Sept. 11, 1916.—Industrial affairs, which had become somewhat unsettled, owing to the labor situation on the other side of the border, are gradually assuming normal conditions. The activity in all lines of manufacture continues to reflect the prosperous condition of the country, and the outlook for the coming winter appears to be satisfactory. The unexpected calamity of the collapse of the Quebec Bridge has cast a temporary gloom over the country, as the successful completion of this undertaking has been looked forward to for many months. Favorable crop reports continue to come in and prospects for a normal yield are very encouraging.

Steel

The production end of the steel business continues to tax the facilities of producers; the domestic needs, in many respects, having to suffer for the more urgent necessities of war demands, which are as imperative as ever. The inability of many manufacturers to obtain the required raw material has resulted in some plants being forced to curtail their output. While no price changes are noted for the week, there appears a possibility of advances shortly. A steadier tone is shown in bars and plates, especially in sheet bars for the heavier and wider sizes of plates which are in great demand. The inquiry for ship plates reflects the abnormal demand for this class of material, and also the inability of consumers to cover their requirements. Indications point to a firmer tone in the sheet situation, the export inquiry for galvanized sheets having been quite heavy of late. Blue annealed is not so active, and deliveries are easier. The cooler weather has added considerably to the output of all steel mills. Wire and wire products are showing improvement, and the demand is becoming heavier. Wrought iron pipe and boiler tubes are still in good demand, but prices are generally firm.

Metals

The general condition of the metal market has shown no special features, and prices show little change. Copper is becoming stronger, as the result of an apparent shortage. Tin is at present dull, but otherwise steady. Spelter continues unsteady, with quotations uncertain. Lead is becoming steadier. Antimony is still weak.

Copper.—No special features have developed in the copper situation, although a scarcity of metal is apparent, with a corresponding stiffening of quotations. While the market has been fairly active, no large export buying has been reported. Some extensive inquiries are abroad, but actual contracts have not yet been closed. The future outlook appears very encouraging, and a firm tone is everywhere evident. Production has suffered to some extent owing to the labor troubles prevailing among the employees of some of the large refineries; and, coupled with this, is the inability of the refineries to handle the entire output of the smelters. Facilities for increased refining are under way, but several months must elapse before their operation can have any effect upon present conditions. Producers are believed to be well sold up for the remainder of the year, and the general situation is showing a strong undertone. The London market is steady, with slight advances, corresponding to a ¼c rise. New York is quoting an advance of ¼c on lake and castings, and ⅛c on electrolytic; quotations being 27¾c, 25½c and 28½c respectively. Local dealers, while reporting a strong and fairly active market, are holding firm on quotations of 31c for lake and electrolytic, and 30c for castings.

Tin.—The unsteady position of tin continues to keep this metal in a dull condition. The inactivity of the past few weeks is causing some uneasiness throughout the trade, and prices are inclined to become easier; but while slight declines may be reported, it is not expected that any serious falling off will be shown, as tin is conceded to be one of the firmest of metals. However, war conditions make it impossible to predict the future, and buyers should always be prepared for the unexpected. While no early advance is expected, it is thought that a stronger tone will develop after a short period of inactivity. The London market has declined slightly, and is at present quiet. Following the recent spell of inactivity, the New York market has declined ¼c, the nominal quotation being 38⅝c per pound. The local situation is quiet, with prices unchanged at 44c per pound.

Spelter.—Early in the week the market was looking forward to a further decline in spelter, but recent advices state that the situation is stronger owing to the fact that prices have been advanced on the London market. The apparent return to a stronger position is, however, not due to the activity of the market, but quotations have been lately affected by the lack of shipping facilities at the present time and the increase of ocean freight rates. The demand is still below the supply, and the market is expected to remain weak for some time. London prices have been fluctuating during the past week, and New York prices have been unsteady, advancing ¼c, putting the present nominal quotation at a shade over 9c per pound. Local dealers report a very quiet market, with prices lower; the quotation of 13c being a decline of 1c per pound.

Lead.—The market generally is showing a strong tone, and the demand, both domestic and export, has shown improvement. Rumors are current that the Trust price is likely to become stronger, as producers are apparently well supplied with future orders, and the visible supply for early consumption is on the decrease. However, the London market, and also the American independents, are inclined to show a weak undertone, with slight declines in prices. It is nevertheless expected that a stronger market will shortly be reported. Dealers here are holding firm on a quiet market, quoting last week's price of 8¾c per pound.

Antimony.—In spite of the weakness still shown in antimony, some dealers refuse to dispose of metal at concessions on quoted prices; and this gives rise to the belief that some strength is still left in the market. The New York market has declined ½c during the week, the current nominal quotation being 12c per pound. Local dealers report a dull market and a decline of 1c on the week; quotion being 16c per pound.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Machine Tools and Supplies

No developments have taken place in the tool situation, which is gradually becoming normal. The demand for munition machinery is not so pressing as six months ago, and although orders are still being placed for individual tools, the bulk of the machinery has now been ordered. Deliveries are almost normal and conditions throughout the trade are much more settled, labor difficulties having greatly improved. The volume of secondhand machine tools for sale is very large, which is having the effect of reducing the prices recently obtained for certain kinds of special tools. The requirements of the trade continue to place a heavy demand on all classes of tool supplies, and the raw material situation in some respects is having the effect of advancing quotations on some lines.

Scrap

The situation in the scrap iron and steel market is very strong, and American quotations show a ½c advance on heavy melting steel scrap and old steel rails. Old metals have shown considerable activity, and prices on the light brass scraps show a slight advance. Heavy brasses and scrap zincs are slightly weaker. Dealers here report an active market, but prices are generally firm. Steel axles are quoted at 15½c, being 1c stronger than last week.

Toronto, Ont., Sept. 12.—Industrial conditions continue very favorable, and the volume of business is steadily increasing. The shortage of labor, however, is becoming more serious, as it is interfering with production. The shortage of raw materials is also becoming more acute, and is a serious handicap to manufacturers who are thus forced to advance their prices.

Steel

Unusual strength characterizes the steel market, and the situation is getting tighter, with deliveries slower and prices advancing. All indications point to a continuance of present conditions for an indefinite period, as the demand for steel is increasing rather than decreasing, principally due to the war, but also on account of the steady improvement in industrial conditions and increase in the domestic demand. This latter feature promises to be an impor-

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department is able to present the following list of the moreimportant British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL
Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE
Valparaiso, British Consul General.

COLOMBIA
Bagota, British Consul General.

ECUADOR
Quito, British Consul General.

EGYPT
Alexandria, British Consul General.

FRANCE
Havre, British Consul General.
Marseilles, British Consul General.

INDIA
Calcutta, Director General of Commercial Intelligence.

ITALY
Genoa, British Consul General.
Milan, British Consul.

MEXICO
Mexico, British Consul General.

NETHERLANDS
Amsterdam, British Consul.

PANAMA
Colon, British Consul.
Panama, British Vice-Consul.

PERU
Lima, British Vice-Consul.

PORTUGAL
Lisbon, British Consul.

RUSSIA
Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN
Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN
Stockholm, British Consul.

SWITZERLAND
Geneva, British Consul.

URUGUAY
Monte Video, British Vice-Consul.

VENEZUELA
Caracas, British Vice-Consul.

tant factor in the situation, as there are a number of building propositions, etc, being held up owing to the difficulty of obtaining material, which, when conditions become favorable, will be proceeded with. There is no relief in sight as regards the scarcity of steel and higher prices. Wrought iron pipe has been advanced; the new list has not been issued, but will be out in a day or so. Black pipe only is affected, as the lower price of spelter has made a change in galvanized pipe unlikely in the meantime. Higher prices on boiler tubes and plates are practically certain owing to the big demand and congested condition at the mills. The demand for plates is very heavy, particularly from shipyards and car builders. Boiler and structural rivets have advanced 25c per 100 lbs.

The sheet market is fairly steady at firm prices. There is a heavier demand for special sheets than can be met for the delivery required. Blue annealed sheets are easier as to early deliveries, premiums now being relatively small. Although spelter continues weak, lower prices on galvanized sheets are unlikely in the meantime, as black sheets have a higher tendency and acids are still costly, while labor is also a factor to be considered.

In the United States the steel market is as strong as ever, due principally to the sold up condition of the mills. The situation in this respect is getting more acute and unfilled tonnage reports will no doubt show increases for each month this year. The export demand is still heavy, principally for shell steel and billets, but other products, such as rails, wire rods, barb wire, etc., show a heavy tonnage. The demand for steel bars is heavier, and the mills are practically sold up for the first half of 1917. An advance in sheet bars is expected for the fourth quarter.

Pig Iron

The situation in the pig iron market continues more or less as during the past few weeks. Quotations, however, are firmer, and an advance is very probable in the near future.

Scrap

The renewed activity in the copper market has affected scrap metal and prices have advanced practically 2c per pound. Brass and composition scrap has also advanced an equivalent amount. Steel rails are higher, as is also heavy melting steel. Scrap lead is unchanged, but zinc is a shade lower. The market locally is steady, with business good.

Machine Tools

The principal feature in this market is the steady demand for large swing lathes for machining the large calibre shells. Deliveries on this class of equipment are quite good, considering the demand. Although there have been no increases in makers' prices recently of any consequence, the cost of all machine tools has risen considerably since the war started. Standard lathes, for instance, are now about 60 per cent. higher than they were before the war, while heavier equipment, such as cranes, have advanced almost 110 per cent. Quotations on the general run of machine tools are about 30 per cent. higher.

Supplies

While business is very brisk, it is becoming increasingly difficult to get many lines of machine shop supplies, especially steel and brass goods. Makers of milling cutters are sold up for approximately ten months, so heavy is the demand. Twist drills are also in big demand, as are also files; in the latter case there is a shortage reported. An advance in bolts and nuts of about 10 per cent. has been announced, while malleable bushings are also higher.

Metals

The feature of the metal markets is the continued strength of copper and the possibility of higher prices for this metal. The Allies are placing large orders in the States for copper, while the domestic demand is also heavier. In regard to the other metals, the situation is unchanged, and the markets are quiet. Business locally is very good.

Copper.—With producers practically sold up for this year and probably half of the production for the first six months of 1917 disposed of, it follows that the copper position is an exceptionally strong one. It is thus quite probable that higher prices may be looked for in the near future. Quotations are nominal and unchanged at 30c per pound.

Tin.—The market in New York is quiet, with a slightly easier tone, while London is also easier. Local quotations are unchanged at 44c per pound.

Spelter.—Prices declined during the week, but recovered, and the market is now firmer. The brass trades have been buying more spelter, and galvanizers are also taking fair quantities. Local quotations are unchanged at 14c per pound.

Lead.—Consumers are said to be well covered; the demand for lead in the meantime is consequently light. The "Trust" price of 6.50c New York is unchanged, and "Independents" are still a shade higher at 6.60c New York. Local price 8½c per pound.

Antimony.—The market is quiet and featureless, with quotations unchanged and nominal at 18c per pound.

Aluminum.—The situation in this market is unchanged, with nothing of importance to note. Quotations unchanged at 68c per pound.

Trade Gossip

The Deloro Mining & Reduction Co., Deloro, Ont., have transferred their business to the Deloro Smelting & Reduction Co.

The Canadian Fairbanks-Morse Co., Toronto, have been awarded a contract for a 30 h.p. motor-driven vertical centrifugal pump by the Town Council of Palmerston, Ont.

Toronto-Hamilton Highway. — Hon. Finlay G. Macdiarmid, Minister of Public Works for Ontario, stated on Sept. 5 that the Toronto-Hamilton highway would be open for traffic in about three weeks.

Commissioners End Tour of Britain.—The Canadian Trade Commissioners, having finished their provincial tour of Great Britain, received most cordial receptions in the various cities they visited, and their movements received considerable attention from the newspapers.

Wide Canadian Forests.—Merchantable timber of Canada is distributed by millions of acres, as follows: Nova Scotia, 5; New Brunswick, 9; Quebec, 130; Ontario, 70; British Columbia, 100; Saskatchewan, 100. The grand total of forest area is 414,000,000 acres for the Dominion.

H. E. Streeter, formerly works manager of the Precision Tool & Machine Co., of Montreal, has severed his connection with this company, and has taken over the Canadian sales agency for Grankvist Drill Chuck Co. for the sale of "Johansson" standard gauge blocks and the "Johansson" adjustable limit snap gauges. An office has been opened at 504 McGill Building, Montreal.

St. John, N.B.—Much interest is being shown in the tungsten (wolfram) mine which is being developed at Burnt Hill, on the South-west Miramichi. George E. Howie, C.E., of Fredericton, has been appointed resident engineer. The Milton Hersey Co., of Montreal, and Mathew Lodge, of Moncton, are interested in the property.

Britain Controls Synthetic Nitrate.—Great Britain has purchased the entire supply of synthetic nitrate in Norway, thereby preventing exportation of this requisite in the manufacture of ammunition by Germany, according to a statement made at San Francisco, Cal., recently, by J. M. Humphreys, manager of a large British nitrate corporation, who was in that city en route to Chile. Mr. Humphreys stated that he plans to put into operation at the nitrate fields of his company in Chile a new process for extracting and elaborating nitrate that will cut the cost of production in half.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

St. John, N.B.—The Governors of the General Hospital here contemplate building a laundry and power house.

St. Thomas, Ont.—The Monarch Knitting Co., will build an extension to the power plant and factory. T. O. Aked is the manager.

Nelson, B.C.—The West Kootenay Power & Light Co. will construct an 8,000-horsepower unit addition to its plant at Upper Bonnington Falls.

Vancouver, B.C.—Fire of unknown origin destroyed the buildings and plant of the Pacific Steel Products Co., in operation only five weeks, causing a loss estimated at $150,000.

Montreal, Que.—President Chahoon of Laurentide Ltd., announced recently that by the middle of November the company's sulphite mill at Grand Mere would have its capacity increased 100 per cent.

Redcliffe, Alta.—The Redcliffe Rolling Mills is installing a new furnace at its plant which will double the present capacity. The company will also install machinery for the manufacture of bolts and nuts.

Iroquois Falls, Ont.—Plans for the enlargement of the capacity of the Abitibi Power & Paper Co., and financial arrangements for the extension of the plant have been completed, according to reports. The proposed extension will increase the company's output of newsprint to some 400 tons per day.

Montreal, Que.—The Atlas Construction Co., has been awarded a contract for the construction of a brick and reinforced concrete paper factory and power house for the Thompson Norris Co., 355 East Notre Dame street, Montreal. The plant will cost $84,000. Lockwood & Greene, Boston Mass., are the architects .

St. Thomas, Ont.—The St. Thomas Construction Co., St. Catharines Street, suffered damage to the extent of about $20,000, by a fire on Sept. 5. Among the items which make up the $20,000 loss are included the furnaces, air compressors and a number of other valuable machines. The loss will be pretty well met by the insurance carried.

Toronto, Ont.—Plans have now been completed for the initial mill of the West

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia .
C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Ploschad 9, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.
R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

Dome Consolidated, and it is proposed to have the foundations for the mill and machinery completed this fall so that the other construction work can be carried on throughout the winter months. A start will also be made almost immediately on the new surface plant which is to be installed at the head of the main shaft.

Electrical

Kingston, Ont.—It is reported that there is a proposition on foot to have the C.P.R. line from Kingston to Renfrew electrified, and that power will be secured from the Mississippi River to operate the road, and also meet the needs of Kingston and adjacent towns.

General Industrial

Granby, Que.—The Elastic Web Co., may build a factory here.

Hamilton, Ont.—The Chipman & Halls Knitting Co., will build a factory here to cost about $15,000.

Regina, Sask.—The Prairie Biscuit Co. is building a factory which it is expected will be in operation early in January next.

Calgary A,lta.—The Western Canada Flour Mill Co., propose to build an addition to their plant at an approximate cost of $5,800.

Brantford, Ont.—The City Council have decided to grant a fixed assessment of $3000 on the Hampel Paper Box Co. new factory.

Toronto, Ont.—H. Webb Co's. factory on Buchanan St., was destroyed by fire on Sept. 10, entailing a loss of over $100,000. The cold storage plant was destroyed as well as the bakery.

Galt, Ont.—For the purpose of manufacturing sand brick by a new process, an invention of John T. Jackson of Toronto, the Dominion Building Products, Ltd., has been organized, with Dr. David D. Williams, of Toronto, president, W. J. Heron, Galt, vice-president, and John T. Jackson, managing director. Vice-President Heron announced that the erection of a plant in Galt will be commenced in a few weeks, and other plants will be established at Toronto, Sarnia, Owen Sound, Sudbury and Picton. The headquarters of the concern will be at Galt, where almost unlimited quantities of suitable sand are obtainable. Each plant will have capacity of 190,000 bricks per day.

Municipal

Milton, Ont.—The Town Council propose spending $5,000 on additional fire equipment.

Winnipeg, Man.—The Board of Control are in the market for fifteen fire alarm boxes and 3,000 feet of hose.

Aylmer, Que.—The Town Council have decided to call new tenders for the proposed filtration plant, the recent bids having been rejected.

Saskatoon, Sask.—This City Council has passed a by-law to provide for the erection of an incinerator plant to cost $100,000. G. H. Archibald is the engineer.

St. Marys, Ont.—The Town Council are considering the installation of an auxiliary gasoline waterworks plant at an approximate cost of $4,000.

Chatham, Ont.—The City Council propose to extend a 12-in. main along King street west from Lacroix to Robertson Avenue, and thence to run a 10-inch main to the Dominion Sugar Co. plant.

Halifax N.S.—The Board of Control have received tenders on water meters but no award has been made yet. It is likely that 500 meters will be purchased at the present time and not 3000 as was originally intended.

Swift Current, Sask.—The City Council proposes to make extensive additions to its power plant. Two plans of operation are contemplated, one a gas plant at a cost of $100,000 and the other a steam plant to cost $34,000. J. W. Calder is city engineer.

Kingston, Ont.—Lieut-Col. McCammon, camp sanitary officer, is arranging for the installation of a new system of injecting chlorine into the water of Barriefield Camp. A specialist from New York is here for the work and new apparatus will be installed, which promises to completely take the taste of chlorine out of the camp water.

Renfrew, Ont—The ratepayers have defeated by a majority of 64 a by-law for power development on the Bonnechere River by the Hydro-Electric Power Commission of Ontario. M. J. O'Brien offered to develop 5,000 h.p. on the Madawaska at $15 per h.p. The ratepayers thought this proposal better than having the commission bring 1,500 h.p. from the Bonnechere at $13 per h.p.

Kitchener, Ont—At a meeting of the City Council held on Sept. 5, the recommendation of the Finance Committee that the request of the Water Commissioners, asking the Council to raise the sum of $100,000 for the erection and completion of a waterworks plant in Bridgeport, with the necessary connections to the present system, be granted, was adopted. The plans for the new system have been accepted by the Provincial Board of Health.

Wood-Working

Guelph, Ont.—Fire on Saturday destroyed George McAllister's saw mill.

Clarksburg, Ont.—The A. E. Pedwell Co. planing mill was recently destroyed by fire. The loss is estimated at $4,000.

Railways—Bridges

Montreal, Que.—The C. N. R. has made satisfactory financial arrangements to finish its terminals here.

Vancouver, B.C.—The Harbor Commissioners will submit plans to the City Council with regard to the proposed harbor terminal railways.

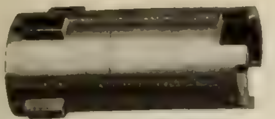
Guelph, Ont.—Although no definite announcement has been made, it is expected that the Toronto Suburban Railway between Guelph and Toronto will be in operation about the first of October.

Marine

Port Arthur, Ont.—The steamer Masaba, of Toronto, which grounded recently at Victoria Island, Lake Superior, has been released and brought here for repairs.

Sarnia, Ont.—The Reid Wrecking Co. has been awarded the contract for raising the steamer Henry Houghton, which sank at Mullen's coal dock, Sandwich, Ont., on September 6. The wreckers guarantee to have the Houghton up in five days. If they succeed within the time limit they are to receive a bonus of $500 from the Mullen Coal Co.

Halifax, N.S.—The St. Peter's Canal, which connects the Bras d'Or Lakes with the Atlantic at the Strait of Canso, and which has been closed for more than a year while being enlarged, was formally re-opened on September 2. This canal was first opened in 1865 and, with comparatively slight changes, has been operated since then. The lock has now been lengthened about 250 feet and a curve in the alignment is to some extent eliminated. The entrance to the canal at the southern end has been widened and enlarged, making a commodious and sheltered dock for vessels awaiting passage through to the Bras d'Or Lake. This canal makes it possible to carry on a considerable trade by sailing vessels and steamers drawing not more than 17 feet of water.


Rough Bore, Straight Diameter

Rough Bore, Inside Radius

Finish Bore, Straight Diameter

Finish Bore, Inside Radius

50% Boring Economy!

8" Shells

9.2" Shells

High-salaried men are employed to keep the cost of production down, but in this case a boy could see the advantages to be obtained through these boring heads. 25% to 50% reduction is obtained only by the use of Davis Boring Heads. These consist of 16 sizes and 26 different styles, and embrace every operation from a shell of the smallest calibre to 8" and 9.2". (The quality of work produced is limited, and that limit is highest quality.)

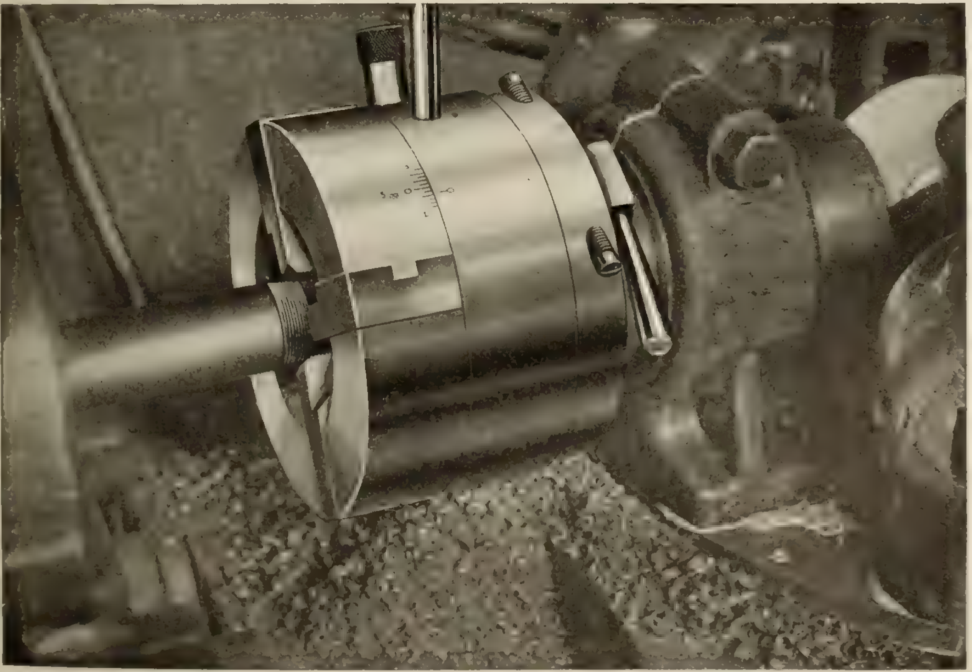
Davis Boring Heads are constructed of high-speed steel and are the result of years of scientific knowledge of boring-tool requirements and the experience obtained by the "pioneering" days.

WRITE FOR PARTICULARS

The heads illustrated here are used for operations on 8" and 9.2" shells. The heads are all equipped with micrometer adjustments. This enables more speed to be put to the operation, leaving the adjusting of the cutters to the micrometer.

The A. R. Williams

Machinery Co., Limited **64-66 Front St. W., Toronto**



This Geometric Die Head is threading a malleable iron casting, on a Jones & Lamson Machine, in the plant of the Detroit Gear & Machine Co., where they make transmission and internal drive rear axles.

Have you investigated the merits of the Geometric Self-opening and Adjustable Die Heads? It will cost you nothing to get our quotation on your specifications.

The Geometric Tool Company, New Haven, Conn., U.S.A.

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

Trade Gossip

The Beaver Wood Fibre Co., has increased its capital stock to $2,000,000.

U.S. Copper Refined.—It is estimated that the refinery yield of copper in the United States during the month of August ran between 150,000,000 and 160,000,000 pounds. The high record on present capacity was established last May, with approximately 190,000,000 pounds of refined copper being produced by the various plants of the United States.

Royal Commission Visits Cobalt.—The Dominions Royal Commission, inquiring into the resources of the Colonies of the Empire, recently visited Cobalt and Timmins. From there they proceeded to British Columbia. The party consisted of Sir George Foster, Hon. Sir Edgar Bowring, W. Lormier, Joseph Tatlow, Mr. Harding, secretary, and Mr. Bridgeman, clerk. Mr. Thomas Gibson, Deputy Minister of Mines for Ontario, accompanied the party.

The Newsprint Market.—Stocks of newsprint in hands of producers in United States and Canada at end of July were probably in the neighborhood of 63,000 tons, according to best information available at present. The normal average of stocks on hand at this time is between 80,000 and 90,000 tons. On June 31, 1915, they were close to 93,000 tons. Manufacturers have been unable to build up their reserve stocks as usual during the summer, owing to unprecedented demand.

C.N.R. Mileage.—Among the interesting items included in the annual report of the Canadian Northern Railway Co. is the statement of mileage which **totals 7,761 miles, distributed among the** Provinces and States as follows:

Province of Nova Scotia	380.76
Province of Quebec	626.77
Province of Ontario	1,480.65
Province of Manitoba	1,983.46
Province of Saskatchewan	2,111.85
Province of Alberta	962.19
State of Minnesota	215.42
Total mileage	7,761.10

Kingston, Ont.—Frontenac County will soon have an industry that will mean exports to extent of $100,000 this year and possibly double that amount next year. The feldspar of the county will be mined on an extensive scale to meet the demand for potash, enamel requirements and fertilizing. There are five companies operating in this district. The Richardson properties at Desert Lake have been taken over by Feldspar, Limited, while a Buffalo firm has announced its intention of handling 220 tons daily.

Russia in Need of Leather.—C. F. Just, Canadian Government commercial agent in Petrograd, Russia, reports that steps are being taken to organize a combined leather selling agency for Russia which will deal only in leathers produced in the countries allied with Russia in the present war. Plans are being formed for business after the war, and it is hoped that a substantial portion of the leather trade which was controlled by German manufacturers before the war will be captured. The agency will have its branches in four or five leading centres of consumption in Russia. It is desired to add some of the leading Canadian leather manufacturers to the list of firms supporting the selling agency. Further particulars may be obtained on application to the Commercial Intelligence Branch of the Department of Trade and Commerce, Ottawa.

New Incorporations

The Sudbury Nickel Refineries has been licensed to carry on business in Toronto, with a capital not exceeding $5,000,000. Angus W. Fraser, of Toronto, is the attorney.

The Deloro Smelting & Refining Co. has been licensed to carry on business in the Province of Ontario with a capital not exceeding $1,000,000. Thomas Southworth, of Toronto, is the attorney.

Drummondville Matches, Ltd., has been incorporated at Ottawa, with a capital of $100,000, to manufacture matches at Drummondville, Que. Incorporators: C. Beauchamp, J. A. Desautels and H. Brosseau, all of Montreal.

The Rapid Tool & Machine Co. has been incorporated at Ottawa, with a capital of $40,000, to make machine tools, gauges and motors of all kinds at Lachine, Que. Incorporators are: John MacNaughton and J. G. Cartwright, all of Montreal.

The Sterns Tire & Tube Co. of Canada has been incorporated at Ottawa, with a capital of $1,000,000, to manufacture automobiles and parts, with head office at Toronto, Ont. Incorporators: J. L. Ross, L. F. Lambier and A. S. Macrae, all of Toronto.

The Jackson Construction Co. has been incorporated at Ottawa, with a capital of $30,000, to carry on the business of contractors and engineers, with head office at Batiscan, Que. Incorporators: B. Melancon, A. Dufort and A. Dufresne, all of Montreal.

Consolidated Steel Foundries has been incorporated at Ottawa, with a capital of $500,000, to carry on the business of steel makers, engineers and sheet metal workers, etc., with head office at Montreal. Incorporators are: L. E. Bernard, W. A. Handfield and J. A. Sullivan, all of Montreal.

Canadian Zinc Products Co. has been incorporated at Ottawa, with a capital of $45,000, to deal in ores and metals of all kinds, with head office at Montreal. Incorporators are: R. F. Maxey, of Portland, Me., also L. D. Adams and A. R. Holden, of Montreal.

Tenders

Toronto, Ont.—Tenders will be received until October 2, addressed to the Chairman of the Toronto Harbor Commissioners, and marked "Tenders for Cherry Street Bascule Bridge." All information may be obtained by applying to E. L. Cousins, chief engineer and manager.

Ottawa, Ont.—Tenders will be received until September 29, for the construction of an extension to the west breakwater at Port Stanley, Elgin County, Ont. Plans and forms of contract can be seen, and specification and forms of tender obtained at the Department of Public Works, Ottawa, at the offices of the District Engineers at Windsor, Ont., and Equity Building, Toronto, Ont., also on application to the Postmaster at Port Stanley, Ont.

Ottawa, Ont.—Tenders addressed to J. W. Pugsley, Secretary Department of Railways and Canals, Ottawa, Ont., will be received up to September 18, for the construction of foundations for 500,000 bushel storage capacity grain elevator, working house and track shed at St. John, N.B. Plans, specifications and blank form of contract may be seen at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa; at the office of the Chief Engineer, Moncton, N.B..; at the office of the Terminal Agent, St. John, N.B. and at the office of the John S. Metcalfe Co., Engineers, Montreal, P.Q.

Ottawa, Ont.—Tenders will be received up to October 2 for the undermentioned metal supplies for delivery to H.M.C. Dockyards at Halifax, N.S., and Esquimalt, B.C., Items 1, steel angles, bars, sheets and plates; 2, iron bars, fire bar; 3, brass bars and sheets; 4, copper sheets and bars; 5, solder tin- and alloys; 6, tubes brass and copper. Forms of tender and full information may be obtained by application to the Department at Ottawa, or to the Naval Store Officers, at H.M.C. Dockyard Halifax, N.S., and Esquimalt B.C. In making application for forms, the particular item or items for which forms are required should be clearly stated.

WAR LOAN

DOMINION OF CANADA

Issue of $100,000,000 5% Bonds, Maturing 1st October, 1931

PAYABLE AT PAR AT

OTTAWA, HALIFAX, ST. JOHN, CHARLOTTETOWN, MONTREAL, TORONTO, WINNIPEG, REGINA, CALGARY, VICTORIA

INTEREST PAYABLE HALF-YEARLY, 1st APRIL, 1st OCTOBER.
PRINCIPAL AND INTEREST PAYABLE IN GOLD.

ISSUE PRICE 97½

A Full Half-Year's Interest will be Paid on 1st April, 1917.

The Proceeds of the Loan will be Used for War Purposes Only.

The Minister of Finance offers herewith, on behalf of the Government, the above named Bonds for subscription at 97½, payable as follows:—

10	per cent.	on application;
30	"	" 16th October, 1916;
30	"	" 15th November, 1916;
27½	"	" 15th December, 1916.

The total allotment of bonds of this issue will be limited to one hundred million dollars, exclusive of the amount (if any) paid for by the surrender of bonds as the equivalent of cash under the terms of the War Loan prospectus of 22nd November, 1915.

The instalments may be paid in full on the 16th day of October, 1916, or on any instalment due date thereafter, under discount at the rate of four per cent. per annum. All payments are to be made to a chartered bank for the credit of the Minister of Finance. Failure to pay any instalment when due will render previous payments liable to forfeiture and the allotment to cancellation.

Subscriptions, accompanied by a deposit of ten per cent. of the amount subscribed, must be forwarded through the medium of a chartered bank. Any branch in Canada of any chartered bank will receive subscriptions and issue provisional receipts.

This loan is authorized under Act of the Parliament of Canada, and both principal and interest will be a charge upon the Consolidated Revenue Fund.

Forms of application may be obtained from any branch in Canada of any chartered bank and at the office of any Assistant Receiver General in Canada.

Subscriptions must be for even hundreds of dollars.

In case of partial allotments the surplus deposit will be applied towards payment of the amount due on the October instalment.

Scrip certificates, non-negotiable or payable to bearer in accordance with the choice of the applicant for registered or bearer bonds, will be issued, after allotment, in exchange for the provisional receipts.

When the scrip certificates have been paid in full and payment endorsed thereon by the bank receiving the money, they may be exchanged for bonds, when prepared, with coupons attached, payable to bearer or registered as to principal, or for fully registered bonds, when prepared, without coupons, in accordance with the application.

Delivery of scrip certificates and of bonds will be made through the chartered banks.

The issue will be exempt from taxes—including any income tax—imposed in pursuance of legislation enacted by the Parliament of Canada.

The bonds with coupons will be issued in denominations of $100, $500, $1,000. Fully registered bonds without coupons will be issued in denominations of $1,000, $5,000, or any authorized multiple of $5,000.

The bonds will be paid at maturity at par at the office of the Minister of Finance and Receiver General at Ottawa, or at the office of the Assistant Receiver General at Halifax, St. John, Charlottetown, Montreal, Toronto, Winnipeg, Regina, Calgary, or Victoria.

The interest on the fully registered bonds will be paid by cheque, which will be remitted by post. Interest on bonds with coupons will be paid on surrender of coupons. Both cheques and coupons will be payable free of exchange at any branch in Canada of any chartered bank.

Subject to the payment of twenty-five cents for each new bond issued, holders of fully registered bonds without coupons will have the right to convert into bonds of the denomination of $1,000 with coupons, and holders of bonds with coupons will have the right to convert into fully registered bonds of authorized denominations without coupons at any time on application to the Minister of Finance.

The books of the loan will be kept at the Department of Finance, Ottawa.

Application will be made in due course for the listing of the issue on the Montreal and Toronto Stock Exchanges.

Recognized bond and stock brokers will be allowed a commission of one-quarter of one per cent. on allotments made in respect of applications bearing their stamp, provided, however, that no commission will be allowed in respect of the amount of any allotment paid for by the surrender of bonds issued under the War Loan prospectus of 22nd November, 1915. No commission will be allowed in respect of applications on forms which have not been printed by the King's Printer.

Subscription List will close on or before 23rd September, 1916.

Department of Finance, Ottawa, September 12th, 1916.

Contracts Awarded

The Turnbull Elevator Mfg. Co., Toronto, have been awarded a contract for the elevators for the hospital at Ingersoll, Ont.

Antigonish, N.S.—The contract for the erection of a new library building for St. Francois Xavier University has been let. A gymnasium will also be built.

Toronto, Ont.—The Scarboro Township Council have awarded a contract to the Ontario Bridge Co. for a steel bridge over the Rouge River, to cost $1,700.

PURO
(MADE IN CANADA)
Saves Dollars

Why let that old-fashioned faucet go on year after year wasting water—MONEY?
Why more drinking cups and glasses, only to become unsanitary—lost, broken or carried away?
Puro Sanitary Drinking Fountain stops all this needless waste. Puro saves you 35% on the water bill alone. Puro saves you all that money you spend for cups. YET Puro is always ready with a clear, cool drink with dollars in the bank.

Bubble Handle
Water Inlet
Faucet Handle
PURO SANITARY DRINKING FOUNTAIN
PATENT

Puro Pays for Itself

You don't have to wait years to get back the small investment you have tied up in Puro equipment—
You start cashing in at once not only on your water bill saving but on the increased efficiency of your workers as well.
Men like PURO it's Clean. No danger of deadly germs lurking in its sparkling bubble.
Write us tell how many men, how many departments, and we'll tell you how much the cost will be to

"PURO - FY"
YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

Personal

Major William Ashplant, formerly city engineer of London, Ont., has been wounded in France.

O. W. Cook, works manager of the Canadian Cartridge Co., Hamilton, Ont., was recently appointed manager of the entire organization.

James Balkwill has been appointed superintendent of the M. C. R. at St. Thomas, Ont. Mr. Balkwill is the first Canadian to occupy this position.

Thomas John Kennedy, president and general manager of the Algoma Central & Hudson Bay Railway Co., and the Algoma Eastern Railway Co., died at his home in Sault Ste. Marie, Ont., on August 30, aged 61.

J. H. Plummer, former president of the Dominion Steel Corporation, who has been abroad since he resigned from the presidency some time ago, returned to Toronto on September 2. Mr. Plummer is greatly improved in health.

Thomas Doherty, Mayor of Sarnia, Ont., and president of the Doherty Mfg. Co., died suddenly on September 6, aged 70. Mayor Doherty went to Sarnia from Brantford 35 years ago, and had been in the stove business since.

Lord Shaughnessy, president of the C. P. R., has left Montreal for the annual inspection of the company's lines through to the coast. Accompanying him are Directors Sir Herbert Holt, R. B. Angus and E. W. Beattie, K.C., Sir Edmund Osler and W. D. Matthews. General Manager A. D. MacTier will go as far as Fort William, where the train will be met by Western officers, who will conduct the party West. The trip will occupy about three weeks.

Building Notes

Toronto, Ont.—A building permit has been granted to Henry Griesman for a 3-storey brick factory to cost $20,000.

St. John, N.B.—The School Board has decided to proceed with the erection of a new school building on Bentley Street at a cost of $70,000.

St. John, N.B.—The Crosby Molasses Co. are building a large brick addition to their warehouse on City Road. Grant & Horne are the contractors.

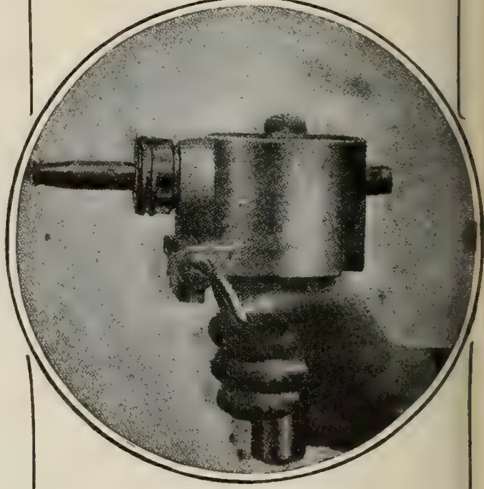
St. John, N.B.—Ground has been broken for a Catholic High School for girls. The building will be three storeys high and 123 ft. by 87 ft.

St. John, N.B.—Grant & Horne, contractors, have recently completed the construction of storage warehouses for the Atlantic Sugar Refineries at a cost of $33,000.

Toronto, Ont.—At a meeting of the Separate School Board, held recently, a by-law was passed authorizing the chairman of the Finance Committee, Rev. Dean Moyna, and Secretary-Treasurer Rev. J. J. McGrand to borrow $40,000 for building purposes.

Simcoe, Ont.—Tenders will be received by the Secretary of the Simcoe Board of Education, up to August 30th, for the various trades required in the erection of two new school buildings. Plans and specifications may be obtained upon aplication to Chapman and McGiffin, 95 King Street East, Toronto.

The Metals Coating Co. of Canada, Ltd.
Versailles Building, 90 James St.
MONTREAL, CANADA



A machine gun making its ammunition from Reeled Wire, and coating objects by bombarding with minute plastic particles of metal. The **Schoop method** of Metallic deposition, any object and any size coated with a positive adhesive and homogeneous coating with any metal for any desired thickness.

Solves one of the greatest problems heretofore confronting the structural engineer, because it produces on iron or steel a permanent coating not susceptible to corrosion.

Carbons can be coated with copper, etc.

For full information write for booklet "D".

Refrigeration

Montreal, Que.—Armour & Co. will build a packing plant and power house here.

Montreal, Que.—The British Munitions Co. had their plant equipped with three refrigerating machines of 50 tons capacity each, together with three batteries of cooling coils, all furnished by the Frick Co., Waynesboro, Pa., and installed by the Carrier Engineering Corporation, New York, N.Y.

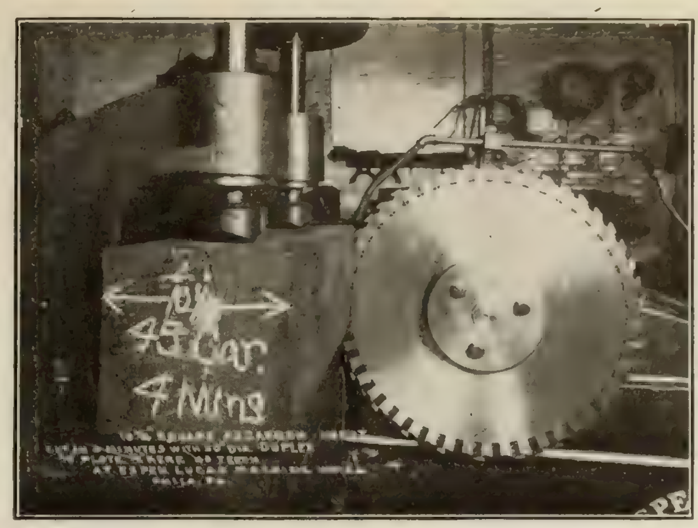
Catalogues

Belts, the house organ of the Federal Engineering Co., Toronto, contains in the August issue, humorous stories and some interesting matter relative to belting.

Mechanics' Tools.—The Keystone Mfg. Co., Buffalo, N.Y., have issued a new catalogue, No. 24, illustrating and describing an interesting line of mechanics' tools, including ratchets, wrenches, sockets, drill sleeves, etc. A complete price list is included for the various lines.

Smooth-On Instruction Book No. 16, just off the press, is being distributed to the trade by the Smooth-On Manufacturing Co., Jersey City, N.J. This book, as in the case of previous issues, will be of considerable value to those in charge of machine shops and foundries. The book contains much of the original matter, but in addition, many new examples and illustrations, showing the working of the different "Smooth-On" cements, have been included. The book contains numerous testimonials from users of "Smooth-On" products, accompanied by illustrations showing different classes of work where these materials have been used. Copies will be sent to anyone forwarding their name and address.

Strength of Webs of I-beams and Girders.—For the purpose of studying the web strains in I-beams and girders tests have been conducted at the Engineering Experiment Station of the University of Illinois on a number of specimens consisting of 12-inch I-beams having webs planed down to a thin section and 24-inch built-up girders having webs of thin plates. The test data were used in conjunction with a mathematical analysis to determine the importance of the diagonal strains and the methods of failure of girders. The results show (a) that, in general, the shearing stress is a maximum at the neutral axis, but that diagonal stress at the junction of web



Circular Metal Cutting Saw Blades for Any Type of Machine

Let us demonstrate what a saving can be made by installing a

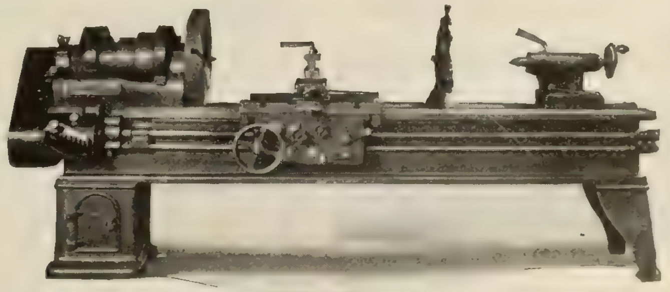
HUNTER "DUPLEX" Inserted Tooth Blade

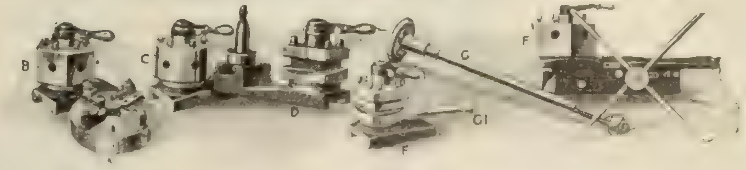
Write for information

HUNTER SAW & MACHINE CO., Pittsburgh, Pa., U.S.A.

"PERFECTION"

THE NAME THE DESCRIPTION





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Edgar Bloxham, Inc.

Grand Central Terminal Building NEW YORK, N.Y., U.S.A.

Prices lower than any other lathe of same specifications because of volume of manufacture and fixed low percentage of profit over actual cost of production.

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Patent Solicitors. Head Office, Royal Bank Bldg., Toronto. Ottawa Office, 5 Elgin St. Send for our Plain Practical Pointers. Copy of National Progress, in which our patents are advertised, mailed free.

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We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS
372 Pape Avenue, Toronto, Can.

and flange must be considered; (b) that approximate methods of computing shearing stress in webs should, under certain conditions, be checked by more exact methods; (c) that stiffeners at supports and under concentrated loads are very necessary; and (d) a formula is developed for the buckling strength of webs. The investigations were conducted by Professor H. F. Moore and Professor W. M. Wilson. The results are described in Bulletin No. 86 of the Engineering Experiment Station, copies of which may be obtained upon application to W. F. M. Goss, director, urbana, Illinois.

Water Lift Pump.—The Buckeye Pump Mfg. Co., Columbus, Ohio, have issued a folder containing suggestions for installing the "Buckeye" water lift pump, together with a diagram showing the necessary piping and connections for a typical installation. A sectional view of the pump is included showing its construction, accompanied by a table giving the principal dimensions of the various sizes.

High Pressure Tanks.—The Wm. B. Scairfe & Sons Co., Pittsburg, Pa., have recently issued a catalogue dealing with their line of copper brazed high pressure tanks for air, gas and liquids. The construction of these tanks is described, followed by a general specification and tables, giving the working pressures and dimensions for painted and galvanized pressure tanks. One section of the catalogue illustrates and describes brazed and riveted pneumatic tanks for a variety of purposes, and include tables giving the capacity, weight and prices of the various sizes of each type. Another section deals in the same way with garage air and gasoline tanks. The concluding section illustrates and describes a line of range boilers.

Portable Conveyers. — Bulletin No. 184, just off the press, features an interesting line of portable conveyors and stackers for handling barrels, bags, boxes and miscellaneous packages, made by the Jeffrey Mfg. Co. The equipments illustrated and described in this bulletin are adapted to a wide range of industries, such as bakeries, breweries, cement mills, flour mills, glue factories, paint works, salt works, sugar refineries, warehouses, docks and storage where large quantities of material are handled in packed form; for stacking purposes, for loading material into shipping platforms, into freight cars, etc. Free copies may be obtained by interested persons, by addressing the Canadian office of the Jeffrey Mfg. Co., Power Building, Montreal, Que.

MALLEABLE GREY IRON **CASTINGS** ALUMINUM & BRASS

OUR CASTINGS GIVE A MAXIMUM OF GOOD SERVICE BECAUSE THEY ARE MADE AND TREATED ESPECIALLY FOR THE WORK REQUIRED.

MADE IN ALL SIZES.

Castings made on moulding machines are accurate and true to pattern.

IT WILL PAY YOU TO GET ACQUAINTED — SEND A TRIAL ORDER.

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"Barnes-made" **SPRINGS**

are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

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Established 1857.
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U.S.A.
Man'f'rs of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire

MacKinnon, Holmes & Company, Limited
Sherbrooke, Que.

Engineers, Manufacturers and Erectors of Steel Structures such as

Bridges, Buildings, Tanks, Penstocks, Smoke Flues, Stacks, Coal Bins, Refuse Burners, Air Receivers and other **Miscellaneous Steel Plate and Structural Steel Work.**

Write us for prices.

ENGINEERING EXHIBITS, 1916 CANADIAN NATIONAL EXHIBITION

A COMPLETE line of electric and gas furnaces for all workshop purposes was shown by Canadian Hoskins. The former include small experimental and analytical electric apparatus, increasing in size to large workshop types for heavy work and rough usage. One furnace was shown which dispenses with the muffle formerly deemed necessary with electric furnaces. Large diameter hairpin units are laid in moulded grooves in the walls and covered with alundum cement. When renewals are necessary the cement is pried loose and replaced with new stuff at trifling cost compared with new muffles, which were formerly required. An electric oil tempering furnace was also exhibited, which entirely overcomes all fire risks incidental to gas heating. The gas furnaces exhibited were of heavy cast iron shell construction with reinforced sides and 4½ in. steel mixture fire brick lining, with 1 in. asbestos. Other gas furnaces shown were for treating high-speed steel, also crucible types for lead, cyanide and barium baths.

An exhibit of particular interest to the woodworking industry was in the form of a complete working model of a Linderman automatic jointer. This model was exhibited by the Garlock-Walker Machinery Co., whose exhibit also included special munition lathes and a full range of Thor pneumatic tools. Specially interesting were samples of work done on the Linderman machine, which, in a few seconds, performs all of the operations necessary for uniting lumber automatically—that is, making narrow lumber wide for any purpose by means of an auto-clamping taper wedge dovetail. Jointing, gluing, clamping, and sizing of panels to finished widths are combined into one operation, thus doing work which formerly required three to five separate operations and machines. The work done by this machine is of particular value in furniture building, producing dependable glue joints in quartered oak, mahogany, gum, walnut, maple, etc.

Oxy-acetylene welding is now thoroughly established as an industrial process, and numerous samples of Canadian work and apparatus were shown by L'Air Liquide Society and Carter Welding Co. Steel barrels, tanks, and other sheet metal goods with welded seams were a feature of the former exhibit, while mechanical applications of the process to cutting irregular shapes by means of a pantographic device known as the Oxygraph were prominent in the latter display. All the necessary apparatus, including generators, torches, gauges, carbide and oxygen cylinders were available for inspection in both exhibits.

The exhibits in the Machinery Hall have usually been confined to products of direct interest to machinery and

Steel Shell Forgings or Billets of any size or weight will move any distance or about curves upon our specially constructed Gravity Carriers and Incline or Horizontal power devices. No labor required.

Canadian Mathews Gravity Carrier Co., Toronto

We are qualified Tool, Die, Jig, Gauge and Fixture Makers.
WRITE US.
Windsor Machine & Tool Works.
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Forgings Cranks, Connecting-Rods, Valves and any other special work.
MACHINE HANDLE FORGINGS
Blue finish, ready for use.
Write for prices to
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DIES, TOOLS AND REPAIRS
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PORTABLE PLANERS
DRAW CUT SHAPERS
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FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
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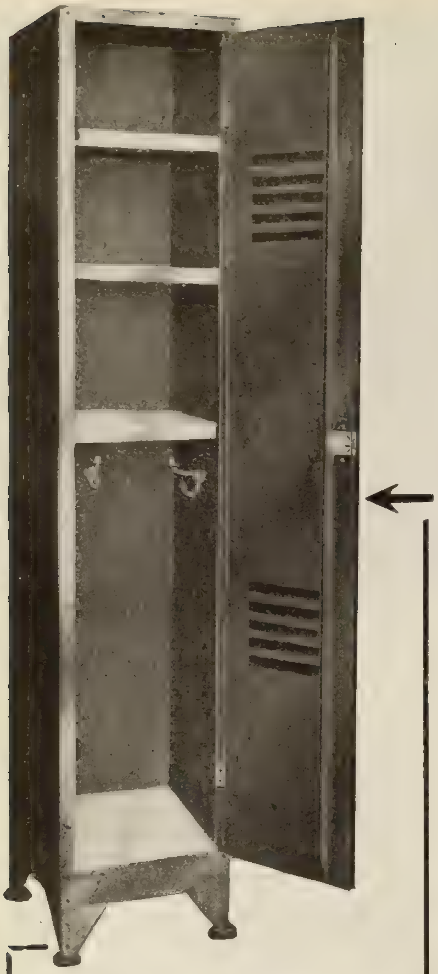
Stampings and Metal Specialties

We have the plant and equipment for turning out stampings of the highest quality in brass, copper, aluminum, tin and steel, and are prepared to undertake the manufacture of metal specialties of any description.
PUNCHES, DIES, TOOLS.
COLEMAN FARE BOX COMPANY, LTD.
70 Bond St., Toronto

IF what you want isn't advertised in this issue, consult our Buyers' Directory, Page 81.

KEYSEATER
for Milling Internal Keyseats

This tool is an attachment for the drilling machine, and is regularly made with straight shank for gripping in the drill chuck; taper shank can be had if desired. The tool is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. To complete a keyseat it is only required to pass the tool through the hole just once. Innumerable inexpensive eccentric bushings are supplied whereby the tool may be bushed to meet any diameter above its own.
Write for Catalog C for full detail.
NATIONAL MACHINE TOOL CO.
2270-2272 Spring Grove Avenue,
Cincinnati, Ohio, U.S.A.
Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria.



An Ideal Locker for Clothes and Personal Tools

This combination Tool and Clothes Locker will be very useful to the mechanic because it provides ample space for clothes and a safe place for his tools.

Built for life-time service. Supplied in unit or group construction.

We also manufacture STEEL SHELVING FOR ALL PURPOSES. Drop a line for full details.

CANADA WIRE & IRON GOODS CO.
HAMILTON ∴ ONTARIO
Eastern Representative: H. E. O. Bull
184 Mance St. Montreal, P. Q.

power plant builders and users, while products of a more general nature are located in a suitable part of the grounds where ample space is available for display and demonstration. Makers of engines, windmills, pumps, farm machinery of all kinds, agricultural implements, building materials, road, concrete and municipal machinery of various descriptions were here represented, their number and scope indicating to some extent the possibilities of future development in foreign trade. The view of one of the avenues in this part of the ground gives a slight idea of the extent of these exhibits. Farm tractors, gasoline engines, flour mills, dairy supplies, silo systems, glass houses, metal shingles, patent roofing materials, bricks, fertilizers, incubators, and concrete mixers lined both sides of several avenues, while ditch digging machines and motor plows were demonstrated before hundreds of interested spectators.

Among the engineering exhibitors in the grounds were:

Avery Co., Peoria, Ill.—Tractors.

Buckeye Traction Ditcher Co., Findlay, O.—Combined tractor and ditch digger.

Beath & Son, W. D., Toronto—Conveyor apparatus for farm use.

Bateman-Wilkinson Co., Toronto—Agricultural implements, engines, etc.

Canadian Fairbanks-Morse Co., Toronto—Engines, pumps, flour mill, etc.

Canadian Engines, Dunville, Ont.—Engines.

Chapman Engine & Mfg. Co., Dundas, Ont.—Engines.

De Laval Dairy Supply Co., Peterboro, Ont.—Engines and dairy apparatus.

Gibson Mfg. Co., Guelph, Ont.—Engines.

International Harvester Co., Hamilton—Tractors, plows, engines, etc.

Lister & Co., R. A., Toronto—Engines, pumps, lighting plants, etc.

Ontario Wind Engine & Pump Co., Toronto—Engines.

Wettlauffer Bros., Toronto—Concrete machinery.

Waterous Co., Brantford, Ont.—Road rollers.

"HAWK'D"
CHROME
VANADIUM
STEEL

Will Give You Exceptional

Shell Forging Production

WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

There are many cases where each punch has turned out over 2,000 shells.

It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

Hawkridge Brothers Company
303 Congress St., BOSTON, MASS.
U.S.A.

Double-Quick Cutting-Off

THE HURLBUT-ROGERS CUTTING-OFF AND CENTERING MACHINE has the advantage of two cutting tools.

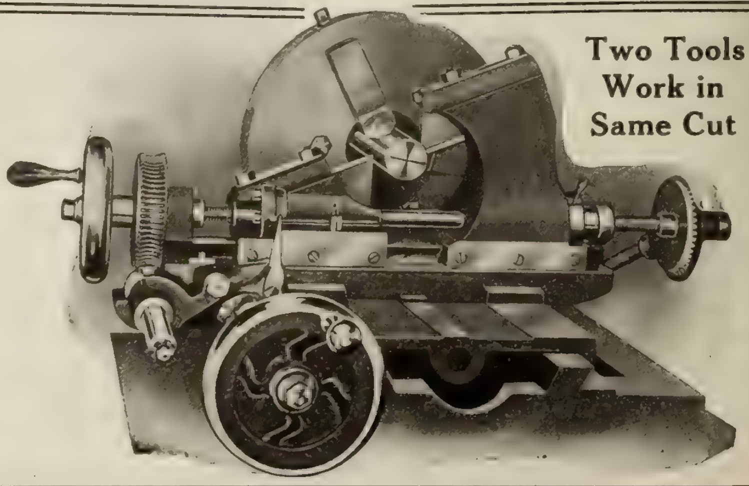
Each tool is rigidly supported in a stationary block at an angle which permits a strong shearing cut.

WITH THIS MACHINE PRODUCTION CAN BE NEARLY DOUBLED, and the utmost accuracy maintained under the hardest of work.

Read full details. Write for catalogue.

Hurlbut-Rogers Machinery Company
South Sudbury, Mass., U. S. A.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow, Newcastle-on-Tyne. H. W. Petrie, Toronto, Canada.



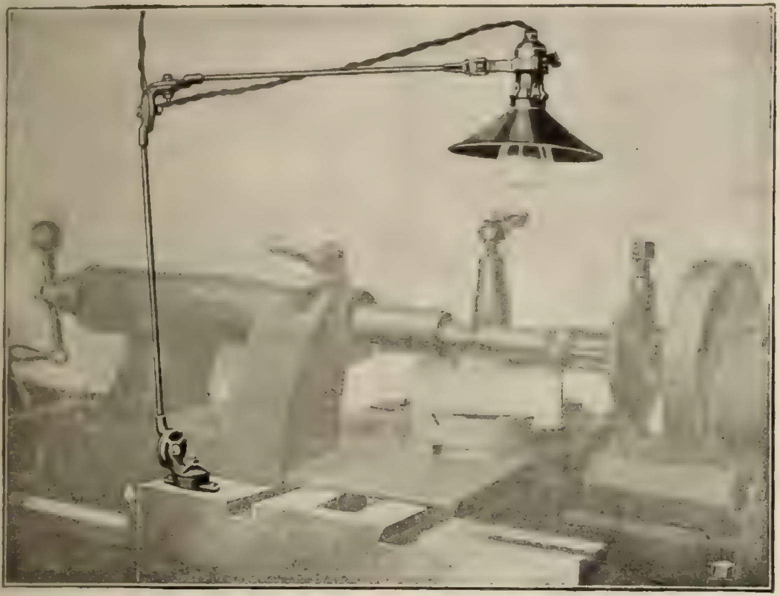
Two Tools Work in Same Cut

More Production — Greater Accuracy — Less Globe Breakage — Happier Men

That sums up the argument on this lamp bracket. Three frictional universal joints that can't wear out and are adjustable for any desired tension give the reason.

Just a slight push or pull puts the light where you want it, when you want it.

Any workman will do more and better work if his light is always in just the right place and under instant control.



The Searchlight Bracket

will pay for itself many times over in one season. The period of short days is approaching. Many shops are working night and day the whole year through. The cost is trifling compared with results. Only $1.50 each, with big discount, according to quantity.

Write now for samples and let us show you how your whole factory could be equipped at a big saving to you. Any quantity sent on 30 days' trial to any responsible concern. You can't possibly lose, and **You Might Win!**

The McCrosky Reamer Company
Meadville, Pa., U.S.A.
Export Agent:
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M·A HANNA &Co

"Victoria" Foundry and Malleable, made by The Canadian Furnace Co., Port Colborne, Ont., Canada

M.A.HANNA&CO. **Sales Agents:** **CLEVELAND, O., U.S.A.**

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Dominion Forge & Stamping Co., Limited
WALKERVILLE ONTARIO

DROP FORGINGS

Our facilities and equipment enable us to give you a top-notch quality at a very reasonable price.

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HORIZONTAL GAS ENGINE 25 H.P. IN SERVICE at present time, $375.00 cash. Write Penberthy Injector Co., Limited, Windsor, Ontario. (5)

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

A SNAP IN TURRET LATHES SLIGHTLY used on shell work. Fourteen splendid machines at bargain prices. Do you need these machines? If so, drop a line to Box 953, Woodstock, Ont.

LATHE FOR SALE—ONE 39 x 17-FOOT Pond engine lathe, suitable for heavy shells; in good condition; $1,500.00. A. B. Ormsby Company, Limited, Toronto. (2)

A BARGAIN FOR QUICK SALE—30 H.P. 10 x 14 engine; guaranteed in first-class working condition; drive belt included. Hamilton Whip Co., Hamilton.

BUSINESS FOR SALE — MACHINE SHOP with a good, steady run of work and always busy. A good opening for a young man to get into business. Owner has other interests. Box 224, Canadian Machinery. (13)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make. used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

DROP PRESS FOR SALE—NO. 9 MINER & Peck drop press; anvil 2,000 lbs.; base 30,000 lbs.; 36" between uprights; 40" x 35" between poppets; 34" x 29" top of anvil; guaranteed as good as new. Can be shown in operation to any genuine prospective buyer. The Metallic Roofing Co., Limited, Toronto. (4)

For Sale Cheap

- 1—Box Girder Type Overhead Hand Power Crane, 48′ 6″ span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.
- 1—12″ Single "I" Beam Overhead Hand Power Crane, 30′ 10″ span, 3 tons capacity; complete, less the Hoist.
- 1—10″ Single "I" Beam Overhead Hand Power Crane, 23′ 0″ span, 2 tons capacity; complete, less the Hoist.
- 1—Brantford (Gas) Bake Oven and 4 Racks.
- 1—Linderman 2-Spindle Boring Machine.
- 1—24″ Drill, Bertram Company.
- 1—26″ Drill, London Machine Tool Company.
- 1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

M. BEATTY & SONS,
Limited
Welland, Ont.

MACHINE SHOP WITH MODERN EQUIPMENT manufacturing a good staple line; orders for months ahead; will bear the fullest investigation; satisfactory reason for selling. Box 220, Canadian Machinery.

FOR SALE—ONE 16″ X 8′ HENDEY LATHE, with taper attachment, $1,100.00; one 22″ x 10′ Blaisdell lathe, with taper attachment, $1,200.00; one 24″ Gould & Eberhardt shaper, $800.00. The above machines are in first-class condition. For particulars apply Box 221, Canadian Machinery.

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

FOR SALE — SOIL PIPE AND FITTING plant; full range medium patterns; good assortment, standard and extra heavy; ten-ton cupola; complete modern equipment, with machine shop; on 2 acres land; railway siding. Would give lease of land now occupied. Reasonable price and easy terms. Fine opportunity for two or three practical foundry men. Apply The Vancouver Pipe and Foundry Co., Ltd., 572 Beatty Street, Vancouver, B.C.

WE HAVE FOR SALE THE FOLLOWING equipment: Complete nickel and copper plating plant, including direct connected dynamo and motor; one second operation cast iron plug machine, and two first operation cast iron plug machines manufactured by the Brown Engineering Corporation; 2 16-inch turret lathes; 1 38-inch engine lathe, 20-foot bed. The above outfit will be sold en bloc or separate. Apply direct to Foundry & Machine Co., Ltd., Montreal. (12)

SITUATIONS VACANT

TWO EXPERIENCED DIE SETTERS, TWO good die makers, and one experienced screw machine operator. Box 216, Canadian Machinery. (8)

SITUATIONS WANTED

SUPERINTENDENT OF SHELL FACTORY desires position—at present employed, but wishes to change. Would accept general foremanship. Best references. Box 217, Canadian Machinery. (9)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

Kindly mention this paper when writing advertiser

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 40, 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN LAMP FACTORY
ST. CATHARINES, ONTARIO

WANTED

JONES & LAMSON FLAT TURRET LATHES, 13 x 36, four wanted; must be in good condition; price reasonable. Box 223, Canadian Machinery.

WANTED — 250-VOLT D.C. GENERATOR — 75 to 150 k.w., direct connected to steam engine; must be in good condition. Write to The Kaufman Rubber Co., Berlin, Ont. (13)

WANTED—ELECTRIC TRAVELLING GANtry crane, span about 57 ft., clearance 50 ft., overhanging at one end; load 15 tons. State full particulars and price. Thor Iron Works, Limited, Toronto, Ont. (27)

WANTED—12″ BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Apply Box 218, Canadian Machinery.

FOR SALE

■ ■

Two 24-inch standard Gisholt Turret Lathes, completely tooled for boring 4.5″ H.E. Shells.

Box 212
Canadian Machinery
t.f.

Bargains

Garvin Back Geared Miller; has 36 in. automatic feed in table; has centres..	$490.00
16 in. x 8 ft. Fitchburg Lathe, C. Rest	290.00
18 in. x 8 ft. Fitchburg Lathe, C.R. & P. C. Feed	380.00
27 in. x 16 ft. Putnam Lathe, C.R. & P. C. F.	500.00
18 by 17 by 40 in. Planer, with chuck....	150.00
42 by 42 by 11 ft. Pond Planer, 2 heads..	1,800.00
Radial Drill 3½ ft. arm; Back gears, Power feed, box table, etc.	525.00

The above machines in good order, for immediate shipment.

Geo. E. Affleck
136 Liberty St. New York
(11)

MACHINERY FOR SALE

2 70 Gallon Hydraulic Pumps.

1—100 Gallon Hydraulic Pump. Offer Bargain on above.

1 125 H.P. Motor, 3 Phase, 60 Cycle, 220 Volts, General Electric. Price—$1200.00.

2 90 H.P. General Electric Motors, 3 Phase, 60 Cycle, 220 Volt. Price $700.00 each.

2 Sheldons No. 3 Cast Iron Fans.

NATIONAL STEEL CAR COMPANY LIMITED
HAMILTON, CANADA
(13

When writing advertiser kindly mention that you saw his ad. in this paper.

A SNAP

For Sale—Boiler Repair and Sheet Iron Works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars.

Box 213, Canadian Machinery

FOR SALE

1—American Wood Working Machinery Company Tennoning Machine.

1 Dennis Tilting Table, wood drill, capacity 36".

1 No. 2 Gardiner Double Disc Grinder, with Press.

1 Pettongill Machinery Company Automobile Body Hammer.

1—American Wood Working Machinery Wood tp 36" x 56" Rip Saw.

1 Badger State Machinery Company No. 5 Tilting Table, cut-off saw.

1 Brown-Beggs 30" Foot Power Sheet Metal Shear.

1 16" Porter Joining Planer.

1 Fay & Egan Company Surfacing Planer, 24" knives.

1 Fay & Egan Double Spindle Wood Shaper.

1 Boring and Mortising Machine.

Some of the above machinery has never had a belt, but others have been used about sixty days; all are in splendid condition.

1 -Modern Heavy Duty Bar Equipment Turret Lathe, 2¼" spindle.

1—Power Hack Saw.

Numerous Chucks and other Tools.

1—Bertram Waving and Undercutting Machine for 18" lathe, suitable for 18-pound H.E. or Shrapnel Shells.

1—Holden-Morgan Base Plug Milling Machine for 4.5 Shells.

1—Rochester High Power Riveting Hammer.

For prices and terms write to

Tate Electrics Limited
34 Dalhousie Street, TORONTO
(eow 12)

FAIRBANKS-MORSE
New and Used Machinery

In Stock at Toronto

1 5' Bickford Universal Radial Drill; used.
1 ⅞" 4-spindle National Acme Automatic; used.
2 No. 3 Foster Hand Screw Machines; new.
4 No. 4 Smurr & Kamen Turret Lathes; new.
2 14" x 5' Seneca Falls Lathes; used.
1 10" x 5' Seneca Falls Lathe; used.
2 18" x 8' Springfield Lathes; new.
5 22" x 7' and 9' Fairbanks-Morse Lathes; new.
1 Gisholt Universal Tool Grinder.
2 No. 1 Racine Hacksaws; new.
1 No. 3⅛ A Oster Pipe Machine; new.
1 20" x 8' Hendey Lathe; used.
1 Gisholt 16" Special Lathe, type C, 6½ bore.
2 Walcott 8" and 20" x 8' Lathes.

In Stock at Montreal

2 16" F. M. Single Purpose Lathes; used.
1—Hendey 16" x 8' Lathe, taper attachment, Q.C.G.; used.
2 American 16" x 6' Tool-room Lathes, new.
2—Barnes 18" x 8' Lathes; new.
1 -Walcott 20" Lathe, 3-step cone, D.B.G. and Q.C.G.; new.
3 -Walcott 18" Lathes, 3 step cone, D.B.G. and Q.C.G.; new.
1 Rivett Precision Lathe; used.
1 -Seneca Falls 9" x 4' Star Q.C.G. Tool-room Lathe.
1—Brown & Sharpe No. 1½ Universal Miller; used.
1 -Ford Smith Plain Miller; new.
W. & M. Drill Grinder; new.
1 -Hall No. 6 Cutting-off Machine, 6" Shells; new.

This is only a partial list of our stock of Machine Tools.

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3¼" Gridley Automatic
40" x 16' Conradson, heavy duty
40" x 12' New Haven
26" x 8' Davis
24" x 8' Lodge & Shipley
21" x 10' LeBlonde, D.B.G.
20" x 10' American
20" x 7' Fay & Scott
17" x 6' Garvin
16" x 6' Pratt & Whitney
16" x 5' Windsor, wire feed
15" x 5½' fox, American
2" x 24" Jones & Lamson flat turret
No. 22½ Garvin, wire feed
No. 2 Garvin, wire feed
8" x 31" Brown & Sharpe

Engine Lathes

42" x 20' Fifield
36" x 16' Putnam
30" x 10½' Pond
26" x 46" x 20' London Gap
26" x 14' Hamilton, D.B.G. (4)
26" x 14' Gleason, D.B.G. (2)
24" x 13' New Haven
24" x 10' LeBlonde
24" x 10' Peerless
24" x 10' Lodge & Shipley, patent head
22" x 12' American, all-geared head
21" x 12' Peerless
21" x 8' Back geared single purpose (4)
20" x 12' Lodge & Shipley, patent head (2)
20" x 10' Reed
20" x 8' Walcott, D.B.G. (2)
20" x 8' Hercules, heavy duty
20" x 8' American
20" x 8' Ames
19" x 8' LeBlonde, D.B.G.
18" x 10' MacGregor-Gourlay
18" x 8' Walcott, D.B.G. (2)
18" x 8' New Haven
18" x 6' New Haven
17" x 8' Blaisdell
16" x 10' MacGregor-Gourlay, D.B.G
16" x 8' Back-geared single purpose (2)

Upright Drills

24" Bickford, shaft-driven
24" London, back-geared, sliding head
20" Bertram, power feed
No. 10A Baush, 16 spindle
16" Avey, high speed, 4 spindle, sensitive
16" Canedy-Otto
15" Barnes
14" Excelsior
14" Garvin, 4-spindle
13" Perfect, 3-spindle
10" Barnes, friction
60" Bertram Semi-universal Radial
48" Gang, plain radial, tapping attachment
36" New Century, plain radial
32" Canedy-Otto wall radial

Iron Planers

30" x 30" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
20" x 20" x 5' Bertram

Milling Machines

No. 5 Becker-Brainard, plain
No. 2 LeBlonde Universal
No. 12 Brown & Sharpe plain
No. 1½ Brown & Sharpe Universal
Louden Universal
24" Bertram, plain
Holden-Morgan Thread Miller

Presses

No. 12 Geared Rhodes, roller feed
No. 4½ Bliss, double crank
No. 5 Waterbury, inclinable
No. 150 Brown-Boggs, inclinable

Miscellaneous

24" Gould & Eberhardt, B.G. Shapers (2)
24" MacGregor Gourlay B.G. Shaper
20" Steptoe shaper
No 1 Racine Hack Saw
Lo-Swing Lathes (2)
32" x 9' Special Facing and Tapping Machine
40" Binsse Horizontal Boring Mill
No. 14 Besly Grinder
No. 60 Heald Cylinder Grinder
2¼" La Salle Drill Grinder
No. 2 Garvin Automatic Tapping Machine
No. 1 Garvin Automatic Tapping Machine
No. 2 Cochrane-Bly Filing Machine
¼" Shuster Riveters (3)
11' Bertram Bending Rolls
9½' Bertram Bending Rolls
30" Pels Punch and Shear
15" London Punch and Shear
60" Hanna Yoke Riveter

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.
Front St. W., - - Toronto, Ont.

FOR SALE

We are offering subject to prior sale,

Immediate Shipment

One slightly used

"TYCOS" RECORDING THERMOMETER

registering to 500 degrees F., manufactured by Taylor Instrument Co., Rochester, N.Y., with supply of indicator sheets, H. and M. divisions.

GUARANTEED IN FIRST CLASS CONDITION.

All castings for one

OIL FIRED 4.5 SHELL BAKING OVEN

Manufactured by Mech. Eng. Co., Montreal, P.Q.

ALL IN FIRST CLASS CONDITION
CAPACITY 200 SHELLS

Write for full particulars and Prices.

T. McAVITY & SONS, LIMITED
ST. JOHN, N.B.

(11)

List of Second-Hand Machinery

On hand for immediate delivery, subject to prior sale

1—No. 2 Brown & Sharpe Vertical Chucking and Boring Machine; excellent condition.
1—No. 4 Quint Vertical Turret Drilling and Chucking Machine; excellent condition.
1—24" x 24" x 7' Lodge & Davis Planer, fitted with full electric equipment and in good condition.
1—4¼" Belt-driven Gridley Automatic; excellent condition.
2—4¼" Motor-driven Gridley Automatics; excellent condition.
1—26" x 48" x 10' J. J. McCabe Lathe; good condition.
1—No. 12 16-spindle Pratt & Whitney Multiple Drill, ½" capacity in steel, ⅝" capacity in cast iron; excellent condition.
1—Foster Ring Turret; good condition.
1—22" x 22" x 4' Whitcomb Planer.
1—18" Warner & Swasey Plain Head Turret Lathe.
1—14" Flather Engine Lathe, rod and screw feed, plain rest, slip change gears.
1—14" Pratt & Whitney Engine Lathe, screw feed, plain rest, slip change gears.
1—No. 15 Toledo Punch, 18" throat.
1—No. 12 Badger Punch and Shear.
1—30" Collier Circular Shear.
1—16" Steptoe-McFarland Lathe.
1—12" Shepard Gap Lathe.
1—No. 2 Mitts & Merrill Keyseater.
1—No. 2 10" Massillon Punch; new.
2—20" Barnes Drills.
1—¼" Shuster Riveter.
2—Marvel Hack Saws.
1—14" Fox Drill.
1—24" Ohio Shaper.
1—14" Steptoe Shaper.
1—Shinn Metal Band Saw.

C. E. FALES MACHINERY COMPANY
KERR BUILDING, DETROIT, MICH.

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

This space $1.00 per insertion on yearly order.

Kindly mention this paper when writing advertisers

Canadian Agents Wanted

Agents wanted to represent a well-known British line of

Chain Belting,
Chain Gearing,
Etc.

Apply Box 222
CANADIAN MACHINERY

They must be getting results—

or why would they continue to advertise each week? That's logic, isn't it? This is a *direct-result* department. Have you noticed that each week the same firms' lists appear? If you don't care to use large space, insert a "liner" ad.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto, Ont.

FOR SALE

GRINDING MACHINES

1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 76 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16" x 66" Landis Crank Shaft Grinder (18 months old).
2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES

58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13" Gisholt Semi-Automatic (12 mos. old).
30 21" Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES

1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES

1 8 spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.
2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS

1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES

38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES

2 Noble & Westbrook No. 1 (new).

PROFILERS

1 No. 3H Becker (new).

PLANERS

1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 40" x 40" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS

1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES

1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES

1 12" Jackson (new).

KEY SEATERS

1 No. 1 Catlin (new).

SCREW MACHINES

1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2" x 24" Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼" capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES

1 No. 3 La Pointe (nearly new).

BOLT CUTTERS

1 2" Landis Double Head (nearly new).

BORING AND TURNING MACHINES

1 4' Bickford Boring & Turning Mill (nearly new).
1 20" swing 4-Spindle Moline Vertical Boring Machine with 18" x 36" table.

BULLDOZERS

1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES

1 Large Filing and Sawing Machine with 12" stroke.

PUNCHES AND SHEARS

1 No. 3 Walsh Punch Press.
1 Moser 1½" stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8" throat capacity ¼" x ¼".
1 27½" throat lever punch ½" capacity 1¼" stroke.
1 Thompson Bevel Shear ½" capacity.

PIPE MACHINES

1 6" Saunders.

SHAPERS

1 14" Hendey Geared Friction.
1 20" Hendey Geared Friction.

TAPPING MACHINES

1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2" collapsible taps (new).

THREAD ROLLING MACHINES

1 Waterbury Farrell ⅜" capacity (nearly new).

THREADING MACHINES

5 Special Threading Machines for threading 3" steel shells (nearly new).

SPOT WELDERS

1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

Write us what you want new or second-hand.

32 North Clinton Street, Chicago
W. F. Davis Machine Tool Co.
403 Singer Building, New York City

High-Grade

MACHINE TOOLS

The list below is a small portion of our present stock. Write for complete lists.

30" x 20' Fitchburgh lathes.
12 26" 48" x 14' new style McCabe double spindle heavy pattern new lathes.
2 26" 48" x 18' new style McCabe double spindle heavy pattern new lathes.
20" x 8' Prentice, H. S., C. R., T.A.
3-19" x 8' Sidney new lathes, swing, 21".
2 19" x 8' Sidney new lathes, quick change, swing 21".
2 17" x 8' Sidney new lathes, quick change, swing 19".
2 18" x 10' Rahn Mayer, H.S., C.R.
18" x 10' Cincinnati, H.S., C.R.
18" x 8' 6" Rahn Mayer H.S., C.R.
9 17" x 8' National, quick change, new.
16" x 10' Prentice, taper attachment.
2 13" x 7½' Carroll, Jamieson, new.
40" swing, 3¾" H.S. Conradson Semi Automatic turret.
1" x 8" New Pierce screw machine.
1 ¼ Hartford Automatic screw machine with slotting attachment.
⅜" Pratt & Whitney screw machine.
36" Baker Bros. tapping and boring drill.
26" Currie & Snyder sliding head drill.
No. 3½ Fox Miller, vertical attachment, index head.
No. 210 Heald wet ring grinder.
12" x 66" Landis universal grinder.
20" Cincinnati B.G. Shaper.
20" Steptoe new S. G. Shaper.
24" American B. G. shaper.
18" x 18" x 5' Pond planer.

FRANK TOOMEY, INC.
127-131 North Third St., PHILADELPHIA, PA., U.S.A.

Immediate Delivery

NEW STEAM ENGINES

Two 5 x 6 Vertical steam engines, 8 horse	$105.00	each
Two 6 x 6 Vertical steam engines, 10 horse	125.00	"
One 7 x 8 Vertical steam engine, 15 horse	175.00	
One 8 x 8 Vertical steam engine, 20 horse	200.00	
Two 4 x 6 Horizontal steam engines, 6 horse, with base	100.00	"
One 5 x 6 Horizontal steam engine, 8 horse, with base	125.00	
Five 6 x 6 Horizontal steam engines, 10 horse, with base	135.00	"
Five 6 stroke engines, with base, 10-15 H.P.	150.00	"
Two 6 x 6 Automatic, with base, 12-20 H.P.	250.00	"
Two 7 x 6 Automatics, with base, 15-25 H.P.	275.00	"
One 8 x 8 Automatic, with base, 20-42 H.P.	500.00	
One 10 x 10 Automatic, with base, 39-82 H.P.	700.00	
One 11 x 10 Automatic, with base, 47-85 H.P.	725.00	

YOUNG, CORLEY & DOLAN, Inc.
115 Broadway, NEW YORK CITY
Telephone: Rector 7866

(tf)

Among the 400 Machine and Iron Working Tools in Our Jersey City Stock, We Mention the Following:

MODERN LATHES

14" x 8' Lodge-Shipley quick change.
15' x 8' Cisco quick change, taper attachment.
Two 16" x 6' LeBlond geared head, single pulley drive, d.b.g., taper attachment.
17" x 6' LeBlond, h.s., compound rest, power cross feed, taper attachment, turret on shears.
18" x 8' Lodge-Davis, h.s., compound rest, power cross feed.
18" x 8' Shellenbach geared head, h.s., compound rest, power cross feed.
20" x 10' Niles, h.s., compound rest, power cross feed.
21" x 10' Greaves-Klusman quick change, h.s., compound rest, power cross feed.
Two 22" x 10' Davis quick change, d.b.g., h.s., compound rest, power cross feed.
Two 24" x 10' Reed-Prentice, h.s., compound rest, power cross feed.
Two 24" x 10' Hendey, quick change d.b.g, h.s., compound rest, power cross feed, D.C. Motors, 220 volts.
Three 24" x 10' Johnson, h.s., compound rest, power cross feed.
26" x 12' Blaisdell, h.s., compound rest, power cross feed.

MILLING MACHINES

Ingersoll Slab Milling Machine, adjustable rail, 42" between housings, three heads.
Newton Duplex Slab Milling Machine, 42" between heads, 20" platen, 10 ft. long.
76" Newton Vertical Milling Machine, 48" rotary table
Detrick & Harvey Milling, Drilling and Boring Machine, weight 10,000 lbs.
No. 1-B Milwaukee Plain Miller, with dividing heads, chuck and vise.
No. 9 Kempsmith Plain Miller.
No. 1 Cincinnati Plain Miller.
No. 3 Brown & Sharpe Plain Miller.
No. 1 Pratt & Whitney Plain Miller.
No. 22 Garvin geared Miller, with motor.
No. 4 Garvin Profiler
Two No. 1 Garvin 2-spindle Profilers.
No. 2 Cincinnati Universal Miller.

PLANERS—SHAPERS

60" x 60" x 15' Sellers, four heads.
60" x 60" x 12' Pond, three heads.
54" x 45" x 14' Lincoln, four heads.
44" x 44" x 12' Niles, two heads.
44" x 42" x 17' Betts, two heads.
44" x 44" x 16' Niles, one head.
42" x 42" x 13' Sellers, two heads.
36" x 36" x 12' Chandler heavy duty.
36" x 34" x 12' New Haven, one head.
30" x 30" x 16' Harrington, one head.
28" x 24" x 8' Fitchburg, one head.
22" x 22" x 5' Whitcomb, one head.
30" Morton Draw Cut Shaper
Two 24" Steptoe Crank
20" Gould & Eberhardt Crank Shaper.
21" Juengst Crank Shaper.
16" Juengst Crank Shaper.
16" Hendey Friction Shaper

New York Machinery Exchange
50 Church St., NEW YORK CITY

DOMINION MACHINERY CO.
TORONTO

SPECIAL MACHINES
OF UNQUESTIONABLE VALUE

Returnable Without Question If Not As Represented

24" x 12' London Engine Lathe, Hollow Spindle C.R.
20" x 10' Rhan Engine Lathe Double Back Geared.
18" x 8' American Tool Works, Engine Lathe Quick Change Gear.
14" x 6' Bertram Engine Lathe C Rest.
24" Back Geared Shaper, McGregor Gourlay.
16" Back Geared Shaper, New Ohio Machine Tool Co.
24" Sliding Head Drill, Barnes.
20" Back Geared Drill Davies.
14" Henry & Wright Sensitive Drill.
14" Reid Sensitive Drill.
14" 3 Spindle Foote-Burt.
1 Plain Milling Machine Back Geared, with Dividing Head.
1-12 Horse Power Hydro Motor.
5 H.P. Motor Hydro

All the above used tools guaranteed. We have other machines. Ask for what you don't see listed.

DOMINION MACHINERY COMPANY
TORONTO, ONTARIO, CANADA
Office—110 Church Street Factory—14 Darling Avenue

Don't Keep It--Sell It!

If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor
or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Used Machinery for Immediate Delivery

BORING MILLS.

51" Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52" Niles Car Wheel Boring Mill.

DRILLS.

22" Aurora, S.H., B.G., P.F.
24" Hamilton, B.G., P.F.
25" Fitchburg, S.H., B.G., P.F.
26" Hoefer, B.G., P.F.
32" Hamilton, S.H., B.G., P.F.
32" Hoefer, S.H., B.G., P.F.
34" Barnes, S.H., B.G., P.F.
4" Baker Tapping and Drilling Machine.
2½' Dreses Radial
2½' Industrial Radial
12 Spindle Multiple
6 Spindle V.C.
No. 30C Baush, 12 spindles

GEAR CUTTERS

20" G. & E., for spur and bevel
24" x 7" G. & E., for spur
36" Walcott, for spur
No. 14 Brown & Sharpe

GRINDERS

No. 3 Landis Universal
14" x 20" B. & S. Universal
Gisholt Tool Grinder

LATHES

12" x 4' Hendey, C.R., Q.C.G., taper
12" x 5' Davis, C.R.
14" x 5' P. & W., R. and F., taper
14" x 6' Fairbanks, C.R., taper
15" x 6' Goddard, C.R., taper
16" x 6' Prentice, C.R.
16" x 6' Sebastian, P.R.
16" x 6' Walcott, C.R.
16" x 8' Lodge & Shipley Pat. Head, C.R., Q.C.G.
16" x 10' Greaves & Klusman, C.R.
17" x 10' Blaisdell, C.R.
18" x 6' Bradford, C.R., taper
18" x 8' Lodge & Shipley, Pat. Head, C.R., taper
18" x 12' American, C.R., Q.C.G.
18" x 12' Greaves & Klusman, C.R.
20" x 10' Flather, C.R.
21" x 12' New Haven, C.R.
24"-40" x 12' McCabe Double Spindle, C.R.
24" x 16' Schumacher & Boye, C.R.
30" x 14' Reed, C.R.
32" x 16' Blaisdell, C.R.
36" x 28' American, C.R.

MILLING MACHINES

No. 12 B. & S., plain
No. 34 Oesterlein, plain
No. 1½ Garvin Universal
No. 2 Cincinnati Universal
No. 2 Cincinnati Vertical, High Power
No. 32 Plain Kempsmith—Lincoln
No. 3 Cincinnati Universal
No. 13 P. & W. Lincoln
No. 4 Becker Vertical

PLANERS

Morton Portable
22" x 22" x 6' Gray, one head
30" x 30" x 8' Woodward & Powell, one head
30" x 30" x 12' Cincinnati, two heads
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Cincinnati, two heads
36" x 36" x 16' Sellers, one head
39" x 39" x 12' New Haven, one head
40" x 38" x 14' Putnam, one head
40" x 40" x 12' New Haven, one head, one side head

PRESSES

No. 3 Delivouk & George, O.B., Inc.
No. 30 A. Perkins, O.B., Inc.
No. 133 Ferracute, Double Action, O.B., Inc.
No. 5½ Walsh, O.B., Inc., geared
No. 174 Consolidated Double Crank
No. 25 Toledo, O.B., Inc., Cam Drawing

SHAPERS

15" Hendey Friction
16" Walcott
16" Niles, B.G.
16" Rockford, B.G.
20" Rockford, B.G.
26" Putnam

SCREW MACHINES

No. 1 Chicago Automatic
1 3-16" Hartford Automatic
2" Cleveland Automatic
2¾" Cleveland Automatic
⅝" P. & W. Plain
1" B. & S. Plain
16" P. & W. Plain

MISCELLANEOUS

No. 4 Warner & Swasey Turret Lathe
No. 2 Warner & Swasey Turret Lathe
No. 2 Baker Keyseater
Whitton Centering Machine
1½" Acme Bolt Cutter
2—Springfield Stud Lathes
Blount Speed Lathe

Write for our Stock List.

The H. A. Stocker Machinery Company, 566-572 W. Randolph St., CHICAGO, ILL.

MACHINE TOOLS NEW AND REBUILT

The World is Our Field
SIMMONS
ALBANY N.Y. U.S.A.
MACHINERY

We own every tool that we advertise and guarantee each and every one to be as represented. You can secure immediate shipments by buying direct from us and save the middleman's profits.

NORTON GRINDERS

18 6 x 22 Plain Grinders.

12 10 x 22 Plain Grinders.

These machines have been rebuilt and are in excellent condition.

1 8 x 30 Walker Surface Grinder.

2 10 x 36 Plain Grinders, used only three months.
In exceptionally good condition.

BEMENT MILES BORING MILLS

6 60" Boring Mills, 2 swivel heads. In excellent condition.

SELLER'S BORING MILLS

6 60" Seller's Boring Mills, 2 swivel heads—only slightly used in first-class condition.

6—84" Seller's Boring Mills, 2 swivel heads, excellent condition.

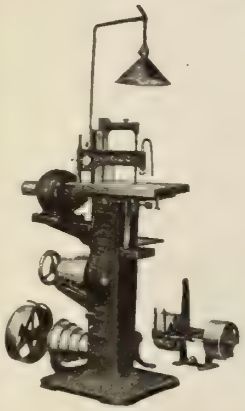
AMERICAN LATHES.

6—20 x 8 actual swing, 22 American High Duty Lathes with Quick-Change Gears, Double Back Geared, Four-Sided Turret Post, $1050.00 each, F.O.B. Albany, N.Y.

48 x 12 G. & Eberhart Gear Cutter (bevel and spur gears).

Simmons Machine Company, Inc.
981 Broadway - - Albany, New York
New York Office: 902 Singer Building

Hints to Buyers



Will your die filer use any file ?

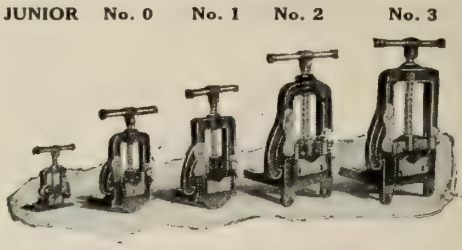
The Rearwin Die Filing Machine uses irregular-shaped length files or hack saws.

And this is only one of the conveniences of this tool. Weight, 375 lbs. Floor space 22 x 36". Speed of Lower Shaft 160 r.p.m. Height of table 39". 17 x 18" Square supported on a yoke with a tilt of 7 degrees 4 ways.

The circular is interesting—get it.

W. D. Rearwin

342 Mill St., N S, Grand Rapids, Mich., U.S.A.



ARMSTRONG MALLEABLE IRON HINGED PIPE VISES

WITH HARDENED STEEL JAWS

Manufactured By

THE ARMSTRONG MFG. CO.

328 KNOWLTON ST., BRIDGEPORT, CONN., U.S.A.
NEW YORK, U.S.A., 248 CANAL ST.

FOR YOUR HARDENING BATHS

Too much depends on the accuracy and uniformity of your hardening baths to run risks without pyrometers.

TRADE MARK
BRISTOL'S
REG. U. S. PAT. OFFICE
ELECTRIC PYROMETERS

are accurate, dependable and inexpensive. The pioneer pyrometer for shop use. Equipped with high-grade Weston movements. Write for Bulletin I. 205.

THE BRISTOL CO., Waterbury, Conn., U.S.A.

Branch Offices:
Boston, New York, Chicago, Pittsburgh, San Francisco

Uncertainty becomes Certainty when you have your material and apparatus tested and inspected by us.

Get the benefit of many years of service.

CANADIAN INSPECTION AND TESTING LABORATORIES, LIMITED

Head Office and Main Laboratories—MONTREAL
Branch Offices and Laboratories:
TORONTO, WINNIPEG, EDMONTON, VANCOUVER, NEW GLASGOW.

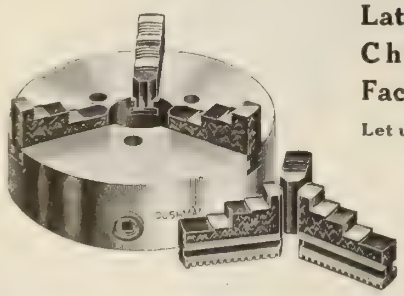
Cushman Chucks

Lathe Chucks, Drill Chucks, Portable Face Plate Jaws.

Let us send you our catalog.

The Cushman Chuck Co.

Hartford, Conn., U.S.A.



EFFICIENT EQUIPMENT

for general machine shop operation requiring pressure up to 25 tons and centering capacity up to 38 inches. For driving mandrels, bending and straightening, broaching, embossing with dies, setting bushings and many other everyday manufacturing jobs, there is an ATLAS PRESS. All sizes for all purposes.

It will pay you to investigate.

ATLAS PRESS CO.
330 N. Park St.
KALAMAZOO, MICH.

NORTHERN CRANE WORKS, Limited
WALKERVILLE, ONT.

BUY IN CANADA!

NORTHERN CRANES

ELECTRIC AND HAND POWER
ALL SIZES, CAPACITIES AND TYPES.
ALSO ELECTRIC AND AIR HOISTS
Foundry Equipment—Cupolas, Ladles, Etc.

You want Tool Holders that have made good

ARMSTRONG TOOL HOLDERS

Won The

GRAND PRIZE

THE HIGHEST POSSIBLE AWARD AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

DROP FORGED OF STEEL
ARMSTRONG
PATENT TOOL HOLDER

THEY ALWAYS MAKE GOOD

Write for Catalog.

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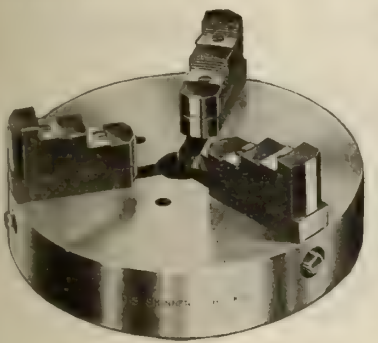

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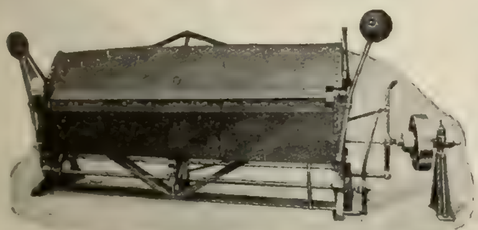

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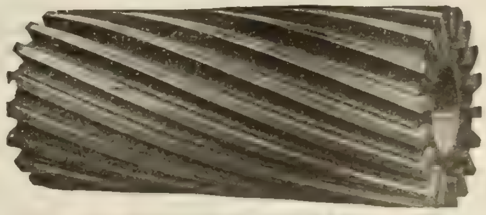

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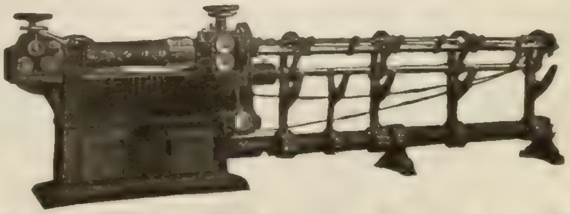

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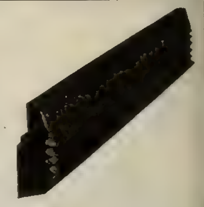

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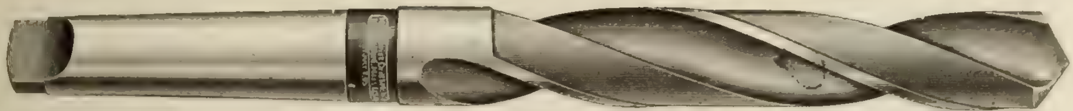

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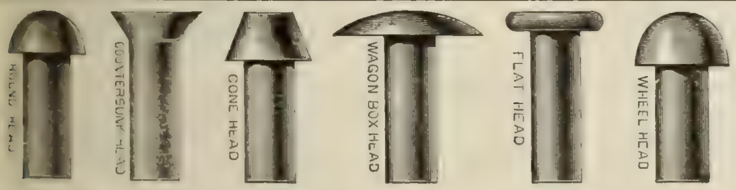

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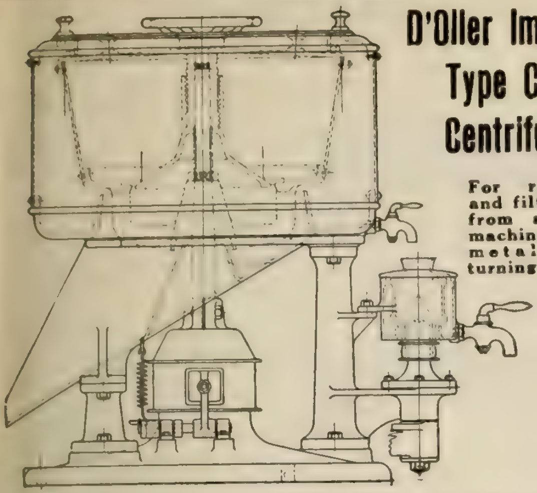

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Northern Crane Works, Walkerville, Ont.
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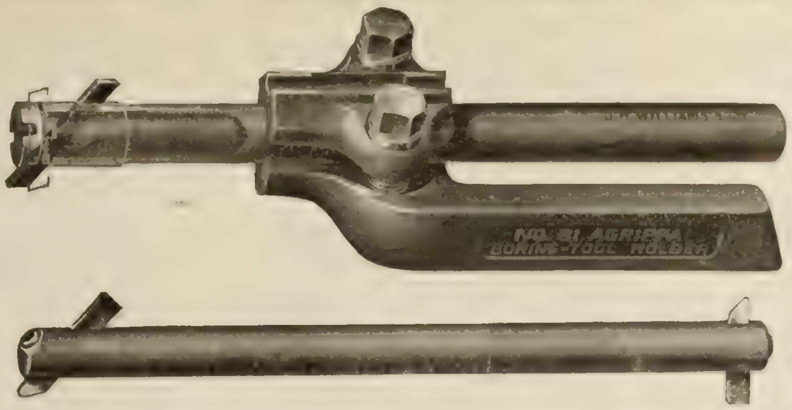

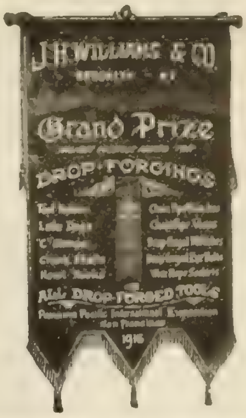

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IN Toronto certain Liberals are pulling the wires to make Mr. N. W. Rowell Sir Wilfrid's successor. Farther East and farther West there is a "Duff Boom." Sir Wilfrid may lead his party through the next session at Ottawa, but after that—what? H. F. Gadsby discusses the Duff Boom in the September **MacLean's**, and in the October number will have another boldly written article, based on "inside" information, on "Ribbing Up the Liberal Party." Brisk reading this, for both Liberals and Conservatives.

Ships, and Ships, and Ships Yet Again

Canada is paying a very high price for the lack of adequate ocean shipping. In normal times the rate on wheat to Liverpool is 4-6 cents. This year the rate is 40-46 cents! This is just one of several examples given by Miss Agnes C. Laut, the brilliant Canadian writer domiciled in New York and writing on economic questions with rare vigor and information. Is it wise for Canada to buy ships at the present high prices? Canada could have the whole shipbuilding field in America to herself if she recognized her opportunity. Canada's laws permit a merchant marine and Uncle Sam's don't.

As a thinking Canadian you should read Miss Laut's remarkable article for its information and arguments.

How Infantile Paralysis Spreads

The Director of Laboratories of Rockefeller Institute, Simon Flexner, M.D., contributes a timely article, most readable on a subject of first importance. This in view of the incursion into Canada of this dread disease, and of its heavy toll of infant life. It will do you good to read this authoritative article.

Feeding the Travelling Public

Do you know much about the problem of the railways in feeding their patrons, on dining cars? Where the food came from, how stores are replenished, how meals are prepared, how table linen is kept fresh, and all that? E. A. Hughes writes interestingly on this subject in the September **MacLean's**.

Dr. The Hon. Ella Scarlett-Synge

—A Vancouver woman who started the Woman's Volunteer Reserve Corps—a movement designed to do the work of men in many lines of work in order that they—the men—may enlist. A sketch by Mrs. Arthur Murphy ("Janey Canuck").

A Canadian Who Saved Ypres—Major-General Turner, V.C., D.S.O.

A sketch of a South African veteran, who won the Victoria Cross and Distinguished Service Order in the Boer War, and who saved the day at Ypres—the present war—this according to the testimony of Sir Max Aiken. C. Lintern Sibley tells the story vivaciously.

Funk—A War Ballad, by Service

—A ballad by the poet of the Yukon, written, one may truly say, in the trenches of Flanders, and which tells in Service's own vivid and gripping style of the horrors and terrors of trench fighting.

Good Stories by

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OXY-ACETYLENE WELDING AND CUTTING
Carter Welding Co., Toronto.
Coleman Fare Box Co., Toronto, Ont.
Toronto Welding Co., Toronto, Ont.

OXY-ACETYLENE WELDING AND CUTTING PLANTS
Carter Welding Co., Toronto, Ont.
Lachapelle, J. D., & Co., Montreal, Que.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Indianapolis, Ind.

OXYGEN (SEE ACETYLENE)

PACKINGS, LEATHER, HYDRAULICS, ETC.
Graton & Knight Mfg. Co., Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.

PANS, LATHE
Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

PAPER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

PATENT SOLICITORS
Babcock & Sons, Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Ross Thomson & Co., Ottawa, Ont.

PATTERNS
Galt Malleable Iron Co., Galt.

PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton.

PIG IRON
Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PIPE CUTTING AND THREADING MACHINES
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
H. W. Petrie, Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.

PIPE CUTTERS, ROLLING
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
John H. Hall & Sons, Ltd., Brantford, Ont.
H. W. Petrie, Ltd., Montreal.

PIPE, RIVETED STEEL
Toronto Iron Works, Ltd., Toronto.

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Oliver Machy. Co., Grand Rapids, Mich.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio
A. R. Williams Machy. Co., Toronto.

PLANING MILL EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

PLIERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Billings & Spencer, Ltd., Welland.

PLUG MILLERS
Banfield, Edwin J., Toronto.

PRESSES, ARBOR
Atlas Press Co., Kalamazoo, Mich.
Metalwood Mfg. Co., Detroit, Mich.

PRESSES, BANDING
Chapman Double Ball-Bearing Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Wm. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

PRESSES, HAND FORCING
Atlas Press Co., Kalamazoo, Mich.

PRESSES, BROACHING
E. W. Bliss Co., Brooklyn, N.Y.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo, O.

PRESSES FOR SHELLS
Atlas Press Co., Kalamazoo, Mich.
Charles F. Elmes Eng. Works, Chicago.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER
Lymburner, Ltd., Montreal.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, DROP AND FORGING
W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago, Ill.
Can. Fairbanks-Morse Co., Montreal.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.
Wm. R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

PRESSES, HYDRAULIC
Bawden Machine Co., Toronto, Ont.
John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, BALING
William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

PRESSES, SCREW
Barnes, W. F. & John, Co., Rockford, Ill.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Erie Foundry Co., Erie, Pa.

PRESSURE REGULATORS
Can. Fairbanks-Morse Co., Montreal.

PROPELLERS
Ontario Specialties, Ltd., Ottawa, Can.

PULLERS, WHEEL
The Crane Puller Co., Arlington, Mass.

PULLEYS
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Dodge Mfg. Co., Toronto, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Ltd., Toronto
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PULLEY MACHINERY, DRILLING AND TAPPING
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.

PUMPS, AIR
Bawden Machine Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
Jenckes Mach. Co., Sherbrooke, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Darling Bros., Ltd., Montreal, Que.
D'Olier Centrifugal Pump & Machine Co., Philadelphia, Pa.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

PUMPS, HIGH PRESSURE
Charles F. Elmes Eng. Works, Chicago.
Darling Bros., Ltd., Montreal, Que.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

PUMPS, ALL KINDS
Bawden Machine Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PUMPS, HYDRAULIC
Charles F. Elmes Eng. Works, Chicago, Ill.
Darling Brothers, Montreal.
Metalwood Mfg. Co., Detroit, Mich.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto.

PUMPS, LUBRICANT AND OIL
Cincinnati Lubricant Pump Co., Cincinnati, Ohio
Roper, C. F., Co., Hopedale, Mass.

PUMP LEATHERS
Graton & Knight Mfg. Co., Montreal.

PUNCHES AND DIES
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E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Coleman Fare Box Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

PUNCHES, PNEUMATIC
Jno. F. Allen Co., New York.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

PYROMETERS
Peacock Bros., Montreal, Que.
Shore Instrument & Mfg. Co., New York City.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES
John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS (SEE GUARDS)

RAIL BENDERS
Niles-Bement-Pond Co., New York.

RAILROAD TOOLS
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

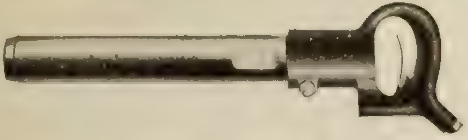
REAMERS, ADJUSTABLE
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto, Ont.
Boker & Co., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McKenna Bros. Brass Co., Pittsburgh.

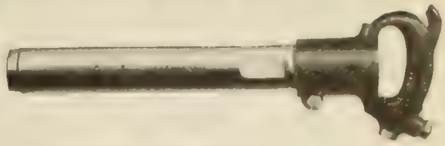
REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Boker & Co., H., Montreal, Que.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CLEVELAND RIVETING, CHIPPING, CALKING AND BEADING HAMMERS

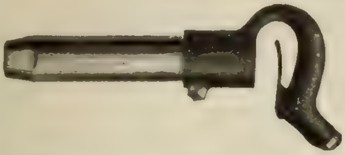
MOST POWERFUL AND EFFICIENT AIR TOOLS ON THE MARKET



Cleveland Riveters are made in 20 styles and sizes with driving capacities of ¼-in. to 1½-in. rivets in Boilers, Tanks, Stacks, etc.

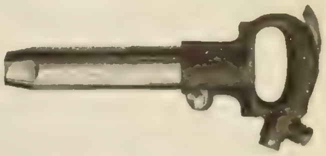


They have a enviable record for durability and economy in service.



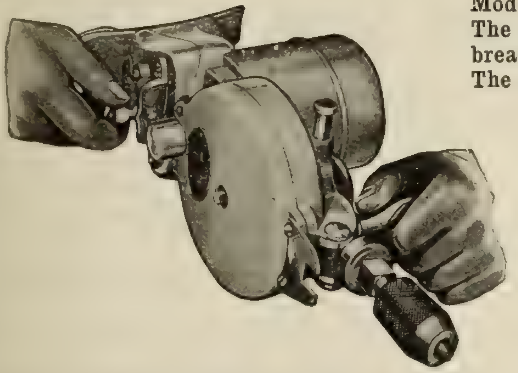
CLEVELAND CHIPPING HAMMERS

are made in 20 styles and sizes to suit all classes of work. They are ideal tools for foundries, as they have high speed, no recoil and are practically dust-proof.



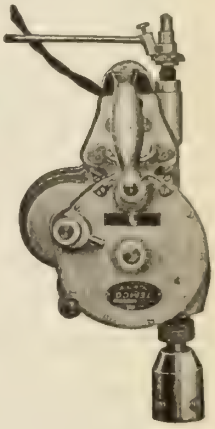
In stock: Riveting and Chipping Hammers, Air Drills, Corner Drills, Sand Rammers, Portable Grinders, Bowes Couplings, Chisels, Rivet Sets, etc.

PORTABLE ELECTRIC DRILLS



Model "B" Drill illustrated, shows compactness of design. The Casing, Switch and Gear Covers are aluminum; the breast plate, motor-head and handle supports are of steel. The machine is light in weight, convenient in shape; has high speed; operates on either A.C. or D.C. currents and runs either forward or reverse as desired. Model "C" has two speeds and in construction is similar to Model B.

Bulletins mailed on request.



Cleveland Pneumatic Tool Co.
of Canada, Limited
84 Chestnut Street, - Toronto, Ont.

Thor

CHIPPING HAMMERS with Single Valve of the Latest Improved Design.

Made in five sizes, with piston diameter of 1 1/16" by strokes of from 1 to 5", designated as sizes A, B, C, D and E. **Shipped on Trial at Our Expense**

Independent Pneumatic Tool Co.

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334 St. James St., MONTREAL, QUE.
General Offices: Thor Building, Chicago, U.S.A.
Branches: New York, Pittsburgh, Detroit,
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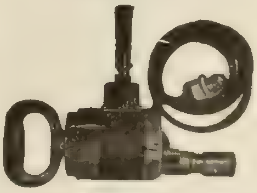
U. S. Electric Drills and Grinders

Save Time, Labor and Money



3 SIZES
3-16 inch, W.G.T. 6 lbs.
¼ inch, W.G.T. 9 lbs.
⅜ inch, W.G.T. 12 lbs.

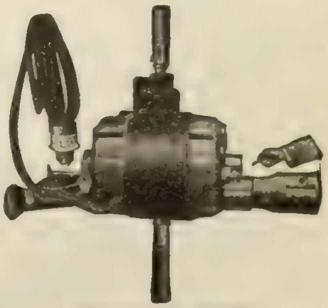
They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



½ inch—2 SPEED.
Speed, 400-750 R.P.M.

For Sale By
The Canadian Fairbanks-Morse Co., Limited
Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver.

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO

REAMERS, STEEL TAPER AND SELF-FEEDING
Boker & Co., H., Montreal, Que.
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Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont

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Cleveland Pneumatic Tool Co. of Canada, Toronto.

RECORDING INSTRUMENTS
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Lachapelle, J. D., & Co., Montreal, Que.

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Cook, Asa S., Co., Hartford, Conn.
National Machinery Co., Tiffin, O.
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Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.

RIVETING MACHINES, ELASTIC ROTARY BLOW
Grant Mfg & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.

ROLLS, BENDING
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.

ROLLS, CRUSHING
Jenckes Mach. Co., Sherbrooke, Que.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
L. S. Starrett Co., Athol, Mass

SAND BLASTS
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Gray Mfg. & Machy. Co., Toronto, Ont.

SAND BLAST SYSTEMS
Whiting Foundry Equipment Co., Harvey Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt. & Son, Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Espen-Lucas Mach. Wks., Philadelphia, Pa.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

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H. A Drury Co., Montreal.
Hunter Saw & Machine Co., Pittsburg, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)

SAWS, INSERTED TOOTH
Tabor Mfg. Co., Philadelphia, Pa.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

SCRAP IRON
L. S. Tarshis & Sons, Montreal.

SCREW MACHINE PRODUCTS
Milholland, W. K., Co., Indianapolis.

SCREW MACHINES, HAND, AUTOMATIC
Bawden Machine Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Garvin Machine Co., New York.
A. B Jardine & Co., Hespeler.
Milholland, W. K., Co., Indianapolis, Ind.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

SCREW MACHINES, MULTIPLE SPINDLE
New Britain Machine Co., New Britain, Conn.
Windsor Machine Co., Windsor, Vt.

SCREWS
Galt Machine Screw Co., Galt, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
Can. Tap & Die Co., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
Wells Bros. Co. of Canada, Galt, Ont.

SCREW SLOTTERS
Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY
Baird Machy. Co., W. J., Detroit, Mich.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
New York Machinery Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Simmons Machine Co., Albany, N.Y.
H. A. Stocker Co., Chicago, Ill.

SET SCREWS, SAFETY
Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Hendey Machine Co., Torrington, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.

SHAFTING
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Dodge Mfg. Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
A. R. Williams Machy. Co., Toronto.

SHARPENING STONES
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

SHAVINGS, SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

SHEARING MACHINES, ANGLE IRON, BAR AND GATE
John Bertram & Sons Co., Dundas.
Bertrams, Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.

SHEARS, POWER
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

SHEARS, PNEUMATIC
John F. Allen Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada.

SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Steel Bending Brake Works, Ltd., Chatham, Ont.

SHEET METAL STAMPINGS
Coleman Fare Box Co., Toronto, Ont.
Dominion Forge & Stpg. Co., Walkerville, Ont.

SHELL BANDING MACHINES, HYDRAULIC
Lymburner, Ltd., Montreal.
Perrin, Wm. R., Toronto.
West Tire Setter Co., Rochester, N.Y.

SHELL PAINTING MACHINE
Can. Blower & Forge Co., Kitchener, Ont.

SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.

SHRAPNEL SHELL MARKER
Brown-Boggs Co., Hamilton, Ont.
Noble & Westbrook Mfg. Co., Hartford, Conn.

SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.

SILVER SOLDER
Geo. H. Lees & Co., Hamilton, Ont.

SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

SLOTTERS
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.

SMOKESTACKS.
MacKinnon, Holmes Co., Sherbrooke, Que.

SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
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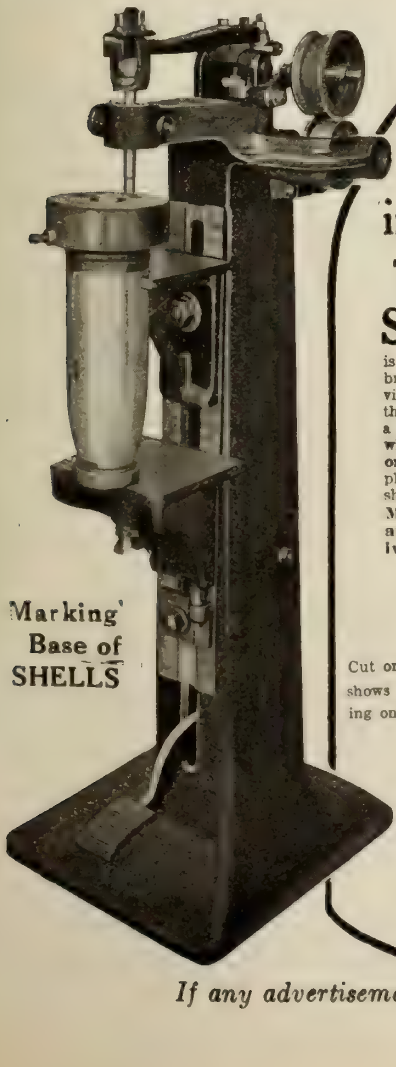

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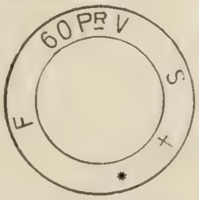

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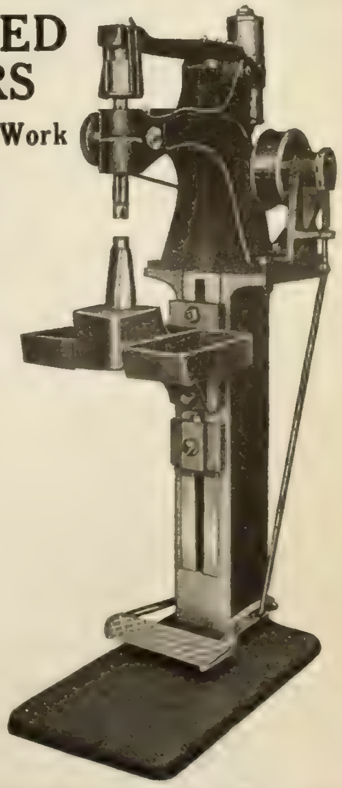

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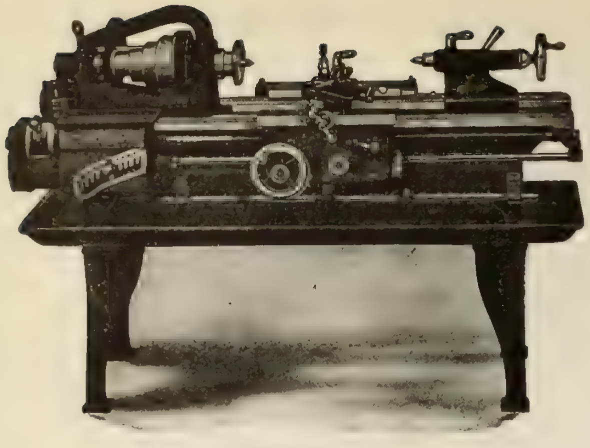

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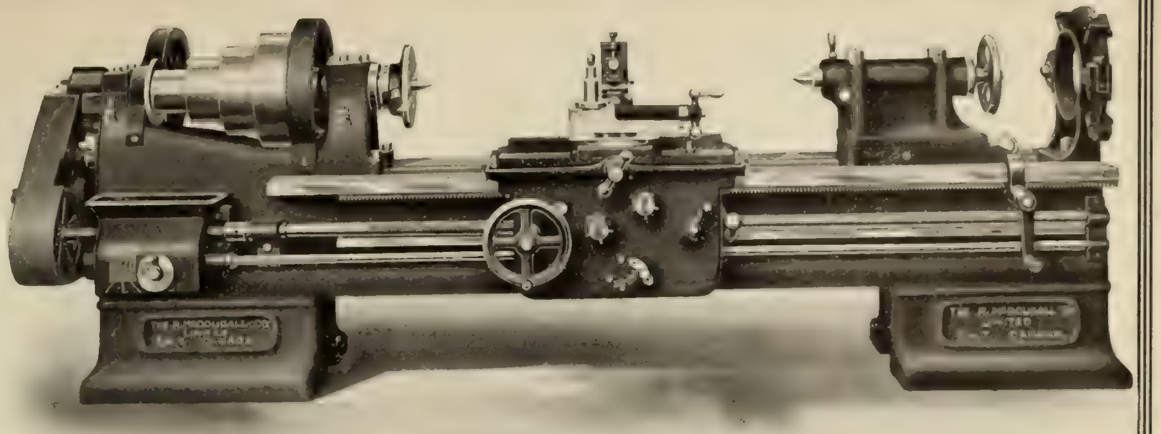
McDougall Lathes for Big Production

16, 18, 20, 22 and 26 inch Swing.



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Furnished with all the regular attachments of modern machine tool practice.

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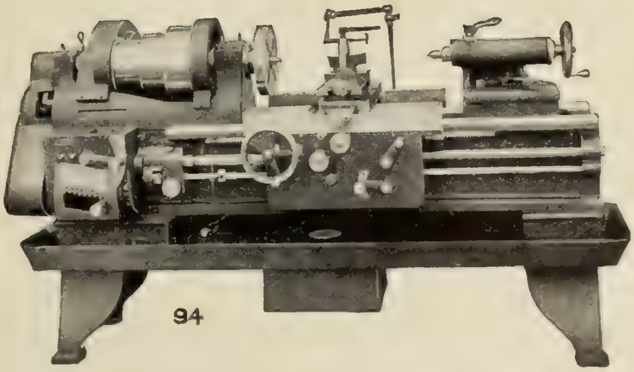

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BUILDERS OF MACHINE TOOLS AND
WOODWORKING MACHINERY

For the convenience of the Trade we have opened Showrooms in Toronto at Brock Avenue Subway, where a full line of our machinery can be inspected.

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CANADIAN MACHINERY
AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XVI—No. 12 Publication Office: Toronto, Sept. 21, 1916 Subscription Price $3.00 per Year

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Manufactured by
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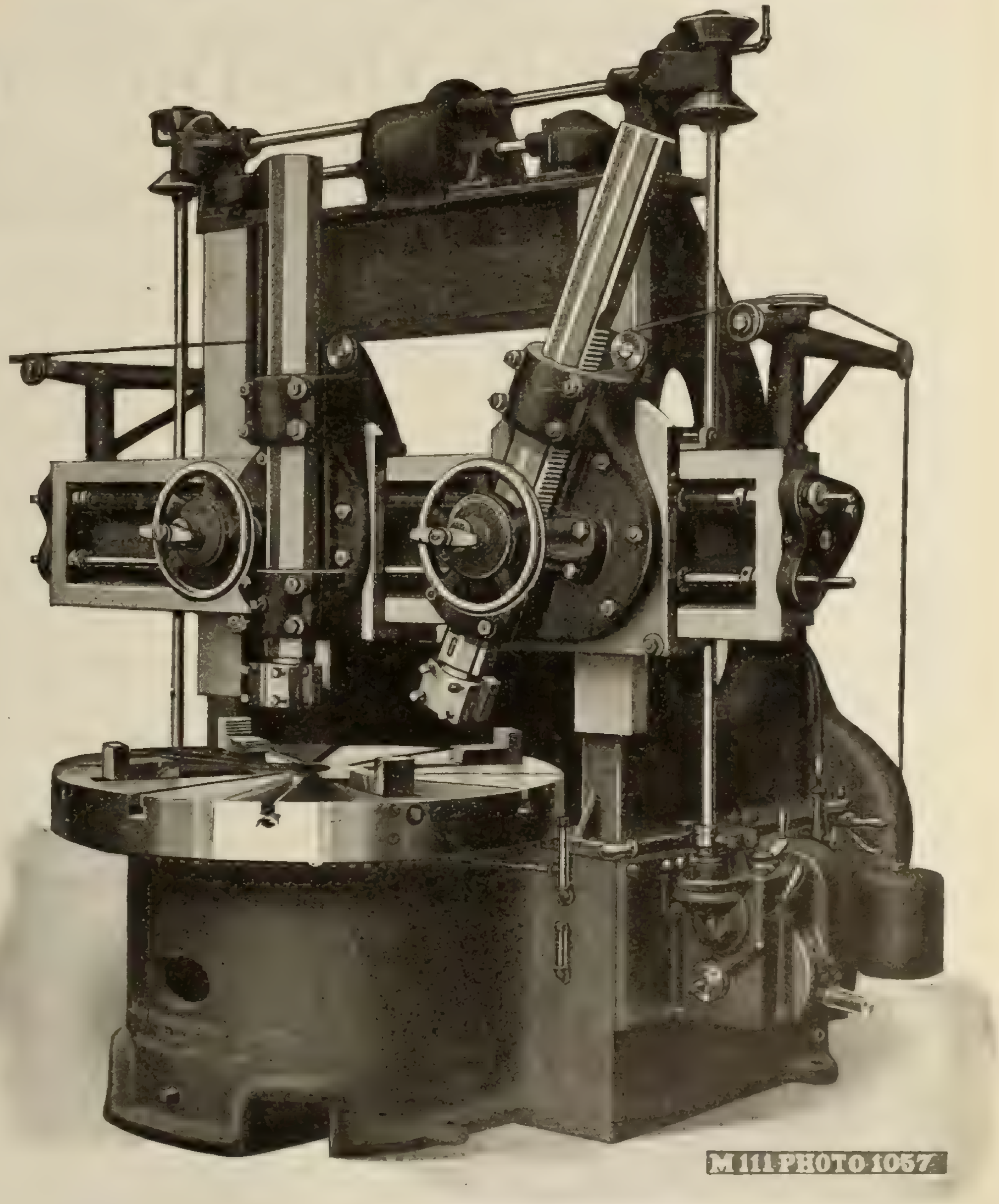

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The Publisher's Page

TORONTO September 21, 1916

Selling the Buyer

(No. 2 of a Series of Short Articles)

Advertising Reduces Selling Expense

SINCE selling consists in great part of educating the buyer and since the process can be accomplished through advertising, it is reasonable to consider advertising a potent factor in your sales organization. Advertising can be made to reduce the time required by a salesman to make a sale. It is intended to supplement the personal salesman, not supplant him. It can be made to perform the very necessary work of education which otherwise would be tedious and expensive. It insures more respectful attention for personal letters, for catalogues and for other literature, as well as for salesmen.

INFLUENCING THE SILENT VOTE

There is an important phase to the usefulness of the technical journal, one which should be carefully considered, i.e., its influence upon the apparently silent, though nevertheless important, vote.

In every shop there are men whose advice is sought by the men who have the actual buying power. Upon their recommendations a sale is frequently made or denied. The salesman may be told to call again a little later or to wait while the buyer consults "someone" else. This is the crucial time for the salesman, but the one who represents a well-advertised house and line, can afford to await results more confidently than the man whose line has not been heralded for months in advance.

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CANADIAN MACHINERY
and Manufacturing News
143-153 University Avenue, Toronto

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* * *

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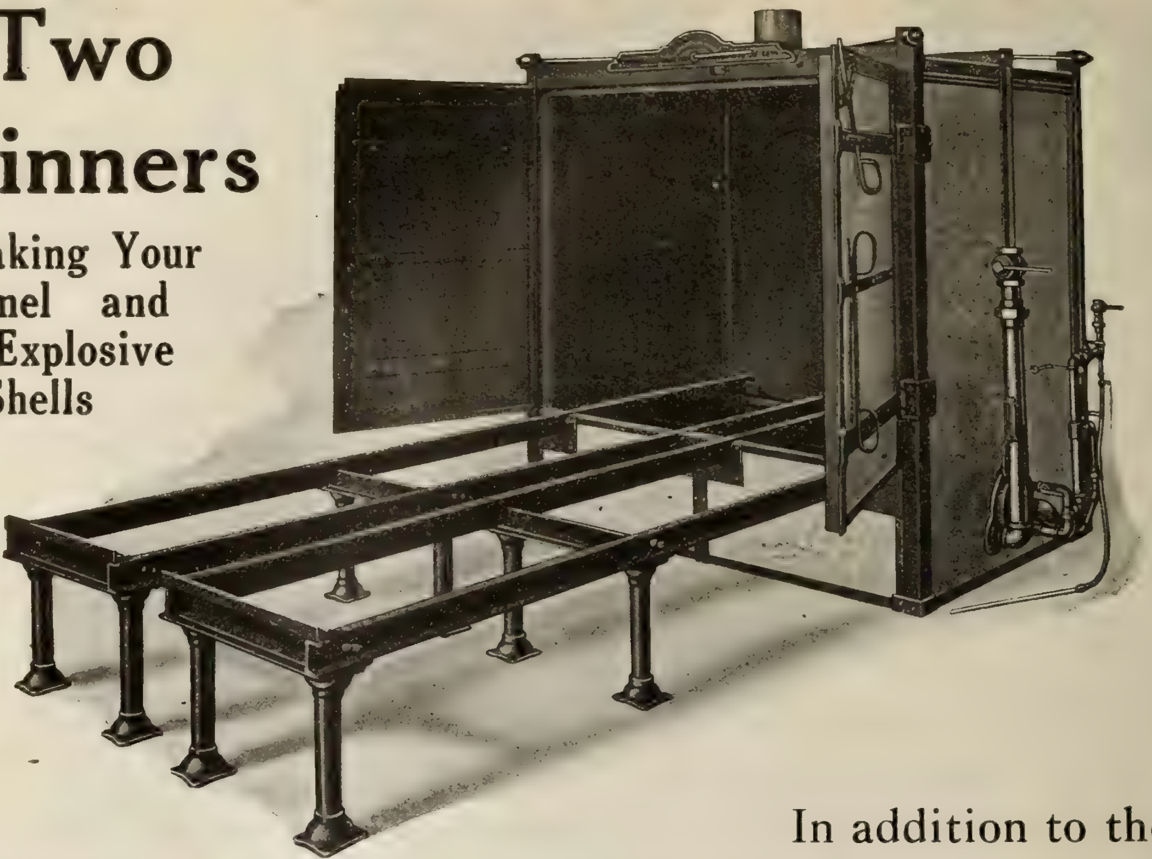
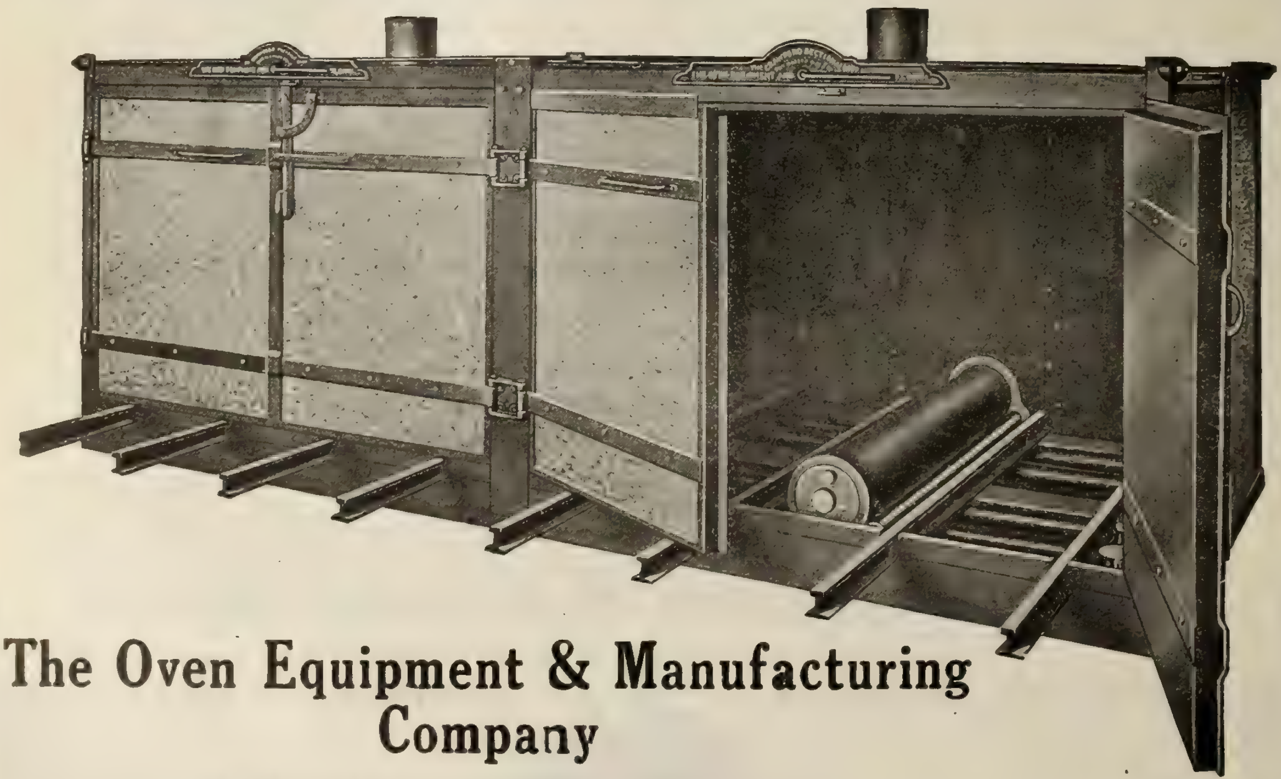


In addition to the constructing of Special Oven Equipment, we design and build trucks suitable for handling any size of shell.



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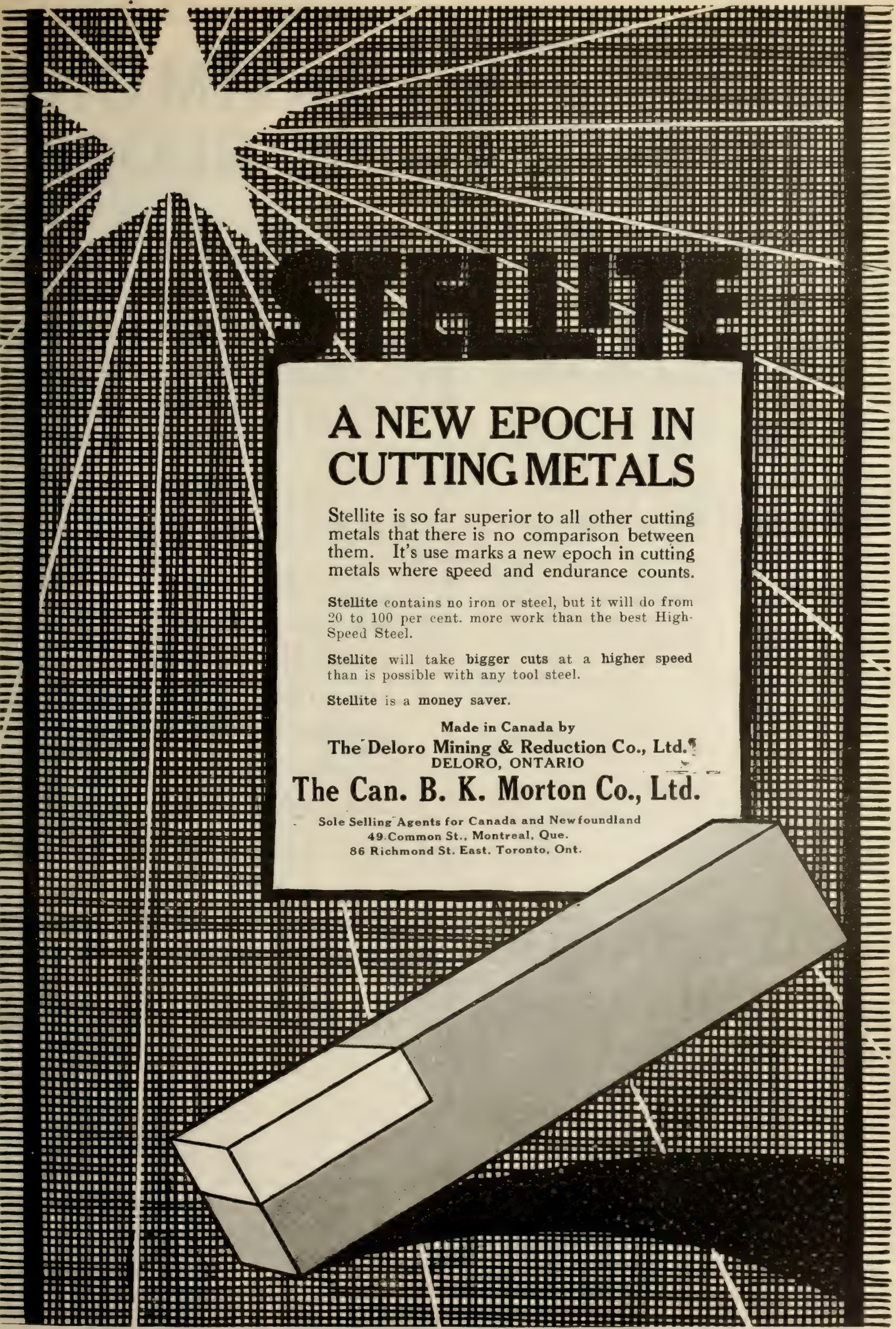
Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA



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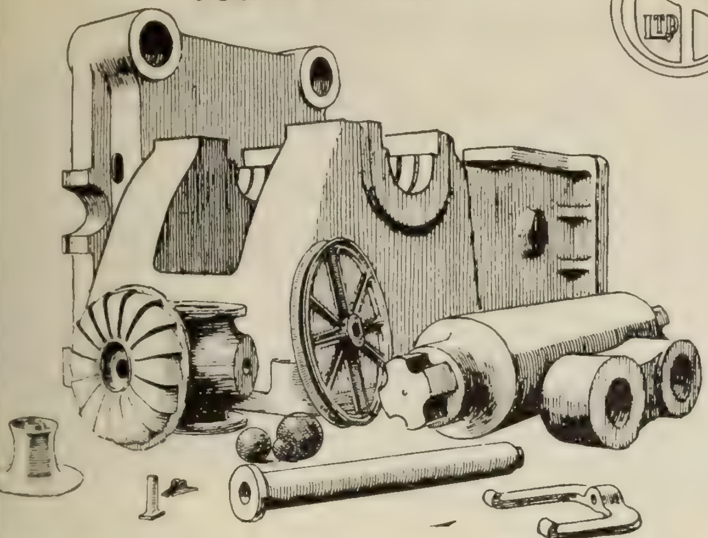

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Shell Forgings

We have the Equipment and Experience and can execute orders for

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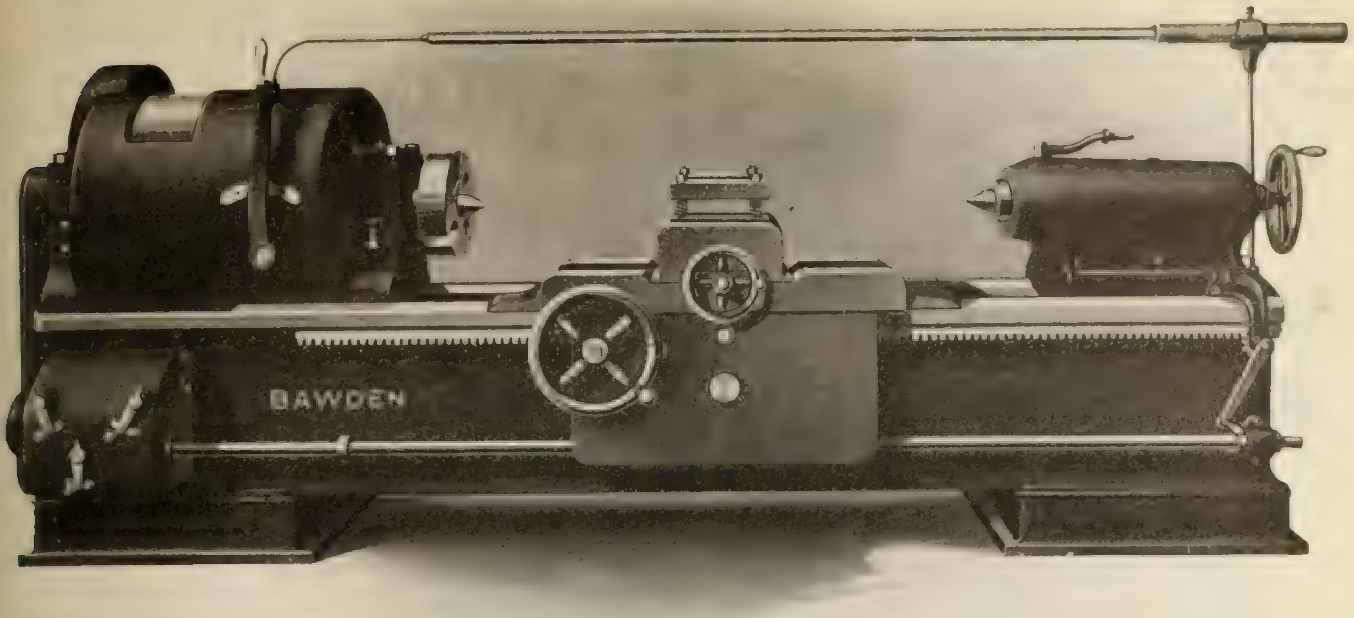

36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

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Heavy Duty Shell Lathes

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BAWDEN LATHES HAVE remarkable shop records.

We'll gladly supply you with names of factories where they are at work, so that you may write them for their independent opinion.

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We manufacture a **full line of gauges for all sizes of British, Russian and French Shells and component parts.**

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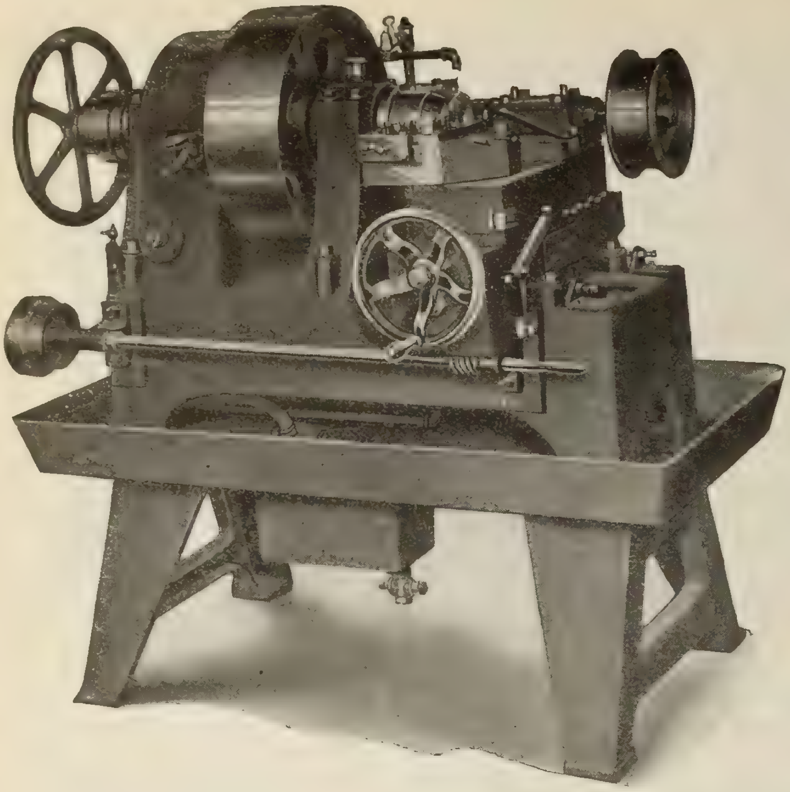

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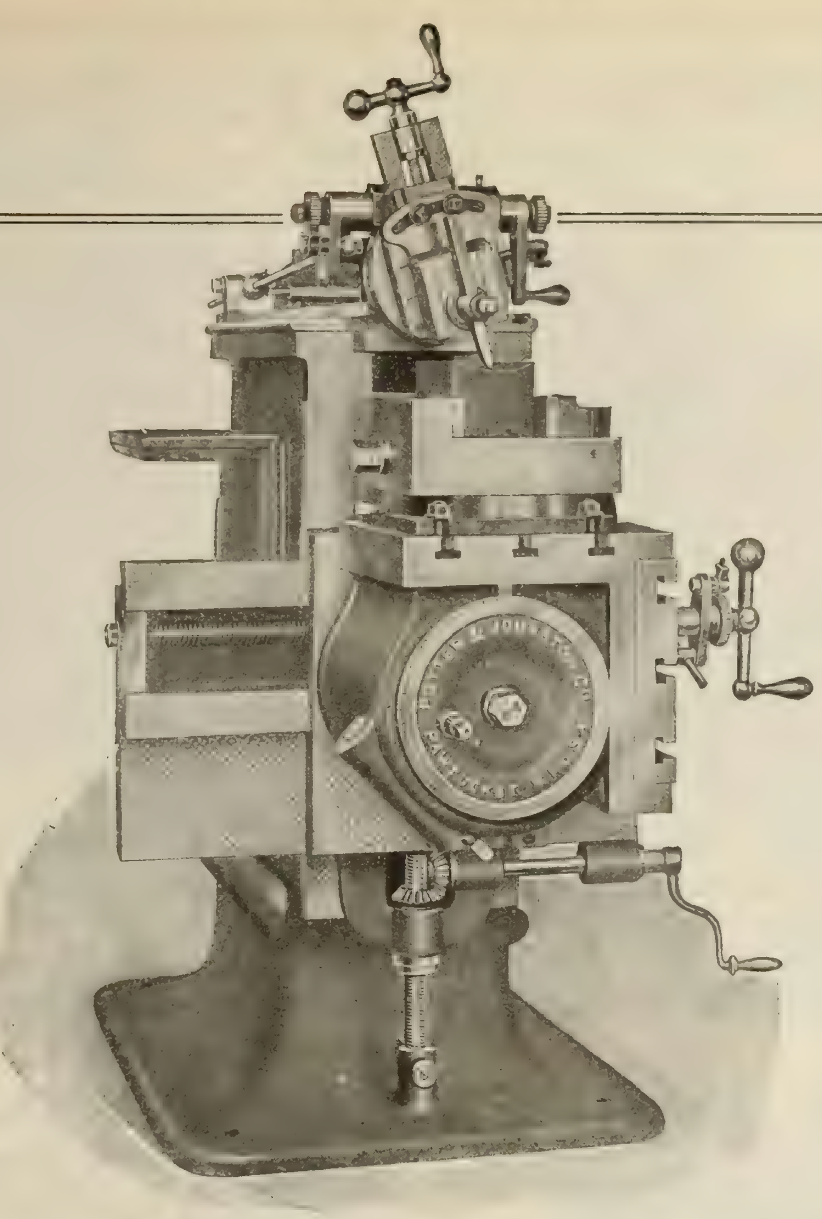

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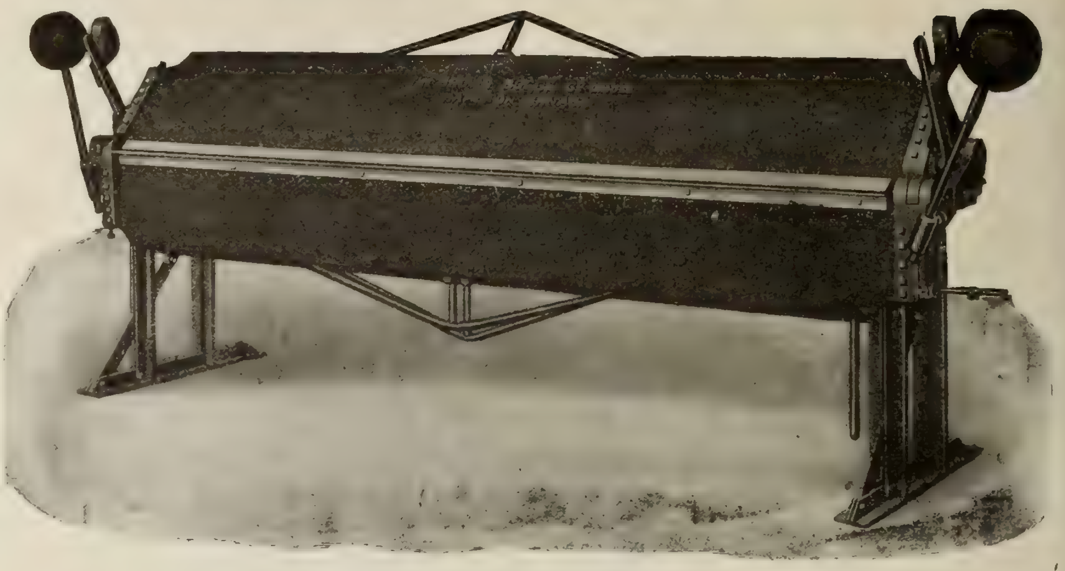

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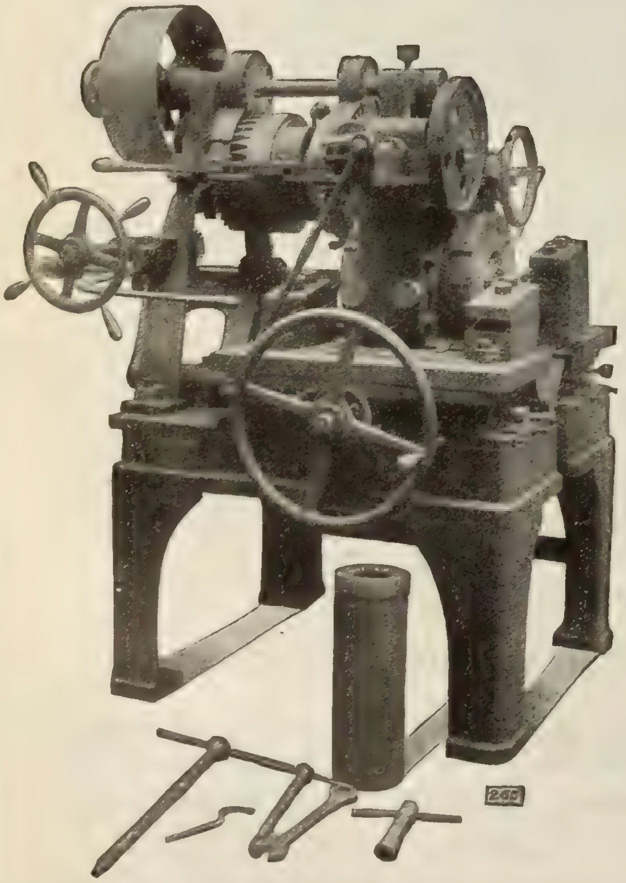

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Canadian Sales Agents
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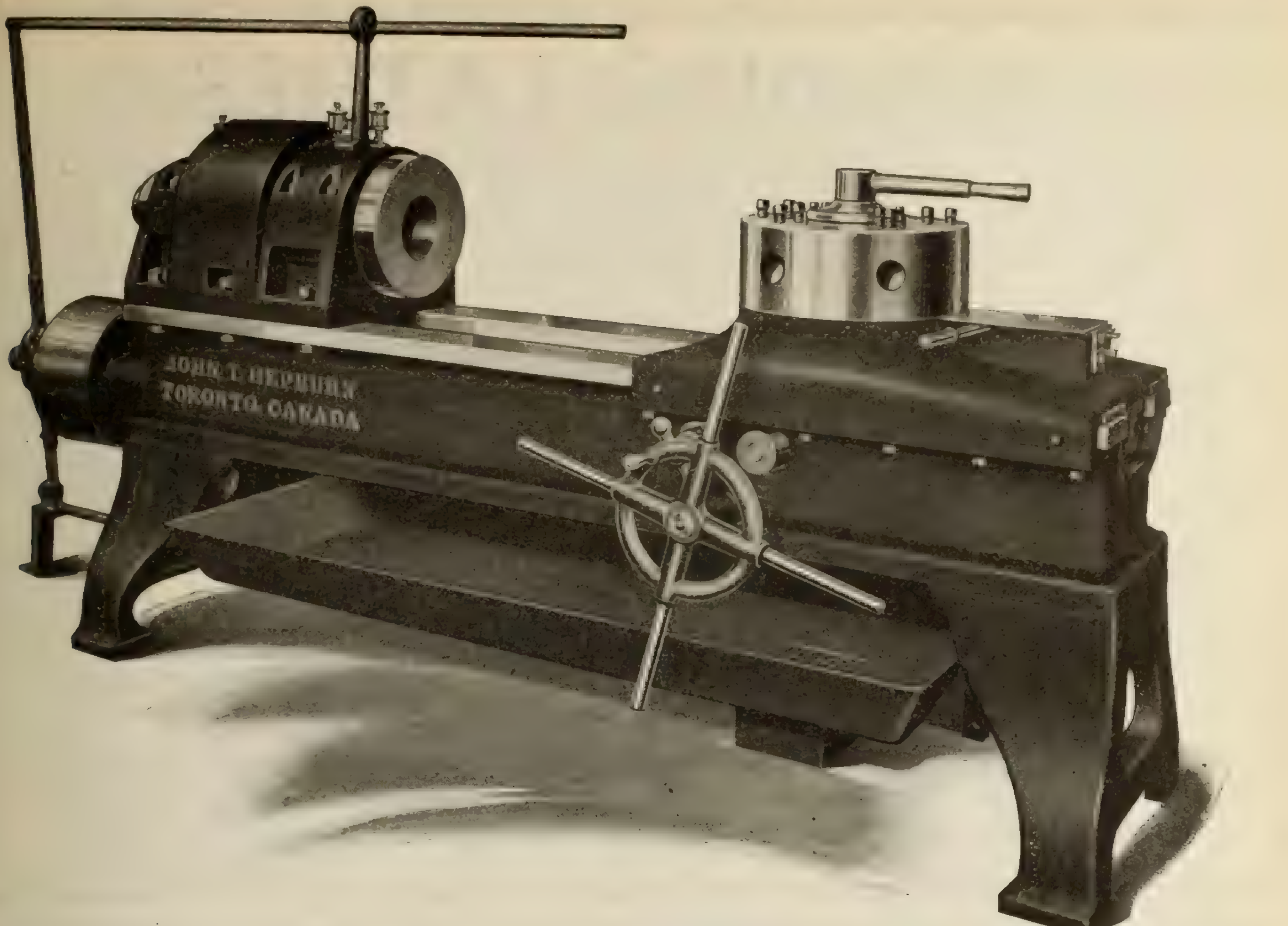

Hepburn Lathes for performance—

The test of tests is production. What have

Hepburn Heavy-Duty Shell Lathes

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Answers to these questions are the best commendation (or condemnation) of ours or any maker's Lathe. Let us send you the names of **users,** then get **from them** answers to the questions you may want answers for.

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—these are the five notable features of Hepburn Heavy Duty Shell Lathes.

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Important—We can make immediate delivery.

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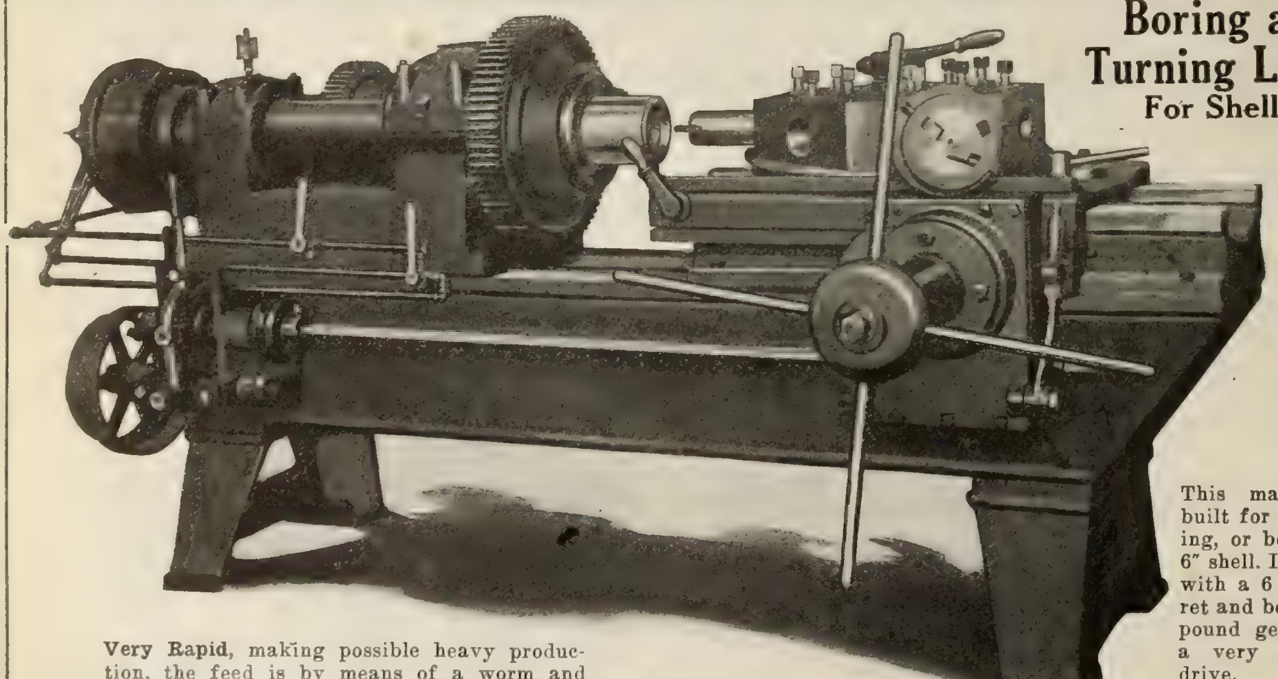
Cincinnati, U.S.A., Makers of

CISCO 14 in., 16 in., 18 in., 24 in. ENGINE LATHES

Boring and Turning Lathe
For Shell Work



This machine is built for base facing, or boring the 6" shell. It is made with a 6 side turret and being compound geared has a very powerful drive.

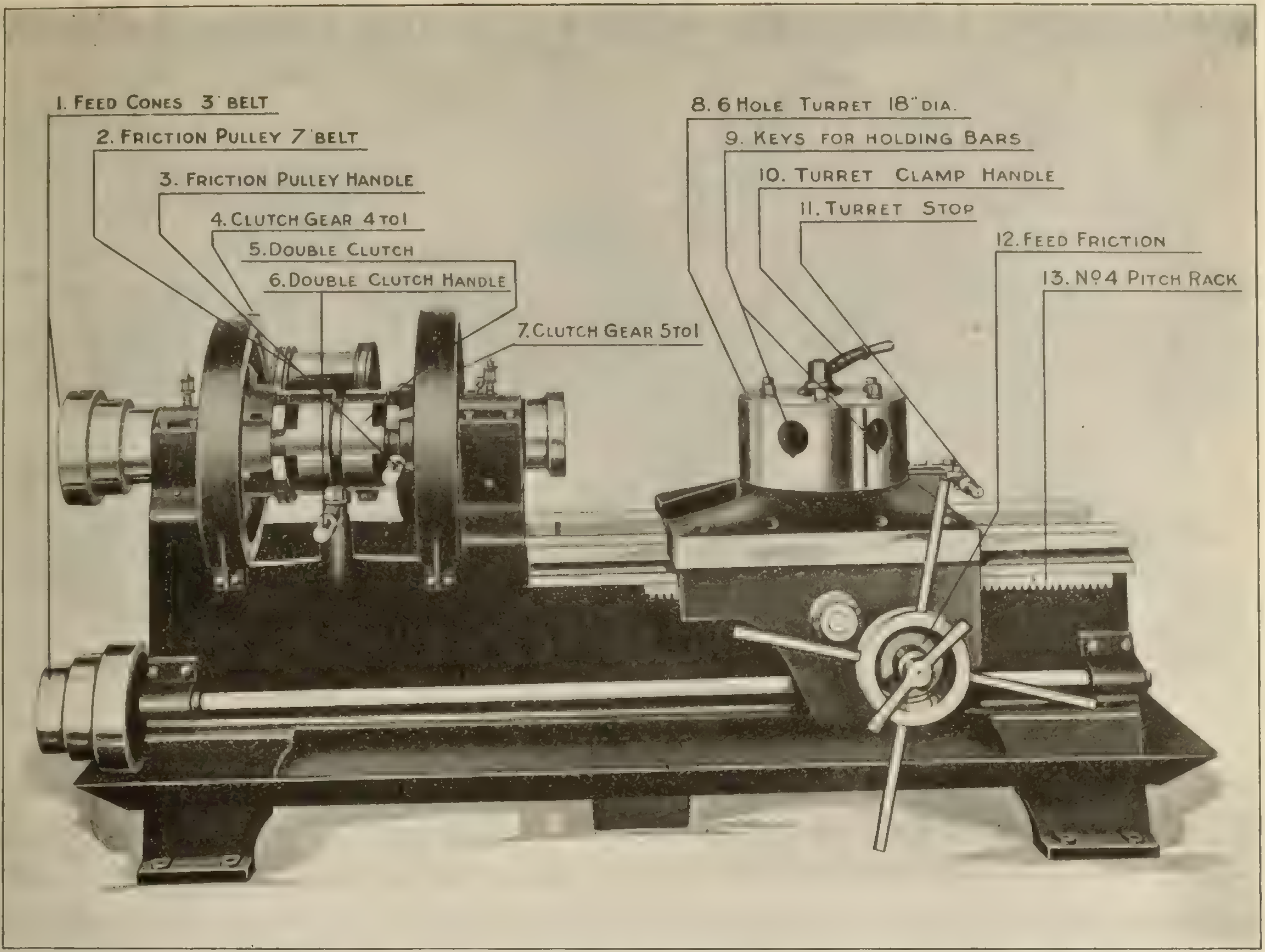
Very Rapid, making possible heavy production, the feed is by means of a worm and gearing in the apron.

WRITE FOR DELIVERIES.

THE JENCKES MACHINE COMPANY, LIMITED

Works: SHERBROOKE, QUE.; ST. CATHARINES, ONT.

SALES OFFICES: 727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.


1. FEED CONES 3" BELT
2. FRICTION PULLEY 7" BELT
3. FRICTION PULLEY HANDLE
4. CLUTCH GEAR 4 TO 1
5. DOUBLE CLUTCH
6. DOUBLE CLUTCH HANDLE
7. CLUTCH GEAR 5 TO 1
8. 6 HOLE TURRET 18" DIA.
9. KEYS FOR HOLDING BARS
10. TURRET CLAMP HANDLE
11. TURRET STOP
12. FEED FRICTION
13. Nº 4 PITCH RACK

SPECIAL SHELL LATHE

For boring and turning shells from 9.2 down. Above cut shows bed turret for boring operations. We have them in stock for both boring and turning.

Among other good features, note the following:—

No. 1—3" belt on feed.
" 2—7" belt and 75 H.P. friction.
" 8—18" turret.
" 9—Keys for boring bars.
" 12—External Feed friction.
" 13—Four-pitch rack.
Note ratio of gearing.

Note Sheet Steel Oil Pan.
No countershaft required.
Bronze bearings throughout.
Sight feed oilers.
Hardened and ground thrust collars.
An overplus of strength throughout.
Workmanship guaranteed.

This lathe will give you satisfaction.

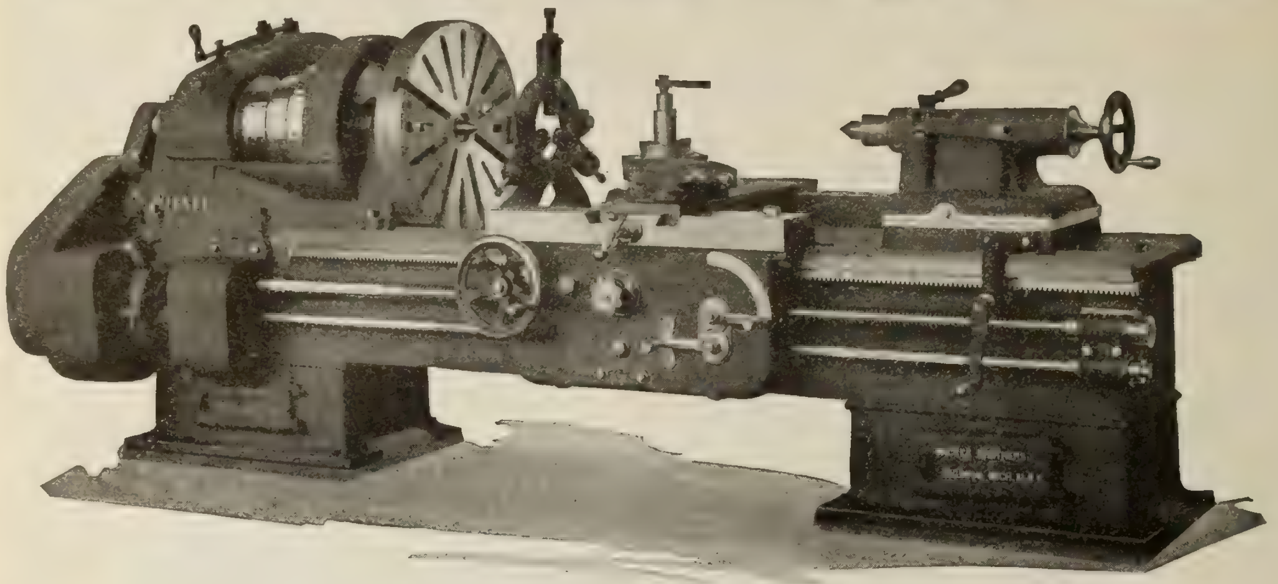
Immediate Shipment From Stock

(Subject to Prior Sale)

The Foundry & Machine Co., Limited

1167 Carriere Road
Montreal, Canada

Wickes Heavy Duty Engine Lathe



The Wickes 26" Heavy Duty Lathe.

Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.

This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.

Let us tell you about this lathe and our 20", 32", also our 17" Rapid Production Lathe for Automobile and other work.

We can make prompt shipment.

WICKES BROTHERS **Saginaw, Michigan**

GARLOCK-WALKER MACHINERY CO. LIMITED

G&W MACHINERY

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Lodge and Shipley — Double Back Geared Engine Lathe — Good Delivery

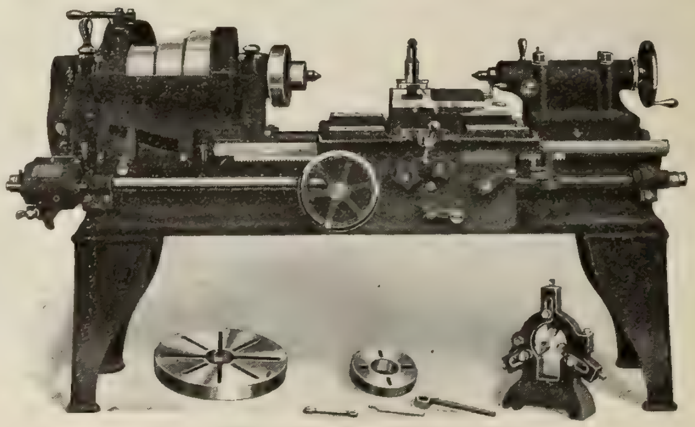
We have at Toronto

FOR IMMEDIATE DELIVERY

New Davis 6" Cutting-off Machine—fully equipped—Size of hole in spindle 6⅞".

New 18" x 8' Giddings & Lewis Heavy Duty Engine Lathe. 3 Step Cone—Double Back Gears. Regular equipment.

Strong, speedy, accurate machines for all operations on 6-in., 8-in., 9.2-in. and 12-in. projectiles — Get our prices.



THE LATHE FOR YOUR TOOL-ROOM

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds

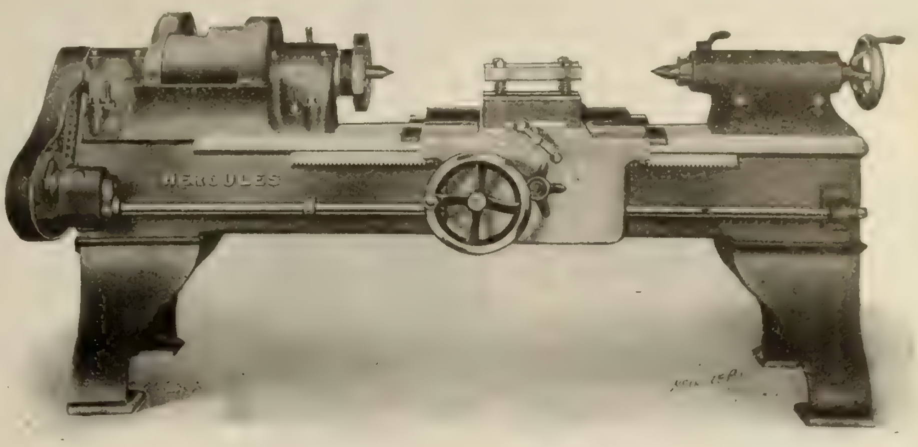
How Lathe Simplicity Solves Labor Problems

The great simplicity, the compact, convenient design, make the Hercules Lathe an ideal single-purpose machine. To train an unskilled laborer to perform accurately one or two operations on this machine requires but a short time. The rugged, powerful construction then enables that laborer to turn out precise work continuusly at the maximum speed.

Where skilled mechanics are not always available — the Hercules Single-Purpose Lathe is the logical machine tool.

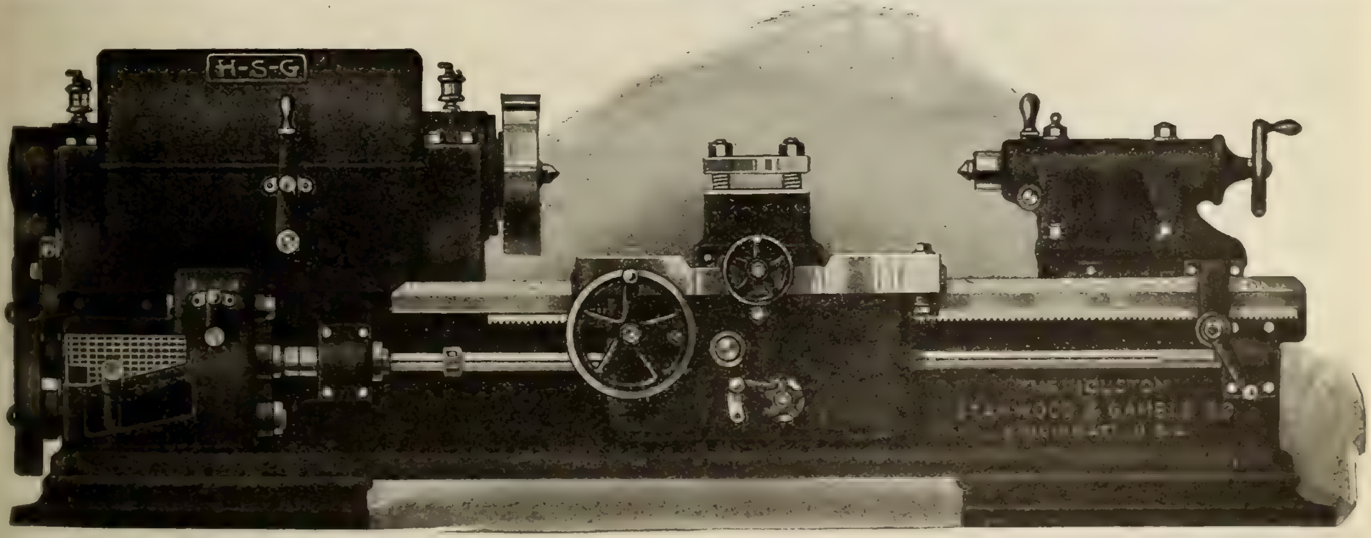
At the present time, we can still make early deliveries.

Write—at once — for full details.



HIMOFF MACHINE COMPANY, INC.

128 MOTT STREET, NEW YORK CITY



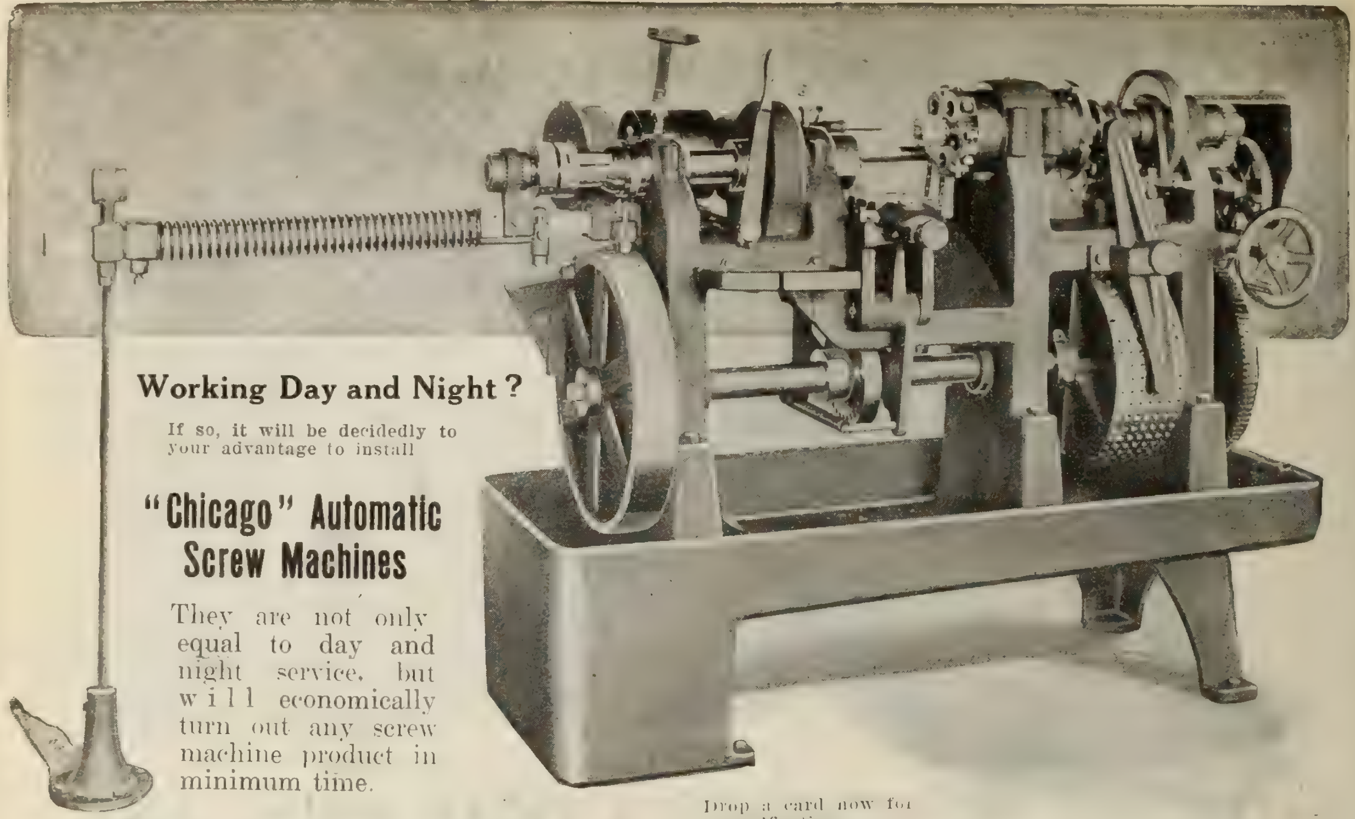
H-S-G TRADE MARK single-pulley, high-powered, all-geared engine lathe which can be shipped promptly in three sizes, 26", 30" and 36" swing.

This is a heavy duty lathe. For instance, the 30" swing lathe has 7" face drive pulley, 8" x 10" front spindle bearing and other parts of correspondingly liberal dimensions. The net weight with 12 ft. long bed is 15,000 pounds. Weight with profiling attachment and pot chuck for boring 18,000 pounds. All gears without exception are of steel. The design and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

CINCINNATI, U.S.A.

Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto



Working Day and Night?

If so, it will be decidedly to your advantage to install

"Chicago" Automatic Screw Machines

They are not only equal to day and night service, but will economically turn out any screw machine product in minimum time.

Drop a card now for specifications.

READY FOR OPERATION IN YOUR PLANT IN LESS THAN SIX WEEKS from the time your order reaches us.

The John MacNab Machinery Co., 90 West Street NEW YORK.

European Representative: John MacNab, Hyde, England.

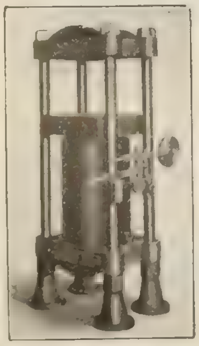
WE MANUFACTURE

Special Machinery, Tools and Gauges for the manufacture of Munitions.

WE MAKE TO ORDER

Special Machinery for any purpose.
Gauges, Tools, Cut Gears, Molds for rubber, Etc., Etc.

BROWN ENGINEERING CORPORATION, Limited
415-419 King St. W., TORONTO, Ont.



Elmes Hydraulic Press No. 676 With ¾-in. Automatic Lever Operating Valve No. 677-A

This press is of steel and semi-steel construction, and the stands which support the press are threaded at the ends to receive the steel columns and have holes for fastening to the floor. The platen is guided by the columns.

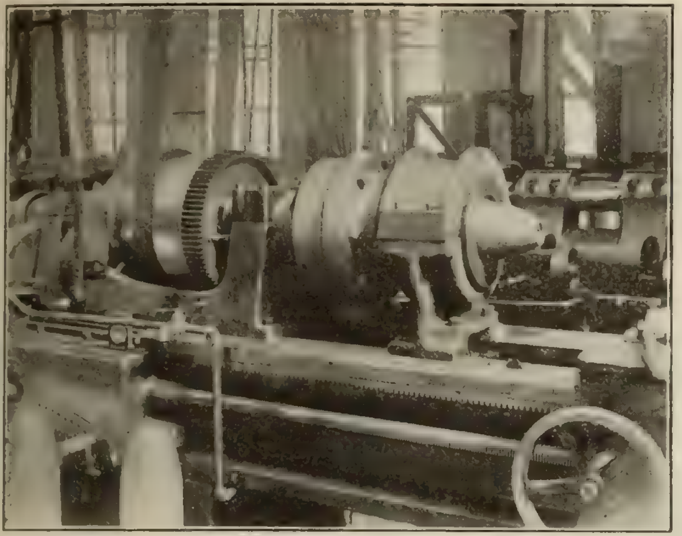
The operating valve is attached to the cylinder, and is designed with a weight to be set for the pressure desired, and releases automatically. To start the ram up, the lever is pushed down; upon the ram reaching the desired pressure, the lever automatically releases (acting as a safety valve as well), causing the ram to descend. Valve body is made of bronze, and other parts are made of tool steel and machine steel. If desired a hydraulic gauge can be attached to show the various pressures, although with this valve it is not necessary.

Write for our Hydraulic Machinery Catalogue.

Charles F. Elmes Engineering Works 217 N. Morgan St. Chicago, U.S.A.

Over 50 years' experience building hydraulic machinery.

Shell Manufacturers



Cut shows Chuck in use in one of Canada's largest Shell Shops, on Nosing Operation.

Increase Your Production from 25% to 75%

with the use of

A. J. LAVOIE'S

Low Pressure

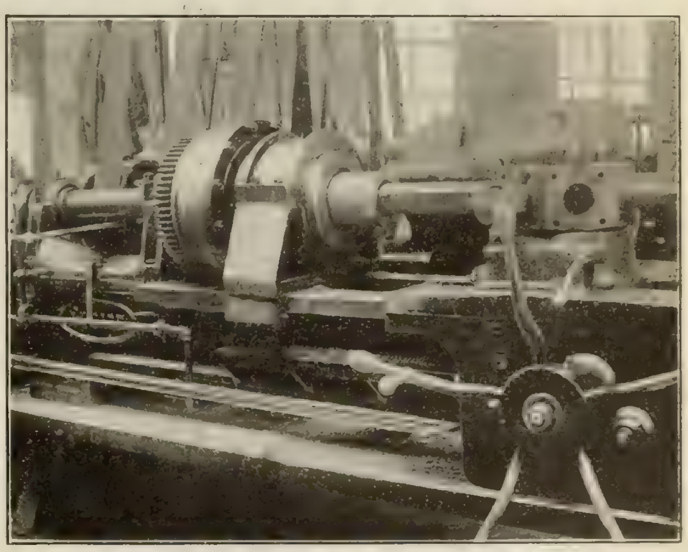
Compressed Air Chucks

This chuck can be applied to any make of lathe without alteration to the machine.

It is a one unit combination attached to the face plate of your lathe, supported by an additional heavy duty bearing, thus making a heavy duty lathe out of a light machine.

It grips the shell while in motion. It releases the shell while in motion. No need to stop your machine.

One small lever operates the chuck. It requires very little air, and will operate with pressure as low as 60 lbs. per sq. in.



Cut shows Chuck on Rough Boring Operation.

It grips the shell in a predetermined position. The jaws do not slip on the shell. It has shell interior and exterior adjustable stops.

If you will try one of these chucks on a machine you will see the necessity for installing them, because **they hold shells of all dimensions, for all kinds of operations and can be mounted on all kinds of machines.**

The Lavoie chuck is simple—it is effective, and it is fool proof.

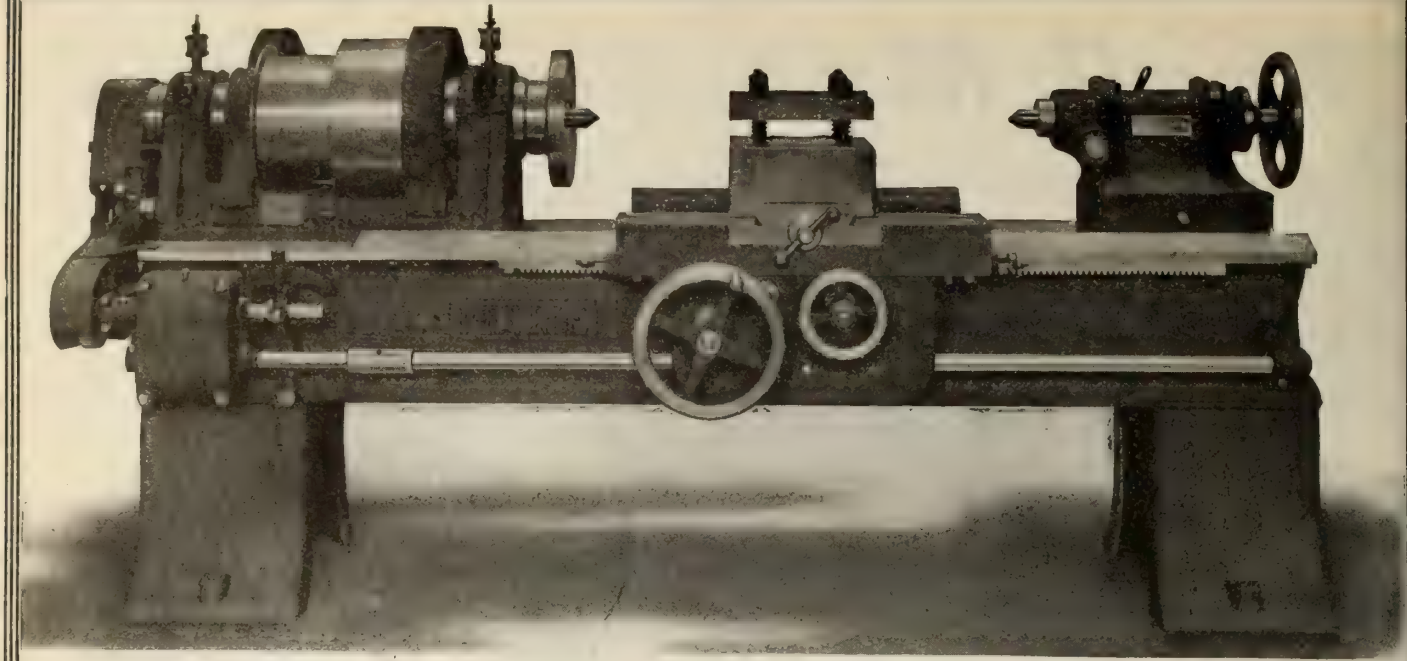
It is built on the duplicate part system. This chuck is already in use by some of the largest shell makers.

Manufactured by

The Montreal General Tool Co.

673-675 Notre Dame Street - Maisonneuve, Montreal, P.Q.

Also Manufacturers of Shell Tools, and Special Machine Attachments of All Kinds Made to Order



Petrie 20-inch Heavy Duty Manufacturing Lathe

A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

Made in Canada **Reasonable Price** **Prompt Deliveries**

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.

"Metalwood" Banding Press

Capacity, 6 to 12-in. Shells

While the price of this press is somewhat higher than others on the market, customers who have used both unhesitatingly prefer our machine, even to the point of discarding other types, for the reason that it is so sturdily constructed it withstands the most severe service and constant use.

Rams—6—Semi steel 11" diameter. Move of each ram ½" or more if necessary. All rams returned by levers on plate with heavy Vanadium steel spring. Cylinder—Removable, of alloy steel.

Hydraulic inlet to cylinder, 1¼ pipe. Distributing ring 2".

All pipe, seamless steel tubing; all fittings, drop-forged steel. All parts under strain, alloy steel castings or forgings.

Dies, 6, forged chrome nickel steel, hardened and removable without disturbing any part of press by loosening 2 nuts.

Weight, 9,500 lbs.

Can be operated either from accumulator or pump.

Metalwood Manufacturing Co.

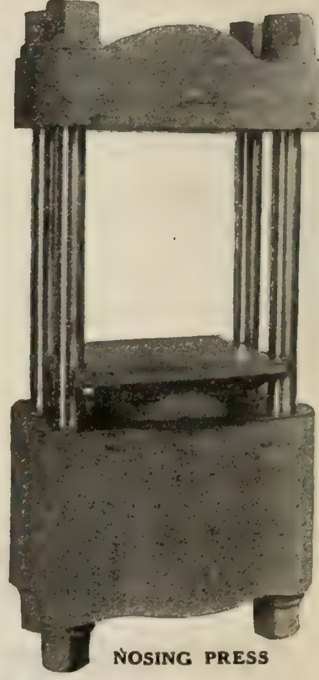
Leib and Wight Sts., DETROIT, MICH.

PRESSES

Pumps and Accumulators

FOR ALL PURPOSES

Made in Canada



NOSING PRESS

WILLIAM R. PERRIN, Limited

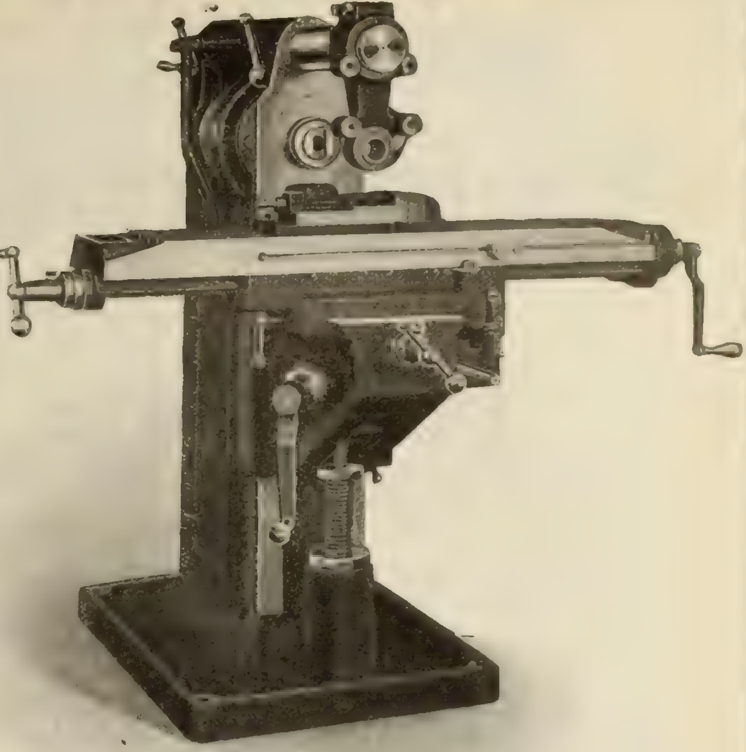
TORONTO

The Ford-Smith Machine Company

Ford-Smith

27" x 19" x 7½"

Milling Machines



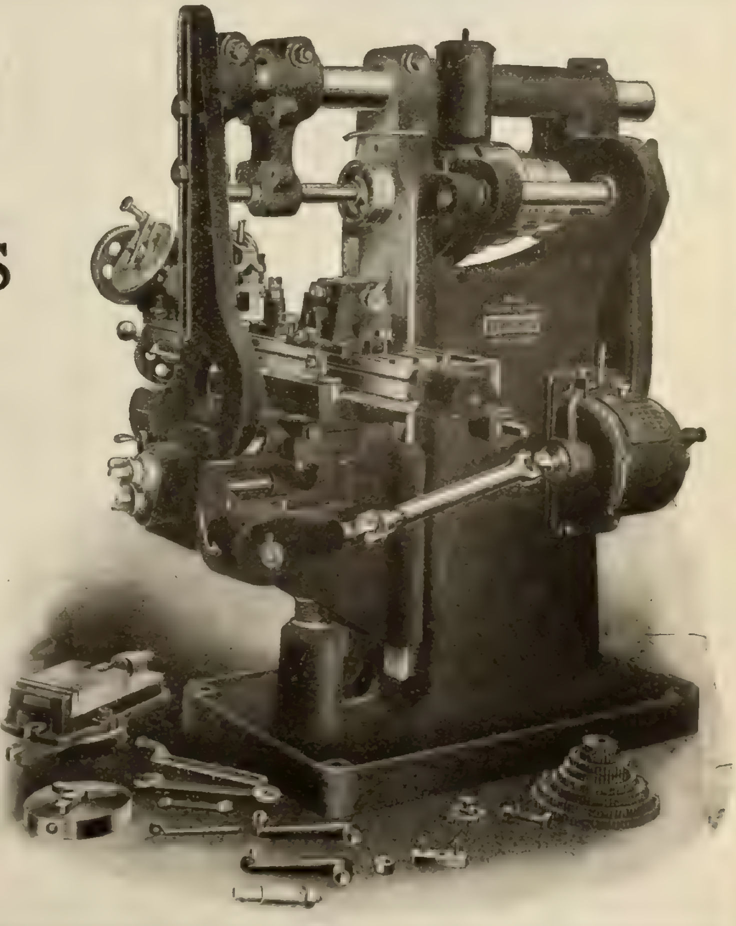
We can make interesting deliveries on these machines, either through our regular dealers or direct from our plant.

Our Catalog illustrates various features exclusive with Ford-Smith Millers and will be gladly forwarded on request.

The Ford-Smith Machine Company
Limited
Hamilton Canada

KEMPSMITH

UNIVERSAL MILLING MACHINES



Are built in three standard sizes. They embody every worth-while feature to be found on a tool room Milling Machine.

We call especial attention to the Dividing Head which is part of the regular equipment of every Universal Miller.

The Kempsmith Dividing Head is compact and rigid, unusually convenient in operation and so constructed as to maintain its accuracy under heavy service.

We publish a thirty-two page book elaborately illustrating and describing this Dividing Head. A copy will be sent free on request. Just ask for "Dividing Head Book."

Kempsmith Manufacturing Co.
MILWAUKEE, U. S. A.

Agents:—Foss & Hill Machinery Co., Montreal
General Supply Company, Toronto and Ottawa
Western Supply and Equipment Co., Calgary

HEAVY DUTY

Ammunition Lathes

FOR

Immediate Delivery

FULL INFORMATION ON REQUEST TO

HYDE ENGINEERING WORKS

27 WILLIAM STREET - - - MONTREAL, P.Q.

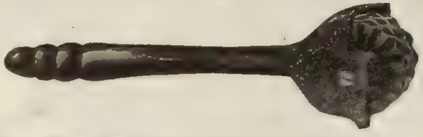
Grinding Wheel Dressers

No one type of Grinding Wheel Dresser is adapted for all kinds of wheels, any more than one size or grade of wheel is adapted for all classes of work. We manufacture Dressers for every class of wheel, and, being specialists, are frequently in position to make valuable suggestions to customers as to the best type of Dresser for their particular needs.

Any of our Dressers will be cheerfully sent, subject to approval and can be returned should they not be found satisfactory.

The Diamo-Carbo Emery Wheel Dresser.

Owing to the high price of Diamond Dressers, the Diamo-Carbo is rapidly coming into favor as an economical substitute for the Diamond. It will do practically the same work as will the Diamond, excepting in some instances of precision grinding. It is so inexpensive that the tool can be left with each grinder. It has been adopted by many of the leading shops of Canada, United States and Great Britain.



The Sherman-Huntington Dresser.

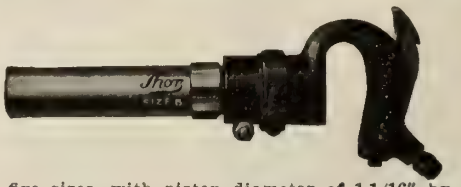
For rough work the Huntington Dresser mounted on the bearings covered by our Sherman patent gives the best results. They are made in two sizes: No. 1 with Cutters 1¼" diameter and No. 2 with cutters 2⅜" diameter. We also make the ordinary Huntington Cutters. All of our Dressers of this type are equipped with our protection hood which continually protects the face of the user from flying particles and is a very valuable feature at no added cost.

Write for booklet and trial offer.

The Canadian Desmond-Stephan Mfg. Co.,
HAMILTON LIMITED ONT., CAN.
Alfred Herbert, Ltd., Coventry, Agents for Great Britain.

Thor

CHIPPING HAMMERS with Single Valve of the Latest Improved Design.



Made in five sizes, with piston diameter of 1 1/16" by strokes of from 1 to 5", designated as sizes A, B, C, D and E. **Shipped on Trial at Our Expense**

Independent Pneumatic Tool Co.

CANADIAN OFFICE:
334 St. James St., MONTREAL, QUE.
General Offices: Thor Building, Chicago, U.S.A.
Branches: New York, Pittsburgh, Detroit, San Francisco, Birmingham

CELFOR

Why worry about deliveries—

Our modern and efficient plant and an ample supply of high-speed steel make possible prompt deliveries of

High-Speed Tools

We make nothing but high-speed tools and the very best at that. All are made by the forged and twisted process.

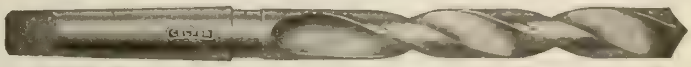
We have in stock or in process of manufacture every tool of every size shown in *Catalog No.* 15.

This means we can ship promptly from stock—or very, very soon after your order is received.

Celfor
TOOL
COMPANY

Our Catalog No. 15
Send for a Copy

It is our constant aim to give you service when you buy—and service after you receive the tools.



Type "J" High-Speed Twist Drill—gives maximum speed—and the maximum number of holes per grind—and good, clear down to the shank.

Celfor Tool Company

Buchanan, Mich.

Canadian Agents: **Rudel-Belnap Machinery Company, Toronto, Montreal**

Canada's Largest Railway and Machine Shops have installed DENNISTEEL Shelving.

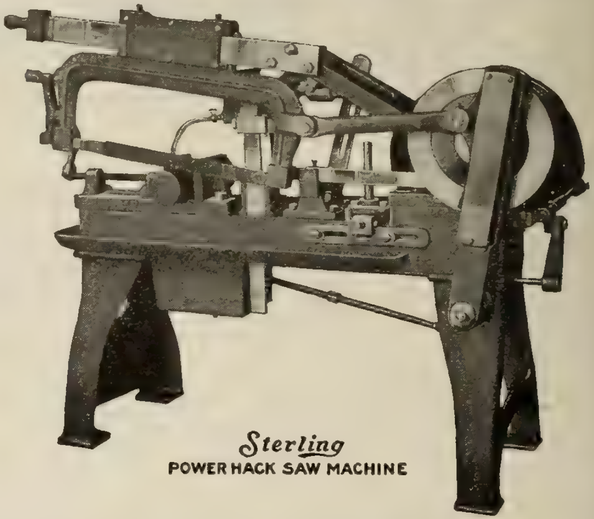
Steel Shelving

DENNISTEEL is the logical machine shop shelving. It stands the wear better, takes care of stock better, and looks better, besides being better value for the outlay. And it's FIREPROOF. We want to send you interesting literature. May we?

Dennis Wire & Iron Works Co., Ltd.
London, Canada

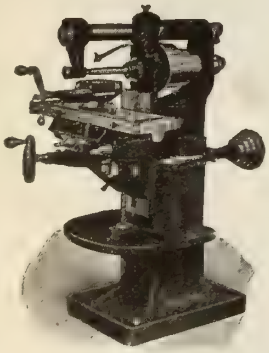
DENNIS-LONDON

"STERLING" HIGH DUTY POWER HACK SAW MACHINE



Sterling
POWER HACK SAW MACHINE

MANUFACTURED BY
DIAMOND SAW & STAMPING WORKS
BUFFALO, N.Y., U.S.A



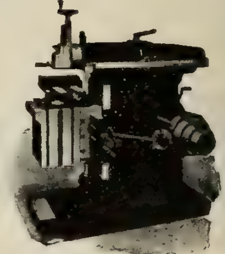
Cut Your Shop Costs

Nobody would think of putting 16-inch lathe work on a 30-inch lathe, then why leave small parts on a large Milling Machine?

A Steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

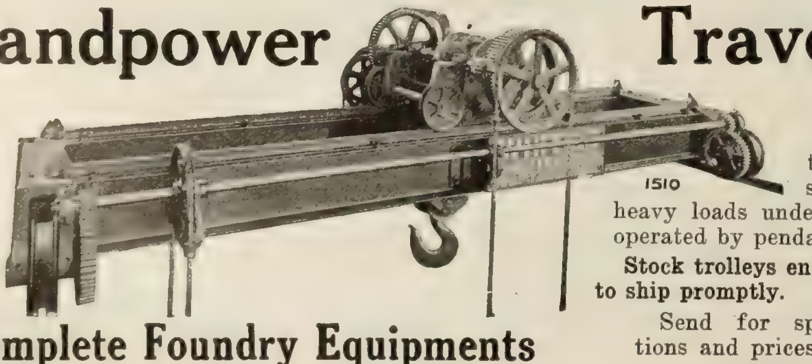
That same principle applied to your small planer work will cut the cost of planer work.

A Steptoe Shaper will do the work faster because it can be handled quicker.



The John Steptoe Company, CUMMINSVILLE CINCINNATI, OHIO, U.S.A.

Handpower Traveling Cranes



2½ to 40 TONS CAPACITY

Our standard "Rope Drum Hoist" type, as shown herewith, has two speeds and automatic brake. Lowers heavy loads under complete control. All movements operated by pendant chains.

Stock trolleys enable us to ship promptly.

Send for specifications and prices.

Crane catalog 110 on request.

Complete Foundry Equipments

CRANES OF ALL TYPES

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB.

The World Does Move

PEERLESS
PEERLESS MACHINE CO. RACINE WIS. U.S.A.

Evidently one of our competitors is not aware of this fact, or they would not have written the ad. which read as follows:

"One blade on this machine does what six of the same kind will do on any other."

One blade in the **PEERLESS** High-Speed Metal Cutting Machine will cut as much as their machine and will make approximately two cuts to one. Possibly you need more cutting-off machines and have not the additional floor space. The **PEERLESS** will solve this problem; instead of buying two machines, one will do the work.

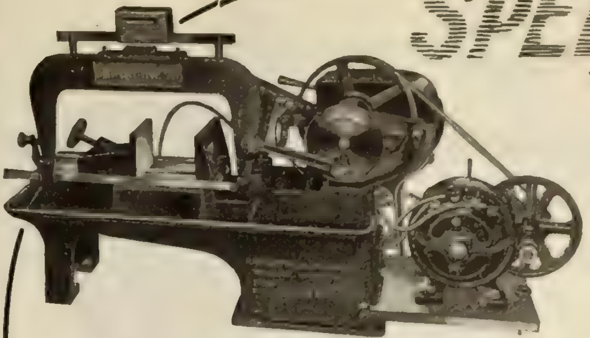
The **PEERLESS** is also semi-automatic, which means where one operator attends to 10 machines of the other type, he can operate 15 of the **PEERLESS**. A ten-year-old boy can operate the **PEERLESS** with one hand, because he does not have to raise and lower a heavy, cumbersome saw frame, as this is automatic. All he has to do is to pull the shifting lever.

It is very seldom such improvements are made in machinery that they cannot be fully described, but this is the case in the **PEERLESS**, and in order for anyone to appreciate these improvements the machine must be seen in actual operation, therefore, will gladly send one on thirty days' free trial.

Write us for complete description before you consider another machine.

PEERLESS MACHINE COMPANY
1607 Racine Street **RACINE, WISCONSIN**

SPEED



and a clean, straight cut

If you're interested in speed and accuracy you'll be interested in the

Racine Metal Cutter

It goes through angle irons, channels, I-beams, die blocks, pipe, tubing, heavy bars, etc., in a way that wins the enthusiastic endorsement of all users. It is in use in many Canadian shops. One Canadian Steel Company purchased 120 Racine Metal Cutters and has effected a saving of $11,019.50, full particulars of which will be given interested parties.

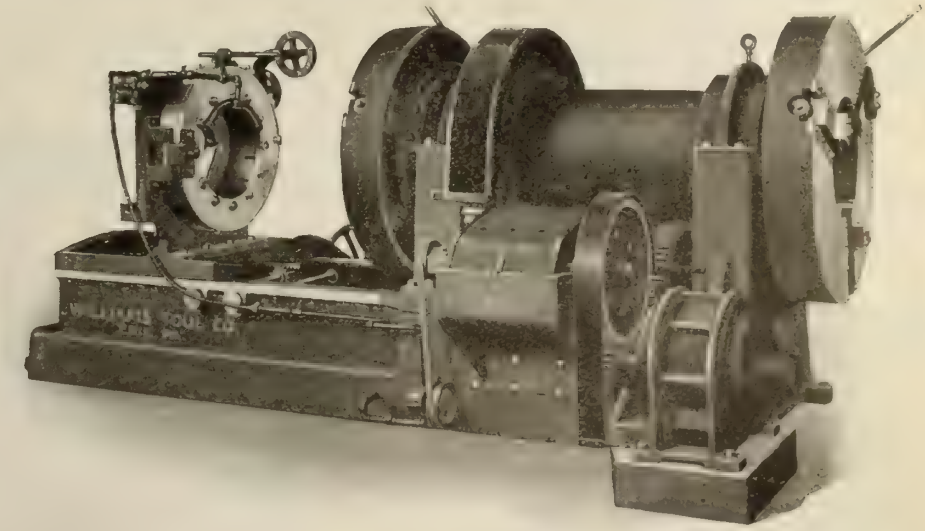
Write for list of Canadian users, and specifications.

Racine Tool & Machine Co.

15 Melbourne Ave., Racine, Wisconsin, U.S.A.

WILLIAMS PIPE MACHINES

Received Highest Award at Panama Exposition



The Following Letter Explains Why:

Williams Tool Co., Erie, Pa.: Rochester, N.Y., 12-3-14.

Gentlemen:—We are so pleased with our No. 3 Pipe Machine, and it is doing such splendid work for us at a minimum of expense that we are now considering the advisability of displacing two smaller machines for one of your No. 1½ or No. 2 motor drive.

The machines which we would displace, if we make a change, are belt drive, are (names of two of the oldest and best known machines on the market) equipped with nipple holders, extra dies, etc. Both of these machines are still in fairly good condition. On what basis could we make an exchange with you?

Yours very truly, SAMUEL SLOAN & CO.

WILLIAMS TOOL CO. - - - ERIE, PA.

The New "Murchey" Adjustable TAP

MURCHEY MCH. & TOOL CO.
DETROIT, MICH.
2" 14
WHITWORTH

POSITIVELY ACCURATE

10 times the life of the ordinary tap

With the Murchey Tap and chasers can be ground any number of times and adjusted each time to compensate for wear. **One set of chasers will last ten times as long as a solid tap,** and new chasers can be replaced at low cost.

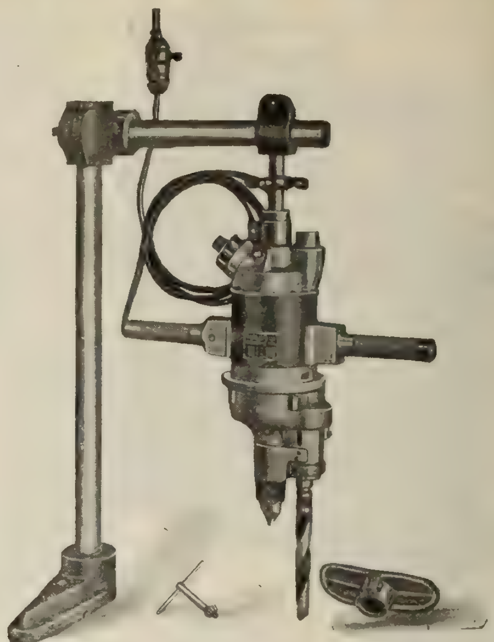
Now with the solid tap it is an entirely different matter. Just as soon as you begin to sharpen a solid tap, it loses size and accuracy, and after one or two sharpenings the tool is of no further use.

This new Murchey Adjustable Tap is working finely and we are receiving a great number of orders for it. Send in yours to-day—the price is of no consequence considering the remarkable results and economies shown in length of service.

FULL PARTICULARS ON REQUEST.

Murchey Machine & Tool Co.
34 Porter Street, DETROIT, MICH.

Stow Two Speed Two Spindle Drill

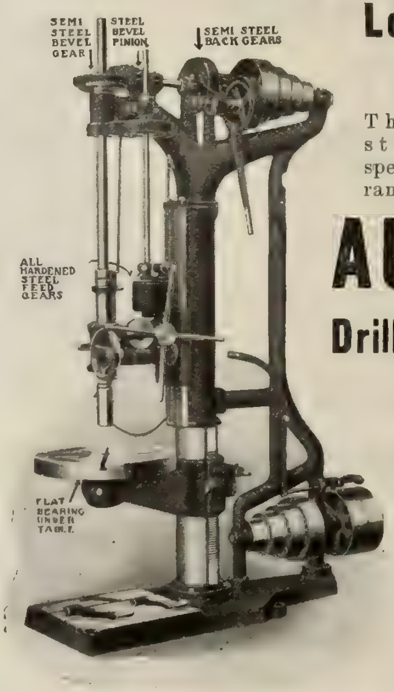


The only tool of its kind on the market. Fills a long-felt want. Will cut your cost.

We make drills of every size.

STOW MFG. CO., Binghamton, N.Y., U.S.A.
London, England, Stock: 85 Queen Victoria Street
Oldest Portable Tool Manufacturers in America.

Production of Rare Quality at Lowest Labor Costs



There is unusual strength, accuracy, speed, convenience and range in

AURORA Drilling Machines

You can use them to great advantage on **HIGH EXPLOSIVE SHELLS** or any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

Drop a line for full particulars and specifications.

Stationary Head Sizes 20"—21"
Sliding Head Sizes 22"—44"

The Aurora Tool Works, Aurora, Indiana

You can drive high speed drills up to 2½" diameter

with the new box-column type

Heavy Duty "Rockford"

Drilling Machine

This Rockford machine tool meets the most exacting requirements.

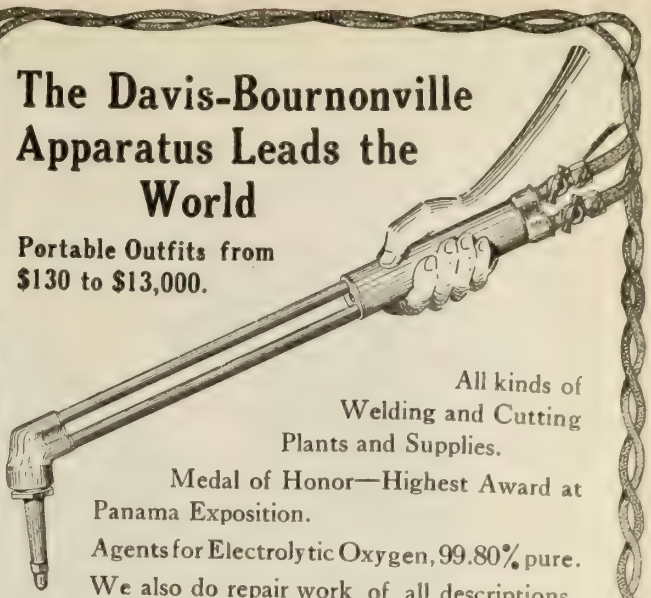
It is **STRONG, RIGID, ACCURATE AND FAST,** with individual features. Built in three styles.

ROCKFORD DRILLING MACHINE CO.
ROCKFORD, ILL., U. S. A.

Rockford Machines Cut Costs.

The Davis-Bournonville Apparatus Leads the World

Portable Outfits from $130 to $13,000.



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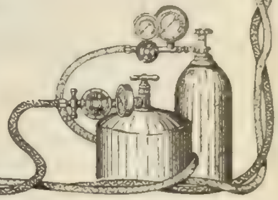

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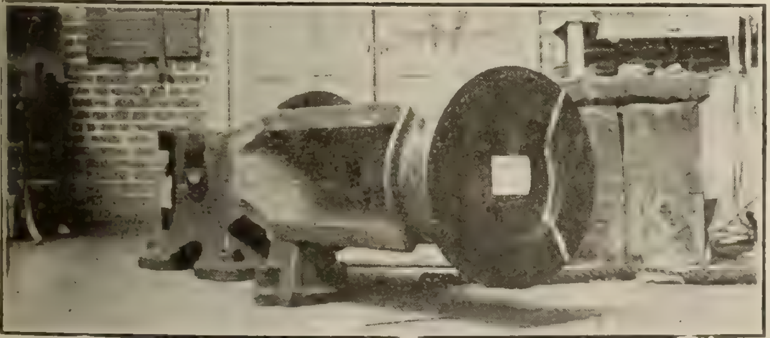

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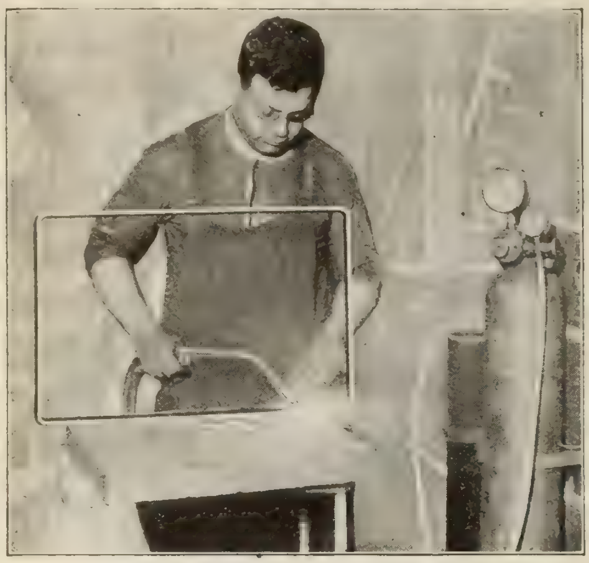

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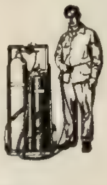

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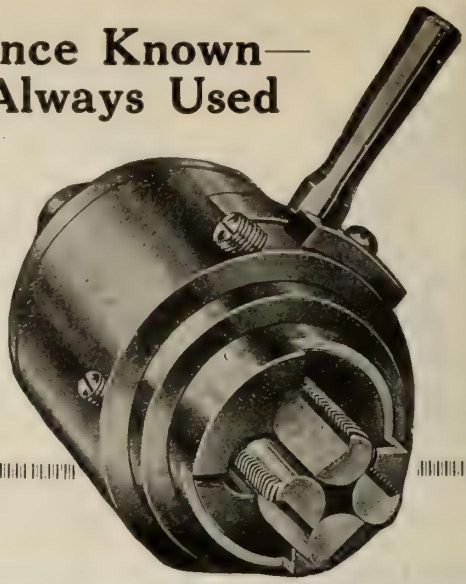

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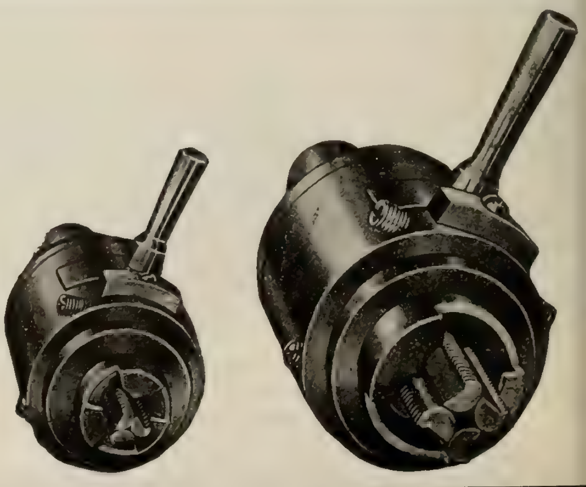

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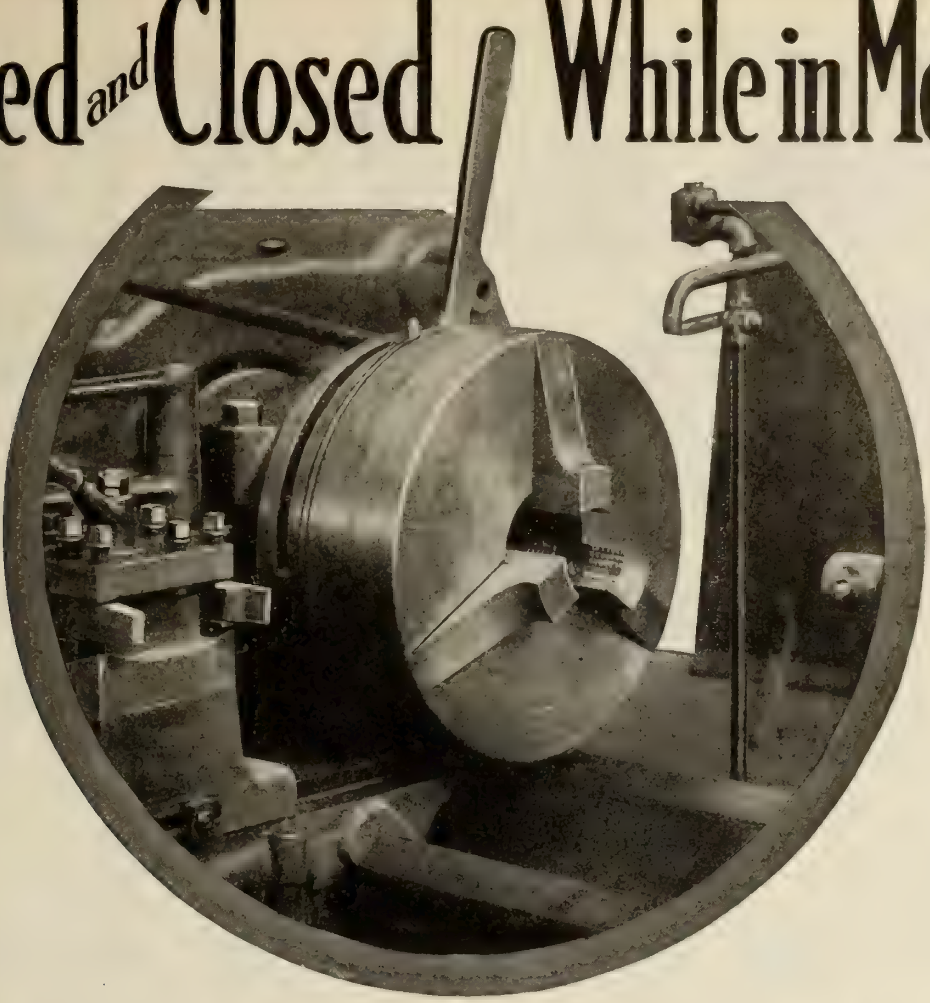

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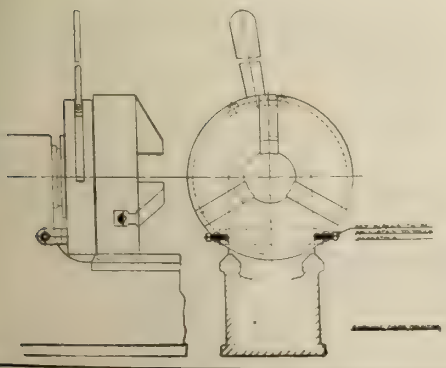

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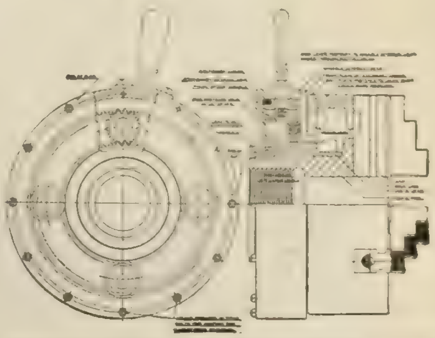

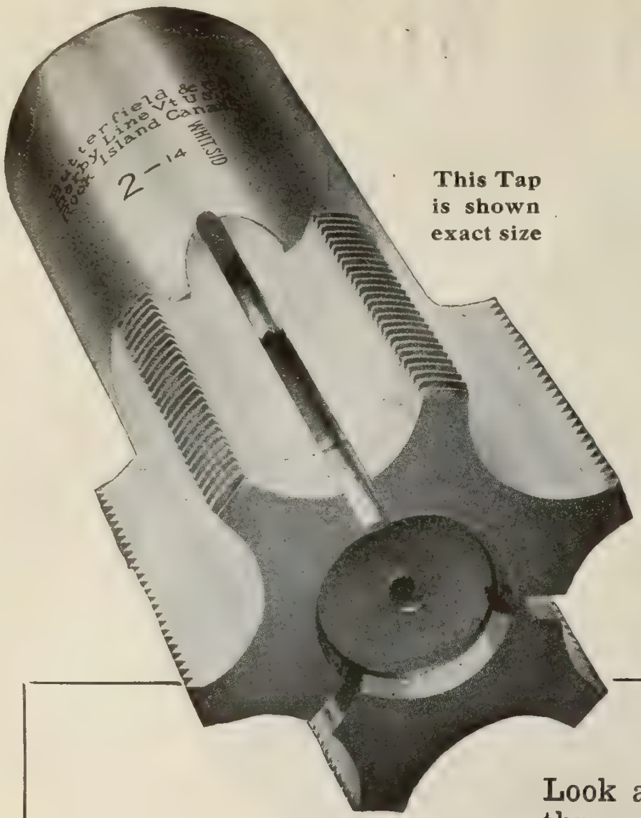

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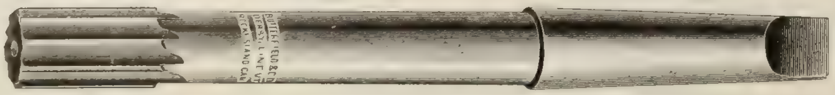

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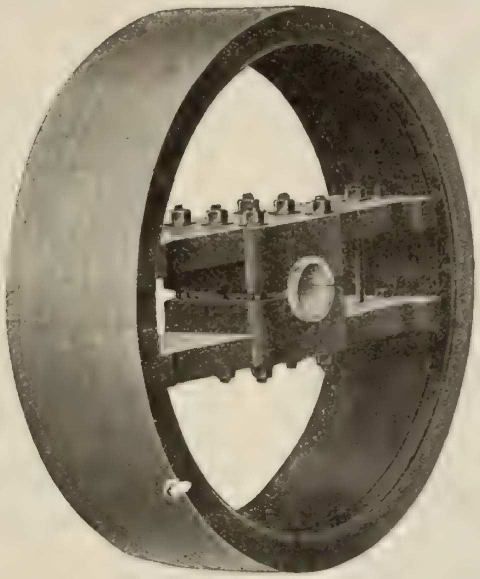

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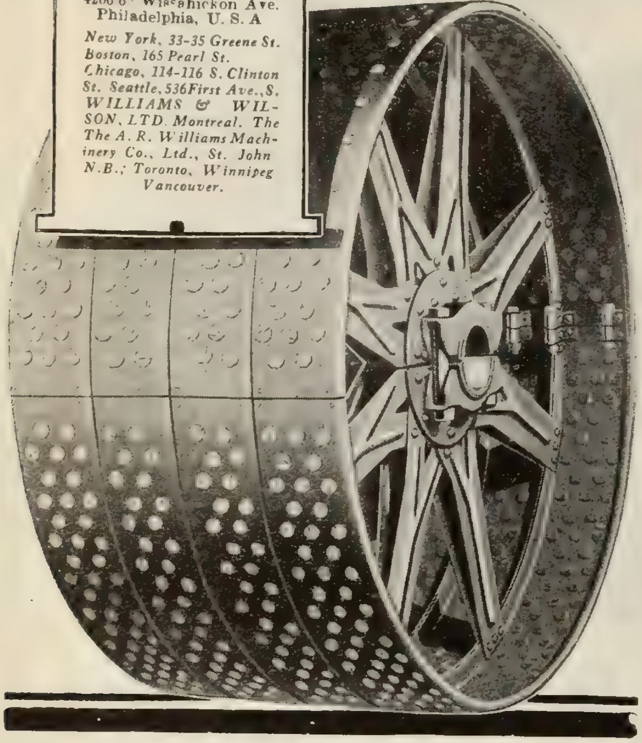

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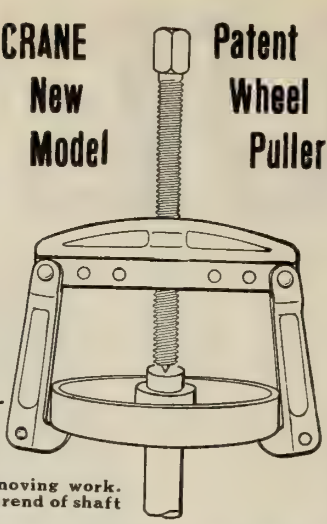

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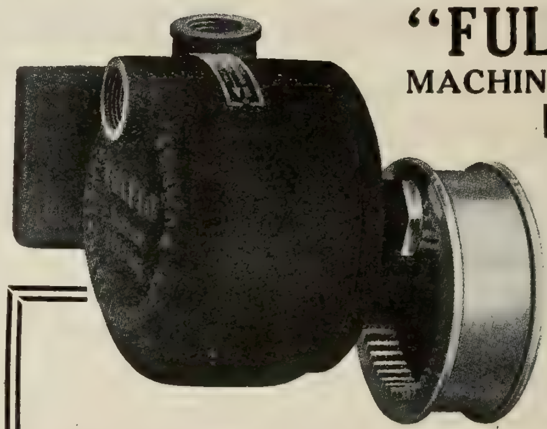

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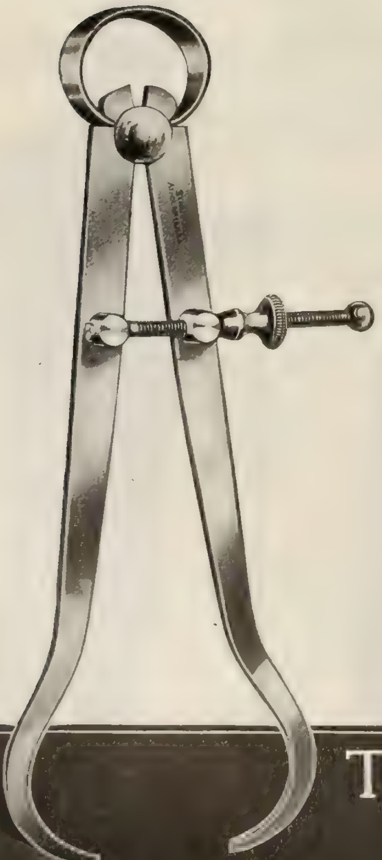

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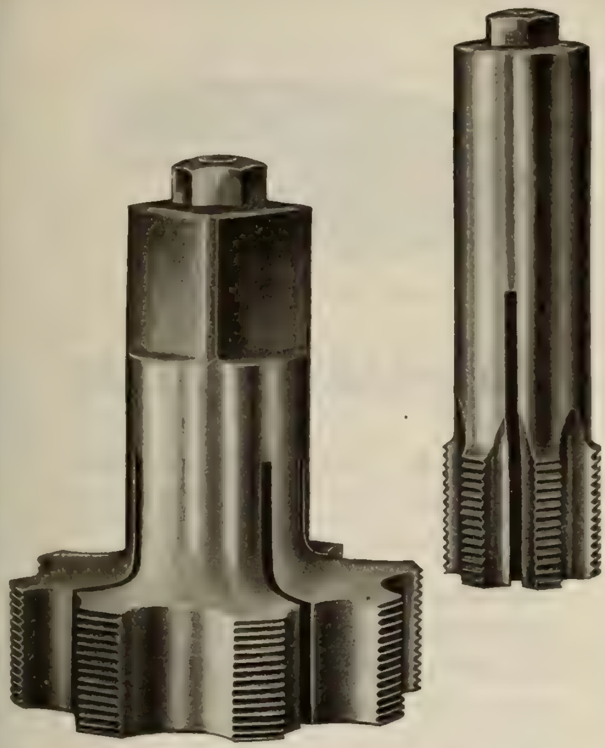

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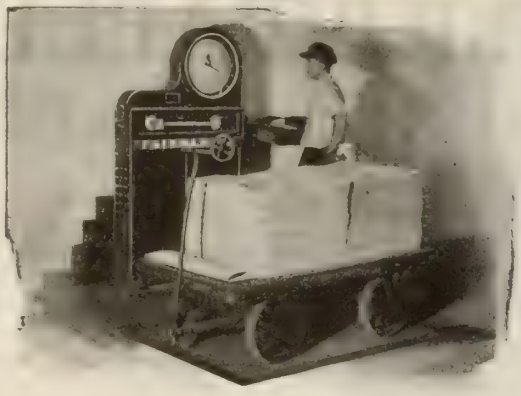

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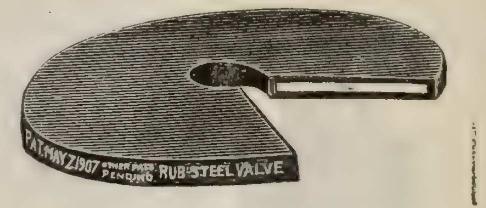

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Rub-Steel Valves

The rubber is securely and lastingly attached to steel by a special process.

This combination valve resists warping and twisting under high pressure, and possesses the desirable heating qualities of a rubber surface.

The construction consists of a plate of high-grade steel placed in the centre of the valve with a tough rubber composition on each side and edge. Because of the rigidity of form thus obtained, the surface of the valve retains its true normal position and is not forced through the grating by high pressure. Its reduced thickness gives greater efficiency to the pump, and when pumping hot water, a softer valve may be used, thus securing a better seat on worn or uneven grids.

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Motion and Relative Position of Projectiles in Flight

Staff Article

In our last week's issue, the Effect of Gravitation on the Flight of Projectiles was discussed. That the design and constructional features of the projectile itself, and the necessity of a special provision being made for its progress through the gun barrel, are relatively of perhaps more importance than the gravitation effect, is demonstrated in the present article.

THE obtaining of the desired range of a field gun, and maintaining same within a certain degree of permanency, depends largely upon the accuracy with which the projectile has been constructed, and the action of the shell in its flight through space. The possibilities of error are so numerous—owing to the variety of operations—that the greatest care is taken to secure a uniform product; thus eliminating, as far as possible, the chances of misplaced shells. It is essential that the centre of gravity should lie upon the axis of the moving body, otherwise the several forces will have varying effects upon the shell in its flight. To increase the accuracy of predetermined direction, the shells, in modern field pieces, are given a rotating motion as they are passing out of the gun barrel. This is effected by a series of helical grooves running the entire length of the bore. When the charge is ignited, the expanding gases propel the shell outward, and the copper band—placed near the base of the shell—is forced into the grooves of the rifling, causing the shell to revolve about its axis as it passes through the gun chamber. The speed at which the projectile is revolved, depends upon the pitch of the rifling and the velocity of the moving shell.

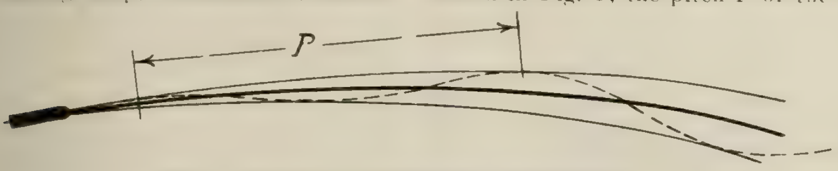


FIG. 1—ROTARY MOTION OF PROJECTILE

Rotary Motion of Projectile.

The pitch of the grooves varies in different makes and sizes of ordnance. In certain makes, the pitch at the breech is about 50 times the calibre; and this is gradually reduced to about 25 at the muzzle end, causing an increase in rotary motion in unison with the accelerated velocity. Suppose the rotary motion of the shell at the muzzle is one turn in 30 feet; then, with a velocity of 1.200 feet per second, the speed of the shell about its own axis, will be

$$\frac{1200}{30} \times \frac{60}{1} = 2.400$$

revolutions per minute; therefore, in a flight of 20 seconds, the projectile will revolve about 800 times.

If the shell is uniform in every respect, the flight will form a true trajectory; but when faulty ammunition is used, the resultant action may prove unreliable. Should the centre of gravity fall to one side of the revolving body, the action of centrifugal force will be similar to that of an unbalanced pulley, and being unrestrained, the path of the shell will form a long spiral, with gradually increasing diameter; the apex being at the gun muzzle, and the axis of the spiral forming the true trajectory. An exaggerated sketch of this action is shown in Fig. 1; the pitch P of the spiral being approximately that of the gun rifling, the dotted line indicating the path of the shell, the axis remaining parallel to the line of trajectory. However, the process of construction and inspection are so thorough that these conditions are seldom experienced.

Shell Position in Flight

Some writers contend that, owing to the gyroscopic action of the rapidly moving projectile, the axis of the shell will retain the same angle with the horizontal at which it was discharged; as shown at A, A, Fig. 2. This condition might be true if no external forces were acting on the body; but the action of the air upon the exposed surface causes the projectile to take the path of least resistance, which, in a perfectly constructed shell, will be nose foremost. The axis of a projectile should always remain parallel with the line of trajectory.

A shell, when leaving the gun barrel, tends to retain its original direction; but the force of gravity causes the path to form a parabolic curve, while the air resistance keeps the axis of a true shell in a parallel position to this curve. Should the shell be inclined to retain the same angle at which it was projected, as shown at A, Fig. 2, or an opposite direction, as at B, the force of the air upon the larger area at the base, would bring the axis again in line; the final or striking position being that shown at C. The sketch D illustrates the action of the air upon the shell, which keeps the nose pointing to the wind, in like manner to a weather-vane. Armour piercing shells must strike nose on, to effectually accomplish their intended purpose.

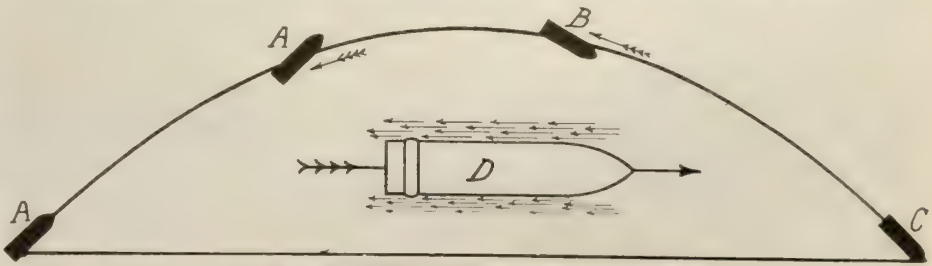


FIG. 2—SHELL POSITIONS IN FLIGHT

If shells were to retain their initial angle of projection, the action of shrapnel, at the moment of discharge, would be as shown at A, Fig. 3, while the intended discharge of an accurate shell takes place as shown at B; the contents being directed at the target with increased velocity, the effect of the reaction of the explosion throwing the empty shell back, as at C. However, there are instances when projectiles will, through faulty construction, etc., behave very erratically, sometimes causing serious accident where not intended. Therefore, it is essential that the strictest adherence be exercised at all times to specifications of material and manufacture.

Power of Propelling Gases

Some conception of the power required to discharge a shell at a given velocity, may be had by calculating the work done by the propelling charge. Suppose a 100 pound shell is fired from a 6-inch gun, having a length of bore of 8 feet, and acquires a muzzle velocity of 1.200 feet per second; what would be the approximate horse power developed, power absorbed by friction being taken at $12\frac{1}{2}$ per cent.?

As the muzzle velocity is given at 1.200 feet per second, it is evident that

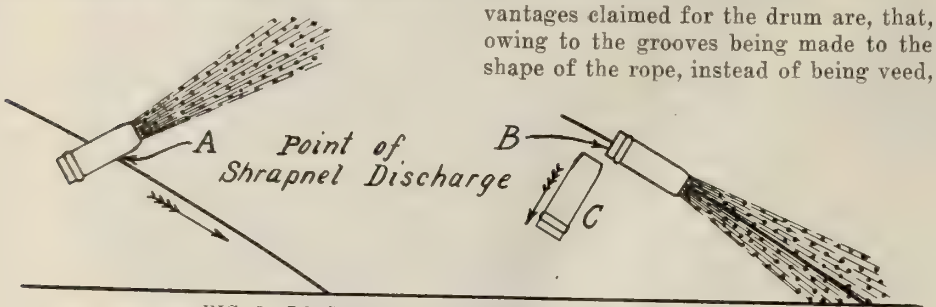


FIG. 3. DISCHARGE FEATURES OF SHRAPNEL.

the shell has acquired this velocity from a state of rest while travelling through a distance of 8 feet, or the length of the gun barrel. The apparent time taken for the projectile to reach the muzzle will be the length of the gun divided by the final velocity, or, 8 divided by 1,200 equals .007 seconds. This time is however, on the basis that the shell was travelling at muzzle velocity for the entire 8 feet; while in reality, time is occupied in the acceleration of the projectile. The acceleration can be found from the formula

$$A = \frac{V}{2S} = \frac{1200\times1200}{2\times8} = 90000$$

Then the time taken for the shell to obtain a velocity of 1200 feet per second in a length of 8 feet from a state of rest will be the final velocity divided by the acceleration, or

$$\frac{1200}{90000} = .013 \text{ seconds.}$$

Now, the work done by the expanding gases can be found by multiplying the weight of the projectile by the space passed over in feet, or by formula: $W = F\times S = 100\times8 = 800$ foot pounds. Where W equals the work done in foot pounds, F equals the weight or resistance overcome, and S the space passed over in feet. However, as the work is performed in .013 seconds, the power required will be found from the formula.

$$H.\ P. = \frac{F\times S}{T\times33000},$$ where T equals the time in minutes: then

$$\frac{100\times8\times60}{.013\times33000} = 112 \text{ H. P.}$$

As this represents 87½ per cent. of the generated power, the total power contained in the explosive charge will be approximately 128 H. P.

◆

ELECTRIC LIFT TRANSMISSION

THE most essential part of a lift is the driving sheave, or alternatively the drum. There used to be a great difference of opinion as to the rival merits of the drum and sheave, but the principle of the driving sheave is now admitted to be the better. In a sheave lift the ropes only pass a half turn more or less round the driving sheave, the grooves of which are cut at such an angle as to give the necessary grip to the ropes with a minimum of distortion. In a drum lift the ropes are anchored to the drum at one end and wind up upon it in a spiral groove cut upon its surface. The advantages claimed for the drum are, that, owing to the grooves being made to the shape of the rope, instead of being veed, the rope life is longer. This, however, is only the case provided the drum is large in diameter.

A drum of small diameter now usually employed is more destructive to the ropes than a sheave of large diameter, which is essential when the gear is situated at the top of the well and leading wheels are not employed. With a drum drive a standard gear may be made up and used for lifts of different dimensions. The same can be done with the sheave device, but by so doing one of the great advantages of the system is lost, viz., the saving of all leading wheels and the attending losses and rope damage. The disadvantages of the drum drive are the impossibility of slip in case of overrunning. This means that if limit switches and limit safety devices fail, something must break, as the ropes are positively driven from the drum. This difficulty necessitates the introduction of additional safety devices, which are unnecessary with sheave driving.

Sheave Drive

With a sheave lift, in the event of overrunning, either the car or the counterweight lands upon the buffers, and the tension being so removed from the ropes, the driving sheave can continue to revolve under the ropes with no risk of anything serious happening. This state of things has been known to exist during a whole night, and the ropes to show no serious wear in the morning. The advantage of increased safety alone is sufficient to recommend sheave driving, as compared with the drum winding system, but there is a second advantage. With a sheave there is practically no limit to the number of ropes which may be employed, whereas if a drum is to be kept to reasonable dimensions the number of ropes must be reduced to a minimum in order to find room for them to coil on the drum. As a consequence it is usual to find four ropes to a sheave-driven lift against two on a drum lift

driven lift against two on a drum lift.

To obtain equal strength, the ropes on the drum lift must be larger in diameter, and in consequence will suffer more from bending round the drum and leading wheels. The driving sheave should be substantial, of the disc pattern, and not of the light spoked variety, which is apt to develop cracks from no obvious cause whatever. The grooves must be cut with care to the exact angle to ensure correct driving with minimum wear on the ropes. It is a frequent business to re-cut the grooves on the sheaves of old lifts coming under maintenance contract in order to reduce the annual rope bill. The driving sheave should be as large in diameter as possible, so as to give a maximum of driving surface and a minimum radius round which the ropes have to bend. This provision is usually amply complied with by making the sheave span from the centre line of the car to the centre line of counterweight.

Leading or Guide Wheels

Leading wheels—that is, wheels to guide the ropes to the required position over the car or counterweight—should, when they are necessary, be provided with spindles giving ample bearing surface, and they should be well lubricated. Those wheels often sustain great weight, and the designer using a standard wheel does not always stop to calculate the pressure in individual cases. Passenger lifts are not usually designed for speeds exceeding 200 feet per minute, but the tendency is to increase the rate of travel.

Rope Features

The form of stranding for ropes found to be most satisfactory for all-round lift work is that known as 6-19 in., layered up round a hemp core; 6-24 and 6-30 ropes give much greater flexibility, but the finer wires wear more quickly. A good rule for deciding upon the ropes required is to allow for a set of four ropes a breaking strain of six times full load upon each rope, and for a set of two ropes a similar margin of seven times. Good ropes should not be grudged, for the cost of labor in changing a set of ropes is often as much as the cost of the ropes themselves. When one rope in a set requires renewal it is therefore economy to renew the whole set. The car is supported by a sling of wrought iron which carries four guiding shoes. These must be accurately shaped to fit guides, and preferably be made or lined with gun-metal. They should be mounted upon spring boxes so designed as to maintain them in constant and nicely balanced pressure upon the guides, so that any uneven loading or swaying of the car will be automatically taken up. The pressure of the springs in the boxes should be capable of regulation.—From a paper read before the Association of Supervising Electricians.

Observations on the Quebec Bridge Centre Span Tragedy

By C. T. R.

Many opinions have been expressed, not a few theories have been developed, and from observation and otherwise there is a conflict of opinion as to what actually happened, to account for the centre span of the new Quebec Bridge failing to reach its intended location and finding instead a lodgment at the bottom of the St. Lawrence. The accompanying article, while not seeking to refute either superficially or ill-formed opinion, over-drawn theory, or excited observation, puts the matter of the "make-ready" of the centre span and its subsequent "hoisting to place" in definite, easily intelligible language, applicable more especially, of course, to the second effort to close the gap, but none the less pertinent to the first.

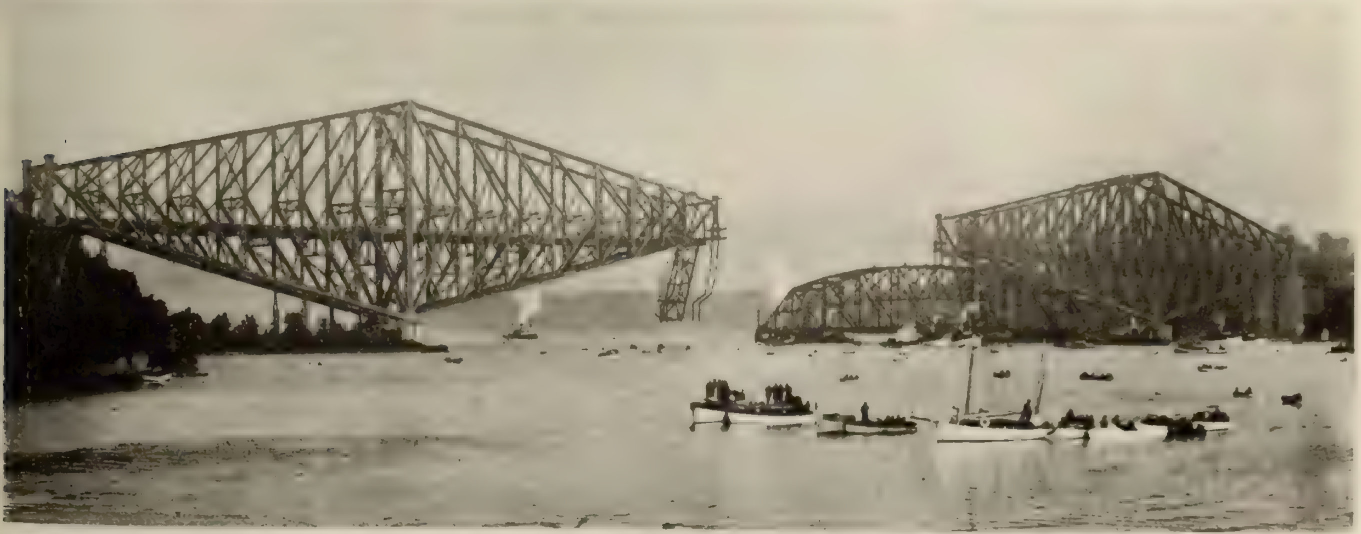
HOWEVER welcome an opportunity, the lamentable disaster may have afforded the numerous critics of the "I told you so" class to express their "wise after the event" opinions, the fact remains that the span is not yet in position, and that, to insure the safe and successful completion of the notable undertaking, the reason for the mishap must be authentically established, the contributory factors duly analyzed, and the necessary precautions taken to not only overcome the cause of the present trouble, but to foresee and forestall any other possible difficulty which may arise on the next occasion.

That the real actual cause of the accident is known to the parties concerned, is not doubted, but whether it be deemed judicious or desirable that such facts should be publicly discussed is a matter which rests between the builders and the Dominion Government.

PONTOONS WITH CENTRE SPAN ABOARD BEING TOWED FROM SILLERY COVE TO THE BRIDGE SITE.

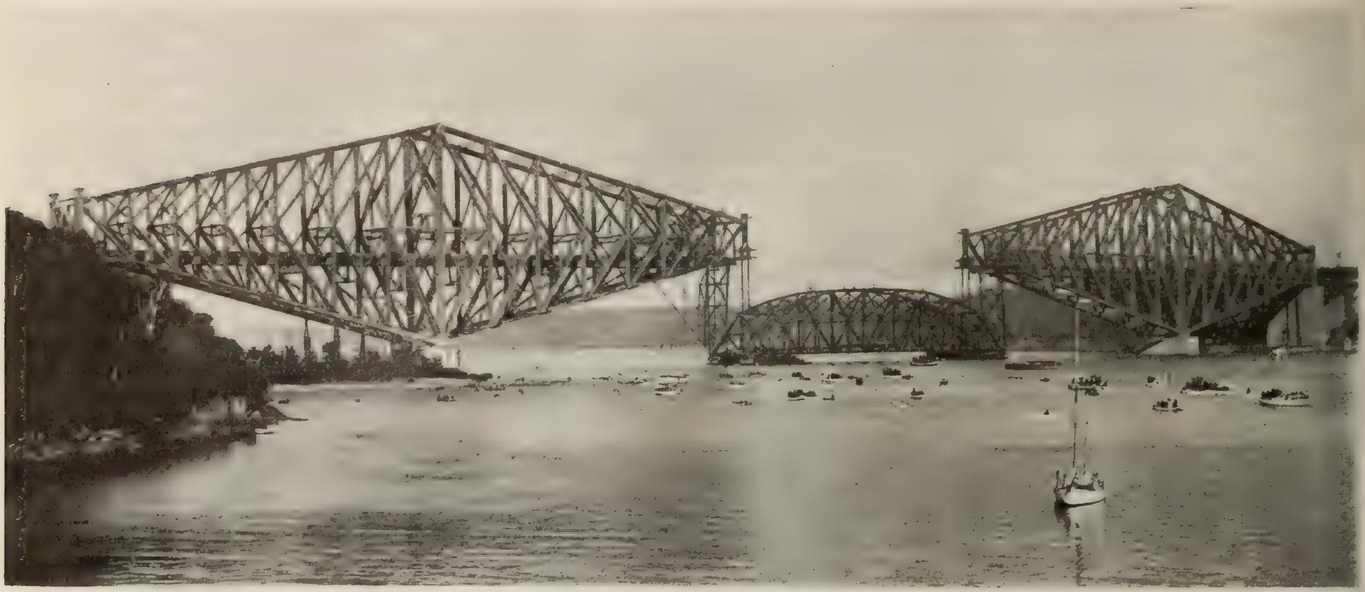
Structural Completeness

It is known, however, that the greater portion of the main flooring, together with a large number of cross and diagonal stiffening members were not yet in place, it being the intention to erect these after the span was elevated into position. Such a procedure does not, however, merit such criticism as might arise from hastily formed opinion. If it be possible to calculate the strength of the completed structure, it is likewise possible to arrive at the necessary degree of completion which would enable the span to support its own weight, so that one may therefore assume that the span was quite capable of being supported on four points as was done. That it was compatible with safety to leave off the most of the main flooring will be admitted by structural engineers, as, until the span was elevated and the ends of the main side girders permanently built onto the cantilevers, such flooring construction would have constituted a



PONTOONS WITH CENTRE SPAN ABOARD BEING MOVED INTO POSITION FOR LIFTING OPERATION.

purely dead load amounting to 500 or 600 tons of material, with no resultant strengthening of the structure.



CENTRE SPAN MOORED AND READY TO BE LIFTED FROM PONTOONS.

Consideration of the manner of slinging the span raises the question of the desirability of localizing the load on four points as was done. The span is designed to be built onto the cantilever ends so as to form a continuous fabric, and the additional support derived in this manner may well impart the necessary strength to the span in position. While the span as a unit was doubtless correctly designed, so far as final conditions are concerned, it seems possible, according to all available accounts, that not only did one point of support give way, but that its giving way was to some extent due to local distortion.

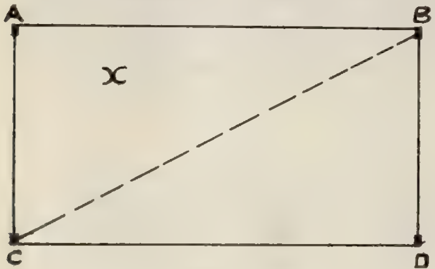


FIG. 1.

While being constructed and transported to the site, the span was supported by ideal methods. The three pontoons at either end offered a well distributed area of support which, by virtue of being water borne was capable of absorbing or preventing any undue shock to the span. Once the span was suspended by inelastic slings from the cantilever ends, the compensating effect of the water-borne pontoons was replaced by uncushioned suspension from four practically rigid points. Taking the builders' own estimates of the rate of hoisting, viz., 70 lifts of 24 inches in 16 hours, which equals 1 lift every 14 minutes, and allowing 4 minutes for changing and adjusting tackle at each lift, there remains the fact that it was intended to lift the structure at an actual velocity of 2.4 inches per minute, roughly 1-25 inch per second. Without introducing intricate calculations, let the reader picture one end of the span having a vertical velocity of 1-25 inch per second, imparted to it from a rigid support, so that in 5 seconds the end was raised 1-5 inch. Allowing the various members of the span to adjust themselves to the stress of the lift, it might or it might not be 5 seconds before the stress reached the centre of the span, being at the rate of 64 ft. per second. Any adjustment which the parts of the span would tend to make would now be deprived of the diminishing effect of the pontoon support, re-

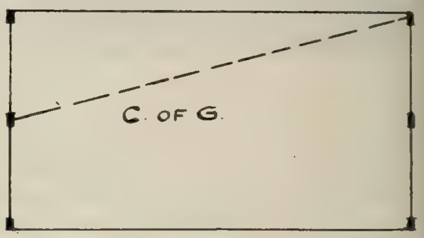
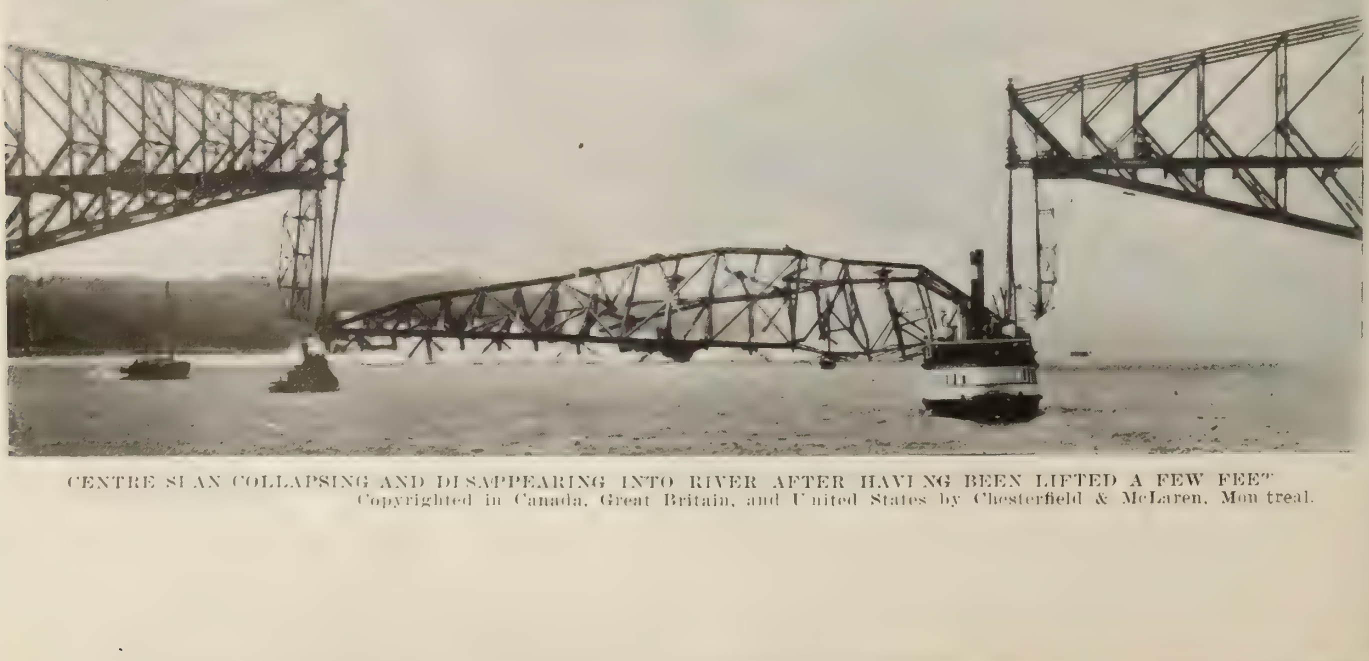


FIG. 2.



CENTRE SPAN COLLAPSING AND DISAPPEARING INTO RIVER AFTER HAVING BEEN LIFTED A FEW FEET
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sulting in still further increased stresses when resisted by the unyielding support of the hydraulic lifting jacks. It is only necessary to consider this cycle of stresses recurring every few minutes in a structure which had just undergone a complete change in system of support, to appreciate the possible conditions of the case.

Actual Cause of Accident

The casting which is stated to have failed formed part of a ball and socket support, one of which was at each of the four corners as in diagram Fig. 1. A failure at A if it actually took place would result in the entire weight being supported on the two diagonally opposite points B and C as the point D would only be balancing the weight of the structure now pivoted on two points. The complete reversal of strains in many of the important members resulting from this lack of support, following on the repeated stressing due to rapid elevation may quite well have been the undoing of the job. Such an occurrence may very naturally have been left out of the list of possible contingencies taken into account by the designers.

In the absence of a detailed statement of future intentions beyond the determination to build and place another span the suggestion is advanced that with proper safeguards in lifting, along with increased stiffening, the job will be completed safely. Safeguards include methods as well as appliances, and the advantages of using three points of support at each end merit consideration. As shown in Fig. 2, should the support at one corner fail, the area still supported would be more than half, and if emergency stiffening were in place the evil effects of the overhung portion could be safely neutralized until corrected.

More Rigid Test for Tackle

The statement attributed to officials that the span had been resting on the ball and socket supports for six weeks previous to erection is doubtless perfectly true, but in view of the difference between conditions during that time and those under which the span was being elevated, it is not possible to accept this as a fair test of the ability of the supports to stand up at the crucial moment. It would appear that the rigid slinging aggravated the stresses in a green girder which had not been allowed sufficient time to settle and adjust itself to a severe change in its method of support. Such adjustment undoubtedly reacted on the supports so that they were stressed in a totally unexpected manner. That such stresses were intensified by the rate of elevation seems more than likely, and in a case of this kind there is truth in the adage "The more haste the less speed." True it would seem to be that it is safe to make haste slowly and the efforts of the builders to bring the undertaking to a successful conclusion will be none the less meritorious even if delayed by precautions against additional emergencies brought to light by the recent accident.

TRANSMISSION SAFETY—IV.

IN some plants arrangement is made whereby the man who oils the shafting comes early in the morning and does his work before the engine is started up. In some respects this is an excellent idea, but like every other method of doing work it has to be carried out in accordance with a definite and intelligent plan if accidents are to be avoided. The oiler should first report to the engineer that he is about to oil the shafting, and he should again report to him when he has completed his task; and the engineer should be instructed not to start the engine until he has received definite word from the oiler in person, to the effect that the oiling is completed.

The way in which accidents are likely to happen in connection with this program is fairly evident. The oiler, when he has finished his task, sometimes omits to inform the engineer that he is through and the engineer, having received no word when it comes to start the engine, does not know what to do. If he does start the engine he may kill the oiler, while if he does not do so he may be delaying the day's work quite unnecessarily. In one case that we have in mind the engineer made a practice of looking over the plant under these circumstances, to see where the oiler was; and he invariably found that he had gone away and forgotten to leave word. The engineer then returned to the engine room and started the machinery.

After having done this a number of times he began to take it for granted that the oiler had merely forgotten to bring him the message, and thereafter he started up at the regular time without taking the trouble to look through the shop. It is evident that when the thing is managed in this way there is a strong probability that sooner or later the machinery will be set in motion while the oiler is in a dangerous position, and he will be likely to be killed or badly injured in consequence. Hence it is of paramount importance, when this plan is adopted, to see that the oiler invariably passes the word to the engineer as soon as he is through with his work.

Protruding Dead Ends of Shafting

All protruding dead ends of shafting should be boxed in or guarded with wire mesh, unless they are more than 7 feet above the floor. All horizontal shafting and all pulleys that are not more than 7 feet above the floor should also be inclosed, or be guarded by standard railings at least 42 inches high, placed not less than 15 inches from the point to be guarded. Safety couplings, collars and set-screws should be used in all cases. Take suitable precautions to prevent pulleys from working off at the ends of their shafts, and provide a clearance of at least 36 inches between every pulley and the nearest shaft bearing. If this is not feasible a screen guard should be located between the pulley and the shaft bearing.

Projecting Keys

Another source of danger to workmen who are oiling or repairing shafting or pulleys is the projecting key, which causes more trouble than many of the larger parts, though it often escapes notice on account of its small size. The danger is, that the key will catch a workman's clothing, cause the cloth to wind up around the shaft, and whirl the man around and seriously injure him. All projecting keys should therefore be effectively guarded. These precautions should be taken not only in the places where the men are most frequently required to work, but also throughout the entire plant; because the men, when called upon to do repair work in out-of-the-way or cramped quarters, are likely to forget that the dangers are not guarded there as well as in other places. It is hardly more dangerous to leave them all unprotected, than it is to give a false sense of security by attending to only a part of them.

A competent mechanic should be assigned to the work of inspecting the power-transmission equipment, and he should examine all parts of it carefully and at regular intervals. Such inspections often disclose dangerous conditions.

OIL RING BEARING TROUBLE

THE oil ring in a motor bearing failed to turn because it had been distorted into an elliptical shape by a crowding which it had received when the armature had been reinstalled after having been removed for repair. When an armature shaft is shoved into a bearing, the oil ring should be held up with a screw driver or other article of suitable shape. Assemblers accomplish the same result by turning an end shield upside down, for then the ring drops out of the way. Some operators lift the rings and rest them on the boss alongside the ring slot; this is not to be recommended as a general practice for the rings may be forgotten and remain raised out of the oil. Indeed, this has been found to be the cause of trouble in several instances of bearing heating. In these cases, however, the bearing was so inaccessible that only an experienced hand could locate the ring by feeling for it. Another very similar instance took place when a motor had to be disassembled on account of having been through a flood; in reassembling, the rings were left out entirely.

Evolving Standard Cutting Tools After a Definite Plan--II.

"Herbert's Monthly Review"

This series of articles dealing with the practical side of the subject of cutting tools may be said to be supplemental to what appeared in our issues of July 20 and 27; cutting tools from the theoretical and analytical viewpoint were then discussed. As efficiency in the machine shop depends largely on the character of the tools used, it is believed to be easily worth while for those concerned to not only sift this tool question to its fundamentals, but for each individual shop to establish a standard tool scheme to suit its own special conditions.

CONTINUING the discussion of standard tools from our September 14 issue, it is to be noted that Nos. 2 and 3 have a similar profile to tool No. 1, the difference lying in the rake of the top face. This has side as well as front cutting angles, so the tools can only be used for feeding in one direction. These are general purpose tools for right and left-hand rough turning, though they are preferable to No. 1 for shaping and planing steel when the feed of the tool is in one direction only.

The tools are shown in the chart with both sides rounded, this being the form most suitable for ordinary purposes. Where they are used for heavy roughing in preference to tools Nos. 4 and 5 (this, however, is not recommended), the rounding of the non-cutting side can be left out, the end of the tool being ground off at 80 degrees "back" and 6 degrees clearance, No. 2 tool being ground with the top face upwards, and No. 3 with the top face downwards. This agrees with the axiom that for heavy cutting as much metal as possible should be left on the tool nose to absorb the heat, but will only apply to tools of larger section than, say, ¾ in. x 1 in. Generally speaking, these tools should be made of steel with a depth about one and a half times its width, though for some small American lathes it will be found necessary to employ a section of two to one. Grinding instructions as for tool No. 1 will apply, with the exception of grinding the top face.

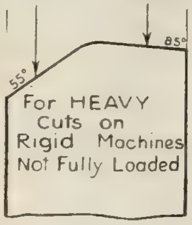
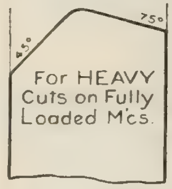
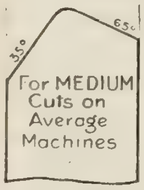
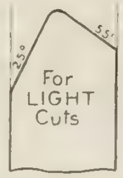
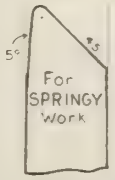
PROFILE.			RAKE.		
SIDE ANGLE FRONT ANGLE	SIDE ANGLE.	FRONT ANGLE.	For STEEL with a Tensile Strength of	SIDE CUTTING ANGLE Toolholder Setting	FRONT CUTTING ANGLE Turntable Setting
55° 85° For HEAVY Cuts on Rigid Machines Not Fully Loaded	TURNTABLE		20 TONS	D.18. LEFT	25 FORE.
	55 BACK	85 BACK	30 TONS	D.15. LEFT	21 FORE.
	TRUNNION.		40 TONS	D.12. LEFT	17 FORE.
	6 DOWN	6 UP	50 TONS	D.9. LEFT	12 FORE.
	TOOLHOLDER.				
	C.6. RIGHT	A. ZERO.	FOR CAST IRON	D.6. LEFT	8 FORE.
45° 75° For HEAVY Cuts on Fully Loaded M'cs.	TURNTABLE.		20 TONS	D.22. LEFT	22 FORE.
	45 BACK	75 BACK	30 TONS	D.18. LEFT	18 FORE.
	TRUNNION.		40 TONS	D.14. LEFT	14 FORE.
	6 DOWN	6 UP	50 TONS	D.11. LEFT	11 FORE.
	TOOLHOLDER.				
	C.6 RIGHT	A. ZERO.	FOR CAST IRON	D.7. LEFT	7 FORE
35° 65° For MEDIUM Cuts on Average Machines	TURNTABLE.		20 TONS	D.25 LEFT	18 FORE.
	35 BACK	65 BACK	30 TONS	D.21. LEFT	15 FORE.
	TRUNNION.		40 TONS	D.17. LEFT	12 FORE.
	6 DOWN	6 UP	50 TONS	D.12. LEFT	9 FORE.
	TOOLHOLDER.				
	C 6 RIGHT	A. ZERO.	FOR CAST IRON	D.8. LEFT	6 FORE.
25° 55° For LIGHT Cuts	TURNTABLE.		20 TONS	D.28. LEFT	14 FORE.
	25 BACK	55 BACK	30 TONS	D.23 LEFT	11 FORE.
	TRUNNION.		40 TONS	D.18. LEFT	9 FORE.
	6 DOWN	6 UP	50 TONS	D.14. LEFT	7 FORE.
	TOOLHOLDER.				
	C.6 RIGHT	A. ZERO.	FOR CAST IRON	D.9. LEFT	4 FORE.
5° 45 For SPRINGY Work	TURNTABLE		20 TONS	D.30. LEFT	3 FORE.
	5 BACK	45 BACK	30 TONS	D.25. LEFT	2 FORE.
	TRUNNION		40 TONS	D.20 LEFT	2 FORE.
	6 DOWN	6 UP	50 TONS	D.15. LEFT	1 FORE.
	TOOLHOLDER				
	C.6. RIGHT.	A ZERO	FOR CAST IRON	D.10 LEFT	1 FORE

FIG. 3 CHART SHOWING VARIATIONS OF TOOL NO. 4, WITH THE SETTINGS NECESSARY TO GIVE EACH SHAPE AND THE CLASS OF WORK FOR WHICH EACH IS SUITED.

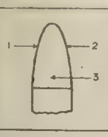
Grinding Instructions.—When grinding these tools with a hollow-curved top face, they should be set in the attachment at an angle of 30 degrees with the slide, as this setting makes the curvature run away from the cutting edge in a manner suitable for all ordinary purposes. On small tools, to be used only for light cuts, this angle can be decreased with advantage to 20 or even 15 degrees. When the non-cutting face is not rounded, the settings to be used, instead of those given in the chart, will be:

	Turntable	Trunnion	Toolholder
Tool No. 2, Op. 2.	80 back	6 up	A zero
Tool No. 3, Op. 1.	80 back	6 down	C zero

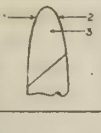
Tools Nos. 4 and 5 are those strongly recommended for nearly all rough turning and planing. They adapt themselves so readily to the most efficient form for cutting all kinds of materials. On the standard tool chart, the form of tools given are those suited for general work, but full instructions will be given for arriving at the form most suitable for definite and particularized conditions. The cutting edge numbered 1 in the diagram can be ground to any angle from 5 to 55 degrees, and can be made of any length, according to the depth of cut. The variations to which these tools are subject are given in the diagram and chart, Fig. 3, with the kind of work for which each is suited.

The cutting edge, whatever the form and rake of the tool, must be approximately horizontal, and in Fig. 3 the angles specified ensure this. For those who are interested in knowing the means whereby the various settings for the rake angles suited to different materials are ascertained, the following formula and its explanation may be cited: Refer to Fig. 4, which shows a tool with the cutting edge at A degrees to the side of the tool. The line pz drawn in a horizontal plane at right angles to the cutting edge gives the rake of the top face as B degrees, shown in triangle z pl; then a vertical line from horizontal line pz to the top face is zl The horizontal lines zm and zn are drawn perpendicular to and parallel with the side of the tool; then the angles which these two lines make with the top face are respectively the side and the front cutting angles, which can be set on the Lumsden machine by means of the toolholder and turntable adjustments.

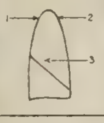
Nº 1 – Shaping.

SETTINGS for Curved Face.		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL HOLDER			TURN TABLE	TRUNNION	TOOL HOLDER
ZERO	A 15 Right			Set tool in holder to give radius on sides equal to width of tool e.g. 1×1½ Section set for 1" Rad. offset to right 1" Sweep off radius after operations 1&2		
			1	10 Back	6 Down	0 3 Right
			2	10 Back	6 Up	A.3 Left
			3	15 Fore	ZERO	D Zero

Nº 2 – Round Nose Roughing. R.H.

SETTINGS for Curved Face		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL HOLDER			TURN-TABLE	TRUNNION	TOOL-HOLDER
30 Right	A20 Right			Set tool in holder to give radius on sides equal to width of tool e.g. 1×1½ Section set for 1" Radius offset to right 1" Sweep off radius after operations 1&2		
			1	10 Back	6 Down	C3 Right
			2	10 Back	6 Up	A3 Left.
			3	10 Forr	ZERO	D15 Left

Nº 3 – Round Nose Roughing. L.H.

SETTINGS for Curved Face		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL-HOLDER			TURN-TABLE	TRUNNION	TOOL-HOLDER
30 Left	A20 Left			Set tool in holder to give radius on sides equal to width of tool e.g. 1×1½ Section set for 1" Radius offset to right 1" Sweep off radius after operations 1&2		
			1	10 Back	6 Down	C.3 Right
			2	10 Back	6 Up	A3 Left
			3	10 Fore	ZERO	D.15 Right

The lines zl, zs and zt are all equal, as they represent the vertical line from point z to the tool face. Call them r, then

$$\frac{r}{pz} = \text{Tan } B.$$

$$r = pz \text{ Tan } B \ \ldots\ldots (1)$$

$$\frac{pz}{mz} = \text{Cos } A \ \ldots\ldots\ldots (2)$$

$$\frac{pz}{nz} = \text{Sin } A \ \ldots\ldots\ldots (3)$$

$$\text{Tan } S = \frac{r}{mz}$$

$$\text{Substituting } (1) = \frac{pz}{mz} \text{ Tan } B.$$

$$\text{Substituting } (2) = \text{Cos } A \text{ Tan } B.$$

Thus angle S, the side cutting angle, is determined in terms of angles A and B, which are known.

$$\text{Tan } F = \frac{r}{nz}$$

$$\text{Substituting } (1) = \frac{pz}{nz} \text{ Tan } B.$$

$$\text{Substituting } (2) = \text{Sin } A \text{ Tan } B.$$

Thus angle F, the front cutting angle, is also determined in terms of angles A and B. The same problem can be solved graphically by drawing the diagram (Fig. 4) to the correct angles, then measuring angles S and F with a protractor to the nearest degree. Nos. 4 and 5 tools should have shanks of sections with a depth one and a half times the width.

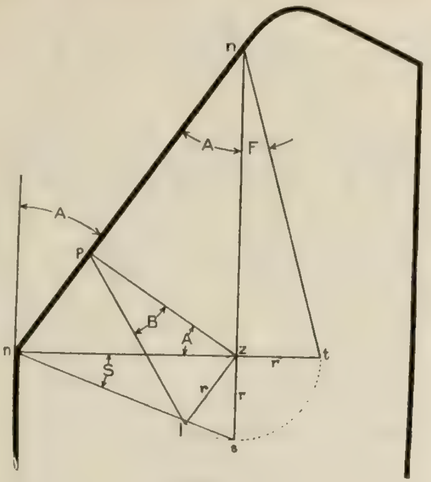
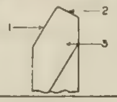


FIG. 4.

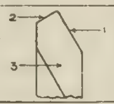
Grinding Instructions. — The tool blank needs no special setting in the holder beyond the elementary one of placing the base of the blank flat on the bottom of the holder. Grind side angle 1 to the requisite inclination of the cutting edge, then turn the tool over and grind front angle 2. In a small tool or one to be used for light cuts only, make face 1 quite short, and grind face 2 till it almost joins it. When grinding a curved top face, the cutting edge, whatever its inclination, must be set parallel to the attachment slide. The setting of the machine toolholders is given as A.20, right or left—this is correct for most tools. Very small tools can be ground with the slide set nearer the vertical, while for very large tools, the angle can be increased to, say, A.30, beyond which it is not desirable to go.

The point of the tool can be radiused by hand, though, if desired on large tools, it can be rounded on the machine, with 6 degrees clearance, setting to the desired radius by means of the radius gauge and carefully noting the position of the centre of the tool width, in order to offset the tool correctly. One point that should be rigorously watched in making these tools is that the cutting edge must be long enough for any depth of cut it may be called upon to take, while at the same time it should not be made any longer than is necessary.

Nº 4 – Straight Roughing. R.H.

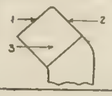
SETTINGS		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL-HOLDER			TURN-TABLE	TRUNNION	TOOL-HOLDER
55 Right	A20 Right		1	35 Back	6 Down	C6 Right
			2	50 Back	6 Up	A Zero
			3	15 Fore	ZERO	D.22 Left

Nº 5 – Straight Roughing. L.H.

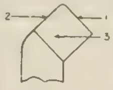
SETTINGS		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL-HOLDER			TURN-TABLE	TRUNNION	TOOL-HOLDER
55 Left	A20 Left		1	35 Back	6 Up	A6 Left
			2	50 Back	6 Down	C Zero
			3	15 Fore	ZERO	D22 Right

Tools Nos. 6 and 7 are precisely the same in principle as Nos. 4 and 5. They are bent for the purpose of reaching outside the tool rest in those cases where the saddle cannot be brought close enough to the work to employ a straight tool. The blank should be bent to an angle of 45 degrees. As the use of bent roughing tools is limited to special and but few cases, it is not necessary to consider variations in its angles, as the expense of providing tools with the possible variations would not be justified. Generally speaking, any variation desirable can be obtained by inclining the tool in the tool rest. A section of 1 to 1½ will be found generally suitable for this tool.

Nº 6 – Bent Roughing. R.H.

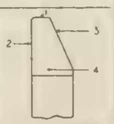
SETTINGS		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL-HOLDER			TURN TABLE	TRUNNION	TOOL HOLDER
45 Right	A20 Left		1	45 Back	6 Down	C6 Right
			2	45 Back	6 Up	A Zero
			3	18 Fore	ZERO	D18 Left

Nº 7 – Bent Roughing L.H.

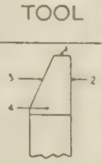
SETTINGS		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL-HOLDER			TURN-TABLE	TRUNNION	TOOL-HOLDER
45 Left	A20 Left		1	45 Back	6 Up	A6 Left
			2	45 Back	6 Down	C Zero
			3	18 Fore	ZERO	D18 Right

Grinding Instructions.—These will be generally as specified for tools Nos. 4 and 5. The rake of the cutting edge can be varied to suit different materials, the angles given for the top tool but one in Fig. 3 being all the variations necessary.

Nº 8 – Narrow Finishing R.H

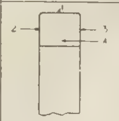
SETTINGS		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL-HOLDER			TURN-TABLE	TRUNNION	TOOL-HOLDER
ZERO	A15 Right		1	90 Back	6 Up	A Zero
			2	ZERO	ZERO	C6 Right
			3	25 Back	ZERO	A Zero
			4	15 Fore	ZERO	D Zero

Nº 9 – Narrow Finishing L H

SETTINGS		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL-HOLDER			TURN-TABLE	TRUNNION	TOOL-HOLDER
ZERO	A15 Right		1	90 Back	6 Up	A Zero
			2	ZERO	ZERO	A6 Left
			3	25 Back	ZERO	C Zero
			4	15 Fore	ZERO	D Zero

Tools Nos. 8 and 9 are intended for fine finishing cuts on lathes, planers or shapers. Sides 1 and 2 are ground with clearance, so the corner between them should always be the leading corner. These narrow finishing tools will rarely, if ever, be used in the larger sections; on the other hand, the broad finishing tool, No. 10, will rarely be used in the smaller sections. Theoretically, the width of the cutting edge should be about twice the intended feed, but as this cannot be readily determined, it will prove a good rule to make the cutting edge half as wide as the tool shank. These tools will give the greatest satisfaction if made of a section having a depth twice the width.

No.10 - Broad Finishing

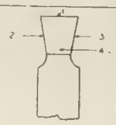
SETTINGS		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL-HOLDER			TURN-TABLE	TRUNNION	TOOL-HOLDER
ZERO	A15 Right		1	90 Back	6 Up	A Zero
			2	ZERO	ZERO	C6 Right
			3	ZERO	ZERO	A6 Left
			4	15 Fore	ZERO	D Zero

Grinding Instructions.—First grind the end of the tool, this being the cutting edge, giving it 6 degrees of clearance. The front edge of the tool can next be thinned down to half the width of the shank by grinding off at 25 or 30 degrees with the side. For cutting steel, it is strongly recommended that these tools be ground with hollow curved top faces, the tool being set in the attachment at right angles to the slide, top face turned towards the wheel. The toolholder setting of A.15, right, will give the right amount of curvature for all tools up to ¾ in. x 1½ in. Larger tools can be ground at a toolholder setting of A.20, right. For cutting cast iron, a flat top face with 10 degrees rake is best; this is obtained with settings for operation 4 of

Turntable.	Trunnion.	Toolholder
10 Fore.	Zero.	D Zero.

Tool No. 10 is a broad finishing tool, and will generally be made of square section steel, 1½ in. x 1½ in. and larger.

No.11 - Recessing.

SETTINGS		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL-HOLDER			TURN-TABLE	TRUNNION	TOOL-HOLDER
ZERO	A15 Right		1	90 Back	6 Up	A Zero
			2	3 Fore	ZERO	C3 Right
			3	3 Fore	ZERO	A3 Left
			4	15 Fore	ZERO	D Zero

This tool will be generally more used for planing than for shaping or turning. Its long cutting edge makes it suitable for the very coarse feeds used in finish planing.

Grinding Instructions.—Grinding instructions are generally similar to those given for tools Nos. 8 and 9. Sides 2 and 3 are, however, both ground with clearance, so that the tool can be fed in either direction. For cutting steel it should be ground with a hollow curved top face. For cutting cast iron, it should have a flat top face with 10 degrees of rake, the settings for operation 4 being

Turntable.	Trunnion.	Toolholder.
10 Fore.	Zero.	D Zero.

Tool No. 11 is for a special purpose, namely, feeding straight into the work to cut a recess. Such a tool is often used in narrow form for cutting the recess between different diameters on a turned shaft, and in broader form for the first operation in planing tee slots from the solid. As this tool cuts more or less deeply into the work, both sides of the tool are given a side angle of 3 degrees, in order to clear the work. The section of steel used will depend entirely on the width of cutting edge desired.

Grinding instructions are practically the same as those given for tools Nos. 8, 9 and 10, viz.: Grind the cutting edge first, then the two sides to give a definite width of cutting edge, and lastly, the top face. The two sides are ground with 3 degrees of clearance in addition to the 3 degrees of side angle. For cutting steel, a hollow curved top face is strongly recommended, but for cast iron the top face should be flat and have 10 degrees rake, the settings for operation 4 being

Turntable.	Trunnion.	Toolholder.
10 Fore.	Zero.	D Zero.

TUBE FIXING IN WATER-TUBE BOILERS

SOME failures of Stirling water-tube boilers reported upon in two recent British Board of Trade reports, Nos. 2,405 and 2,406, show that the importance of securely fixing the ends of the tubes in the tube plates is perhaps not sufficiently appreciated by makers of this type of steam generator. It is common practice in boilers of the locomotive and Scotch multi-tubular type to fix the tubes by slightly expanding the ends into parallel holes in the tube plates, and when the design is such that the tube plates are held in position by stays or other attachments which make their rigidity independent of the holding power of the tubes, little exception can be taken to this method of fixing, for then, in the event of a tube working loose, nothing beyond leakage can occur. It is seldom of course, that even in these designs the stiffness of the tube plate is entirely independent of the holding power of the tubes, and if this becomes defective over a large area there is risk of the plate being bulged and forced over the tube ends.

In water-tube boilers of the Stirling and similar designs in which the lower drums are suspended from upper steam drums by groups of tubes, there are no stays to connect the drums and nothing to resist the tubes being forced out beyond the holding power of the tubes themselves. In commenting on the case the chief engineer-surveyor to the Board of Trade calls attention to the excessive stress which tubes in this type of boiler have to bear, owing to the considerable weight suspended from them, and to the importance, therefore, of bell-mouthing the ends of the tubes to diminish the risk of the tubes being forced out of the tube-plate.

Local Overheating of Tubes

It should be remembered that in boilers of the type under notice the working conditions are rather trying to the tubes. They have not only to carry the load of the lower drums when filled with water, but are directly exposed to the intense heat of the fire and furnace gases which cannot be uniformly distributed, and, therefore, gives rise to racking stresses from differences of expansion. Obviously these are aggravated if the feed water is not good and incrustation accumulates near the tube ends, as local overheating is then set up. This, in fact, proved to be the precipitating cause of three failures in the course of three weeks in the case of one of the reports quoted, viz., No. 2,406, and emphasizes the importance of a water-softening plant in connection with water-tube boilers whenever the feed water produces scale in objectionable quantity. Grease is even more objectionable than scale, as the merest trace with some kind of feed water is sufficient to cause overheating, and, it may be added, is very liable to get introduced where surface condensation is practised unless great care is exercised in the lubrication of the engine and the separation of the oil from the exhaust steam.

RUBBER BELT DRESSING

BEFORE applying dressing to a rubber belt, if you have the right kind to apply to that material of belt, brush the latter off thoroughly with a brush that will find the bottom of the dust, then, with a brush or suitable cloth, apply the dressing to the full width of the belt—not in the centre. Remember that the dressing should not be put on so heavy that it causes the belt to incline to follow the pulley and only releases when forced to by natural causes, and then makes a terrible crackling noise when it does let loose. In seeing a belt follow the pulley and hearing the crackling noise in its tearing loose, one must certainly understand that there is not only an unnecessary strain on the belt, but that it is bound to take considerably more power. I have seen rubber belts that had the outer ply of rubber torn off by this practice. The dressing suitable for a leather belt, is pretty apt to rot a rubber belt.

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

GAS LEAK AND AN OPEN TORCH.

By J. H. R.

THE old adage of looking for a gas leak with a lighted match, has often been related—not always by e unfortunate explorer,—but by those ho desire to warn others against emarking on a like enterprise. The orignal source of this article, not being of e ordinary gas leaking variety, may be f interest to the readers.

Some few years ago in a small jobing shop, a number of special design nternal combustion engines were being onstructed, and when completed, were ubjected to the usual test. During the peration of testing one of these enines, the charge refused to explode. fter turning the engine over several imes without success, the caps were removed from one of the valve seats, to y and locate the cause of the trouble. he operator, who was an experienced and on gas engines, stooped down to nvestigate, but being rather dark, he alled for a light. The light, which was n open flame torch, was handed to him, nd unthinkingly he placed the light to e valve opening . The result, like the ellar explorer, was a gentle explosion, hich centered itself in the face of the orch bearer, causing some serious burns, nd the loss of his eyebrows and oustache; the latter being the most erious of all, as he stated himself he ad been seven years in raising it.

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THE ELUSIVE ELEMENT OF SUCCESS.

By A. L. Haas.

THE most elusive quality of merit in e mechanical business, difficult to nalyse and upon whose value too great n assessment can scarcely be placed is at termed initiative.

Study, training and experience do not one evolve it, when the psychologist ttempts its explanation, he seems to ake confusion worse confounded. In ctual practice the individual having is quality strongly marked is certain o be deferred to in time of crisis or hen things go awry, it is therefore nderstood although more or less inexplicable.

There is no other business extant giving the same opportunities for all ranks to exercise and develop initiative as that of the engineer in whatever subdivision of the mechanical field he happens to be located or whatever his position.

Like every other ethical sense or mental quality it gains by experience training and knowledge in fact destitute of these it is by no means a striking or uncommon quality, developed highly in a narrow or limited sense it becomes of the greatest possible value.

Like wisdom it is more or less a birth endowment, many labourers have it, many mechanics lack the quality—in the sense indicated it is a native and not an acquired trait of character. It has nothing to do with verbal memory or examination success, knowledge is its tool not its master, in the larger fields of human effort and for success in any real sense it is indispensable.

Truth Will Out .

We are all acquainted with individuals who in place of knowledge and initiative, substitute bluff or its modern variant swank. These folk have their day and cease to be, the ring of fine gold cannot be imitated for long not at all events to a trained ear; some quite small matter it may be reveals the sham and the counterfeit of their profession stands revealed. Sometimes the survival is for a period until the retribution, just and long overdue produces a sign of relief from below from those who realised but were unable from their positions to protest effectually.

Cutting and contriving, presence of mind, power to diagnose, to visualise, to substitute, to apply a remedy, all matters needing courage, are the fruits of initiative.

The tricks of the trade, tool using ability, power to repeatedly perform operations learnt are not initiative, they are common possessions enough.

No firm may neglect the quality and live, no concern play the role of simple imitator for long without suffering the penalty. Get a reputation of being always after the fair and the centre of gravity of business will assuredly shift disadvantageously.

In a business sense, the formulation of policy, opening out new fields of effort, good correspondence, purchase, dealing with complaints, instalment of new plants, courage to scrap the old, are all apart from simple clerical or technical ability and are obviously matters demanding initiative. In ordinary times with ordinary conditions the value of being in front is realised, in actual warfare belligerent or industrial it is the winning side which can afford to take the initiative.

The quality cited means keeping in the forefront of evolution not merely swept up with its final wave. Adjustment in front is preferable to hasty reorganisation when it becomes evident that the penalty for conservatism is about to operate.

The conditions which have existed for the past two years and more especially those which are yet to come, represent a unique opportunity. Never in the annals of mankind has the necessity for foresight been at a greater premium, never since the first engineer started in business has there been a more urgent need for the exercise of every human and mental endowment opportunity of similar magnitude will not occur again for perhaps a century. The re-construction which the greatest war in history has necessitated leaves the greater question still of reversal to normal manufacture yet to come. This will afford opportunity commensurate with the occasion and the magnitude of this needs to be grasped.

To initiate re-commencement, to be more than ready to take the commercial field again, to be equipped knowing where to begin and what to do will mean the difference between the front and the rear of the procession. The question of success or failure may hinge on what is now being prepared. If the war has emphasised one thing it is that organisation is the soul of the offensive which in turn depends upon the initiative taken.

The Campaign of Peace

The re-adjustment will be immense, the national task stupendous. There will be as much opportunity for big things at the resumption of the usual as there was at the commencement of the unusual period now past, which we all hope is drawing to a close. Values have changed, ideas have altered, a new and immense future awaits exploitation; to take advantage of the same will require acute intellect, realisation of possibility, preparation, foresight, indeed every variant of the general quality initiative will be severely exercised. Peace when it comes will be a commencement not a finish; another and most serious campaign, for which it is hoped the plans are in preparation, will commence in a changed world, having different values and fresh economic conditions

The squandered wealth and loss of production needs restoration, it will need long and laborious work, strenuous days and months of effort to make the national machine run smoothly and efficiently. If we are to regain our previous footing, earn our former industrial status it will call for every ounce of effort in the forthcoming trial of strength. We have shown that we can adapt ourselves to the needs of war, put aside carefully guarded privileges and prejudices under the iron spur of national need. Are we also going to throw the same effectual strength into the trade war coming and regain not simply destroyed wealth but trade prestige. To do this depends upon the present in no small measure, equal sacrifice will be needed, are we prepared to make it? The matter does not rest with Committees, however representative and capable, nor with the Government, it rests individually upon every single unit in the mechanical world, where international competition is most easily realised and will make itself more keenly felt than in almost any other quarter.

The engineering and manufacturing resources of the world have increased at an unprecedented rate just recently, this increase will continue in the near future, our very sacrifices have built up rivals in neutral countries where expansion has been almost as great as here. As a consequence long views must be taken the conditions must be anticipated otherwise a large slice of our export trade will be permanently alienated and our sacrifices vain.

It is not merely a question for managements, it is equally important that the facts are realised by rank and file, the responsibility for the future rests as much with foremen, mechanics, draughtsmen as with the commercial and direction sides.

When normal conditions are resumed the first phase will be a busy period making good quantities of work in arrear; re-construction of destroyed material and overdue repair must make employment good. The larger the catastrophe the greater the wreckage and the larger the amount of work involved in simple clearance. After this first period will come the re-action, the lull of stagnation and slackness.

It is this portion of the future which will prove troublesome, difficult, dangerous.

It is then that initiative commencing now will count; count as initiative never counted before nationally, commercially, technically. The resources are here, the national spirit is here and careful hands may steer safely through. It will however tax all our faculties and leave us all less leisure to re-establish stable conditions of industry, in which labour and capital are equally interested. Most state interference is brought about by default or oppression. A good employer usually has met outstanding factory regulations before they are made. While it is certain that the exact conditions existing before the war will not be re-established, the alterations necessitated may cause less trouble if the conditions be given due thought ahead. It rests altogether on the initiative and national conception of all concerned to place this country in the position of industrial pre-eminence she formerly enjoyed.

There is no cause for pessimism but much cause for mental activity; not when the re-start is made but at the present moment all hands should be busy that the shock when it comes may be softened and the conditions which have prevailed universally after a great war be more or less averted and provided for.

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THE French army steel helmets are stamped out of the best half-hardened sheet steel, about 1 mm. thick, according to the Bulletin des Armees. Four pieces make up the helmet: The cap, the peak, the neck protector, and the crest, and they are riveted together and sprayed with a gray-blue paint to prevent rust. After drying for some hours at 135 deg. Cent., the helmet is lined and fitted with a chin strap.

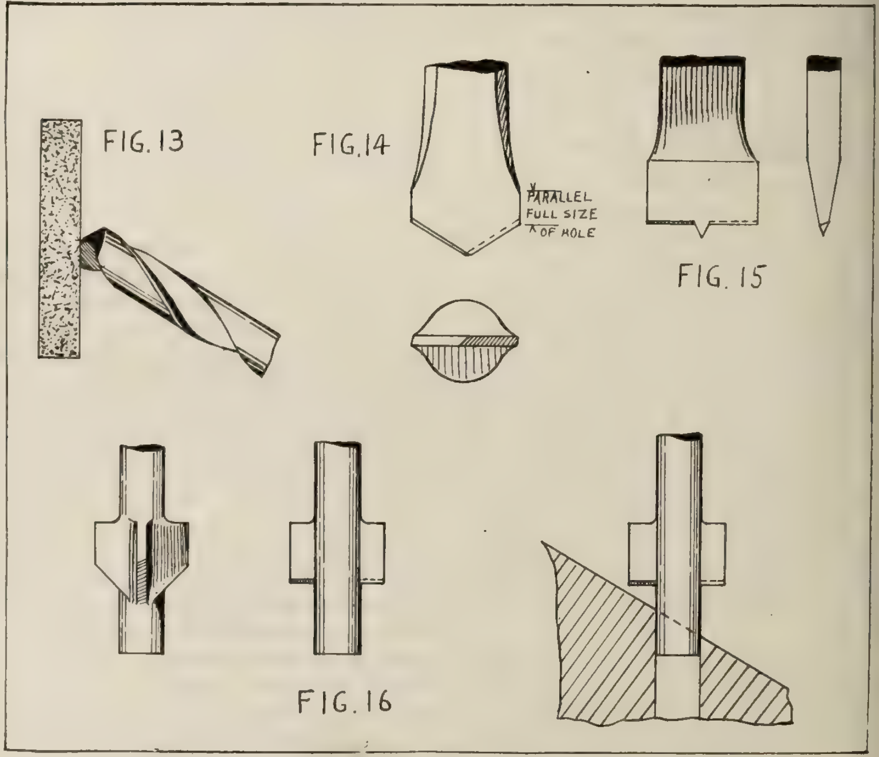
MACHINISTS' INSTRUCTION COURSE—III.

By J. Davies.

THERE are special machines or attachments made for grindin drills, which give better result than can be expected from hand grinding. By far the greater number are ground by hand, however, so that hand grinding is a very necessary accomplishment. It is usually done by holding the drill on the side of the emery wheel, a shown in Fig. 13. Start grinding at the cutting edge and turn the drill round in much the same way as it turns when working. Take care not to turn the dril too far round or you will grind the cutting edges off the opposite side. Copy from a new drill. Grind to gauge unti you become proficient, then you will be able to do without gauges, depending only on the eye for the angle and shape of cutting edges.

Speed and Feed of Drills

The speed of a drill and the amount of feed for revolution can only be determined by the man on the job, depending as it does upon so many conditions, i.e. the hardness of the material to be drilled, the nature of the job, the quality of the drill, the depth of the hole, etc. It is impossible to give a rule to cover all cases; therefore, the correct cutting speed must be determined by good judgment. It is safe to start drilling with carbon drills at 30 ft. per min. for machinery steel, 35 ft. for cast iron, and 60 ft. for brass, using a feed of about .004-inch per revolution for small drills up to about $5/8$ in., and a higher feed up to



ILLUSTRATING VARIOUS TYPES OF DRILLS AND CUTTERS.

about .010 for larger drills. These are only trial speeds, from which the correct feed and speed can be obtained to suit the job. I am indebted to the Cleveland Twist Drill Co. for the following table of cutting speeds:

TABLE OF CUTTING SPEEDS.

Feet per min......	30	40	50	60	70	80	90	100	110	120	130	140	150
Diameter.	Revolutions per Minute.												
1-16 in.	1833	2445	3056	3667	4278	4889	5500	6111	....	....	....	....	....
⅛ in.	917	1222	1528	1833	2139	2445	2750	3056	3361	3667	3973	4278	4584
3-16 in.	611	815	1019	1222	1426	1630	1833	2037	2241	2445	2648	2852	3056
¼ in.	458	611	764	917	1070	1222	1375	1528	1681	1833	1986	2139	2292
5-16 in.	367	489	611	733	856	978	1100	1222	1345	1467	1589	1711	1833
⅜ in.	306	407	509	611	713	815	917	1019	1120	1222	1324	1426	1528
7-16 in.	262	349	437	524	611	698	786	873	960	1048	1135	1222	1310
½ in.	229	306	382	458	535	611	688	764	840	917	993	1070	1146
⅝ in.	183	244	306	367	428	489	550	611	672	733	794	856	917
¾ in.	153	203	255	306	357	407	458	509	560	611	662	713	764
⅞ in.	131	175	218	262	306	349	393	436	480	524	568	611	655
1 in.	115	153	191	229	267	306	344	382	420	458	497	535	573
1⅛ in.	102	136	170	204	238	272	306	340	373	407	441	475	509
1¼ in.	92	122	153	183	214	244	275	306	336	367	397	428	458
1⅜ in.	83	111	139	167	194	222	250	278	306	333	361	389	417
1½ in	76	102	127	153	178	204	229	255	280	306	321	357	382
1⅝ in.	70	94	117	141	165	188	212	235	259	282	306	329	353
1¾ in.	65	87	109	131	153	175	196	218	240	262	284	306	327
1⅞ in.	61	81	102	122	143	163	182	204	224	244	265	285	306
2 in.	57	76	95	115	134	153	172	191	210	229	248	267	287
2¼ in.	51	68	85	102	119	136	153	170	187	204	221	238	255
2½ in.	46	61	76	92	107	122	137	153	168	183	199	214	229
2¾ in.	42	56	69	83	97	111	125	139	153	167	181	194	208
3 in.	38	51	64	76	89	102	115	127	140	153	166	178	191

The following lubricants used in drilling have been found to give good results:—Hard steel — turpentine; soft steel—lard oil; malleable iron—soda water; aluminum—soda water; brass and cast iron—cut dry.

The size of drill for tapping or clearance holes for bolt is rarely given, so that it is very essential for the drill hand to know them for himself. No one ever thinks of having to do any figuring to find the size of drill for any tapped hole. There are two ways of procuring it, either to consult a table or chart, or learn the sizes by heart; the last is by far the best. The most fruitful source of broken taps is making tapping holes too small.

Drilling Deep Holes

In drilling very deep holes, it is sometimes necessary to drill deeper than the flutes of the drill, the trouble being, however, to get rid of the cuttings: sometimes it is necessary to drill with a smaller drill, after drilling as far as you can with that of the proper size.

MACHINE SCREW TAP SIZES.

Size of Tap	No. of Threads	Tap Drill	Clearance Size
14	20	10	¼
14	24	6	¼
12	24	15	1
11	24	19	3
10	24	23	9
10	32	20	9
9	32	24	13
8	32	28	18
7	32	30	22
6	32	33	27
5	40	36	29
4	36	41	31
3	48	44	37
2	56	48	42

You will probably have to back the drill a few times and clean the hole out the best way you can. Some get a piece of tin and roughly make a scoop or spoon: others try a blow pipe, particularly for cast iron. The best way is to secure an old round file and get it well magnetized; the electrician or engineer will do the latter for you. Insert the file into the hole, and it will come out loaded with chips, a slight tap knocking them off each time.

There are other kinds of drills used beside the twist drill. We have the flat drill, generally made by the shop blacksmith, by simply flattening the end of a piece of round steel and grinding to size and shape, as shown in sketch, Fig. 14. Be careful to leave it a little parallel for a short distance equal to the full size of hole. Another variation of the flat drill is the teat type, Fig. 15, which is ground with a flat bottom except for the little teat left on as a guiding point for the drill. It is used for making a flat-bottomed hole, or for spot facing a flat spot for a nut or bolt head.

PIPE TAPS AND DRILLS.

Tap	Drill
⅛	11-32
¼	15-32
⅜	19-32
½	23-32
¾	15-16
1	1 3-16
1¼	1½
1½	1 23-32
2	2 3-16
2½	2 11-16
3	3 5-16

A pilot drill is a very useful tool. It is made of various forms, the chief characteristic being that of its having a round pilot turned on the end to suit standard size drills. Some pilot drills are made with four cutting edges, and some with only two, Fig. 16. They are employed for countersinking, counterboring, and for enlarging small holes where accuracy is desired. Perhaps their most useful feature is the drilling of a hole on an inclined plane, the pilot preventing the drill from running to one side. A small hole is first drilled the size of the pilot.

Drilled holes are not always true, smooth, or of the exact size; therefore, when a hole is required to be very smooth and accurate, a reamer is used. The latter are made in different forms, being known as solid reamers, adjustable reamers, shell reamers, etc.

SIZE OF TAPPING DRILLS—
U.S. STANDARD

Dia. of Tap.	No. of Yards per in.	Tapping Size.	Dia. at Bottom of Thread.
¼	20	13-64	0.185
5-16	18	¼	0.240
⅜	16	5-16	0.294
7-16	14	23-64	0.345
½	13	13-32	0.400
⅝	11	17-32	0.507
¾	10	41-64	0.620
⅞	9	¾	0.731
1	8	⅞	0.838
1⅛	7	31-32	0.939
1¼	7	1 3-32	1.064
1⅜	6	1 7-32	1.158
1½	6	1 11-32	1.283
1⅝	5½	1 7-16	1.389
1¾	5	1 17-32	1.490
1⅞	5	1 21-32	1.615
2	4½	1 25-32	1.711
2¼	4½	2 1-64	1.961
2½	4	2¼	2.175
2¾	4	2½	2.425
3	3½	2 11-16	2.629
3¼	3½	2 15-16	2.879
3½	3¼	3 3-16	3.100
3¾	3	3⅜	3.317
4	3	3⅝	3.567
4¼	2⅞	3 27-32	3.798
4½	2¾	4 3-32	4.028
4¾	2⅝	4 5-16	4.255
5	2½	4 9-16	4.480
5¼	2½	4 13-16	4.730
5½	2⅜	5 1-32	4.953
5¾	2⅜	5 9-32	5.203
6	2¼	5½	5.423

N.B.—The difference between the English or Whitworth standard of tapping sizes and the U.S. is so small that for all practical purposes the same tapping size can be used up to 2 inches.

In using a reamer, drill to within 1-64 in. of size for small holes, up to about ⅞ in. and to within 1-32 in. for holes larger than ⅞ in. Taper reamers are used for finishing holes for taper pins. They have a much heavier duty to perform than straight reamers; it helps, some however, to drill the hole to the centre the size of the centre of reamer, or of that part of reamer that comes to the centre of the hole.

◆

HOT BEARING EXPERIENCE.

THE test of years in practice has proved that the oil ring method of lubricating bearings is entirely satisfactory, says E. C. Parham in the General Electric Review. Although it is seemingly obvious that the following precautions should be taken, past experience has shown that it is necessary to call attention to the facts that (1) there must be oil in the oil-well, (2) the oil rings must be installed, and (3) the oil rings must turn.

Complaint was made that the lining in one bearing of a motor armature had melted twice, notwithstanding the fact that the oil had been renewed just as often as had that of the other bearing which had given no trouble. The motor, being started and stopped by means of an automatic panel and being almost inaccessible, was not given daily attention. It would operate for about five days and then the bearing heating would produce a binding effect which would cause the motor circuit-breaker to open. The opening of the breaker was all that prevented the babbitt metal from running out and letting the armature down onto the pole pieces. An inspector, who was sent to locate the trouble, noticed that the floor was much more oily under the trouble-giving end of the motor than at the other end. This suggested that the oil flooding could not have been due altogether to careless oiling, for then the flooding at both ends would have been about the same. Inspection of the oil-well showed that there was but little oil in it although the other bearing was nearly normal; both bearings had recently been washed out and refilled. On refilling the oil well and carefully wiping the outside of the box, a crack was discovered through which the oil slowly oozed out. This was stopped by drilling, tapping and plugging a hole in the affected area.

BEARING METALS—BABBITT

THE best combination for bearings is to make the wearing parts of one of a material softer than the other. No doubt the good effects resulting are due to the fact that the softer material yields somewhat to the inequalities of the harder metal, and this giving way of one of the metals permits of easy running. Conversely, the hard, unyielding surfaces of steel on steel have exactly the opposite effect, as neither will give in to the other, and friction naturally follows, causing heating, which again increases the friction until failure occurs.

Within certain limits the more accommodating the soft bearing the better the result obtained, the material generally employed being what is known as "white metal," or "Babbitt," from the name of its originator. This white metal is an alloy of several metals, the proportions varying according to the results desired. Nearly every shop has its own formula for the mixture, but a typical one may be taken as 73 parts of tin, 10 parts of antimony, and 4½ parts of copper. These are melted together in the foundry and supplied in blocks to consumers who heat it to a molten state for use, adding thereafter some 12½ parts of zinc to it. The parts mentioned are by weight.

It is very important that the white metal should be well supported by another metal possessing more strength, as, unless reinforced in some way, it would be crushed and deformed. For instance, in journal boxes it will usually be found good practice to cast the bearing area with recesses in the face, into which the white metal is run, the whole being then turned up with the axle, so that the actual bearing face is partly bronze or cast iron, but more largely white metal. In some cases it is possible to make one of the wearing faces entirely of white metal, in which a very thin layer is attached to the harder metal. Even in such instances, however, it will be found best to provide for the harder metal to project all round the Babbitt, to prevent the edges breaking off. At least some form of "key" will be necessary, such as serrations in the hard metal holes in which the white metal can penetrate and get a grip.

The Tinning Feature

The problem of attaching the two metals together is one that the operator must effectually solve, as on the success of his workmanship rests the whole responsibility for good results to be obtained in the after-work of the engine or machine when running. The article to be Babbitted must first be thoroughly cleaned from scale or rust at those parts which are required to be lined up. This cleaning is done either by mechanical means such as turning, filing, or chipping, or by chemical means of immersion in an acid bath. The latter method is preferable, but not always possible, so the former is often met with in service. It depends also upon the metal of the part to be lined up, as if this is cast iron it is more difficult to make the white metal adhere to it than if it is a metal more nearly akin to the white metal, such as bronze.

When the surfaces are thoroughly clean, the article is heated to a temperature sufficient to make tin melt freely, say 450 dgs. F. Then a stick of tin is dipped in sal-ammoniac and rubbed on to the parts to be metalled, a very thin coating being deposited. This operation has to be carried on until the whole surface is covered with a layer of tin, and is necessary in order to ensure that the white metal is in firm metallic contact with the article to which it is required to be attached. If no previous tinning were done, the white metal might stick, or it might not, and failure would be probable in the after-working processes or in service. The babbitt is afterwards poured on to the tinned parts, and guided and pressed into position by means of a hard smooth stick of wood. Whilst in a plastic state the Babbitt is easily controlled, and a layer of almost any thickness can be spread on to the skin of tin, to which it will firmly adhere.

* * *

A DUTCH periodical, "In en Uitvoer," states that in Holland complaints about the quality of German pig iron are daily growing. This deterioration is apparently due to a shortage of skilled workmen and an insufficient quantity of manganese. The substitute for maganese, of which the discovery was recently reported in German papers, does not seem to have come up to expectation.

COMPUTING VALUES OF TUNGSTEN LAMPS.

IT is well-known that a change in the voltage applied to the terminals of an incandescent lamp changes the candlepower, current and, in consequence, the wattage (watts=volts × amperes), and the watts per candle. If these changes are followed from point to point, relations among the variables may be found and plotted as characteristic curves. The equations of these characteristic curves for tungsten lamps have been found by the Bureau of Standards of the United States Department of Commerce, and a special application of these equations has been made in a device which gives a solution of problems involving voltage, candle-power, and watts per candle.

In this device the volt scale is movable, and, by setting it to the other scales at a point corresponding to the observed watts per candle, values of per cent. candlepower and of actual watts per candle may be read directly from the proper scales, or the converse problems may be solved. Use of this device results in a decided saving of time when compared with other methods of characteristic evaluation. In connection with the device are given tables of values used in its construction and practical examples illustrating scale settings.

STRENGTH OF GEAR TEETH

WHILE the exact load that should be transmitted by a pair of gears is a matter that requires considerable judgment owing to the many variable conditions involved, the experience of engineers and manufacturers have demonstrated that reliance can be place upon Lewis' formula for the strength of gear teeth. This formula takes into account the shape of the teeth for different numbers of same and the effect of velocity upon shock and wear, as well as the face and pitch of the teeth. The Lewis' formula referred to is $W=s\,p\,f\,y$, from which

$$\text{Horsepower}=\frac{s\,p\,f\,y\,V}{33000},$$

where W=total pressure in pounds along the pitch line.

s=working fibre stress (in lbs. per sq. in.) of material used in gears, corrected for velocity effect.

p=circular pitch, inches.

f=face width, inches.

y=tooth strength factor, from curve.

v=velocity at pitch line in feet per minute $=\frac{P\,N\,R}{12}$

where N=number of teeth.

R=revolutions per minute.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data
and Ideas Evolved from Actual Practical Application and Experience

QUICK-ACTING AUTOMATIC SHELL CHUCK

By C. F. Whyte.

THE chuck shown in the accompanying illustrations is applicable to shells from 4 in. dia. upwards, and was originally designed for 4.5 in. H. E. Howitzer shells. The first chuck made in the shop ran continuously for six months, averaging 10 shells per hour with a record of 160 in 12 hours, single cutting tool on heavy engine lathe feeding 1-16th in. per revolution.

The features of this chuck may be summarized as follows: Its action is "quicker than air"; positive drive avoiding slippage; operator need not stop lathe to remove and replace work; no wrench or hand wheel necessary; great freedom from repair; being smaller than shell affords ample clearance; its short length enables the projection of the tail stock sleeve to be reduced to a minimum; no excessive end thrust is required to keep shell tight.

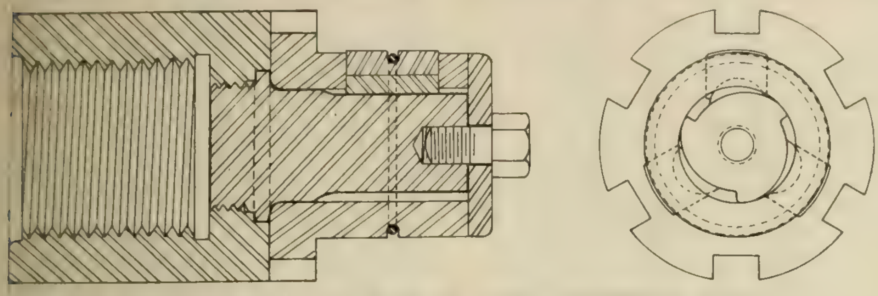
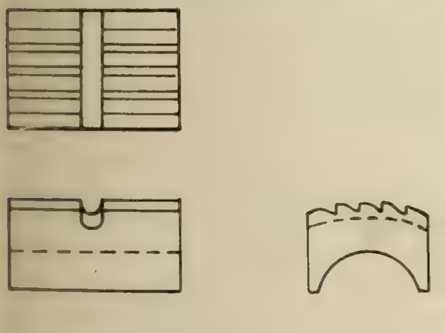
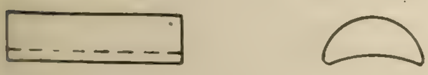


FIG. 1 SECTION AND END VIEW OF AUTOMATIC SHELL CHUCK.



HARDENED STEEL JAW



HARDENED STEEL FILLER PIECE

FIG. 2 DETAILS OF DRIVING JAWS.

A section of the complete chuck or driver is shown in Fig. 1. One end of an adapter is threaded to suit the lathe spindle, and the other end is threaded to receive the chuck stem or arbor. The stem is formed with eccentric flutes seen in end view, each one having fitted to it a driving jaw, the three jaws being maintained equidistant from each other by a sleeve with slots in it, and retained in the slots by a wire spring fitting into grooves on the outside of the jaws. The inner end of the sleeve is flanged and slotted for a wrench in case of emergency. By moving the sleeve in either direction the jaws expand or contract.

To remove a shell, run back the tail centre, when the long overhang of the heavy rotating billet loosens up the job and collapses the chuck when the shell readily slides off, while receiving a slight left hand turn from the operator to prevent jaws gripping again. The same turn is necessary when putting on a fresh forging, as it allows the forging to get right onto the chuck instantly.

The satisfactory working of the chuck is largely due to the filler piece, Fig. 2. which provides a rolling joint support underneath the jaws and maintains full contact with the curved surfaces of the flutes, preventing the formation of ridges or undue wear at spots by the large amount of surface always in contact.

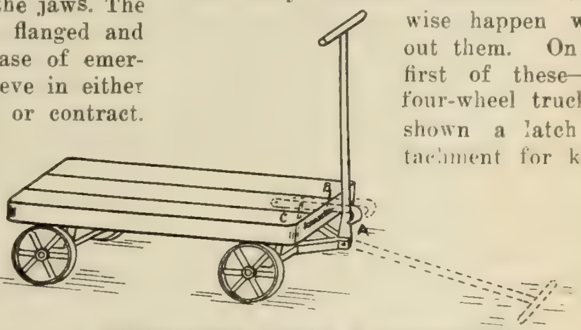
* * *

SAFETY ATTACHMENTS FOR TRUCKS.

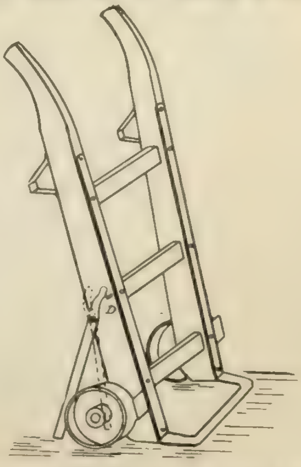
By J. E. Cooley

THERE is this about safety work that it leads one to discover sources and places of danger that would otherwise remain unknown until an accident therefrom arrested attention. In the pursuit of safety work, there is developed, what might be called a "safety faculty", or, in other words, the power of observing where danger really exists. To speak more plainly still, one develops a knack of seeing danger possibilities wherever these lurk. Such a danger as described is found to exist in the use of trucks, the two and the four-wheel kind used so extensively for transporting work about a factory. Many accidents can happen and have happened through the careless manner in which these are left about, especially as they stand or lie in machine aisles or dark passage-ways, where they are stumbled over, or as in the case of the two-wheel kind, when placed upward against a wall or post, through their rolling out and remaining unseen until someone trips over them.

The accompanying sketch shows safety attachments that can be applied to these two types of trucks, and will prevent many accidents that would otherwise happen without them. On the first of these—the four-wheel truck, is shown a latch attachment for keeping the truck handle up out of the way when not in use. It consists of a forged strip of steel as A, having a hook or nose bent on one end which is held to the truck proper by a screw on which it swings. A spring B is fastened to this which holds it against a stop pin C. When the handle is lifted up, it



FOUR-WHEEL TRUCK WITH HANDLE LATCH.



TWO-WHEEL TRUCK WITH ANTI-TIPPING SUPPORT.

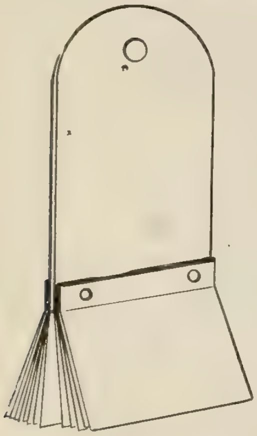
forces the latch over to one side, closing and locking the handle as shown. The handle is self-releasing, for, when pulling it down, it forces the latch out again sidewise.

On the two-wheel truck is shown a support or prop attached to the side and used for the purpose of keeping the truck upright or from tipping back when not in use. It is made from a long strip of flat stock having a curve bent on the end in order to have it bear tightly against the side of the truck. The pin D serves as a stop when the prop is pulled out. The prop is operated with the foot, being closed in when the truck is in use.

INK DRYING FAN.

By F. A.

WHEN tracing over a drawing on tracing-paper or cloth, it takes some little time for the ink to dry after each line is drawn, and in order that there may be as little delay as possible in doing the work, it is necessary to have the ink dry quickly. This is usually accomplished by means of a fan made from a piece of card-board or blotter which is waved down near the wet inked line. In the accompanying sketch is shown an idea of an ink-drying fan which drys the ink more rapidly than the method already described. It consists of a strip of card-board which serves for a handle together with several thin strips of paper attached to the end of same as shown. By swinging this down close to the inked-in portion on the tracing, several currents of air are simultaneously forced against the inked line which drys it very quickly.

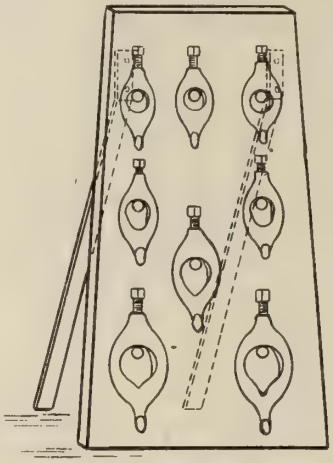


INK DRYING FAN.

A STAND FOR LATHE-DOGS.

By J. Edward.

THE order in which lathe-dogs are usually kept is not always such that they can be conveniently handled. They are generally placed ten or a dozen on a rod that is driven into a post or wall, as the case may be. When one is wanted, several of these have to be taken off and put back again on the rod in order to secure the right one. In the sketch herewith, is shown a stand for lathe-dogs that can be placed on the floor under one end of a lathe or between two lathes where it will be accessible to workmen. It is made from a board having a number of pegs attached thereto on which the dogs are placed.



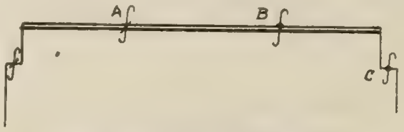
STAND FOR LATHE DOGS.

The stand is set at an incline and supported on the back by two braces as shown. Two or three of the smaller sizes of lathe-dogs can be placed on one peg if necessary.

FINISH-MARKS ON DRAWINGS.

By Alden Street

WHERE two or more lines are close together on a drawing, and one of these contain "finish-marks," it is not always possible to distinguish which of these lines represent the portion to be finished, owing to the fact, that the short oblique bar that intersects the letter "F" and the line on which it is suppose to lie, is not always properly placed. Referring to the sketch shown herewith, this bar on the "finish-mark" A, has this troublesome feature. It often confuses workmen, especially pattern-makers, and much time is consumed in studying it out or in making inquiries, that might be saved. A little suggestion that overcomes this is shown at the "finish-mark" B, which consists in placing a small round dot on the "Finish-mark" and line. This shows up plainly especially on a blueprint. It also takes up less room than the bar in a short space as at C.



FINISH MARKS ON DRAWINGS.

A CONVENIENT EXPANDING MANDREL

By D. O. B.

WHERE a number of pieces are to b bored and faced on either end, the usua method of procedure is of course t chuck the piece and bore and face th one end, after which it is pressed o the mandrel and the other end faced Where there are several pieces of thi kind to be done, the following metho will be found to be a time saver, an it can also be used as a regular manu facturing proposition, as it is cheap t make, and the outlay is small compare with making up a special mandrel fo this purpose.

If the work is to be done in the scre machine, an ordinary piece of cold drawn steel of the required diamete may be held in one of the regular col lets. Should the work be done in th engine lathe, the universal chuck ma be used, or better yet, a piece slightl larger is chucked up and then turne down to the proper diameter, a shoulde being left so that the piece is slightl shorter than the over-all length to b faced. This piece is then drilled and a pipe tap-run in the end, this being a large as possible, in order to give a bet ter hold for the wrench which is use on same. The piece should be drille back for some distance from the end and about three saw cuts put in witl the hack saw. After the piece is on th mandrel, it is easily expanded by mean of the tapered pipe plug.

The writer has used quite a number o these for various perposes, both o screw machines and engine lathes an they have given satisfaction in ever case, being cheaply made and yet o sufficient power to hold even under th heaviest cuts. When it is necessary t take but one cut, the carriage may b locked and the piece duplicated i length without any necessity fo calipering.

FACING IN THE DRILL PRESS

By D. S. Mann.

ON one of our machines were a large number of bosses, which were tapped out and faced on the end for lock nuts The usual method of doing this had been to drill the hole, then spot-face and finally tap, all being done in the radial drill press. To save the time of changing tools a spot-facer was made, which was directly attached to the tap drill. This was placed at the required distance from the end of the drill, and thus automatically acted as a stop for the depth of hole. Of course, the regular feed was thrown out when facing. Only a few seconds were thus required for the facing operation. The facing heads were made of machine steel and slotted for the two high-speed steel blades, these extending into the grooves in the drill and providing a means of driving same. The heads were split and provided with a clamping screw for regulating the vertical position.

CARE OF BRUSHES FOR COMMUTATORS AND SLIP RINGS

SUPERFICIALLY, the care of brushes is simple enough, says C. H. Smith in the Electric Journal, but, in fact, quite the contrary is true. Properly selected and applied brushes may fail on account of neglect, while improperly selected and applied brushes may render acceptable service if given intelligent care. Proper care of the brushes and brush rigging is a fundamental of good commutation, and of prolonged life for both commutator and brushes. Operators of electrical apparatus are directly responsible for the majority of their commutating troubles, although the manufacturer is frequently held to account. There are, on the other hand, a few (a very few) who give such superior attention to their brushes that inherent brush and machine evils are rarely permitted to assert themselves. The following practices will more than justify the effort:—

1—Keep the brushes clean. Both direct and alternating-current brushes get dirty—become coated with carbon and copper dust, which packs between the brush and holder and jams or "freezes" the brush in the holder. This frequently results in broken brushes, a gouged commutator, or both, concluding with a "flat spot," and necessitating the grinding or turning of the commutator. The commutator is blamed; the brush did the damage; negligence was the cause.

2—Have the spring pressure uniform. Otherwise, the brushes will commutate unequal currents; overload some and underload others; overwork some shunts and underwork others; cause an excessive flow of current between the overloaded brush and holder, and brush and spring; burn the sides and tops of the brushes and destroy the pressure springs. This unbalanced effect of brush work is sometimes known as "selective commutation"—not so descriptive a term perhaps as "unbalanced commutation," "unequal commutation," or possibly some other, which might have been selected. However, after the meaning of a term is understood, it matters very little what the spelling is.

3—Fit the brushes to the commutator properly, disregarding looks, and there is nothing "easy" about "grinding in" or "sandpapering" brushes. This apparently simple performance requires patience, care and judgment. Too much haphazard indifference is exercised in the seemingly simple act of making the brush face conform to the commutator surface. Examine indiscriminately the faces of the brushes on a few machines. The chances are that the brushes on nine out of ten of them will show imperfect brush contact surfaces; two or more contact faces may be clearly discernible on a single brush; one or more corners may be ground away; the heels or toes or both may be "nosed" off; or perhaps, worse still, the faces may show comparatively large areas of inactive surfaces. When "grinding in" brushes keep the sandpaper against the commutator. Do not allow it to "belly," "bow" or "buckle," unless convinced that cornerless, heelless, toeless, ball and cylinder faced brushes are the proper things. Knowledge of what is being done, and why, is necessary for most men if their interested efforts are to be expected. The average man if told why will learn how, but only a few learn both why and how for themselves.

Grinding-in Brusher

When a new set of brushes is installed it is frequently possible to purchase in the local market sandpaper or garnet paper, or their equivalents (these papers are made in rolls of 25 to 50 yards, or more), in any lengths required to go around a commutator. It should have a lap of several inches, and be so mounted on the commutator as to preclude the lapped end butting against the brushes when the machine is rotated for grinding. With many commutators the friction between the commutator bars and sandpaper (if the paper is taut) will suffice to keep the paper from slipping, especially if when, starting, the paper is given a pull in the direction of rotation by the operator. If the paper persists in slipping, use a little glue to stick the under end of the paper at the lap to the commutator. All traces of the glue must be removed from the bars before putting the machine into service.

A second method is to remove the middle brush on each arm and bind the paper to the commutator by running tape or string entirely around the periphery. If necessary, also bind the paper at the inner and outer ends of the commutator.

After the paper is anchored the commutator may be rotated by hand, or in any convenient way. Great care must be exercised in "grinding in" brushes in this way, as the cutting is very rapid, especially with soft brushes, and much of the life of the brush may be ground away in a very few revolutions. If after the brushes have been surfaced in the above manner, the trailing edge shows a poor seat on account of having had to mount the ridge due to the lap in the paper, a final surfacing should be done with very fine sandpaper by hand. The foregoing method is particularly desirable when a machine has very hard brushes, or a large number of soft brushes. It is a great time-saver after the knack of applying and anchoring the paper is understood. With slip rings, if carbon or graphite brushes are used, the same general scheme is applicable, but if metal graphite brushes are used, emery cloth, or its equivalent, is preferable.

There are those who advocate and those who practise pulling the grinding paper in the direction of rotation in order to more accurately surface the brush. This seems logical enough on first thought, but inasmuch as the commutator is not in motion when the brushes are surfaced in this manner there is no assurance that the brush will bear the same relation to its holder (and therefore to the commutator) when the commutator is rotating and, consequently, no assurance that the contact will remain fixed. This perhaps explains why brushes frequently show perfect contact when idle, but poor contact when in service. Generally speaking, this method of fitting the brushes, therefore, is not necessarily more dependable than other methods, though in proven instances it is to be commended.

4—It is important that the brush-holders, whether for direct or alternating-current use, be neither too close to nor too far from the commutator or slip rings. A suitable distance is from three-sixteenths to one-quarter of an inch.

5—If the brushes are copper-coated, the coating should not be allowed to come in contact with the commutator or slip rings. This means that as the brushes wear the copper coating should be scraped back and not allowed to extend below the brush-holder box. With proper shunts there should be no need for copper coating from an electrical standpoint, although for mechanical reasons it may be desirable as a protection for soft or structurally weak brushes.

6—If the toe of the brush is very sharp, it is good practice to "nose off" the knife edge. This reduces breakage and militates against gouging into the commutator.

Care of Commutators and Slip Rings

The care of commutators and slip rings is so closely related to the care of brushes that a few pertinent requirements may be regarded as applicable.

1—Keep the commutators and rings clean. When in service use a dry canvas or some related cloth having a hard texture. When soft, "nappy" materials are used the "nap" is caught by the slots or rough spots and pulled under the brushes, where it lodges and helps to collect and hold dirt and carbon. When shutting a machine down it is good practice in most cases to clean the commutator with a little gasoline on a hard surfaced material. This not only removes any grease or oil from the commutator, but also frequently improves the brus condition by removing from their faces the residue of greases or oils collected by them.

2—If the mica is flush, see that it is kept flush. If holes appear in the mica, clean them thoroughly and fill them with a dependable filler. Dental cement is perhaps as desirable for this purpose as anything to be had at the present time. These holes are generally traceable to the too free use of lubricating oils, many of which attack the shellac in the mica and rob the mica of its binder. This trouble in its incipiency is of very slow growth, but later increases rapidly, due to the increasing amount of carbon, copper, and other dust which collects in the holes and enlarges the burning area subject to the short-circuits which take place between the bars.

3—If the mica is undercut or recessed, keep the slots clean. For this purpose the use of fibre, bone, horn or hardwood is more desirable than metal, for the reason that metal is likely to cut the mica and deepen the slots. The advantage of deep slots are all disadvantages. Both practically and theoretically, mica need be but a hair's breadth below the surface to accomplish the end desired. The shallower the slot, the better. Depth encourages the collection of carbon, copper, dirt, etc., and is responsible for the bridging of the slots, which necessitates the beveling of the commutator bars.

4—Keep the edges of the commutator bars beveled or chamfered. When slots are deep (as most slots unfortunately and unnecessarily are), the commutator bars pull, or drag over, especially on the lagging edges of the bars. Unless the edges are beveled this pulled-over edge will, in time, close or bridge the slots and cause "flash-overs"; also melted-out connections between the necks of the commutators and windings, and even burned-out armature windings. These things not only may happen, but have happened.

5—Keep the necks of the commutator clean. Dirt between the necks is not only bad for the commutator, but affects adversely the ventilation and, therefore, the temperature of the machine.

6—If the machine "flashes over," shut it down and remove all blisters or burned spots; otherwise the brushes will be unnecessarily worn away, and the commutation will be imperfect.

7—In the matter of slip rings, keep them clean, including studs, spider (or bushing), leads to armature windings, brackets or supports for brushholder yokes, and all insulation between the several parts.

* * *

NEW TYPE OF CARGO SHIP.

A NEW type of cargo vessel belonging to an Italian shipping firm recently made her maiden voyage to the United States. The name of the ship is the Milazzo, and she is said to be the largest purely cargo-carrying vessel in the world, having a displacement of 20,400 tons when loaded. The cargo hold has a flooring of steel plates which slope away from or toward the sides of the vessel like the letter W. and below this flooring are longitudinal tunnels each of which has a double line of rails. On these rails small trucks travel and are charged with grain or coal through small gate hoppers from the hold. When loaded the trucks are pushed along shafts in which are cable elevators. The latter are attached to the trucks which are raised to the deck where they dump their contents into chutes which discharge from the vessel. The shafts in which the elevators work are divided below the deck into two branches, which command the two tracks in each tunnel. These shafts are surmounted by tubular steel masts which are fitted with guides, and with triggers which automatically upset and discharge the cars as they are elevated to the proper level. The masts are provided with platforms to which the chutes are fixed.

* * *

SOME LANGUAGE

IN Dallas, Tex., a railroad manager received the following letter: "Gentlemen, —Is it absolutely necessary in the discharge of his duty, day and night, that the engineer of your yard engine should make it ding and dong and fizz and spit and clang and bang and buzz and hiss and bellow and wail and whistle and wheeze and squak and blow and jar and puff and bump and click and clang and chug and moan and moot and toot and crash and grunt and gasp and groan and jerk and rasp and jingle and twang and clack and rumble and jangle and ring and clatter and yelp and croak and howl and hum and boom and clash and jolt and jostle and slam and scrape and throb and crink and jangle and quiver and rumble and roar and smell and shriek like —"—Chicago Tribune.

* * *

THE true relationship between the science of the schools and that of the workshop is accurately set forth by Dr. L. H. Baekeland, in an address to the New York section of the Society of Chemical Industry, on the award to him of the Perkin Medal. Laboratory science is, in fact, seldom comprehensive enough to be applicable to practical ends without careful collation and correction. A pioneer cannot, in the nature of things, be expected to make more than a general reconnaissance of the field covered by his investigations. The exact features of the territory he opens must accordingly be established by a much more elaborate survey than he is in a position to make.

REBABBITTING BEARINGS.

IN pouring a bearing on a horizontal shaft, says a writer in the Dodge Idea, cut out only one of the old bearings at a time, using the old on in order to hold and clamp the mandrel. If it is worn out of true or too thin to hold the mandrel in the right position, put in shims of paper as may be required in order to line it up as wanted, then clamp the mandrel in the position it is desired to assume when finished. This being done, wrap the shaft of the bearing to be poured with oiled paper, and around this wrap a twine string spirally from one end of bearing to the other. This holds the paper snug, and, when the bearing is poured and the string removed, there remains a nice oil channel.

Arrange to pour both the top and bottom of bearing at the same time. This is done by cutting the liners so that they fill out to the shaft nicely, afterwards cutting some notches at intervals for the metal to pass through to fill the bottom. This will leave small strips of metal between the top and bottom, but a thin cold-chisel, driven carefully between the ends of the cap and bottom portions of the bearing, will easily break them apart. Make a funnel of clay or putty around the hole, to hold a surplus of metal, so as to get the benefit of the pressure to insure complete filling of the bearing. The bearing is now ready for the metal.

In heating be sure to not get it too hot. This, in my opinion, is where some of the springing trouble starts. Heat until the metal will just brown a dry pine stick. If both the top and bottom are poured at the same time, there is little, if any, danger of springing the shaft. The metal, of course, falls on the top of shaft, but it immediately starts down the sides, following around the shaft on both sides and passing through the openings in the liners into the bottom. By pouring as fast as it will run, it is only a few seconds until the metal in the bottom has reached the shaft, tending to heat it and offsetting the heat on top. The metal falling down both sides of shaft has tended to spread the heat over a considerable part of its circumference, and the time which has elapsed is so short that there is very little heat absorbed by the shaft, anyway. With the offsetting heat coming from the bottom, it will only be once in many operations, if at all, that trouble will be encountered from this cause. When one bearing has been poured as directed, cut out the next, using the new one by which to clamp and line the shaft, and proceed as above.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

RAIL PUNCHING AND RAIL BREAKING MACHINES.

TWO important items of railroad shop equipment are shown in the accompanying photographs, Fig. 1 being a rail punch, and Fig. 2 a rail breaker, both machines being the product of the Covington Machine Co., Covington, Va.

The punching machine is a special adaptation of a vertical type punch and is designed to punch opposite ends of two rails simultaneously which makes it equivalent to punching both ends of one rail in a single operation, the machine being large enough and heavy enough to take care of three punches for each end of the rail. Referring to the illustration, the punch is shown set up with four punches, two for each end of the rail. The centre block is a stop and the die blocks are made of proper size and shape to fit in between the rails.

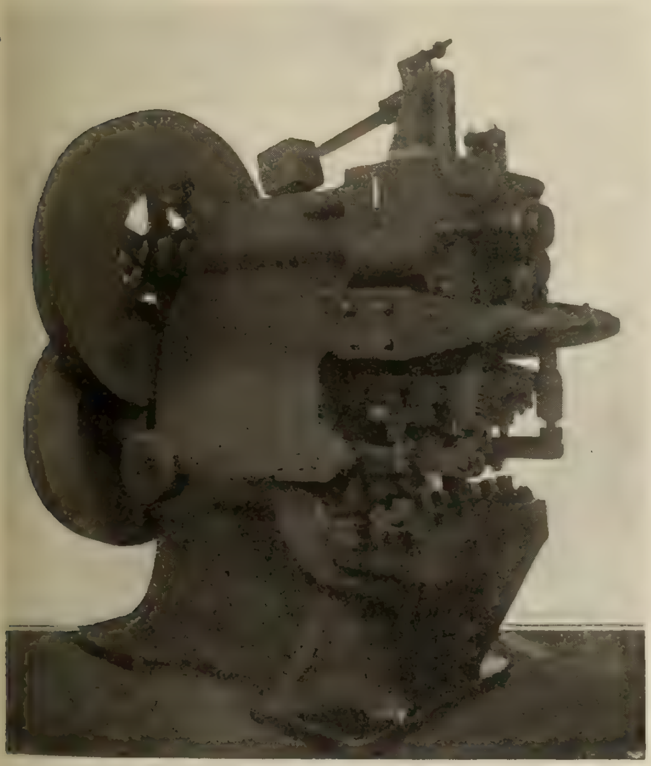


FIG. 1—RAIL PUNCHING MACHINE.

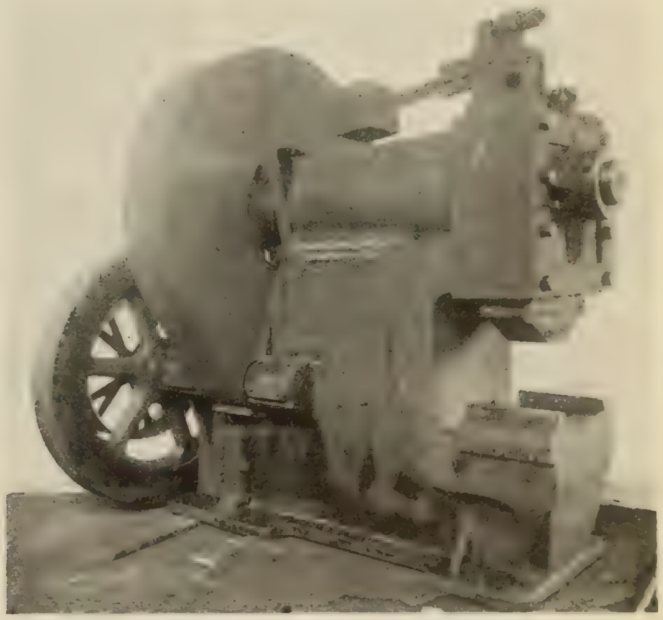


FIG. 2—RAIL BREAKING MACHINE.

The cross shaft is mounted in bearings and attached to the frame back in the throat, and the balance weight keyed to this same shaft. The two clamping arms are each provided with an extended lug, dropped down between the flange and the bulb of the rail, and the actual clamping is done from a cam mounted on the main eccentric shaft outside, engaging with a roller, which roller mechanism is in turn connected with a lever on the outer rock shaft for transmitting motion to the clamp arms through the spring connections shown. The cam is timed so that the clamp affords ample opportunity for sliding the rail into position for punching before it is gripped.

The eccentric shaft bearings as well as the drive shaft bearings are bushed in a form that is easily removed, while the machine may be either belt or motor driven, the former being illustrated with a capacity of lighter weight rails up to and including 40 lbs.

A rail breaker of the open throat type is illustrated in Fig. 2, this design being considered preferable to that with a closed throat. Owing to the heavy shocks experienced in working, special attention has been paid to the size of the main bearings for the eccentric shaft which with the eccentric shaft bearing in the cover has been made exceptionally large.

This machine is preferably belt driven as careless operators frequently allow the plunger head to jamb to such an extent that the machine is instantly stopped, so that the remainder of the stroke cannot be completed without some breakage. Such a contingency is met by slipping of the belt, and, when motor driven, by the use of a friction clutch.

On the plunger is mounted a steel head, and on the lower portion of the jaw are two renewable bearing parallels mounted in a steel cast block pivoted to the lower face of the machine jaw. These bearing parallels wear out quite rapidly, and where they are mounted directly on the jaw or main casting; they gradually break down the corners and surface to which they are fastened. The steel block is therefore used to save the main frame from gradual deterioration at this point. The main eccentric bearings are bushed with easily renewable bearings, while the drive shaft bearings are of babbitt construction with caps and bolts.

The rail is preferably broken by laying it with the side of the bulb and thin edge of the flange on the parallels, and a steel fuller on the end of a metal handle is interposed by the operator between the rail and the plunger head. One stroke of the plunger is all that is necessary to break the rail.

The machine illustrated is designed to handle rails up to and including 100 lbs. per yard, machines for larger sized rails being also built.

SPECIAL MULTIPLE DRILLING MACHINE

A SPECIAL multiple drilling machine is illustrated in Figs. 1 and 2, having been recently built by the Langelier Mfg. Co., Providence, R.I., for drilling at one operation twelve 1/8 in. holes in the outer sleeve of the Knight type motor built by a prominent American manufacturer. A machine of similar type but for drilling four 1/8 in. holes only in the inner sleeve has also been built, the output of each machine being at the rate of 3½ sleeves per min., or 2,100 per day.

The operating side of the machine is shown in Fig. 1 from which the principal points of the design are apparent. Two columns are arranged on a common base, the column at the left being provided with ways on which slides a tailstock A, which supports the work on an expanding arbor. The sleeve is a thin cast iron tube on one end of which are two lugs to which a connecting rod is attached for reciprocating it. This end is placed on the arbor first and when in contact with stop B, it locates each sleeve accurately in a circular direction. By means of hand wheel C, the sleeve is inserted in the tubular drilling jig mounted in line with the centre of tailstock, the end of the sleeve coming in contact with a positive adjustable stop inside the drill jig.

Four drilling heads, each carrying three spindles are arranged radially as shown, being mounted on a circular plate which in turn is attached to a similar flanged portion of the drilling column.

The spindles are driven by spiral gearing from four shafts which extend to the rear where their belt pulleys are driven by an endless belt which in turn is driven by two large pulleys on its under side, geared to the main drive pulley which is belted to the self-contained countershaft on the end of the bed.

Simultaneous feed to the spindles is obtained through a spur rim gear enclosed in the flanged portion of the drilling column. This gear is concentric with the work and is operated by handwheel through a spur train. Four segmental cams are provided on the rim gear, each cam operating one of four feed yokes which are clamped to the sleeves on the outer end of the drill spindles. This clamp connection allows of easily adjusting the spindles individually.

The expanding arbor is opened and closed automatically by compressed air which is controlled by a small piston valve on the back of tailstock, operated by a fixed stop attached to the slide, see Fig. 2. The tailstock is also automatically locked in position for drilling by a small adjustable cam plate on the front side of tailstock, engaging with a locking lever which is released by the pedal in front of the bed. Near this pedal may be observed the belt shifting lever in convenient location.

The drill speed is 2,500 revs. per min. Floor space occupied is 4 ft. by 6 ft. Height 5 ft. 9 in. and net weight 3,500 lbs.

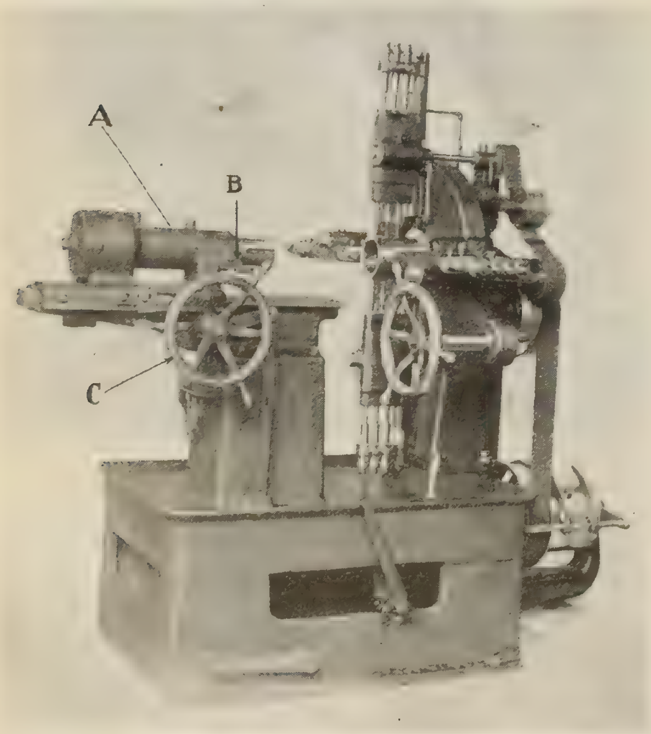


FIG. 1. OPERATING SIDE OF MULTIPLE DRILLING MACHINE.

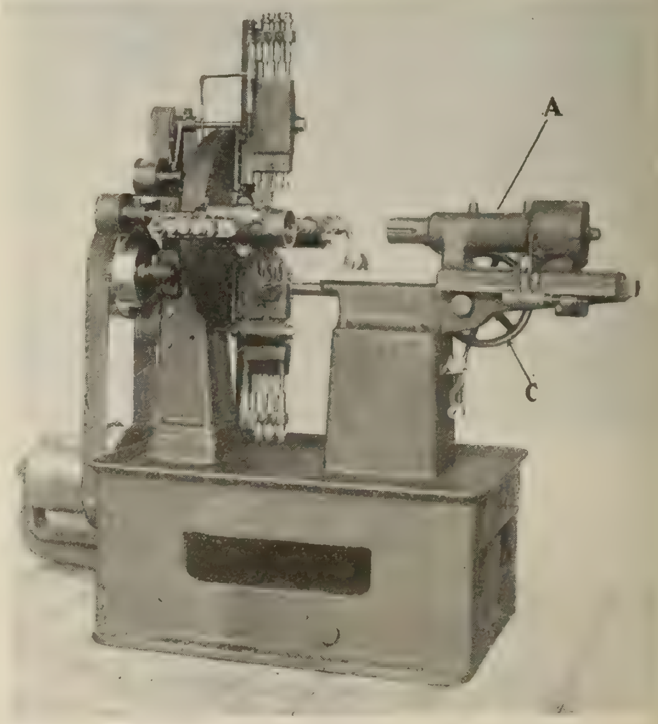
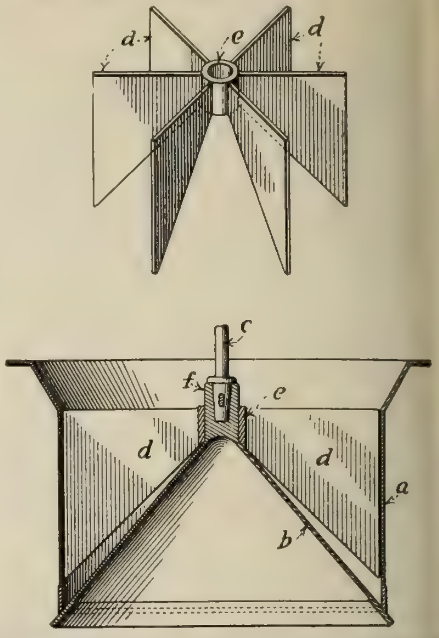


FIG. 2. REAR VIEW OF DRILL SHOWING AIR VALVE ON TAILSTOCK.

CHARGING BELL FOR BLAST FURNACES

AN improvement in charging bells fo blast furnaces is covered by a recen patent granted to Julian Kennedy o



CHARGING BELL FOR BLAST FURNACES.

Pittsburgh. It has been designed for guiding or controlling the charge, and maintaining the bell in its proper position, so that each charge will be approximately equally distributed around the furnace—a feat usually difficult to accomplish.

The illustration shows part of the details, in which (a) designates a blast-furnace feed hopper, and (b) the discharge bell with a supporting and operating stem, (c). There are radial wings, (d), so arranged as to retain the bell centrally within the hopper and also to provide guides for the charge, so that the material will move in a radial direction and be restrained from moving at a tangent with relation to the center of the hopper. The wings (d) do not extend to the upper face of the bell at their outer edges, permitting the material passing through one section to spread out and meet that passing through adjacent sections. These wings are cast as part of the hub (e), mounted on the boss (f),

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1000-TON HYDRAULIC BRIQUETTING PRESS.

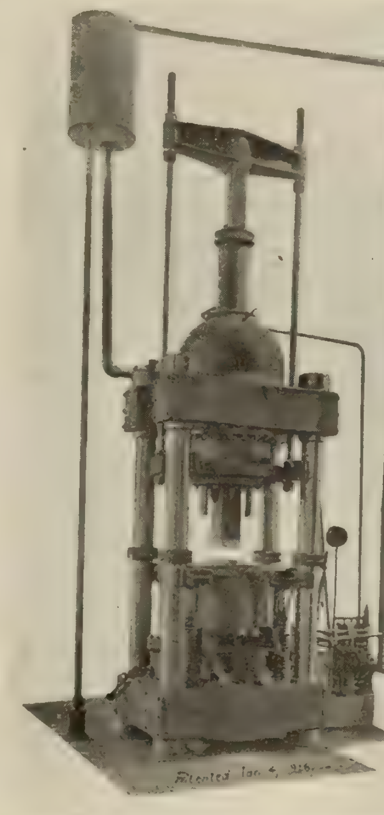
THE accompanying photograph illustrates a new design of hydraulic press recently brought out by The Hydraulic Press Mfg. Co., Mount Gilead, Ohio. The press is used for briquetting metal borings, turnings, etc., so that they may be remelted without the loss of valuable ingredients, at the same time preventing oxidation, and putting the material in a convenient form for handling. This design of press is of the four rod inverted cylinder type and is built in three different sizes and pressure capacities, 1000 tons, 750 tons and 300 tons. The illustration shown is a reproduction of the 1000 ton press.

The briquet forming mechanism of these presses is unique in design and operation, being capable of forming a briquet quickly and of uniform density. This is accomplished by placing the material in a floating mould which is supported by four springs. When the pressure is applied upon the material from above the friction of the material on the sides of the mould causes it to move down over a stationary plunger which projects into the mould from below. Pressure is thus applied on the bottom as well as on the top of the material. A briquet of uniform density is obtained in this manner.

After being formed the briquet is ejected from the mold by the pressure of the main ram being applied upon the briquet with the lower plunger removed, the latter being done by a simple movement of a controlling lever. The briquet then falls through to the base of the press from whence it is removed by a conveyer installed by the customer. On the 1000 ton and 750 ton presses, hydraulic push cylinders lift the floating mould while the lower die is withdrawn or returned to place. A collar surrounding the lower die is held against the mould by a spring to close up all clearance between the mould and the lower die in the 300-ton press.

The press illustrated is provided with a surge tank, the base of which is located higher than the main cylinder. By a simple movement of the valve lever the plunger drops to the material in the mould and the main cylinder is filled with fluid by suction caused by the lowering of the ram as well as by gravity of the fluid. Thus the first stroke of the pump initiates the pressure upon the material. After the pressing operation the main ram is returned by means of the auxiliary ram located at the extreme top of the press. This action returns the fluid to the surge tank.

Every operation of these presses is controlled by levers which are conveniently located for the operator. The stationary plunger projecting into the mould from below is displaced and replaced by means of a lever located near the operating valve.



HYDRAULIC PRESS FOR BRIQUETTING METAL BORINGS AND TURNINGS.

The presses are solidly built, steel being used throughout. The strain rods are made of heat treated forged steel. They have solid heads and collars. The main ram is guided in its travel by babbitted bearings working upon the strain rods and by a long bearing in the throat of the cylinder . The floating mould is guided by babbitted bearings. The collars located on the centre of the strain rods prevent the floating mould ascending too high.

FAILURES OF CRANKSHAFTS IN DIESEL ENGINES.

THAT the engineer in charge is primarily responsible for the lift of the crankshafts of Diesel engines is the opinion expressed in paper read before the Diesel Engine Users' Association recently.

The paper states that certain reasonable and simple precautions will prolong the period of usefulness indefinitely. A number of failures cited in the paper were attributed to lack of alignment of the main bearings, which generally resulted from unequal wear of the several shaft bearings, although this same result was brought about in some cases by negligence in the erection of the engine, or to defective foundations in some of the older ones.

A four-cylinder engine is most likely to suffer shaft breaks, with the two-cylinder types having heavy fly-wheels, a close second. The shafts almost always fail through the throw arms, the crack starting at the center and working outwards. With the four-cylinder engine, the throw arm nearest the fly-wheel fails in most cases and this is also true of the two-cylinder units. Either throw of the single-cylinder type may fail and with a three-cylinder engine, which is the least likely to be affected, the failures are equally divided between the two end throws.

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HIGH LIFT SAFETY VALVES.

AN opinion prevails that high-lift safety valves produce injurious shocks both to the boiler and valve and the Boiler Code Committee of the American Society of Mechanical Engineers propose to limit the permissible lift. In a paper on the subject submitted to the above society, G. H. Clark alludes to the inadequacy of present day valves to pass off the maximum quantity of steam generated. The discharge capacity of the ordinary valve is limited by both the apparent impossibility of regulation and the shock produced at closing. The pressure below the disc before and during the blowing period is investigated. The action of a valve depends, not on the magnitude of a lifting force, but on variation of lifting force with discharge capacity and pressure. The design of a valve adjustable for variable lifting force is described. Six charts show the characteristic actions of different valves. Discharge capacity of valves with diaphrams from 1 in. to 4 in. are tabulated. A valve with the discharge turned downwards, having an upward "jet" action on the disc, is shown and discussed. In determining the rules, valves must be considered on the basis of discharge capacity and action, rather than on the lift.

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THE COMING OF THE TECHNOLOGIST

THE term "key" industries has arisen through the prominence which the war has given to many manufacturing lines with the importance of which the general public has hitherto been rather unacquainted, but which, by virtue of their relation to other industries, have exercised a controlling influence over wide fields of semi-finished and finished manufactures. Through the manner in which they developed such lines as optical and chemical glass, photographic and other chemicals, semi-rare metals, dyes and fertilizers, our enemy has been able to seriously handicap our efforts in self-defence, and delay for a regrettable length of time the assumption of that offensive action now developing on the part of the Allies.

While such a course of events was unfortunate at the time, its ultimate effect in awakening the British Empire as a whole to a due recognition of the role played by the chemical engineer, will ultimately prove to have been a blessing in disguise.

Optical glass is a vital part of the observation equipment of miltary and naval forces, laboratory equipment is useless without many items composed of special glass. The large proportion of fine chemicals and dyes made in Germany were produced in plants which had been laid down with the specific intention of being rapidly converted to explosives manufacture, while the control of the potash trade enabled the productivity of other nations to be seriously interfered with.

Through all of these sinister evidences of premeditated action is seen the hand of the chemical engineer. not that anomalous person who, as a contemporary expresses it, is "half chemist, half engineer, and wholly out for his own immediate profit. and who will sell you his wares whether they are suitable for the purpose or not." No! The many advantages enjoyed by our enemy were obtained through the appreciation and application of scientific knowledge, not necessarily abstruse, but requiring a degree of skilled knowledge and supervision which are far in advance of rule of thumb methods still existing in many plants; yet the policy of many firms has been to depreciate the value of such work and question the ability of a highly trained technical man to direct practical work.

The wrongs under which technologists have labored in the past must be removed and the rights of men trained in the mysteries of nature to direct operations of a practical kind be recognized. That such acknowledgment is now on its way is evident in many directions, but its development must not be unnecessarily delayed, let alone its scope narrowed, if our hopes for future achievement are to materialize.

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FOUNDRYMEN'S CONVENTION AND EXHIBITION

THE week of September 11 witnessed the holding in Cleveland, Ohio, of not only the Annual Conventions of the American Foundrymen's Association, and American Institute of Metals, but of an Exhibition of foundry equipment and supplies under their joint auspices and direction for the first time. It had been anticipated that in many respects, if not altogether, established records covering convention work, attendance, exhibits, exhibitors, instructional and entertainment features were likely to "go by the board," and that realization in the various directions indicated has been achieved is now beyond question. A fair representation of Canadian foundrymen took advantage of the opportunity to get into closer touch with developments in progress and pending, relative to the more accurate determination of foundry product constituents, and to familiarize themselves with equipment progress towards greater individual plant efficiency.

It occurs to us, however, that Canadian representation at this "Mecca" of foundrymen is each year far below what it should be, in view of the fact that our sphere of foundry enterprise is all the time enlarging in importance and variety of product. The past two years has witnessed quite an abnormal development along lines akin to and dependent in large part upon the foundry industry—grey iron, steel and non-ferrous. We have not, however, become conscious that in the latter directions, equally abnormal achievement may be realized. Our representation at these annual conventions and exhibitions can be comfortably doubled or even trebled in immediately succeeding years, and not only so, but Canada's representative membership in either the American Foundrymen's Association or the American Institute of Metals can easily be proportionately increased.

In the annual report submitted by the secretary of the American Foundrymen's Association, it is somewhat significant that the membership of that body is practically stationary, the figures for July 31, 1915, and July 31, 1916, being 973 and 974 respectively. Mention was made of the fact that in Canada and the United States there are some 5,000 foundries turning out grey and malleable iron, and steel castings, yet only some 20 per cent. of the industry on that basis is represented by membership in the American Foundrymen's Association. As expressed by the secretary, the meagre percentage above stated is a sad commentary on the interest displayed by foundrymen in the attainment of progress by organized effort. Just what percentage the membership of Canadian foundrymen bears to its total foundry plants, large and small, we do not at the moment have figures available, yet we are well within the mark in saying that something less than 10 per cent. may be assumed. The membership fee is more or less nominal compared with that required by Technical Societies and Associations generally, and in the matter of value received—material and educational, the American Foundrymen's Association, through its convention, exhibition and other activities, occupies perhaps premier place.

We hope in succeeding issues to feature the recent convention and exhibition proceedings as befits their importance, and so familiarize our readers with the work being accomplished that those of them more directly concerned with foundry enterprises may be disposed to take a larger interest in this co-operative effort for the advancement of the foundry craft and calling.

INDUSTRIAL NOTABILITIES

FRANCIS HENRY WHITTON, general manager, The Steel Company of Canada, Limited, Hamilton, Ont., was born in Northamptonshire, England, October 2, 1859, the son of Corbett and Elizabeth Mary Whitton. He was educated at Abington House School, and passed the preliminary examinations at Cambridge University. He came to Canada in March, 1877. The various steps of his business career have been as follows:—Stenographer in office of G.T.R., Montreal, 1877-1879; with Louisville and Nashville Railroad, Louisville, Kentucky, 1879-1880; president's secretary, the Chicago Malleable Iron Co., Chicago, 1880-1887; returned to Canada and organized the Ontario Tack Co., Hamilton, Ont., of which he was manager, 1887-1907; when that concern amalgamated with the Canada Screw Co., he was made general manager. On the formation of The Steel Company of Canada, Ltd., in 1910, he became assistant general manager, which office he occupied until April 25, 1916, when he was appointed general manager.

FRANCIS HENRY WHITTON

Mr. Whitton is a member of the Canadian Manufacturers' Association, the American Iron and Steel Institute, and the Hamilton Board of Trade. He married Eva LeDuc, daughter of Louis Xavier LeDuc, Montreal, March 16, 1885; has one son, Corbett F. Whitton, Assistant Secretary of The Steel Company of Canada, Ltd. His clubs are the Hamilton; Tamahaac; Caledon Mountain Trout; Canadian; Hamilton Rowing; and National (Toronto). His recreations are shooting, fishing, farming, and formerly cricket; played against the Australians in Canada in 1878. In politics he is Conservative, in religion a Roman Catholic. His residence is 353 Bay Street, Hamilton, Ont.

—Photo, Courtesy British and Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh		$18 70
Lake Superior, charcoal, Chicago		19 75
Michigan Charcoal, iron		28 00
Ferro nickel pig iron (Soo)		25 00
	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base, Toronto	3.50
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.50
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.10
Bars, 2 in. and up	4.00
Structural shapes	3.10
Plates	3.50

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$30 00
Electrolytic copper	31 00	30 00
Castings, copper	30 00	29 00
Tin	44 00	44 00
Spelter	13 00	14 00
Lead	8 75	8 75
Antimony	16 00	18 00
Aluminum	68 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4 75	$4 50
Heads	5 00	4 75
Tank plates, 3-16 in.	5 25	4 75

WROUGHT IRON PIPE

Prices in effect Sept. 12, 1916.

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 12	5 25
½ in.	4 00	5 57
¾ in.	4 83	6 96
1 in.	7 14	10 29
1¼ in.	9 66	13 92
1½ in.	11 55	16 64
2 in.	15 54	22 39
2½ in.	24 57	35 39
3 in.	32 13	46 28
3½ in.	38 64	55 66
4 in.	45 78	65 95

Lapweld

2 in.	$17 76	$24 24
2½ in	26 33	36 56
3 in.	34 43	47 81
3½ in.	41 40	57 50
4 in.	49 05	68 13
4½ in.	59 69	83 19
5 in.	69 56	96 94
6 in.	90 24	125 80
7 in.	121 40	165 40
8 in. x 25 lbs. per ft.	127 50	173 80
8 in. x 25 lbs. per ft.	146 90	200 20
9 in.	176 00	239 40
10 in. x 32 lbs. per ft.	163 20	322 40
10 in. x 40 lbs. per ft.	210 10	286 30

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$16 25	$18 00
Copper, crucible	19 25	21 00
Copper, heavy	19 25	20 80
Copper wire	19 25	21 00
No. 1 machine compos'n	14 75	17 00
No. 1 compos'n turings	12 75	14 00
New brass clippings	13 75	15 00
No. 1 brass turnings	12 25	12 00
Heavy melting steel	9 25	10 00
Boiler plate	11 75	10 50
Axles, steel	15 50	15 00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	13 00
Shafting	16 50	16 00
Malleable scrap	10 00	11 00
Pipe, wrought iron	10 00	9 00
Stove plate	10 00	10 50
Heavy lead	6 00	6 00
Tea lead	5 00	5 00
Scrap zinc	7 50	7 75
Aluminum	35 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	45
Stove bolts	62½
Plate washers	25
Machine bolts, and less	35
Machine bolts, 7-16 and over	25
Blank bolts	30
Bolt ends	25
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in. $3.75 per lb. off	
Nuts, hex., over 1 in. $2.00 per lb. off	
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$5.10
Structural rivets, as above	5.00
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent.
Sq. & Hex. Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts, over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	65
Coupling bolts	net
Planer head bolts, without fillet	15
Planer head bolts, with fiillet	net
Planer head bolt nuts, up to 1 in.	60
Planer head bolt nuts, over 1 in.	55
Planer bolt washers .... list plus	10
Hollow set screws ...... list plus	20
Collar screws .... list plus	20
Thumb screws	20
Thumb nuts	75

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$45 00
Open-hearth billets, Pittsburgh	45 00
O. H. sheet bars, Pittsburgh	45 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3.85	$3.80
Cut nails	3 40	3 40
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs.		$3 90

MISCELLANEOUS

Solder, guaranteed	0.27½
Solder, strictly	0.25½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	13.95
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	030½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	0.83
Linseed oil, boiled, single bbls.	0.86
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Backing, No. 2, Italian	0.23
Lead wool, per lb.	0.11
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	55
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	25
3 fluted drills over 1½ in.	15
Bit stock	55
Ratchet drills	15
Machine bits for wood	20
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	30
Sockets	30
Sleeves	50
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	5 25	4 80
Canada plates, dull, 52 sheets	4 50	4 50
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 45	6 15
Premier, 10¾ oz.	6 75	6 40

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$20 00	.....
1¼ in.	23 00	.....
1½ in.	26 00	22 50
1¾ in.	26 00	18 00
2 in.	27 00	17 50
2¼ in.	29 50	.....
2½ in.	32 50	23 00
3 in.	44 00	27 00
3¼ in.	.....	30 50
3½ in.	50 00	32 00
4 in.	57 00	40 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.	
Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.35 to .37
Tin	.50 to .53
Zinc	.18 to .21

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 in.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.10
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.50
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencie

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Que., Sept. 18, 1916.—Industrial and commercial activity at the present time continue to reflect the unceasing prosperity of all branches of trade. The new War Loan promises to equal if not surpass all previous efforts in that direction and subscriptions are pouring in, demonstrating the great interest being taken, both by firms and individuals. General trade conditions have still an improving tendency, although the scarcity of labor continues to be keenly felt. The cooler weather is contributing to better production in those industries which were materially affected by the extreme heat of the summer months.

Pig Iron.

Owing to the increased activity now being shown in the pig iron situation the market is developing a strong tendency, and some quotations have been advanced from 25 to 50 cents a ton. The demand for basic and foundry iron is assuming large proportions, and further advances are not unlikely.

Steel

The return to better operating conditions is giving some relief to the recent congestion in the steel mills. The requirements of steel users at the present time are so heavy that even the greatly increased facilities of production, during the past year, have not been sufficient to cope with the abnormal situation, and the tension at the present time is apparently as great ever. The demand for billets and she bars continues heavy, with quotatio at $45 Pittsburg. Plates are still ve active, with ship plates in heavy d mand. The sheet situation is u changed; the prospect of higher pric on sheet bars is however developi a stronger tendency in prices of t ultimate product. Increased activity being shown in wire and wire product and the mills are beginning to expe ence the additional pressure. Inquiri for wrought iron pipe and boiler tub indicate a rising demand, the recent a vance having apparently stimulat consumers to cover their early requir ments. While no changes are noted local quotations, dealers here intima that an advance may be expected.

Metals.

The general situation in the met market shows little change. Copper at present firm, with indications early strength, on heavy pending bu ness for export trade. Tin is quiet wi an undertone of early activity. I creased interest in spelter is developi a stronger market. Lead is active a advancing in price. Antimony is ve quiet and ensteady. Aluminum is ve firm, showing a slight increase.

Copper.—With the exception of t large producers, the general market quiet. The consumption of copper present is exceedingly heavy and w continue to tax the capacity of the e isting refineries until further additio facilities are provided. What activi there is, appears to be confined larg to the leading interests, and it is ve difficult to state the exact market co ditions. While much of the curre business is for export purposes, t greater proportion is being used f domestic requirements, the demands the brass mills being exceptiona heavy. There are indications that co siderable export business is pendi for next year delivery; but no defin information is at present available. is believed that quiet buying is qu general. The London market l developed a stronger tone on increasi demand; advances of £6 on spot a £5 on futures, being equal to 1¼ ce New York. Current London prices a £116 and £112 respectively. New Yo has become stronger, and an adva of ½ cent is general; prime lake bei quoted at 28¼ cents, electroly 28⅝ cents, and castings 26⅛ cents p pound. All quotations are howev nominal. The local situation is u changed with prices firm at 31 cents f lake and electrolytic, and 30 cents casting.

Tin.—The fact that considera quantities of Banca tin are continua being received is having the effect weakening the market. The demand is however of sufficient volume to offset any sharp decline in prices, and it is anticipated that consumers will soon be in the market to cover their future requirements. This outlook is having the effect of maintaining a very firm situation abroad, quotations on the London market having shown a slight advance. The New York situation is however indicating slight weakness and quotations have declined to $38\frac{3}{8}$ cents or $\frac{1}{4}$ cent lower than last week. Local dealers report a quiet week with prices firm at 44 cents per pound.

Spelter.—Owing to the recent activity shown by dealers and exporters, the market in spelter has developed a firmer tendency, which has somewhat relieved the anxiety lately apparent in regard to this metal. The falling off in the home consumption has been replaced by a very encouraging export demand, and the upward trend has become more general. The leading producers are apparently well supplied with future possibilities, and the situation seems brighter than for some time past. Increased interest in this metal is being shown on the London market and prices are now £54 for spot, and £47 for futures, being an advance of £4 and £3 respectively, which is equivalent to about one cent per pound, New York. The effect of the general conditions is also reflected in a $\frac{5}{8}$ cent advance on the New York market, which is now quoting $6\frac{5}{8}$ cents per pound nominal. Dealers here report a fairly active market, with prices steady at 13 cents, but with a strong undertone.

Lead.—Increased activity in this metal has developed a strong market, and both the home and export demand is very good. Following an advance of $\frac{1}{4}$ cent, the New York market is quoting the Trust price at $6\frac{3}{4}$ cents with the Independents 1-10 cent higher. Dealers here report a steady market on good demand with prices strong at $8\frac{3}{4}$ cents per pound.

Antimony.—Owing to the poor demand, the market is easy with a tendency to become weaker. Chinese and Japanese metal is quoted at $11\frac{1}{4}$ to $11\frac{3}{4}$ cents per pound, being a decline of $\frac{1}{4}$ to $\frac{1}{2}$ cent per pound. Local dealers are quoting 16 cents on a quiet market.

Aluminum — This metal is reported stronger on the New York market, slight advances being quoted. Local conditions are firm and unchanged at 68 cents per pound.

Machine Tools and Supplies

The volume of business that has been an outstanding feature of the machine tool industry for the past two years, is gradually resuming pre-war conditions: the bulk of present activity being due to the intermittent demand for shell machinery, although the requirements for domestic purposes have added more or less to the general activity. Inquiries for heavy shell machinery are still coming in, and delivery on these tools can be had in reasonable time. Second-hand equipments show heavy offerings owing to the placing on the market of tools formerly used for the manufacture of the lighted shells, and also because of various tools being disposed of to make room for heavier equipment. A feature of the machine tool development has been the large number of devices and attachments placed in service during the past year or two for the purpose of facilitating the production of munitions on new and existing machinery. While the greater number of these are specially designed for shell-making operations, many of theem will find a permanent place in the manufacture of domestic utilities. A heavy and unceasing demand continues for all classes of machine tool accessories and shop supplies.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Scrap.

While no special developments are noted in the scrap situation, there are some indications that the supply of heavier steel scrap is not as plentiful as it was some time ago, owing to the constant consumption of the crop ends and the reduction in some cases of the percentage discard in the production of ingots. The stronger tone of pig iron is also having its effect upon the situation, and the tendency is for an advance in heavy melting steel scrap. The present price of Pittsburg scrap is $16\frac{1}{2}$ cents, this being an advance of $\frac{1}{2}$ cent during the week. The local quotation has risen $\frac{1}{4}$ cent, being now $9\frac{1}{4}$ cents per pound. All steel and iron scrap is very strong with a rising tendency. The situation in scrap metals continues steady with slight declines noted in composition turnings, also brass and zinc scrap. Scrap aluminum is a little stronger, as is old stereotype. With the exception of scrap at $7\frac{1}{2}$ cents, a decline of $\frac{1}{4}$ cent, the prices on local scrap metals are firm and unchanged.

Toronto, Ont., Sept. 19.—The industrial situation continues satisfactory The volume of trade is on the increase, and, despite the poor crops, the outlook is favorable. In normal times a poor harvest has usually adversely affected trade, but under prevailing conditions the effect is not so serious, as the greater part of the business being done by manufacturers is on account of war orders and not to meet domestic requirements.

Steel

The steel market shows increasing strength, and the mills have sufficient business to keep them busy for twelve months. In consequence of this great activity, it is becoming more difficult to get deliveries than ever, and prices have a marked upward tendency. The scarcity of steel will likely become serious, particularly as regards its effect on output of munitions, in spite of the large increase in mill capacity. Hopes of lower prices on steel during this year, have been abandoned, as there is every indication of advances in steel products generally. As mentioned last week, wrought iron pipe has advanced, the new prices being published in this issue. Higher prices on boiler tubes are looked for before this month is out, while plates may also take another advance in the near future, the situation in the United States being such that higher prices are inevitable. Prices of steel and iron bars are very firm and in fair demand.

The market for sheets is very firm and the demand continues heavy. Light gauge sheets are showing considerable strength, and the market for these grades is stronger. The demand for black sheets is such that the mills are operating at capacity, and deliveries are very backward. Sheet bars continue very firm, and may advance, in which case higher prices on sheets are looked for. Prices of galvanized sheets are holding steady, and although spelter is weaker, the probable further increase in light sheets may result in an advance in galvanized material within the next two or three months.

The situation in the steel market in the United States is unchanged; the export demand continues very heavy, and prices are expected to advance still further. Plates are particularly strong and scarce, the demand being exceptionally heavy. Although the producing capacity of the mills has been greatly increased, it is not sufficient to take care of the demand, with the result that deliveries are getting more backward and unfilled tonnages heavier. There have been no price changes of importance made during the week. Steel bars are quoted at 2.60c; plates, 4c; and shapes, 2.60c Pittsburg.

Pig Iron

There is no change in the situation in

the pig iron market; consumption is very heavy and prices very firm.

Machine Tools

The shortage of shell forgings has become an important factor in the machine tool market. The capacity of the machine shops is greater than that of forging plants, with the result that the output of the former is being curtailed. In consequence of this, the demand for machine tools is not as heavy as it might otherwise be, as orders for shells are sufficiently plentiful to keep machine shops operating at capacity. The market is steady, with the demand almost entirely for heavy duty equipment for producing large calibre shells. Deliveries are fair on large lathes, but very slow on standard tools. A considerable amount of second-hand equipment has recently come on the market in the United States, but very little is coming into Canada.

Supplies

The situation continues much the same as during the past few weeks; business is very good, but some lines of machine shop supplies are getting scarce. Dealers report a difficulty in keeping their stocks up owing to the delay in getting goods from the manufacturers. Chucks, drills, taps, dies, and cutters are particularly hard to get owing to conditions in the steel market. Prices generally on steel and brass goods are very firm, and in some instances will most probably advance. Linseed oil has declined, being now quoted at 83c for raw and 86c for boiled oil. Turpentine has advanced 2c, and is now quoted at 71c per gallon.

Metals

The feature of the metal markets is the strong position of copper, due to heavy buying and sold up condition of producers. The Allies continue to buy heavily, and it is understood that orders for a million pounds of copper have recently been placed in the States by Canadian interests. Prices on all metals have been maintained during the week, but no changes of importance have to be noted. Business locally continues good.

Copper.—With producers sold up for the remainder of the year and the demand for copper as insistent as ever, the market is consequently very strong and prices firm. The copper market advanced in London during the week, but is unchanged in New York in the meantime, although higher prices are likely. Local quotations are very firm at 30c per pound.

Tin.—The market is quiet, with a firm undertone, but business is dull. The London market advanced recently, but this has not as yet affected local quotations, which are now 44c per pound.

Spelter.—The demand for spelter is more active, and the market is stronger. It is reported that a Canadian inquiry for 500,000 pounds has been closed in the United States. Local quotations are unchanged at 14c per pound.

Lead.—The market is firmer owing to increase in demand; quotations, however, are unchanged, but firm. Canadian buyers have taken over 1,500 tons from United States producers during the week, while other and similar transactions have been recently closed. Local price, 8¾c per pound.

Antimony.—The market is quiet, with little business offering. It is reported that some producers are holding out for higher prices. Quotations unchanged at 18c per pound.

Aluminum.—There has been a steady demand for aluminum during this week, and supplies are smaller. Quotations are firm, but unchanged at 68c per pound.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia.

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Ploschad 9, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Toronto.—The John Inglis Co. are building a new forge shop to cost about $6,000.

Dundas, Ont. — The John Bertram Sons & Co., are making an extension to their plant.

Montreal, Que.—Lymburner, Ltd., will build a reinforced concrete addition to their plant at a cost of $12,000.

Englehart, Ont.—The Dome Consolidated Mining Co., will make considerable extensions to their mill.

St. Thomas, Ont.—The American Brake Shoe Co. will instal equipment so as to operate all its machinery by electric motors.

Toronto.—Puddy Bros. have received a permit to add to their boiler room at 60 Paton road, at a cost of $1,000.

Renfrew, Ont.—Owing to the possibility of a shortage of water for power purposes, a steam reserve plant may be installed here.

Weston, Ont.—The Deakin Construction Co., are the contractors for the new plant which the Russell Motor Car Co., are building here.

London, Ont.—Plans are being prepared for the erection of a galvanizing plant for the McClary Mfg. Co. Approximate cost $30,000.

Vancouver, B.C.—It is reported that the Shell Oil Co., propose to establish a large oil refinery in this district. A site has been acquired on Lulu Island. W. M. Smith of London, England, is president of the company.

Port Colborne, Ont.—Contracts have been let to the Foundation Co., of New York and Montreal, for the International Nickel Co. plant to be located here on the east side of the lake front. The complete plans call for an expenditure of about $3,000,000 but the initial expenditure will be considerably less than that amount.

Collingwood, Ont.—The oil tank steamer Iocolite left here on Saturday afternoon on her maiden trip to Sarnia. A successful trial trip was made around the bay on Friday. This is the second boat of this kind that has been built by the Collingwood Shipbuilding Co. for the Imperial Oil Co., this year. A third one is expected to be launched shortly.

Electrical

Kingston, Ont.—The Hydro-Electric Commission will extend its power lines in Eastern Ontario as far as Napanee

Mount Dennis, Ont.—The ratepayers will hold a meeting shortly to consider the question of installing the hydro-electric system.

Hamilton, Ont.—The Townships of Barton, Saltfleet, East and West Flamboro propose submitting hydro-electric by-laws to the ratepayers in January.

Toronto.—The Ontario and Toronto Hydro-electric Commissions have laid before the York Township Council an agreement for the supply of electric power in the township.

Sarnia.—The high tension line of the hydro-electric system is completed to within one mile of the city limits. In the course of a few days the line will be here. Power will not be turned on, however, until the transformers are installed in the power house.

Municipal

Edmonton, Alta.—The city propose spending $75,000 for street railway extensions. A by-law will be voted on.

Lindsay, Ont.—The Town Concil contemplate extensions to the water distributing system to cost about $8,000.

Ottawa.—The City Council have awarded the contract for supply of cast iron pipe to the National Iron Works, Ltd., Toronto

Montreal.—The City Council have awarded a contract for the supply of cast iron pipe to the Canada Iron Foundries, Ltd., Montreal.

Lyall, Man.—Tenders will shortly be called for the construction of an electric lighting system and transmission line. Engineer, George Guy, Winnipeg.

Chatham, Ont.—An effort is being made by the city to sell the gas producer plant which is not required now that hydro-electric power has been installed.

Merritton, Ont.—The general contract for the construction of a screen plant for the Riordon Pulp & Paper Co., has been awarded to the J. V. Gray Construction Co., Toronto.

Toronto, Ont.—The York Township Council propose making considerable extensions to the waterworks system. Cast iron pipe, valves and hydrants will be required. Frank Barber, Toronto is the engineer.

Kitchener, Ont.—Plans of a waterworks system to be constructed for the City Council have been approved by the Provincial Board of Health. Approximate cost, $100,000. Engineer Herbert Johnston.

Tenders

Toronto.—Tenders will be received until October 2, addressed to the Chairman of the Toronto Harbor Commissioners, and marked "Tenders for Cherry Street Bascule Bridge." All information may be obtained by applying to E. L. Cousins, chief engineer and manager.

Toronto.—Tenders will be received by the Chairman, Board of Control, City Hall, Toronto, up to October 3, 1916, for the manufacture, supply and erection of one twelve-inch venturi meter and register, indicator recorder at the Main Sewage Disposal Works, Toronto. Specifications may be seen and forms of tender obtained at the Works Department, Room 6, City Hall.

Ottawa.—Tenders will be received until September 29, for the construction of an extension to the west breakwater at Port Stanley, Elgin County, Ont. Plans and forms contract can be seen, and specification and forms of tender obtained at the Department of Public Works, Ottawa, at the offices of the District Engineers at Windsor, Ont., and Equity Building, Toronto, also on application to the Postmaster at Port Stanley, Ont.

Toronto.—Tenders for stores, office and garage buildings at Murray and Caer-Howell streets, addressed to the Chairman of the Toronto Electric Commissioners, will be received until, October 2, 1916. Plans and specifications will be open for examination and explanation at the office of the architects, 908 Royal Bank Building, Toronto, and a further set of plans and specifications may be inspected, but not obtained, at the office of the Purchasing Agent of the Hydro-Electric System, Hermant Building, Toronto.

Ottawa.—Tenders will be received up to October 2 for the undermentioned metal supplies for delivery to H.M.C. Dockyards at Halifax, N.S., and Esquimalt, B.C., Items 1, steel angles, bars, sheets and plates; 2, iron bars, fire bar; 3, brass bars and sheets; 4, copper sheets and bars; 5, solder tin and alloys; 6, tubes brass and copper. Forms of tender and full information may be obtained by application to the Department at Ottawa, or to the Naval Store Officers, at H.M.C. Dockyard Halifax, N.S., and Esquimalt B.C. In making application for forms, the particular item or items for which forms are required should be clearly stated.

Dartmouth, N.S.—Tenders addressed to J. W. Pugsley, secretary Department of Railways and Canals, Ottawa, Ont., will be received until Wednesday, September 27, 1916, for an enclosed water tank, capacity 40,000 imperial gallons, at each of the following points on the Dartmouth Branch Line: East Lawrencetown; Meagher's Grant, Upper Musquodoboit. Plans and specifications may be seen at the office of the chief engineer of the Department of Railways and Canals, Ottawa, at the office of the chief engineer, Canadian Government Railway, Moncton, N. B., and at the office of the engineer in charge, Dartmouth, N.S.

General Industrial

Galt, Ont.—The Galt Paper Box Co. prposes to enlarge its plant here.

Hamilton.—The Chipman & Hollo Knitting Co., are building a factory here.

Toronto.—The Sheet Metal Products Co., are building an addition to their factory.

Belleville, Ont.—Work has started on the new factory which the Maple Leaf Tire Co., are building here at a cost of $100,000 including equipment.

Sarnia.—Fire broke out on Thursday morning in the plant of the Ontario Canning Co., here, destroying the factory and entailing a loss estimated at approximately $100,000.

Acton, Ont.—The Reliance Shoe Co., Toronto, propose to build a factory here, estimated to cost $10,000. A by-law will be submitted to the ratepayers to authorize the granting of a loan and free site.

St. Thomas, Ont.—Fire on Saturday completely destroyed the plant of the St. Thomas Dehydration Co., as well as that of the Canadian Wood Products Co. The loss to the Dehydration Co. will be heavy, $30,000 being a conservative estimate. The Wood Products Co.'s loss is placed at $6,000, with insurance of $2,500.

Trade Gossip

The Rockwood Sprinkler Co, of Montreal will install a sprinkler system in the new machine shop which is being erected by the Canadian Ingersoll Rand Co., Sherbrooke, Que.

Ottawa, Ont.—The International Land & Lumber Co. will erect a 100-ton pulp mill, on the Ashuapmauch River, in the Lake St. John district. Among those interested in the company are J. L. Bate, R. N. Bate and Thomas Asquith, all of Ottawa.

The Transmission Ball Bearing Co., Buffalo, N.Y., have been compelled to extend their plant and have acquired a site of seven acres on which new works will be erected immediately. This concern is a branch of the Chapman Double Ball Bearing Co., Toronto.

The Special Trade Commission of the Dominion of Canada have returned and will submit their report to Sir George Foster next week. The report will summarize the information secured by the commissioners and will indicate to Canadian manufacturers the articles for which there is a demand abroad. It will not contain all the data secured by the commissioners. The commissioners, however, will be prepared to answer questions put to them by manufacturers of the country .

Personal

Philip E. Edelman of St. Paul, Winnipeg, has been engaged by the Dominion Government to prepare plans for wireless installations in the Federal Parks in Canada.

James W. Woods, Chairman of the Dominion Special Trade Commission has returned to Toronto after an extended tour in Europe.

Enlarged Canadian Trade Intelligence Service

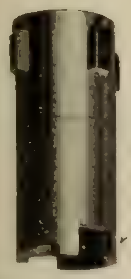
Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department is able to present the following list of the moreimportant British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL
Bahia, British Consul.
Rio de Janeiro, British Consul General.
CHILE
Valparaiso, British Consul General.
COLOMBIA
Bagota, British Consul General.
ECUADOR
Quito, British Consul General.
EGYPT
Alexandria, British Consul General.
FRANCE
Havre, British Consul General.
Marseilles, British Consul General.
INDIA
Calcutta, Director General of Commercial Intelligence.

ITALY
Genoa, British Consul General.
Milan, British Consul.
MEXICO
Mexico, British Consul General.
NETHERLANDS
Amsterdam, British Consul.
PANAMA
Colon, British Consul.
Panama, British Vice-Consul.
PERU
Lima, British Vice-Consul.
PORTUGAL
Lisbon, British Consul.

RUSSIA
Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.
SPAIN
Barcelona, British Consul General.
Madrid, British Consul.
SWEDEN
Stockholm, British Consul.
SWITZERLAND
Geneva, British Consul.
URUGUAY
Monte Video, British Vice-Consul.
VENEZUELA
Caracas, British Vice-Consul.

What Could You Do?



Rough Bore, Straight Diameter

If you had one-half the cost of your boring operations? You could then make that improvement you were contemplating. Or on the other hand you could double your output, do a higher grade of work and not increase your cost. Increased efficiency generally means increased cost but in this case you can secure that better efficiency at half the cost. Our Service department is at your disposal in this matter. Investigate.

The Boring Heads illustrated here effect that saving for you. They are the finished product of years of experience in boring head manufacture. They are constructed of high speed steel and are equipped with a micrometer adjustment which adds greatly to the life of the cutters. They can be expanded to compensate for wear of cutters.

The illustrations here are for 8" and 9.2" shells. But from 26 different styles and 16 different sizes we can equip you with this money-saving device regardless of the style of lathe or boring machine or the difficulty of operation. An inquiry will bring you specifications, prices, delivery, etc.

Finish Bore, Straight Diameter

Rough Bore, Inside Radius

Finish Bore, Inside Radius

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64-66 Front St. W. Toronto

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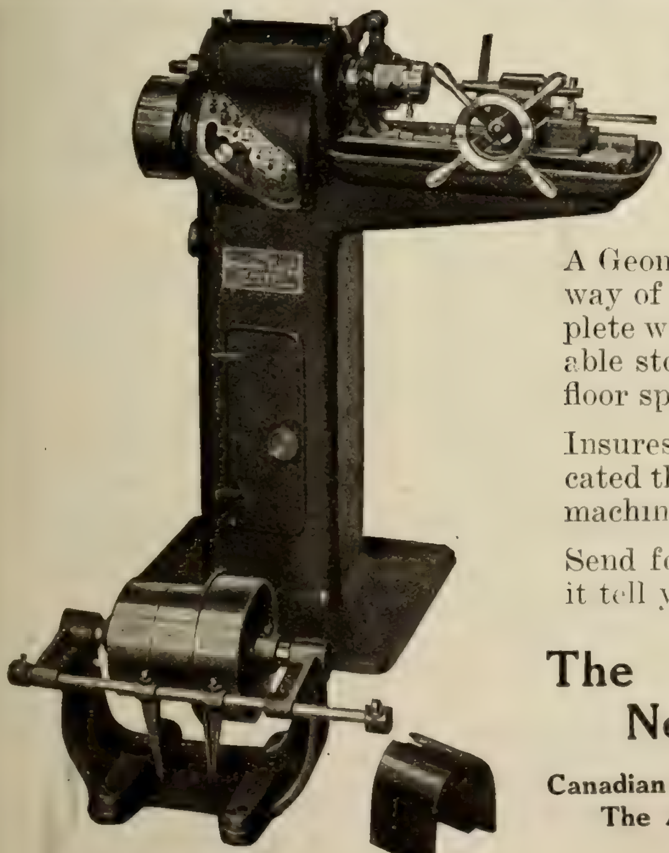
That is one of its credentials



A Geometric Threading Machine is the economical way of producing small threaded parts. It is complete with countershaft, change speed gear, adjustable stop for gauging length of thread; and takes floor space 2 ft. x 3 ft. only.

Insures accuracy and greatest production of duplicated threaded parts. Not the usual bolt threading machine. No rough threads with the Geometric.

Send for our Threading Machine Booklet and let it tell you the value of the machine.

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New Haven, Conn., U.S.A.

Canadian Agents:- Williams & Wilson, Ltd., Montreal;
The A. R. Williams Machinery Company Limited,
Toronto, Winnipeg, St. John, N.B.

John East, manager of the John East Iron Works of Saskatoon, Sask., has just returned from a five-weeks trip to Eastern Canada and the States where he has been perchasing new machinery for his plant.

J. N. McQuaig of the sales staff of the A. C. Leslie Co., Montreal has resigned his position to enlist in the 245th Battalion, C.E.F. He has been appointed Quarter-Master Sergeant. **J. Grimble** for some time assistant to Mr. McQuaig will assume his position during his absence.

F. B. Leonard, of the Canadian Pacific Ocean Services, has resigned his position to enter the service of his country, and will leave for England to take up military duties about the middle of the month. Mr. Leonard has been in the service of the Canadian Pacific Ocean Services since September, 1912.

Sir Harry Drayton, Chairman of the Dominion Railway Commission, and **Alfred H. Smith**, President of the New York Central Lines, members of the Canadian Railway Commission of Inquiry, have left yesterday for Winnipeg, where they will hold their initial session for the purpose of ascertaining information relative to the railway situation in the Dominion.

Contracts Awarded

Chatham, Ont.—The W. G. Seagrave Co., of Walkerville, Ont., have been awarded a contract for a motor truck for the fire department to cost $7,900.

Arnprior, Ont.—The general contract for the erection of a grist mill and elevator for David Craig has been awarded to Thomas Moran & Son. Estimated cost, $18,000.

Assiniboia, Sask. — The following contracts have been awarded for the new power house. For one 150 h.p. internal combustion engine, to the Canadian Boving Co.; generator exciter switchboard and other apparatus, divided between the Canadian Westinghouse Co., and the Canadian General Electric Co.; pumps, motors, piping and air compressor to the James Balantyne Co., Winnipeg; wire and line material, Northern Electric Co.; approximately 17,500 feet of 4, 6, and 8-in. pipe and specials, and twenty hydrants, twenty-nine gate valves and boxes, C. E. Choun, Winnipeg; erection of power station, supply and installation of heating plant, and construction of reinforced concrete reservoir, J. A. Browley Co. The engineers are Murphy & Underwood of Saskatoon, Sask.

Railways– Bridges

St. Catherines.—It is reported here that the Hydro-Electric Commission may purchase the Niagara, St. Catherines & Toronto Railway from the Mackenzie & Mann interests.

Marine

Cobourg, Ont.—Mr. Brummel of East Trenton, it is stated, has just completed a new type of boat for carrying freight. The boat from outside appearances looks like a huge scow. It is to be run by two twenty-four horsepower gasoline engine, operating two propellers, and has a capacity of 600 barrels of apples. It was built for navigation on the Trent Valley Canal.

Ottawa. — Construction of a new lighthouse on Burnt Island, in the Thousand Islands, St. Lawrence River, is announced by the Canadian Department of Marine and Fisheries. The lighthouse replaces a former gas beacon on the east side of Burnt Island. It is in the form of a rectangular wooden dwelling. The light is of fifty dioptric type and is shown at an elevation of 64 feet and is visible five miles.

Building Notes

Winnipeg.—All tenders submitted to the Provincial Government for work on the new Parliament buildings have been rejected, it was announced this morning. Hon. T. H. Johnson, minister of public works, said that prices were too high, and the Government had decided to make certain changes in the plans to reduce the cost.

Wood-Working

Clarksburg, Ont.—A. E. Pedwell's sawmill was recently destroyed by fire, the loss being estimated at $4,000.

New Incorporations

The Rapid Tool & Machine Co., of Lachine, Que., have been incorporated with a capital of $40,000.

Toy Products of Canada has been incorporated at Ottawa, with a capital of $50,000, to manufacture toys of all kinds at the Village of Farm Point, Que. The incorporators are: James S. Dingman, V. Leslie and A. E. Honeywell, of Ottawa.

Fess Oil Burners, Ltd., has been incorporated at Ottawa, with a capital of $100,000, to manufacture the oil burners and similar apparatus at Toronto. The incorporators are: William S. Morlock, R. H. Parmenter and S. D. Fowler, all of Toronto.

Bishop Lumber Co. has been incorporated at Toronto, with a capital of $3,000,000, tooperate saw mills and planing mills at Nestorville, Ont. The provisional directors are: Harry H. Bishop, H. William Bishop and Jesse A. Bishop, all of Chicago, Ill.

The Canada Cleanser Co. has been incorporated at Toronto, with a capital of $100,000, to manufacture cleansers and cleaning compounds, etc., at Toronto. The provisional directors are: W. J. L. McKay, George H. Gray and David Lowrey, all of Toronto.

The Houpt Paper Mills has been incorporated at Toronto, with a capital of $100,000, to manufacture paper of all kinds at Newburgh, Ont. Provisional directors are: Lewis F. Houpt and Wilber E. Houpt, of Buffalo, N.Y., and Edward A. Crippen, of Toronto.

The Richam Mfg. Co. has been incorporated at Toronto, with a capital of $150,000, to manufacture automobile tires and accessories at Hamilton, Ont. The provisional directors are: George A. Truman, C. George Christopher and Arthur E. Wickens, all of Hamilton, Ont.

The Russo-Canadian Mining Corporation has been incorporated at Ottawa, with a capital of $1,000,000, to carry on the business and operations of a mining, milling and reduction company. Head office is at Toronto, and the incorporators are: R. W. Hart, K. D. McKenzie and W. W. Perry, all of Toronto.

International Metal Work, Ltd., have been incorporated at Ottawa, with a capital of $30,000, to manufacture and deal in automobiles, aeroplanes, engines and motors, etc., at Brockville, Ont. The incorporators are: Thomas J. Storey, Walter G. Jarman and Ellery L. Wright, all of Brockville, Ont.

Canada Light, Heat & Welding Co. has been incorporated at Ottawa, with a capital of $1,000,000, to carry on the business of a light, heat and welding company in all its branches, with head office at Toronto. The incorporators are W. B. Sturrup, J. F. McGregor and J. W. Bicknell, all of Toronto.

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372 Pape Avenue, Toronto, Can.

Catalogues

The "Gun" Tap is the title of an attractive booklet recently issued by the Greenfield Tap & Die Corporation, Greenfield, Mass. The bulletin describes in detail the principal features of the "Gun" tap covering its design and operation accompanied by illustrations featuring the claims made for this tap The bulletin also shows results of several tests and contains instructions for grinding.

Pumps. — Bulletin, series G, No. 1 deals with the "Wood" screw type pump made by the D'Oliver Centrifugal Pump and Machine Co., Philadelphia, Pa. These pumps which are designed for irrigation and drainage service are described fully, special mention being made of their principal features while the advantages of the "Wood" screw type of pump are dealt with in detail. Results of tests are included with curves and illustrations.

The National Steam Pump Co, Upper Sandusky, Ohio, have issued two bulletins No. 20 and No. 21 dealing respectively with the "National" boiler feed pump and outside packed plenger pump In addition to a general description of each type of pump the bulletins feature the balanced piston valve. The operation of this valve is fully described and a sectional drawing shows the general arrangement and its application The principal dimensions and capacity of the various sizes of each type of pump are given.

Refrigerating Machines—Bulletin No. 42 A, deals with vertical enclosed single-acting ice making and refrigerating machines built by the York Manufacturing Co., York, Pa. The bulletin contains a detailed description of the "York" refrigerating machine accompanied by illustrations showing the various types and sectional views showing the general arrangement. A description is given of the evaporating system with diagrams showing plant layouts. Copies of this bulletin may be obtained from the Canadian Ice Machine Co., Toronto, selling agents for the "York" machines.

Steam Traps. — Bulletin "C" describes and illustrates the "Marck Therm" steam trap made by the E. F. Houghton & Co., Philadelphia Pa. The bulletin deals fully with the possibilities of the application of this trap to the automatic discharge of condensation from steam pipes, radiators and low pressure steam services generally. The application, construction and operation of this trap are described in a comprehensive manner while illustrations show

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WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.
Comes to you heat-treated and ready for use.
It does not stick to the work.
There are many cases where each punch has turned out over 2,000 shells.
It means more shells, per machine per day.
STEEL OF EVERY DESCRIPTION.
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In Safety First and always.
In providing for the Health of my Fellow Workmen.
In Light and Air and sanitary Working Conditions.
In clean, fresh drinking water for everybody.
In the Safety, Economy and Man-betterment.

PURO SANITARY DRINKING FOUNTAIN

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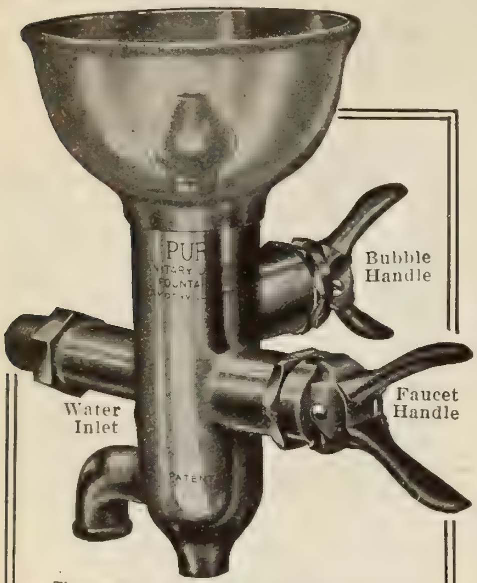

The loss of a man through impure drinking water is a crime that "the front office" must bear.

An ugly statement, isn't it? But true, absolutely.

When a man comes to work in your factory he puts his health in your keeping.

Are you willing to take chances on such a trust?

Impure drinking conditions are responsible for more tragedies than any machine ever built.

Apply the "Safety First" Principles to your water supply; don't deny your men a clean, fresh drink of water.

Conserve their health and they will improve your profits; make yourself as worthy of the name of "employer."

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The only Sanitary Drinking Fountain that is safe, sanitary, simple, automatic in control and easily attached.

Let us tell you just what it will cost you to

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OCTOBER
5
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Space reservation should be made at once.

the trap itself and also its application under various conditions. Interested readers may obtain copies of this bulletin by writing.

Electric Motors.—T. W. Broadbent Ltd., Huddersfield, England, have recently issued leaflet No. 3 of catalogue No. 5, dealing with their "M" type continuous current motors. The leaflet contains a specification covering the principal features of these motors together with illustrations while price tests and shipping weights are included for the various sizes. Copies of the leaflet may be had on application.

Auto Starters for squirrel-cage induction motors are the subject of circular No. H—7001 issued by the Canadian Westinghouse Co., Hamilton, Ont. The construction and principal features of these auto-starters are described fully, accompanied by several tables. The illustrations show different types of this apparatus and also wiring diagrams.

Book Reviews

Canadian Industry, Commerce and Finance by J. J. Harpell, published by the Industrial and Educational Press, Ltd., Montreal and Toronto. This is a companion volume to "The Journal of Commerce" containing much valuable information for Canadian merchants and is particularly useful at the present time when so many firms are endeavoring to develop their export business. This book will give those business men not already familiar with such matters an opportunity to study certain features of commerce and finance which will well repay the time spent in acquiring the knowledge. It is a handy book of reference dealing with the subject in a concise manner and at the same time being an accurate source of information. The book contains six chapters, the first three dealing with industry, commerce and finance and includes maps of trade routes and Canadian ports. A useful feature of this volume is chapter 4 which consists of a trade index or directory of all marketable commodities and Canadian producers, the former being arranged alphabetically. Chapter 5 contains a list of foreign manufacturers of special machinery and supplies necessary to Canadian industry importers, manufacturer agents, wholesale houses, wholesale dealers and exporters. The concluding chapter contains a list of institutions, such as banks, insurance companies, and engineers, etc., in Canada. The book contains 131 pages printed in clear type and is bound in substantial covers.

An introduction to the Study of Organized Labor in America. — By George Gorham Groat, Ph. D. Professor

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PORTABLE PLANERS
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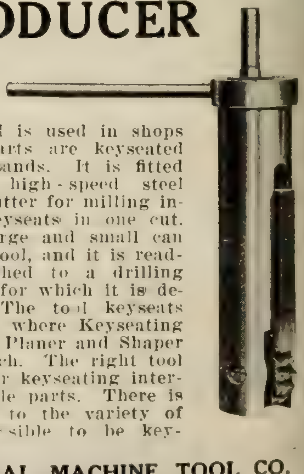


This tool is used in shops where parts are keyseated by thousands. It is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. Shops large and small can use the tool, and it is readily attached to a drilling machine for which it is designed. The tool keyseats in places where Keyseating Machine, Planer and Shaper can't reach. The right tool to use for keyseating interchangeable parts. There is no limit to the variety of work possible to be keyseated

NATIONAL MACHINE TOOL CO.
2270-2272 Spring Grove Avenue,
Cincinnati, Ohio, U.S.A.
Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria.

of Economics in the University of Vermont. The MacMillan Company, Toronto and New York. 494 pages.

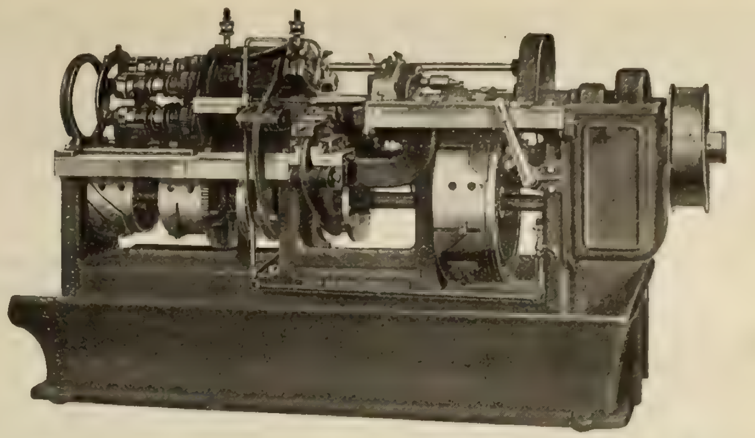
This is a teacher's book for students ample, orderly and thorough. Its contents are indicated by its chapter divisions: The Background; The Structure; Collective Bargaining; Political Activity; Transitional Stages; Suggesgestions for Further Reading is a valuable feature.

Organized labor in Europe and America is a social phenomenon; a token of emancipation. It is indicative of a new social psychology. The organized labor movement cannot be "downed." It is as inevitable as organized capital, and its objective is the same: namely, group or class betterment.

In the book under review the author has confined his treatment to that phase of the labor movement which is organized labor. His material is concerned chiefly with the activities of the unions, but he describes also the background of the labor movement and the current forms of association and gives an account of transitional movements.

Wage Theories, Modern Industrialism, The Knights of Labor, The American Federation of Labor, The American Trade Union, Women and Unionism, The Strike, Arbitration, The Boycott, The Closed Shop, The Trade Agreement, Restriction of Output, Legislative Methods, Labor Legislation, Political Labor Party– these suggest the line of study and treatment .

The war has revealed the power of organized labor in Great Britain as nothing else ever did, showing it to be a force to be reckoned with by governments and statesmen; and when the war is over organized labor is bound to receive a recognition by capital not willingly accorded it in the past. The enmity between capital and organized labor so long continued, so bitter in its expression, so calamitous in its fruitage, rests to some extent on misunderstandings, and to a larger extent on the failure of both sides to recognize the other side's point of view and rights. That there is antagonism of interest there is not a doubt, but at bottom the conflict is based on the first law of life—self-preservation or protection. The new industrialism which will follow the war; and the new economic conditions brought about by trade pacts, man-shortage, emigration, and consequent new social conditions, call for a coming together in mutual accord and purpose of capital and labor. Better relationships can be established only when there is a better understanding of the organized labor movement, and a closer study and analysis of social mechanics. Professor Groat's book is a timely volume.



ACCESSIBILITY:

A Prominent "New Britain" Feature

IN the construction of many tools, access to parts requiring frequent change or adjustment often fails to receive sufficient attention.

The importance attached to this feature by the designers of the "New Britain" Automatic is evidenced by the many provisions for greatest convenience and economy of time in setting up and operating the machine.

A loose cover in cylinder housing permits of instant access to spindle bearing adjusting nuts.

The design of the spindle bearings straight inside and taper outside—enables the slightest wear to be taken up without disturbance of the original alignment of spindle.

Should it become necessary for any reason to remove a spindle, it may be accomplished without removal of spindle cylinder. If, however, it is desirable to take out the latter all that is necessary is to remove upper half of cylinder housing and withdraw drive shaft.

In effecting variations of spindle speed or feed, the "New Britain" design is exceptionally simple and convenient the necessary gear changes being made without removal of driving pulley.

A feature adding greatly to the ease of removal of chips is embodied in the design of the base. That portion directly beneath the work has a 45° slant toward the side of the machine, so that chips and work as cut off are carried to the side. The chip pan is widest on this side and slopes toward the rear, where there is an oil well with strainer from which oil is distributed to the work. This construction permits the oil to thoroughly drain off before chips are removed and makes it possible to rake out chip pan endwise without stopping machine or removing splash apron.

DESCRIPTIVE BULLETIN UPON REQUEST

The New Britain Machine Company
—Automatic Screw and Chucking Machines—
New Britain, Conn., U.S.A.

We Can Sell

your second-hand machinery. Let us tell you about results from condensed ads. in this section. Rates are only 2c per word for first insertion; 1c for subsequent insertions (count five words when box number is used.)

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue, Toronto

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Display rates on application.

FOR SALE

16 H.P. IDEAL GAS ENGINE — ALSO quantity of pulleys. Chipman & Millman, Brantford, Ont. (16)

HORIZONTAL GAS ENGINE 25 H.P. IN SERVICE at present time, $375.00 cash. Write Penberthy Injector Co., Limited, Windsor, Ontario. (5)

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 227, Canadian Machinery. (15)

FOR SALE—2 2" MURCHEY COLLAPSIBLE taps for nosing shells; 1 No. 6 2" collapsible tap; maker, The Manufacturers' Equipment Co. McGregor & McIntyre, Toronto, Ont. (14)

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

A SNAP IN TURRET LATHES SLIGHTLY used on shell work. Fourteen splendid machines at bargain prices. Do you need these machines? If so, drop a line to Box 953, Woodstock, Ont.

LATHE FOR SALE—ONE 39 x 17-FOOT Pond engine lathe, suitable for heavy shells; in good condition; $1,500.00. A. B. Ormsby Company, Limited, Toronto. (2)

A BARGAIN FOR QUICK SALE—30 H.P. 10 x 14 engine; guaranteed in first-class working condition; drive belt included. Hamilton Whip Co., Hamilton.

For Sale Cheap

1—Box Girder Type Overhead Hand Power Crane, 48′ 6″ span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.

1 12" Single "I" Beam Overhead Hand Power Crane, 30′ 10″ span, [illegible] tons capacity; complete, less the Hoist.

1 Brantford (Gas) Bake Oven and 4 Racks.

1 Linderman 2-Spindle Boring Machine.

1 20" Drill, Bertram Company.

1 26" Drill, London Machine Tool Company.

1 Bowser 40 Gal. Varnish or Oil Pump and Tank.

M. BEATTY & SONS
Limited
Welland, Ont.

BUSINESS FOR SALE — MACHINE SHOP with a good, steady run of work and always busy. A good opening for a young man to get into business. Owner has other interests. Box 224, Canadian Machinery. (13)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make. used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

DROP PRESS FOR SALE—NO. 9 MINER & Peck drop press; anvil 2,000 lbs.; base 30,000 lbs.; 36" between uprights; 40" x 35" between poppets; 34" x 29" top of anvil; guaranteed as good as new. Can be shown in operation to any genuine prospective buyer. The Metallic Roofing Co., Limited, Toronto. (4)

MACHINE SHOP WITH MODERN EQUIPMENT manufacturing a good staple line; orders for months ahead; will bear the fullest investigation; satisfactory reason for selling. Box 220, Canadian Machinery.

ONE REED TURRET LATHE, 8′ BED, swing 28"; 4 2" holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 226, Canadian Machinery. (16)

FOR SALE—ONE 16" X 8′ HENDEY LATHE, with taper attachment, $1,100.00; one 22" x 10′ Blaisdell lathe, with taper attachment, $1,200.00; one 24" Gould & Eberhardt shaper, $800.00. The above machines are in first-class condition. For particulars apply Box 221, Canadian Machinery.

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

FOR SALE — SOIL PIPE AND FITTING plant; full range medium patterns; good assortment, standard and extra heavy; ten-ton cupola; complete modern equipment, with machine shop; on 2 acres land; railway siding. Would give lease of land now occupied. Reasonable price and easy terms. Fine opportunity for two or three practical foundry men. Apply The Vancouver Pipe and Foundry Co., Ltd., 572 Beatty Street, Vancouver, B.C.

WE HAVE FOR SALE THE FOLLOWING equipment: Complete nickel and copper plating plant, including direct connected dynamo and motor; one second operation cast iron plug machine, and two first operation cast iron plug machines manufactured by the Brown Engineering Corporation; 2 16 inch turret lathes; 1 38-inch engine lathe, 20-foot bed. The above outfit will be sold en bloc or separate. Apply direct to Foundry & Machine Co., Ltd., Montreal. (13)

FOR SALE—McDOUGALL ENGINE LATHE, 20" swing, 10′ bed; never been used. Baker Keyseater No. 2, good as new. Boring Mill, 2 bars, will bore up to 30" dia. Boston Forge Blower, 27", good condition. Crescent Swing Cut-off Saw, almost new. 7½ H.P. Westinghouse D.C. Motor, in good order. Gurney Platform Scale, 2,000 lb., 16" wheels. Mandrills, Couplings, Hangers, Post Boxes, Pulleys, Belting, Cap Screws, Bolts, etc. Special prices on above, write for particulars. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (14)

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 4), 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN LAMP FACTORY
ST. CATHARINES, ONTARIO

SITUATIONS WANTED

TOOL MAKER IN CHARGE DESIRES change. Competent to take charge of machine shop or tool room. Good references. Box 225, Canadian Machinery. (17)

SUPERINTENDENT OF SHELL FACTORY desires position—at present employed, but wishes to change. Would accept general foremanship. Best references. Box 217, Canadian Machinery. (9)

SUPERINTENDENT—FIRST-CLASS PRACTICAL mechanical man is open for an engagement as works manager or superintendent. Can give best of reference as to character and ability to handle help and produce results. Box 227, Canadian Machinery.

WANTED

WANTED — 250-VOLT D.C. GENERATOR — 75 to 150 k.w., direct connected to steam engine; must be in good condition. Write to The Kaufman Rubber Co., Berlin, Ont. (13)

WANTED—ELECTRIC TRAVELLING GANTRY crane, span about 57 ft., clearance 50 ft., overhanging at one end; load 15 tons. State full particulars and price. Thor Iron Works, Limited, Toronto, Ont. (27)

WANTED—12" BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Apply Box 218, Canadian Machinery.

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

Kindly mention this paper when writing advertiser

FOR SALE

Best quality steel bars, 2" rounds. .30 to .40 carbon, Government inspected for shell parts, and we offer same for immediate shipment from stock, at reasonable price.

Address all letters

Canada Forge Company
Limited
Welland - Ontario
(13)

MACHINERY FOR SALE

2 70 Gallon Hydraulic Pumps.

1 - 100 Gallon Hydraulic Pump. Offer Bargain on above.

1—125 H.P. Motor, 3 Phase, 60 Cycle, 220 Volts, General Electric. Price—$1200.00.

2—90 H.P. General Electric Motors, 3 Phase, 60 Cycle, 220 Volt. Price $700.00 each.

2—Sheldons No. 3 Cast Iron Fans.

NATIONAL STEEL CAR COMPANY LIMITED
HAMILTON, CANADA
(13

Wanted to buy or sell Scrap Iron, Metals, etc.

At the present time we are paying the following prices:

No. 1 Scrap Wrought Iron, $13.75 gross ton.
Heavy Scrap Copper, $20.00 per cwt.
Mixed Heavy Scrap Brass, $13.00 per cwt.
Heavy Scrap Lead, $5.75 per cwt.
Scrap Aluminum, $32.00 per cwt.
Scrap Babbitt, $8.00 per cwt.

Our Motto: Honest dealings and prompt settlements. Make us a trial shipment.

L. S. TARSHIS & SON
88-98 Wellington Street, Montreal

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

Second-Hand MACHINERY

If you want second-hand equipment of any sort, advertise for it in our Classified Section — you'll get results.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue
TORONTO - ONTARIO

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3¼" Gridley Automatic
40" x 16' Conradson, heavy duty
40" x 12' New Haven
26" x 8' Davis
24" x 8' Lodge & Shipley
21" x 10' LeBlonde, D.B.G.
20" x 10' American
17" x 6' Garvin
16" x 6' Pratt & Whitney
16" x 5' Windsor, wire feed
15" x 5½' fox, American
2" x 24" Jones & Lamson flat turret
No. 22½ Garvin, wire feed
No. 2 Garvin, wire feed
8" x 31" Brown & Sharpe

Engine Lathes

42" x 20' Fifield
36" x 16' Putnam
30" x 10½' Pond
26" x 40" x 20' London Gap
26" x 14' Hamilton, D.B.G. (4)
26" x 14' Gleason, D.B.G. (2)
24" x 13' New Haven
24" x 10' LeBlonde
24" x 10' Peerless
24" x 10' Lodge & Shipley, patent head
22" x 12' American, all-geared head
21" x 12' Peerless
21" x 8' Back-geared single purpose (4)
20" x 12' Lodge & Shipley, patent head (2)
20" x 10' Reed
20" x 8' Walcott, D.B.G. (2)
20" x 8' Hercules, heavy duty
20" x 8' American
20" x 8' Ames
20" x 7' Fay & Scott
19" x 8' LeBlonde, D.B.G.
18" x 10' MacGregor-Gourlay
18" x 8' Walcott, D.B.G. (2)
18" x 8' New Haven
18" x 6' New Haven
17" x 8' Blaisdell
16" x 10' MacGregor-Gourlay, D.B.G
16" x 6' Porter
14" x 6' American

Upright Drills

24" Bickford, shaft-driven
24" London, back-geared, sliding head
24" Kerkhoff, back-geared, sliding head
22" Barnes, back geared, sliding head
20" Bertram, power feed
No. 10A Baush, 16 spindle
16" Avey, high speed, 4-spindle, sensitive
16" Canedy-Otto
15" Barnes
14" Excelsior
14" Garvin, 4-spindle
10" Barnes, friction
60" Bertram Semi-universal Radial
48" Gang, plain radial, tapping attachment
36" New Century, plain radial
32" Canedy-Otto wall radial

Iron Planers

30" x 30" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
24" x 24" x 6' Gray
20" x 20" x 5' Bertram

Milling Machines

No. 5 Becker-Brainard, plain
No. 3 Cincinnati Universal
No. 12 Brown & Sharpe plain
No. 1½ Brown & Sharpe Universal
Louden Universal
24" Bertram, plain
Holden-Morgan Thread Miller

Presses

No. 12 Geared Rhodes, roller feed
No. 5 Waterbury, inclinable
No. 3 Michigan Inclinable

Miscellaneous

24" Gould & Eberhardt, B.G. Shapers (3)
20" Steptoe shaper
No. 1 Racine Hack Saws
Nos. 3 and 4 Robertson Hack Saws
Lo-Swing Lathes (2)
32" x 9' Special Facing and Tapping Machine
40" Binsse Horizontal Boring Mill
12" x 42" Landis Universal Grinder
No. 2 Diamond Universal Grinder
No. 14 Besly Grinder
No. 60 Heald Cylinder Grinder
No. 2 Garvin Automatic Tapping Machine
No. 1 Garvin Automatic Tapping Machine
No. 2 Cochrane-Bly Filing Machine
¼" Shuster Riveters (3)
9½' Bertram Bending Rolls
15" London Punch and Shear
50-ton Lucas Forcing Press.

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.
Front St. W., - - Toronto, Ont.

FAIRBANKS-MORSE New and Used Machinery

In Stock at Toronto

1 ⅞" 4-spindle National Acme Automatic; used.
2—No. 3 1" Foster Hand Screw Machines.
4—No. 4 1½" Smurr & Kamen Turret Lathes.
1—14" x 5' Seneca Falls Lathe; used.
1—10" x 5' Seneca Falls Lathe; used.
2—18" x 8' Springfield Lathes; new.
5—20" x 9', 19 16" x 7', 3 16" x 9' Fairbanks-Morse Lathes; new.
2—No. 1 Racine Hacksaws; new.
1 No. 304-A Oster Pipe Machine; new.
1—20" x 8' Hendey Lathe; used.
1—Gisholt 16" Special Lathe, type C, 6½ bore.
1—Walcott 20" x 8' Engine Lathe.
5—Barnes 18" x 8' Engine Lathes; new.
1—McDougall 16" x 6' Engine Lathe, with taper attachment; new.
7 Potter & Johnson No. 6A Automatics; used.

In Stock at Montreal

2—16" F. M. Single Purpose Lathes; used.
1—Hendey 16" x 8' Lathe, taper attachment, Q.C.G.; used.
2—American 16" x 6' Tool-room Lathes; new.
2—Barnes 18" x 8' Lathes; new.
1—Walcott 20" Lathe, 3-step cone, D.B.G. and Q.C.G.; new.
3—Walcott 18" Lathes, 3-step cone, D.B.G. and Q.C.G.; new.
1—Rivett Precision Lathe; used.
1—Seneca Falls 9" x 4' Star Q.C.G. Tool-room Lathe.
1—Brown & Sharpe No. 1½ Universal Miller; used.
1—Ford-Smith Plain Miller; new.
W. & M. Drill Grinder; new.
1—Hall No. 6 Cutting-off Machine, 6" Shells; new.

This is only a partial list of our stock of Machine Tools.

CFM

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

FOR SALE

GRINDING MACHINES
1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16" x 66" Landis Crank Shaft Grinder (18 months old).
2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES
58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13" Gisholt Semi-Automatic (12 mos. old).
20 21" Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES
1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES
1 8-spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.
2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS
1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES
38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES
2 Noble & Westbrook No. 1 (new).

PROFILERS
1 No. 3H Becker (new).

PLANERS
1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 40" x 40" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS
1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES
1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES
1 12" Jackson (new).

KEY SEATERS
1 No. 1 Catlin (new).

SCREW MACHINES
1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2" x 24" Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼" capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES
1 No. 3 La Pointe (nearly new).

BOLT CUTTERS
1 2" Landis Double Head (nearly new).

BORING AND TURNING MACHINES
1 4' Bickford Boring & Turning Mill (nearly new).
1 20" swing 4-Spindle Moline Vertical Boring Machine with 18" x 36" table.

BULLDOZERS
1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES
1 Large Filing and Sawing Machine with 12" stroke.

PUNCHES AND SHEARS
1 No. 3 Walsh Punch Press.
1 Moser 1½" stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8" throat capacity ¼" x ¼".
1 27½" throat lever punch ½" capacity 1¼" stroke.
1 Thompson Bevel Shear ½" capacity.

PIPE MACHINES
1 6" Saunders.

SHAPERS
1 14" Hendey Geared Friction.
1 20" Hendey Geared Friction.

TAPPING MACHINES
1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2" collapsible taps (new).

THREAD ROLLING MACHINES
1 Waterbury Farrell ⅜" capacity (nearly new).

THREADING MACHINES
5 Special Threading Machines for threading 3" steel shells (nearly new).

SPOT WELDERS
1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

Write us what you want new or second-hand.

32 North Clinton Street, Chicago

W. F. Davis Machine Tool Co.

403 Singer Building, New York City

FOR SALE

1—American Wood Working Machinery Company Tennoning Machine.
1—Dennis Tilting Table, wood drill, capacity 36".
1—No. 2 Gardiner Double Disc Grinder, with Press.
1—Pettongill Machinery Company Automobile Body Hammer.
1—American Wood Working Machinery Wood tp 36" x 56" Rip Saw.
1—Badger State Machinery Company No. 5 Tilting Table, cut-off saw.
1—Brown-Boggs 30" Foot Power Sheet Metal Shear.
1—16" Porter Joining Planer.
1—Fay & Egan Company Surfacing Planer, 24" knives.
1—Fay & Egan Double Spindle Wood Shaper.
1—Boring and Mortising Machine.

Some of the above machinery has never had a belt, but others have been used about sixty days; all are in splendid condition.

1—Modern Heavy Duty Bar Equipment Turret Lathe, 2¼" spindle.
1—Power Hack Saw.
Numerous Chucks and other Tools.
1—Bertram Waving and Undercutting Machine for 18" lathe, suitable for 18 pound H.E. or Shrapnel Shells.
1—Holden-Morgan Base Plug Milling Machine for 4.5 Shells.
1—Rochester High Power Riveting Hammer.

For prices and terms write to

Tate Electrics Limited
34 Dalhousie Street, TORONTO
(eow 12)

A SNAP

For Sale—Boiler Repair and Sheet Iron Works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars.

Box 213, Canadian Machinery

IF what you want isn't advertised in this issue, consult our Buyers' Directory, Page 81.

List of Second-Hand Machinery

On hand for immediate delivery, subject to prior sale

1—No. 2 Brown & Sharpe Vertical Chucking and Boring Machine; excellent condition.
1—No. 4 Quint Vertical Turret Drilling and Chucking Machine; excellent condition.
1—24" x 24" x 7' Lodge & Davis Planer, fitted with full electric equipment and in good condition.
1—4¼" Belt-driven Gridley Automatic; excellent condition.
2—4¼" Motor-driven Gridley Automatics; excellent condition.
1—26" x 48" x 10' J. J. McCabe Lathe; good condition.
1—No. 12 16-spindle Pratt & Whitney Multiple Drill, ½" capacity in steel, ⅝" capacity in cast iron; excellent condition.
1—Foster Ring Turret; good condition.
1—22" x 22" x 4' Whitcomb Planer.
1—18" Warner & Swasey Plain Head Turret Lathe.
1—14" Flather Engine Lathe, rod and screw feed, plain rest, slip change gears.
1—14" Pratt & Whitney Engine Lathe, screw feed, plain rest, slip change gears.
1—No. 15 Toledo Punch, 18" throat.
1—No. 12 Badger Punch and Shear.
1—30" Collier Circular Shear.
1—16" Steptoe-McFarland Lathe.
1—12" Shepard Gap Lathe.
1—No. 2 Mitts & Merrill Keyseater.
1—No. 2 10" Massillon Punch; new.
2—20" Barnes Drills.
1—¼" Shuster Riveter.
2—Marvel Hack Saws.
1—14" Fox Drill.
1—24" Ohio Shaper.
1—14" Steptoe Shaper.
1—Shinn Metal Band Saw.

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Used Machinery for Immediate Delivery

BORING MILLS.

51" Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52" Niles Car Wheel Boring Mill.

DRILLS.

22" Aurora, S.H., B.G., P.F.
24" Hamilton, B.G., P.F.
25" Fitchburg, S.H., B.G., P.F.
26" Hoefer, B.G., P.F.
32" Hamilton, S.H., B.G., P.F.
32" Hoefer, S.H., B.G., P.F.
34" Barnes, S.H., B.G., P.F.
4" Baker Tapping and Drilling Machine.
2½' Dreses Radial
3½' Industrial Radial
12 Spindle Multiple
6 Spindle V.C.
No. 30C Baush, 12 spindles

GEAR CUTTERS

20" G. & E., for spur and bevel
24" x 7" G. & E., for spur
36" Walcott, for spur
No. 14 Brown & Sharpe

GRINDERS

No. 3 Landis Universal
14" x 20" B. & S. Universal
Gisholt Tool Grinder

LATHES

12" x 4' Hendey, C.R., Q.C.G., taper
12" x 5' Davis, C.R.
14" x 5' P. & W., R. and F., taper
14" x 6' Fairbanks, C.R., taper
15" x 6' Goddard, C.R., taper
16" x 6' Prentice, C.R.
16" x 6' Sebastian, P.R.
16" x 6' Walcott, C.R.
16" x 8' Lodge & Shipley Pat. Head, C.R., Q.C.G.
16" x 10' Greaves & Klusman, C.R.
17" x 10' Blaisdell, C.R.
18" x 6' Bradford, C.R., taper
18" x 8' Lodge & Shipley, Pat. Head, C.R., taper
18" x 12' American, C.R., Q.C.G.
18" x 12' Greaves & Klusman, C.R.
20" x 10' Flather, C.R.
21" x 12' New Haven, C.R.
24"-40" x 12' McCabe Double Spindle, C.R.
24" x 16' Schumacher & Boye, C.R.
30" x 14' Reed, C.R.
32" x 16' Blaisdell, C.R.
36" x 28' American, C.R.

MILLING MACHINES

No. 12 B. & S., plain
No. 34 Oesterlein, plain
No. 1½ Garvin Universal
No. 2 Cincinnati Universal
No. 2 Cincinnati Vertical, High Power
No. 32 Plain Kempsmith—Lincoln
No. 3 Cincinnati Universal
No. 13 P. & W. Lincoln
No. 4 Becker Vertical

PLANERS

Morton Portable
22" x 22" x 6' Gray, one head
30" x 30" x 8' Woodward & Powell, one head
30" x 30" x 12' Cincinnati, two heads
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Cincinnati, two heads
36" x 36" x 16' Sellers, one head
39" x 39" x 12' New Haven, one head
40" x 38" x 14' Putnam, one head
40" x 40" x 12' New Haven, one head, one side head

PRESSES

No. 3 Delivouk & George, O.B., Inc.
No. 30 A. Perkins, O.B., Inc.
No. 133 Ferracute, Double Action, O.B., Inc.
No. 5½ Walsh, O.B., Inc., geared
No. 174 Consolidated Double Crank
No. 25 Toledo, O.B., Inc., Cam Drawing

SHAPERS

15" Hendey Friction
16" Walcott
16" Niles, B.G.
16" Rockford, B.G.
20" Rockford, B.G.
26" Putnam

SCREW MACHINES

No. 1 Chicago Automatic
1 3-16" Hartford Automatic
2" Cleveland Automatic
2¾" Cleveland Automatic
⅝" P. & W. Plain
1" B. & S. Plain
16" P. & W. Plain

MISCELLANEOUS

No. 4 Warner & Swasey Turret Lathe
No. 2 Warner & Swasey Turret Lathe
No. 2 Baker Keyseater
Whitton Centering Machine
1½" Acme Bolt Cutter
2—Springfield Stud Lathes
Blount Speed Lathe

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One 5 x 6 Horizontal steam engine, 8 horse, with base	125.00	
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Two 7 x 6 Automatics, with base, 15-25 H.P.	275.00	"
One 8 x 8 Automatic, with base, 20-42 H.P.	500.00	
One 10 x 10 Automatic, with base, 39-82 H.P.	700.00	
One 11 x 10 Automatic, with base, 47-85 H.P.	725.00	

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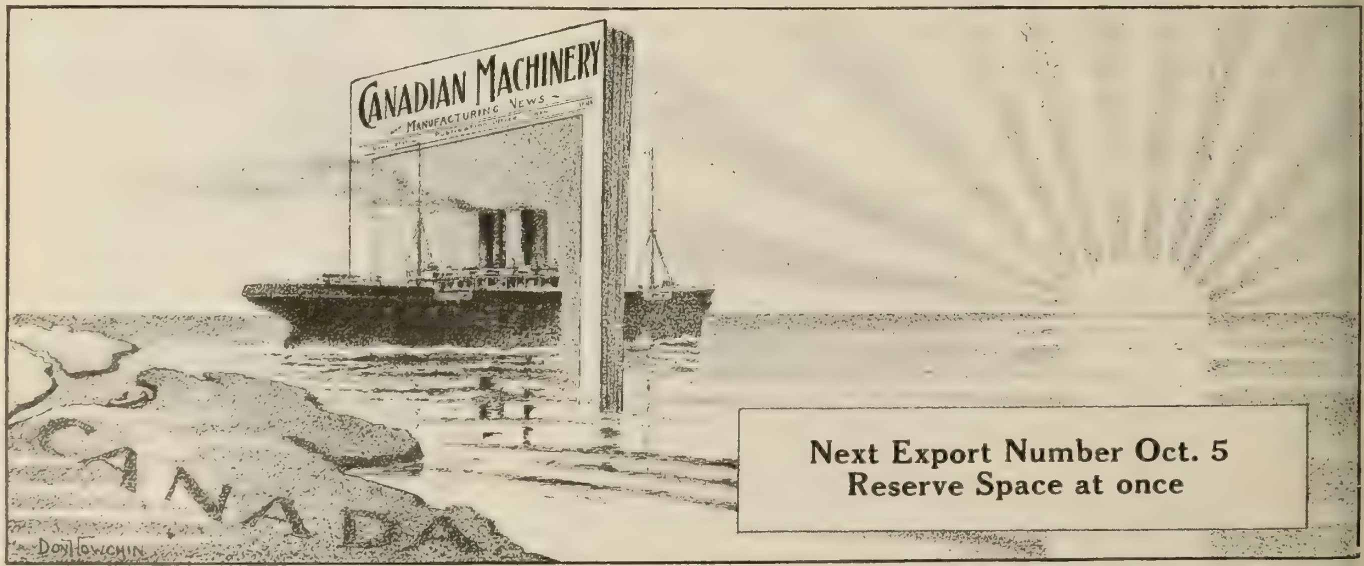

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60″ x 60″ x 15′ Sellers Four-head Planer.
54″ x 46″ x 14′ Lincoln Four-head Planer.
44″ x 44″ x 16′ Niles One-head Planer; fitted for three heads.
44″ x 44″ x 12′ Niles Two-head Planer.
44″ x 42″ x 17′ Betts Two-head Planer.
42″ x 42″ x 13′ Sellers Two-head Planer; one head on rail, one side head.
42″ x 42″ x 10′ New Haven One-head Planer.
36″ x 36″ x 18′ Niles Three-head Planer.
36″ x 36″ x 12′ Chandler Heavy Duty Planer; weight 35,000 lbs.
36″ x 34″ x 12′ New Haven One-head Planer.
30″ x 30″ x 16′ Harrington One-head Planer.
28″ x 24″ x 8′ Fitchburg One-head Planer.
24″ x 24″ x 6′ Wood-Light One-head Planer.
22″ x 22″ x 5′ Whitcomb One-head Planer.
18″ x 18″ x 36″ Wheeler One-head Planer.
30″ Morton Draw Cut Shaper.
Two 24″ Steptoe Crank Shapers.
20″ Gould & Eberhardt Crank Shaper.
16″ Hendey Friction Shaper.
16″ Juengst Back-geared Crank Shaper.

BORING MILLS.

10′ Betts Vertical, two heads.
6′ Betts Vertical, two heads, with extension to 8′.
66″ Betts Vertical, two heads.
5′ Bement Vertical, one head.
26″ Niles Vertical, two heads.
Binsse Horizontal, 2⅞″ bar.
Beaman & Smith 2-Spindle Horizontal.
Bement Horizontal, 2½″ bar.
Newton 2-Spindle Horizontal, 5″ bars.

GRINDERS.

Norton Plain, capacity 12″ x 72″.
No. 20 Springfield Surface.
Four No. 1½ Landis Internal.
No. 1 Brown & Sharpe Internal.
Brown Roll Grinder, capacity 10″ x 84″.
No. 3 Brown & Sharpe Universal Cutter and Reamer.
Cincinnati Universal Cutter.
No. 1 Cincinnati Universal Cutter.
No. 2 Garvin Cutter and Reamer.
Sellers Twist Drill Grinder, 2″ capacity.
Three American Surface Die Grinders.

PRESSES.

PG 6 Ferracute Geared Punch Press; weight 12,000 lbs.
Toledo Double Crank Back-geared Press; weight 20,000 lbs.
Farrel Double Crank Geared Press, 2″ stroke; weight 9,000 lbs.
No. 4 Bliss Double Crank Geared Press; weight 11,000 lbs.
No. 2 Bliss Double Crank Press; weight 5,000 lbs.
No. 4 Farrell Punch Press, 1½″ stroke.
No. 1 Bliss Straight-Sided Press, 8″ stroke.
No. 3 Manville Stamping Press, 1″ stroke.
Empire Inclinable Stamping Press, 2″ stroke.
No. 24 Zeh & Hahnemann Horning Press.
Hoe & Co. 350-ton Vertical Hydraulic Press, with pump; will take 34″ x 31″ between rods.
Sellers 100-ton Hydraulic Wheel Press, 43″ between bars.

PUNCHES AND SHEARS.

Size "D" Long & Allstatter Bar Iron Shear, 3½″ capacity; approximate weight 30,000 lbs.
Cleveland Combined Punch and Shear, 26″ throat; capacity 1″ in 1″.
Cleveland Single End Punch, 22″ throat; capacity 1″ in 1″.
8′ Lennox Rotary Splitting Shear, will split 16′ plates, ¾″ capacity; weight 9,000 lbs.
Kling Bros. Single End Punch, 24″ throat, capacity 1¼″ in ¾″.
Sellers Double Angle Shear, capacity 8″ x 8″ x 1″.
Bliss Machine Co. Double End Punch and Shear, 20″ throats, punching capacity 1¼″ in ¾″; shearing capacity 1½″ round.
Cockburn Direct Acting Punch, capacity 1″ in 1″.
Wilson Double End Punch and Shear, 6″ throats.
Bement Single End Punch, 31″ throat, capacity 2″ in 1″.

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Every machine listed can be seen in our warehouses

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1—15″ x 6′ South Bend Engine Lathe.
1—15″ x 6′ Rockford Plain Engine Lathe.
1—18″ x 10′ Draper Plain Heavy Duty Engine Lathe.
1—32″ x 12′ Shepard Lathe, Quick-change, light pattern
1—17″ x 7′ Street Semi-quick-change Lathe.
1—20″ x 12′ New Haven Lathe and Countershaft, face plates, chucks, follow and steady rests, plain change gears.
1—14″ x 10′ Lodge & Shipley Lathe, quick-change, turret on carriage.
1—20″ x 12′ Bradford Lathe, plain change gears, complete with chuck.
2—20″ x 8′ Walcott Quick-change Gear Lathes.

SCREW MACHINES AND TURRET LATHES.

1—3¼″ Gridley Automatic.
1—2¼ capacity Modern Flat Turret Lathe with bar and chucking equipment.
1—No. 4 Geared Friction Head Screw Machine, complete with wire feed, automatic chuck, power feed to turret.
2—No. 3 Screw Machines, complete with wire feed automatic chuck, hand feed to turret.
1—1″ capacity Garvin Turret Lathe.
2—22″ New Turret Lathes, heavy duty type.

SHAPERS.

1—24″ Cincinnati Back-geared Crank Shaper.
1—32″ Walcott Shaper.

MILLERS AND GEAR CUTTERS.

1—Farwell Gear Testing Machine.
1—No. 2 Cincinnati Vertical Milling Machine (almost new)
2—Warner & Swasey Single Spindle Profilers.
2—U.S. Hand Millers.
1—Keyseating Miller, with long table.
1—No. 1 Farwell Automatic Gear Hobbing Machine.
1—Farwell Quick-change Hand Miller.
1—No. 2 Cincinnati Plain All-geared Miller (new).
1—No. 1½ Cincinnati Universal Miller.
1—No. 2 Owen Universal Miller.

DRILL PRESSES.

1—1-spindle Allen Sensitive Drill, high speed, ball bearing
1—Foote-Burt 3-spindle Sensitive Drill.
1—13″ Reed Sensitive Drill.
3—4-spindle Drill Presses.
1—Double Head Taylor & Fenn Sensitive Drill
2—1-spindle High Speed Ball-Bearing Reed Drills
1—36″ American Sensitive Radial Drill.
1—36″ Mueller Radial Drill, with tapping attachment [illegible] drive, swinging table.

ELECTRIC DRILLS.

1—G.I.U.S. Electric Drill, capacity 1¼″.
1—Thor Universal Electric Drill, capacity ¼″, 110 volts
1—Hisey Wolf Friction Motor Bench Drill, 110 volt, D.C.
1—Standard Type Electric Drill, 110 D.C., ⅜ capacity
1—⅜ Electric Drill, 110 volts, D.C.

SCREW AND PUNCH PRESSES.

1—Foot Press.
1—No. 3 Advance Inclinable Press.
1—No. 5 Eames Mandrel Press.
1—No. 2 Barnes Screw Arbor Press.
1—No. 1 Verdin & Knappes Inclinable Press
1—No. 2 Rockford Inclinable Press.

PLANERS.

1—17″ x 17″ x 20″ Crank Planer, one head.
1—26″ x 26″ x 6′ Cincinnati Planer, one head

GRINDERS.

2—10″ x 36″ Landis Plain Self-contained Grinders.
1—No. 3 Landis Universal Grinder.
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FROM time to time we receive inquiries from parties wishing us to put them in touch with firms in Canada who are in a position to manufacture their lines for them.

SOMETIMES the inquiring parties are located in the United States, sometimes in Great Britain, frequently in Canada. The lines involved range from hardware specialties to mill machinery. Sometimes the interested parties would prefer that the Canadian manufacturers undertake the selling of the products as well as the making of them.

WE would like to hear from metal-working firms who are in a position to take on the manufacture of new lines. Just at present we have an inquiry relating to a steam trap which is enjoying a big sale in the United States. The owner of the patent would like to make arrangements for its manufacture and sale in Canada.

TWO other concerns expect to start operations in the near future and would like us to put them in touch with reliable manufacturers. Details are withheld for the present.

ANOTHER reader would like to know of some firm in a position to build heavy mill machinery.

THESE communications are confidential of course, but we shall be pleased to bring interested parties together. We would like to hear from any Canadian manufacturer who may be interested in the above or similar inquiries. We would like to have their names immediately available.

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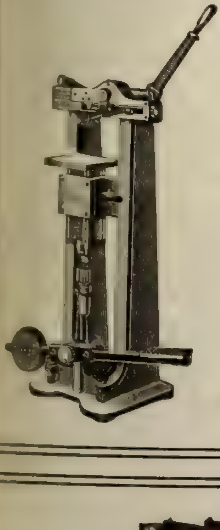

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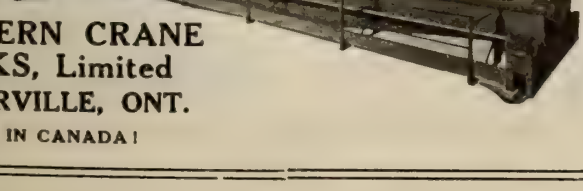

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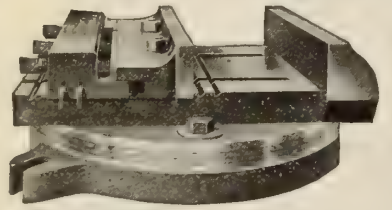

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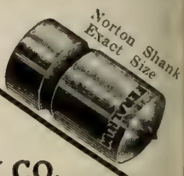

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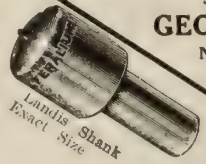

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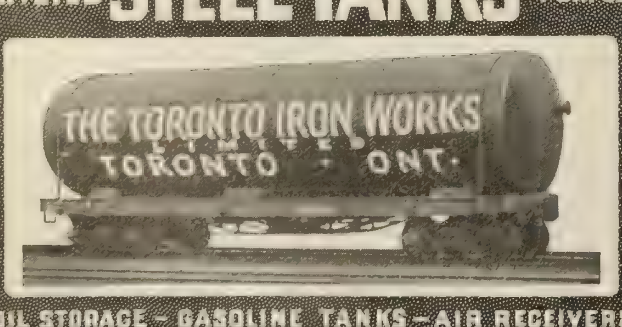

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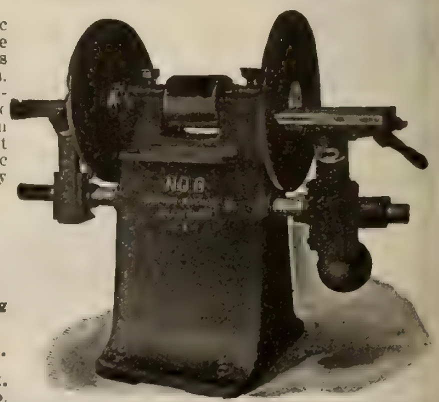

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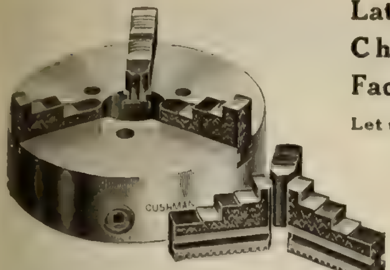

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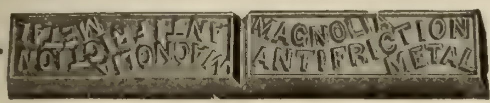

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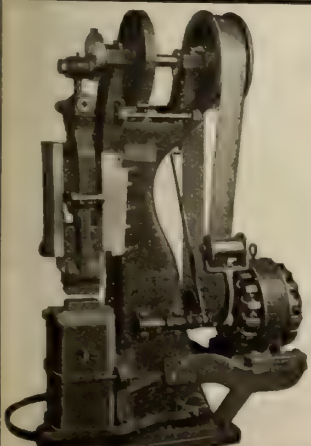

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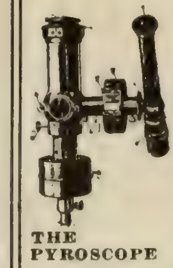

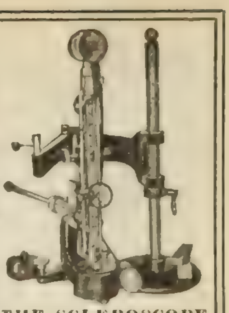

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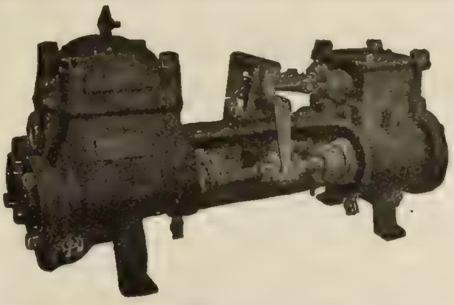

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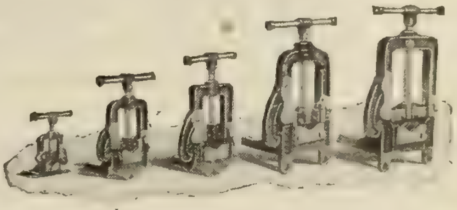

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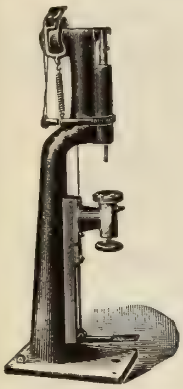

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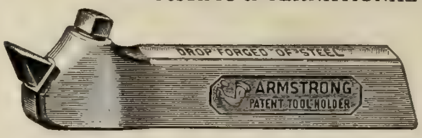

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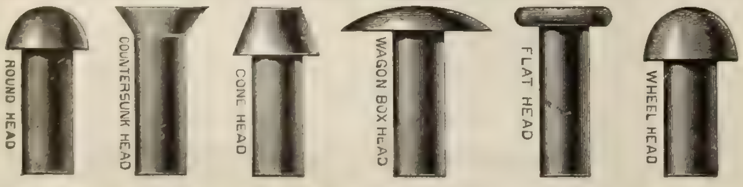

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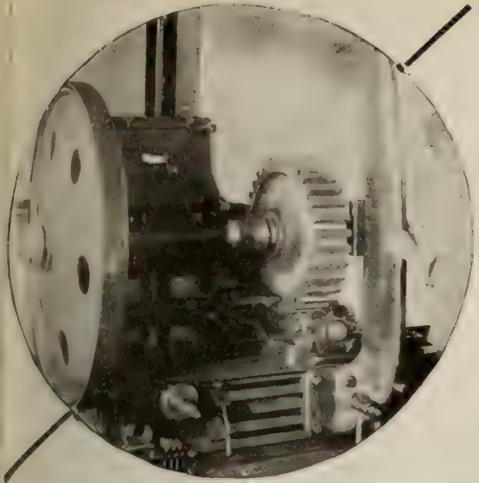

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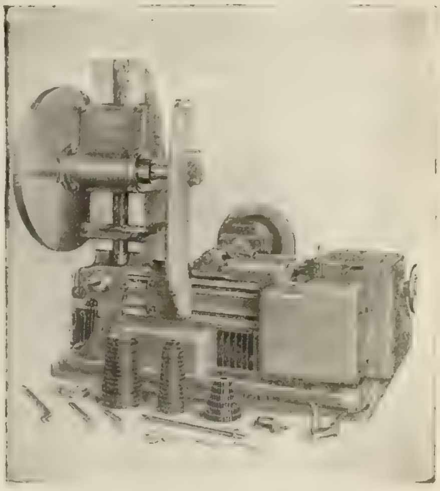

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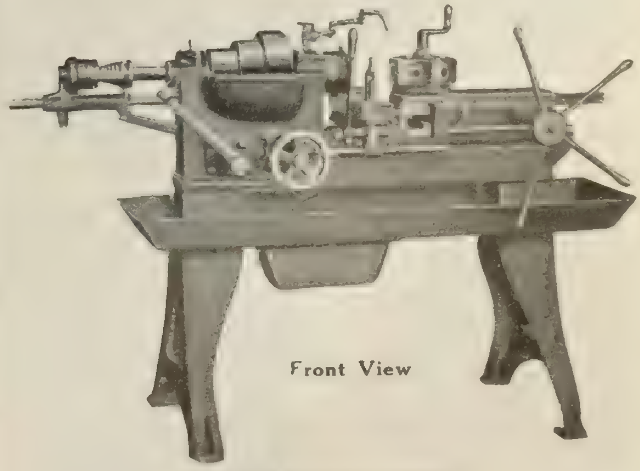

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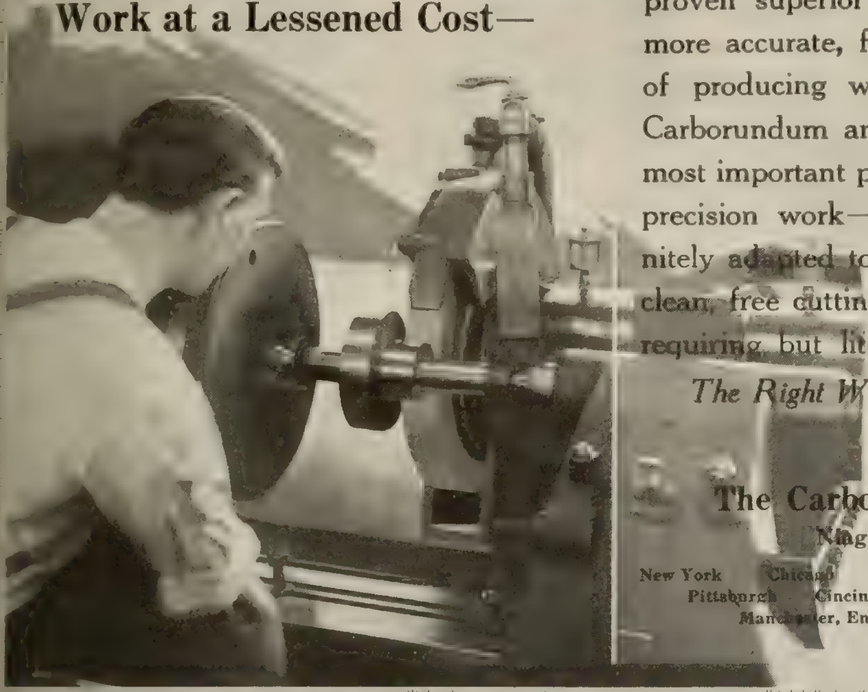

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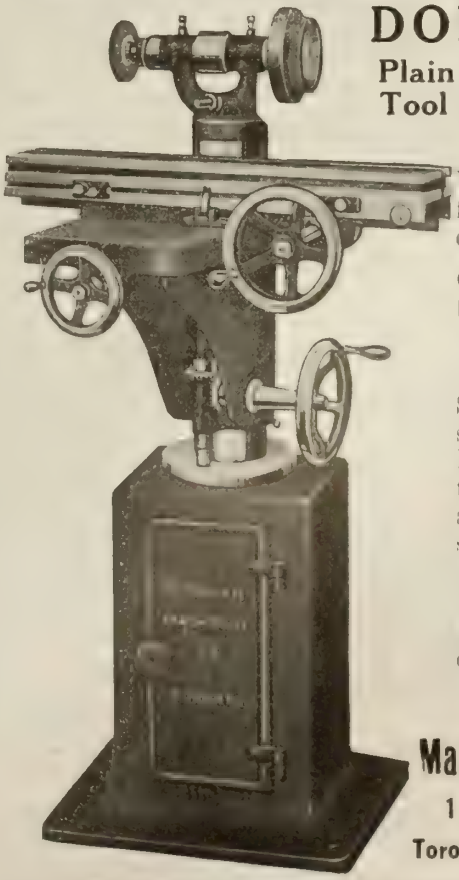

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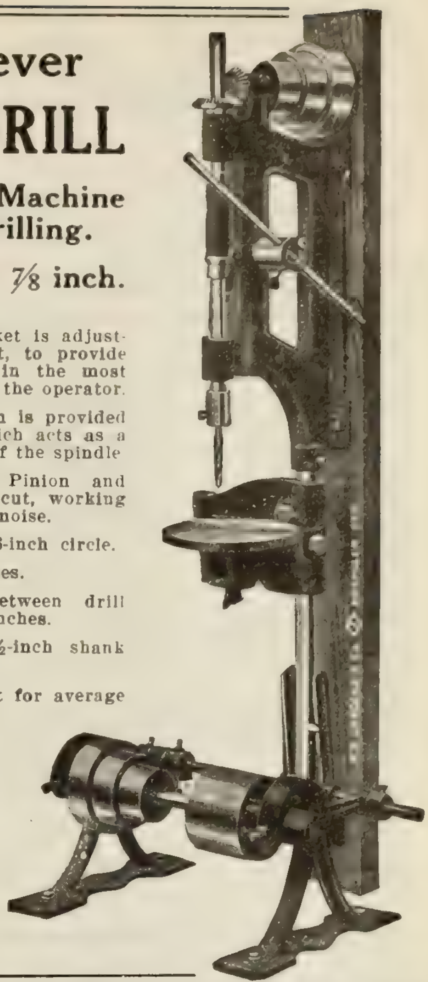

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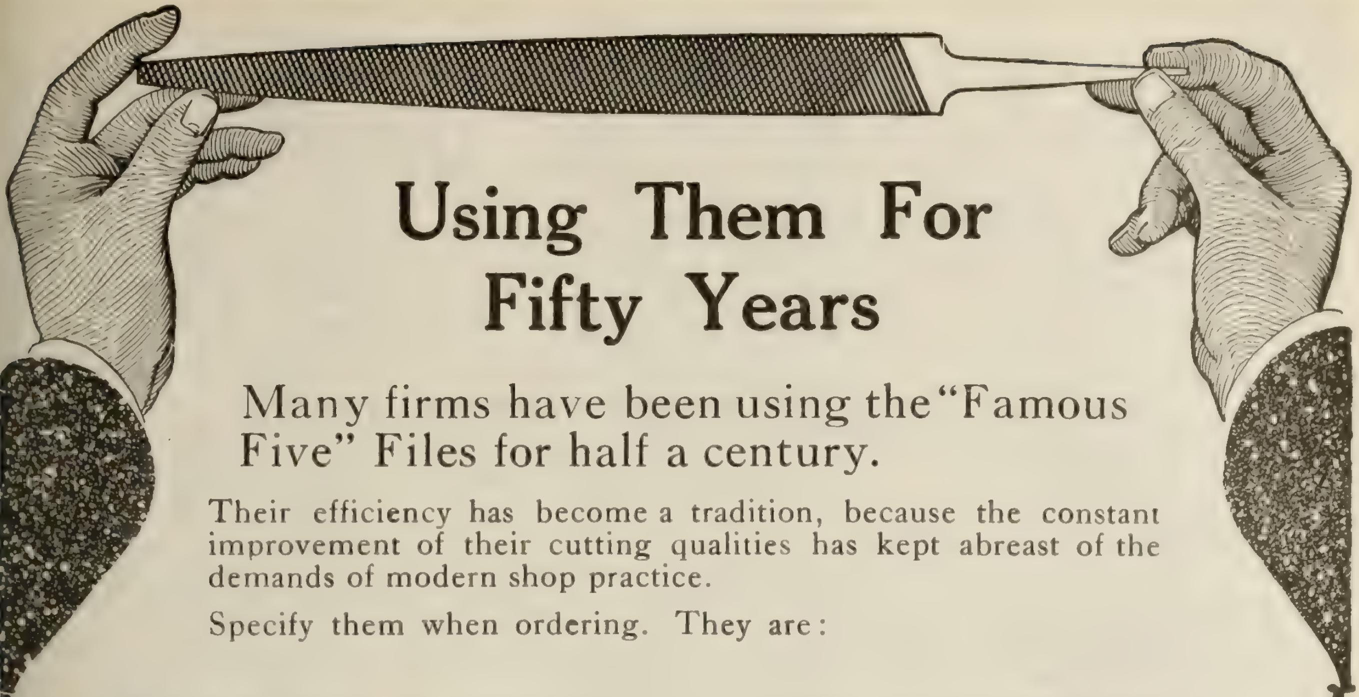

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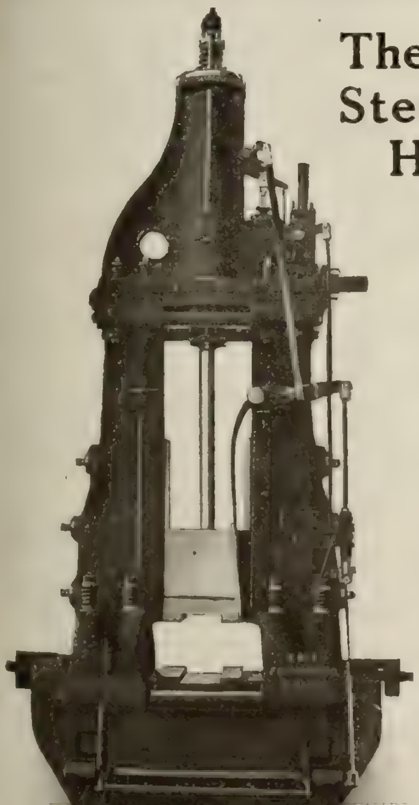

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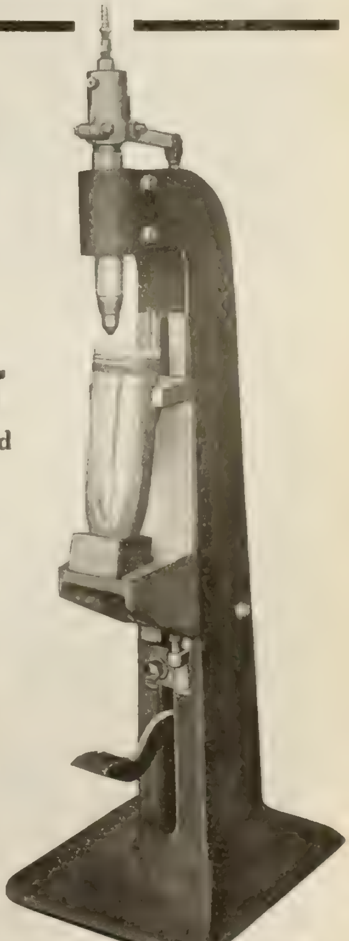

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Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
H. W. Petrie, Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.

PIPE CUTTERS, ROLLING
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
John H. Hall & Sons Ltd., Brantford, Ont.
H. W. Petrie, Ltd., Montreal.

PIPE, RIVETED STEEL
Toronto Iron Works, Ltd., Toronto.

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Oliver Machy. Co., Grand Rapids, Mich.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

PLANING MILL EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

PLIERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Billings & Spencer, Ltd., Welland.

PLUG MILLERS
Banfield, Edwin J., Toronto.

PRESSES, ARBOR
Atlas Press Co., Kalamazoo, Mich.
Metalwood Mfg. Co., Detroit, Mich.

PRESSES, BANDING
Chapman Double Ball-Bearing Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Wm. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

PRESSES, HAND FORCING
Atlas Press Co., Kalamazoo, Mich.

PRESSES, BROACHING
E. W. Bliss Co., Brooklyn, N.Y.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo, O.

PRESSES FOR SHELLS
Atlas Press Co., Kalamazoo, Mich.
Charles F. Elmes Eng. Works, Chicago.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER
Lymburner, Ltd., Montreal.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, DROP AND FORGING
W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago, Ill.
Can. Fairbanks-Morse Co., Montreal.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.
Wm. R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

PRESSES, HYDRAULIC
Bawden Machine Co., Toronto, Ont.
John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, BALING
William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

PRESSES, SCREW
Barnes, W. F. & John, Co., Rockford, Ill.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Erie Foundry Co., Erie, Pa.

PRESSURE REGULATORS
Can. Fairbanks-Morse Co., Montreal.

PROPELLERS
Ontario Specialties, Ltd., Ottawa, Can.

PULLERS, WHEEL
The Crane Puller Co., Arlington, Mass.

PULLEYS
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Dodge Mfg. Co., Toronto, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Ltd., Toronto
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PULLEY MACHINERY, DRILLING AND TAPPING
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.

PUMPS, AIR
Bawden Machine Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
Jenckes Mach. Co., Sherbrooke, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Darling Bros., Ltd., Montreal, Que.
D'Olier Centrifugal Pump & Machine Co., Philadelphia, Pa.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

PUMPS, HIGH PRESSURE
Charles F. Elmes Eng. Works, Chicago.
Darling Bros., Ltd., Montreal, Que.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

PUMPS, ALL KINDS
Bawden Machine Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PUMPS, HYDRAULIC
Charles F. Elmes Eng. Works, Chicago, Ill.
Darling Brothers, Montreal.
Metalwood Mfg. Co., Detroit, Mich.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto.

PUMPS, LUBRICANT AND OIL
Cincinnati Lubricant Pump Co., Cincinnati, Ohio
Roper, C. F., Co., Hopedale, Mass.

PUMP LEATHERS
Graton & Knight Mfg. Co., Montreal.

PUNCHES AND DIES
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

PUNCHES, PNEUMATIC
Jno. F. Allen Co., New York.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

PYROMETERS
Peacock Bros., Montreal, Que.
Shore Instrument & Mfg. Co., New York City.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES
John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS (SEE GUARDS)

RAIL BENDERS
Niles-Bement-Pond Co., New York.

RAILROAD TOOLS
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMERS, ADJUSTABLE
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Stereotype Co., Indianapolis, Ind.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto, Ont.
Boker & Co., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McKenna Bros. Brass Co., Pittsburgh.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Boker & Co., H., Montreal, Que.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

Ribbing up the Liberal Party

HUNDREDS of men whom you know and sell to are tremendously interested either as supporters or opponents in the future of the Liberal party—in its policies, politics, and leaders. And these hundreds of men—Conservatives and Liberals alike—will want to read Gadsby's "inside" story of what is going on behind the scenes in the ranks of Liberalism in Canada.

Gadsby is "next" to big men at Ottawa and elsewhere. His ear is to the ground all the time. He is a pungent writer with a most incisive style, and he fairly scintillates in his article in the October MACLEAN'S "Ribbing Up the Liberal Party."

This article will be followed in the November issue by another "inside" story of doings and movements in the Conservative party. Read the first of the series in

MACLEAN'S MAGAZINE

for October

Some Toronto Liberals are bent on pushing Mr. Rowell, leader of the Ontario Opposition, to the front—as Sir Wilfrid's successor. And Gadsby reveals a great deal else of sensational interest. You can "cash in" on his article in **MacLean's**.

Other Good Things in the October MacLean's

Is Permanent Peace Possible?—by Stephen Leacock (in the role of a professor of political economy). Frequently Leacock doffs the mantle of the humorist, and dons his academic gown and speaks with an earnest seriousness—as a student, teacher and deep thinker. In this article, Is Permanent Peace Possible? he writes to make men and women think.

The Presidential Situation in the U.S.A.—by Agnes C. Laut. Miss Laut says that the German-Americans will support Wilson rather than Hughes, and gives her reasons. This is quite a contrary view to that commonly held, for we all knew that the Hyphenates were "sore" on Wilson a few months ago. What has changed them? Mis Laut tells.

The Man from Athabasca—by Robert W. Service. Another "At the Front" poem by this Kipling of Canada. The stirring tale in verse of an old Athabasca trapper who left the hunting grounds of the Far West to do his bit in France and Flanders. A fine thing, this poem, admirably illustrated.

Present-Day Stage Favorites in London—tells of London's play-people who are entertaining the Canadian soldiers in London, at the camps and in the hospitals. Profusely illustrated.

Arthur Stringer and Arthur E. McFarlane continue their fine serials The Anatomy of Love, and Behind the Bolted Door?

Robert J. C. Stead, a young Western poet of great promise contributes verse entitled "In the Wheat."

"Janey Canuck," Canada's First Woman Magistrate a sketch of Mrs. Arthur Murphy, and incidentally a story of a phase of the Woman's Movement in Western Canada.

Review of Reviews—The best thing from the best periodicals, condensed for busy readers. One of the most prized features of every issue of **MacLean's**.

* * *

THE Mission of MacLean's Magazine is to give the Canadian people a **Canadian** magazine of the highest type and interest and to promote the spirit and progress of Canadian Nationality. Your co-operation in these commendable objects of **MacLean's** publishers is solicited. We have all much to gain by putting Canada first in sentiment, business and affection.

REAMERS, STEEL TAPER AND SELF-FEEDING
Boker & Co., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont

REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Tool Co. of Canada, Toronto.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Lachapelle, J. D., & Co., Montreal, Que.

RIVET MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Cook, Asa S., Co., Hartford, Conn.
National Machinery Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

RIVETS, TUBULAR, BIFURCATED
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
Jno. F. Allen Co., New York.
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.

RIVETING MACHINES, ELASTIC ROTARY BLOW
Grant Mfg & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.

ROLLS, BENDING
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.

ROLLS, CRUSHING
Jenckes Mach. Co., Sherbrooke, Que.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence
James Chesterman & Co., Ltd., Sheffield, Eng.
L. S. Starrett Co., Athol, Mass

SAND BLASTS
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Gray Mfg. & Machy. Co., Toronto, Ont.

SAND BLAST SYSTEMS
Whiting Foundry Equipment Co., Harvey Ill.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt. & Son, Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

SAWS, CIRCULAR METAL
H. A Drury Co., Montreal.
Hunter Saw & Machine Co., Pittsburg, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)

SAWS, INSERTED TOOTH
Tabor Mfg. Co., Philadelphia, Pa.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

SCRAP IRON
L. S. Tarshis & Sons, Montreal.

SCREW MACHINE PRODUCTS
Milholland, W. K., Co., Indianapolis.

SCREW MACHINES, HAND, AUTOMATIC
Bawden Machine Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Garvin Machine Co., New York.
A. B Jardine & Co., Hespeler.
Milholland, W. K., Co., Indianapolis, Ind.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Stereotype Co., Indianapolis, Ind.
Warner & Swasey Co., Cleveland, O.
A. E. Williams Machy. Co., Toronto.

SCREW MACHINES, MULTIPLE SPINDLE
New Britain Machine Co., New Britain, Conn.
Windsor Machine Co., Windsor, Vt.

SCREWS
Galt Machine Screw Co., Galt, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
Wells Bros. Co. of Canada, Galt, Ont.

SCREW SLOTTERS
Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY
Baird Machy. Co., W. J., Detroit, Mich.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
New York Machinery Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Simmons Machine Co., Albany, N.Y.
H. A. Stocker Co., Chicago, Ill.

SET SCREWS, SAFETY
Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Hendey Machine Co., Torrington, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.

SHAFTING
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Dodge Mfg. Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
A. R. Williams Machy. Co., Toronto.

SHARPENING STONES
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

SHAVINGS, SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

SHEARING MACHINES, ANGLE IRON, BAR AND GATE
John Bertram & Sons Co., Dundas.
Bertrams, Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo.

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John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

SHEARS, PNEUMATIC
John F. Allen Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada.

SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Steel Bending Brake Works, Ltd., Chatham, Ont

SHEET METAL STAMPINGS
Coleman Fare Box Co., Toronto, Ont.
Dominion Forge & Stpg. Co., Walkerville, Ont.

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Lymburner, Ltd., Montreal.
Perrin, Wm. R., Toronto.
West Tire Setter Co., Rochester, N.Y.

SHELL PAINTING MACHINE
Can. Blower & Forge Co., Kitchener, Ont.

SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.

SHRAPNEL SHELL MARKER
Brown-Boggs Co., Hamilton, Ont.
Noble & Westbrook Mfg. Co., Hartford, Conn.

SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.

SILVER SOLDER
Geo. H. Lees & Co., Hamilton, Ont.

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Aikenhead Hardware Co., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

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Niles-Bement-Pond Co., New York.

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Brown & Sharpe Mfg. Co., Providence.
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Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedfor
J. H. Williams & Co., Brooklyn, N.Y

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Brown, Boggs & Co., Hamilton, Can.

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Tallman Brass & Metal Co., Hamilton.

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Banfield, Edwin J., Toronto.
W. H. Banfield & Sons, Toronto.
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Baird Machine Co., Bridgeport, Conn.
Bawden Machine Co., Toronto, Ont.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Brown Engineering Corp., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Cunningham & Sons, St. Catharines, Ont.
Charles F. Elmes Eng. Works, Chicago.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
Grant Mfg. & Machy. Co., Bridgeport, Conn
John H. Hall & Sons, Brantford.
Himoff Machine Co., New York, N.Y
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Jenckes Mach. Co., Sherbrooke, Que.
D. McKenzie Machinery Co., Guelph, Ont.
Root & Van Dervoort Engr. Co., East Moline, Ill
Smart-Turner Machine Co., Hamilton, Ont.
Webber Bros. Mach. Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.

SPIKE MACHINES
The Smart-Turner Machine Co., Hamilton.

SPIRAL CONVEYORS
Can. Matthews Gravity Carrier Co., Toronto, Ont

SPRING COILERS
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn

SPRINGS, MACHINERY
Barnes, Wallace, Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Jas. Steele, Ltd., Guelph, Ont.

SPROCKETS, CHAIN
Grant Gear Works, Boston, Mass.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.

SPROCKET WHEELS, CAST
Perrin, Wm. R., Toronto.

STAIRS, IRON
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Canada.

STAMPINGS
Dom. Forge & Stpg. Co., Walkerville, Ont.

STAMPING MACHINERY
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.

STAMPS S,TEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Can.

STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.
H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.

STEEL ALLOY (SEE ALLOYS, STEEL)

STEEL BENDING BRAKES
Steel Bending Brake Works, Ltd., Chatham, Ont.

STEEL, CARBON, FERRO-TUNGSTEN
Boker & Co., H., Montreal, Que.
Tivani Electric Steel Co., Belleville, Ont.
Vanadium-Alloys Steel Co., Pittsburgh, Pa
Zenith Coal & Steel Products, Montreal, Que.

STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont
Union Drawn Steel Co., Hamilton, Ont.

STEEL DRUMS
Smart-Turner Machine Co., Hamilton, Ont.

STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.

STEEL, HIGH SPEED
Armstrong Whitworth of Canada, Ltd., Montreal.
Boker & Co., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Ltd., Montreal.
Hawkridge Bros. Co., Boston, Mass.
H W. Petrie, Toronto.
Tivani Electric Steel Co., Belleville, Ont.
Vanadium Alloys Steel Co., Pittsburg, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Young, Corley & Dolan, Inc., New York, N.Y.
Zenith Coal & Steel Products, Montreal, Que.

STEEL DIE ENGRAVING
Noble & Westbrook Mfg. Co., Hartford, Conn.

STEEL VANADIUM
Boker & Co., H., Montreal, Que.
Drury, H. A., Co., Montreal, Que.
Tivani Electric Steel Co., Belleville, Ont.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa.

STELLITE, HIGH-SPEED TOOL METAL
Can. B. K. Morton Co., Toronto, Ont.

STOCK RACKS FOR BARS, PIPING, ETC.
New Britain Machine Co., New Britain Conn

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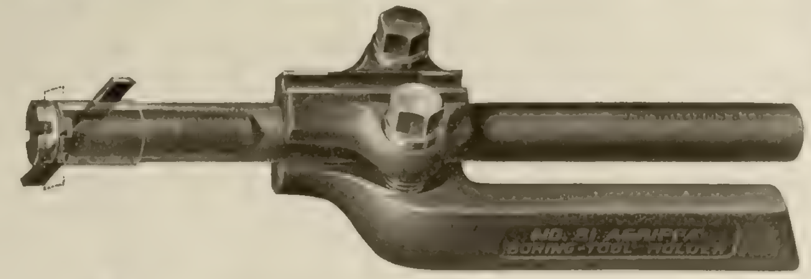

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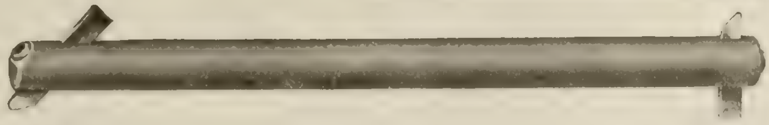

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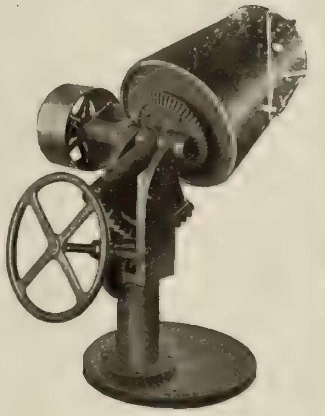

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A weekly newspaper devoted to the machinery and manufacturing interests.

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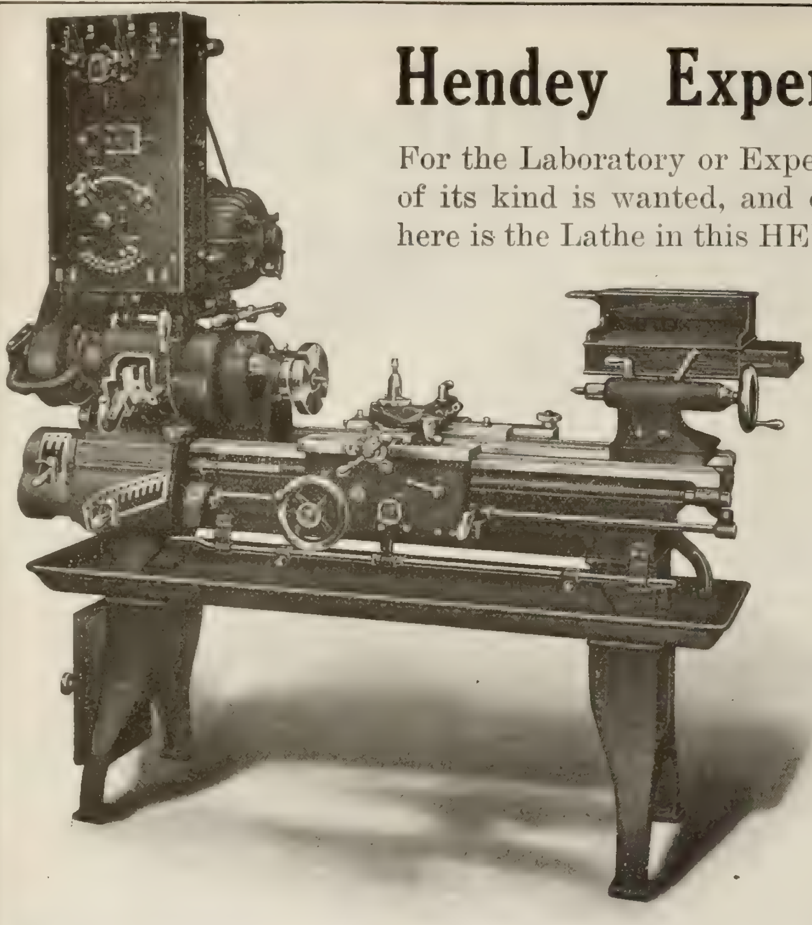

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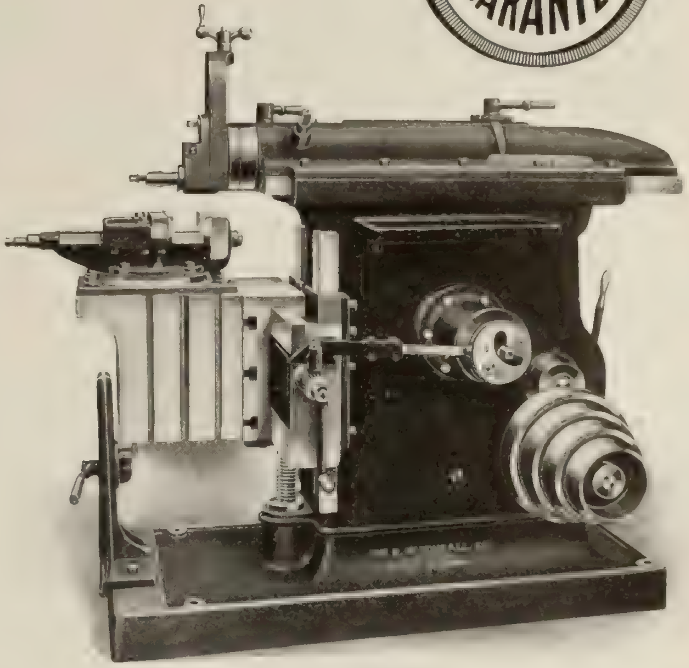

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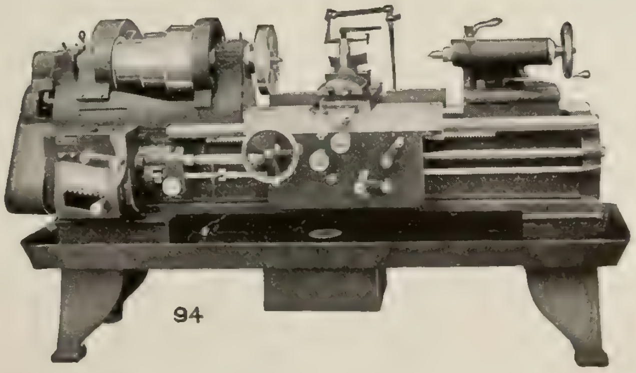
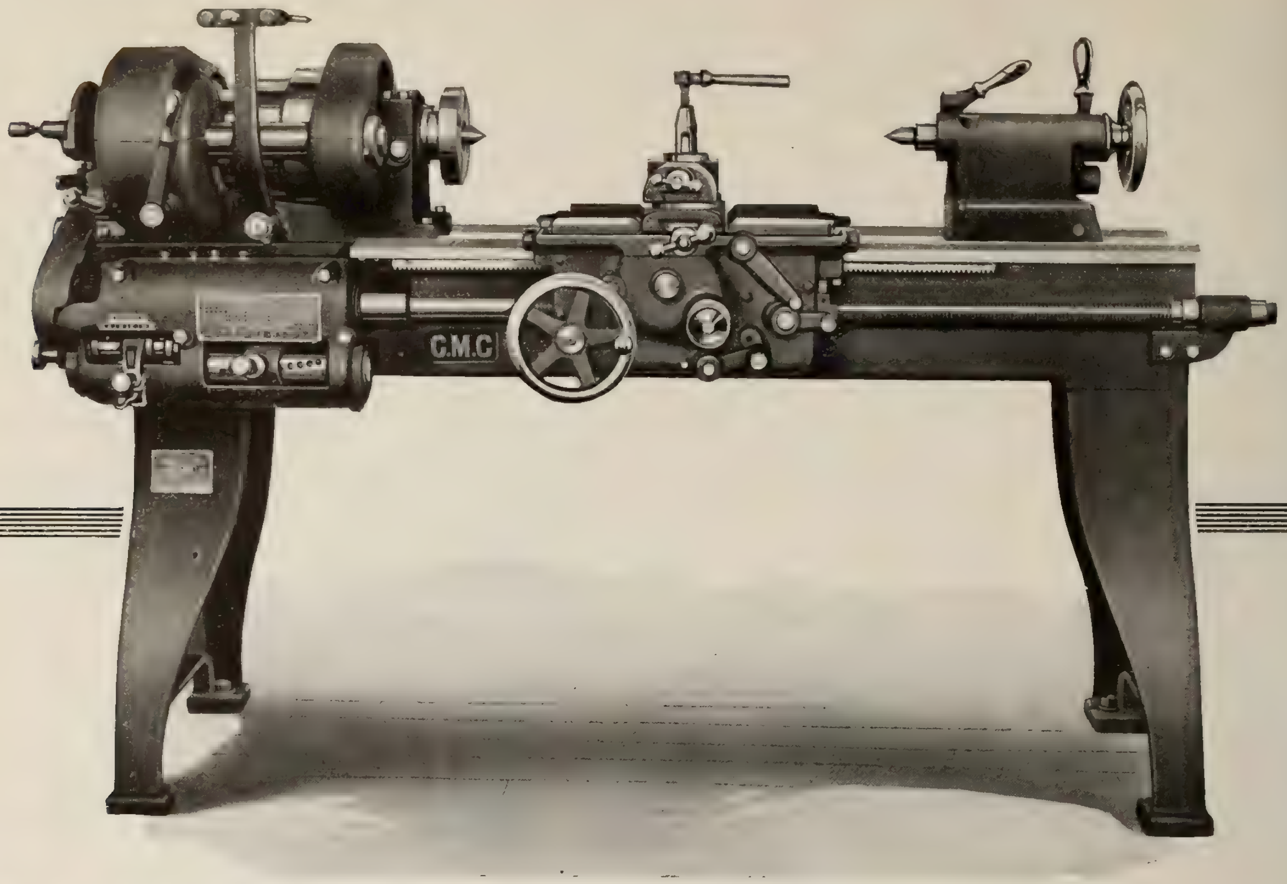
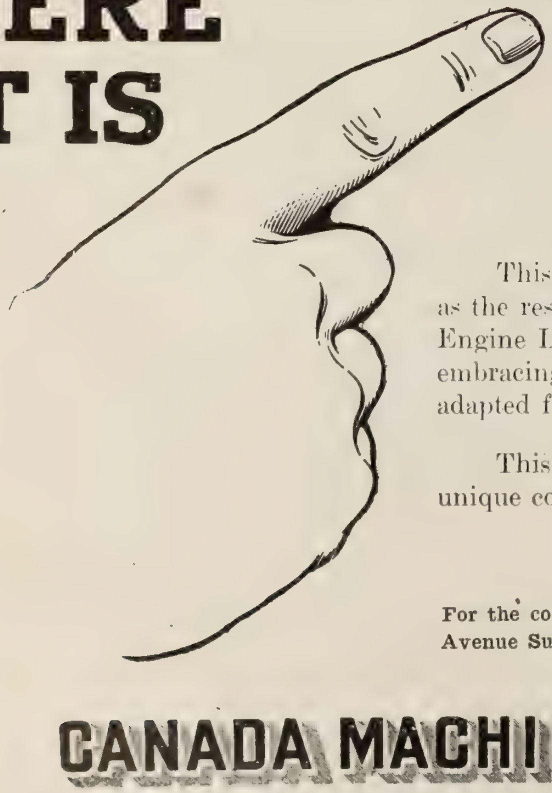


- [illegible] 28 x 12 Boye & Emmes Quick Change Gear Lathe.
- 1 2[illegible] x 12 Boye & Emmes Quick Change Gear Lathe.
- 1 20 x 8 Boye & Emmes Quick Change Gear Lathe.
- 2 20 x 10 Sidney Quick Change Gear Lathes.
- 2 16½ x 8 Cincinnati Quick Change Gear Lathes.
- 1 24 x 8 National Quick Change Gear Lathe.
- 1 2[illegible] x 8 Walcott Quick Change Gear Lathe.
- 2 22 x 10 Milwaukee Semi Quick Change Gear Lathes.
- 5 18 x 8 Mueller Lathes, 3-step cone, double back gear.
- 1 18½ x 8 Cincinnati Quick Change Gear Lathe.
- 1 [illegible] x 8 Foster Geared Friction Head Turret Lathe.
- 1 17 x 8 Sidney Quick Change Gear Lathe.
- 1 16 x 10 Bradford Std. Engine Lathe with taper attachment.
- 1 18 x 10 C.M.C. Turret Lathe.
- 1 36 x 14 Conradson Turret Lathe, for 6" 9" and 12" shells.
- [illegible] No. 1 Foster Geared Friction Head Screw Machine.
- 1 No. 1 [illegible] Turret Screw Machine.
- 1 No. 4 Wells Bros. ½" to 2" Bolt and Pipe Cutter.
- 2 No. 2 Ford-Smith Plain Milling Machines, with vise.
- 1 No. 4 Niagara Inclinable Back Power Press.
- 1 24" Monarch Sliding Head Drill Press.
- 1 2[illegible]" Sibley Sliding Head Drill Press.
- 3 2[illegible]" Buffalo Back Geared Drill Presses.
- 2 16" Four-spindle Drill Presses.
- 3 14" Three-spindle Drill Presses.
- 4 12" Single Spindle Drill Presses.
- 1 Style B Pont. Willmarth & Morman Drill Grinder.
- 1 Universal Tool and Cutter Grinder.
- 1 2[illegible]" Smith & Mills Back Geared Shaper.
- 1 26" Kelley Back Geared Shaper.

THE FOSS & HILL MACHINERY CO.
305 ST. JAMES STREET - - - - MONTREAL, QUE.



HERE IT IS



14-INCH QUICK-CHANGE ENGINE LATHE

a new addition to the C.M.C. Line of High-Grade Machine Tools

This 14-inch Quick-Change Engine Lathe has recently been designed as the result of many years' experience in using, building and designing Engine Lathes, to meet the demands for a Quick-Change Engine Lathe, embracing all modern improvements of practical value; it is especially adapted for use in the most exacting Tool Room.

This Lathe marks an advance on the Engine Lathes sold to-day in its unique combination of handiness, convenience and adaptability.

Write for full particulars.

For the convenience of the Trade, we have opened Showrooms in Toronto, at Brock Avenue Subway, where a full line of our machinery can be inspected.

CANADA MACHINERY CORPORATION

LIMITED

GALT, ONTARIO

BUILDERS OF MACHINE TOOLS AND WOODWORKING MACHINERY

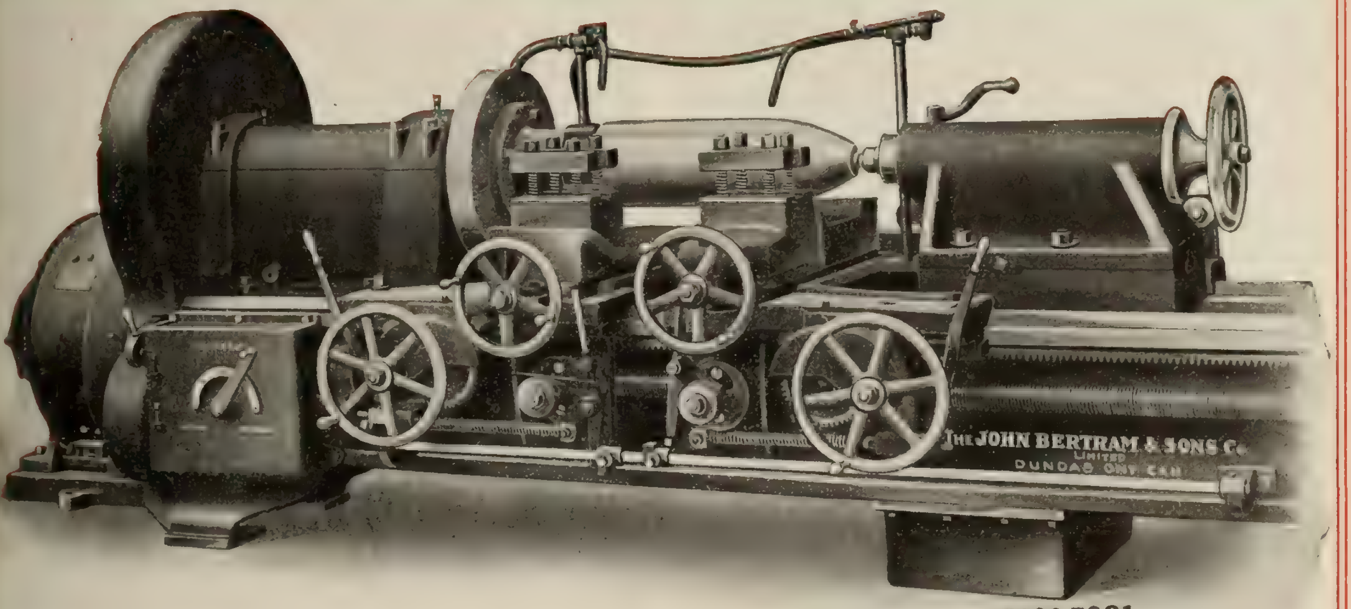
C.M.C.

EDITORIAL INDEX PAGE 111 BUYER'S DIRECTORY PAGE—97 ADVERTISING INDEX PAGE—112

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

ol. XVI—No. 13 Publication Office: Toronto, Sept. 28, 1916 Subscription Price $3.00 per Year



A Single Purpose Lathe for Machining 9.2 Shells

One Carriage is arranged to form the nose of the shell while the other is machining the parallel part of the body. A modification of this lathe is also furnished for machining the driving band recess of 9.2 shells, including the wave ribbing and undercutting.

BERTRAM MACHINE TOOLS

Let us quote you on special Shell Machinery and Equipment.

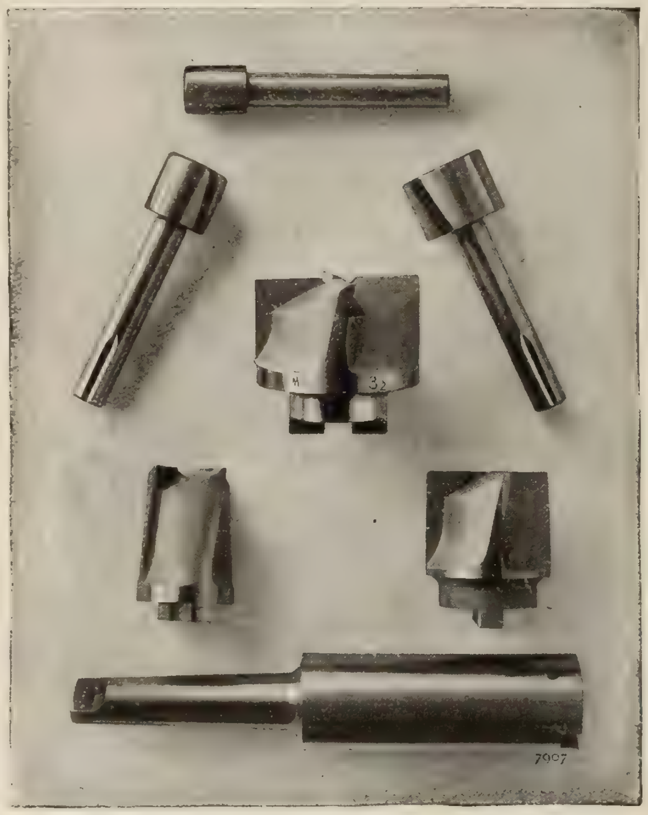
The John Bertram & Sons Co.
Limited
Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Building

WINNIPEG
1205 McArthur Bldg.

The Right Combination At Once



Holder, Cutter and Guide

For every counterboring job you can immediately make the right combination of holder, cutter and guide, if your tool room is equipped with

P. & W. Interchangeable Cutter Counterbores

Holders, Cutters and Guides furnished in wide range of sizes.

Holders

End of holder is milled to receive the driving lug of the cutter and there is also a hole and set screw to accommodate the shank of the guides.

Guides

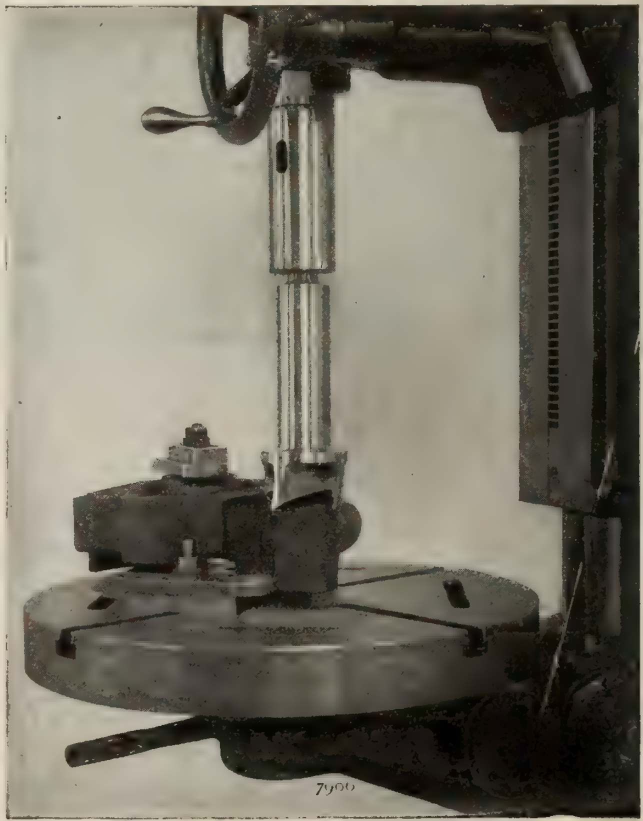
Are of hardened tool steel. They are held in place by means of a set screw in the holder engaging a V-slot in the shank of the guide.

Cutters

Can be furnished of either carbon or high speed steel.

The shank of the guide passes through the hole in the cutter and the shoulder between the guide and its shank keeps the cutter in place. Cutters can be sharpened on the face and the guide is simply pushed further in the hole after grinding.

Write for catalog "Small Tools" showing our complete line.

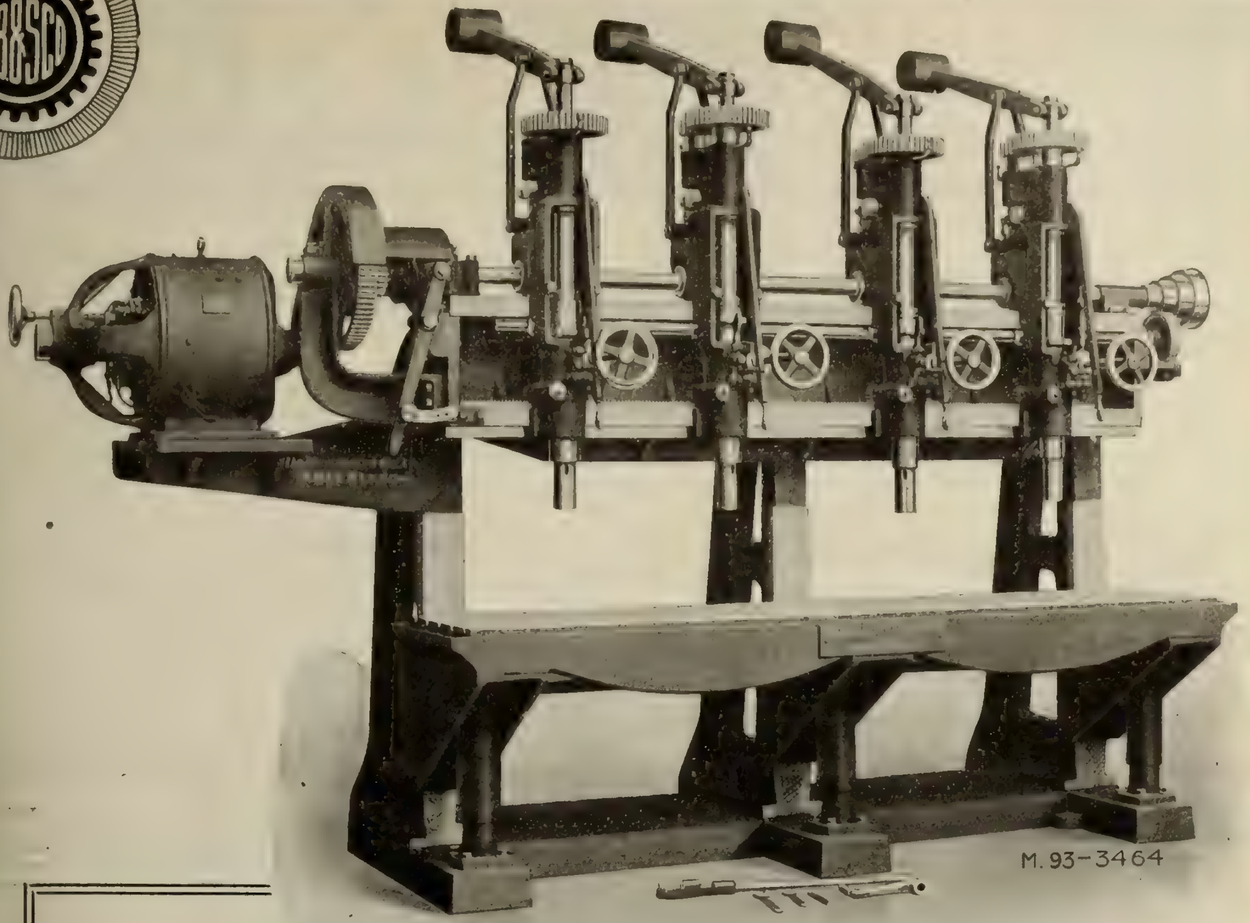


Spot Facing
with a P. & W. Interchangeable Cutter Counterbore

Place a trial order with our nearest store.

Pratt & Whitney Company of Canada, Limited

DUNDAS Ontario	**MONTREAL** 723 Drummond Bldg.	**WINNIPEG** 1205 McArthur Bldg.	**VANCOUVER** B.C. Equipment Co.



Multiple Drills

OF EVERY DESCRIPTION

Bertram Four-Spindle Multiple Drilling Machine for Locomotive and Other Work

SIMULTANEOUS OR INDEPENDENT FEEDS WITH INDEPENDENT KNOCK-OFF FOR EACH HEAD AND CLUTCH DRIVE FOR EACH SPINDLE.
CAPACITY, FOUR 2-inch HOLES IN STEEL.

Drop us a line for photographs and full particulars.

The John Bertram & Sons Company
Limited

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO September 28, 1916

Selling the Buyer

(No. 3 of a Series of Short Articles)

Educating Future Customers

NO manufacturer is in business to-day with the avowed purpose of retiring to-morrow. Rather do the majority wish to leave behind them, in their businesses, proud monuments to their earlier efforts and to their integrity and ability.

The importance of educating the coming superintendents, master mechanics, foremen and managers will not be disputed by the far-seeing. It is perhaps a too seldom recognized truth in connection with advertising in reputable technical journals like Canadian Machinery, that future buyers can be educated while present sales are being influenced. We would like that thought to STICK.

As one leading manufacturer said to us not long ago in arranging for the use of increased space, "I have been thinking about our advertising a very great deal lately and I have reached this conclusion; that it would be nothing short of absolute folly for us to discontinue our advertising even temporarily. New men are coming into the field, new companies are being formed, new plants being erected. The foremen of to-day will soon be superintendents. The superintendents of old plants will secure the same or higher positions in new shops. Changes are constantly taking place. I am signing cheques for firms from whom we ourselves are buying and who were not in existence when I did the buying, personally, a few years ago. If we wish to continue to be as well known as we are to-day, I am convinced we must continue to educate the future buyers through uninterrupted advertising."

CANADIAN MACHINERY
and Manufacturing News
143-153 University Avenue, Toronto

Quality **Service**

Courtesy in Business

* * *

Fittingly framed and hanging in the Offices of one of the most important Public Service Corporations on this North American Continent is the following

> **'Did you say Please and Thank you?'**

Broad minded men direct the destiny of that Corporation, men who know that public or private enterprises to be lastingly successful must operate for the public good.

Quality and Service are the two important factors in our business life today, but Courtesy is the door through which they must enter.

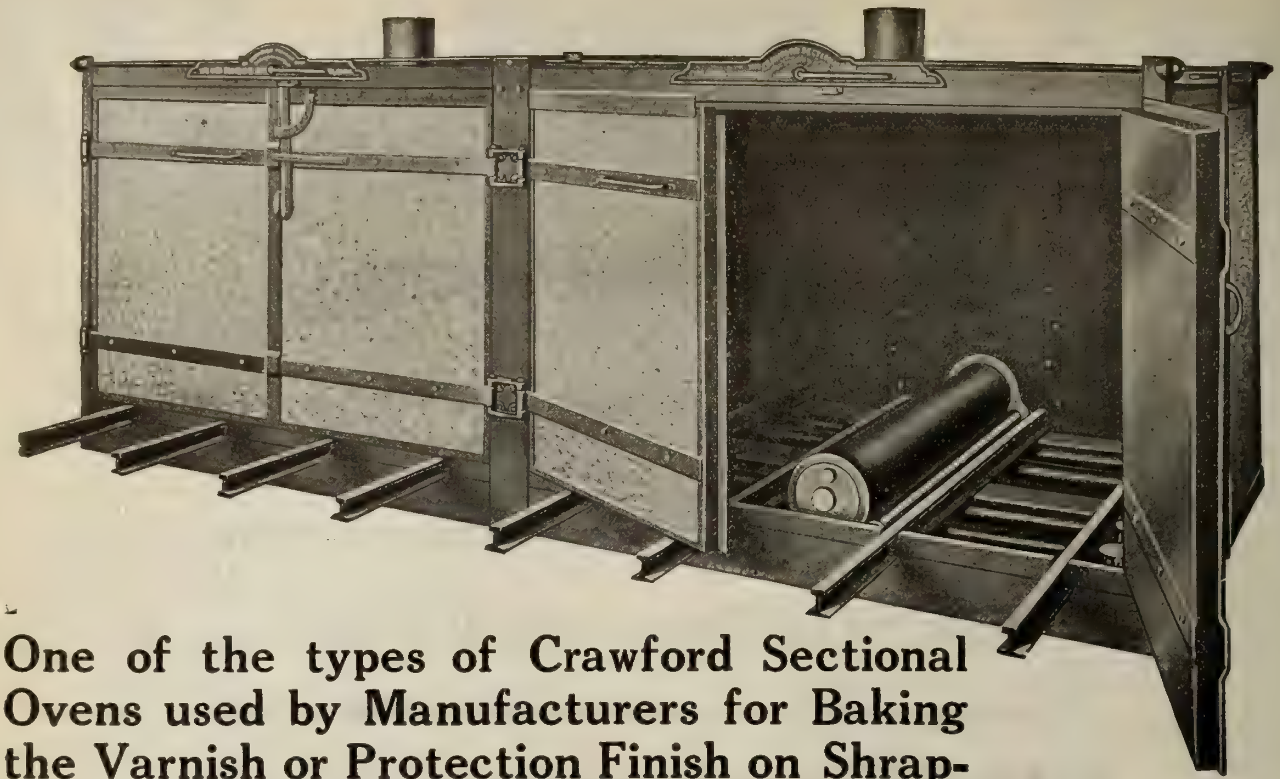
We are large producers of Hamilton Pig Iron and our output of Open Hearth Steel Blooms and Billets, Iron and Steel Bars of all shapes and size runs into enormous tonnage.

The products of our mills include practically everything that can be manufactured from Iron and Steel and these we distribute to thousands of satisfied customers.

Our business is an extensive one and a successful one. The World is our market: but our prosperity and success in the future, as in the past, depend upon the continued confidence, co-operation and good-will of the people we serve.

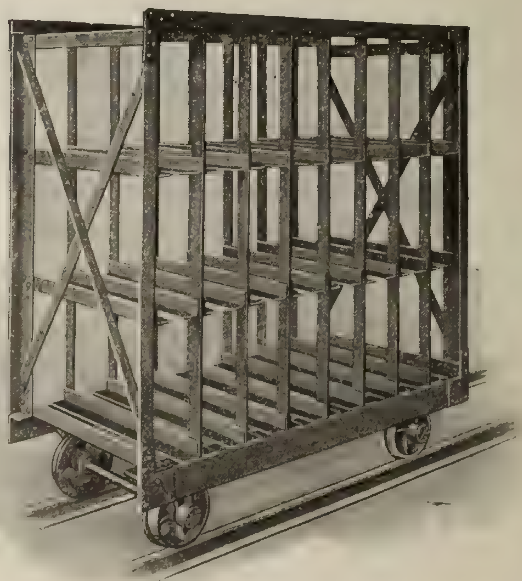
The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG



One of the types of Crawford Sectional Ovens used by Manufacturers for Baking the Varnish or Protection Finish on Shrapnel and High Explosive Shells.

These ovens are equipped with the only gas burner that gives a combined radiated heat and circulation of preheated air in the oven.



The gas and air are mixed and combustion in the large cylinder supported by air from a positive pressure blower which gives the highest efficiency and economy known for burning either city, natural, gasoline or producer gas, and there is no exposed flame in the oven.

The truck shown holds (120) twenty-eight-pound shells and is planned to stand the shells on end, resting on angles. Other designs have been built for shells ranging in weight from fifteen to eight hundred pounds, the last mentioned shell being forty-eight inches high by twelve inches in diameter.

The Oven Equipment & Manufacturing Company
NEW HAVEN, CONN., U.S.A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA

STELLITE

A NEW EPOCH IN CUTTING METALS

Stellite is so far superior to all other cutting metals that there is no comparison between them. It's use marks a new epoch in cutting metals where speed and endurance counts.

Stellite contains no iron or steel, but it will do from 20 to 100 per cent. more work than the best High-Speed Steel.

Stellite will take **bigger cuts** at a **higher speed** than is possible with any tool steel.

Stellite is a **money saver.**

Made in Canada by
The Deloro Mining & Reduction Co., Ltd.
DELORO, ONTARIO

The Can. B. K. Morton Co., Ltd.

Sole Selling Agents for Canada and Newfoundland
49 Common St., Montreal, Que.
86 Richmond St. East, Toronto, Ont.

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX	Carbon Tool Steel
High Speed Steel, Atlas LX	"Deward" Oil Tempering, Non-Shrinking
Chrome Vanadium Steel	

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

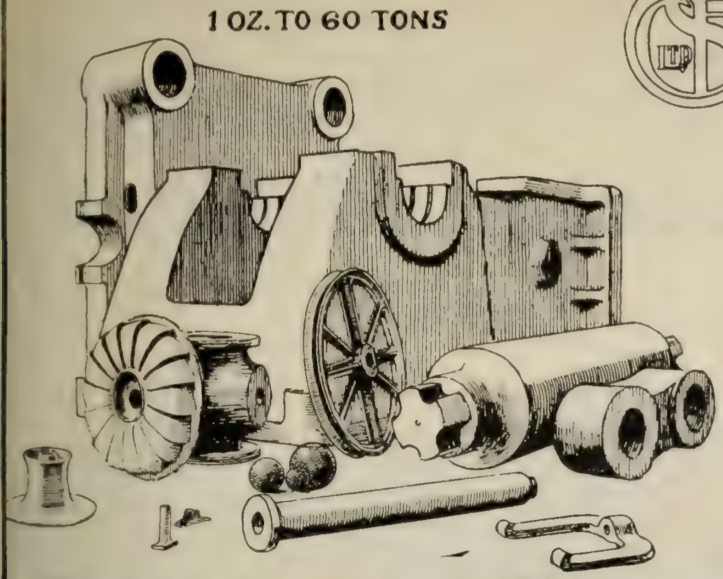
YOUNG, CORLEY AND DOLAN, Inc.

115 BROADWAY, NEW YORK CITY, U.S.A.

ARMSTRONG, WHITWORTH OF CANADA, LIMITED
22 VICTORIA SQ.
MONTREAL
P.Q.
"T.Y.R."
Highspeed Steel
(Made in Canada)
Works: LONGUEUIL, Que.
DOMINION BANK
BLD'G
TORONTO

Immediate shipment of all standard sizes and shell-turning sizes can be made from stock.

MADE IN CANADA



WE ARE MAKERS
OF
STEEL
CASTINGS
MANGANESE, VANADIUM, TITANIUM, CHROME, NICKEL, ETC.
OF ANY SIZE & OF ANY
KIND SUCH AS
HYDRAULIC, MILL GEAR,
LOCOMOTIVE, ROLLING STOCK,
MARINE,
ETC.

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

PIG IRON

"Victoria" Foundry and Malleable, made
by The Canadian Furnace Co.,
Port Colborne, Ont., Canada

M·A HANNA &Co.

M.A. HANNA & Co. Sales Agents:
CLEVELAND, O., U.S.A.

JAMES McKAY COMPANY, PITTSBURGH, PENNA., U.S.A.
Manufacturers of
SHELL FORGINGS

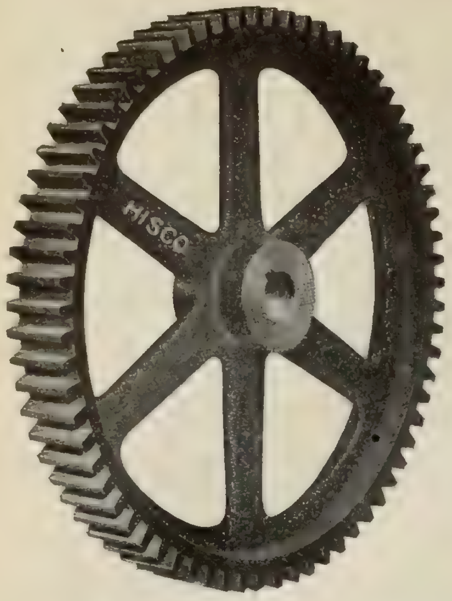
We have the Equipment and Experience and can execute orders for

Nose Sockets Base Plates Adapter Plates

For any size Shells. Can execute orders promptly.

SPECIAL FORGINGS—We can make any forging that can be made under Drop Hammers.
CHAINS AND ACCESSORY FORGINGS—We have a complete line.

Address our Representative: **JOHN A. BUCHANAN, King Edward Hotel, Toronto**



Don't make patterns for your Gears

We make

Machine Moulded Gears

Any size up to 18 feet in diameter, in either steel, semi-steel or grey iron. No patterns required.

TRADE MARK

Also manufacturers of all parts pertaining to Cement Mill Machinery, Crushing, Mining and Dredging Plants in "Adamantine," Chrome, Manganese and Nickel Steel.

Let us figure on your requirements. Write

HULL IRON & STEEL FOUNDRIES, Limited
HULL, P.Q., CANADA

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by
SIR JOSEPH JONAS, COLVER & CO., LIMITED, SHEFFIELD, ENGLAND

Sole Agents for Canada:

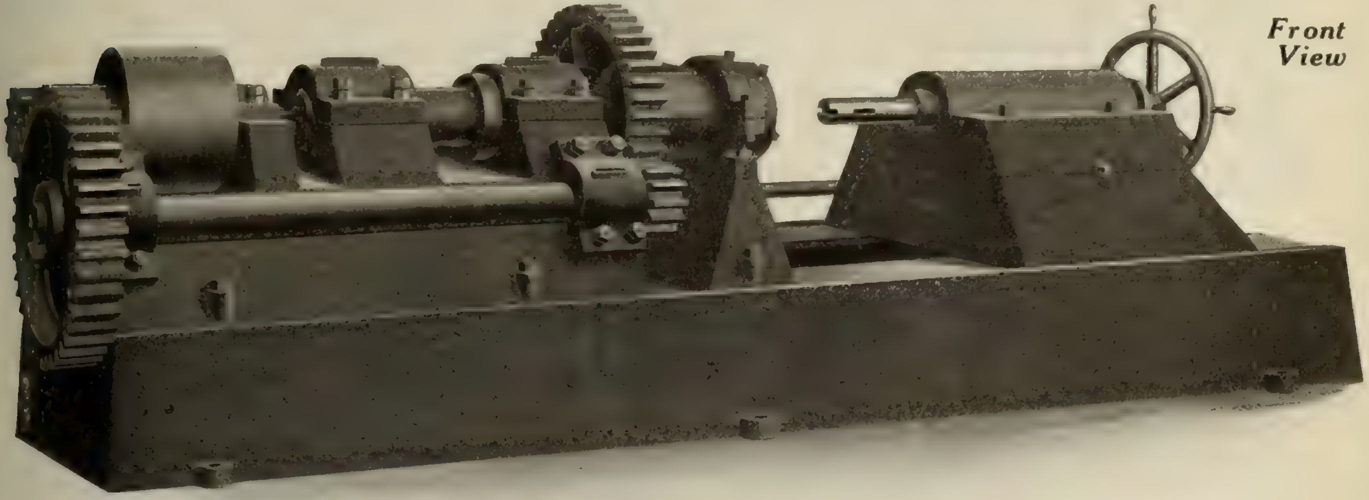
H. BOKER & CO., Inc.
(Formerly Hermann Boker & Co.)
332 St. James Street, Montreal, P.Q.
Established 1837 Incorporated 1914

GARLOCK-WALKER MACHINERY CO.
LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Heavy Duty Special "Columbus" Boring Lathe for 6-in. Shells

Combining Strength, Speed, Accuracy with maximum Capacity



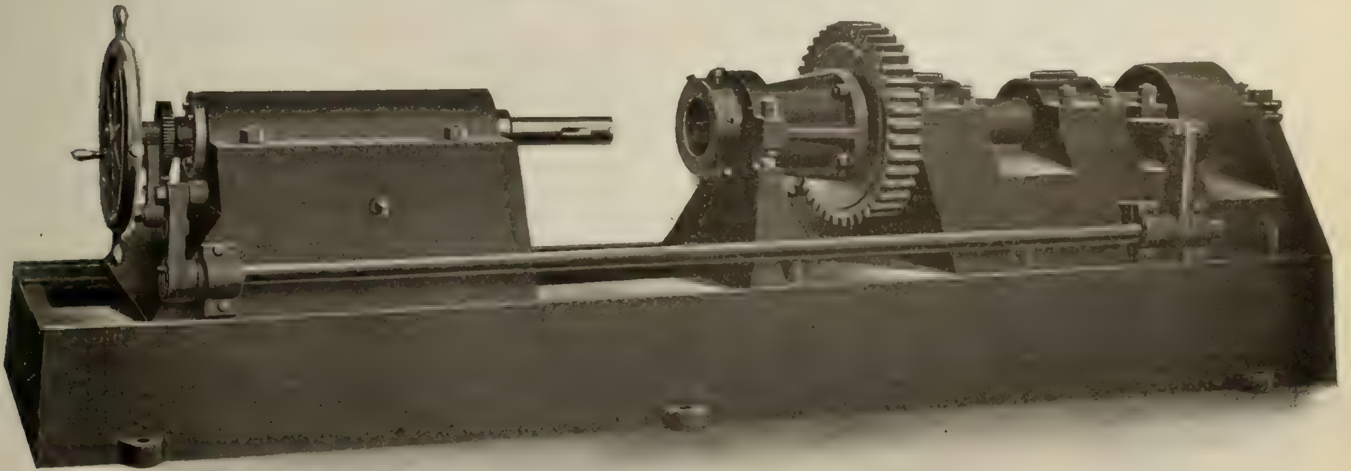
Front View

Will bore a 6-in. Shell in 5 minutes

DIMENSIONS:

Diameter and Length of Spindle Bearing	6"x10"
Diameter of Pinion and Pulley Shaft	2 15-16"
Diameter and Face of Driving Pulley	16"x10"
Diameter of Tail Stock Spindle	5"
Diameter of Tail Stock Screw	2¼"
Width of Machine Overall	4' 2"
Weight	16,000 lbs.

Extra Equipment, such as Taper Attachment, Chuck, Steady Rest, made specially to suit shell to be bored.



Rear View

Write for further particulars and special price. A few available for immediate shipment. These machines will end your boring troubles.

METAL and WOODWORKING MACHINERY of all Kinds

HAMMOND DIE BLOCKS

FOR

Difficult Dies and Record Runs

Speed in Machining

Safety in Hardening

SPECIAL

Trimmer Tool Steels

for hot and cold work

HAMMERED crucible cold trimmer Die Tool Steel means longer runs between grindings—less wasted time dragging down production.

Our Products

"Hammered from Ingot to Finished Bar"

HAMMOND STEEL & FORGING CO.

FINE TOOL STEELS

Specialists in Manufacture of
HIGH GRADE HAMMERED FORGINGS
WELDLESS RINGS, HAMMERED ALLOY STEELS, SPECIAL SHAPES

DETROIT OFFICE:
1257 David Whitney Bldg.
Phone: CHERRY 1898

MAIN OFFICES and MILLS:
Syracuse, N. Y.

EXTRA Die Steel

is produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

You get extra service from "EXTRA" DIE STEEL. A trial is convincing.

STEEL

H. A. DRURY COMPANY LIMITED

MONTREAL TORONTO NEW YORK

Manufactured By SANDERSON BROTHERS & NEWBOULD, Limited
SHEFFIELD, ENGLAND

Red Cut Superior High Speed Steel

Quality First

THE BEST FOR MACHINING ALL HARD MATERIALS

Are your tools made of Red Cut?

Send for folder

VANADIUM-ALLOYS STEEL COMPANY

PITTSBURGH, PA.
Works at Latrobe, Pa.

Hepburn—

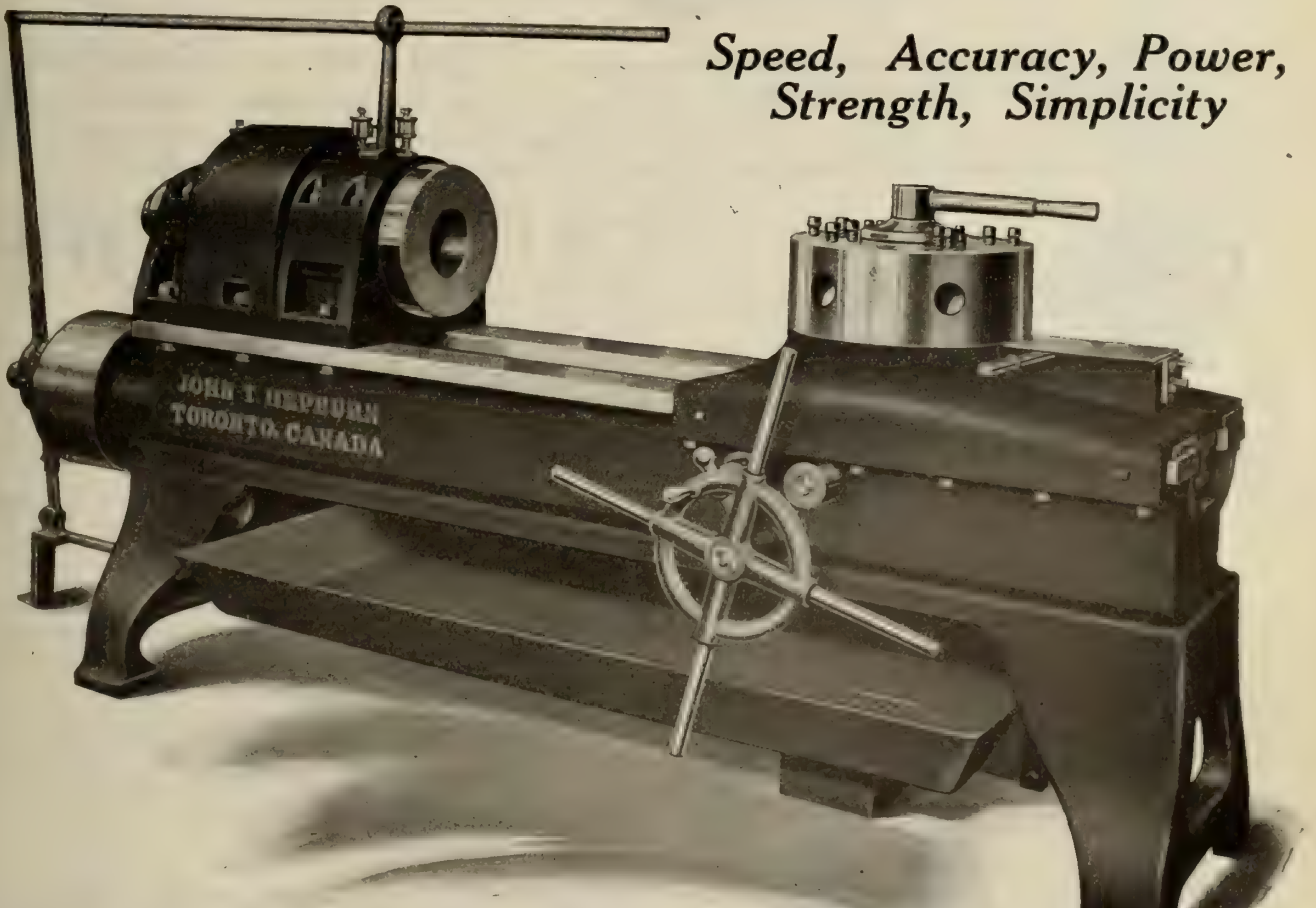
Heavy-Duty Shell Lathes

On the lathe you choose depends almost everything. Some lathes pushed on the market when demand exceeded supply have shown themselves in operation and after the lapse of time to be quite impossible and have had to be replaced by others of better make and service.

Hepburn lathes from the beginning have met the most exacting requirements, and they have been chosen in the light of experience to replace faulty ones. They can be fully depended on for maximum speed, accuracy, power, strength and simplicity —the five cardinal virtues in a heavy-duty lathe.

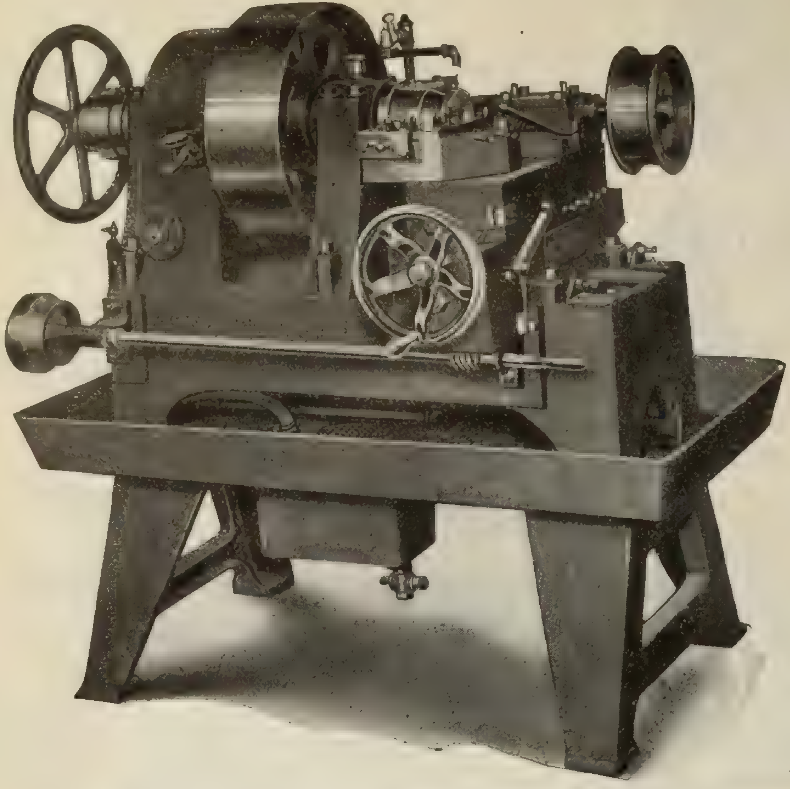
We make turning and turret lathes up to and including 9.2".

Write us for complete specifications.



Speed, Accuracy, Power, Strength, Simplicity

John T. Hepburn, Limited
18 to 60 Van Horne Street
TORONTO, CANADA



For Turning, Facing and Milling the thread on Gas Check Plugs for 6-inch High Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling. driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells, Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

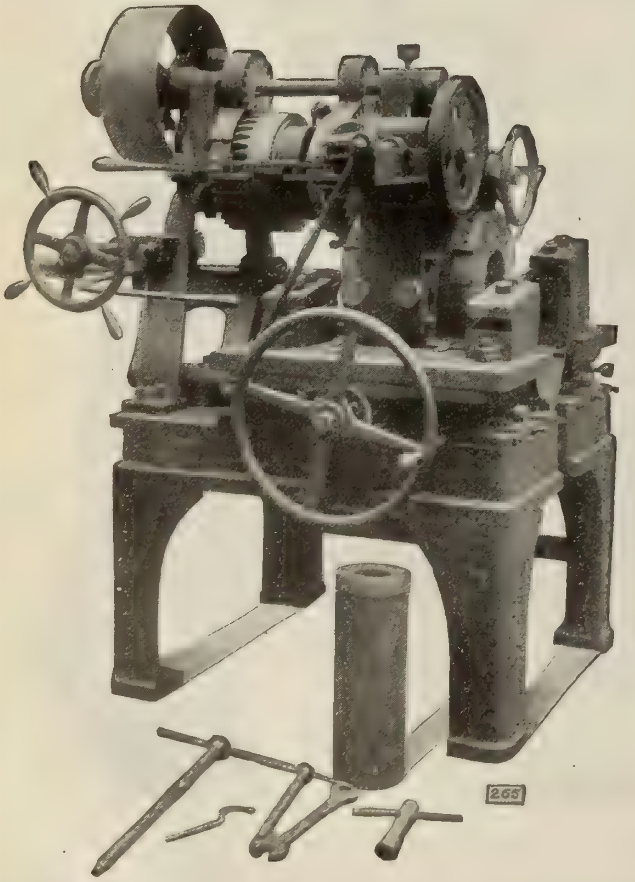
These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield
STAIR BUILDING, TORONTO, ONT.



CUTTING-OFF MACHINES

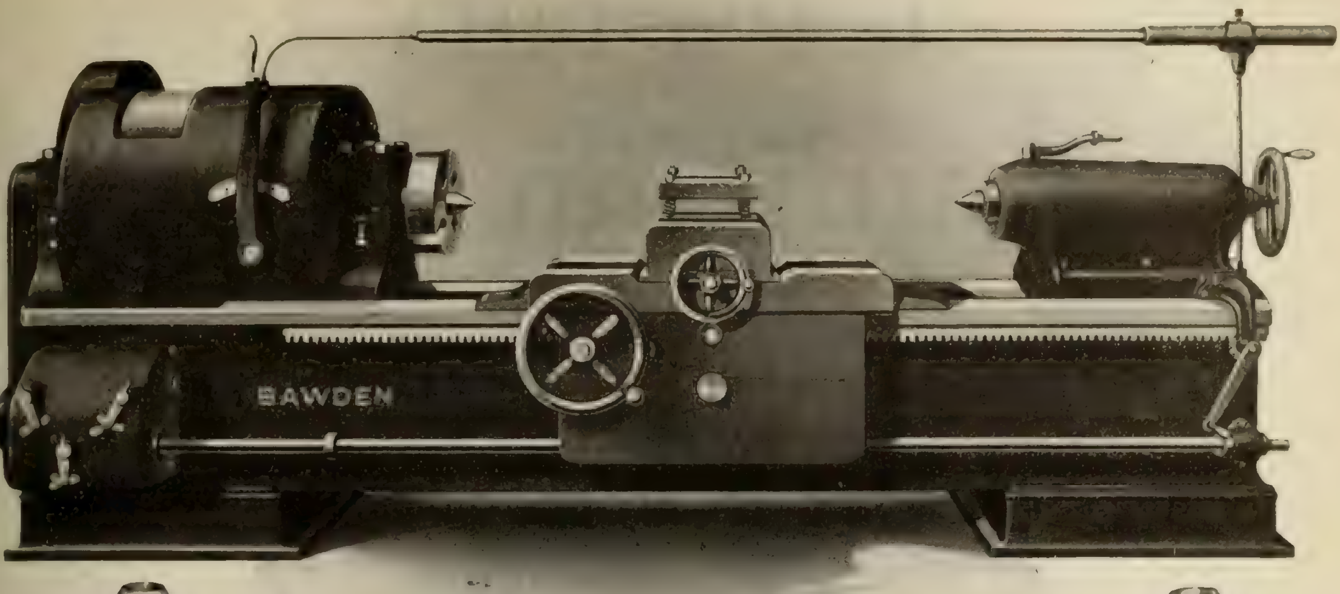
Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

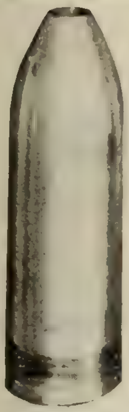
Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

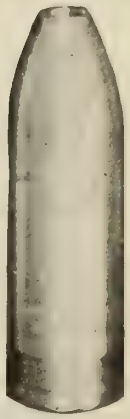
THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.





Here is a lathe that will give service long after war is over, for it is made tremendously strong—this for heavy duty work, where rigidity and accuracy are imperative and can be obtained only by a strong machine perfectly made.

BAWDEN

Heavy Duty Shell Lathes

are not experiments. They have been proven in many a munitions factory in Canada to be everything claimed for them. They stand up under the severest strain and give the service required of them in an eminently satisfactory manner. One Lathe has sold another and another.

We invite your inquiries for names of factories where these lathes are installed. See them at work; investigate them as you will. History assures us that we have nothing to dread and everything to hope for, in the munition. Send for printed matter giving full specification.

N.B.—We manufacture a full line of gauges for all sizes of British, Russian and French shells, and component parts.

The Bawden Machine Co., Limited

TORONTO, CANADA

HEAVY DUTY

Ammunition Lathes

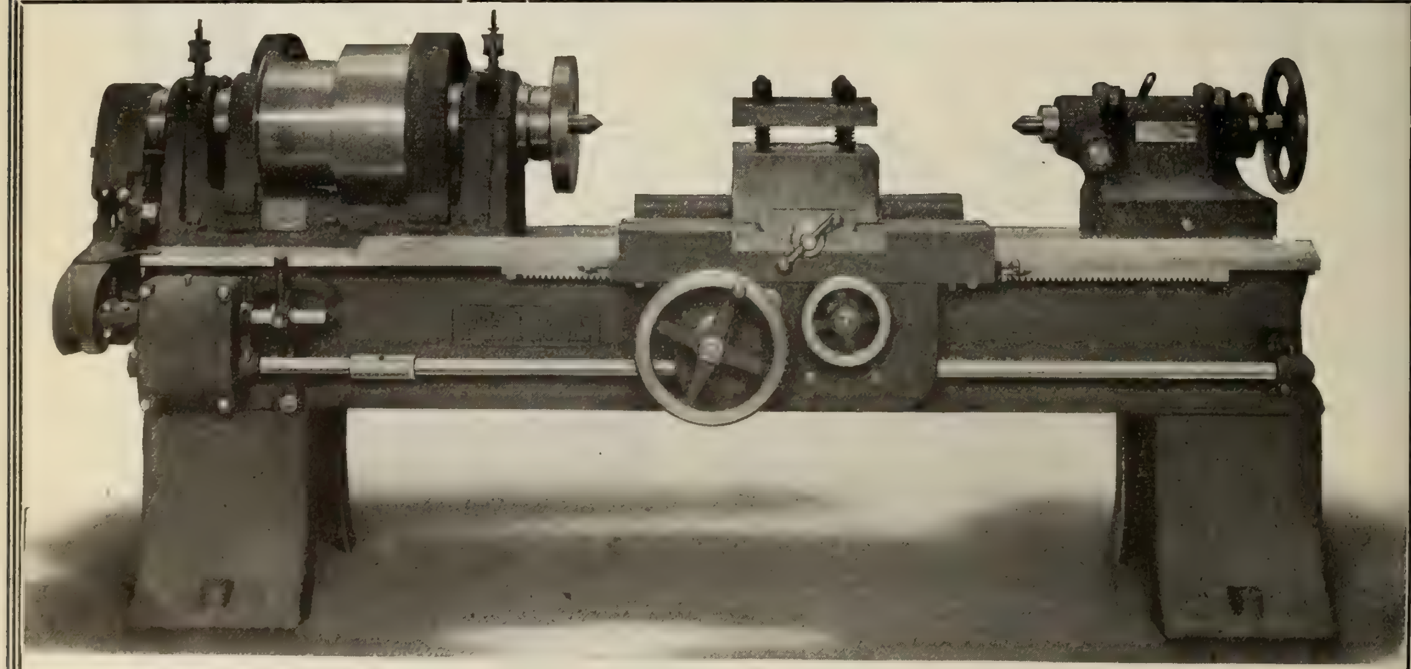
FOR

Immediate Delivery

FULL INFORMATION ON REQUEST TO

HYDE ENGINEERING WORKS

27 WILLIAM STREET - - - MONTREAL, P.Q.



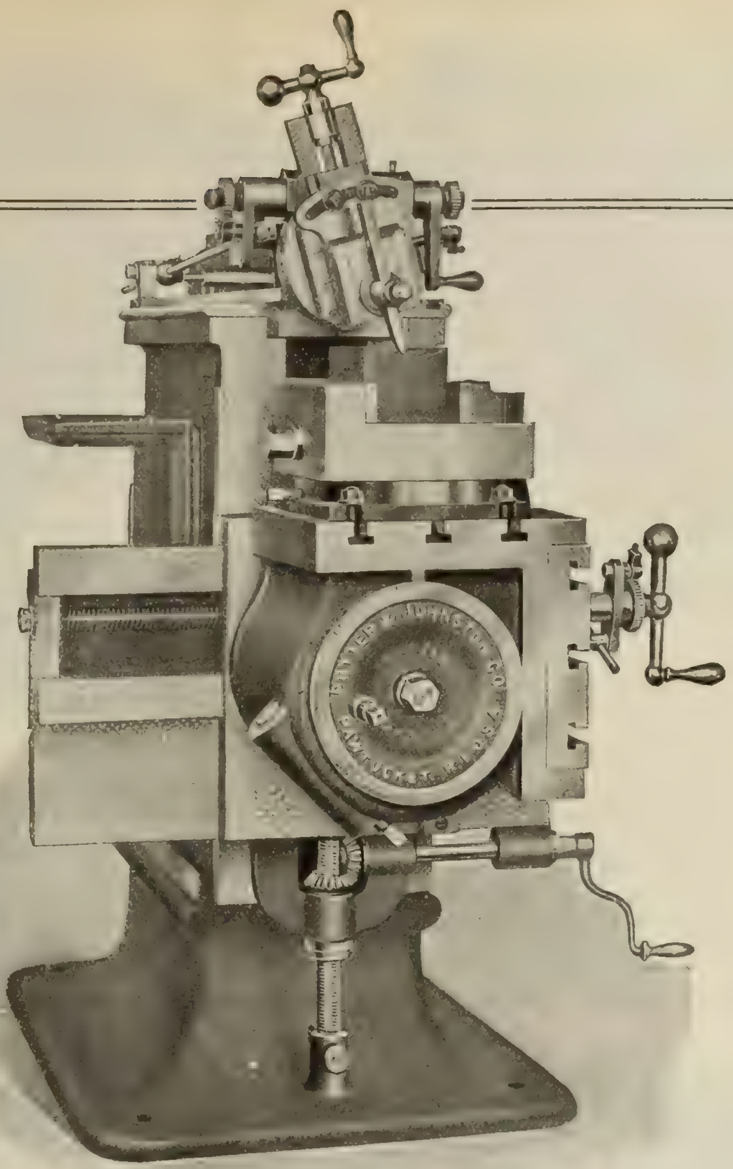
Petrie 20-inch Heavy Duty Manufacturing Lathe

A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

Made in Canada Reasonable Price Prompt Deliveries

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

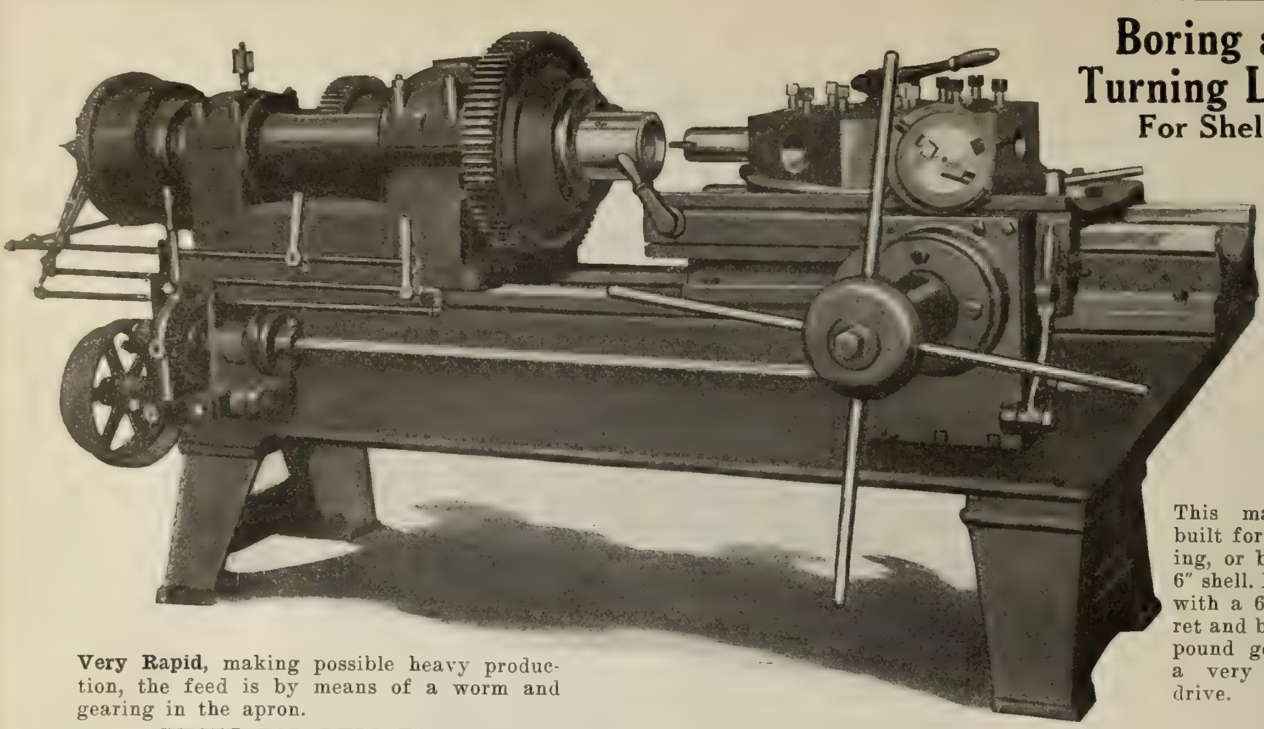
Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

Boring and Turning Lathe

For Shell Work



This machine is built for base facing, or boring the 6" shell. It is made with a 6 side turret and being compound geared has a very powerful drive.

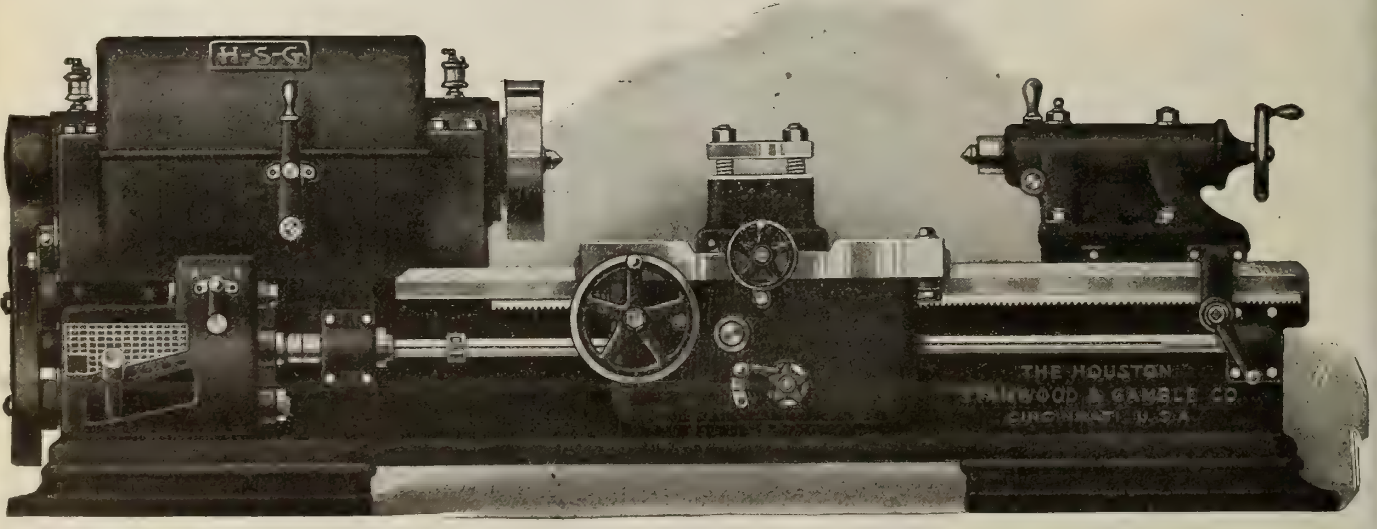
Very Rapid, making possible heavy production, the feed is by means of a worm and gearing in the apron.

WRITE FOR DELIVERIES.

THE JENCKES MACHINE COMPANY, LIMITED

Works: SHERBROOKE, QUE.; ST. CATHARINES, ONT.

SALES OFFICES: 727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.



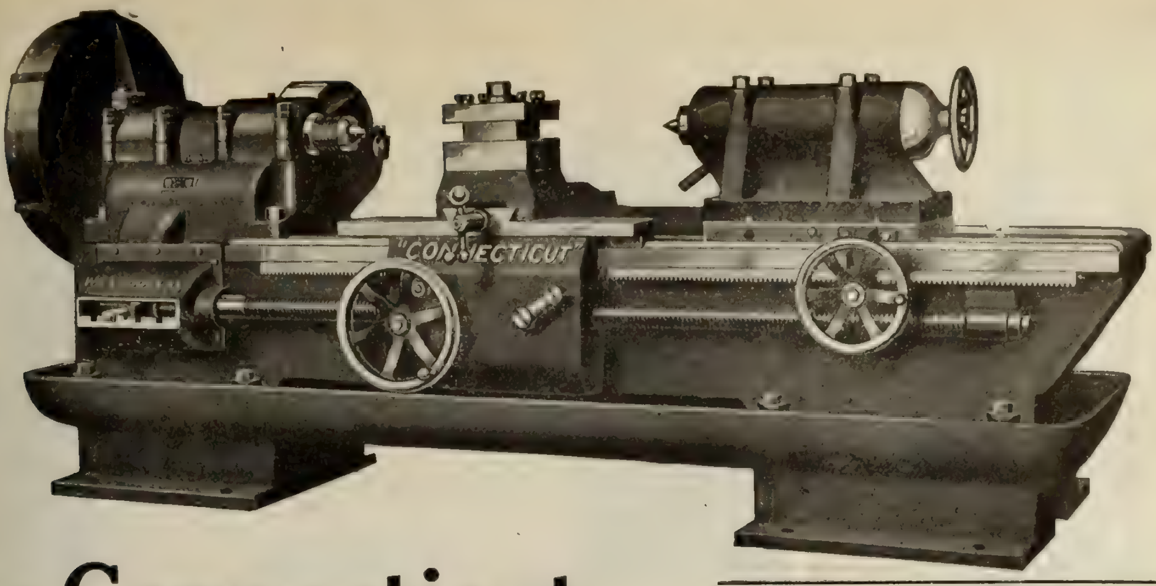
H-S-G TRADE MARK single-pulley, high-powered, all-geared engine lathe built in three sizes, 28", 30" and 36" swing.

This is a heavy duty lathe. For instance, the 30" swing lathe has 7" face drive pulley, 8" x 10" front spindle bearing and other parts of correspondingly liberal dimensions. The net weight with 13 ft. long bed is 18,500 pounds. The design and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

CINCINNATI, U.S.A.

Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto



The Connecticut High-Duty Lathe

A "Single Purpose" Lathe built to turn or bore high carbon steel forgings at maximum speeds.

Eliminates the train of small gears and adds greatly to the strength and wearing qualities.

THIS lathe is made for heavy work and is designed for the machining of high carbon steel at maximum speed. Rigid, rugged, accurate, it is efficient in the extreme and has demonstrated its superior service in prolonged tests of great severity in many shops. It is in all respects heavier and more rigid than standard 30-inch and even 36-inch lathes giving the same distance between centres.

Full Details on Request

The usual cutting speeds on shell work are 40 to 50 feet per minute on shells up to 8" diameter, 30 feet per minute on larger sizes. Depth of cut from ¼" to ⅝" depending upon the eccentricity of the piece. Our lathes will stand more than this.

W. & B. DOUGLAS
MIDDLETOWN - CONN., U.S.A.

Two Cuts at One Time

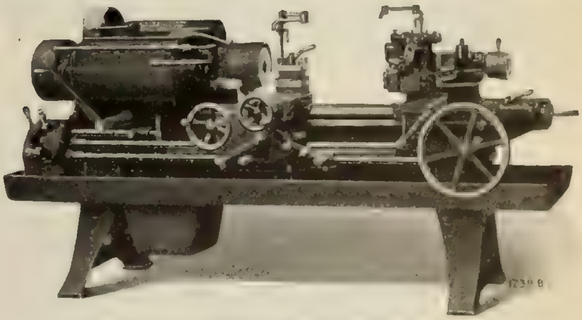
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

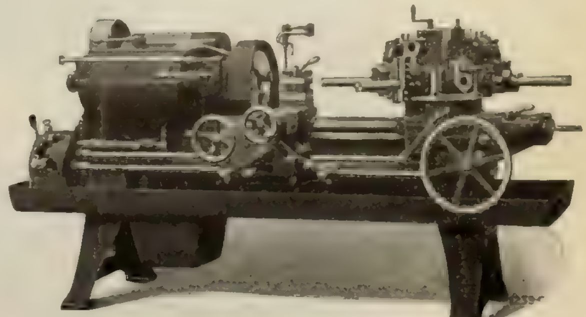
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



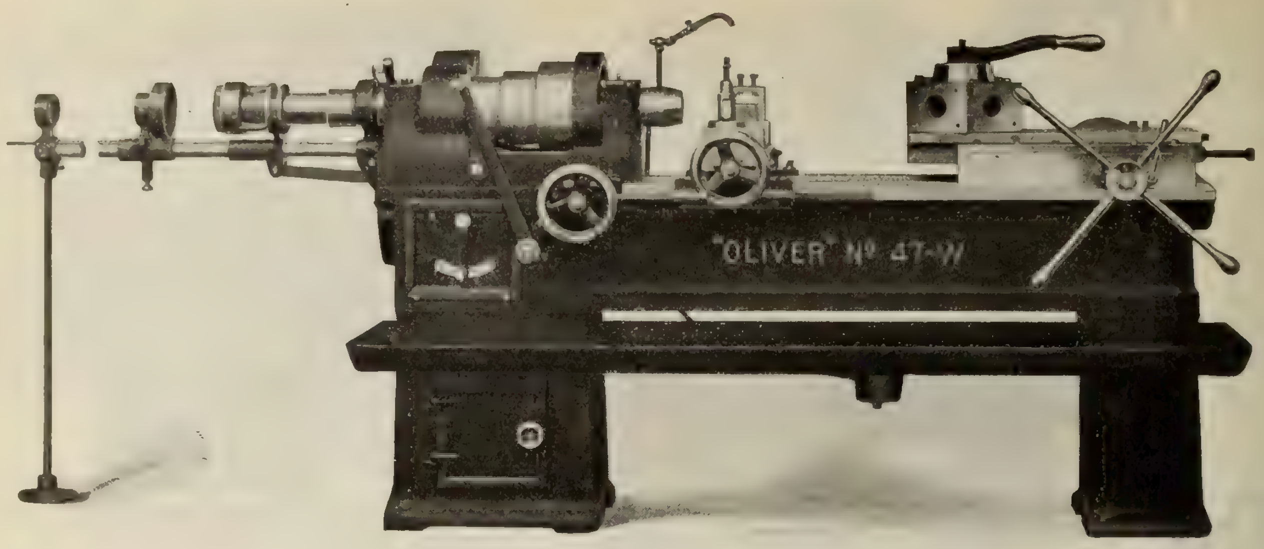
No. 2-A—With "Bar Equipment"



No. 2-A—With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal



"OLIVER" NO. 47-W HEAVY DUTY SCREW MACHINE 2¼"—SWING 16".

A HEAVY TOOL FOR HEAVY WORK—A MODERN MACHINE—OLIVER QUALITY—PROMPT DELIVERIES.

WRITE FOR FULL INFORMATION.

OLIVER MACHINERY COMPANY, Grand Rapids, Mich.

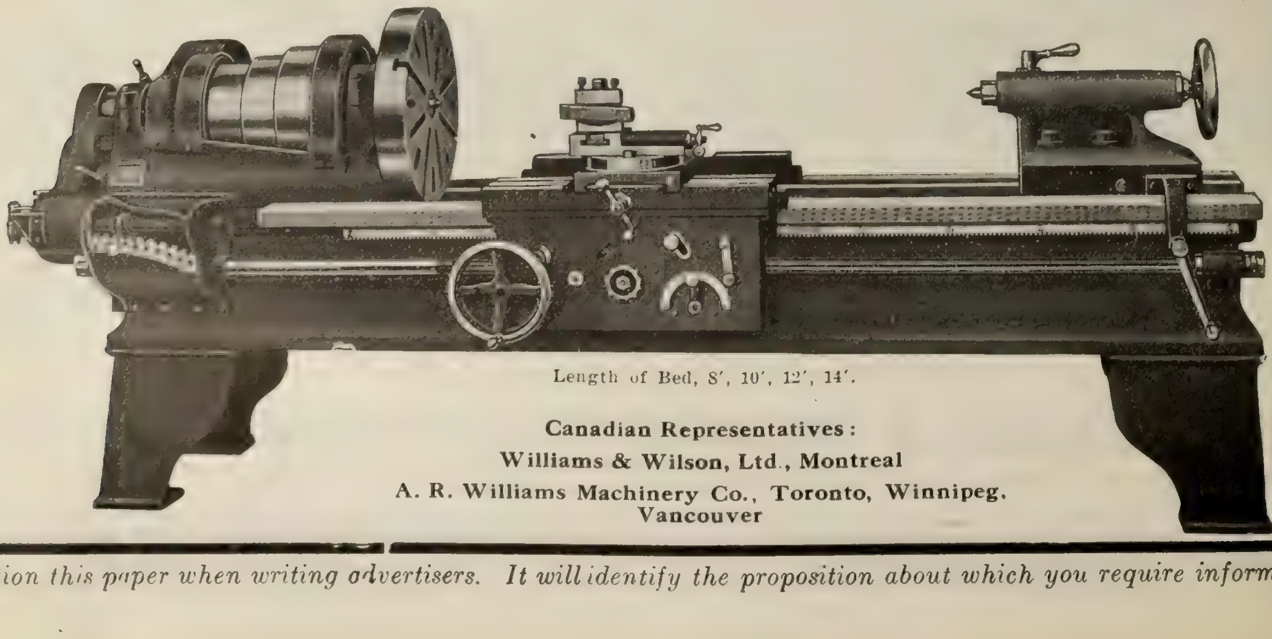
Davenport 22-Inch Lathe — For Extra Heavy Service

These lathes are built exceptionally rigid and heavy. No feature has been omitted, to secure great strength and power. The bed, the headstock, the tailstock, the carriage—every detail has been designed and constructed with a view to driving the heaviest cut that any tool will stand up against. At present we can make quick deliveries on this machine.

Built with ordinary change gears unless otherwise specified.

Write at once for Bulletin. It gives full details of construction.

DAVENPORT LOCOMOTIVE WORKS
DAVENPORT, IOWA



Length of Bed, 8', 10', 12', 14'.

Canadian Representatives:
Williams & Wilson, Ltd., Montreal
A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver

A New Thing in Shell Gauges

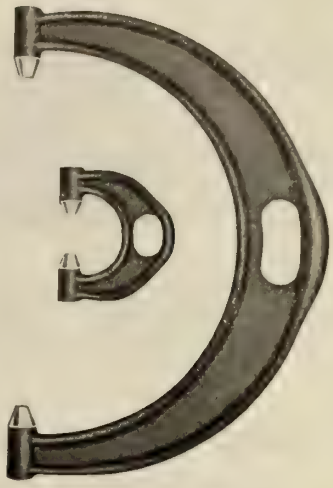
A snap gauge for calipering all outside diameters, with absolute accuracy.

Can be furnished suitable for waving, grooving, rough or finish turning—all sizes of shells, from 9.2″ down.

Note the improvement on this gauge for holding.

In ordering, specify diameter and part to be calipered.

Immediate shipment can be made from stock.



Note the hole for handling when using.

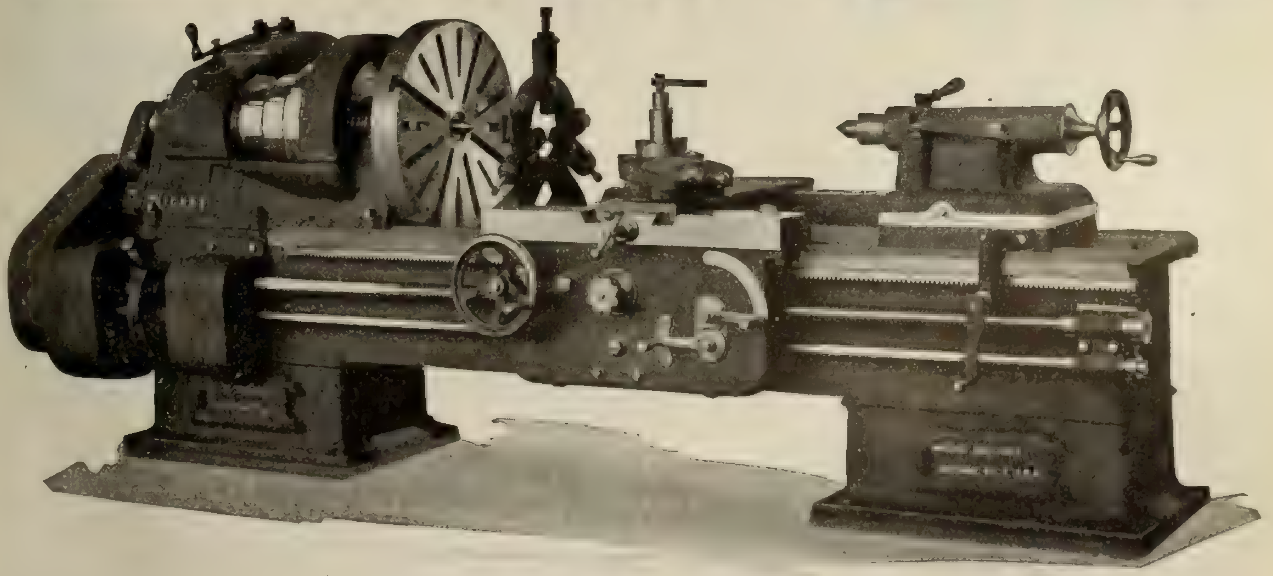
Save the Operators' Fingers

The Foundry & Machine Co., Limited

1167 Carriere Road

MONTREAL, CANADA

Wickes Heavy Duty Engine Lathe



The Wickes 26″ Heavy Duty Lathe.

Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.

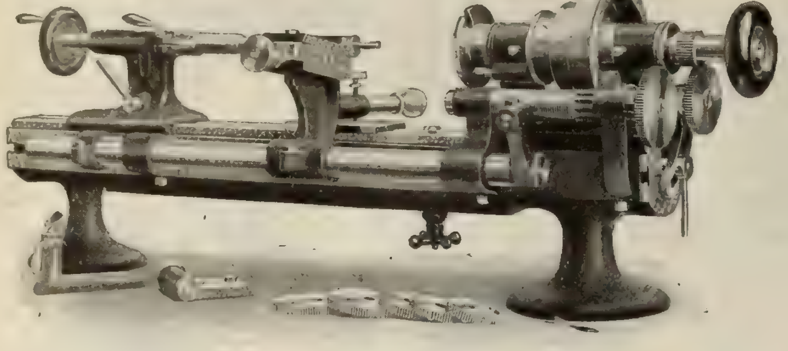
This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.

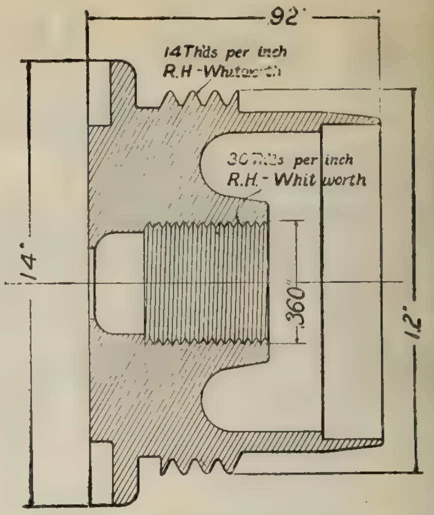
Let us tell you about this lathe and our 20″, 32″, also our 17″ Rapid Production Lathe for Automobile and other work.

We can make prompt shipment.

WICKES BROTHERS **Saginaw, Michigan**

THE CATARACT BENCH LATHE WITH CHASING ATTACHMENTS



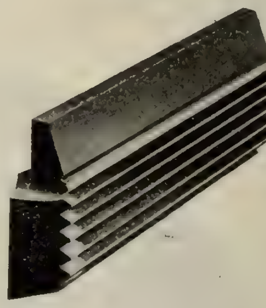


We have sold many of our lathes to Canadian concerns who are eminently satisfied with results. Will you be next?

For work requiring greatest accuracy and rapidity, THE HARDINGE CATARACT BENCH LATHE will not disappoint you. Machine equipped with Automatic Chuck Closer for rapid operation of chuck, and with chasing bar arranged with multiple point, chasing tool is producing from ten to twelve hundred 14-pitch Whitworth threads on primers in TEN HOURS. Prompt deliveries. Catalogue No. 15 is ready to mail TO YOU. You are invited to write for it to-day.

HARDINGE BROTHERS, Inc., 1770 Bertau Ave., CHICAGO, U.S.A.

The Real Efficiency



of any threading machine depends upon the chaser or tool which does the actual cutting.

It's a poor bolt cutter or pipe machine which will not cut a thread, but for real efficiency you must have the Landis Die.

The Landis chaser is entirely different in design from any other thread cutting tool in that it is *strictly tangential* to the stock. This feature other than reducing the friction to a minimum, permits of the use of a long life chaser.

Then, too, the rake or cutting angle is absolutely controllable and may be ground for cutting threads on iron, steel, brass, copper, etc. The life of the chaser is such as to exceed that of any other die by at least twenty times.

These characteristics, together with the many others, insure real efficiency as to *quality of thread, production* and *low cost of upkeep.* Whatever your threading requirements are, write us. Our Engineering Department will give you a helpful answer.

Catalogue No. 22 gladly sent on request.

Landis Machine Company,
Waynesboro, Pa.

Exclusive Canadian Agents—Williams & Wilson, Montreal

BEAVER BRAND

COPPER & BRASS BROWN'S QUALITY ROLLING MILLS

BRASS, BRONZE

AND GILDING METAL IN SHEETS, ROLLS, PLATES AND RODS

SPECIAL MARINE BRONZE ROD
For Shafting and Bearings.

For Drilling and Free Turning, Order
BEAVER BRASS ROD.

Beaver Brand
"SPINNING BRASS."

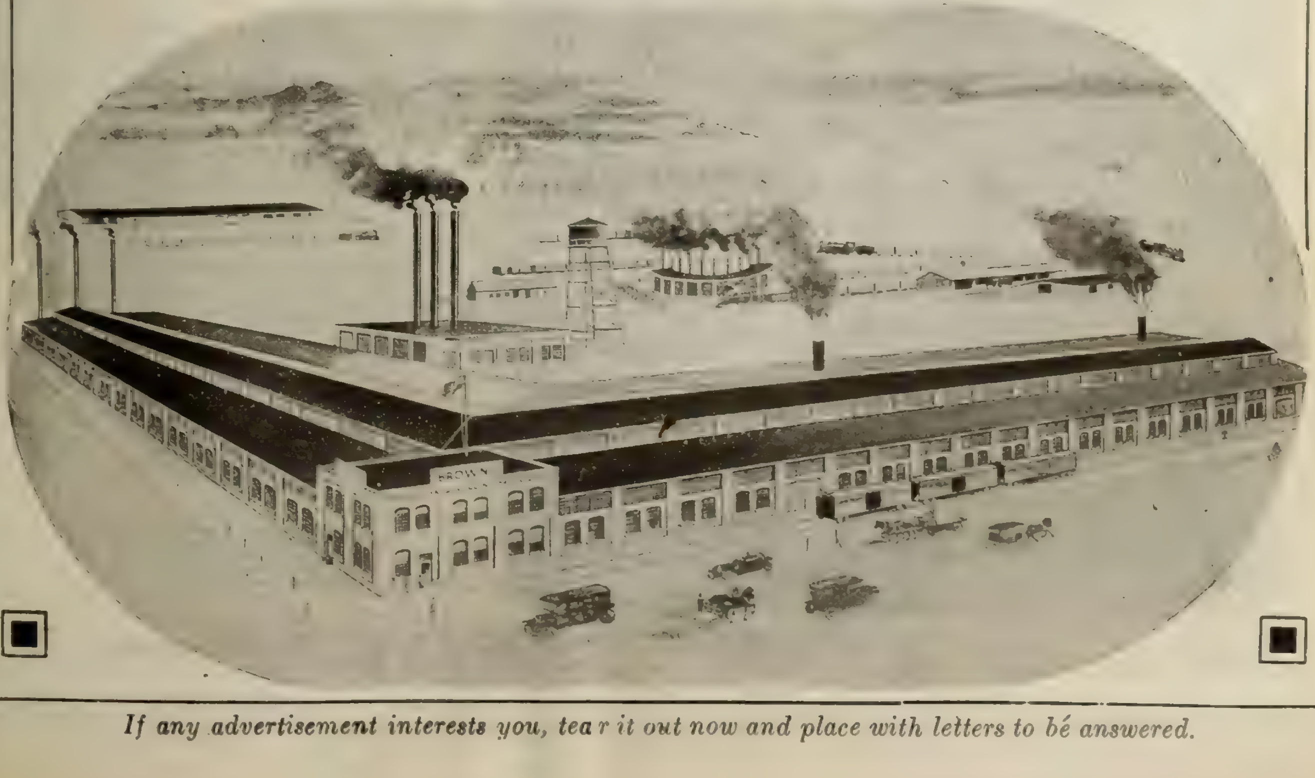
Beaver Brand products are made in Canada, and are quality through and through.

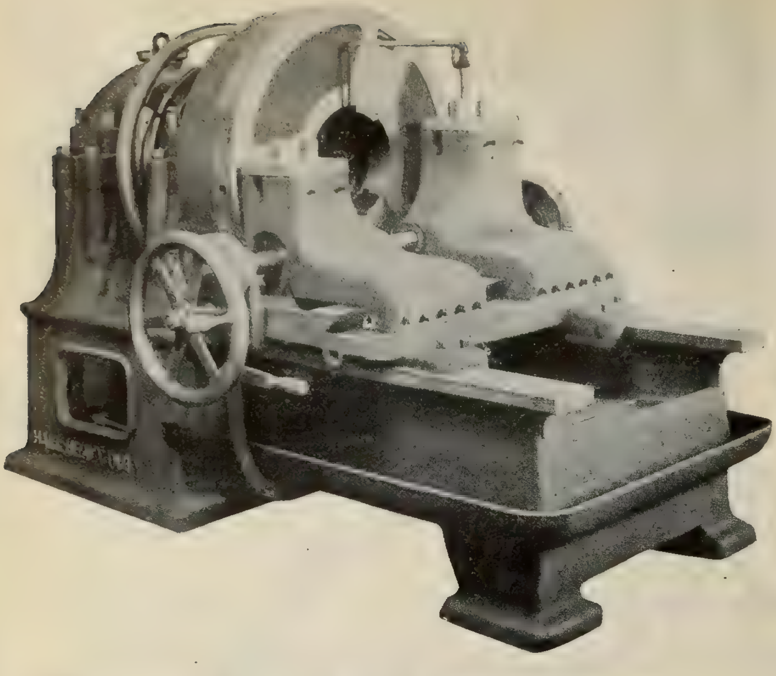
Our manufacturing facilities assure you the best of service and a moderate price.

Send a Trial Order

Brown's Copper and Brass Rolling Mills, Limited

General Offices and Mills:
NEW TORONTO, CANADA





Cut illustrates our No. 12 cutting-off machine for cutting-off and facing 6", 8", 9.2", 10" or 12" shells.

The bed of the machine is of the box lathe type, with sufficient weight and strength to give great rigidity under the severest strain.

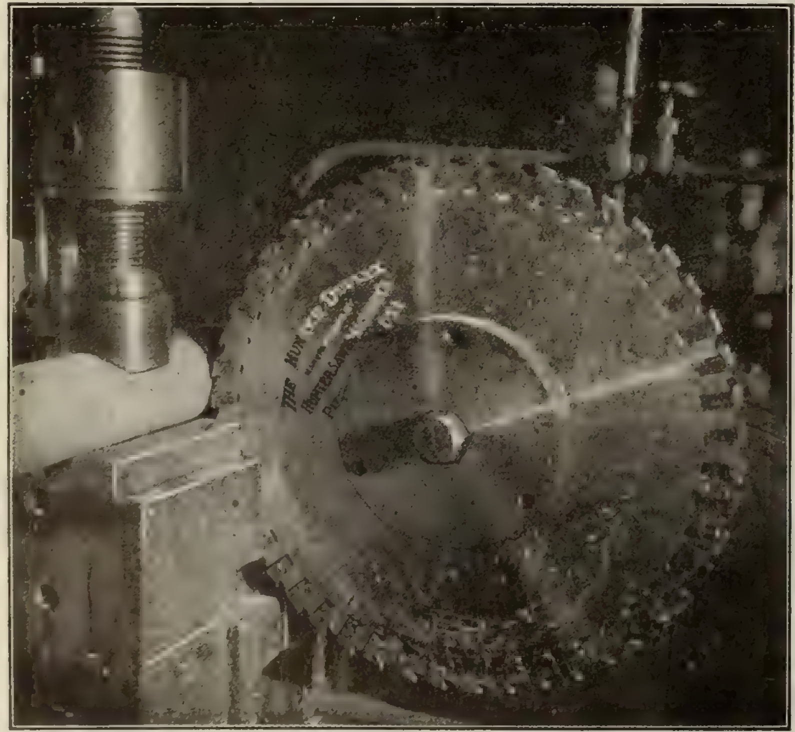
John H. Hall & Sons
Limited
Brantford Canada
Manufacturers of Pipe Threading and Special Machinery

We manufacture a full and complete line of machinery used in the manufacture of shrapnel, 4.5, 60-Pr. and 10" shells.

Cutting-off machines range from 1½" to 12".
For cutting off the open ends.
For facing off the closed ends.
For facing off projecting ends of plugs.
For cutting off bar stock,
For cutting off ingots, any size.
Pipe lathes ¼" to 18".
Double and single head nipple cutters.
Roller pipe cutters.

Let us tell you the nearest point at which you can see some of our machines in operation.

A Hunter "Duplex" on Shrapnel Stock



FAST GOING
on Newton Machine

Through 3½" round 60 Carbon, 70 Manganese Shrapnel Stock every

2 MINUTES

The secret of Hunter "Duplex" Saw speed is the method of holding the high speed teeth.

You can use this speed profitably—on shrapnel or any other stock.

Let us send full Particulars.

HUNTER SAW & MACHINE COMPANY, Pittsburg, Pa.

The World Does Move

PEERLESS
PEERLESS MACHINE CO. RACINE WIS. U.S.A.

Evidently one of our competitors is not aware of this fact, or they would not have written the ad. which read as follows:

"One blade on this machine does what six of the same kind will do on any other."

One blade in the PEERLESS High-Speed Metal Cutting Machine will cut as much as their machine and will make approximately two cuts to one. Possibly you need more cutting-off machines and have not the additional floor space. The PEERLESS will solve this problem; instead of buying two machines, one will do the work.

The PEERLESS is also semi-automatic, which means where one operator attends to 10 machines of the other type, he can operate 15 of the PEERLESS. A ten year-old boy can operate the PEERLESS with one hand, because he does not have to raise and lower a heavy, cumbersome saw frame, as this is automatic. All he has to do is to pull the shifting lever.

It is very seldom such improvements are made in machinery that they cannot be fully described, but this is the case in the PEERLESS, and in order for anyone to appreciate these improvements the machine must be seen in actual operation, therefore, will gladly send one on thirty days' free trial.

Write us for complete description before you consider another machine.

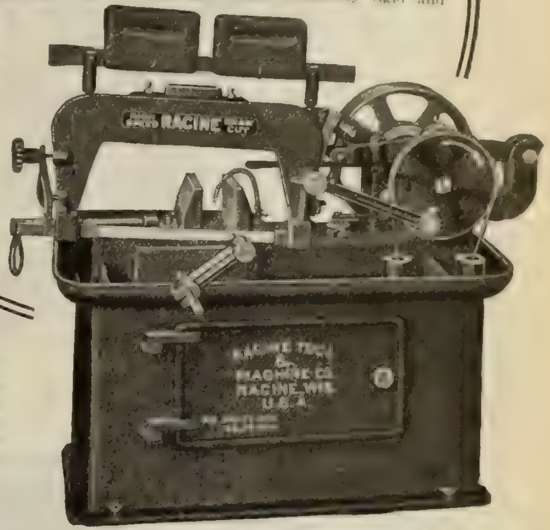
PEERLESS MACHINE COMPANY
1607 Racine Street **RACINE, WISCONSIN**

MORE SPEED LESS BLADES

One Canadian
Steel Company uses 120
RACINE METAL CUTTERS
and has saved $11,019.50. Particulars on request.

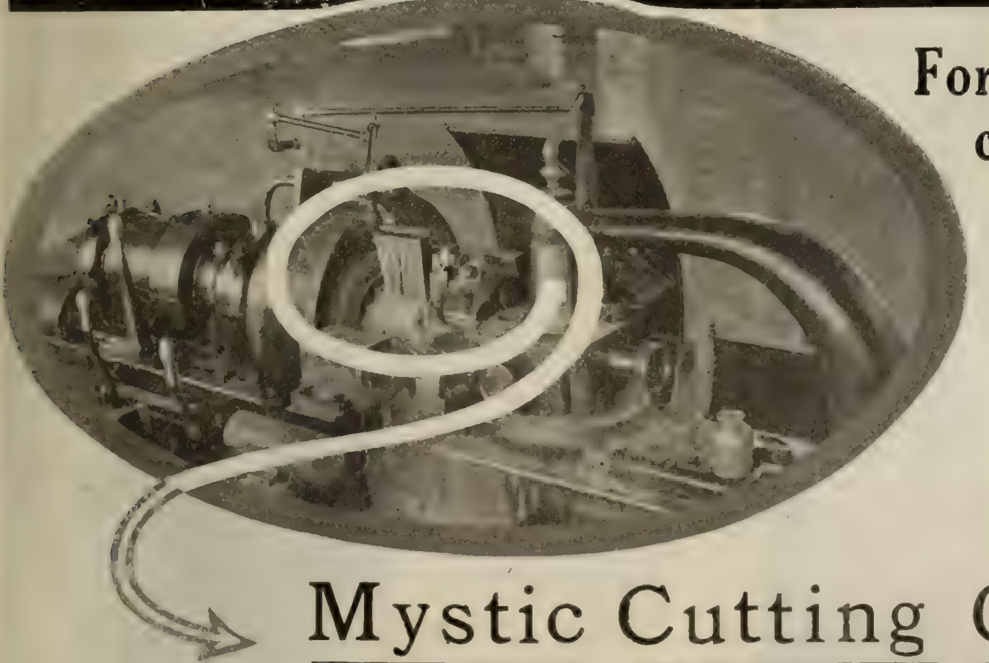
These machines are popular everywhere because they work fast and are easy on the blades—because springing is absolutely prevented by the mechanically correct design and construction.

The heavy, rigid saw frame guide of the Racine is made of the best grade of semi-steel and will hold the saw frame absolutely rigid and work at all times, insuring a straight cut with the least possible waste of material.



There are other Racine features well worth investigation — the **Positive Automatic Lifting Device, the Combination Vise, the Cooling System, etc.** May we tell you about them and about our unusual trial offer?

RACINE TOOL & MACHINE COMPANY
15 Melbourne Avenue, Racine, Wis., U.S.A.



For cool and clean-cutting tools

Leading manufacturers use Mystic Cutting Compound on shell work in preference to oil. It means higher speeds, increased production and lower costs. Keeps work and tool cool and free from chips.

Mystic Cutting Compound

A free-flowing, unsaponified animal oil lubricant. Does not separate in solution, grow rancid or cause rust. It is non-combustible and contains nothing injurious to operator's hands.

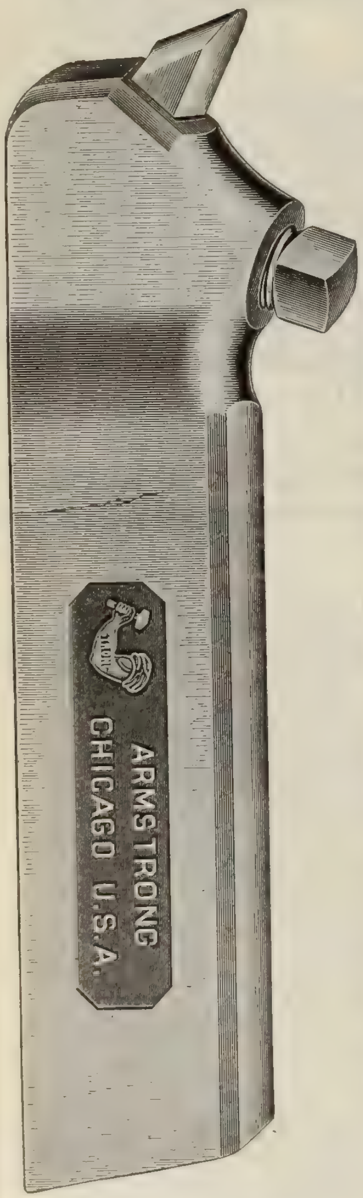
Let us demonstrate **free of cost** what Mystic Compound can do for you.

Cataract Refining Company, Limited, Toronto, Ont.

The Only Grand Prize for
TOOL HOLDERS

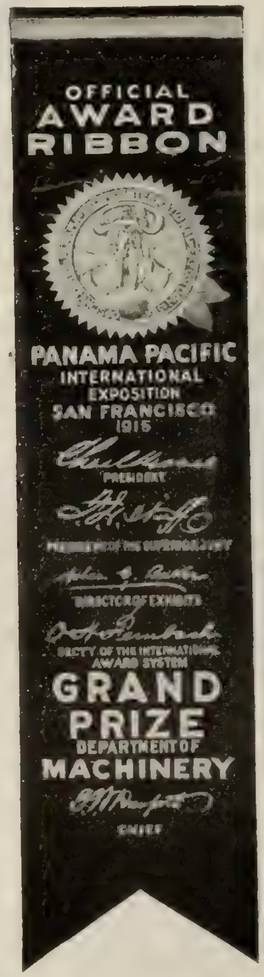
Awarded separately and independent of other lines exhibited at the
PANAMA-PACIFIC EXPOSITION
WAS WON BY

ARMSTRONG TOOL HOLDERS


ARMSTRONG
CHICAGO U.S.A.

HIGHEST AWARD
at 4 World's Expositions
Paris - - - 1900
St. Louis - 1904
Liege - - - 1905
San Francisco 1915

THEY ALWAYS MAKE GOOD


OFFICIAL
AWARD
RIBBON
PANAMA PACIFIC
INTERNATIONAL
EXPOSITION
SAN FRANCISCO
1915
PRESIDENT
DIRECTOR OF EXHIBITS
SECTY OF THE INTERNATIONAL AWARD SYSTEM
GRAND
PRIZE
DEPARTMENT OF
MACHINERY
CHIEF

They Are Saving Millions of Dollars in High Speed Steel

CATALOG FREE

Armstrong Bros. Tool Co.
"The Tool Holder People"
306 N. Francisco Ave., CHICAGO, U.S.A.

The Panama-Pacific MEDAL OF HONOR was also won by ARMSTRONG Drop Forged Wrenches, Ratchets, Clamps, Lathe Dogs, Etc.

SAWS FOR SHELLS

We have experimented on the

SPECIAL SHELL STEEL

and have produced a *HACK SAW BLADE* that will give unequalled service on this material in *HIGH-SPEED MACHINES.*

Possibly we could help you.

"VICTOR BLADE—CANADIAN-MADE."

Victor Saw Works, Ltd.
Hamilton, Ont., Canada

VICTOR HACK SAWS Get a Box and Try em

For Rapid Production and Accurate Work
USE THE
"BRIGGS"

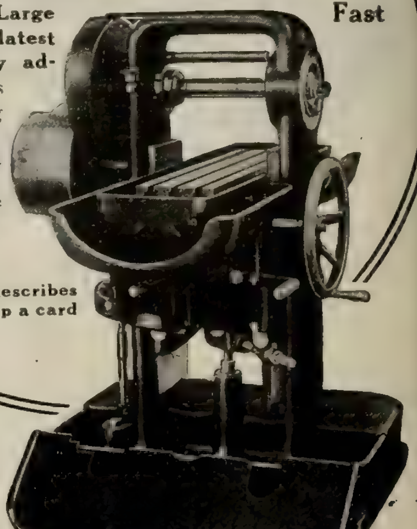
The Briggs Miller handles work no other machine of its size can touch. It is a manufacturing machine. On account of its rigid construction it will produce accurate work when running at a high rate of speed and feed.

Fast

The Base Tank and Large Gear Pump is the latest addition to its many advantages. Tank holds 20 gallons of cutting lubricant.

Pump never requires priming and will deliver ten gallons per minute to the cutters, keeping them cool when run at very high speed.

Our booklet describes fully. Drop a card for it.



Gooley & Edlund
Inc.
Cortland, N.Y., U.S.A

Foreign Agents: Allied Machinery Company of America, France, Belgium, Italy, Switzerland, Russia, Scandinavia, C. W. Burton, Griffiths & Co., London, Manchester and Glasgow, Barandiaran, Metivier, Gazeau & Cia, San Sebastian, Spain.

Two Cuts

Simultaneously

One up, the other down. This is what makes the **Hurlbut-Rogers Cutting-Off and Centering Machine** virtually double the output and reduce the cost per piece about one-half.

The Hurlbut-Rogers Machine gives you capacity of two machines at the expense and in the floor space of one machine.

Cutting-off Economy

5-inch Cone-Driven Machine

We build them for hard work and the utmost in accuracy—and their **GREAT SUCCESS ON SHELLS** shows it.

Let us go into details.

HURLBUT-ROGERS MACHINERY CO., South Sudbury, Mass.

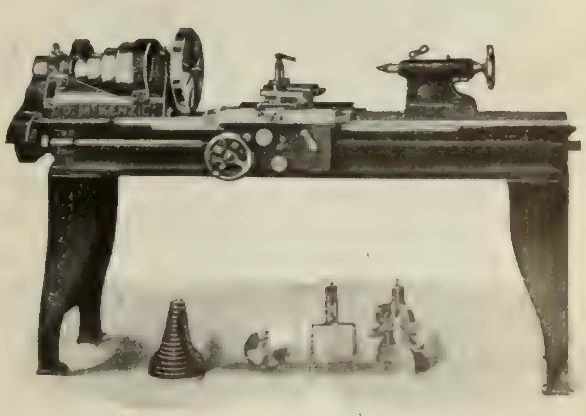
FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle-on-Tyne. H. W. PETRIE, TORONTO, CANADA.

The "McKenzie" Engine Lathe

The Standard of Accuracy

Made from new patterns, of improved design, and constructed of the very best material by expert workmen. Every part is mechanically perfect and excellently finished. Its accuracy and durability mean a big saving of money to you.

Let us put full details before you. Write!



The Improved Power Hack Saw

will cover its cost many times over with the money it saves through long, efficient service.

Saws bars 6 x 6 in., either round or square, and is so constructed as to require no attention after work is put in vise, and stops automatically when piece is cut off.

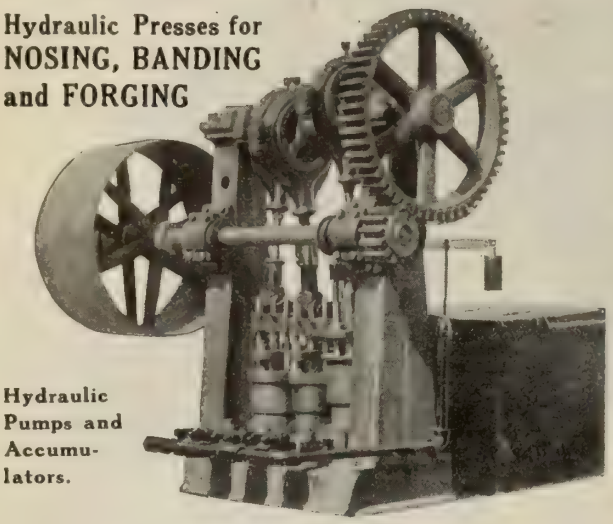
The Improved Saw Guide is a Special Feature—it keeps the saw perfectly in line at all times.

The D. McKenzie Machinery Company

Guelph, Ontario

PRESSES FOR SHELLS

Hydraulic Presses for NOSING, BANDING and FORGING



Hydraulic Pumps and Accumulators.

Hydraulic Presses for all purposes.

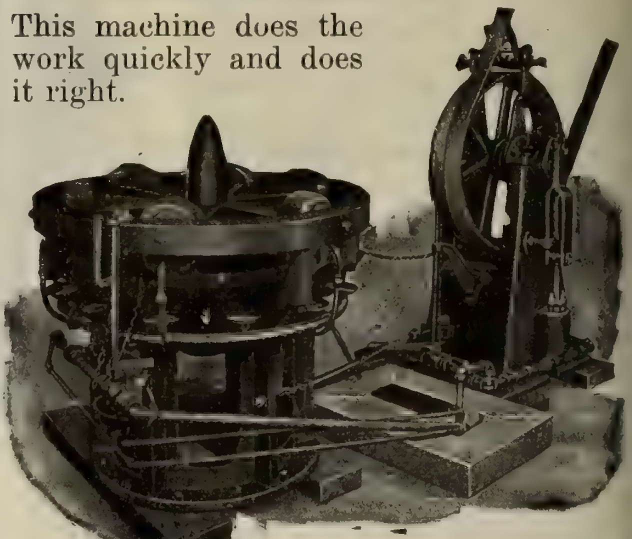
WRITE FOR FULL DETAILS NOW.

William R. Perrin, Limited
TORONTO, ONTARIO

Hydraulic Banding Machine

For compressing bands on shrapnel shells and other projectiles

This machine does the work quickly and does it right.



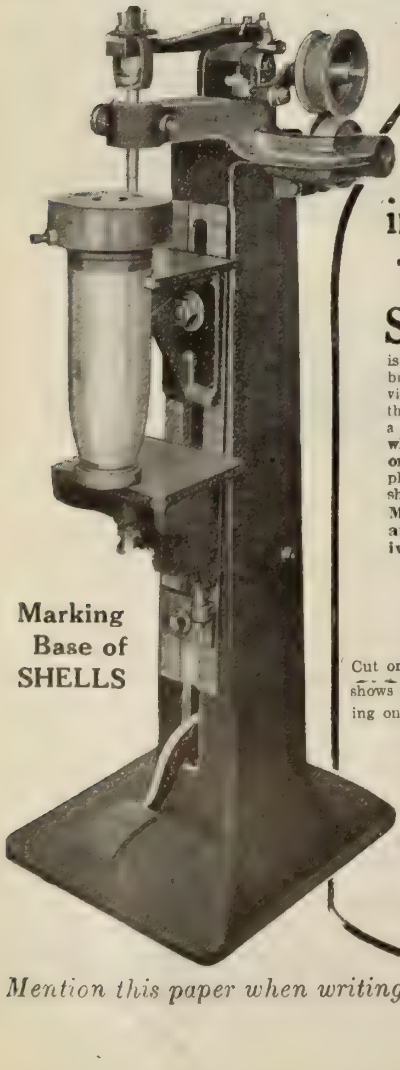
In writing for information or quotation please advise width and thickness of bands and diameter of shells to be handled.

Machines for our Canadian Customers are built in Hamilton, Ont.

We also manufacture machines for setting wagon and carriage tires, cold.

Please address all communications to our Rochester Office

THE WEST TIRE SETTER COMPANY
ROCHESTER, NEW YORK, U.S.A.



Marking Base of SHELLS

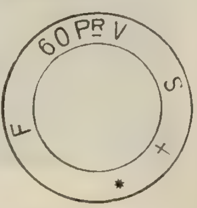
A PERFECT JOB

in 15 Seconds

The "Grant" Shell Marker

is so arranged that the blow is brought to bear on each individual letter successively, while the blow can be adjusted to give a shallow or deep impression which is uniform for each letter or figure. The work is completed in one revolution of the shell, which is done by hand. **Made for 18 pdr., 4.5 in., and 60 pdr. high explosive shells.**

Drop a card for full particulars.

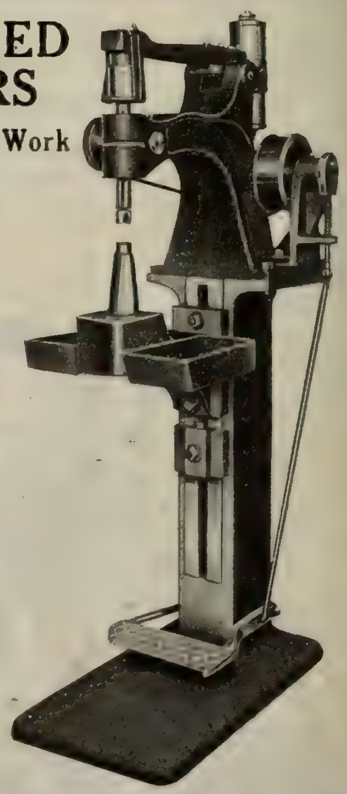


Cut on right shows marking on shell.

THE GRANT MFG. & MACHINE CO.
Holland Ave.
BRIDGEPORT, CONN.
U.S.A.

HIGH SPEED HAMMERS

For High Speed Work



FEATURES:

Economy in floor space, elimination of weight and a guaranteed saving of from 15% to 20% on any class of work. The life of the machine is practically indefinite as phosphor bronze bushings are used throughout.

No riveting too intricate for us; no riveting which our machine cannot accomplish.

Send for our **High Speed Hammer Book.**

THE HIGH SPEED HAMMER CO.
Rochester, N.Y.
Sales Agents: The A. R. Williams Machinery Company, Limited, Toronto, Ontario.

Proved Through Half a Century of Successful Performance

"Toledo"

Arch Power Presses

the best general purpose press on the market to-day.

Built in eight sizes, ranging in weight from 2,900 to 50,000 lbs.

Solidity and accuracy of construction make these a profitable and economical press to operate.

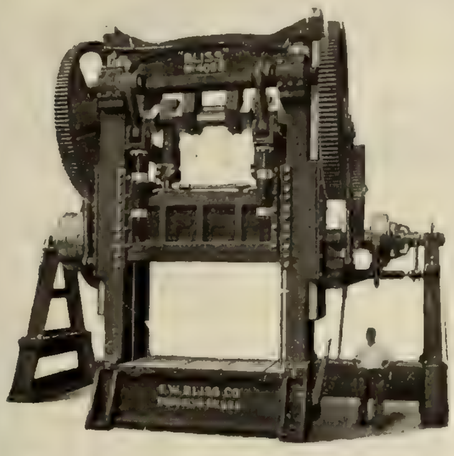
With long stroke they are efficient for deep forming and various classes of heavy work.

With solid front adapted to compound and blanking dies—combination cutting and forming dies, etc.

With removable front—horns, forces and wiring dies can be operated.

The Toledo Machine & Tool Co.

Toledo, Ohio, U.S.A.



Saves Time—Saves Power
Makes Output Uniform

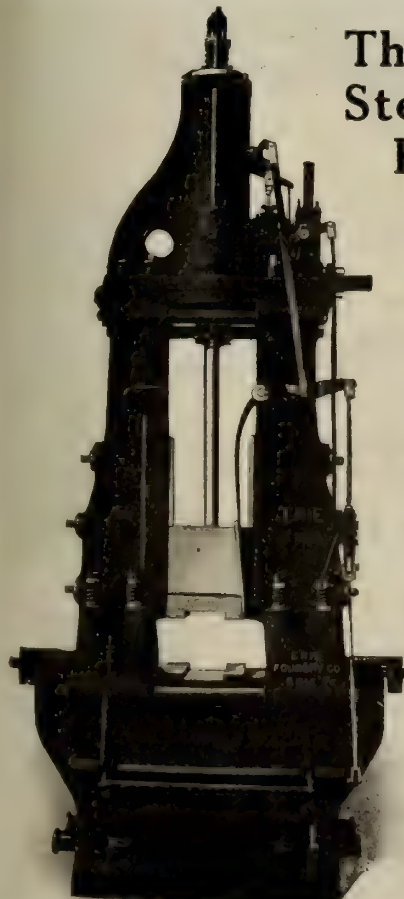
Do you have to draw or form large sheet metal goods from heavy stock? If you do you will appreciate the patented toggle motion of the

BLISS DOUBLE-TANK TOGGLE PRESSES

Its action speeds up the work. It requires less power—and the results are uniform and better. *Send for Catalogue* 11-*G*, stating requirements.

E. W. Bliss Co., **20 Adams Street**
Brooklyn, N.Y., U.S.A.

Chicago Office: 622 West Washington Boulevard
Detroit Office: Dime Bank Building



The "ERIE" Steam Drop Hammer

is the last word in Hammer construction. Ask any user.

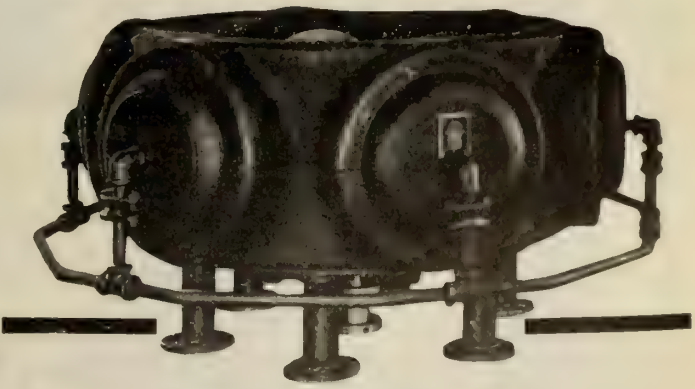
A list will be supplied upon request.

We also build Trimming Presses.

Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

Erie Foundry Co.

ERIE, PA.



Capacity, 6 to 12-in. Shells

"Metalwood" Banding Press

so sturdily constructed that it withstands the most severe service and constant use.

While the price is somewhat higher than others on the market, customers who have used both unhesitatingly prefer our machine even to the point of discarding other types.

Specifications: Rams 6 Semi-steel 11" diameter. Move of each ram $\frac{1}{2}$" or more if necessary. All rams returned by levers on plate with heavy Vanadium steel spring. Cylinder—Removable, of alloy steel.

Hydraulic inlet to cylinder, $1\frac{1}{4}$ pipe. Distributing ring 2".

All pipe, seamless steel tubing; all fittings, drop-forged steel.

All parts under strain, alloy steel castings or forgings.

Dies, 6, forged chrome nickel steel, hardened and removable without disturbing any part of press, by loosening 2 nuts.

Weight 9,500 lbs.

Can be operated either from accumulator or pump.

Metalwood Manufacturing Co.

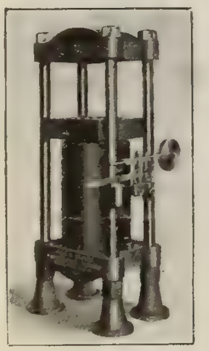
Leib and Wight Sts., DETROIT, MICH.

"W. & B." Drop FORGINGS

¶ We make a specialty of the highest grade Drop Forgings. Our exceptional capacity and equipment insure accurate forgings and prompt delivery.

The
Whitman & Barnes Manufacturing Co.
Established 1854
St. Catharines, Ontario

Send us Blue Prints on Special Forgings, three pounds and under in weight, and permit us to estimate on your requirements.



Elmes Hydraulic Press No. 676

With ¾-in. Automatic Lever Operating Valve No. 677-A

This press is of steel and semi-steel construction, and the stands which support the press are threaded at the ends to receive the steel columns and have holes for fastening to the floor. The platen is guided by the columns.

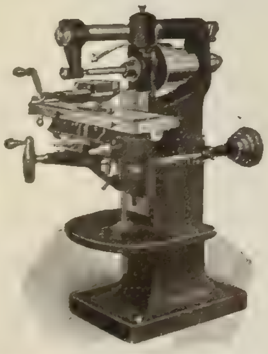
The operating valve is attached to the cylinder, and is designed with a weight to be set for the pressure desired, and releases automatically. To start the ram up, the lever is pushed down; upon the ram reaching the desired pressure, the lever automatically releases (acting as a safety valve as well), causing the ram to descend. Valve body is made of bronze, and other parts are made of tool steel and machine steel. If desired a hydraulic gauge can be attached to show the various pressures, although with this valve it is not necessary.

Write for our Hydraulic Machinery Catalogue.

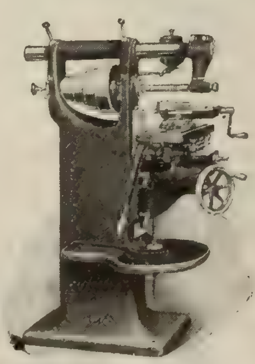
Charles F. Elmes Engineering Works 217 N. Morgan St. Chicago, U.S.A.

Over 50 years' experience building hydraulic machinery.

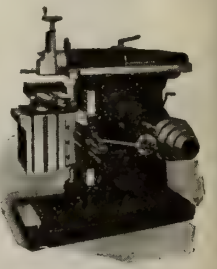
Increased Production Means Increased Profits



Large Millers for large work —STEPTOE MILLERS for small work



Large Planers for large work --STEPTOE SHAPERS for small work



Will result in increased production; less money invested in machinery, and increased profit.

THE JOHN STEPTOE COMPANY
CUMMINSVILLE, CINCINNATI, OHIO, U.S.A.

MISS MARY KINGSLEY
As Joan of Arc in "King Henry VI."

SERIES No. 4

CHARLES:
"Was Mahomet inspired with a dove?
Thou with an eagle art inspired then.
Helen, the mother of great Constantine,
Nor yet Saint Phillip's daughters were like thee.
Bright Star of Venus, fall'n down on earth,
How may I reverently worship thee enough?"
KING HENRY VI.

Charles of France knew how to render praise to Joan of Arc.

HARRIS HEAVY PRESSURE

"The Babbitt Metal Without a Fault."

needs no praise.

ITS MERITS ARE WELL KNOWN, and the enormous sales in all parts of the Dominion of Canada give evidence that it has proved its claim to be the Best Babbitt Metal for all

General Machinery Bearings.

HARRIS METAL
HEAVY PRESSURE
THE CANADA METAL CO. LIMITED
TORONTO

IMPERIAL GENUINE

is

**THE HIGHEST GRADE BABBITT METAL
and Manufactured Specially for all
HIGH-SPEED HEAVY ENGINES
AND
EXTRAORDINARY HARD WORK**

Guaranteed to Give Excellent Service

ORDER A BOX FROM YOUR DEALER

THE CANADA METAL COMPANY, Limited

HEAD OFFICE AND FACTORY **TORONTO** FRASER AVENUE

HAMILTON MONTREAL WINNIPEG VANCOUVER

80 Per Cent. of Time Can Be Saved in the Foundry By the Use of a Bench or Floor

"Crown" Pneumatic Sand Rammer

This is not merely a "test" figure, but is taken from observations made in representative foundries all over the country.

Ask for Bulletin 8408.

CANADIAN INGERSOLL-RAND CO., LIMITED

COMMERCIAL UNION BUILDING - MONTREAL, CANADA
SYDNEY TORONTO COBALT TIMMINS WINNIPEG NELSON VANCOUVER

Works: Sherbooke, Que.

HEATING and VENTILATING

"Keith" Fans will be found more economical and have a greater efficiency where conditions are unusually severe, because they possess advantages over other Fans used for the same purpose.

The "Keith" Fan is the one that will give you continued and unqualified satisfaction.

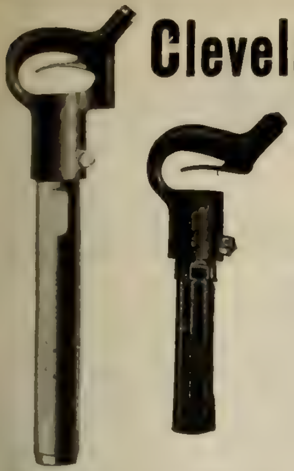
Our New Catalogue No. 55 has just come from the Press. Tell us where to address it and you will receive one by first mail.

SHELDONS LIMITED, Galt, Ont., Canada

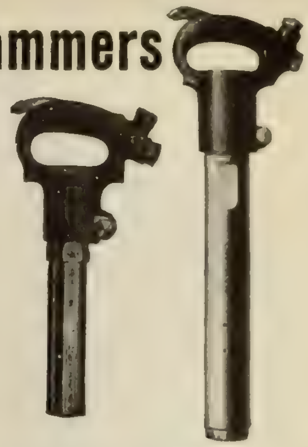
Toronto (Canada) Office: 609 Kent Building.

AGENTS:
Messrs. Ross & Greig, 412 St. James St., Montreal, Que.
Messrs. Walkers, Ltd., 259-261 Stanley St., Winnipeg, Man.
Messrs. Gorman, Clancy & Grindley, Ltd., Calgary and Edmonton, Alta.
Messrs. Robert Hamilton Co., Ltd., Bank of Ottawa Bldg., Vancouver, B.C.

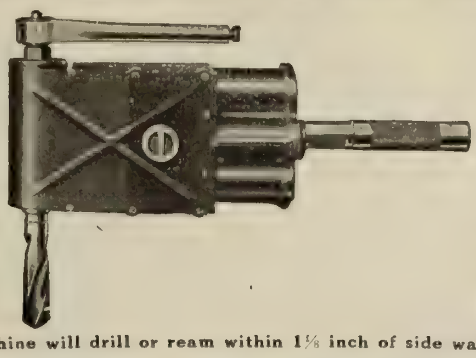
Cleveland Riveting and Chipping Hammers



Fitted with either Inside or Outside Throttle Lever as preferred. They are made in several different sizes and weights for all classes of work.
The Riveting Hammers have a range in rivets from 1/4 inch to 1 1/2 inches.



CLEVELAND CORNER DRILL For Close Quarter Drilling



The Body of the Cleveland Corner Drill is in one piece with cylinders and valve chambers cast integral which insures absolute alignment of working parts.

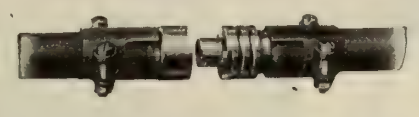
The Driving Crank is mounted upon Annular Ball Bearings which reduce friction to a minimum. Made in two sizes, Nos. 38 and 49, with Nos. 3 and 4 Morse Taper Sockets.

Either size machine will drill or ream within 1 1/8 inch of side wall or corner.

IN STOCK:—Sand Rammers, Bench and Floor, Portable Emery Grinders, Air Drills, etc.

BOWES AUTOMATIC AIR HOSE COUPLINGS

Over 1,000,000 in general use



¶ They are instantly connected or disconnected.

¶ They are absolutely tight under all pressures.

¶ They are interchangeable in all sizes commonly used.

¶ They quickly pay for themselves by stopping costly leaks.

Cleveland Pneumatic Tool Co. of Canada, Ltd., 84 Chestnut St., Toronto, Ont.

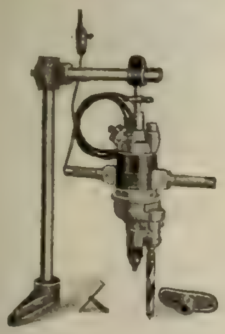
STOW TOOLS

OF PROVEN VALUE

Illustrated and Described in

Bulletin 102, Flexible Shafts
Bulletin 101, Electric Tools
Bulletin 100, Electric Motors

JUST FROM THE PRESS—FREE FOR THE ASKING.



Suspended Type Portable Grinder

FOR INTERNAL SHRAPNEL WORK

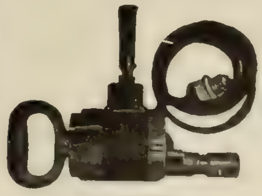
Being Used by the Largest Producers.

Built by the

Stow Manufacturing Co.
Binghamton, N.Y., U.S.A.
Oldest Portable Tool Manufacturers in America

U. S. Electric Drills and Grinders

Save Time, Labor and Money



They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

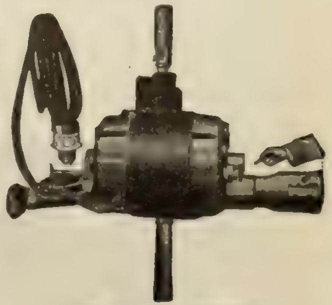
3 SIZES

3-16 inch,	W.G.T.	6 lbs.
1/4 inch,	W.G.T.	9 lbs.
3/8 inch,	W.G.T.	12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

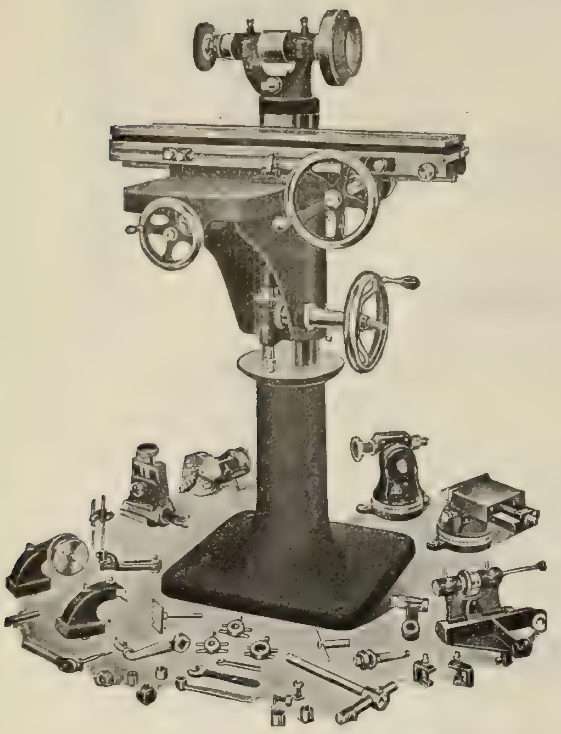
Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



1/2 Inch—2 SPEED.
Speed, 400-750 R.P.M.

For Sale By
The Canadian Fairbanks-Morse Co., Limited
Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver.

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO



The **Greenfield**

For Special Work, Tools, Jigs, Etc.

This Universal Grinder is just the machine needed in many of the shops engaged in equipping for the manufacture of special lines. It is an all-around grinder and will handle about any kind of a job that comes within its range.

It has a stiffer, more rigidly supported table than any similar machine. It will turn out accurate, dependable work. Also, we believe we are perfectly correct in stating that we furnish this machine with a larger and more complete set of attachments than can be had for any grinder selling at anything like the same price.

How can we do it? Specialization and building in quantities.

Ask for Catalog No. 5, showing the machine in twenty-one different "set-ups" and explaining the purpose of each.

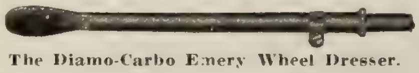
Greenfield Machine Company

Greenfield, Mass., U.S.A.

Grinding Wheel Dressers

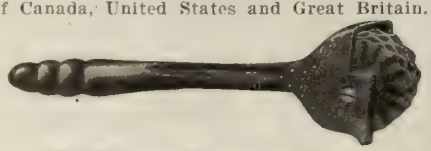
No one type of Grinding Wheel Dresser is adapted for all kinds of wheels, any more than one size or grade of wheel is adapted for all classes of work. We manufacture Dressers for every class of wheel, and, being specialists, are frequently in position to make valuable suggestions to customers as to the best type of Dresser for their particular needs.

Any of our Dressers will be cheerfully sent, subject to approval and can be returned should they not be found satisfactory.



The Diamo-Carbo Emery Wheel Dresser.

Owing to the high price of Diamond Dressers, the Diamo-Carbo is rapidly coming into favor as an economical substitute for the Diamond. It will do practically the same work as will the Diamond, excepting in some instances of precision grinding. It is so inexpensive that the tool can be left with each grinder. It has been adopted by many of the leading shops of Canada, United States and Great Britain.



The Sherman-Huntington Dresser.

For rough work the Huntington Dresser mounted on the bearings covered by our Sherman patent gives the best results. They are made in two sizes: No. 1 with Cutters 1¼" diameter and No. 2 with cutters 2⅜" diameter. We also make the ordinary Huntington Cutters. All of our Dressers of this type are equipped with our protection hood which continually protects the face of the user from flying particles and is a very valuable feature at no added cost.

Write for booklet and trial offer.

The Canadian Desmond-Stephan Mfg. Co.,
HAMILTON LIMITED ONT., CAN.
Alfred Herbert, Ltd., Coventry, Agents for Great Britain.

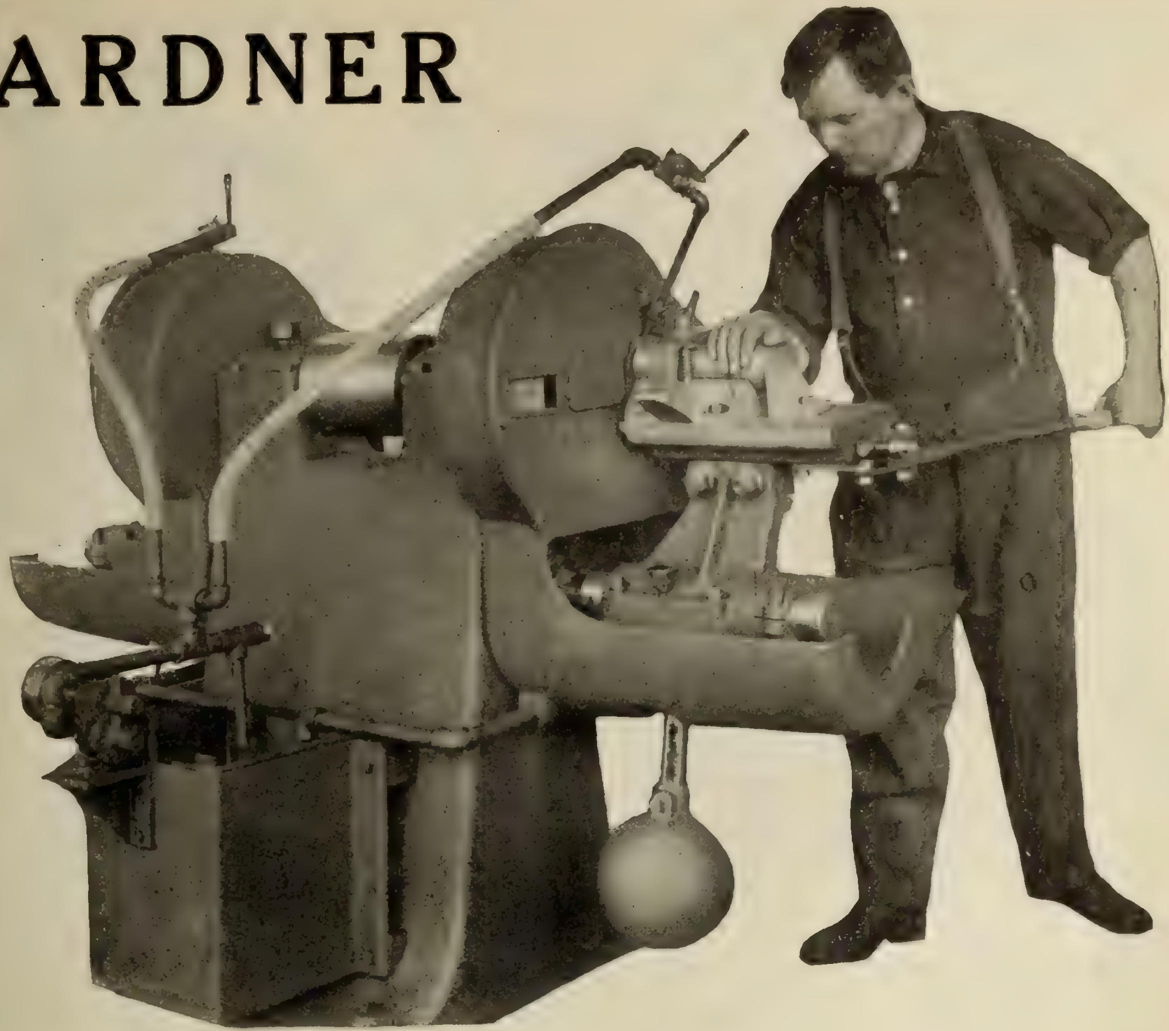
WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only $60 Complete

The Blake & Johnson Co., Waterbury, Conn

GARDNER GRINDERS



For Grinding Ends of Shells

We have developed a Special Grinding Machine for removing the hub or centre projection from the ends of shells. This grinder is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates.

We build as well a much heavier and more Powerful Grinder to be used for these same operations on 6" Shells.

FEATURES

- High-Grade Babbitt Bearings and Lever Feed.
- Rapid clamping of Shell into "V" fixture.
- Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.
- Can be equipped and operated at both ends for double output.
- Output, according to size of projection to be removed, from 40 to 100 per hour.
- Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments.
- Weight, 4,500 lbs.

For further particulars write

The Gardner Machine Company, Beloit, Wis., U.S.A.

The New "Murchey" Adjustable TAP

MURCHEY MCH. & TOOL CO.
DETROIT, MICH.
2"-14
WHITWORTH

POSITIVELY ACCURATE

10

times the life of the ordinary tap

With the Murchey Tap and chasers can be ground any number of times and adjusted each time to compensate for wear. **One set of chasers will last ten times as long as a solid tap,** and new chasers can be replaced at low cost.

Now with the solid tap it is an entirely different matter. Just as soon as you begin to sharpen a solid tap, it loses size and accuracy, and after one or two sharpenings the tool is of no further use.

This new Murchey Adjustable Tap is working finely and we are receiving a great number of orders for it. Send in yours to-day—the price is of no consequence considering the remarkable results and economies shown in length of service.

FULL PARTICULARS ON REQUEST.

Murchey Machine & Tool Co.
34 Porter Street, DETROIT, MICH.

Once Known—Always Used

M. E. C. Collapsible Taps

are giving extraordinary service on Shrapnel and Cartridge SHELL work.

It will be Greatly to your interest to get a line on the value of this tap. WRITE SOME USERS—we'll gladly send names and addresses.

Full particulars and details of our liberal proposition on request.

Manufacturers Equipment Co.
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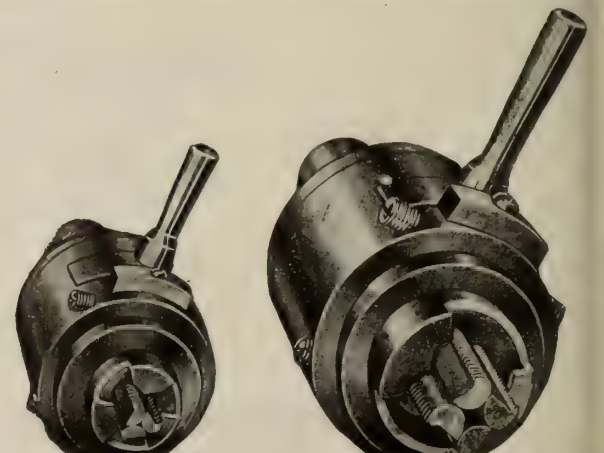
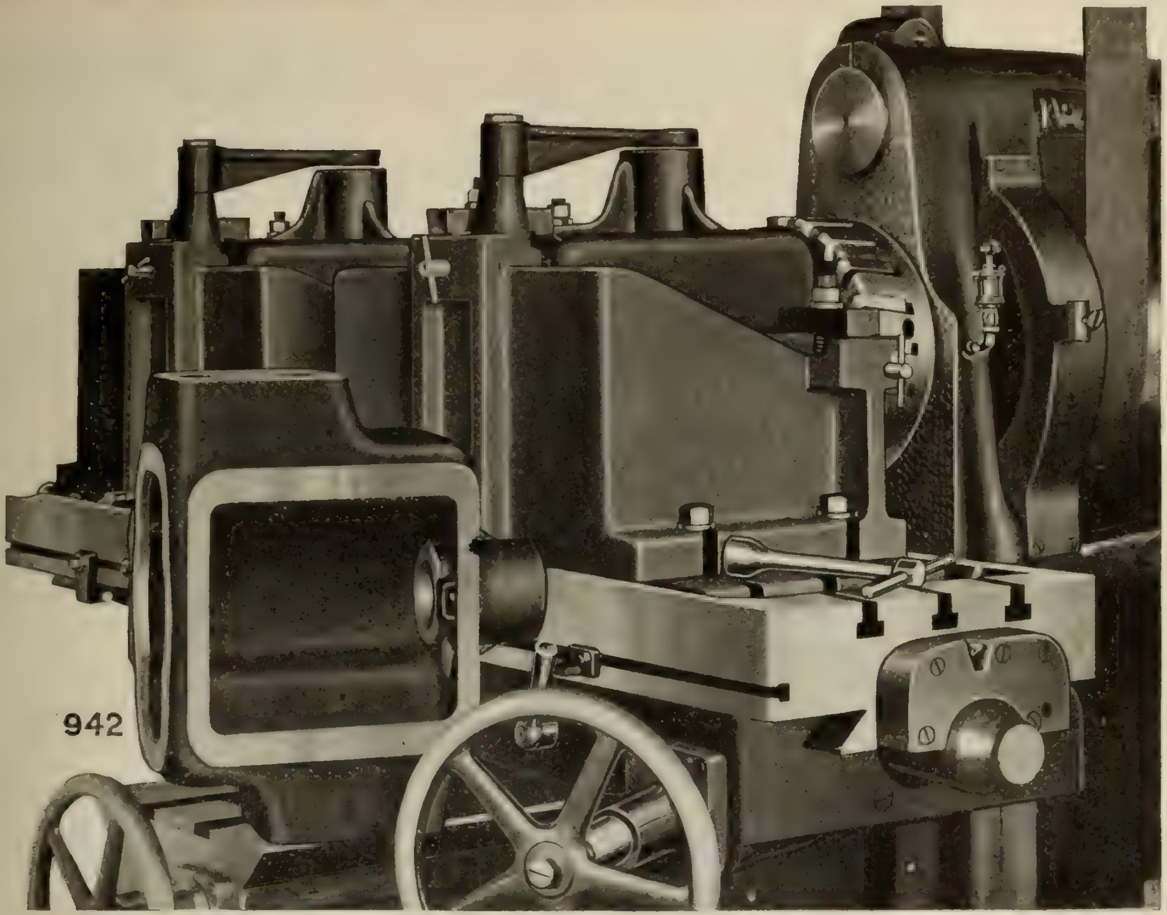
Canadian Agents:
A. R. WILLIAMS MACHINERY CO., Winnipeg
GEO. A. TODD, 826 Traders Bank Bldg., Toronto





THERE ARE LOTS OF JOBS

OF MILLING WHICH REQUIRE LARGE TABLE TRAVEL and chucking space, but do not need great spindle power.

The Crank Cases shown are approximately 10″ x 11″.

Ordinarily they would be milled on a High-Power, single-pulley machine.

In this case they were put on a CINCINNATI NO. 4 PLAIN CONE-DRIVEN MACHINE. A 12″ cutter running 26 r.p.m. at 20″ feed milled these surfaces flat and true in 2.6 minutes.

If you have similar work it will pay you to investigate this machine, as you can save money by buying it.

It is as convenient in operation and as efficient as a high-power miller, but being of simpler construction, it is less expensive.

☛ *Our complete line of millers—cone drive and single pulley—is described in our catalog. Shall we send you a copy?*

The Cincinnati Milling Machine Company

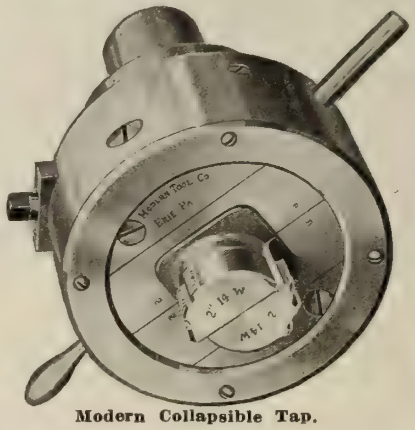
CINCINNATI, OHIO, U.S.A.

Canadian Agents: H. W. PETRIE, Limited, Toronto, Ont. H. W. PETRIE of Montreal, Limited, Montreal, Que. TAYLOR ENGINEERING CO., Limited, Vancouver, B.C.

Modern Self-Opening Adjustable Die Heads and Collapsible Taps

Modern Self-Opening Die Head.

"Modern," Self-Opening Die Heads and Collapsible Taps in your thread-cutting department mean efficiency and accuracy. With "Modern" Dies and Taps it is not necessary to take a roughing cut—a single cut gives a finished thread of absolute accuracy in diameter, form, lead and pitch. They are properly supported to insure the cutting of a perfectly straight thread of full size and accurate lead, and will not clog with chips, necessitating frequent cleaning. Cuts close to a shoulder.

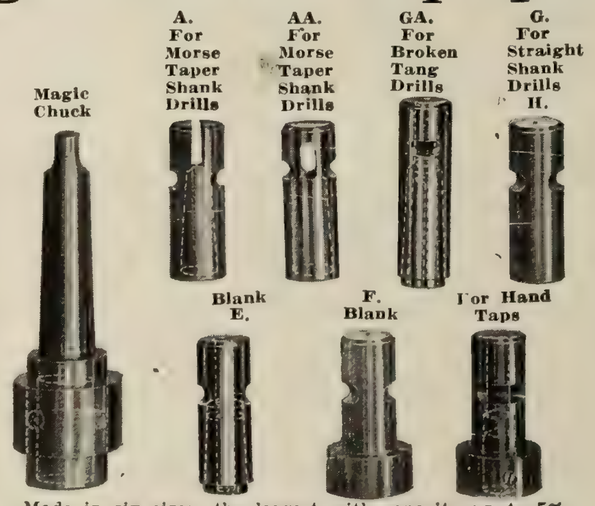

Modern Tool Co
Erie Pa

Modern Collapsible Tap.

"Modern" Die Heads and Collapsible Taps are used on all styles of Hand and Automatic Screw Machines, Turret Lathes, Chucking Machines, Drill Presses, in fact on any Machine that is used for thread-cutting.

Magic Chuck Equipment

The simplest, safest, easiest to operate and most adaptable chuck on the market. For use on Drill Press, Lathe, Screw Machines and other Revolving Spindle Machines.


Magic Chuck
A. For Morse Taper Shank Drills
AA. For Morse Taper Shank Drills
GA. For Broken Tang Drills
G. For Straight Shank Drills
H.
Blank E.
F. Blank
For Hand Taps

Made in six sizes—the largest with capacity up to 5% diam. drills.

Handles such operations as Drilling, Reaming, End Milling, Counter Boring, Tapping, in fact any operation that can be done on a Drill Press, increasing the output from 20% to 100%.

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Main Office and Works: STATE and PEACH STREETS, ERIE, PENNSYLVANIA, U.S.A.

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Ask Your Dealer or Send to Us for New Catalog

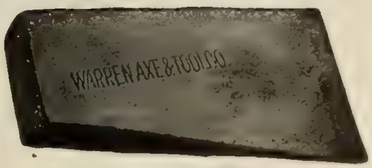
FORGES HAND AND POWER BLOWERS
DRILLS PUNCHES AND SHEARS
PUMPS COMBINATION WOODWORKERS

Fan System Apparatus of all Kinds

CANADIAN BLOWER AND FORGE COMPANY, Ltd.

Factory and Main Office: KITCHENER, ONT.

ST. JOHN MONTREAL TORONTO WINNIPEG VANCOUVER



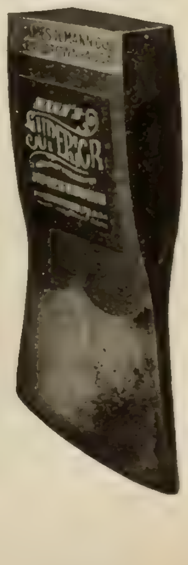
There's a Matthews Steel Die or Stamp for marking any product

The name or trade mark of the down-to-date manufacturer, stamped on his product with a Matthews Steel Die or a Matthews Steel Stamp does more than merely advertise and identify his goods. It enhances the selling value of the product in the eyes of the dealer and it shows the user, the consumer, the product to ask for by name when again in the market. *No other form of good advertising costs so little.*

We operate the largest and most modernly equipped shop in the United States for manufacturing all classes of steel lettering dies and stamps and kindred marking devices. An investigation of our service is invited.

Jas. H. Matthews & Company, Inc.
Pittsburgh, Pennsylvania Established 1850

Distributors for Canada: The Canadian Fairbanks-Morse Co., Ltd. Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Saskatoon, Victoria.



CROWN SKIN
REMEDIES

AMERICAN AX

"Make Overs"
THE PROFIT ROBBER
PH

Make-overs take time, labor, etc., and delay production. They eliminate much of would-be profit.

Make-overs in castings that are due to blow holes, sand holes, etc., can be prevented by the use of

Shelton Metallic Filler

It is applied to the affected parts by means of a spatula, and becomes part of the casting itself; is durable and can never be detected.

Its reliability is proven by the fact that many of America's leading manufacturers are steady users.

Don't waste another dollar by scrapping castings.

Shelton Metallic Filler Co., Derby, Conn., U.S.A.

Agents: Webster & Sons, Limited,
31 Wellington St., Montreal, Canada

TRADE B&C MARK

Bemis & Call Hdw & Tool Co.
Springfield Mass U.S.A.
B. & C.

This Good Wrench

You Will Buy This

Bemis & Call Adjustable "S" Nut Wrench

performs a service often required of wrenches, but not always given; namely, it works efficiently in corners and confined places where an ordinary wrench would be nearly useless.

on its shape, record service and price. A few weeks' use will prove to you its usefulness and superiority.

All parts are strong and durable, the operating nut is steel and the sliding jaw a steel drop forging.

Hardening and tempering are done by experts.

Send for complete Wrench Catalogue.

Bemis & Call Hardware & Tool Co.
SPRINGFIELD, MASS., U. S. A.

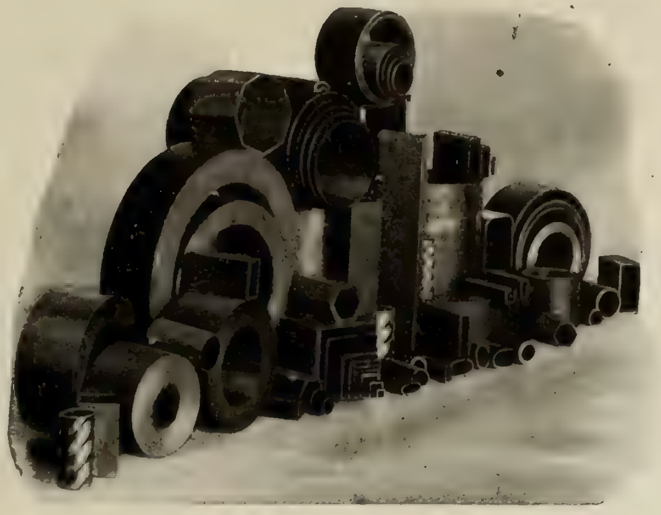
SHEET METAL STAMPINGS

The quality of our production is one grade — THE BEST. Our facilities and equipment enable us to give a very attractive price and prompt service.

Dominion Forge and Stamping Co., Limited
WALKERVILLE, ONTARIO

DROP FORGINGS

IN STOCK



Over 350 Sizes of

SHELBY SEAMLESS STEEL TUBING

Ready to Save You Time and Money

All these Shelby Steel Tubes, and dozens more, are drawn cold, through dies like a piece of wire. Note the smooth little round ones, and the sturdy big ones; the thick and the thin ones, as well as the squares, rectangles, hexagons, ovals and odd shapes; then think how much time, how much temper, and how much REAL MONEY you could save by the use of this excellent material instead of machined steel, or cast iron, or brass.

Twenty years ago you couldn't buy these tubes at any price, because no one knew how to make them; now we will supply you with any size from 1/8 to 5½ inches outside diameter, from our Montreal or Toronto stocks, and larger sizes up to 20 inches O.D., on special orders. We have tubing made from mild steel, and annealed for any particular purpose; high carbon steel, for bushings and special tensile requirements; and 3½% Nickel Steel for Automobile Construction. Write for Price Lists and Descriptive Catalogue.

Ours is the ONLY STOCK of Shelby Steel Tubing in Canada.

WIRE YOUR ORDER—WE WILL SHIP THE SAME DAY.

Lyman Tube & Supply Co., Limited

323 St. James Street, Montreal

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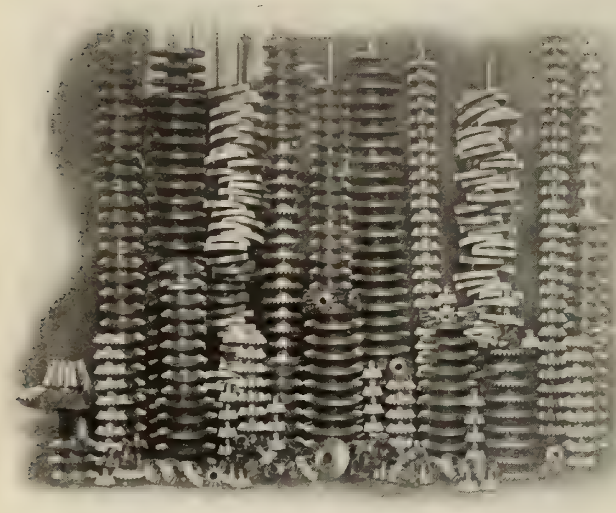
CUT GEARS

CUT GEARS



BEVELS OR SPURS
LARGE OR SMALL
IN ANY QUANTITY

Write for quotation.

Hamilton Gear & Machine Co.

COR. CONCORD
& VAN HORNE

TORONTO

—laces a 6-inch Belt in THREE minutes

CLIPPER BELT LACER

Laces any width or thickness. You don't have to remove belt from shaft, as this small 19-lb. machine is carried to the belt and the work done on the floor.

Saves man-time, machine-time, and money, and you get a better joint.

Adapted to all makes of belting.

33,000 now in use all over the world.

Sent on 30 days' free trial.

Here's your opportunity to prove for yourself, on your own plant — that the "Clipper" is the **only** belt lacer you can afford to use.

FOR SALE BY ALL LEADING SUPPLY HOUSES IN CANADA.

Clipper Belt Lacer Company

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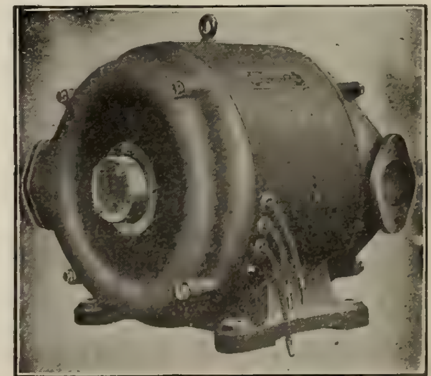
The Lancashire Dynamo & Motor Company, of Canada, Limited

107-109 Duke Street, TORONTO

ELECTRICAL MACHINERY for all Purposes.

ELLIOTT BROS'. { INSTRUMENTS
RECORDING GAUGES



PIPE VENTILATED A C MOTOR
FOR VERY DIRTY PLACES

When you begin to buy belting on the basis of **service** instead of price or habit, you are on the straight road to belting economy.

LEVIATHAN AND ANACONDA
ELEVATING
TRANSMITTING
CONVEYING
BELTING

That's the way to buy

LEVIATHAN and ANACONDA BELTING

You can depend on them for more certain service than any other belting you have ever used — rubber, balata, fabric or leather.

Main Belting Co., of Canada
LIMITED
10½ St. Peter St., Montreal

WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE.

ECONOMIC WATER OIL

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the **COST** of your **CUTTING MIXTURE** BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with **30 to 50** gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will **not** only be **satisfactory**, but will produce very **ECONOMIC RESULTS.**

One TRIAL ORDER will **prove** our STATEMENT.

Made in Canada

Canadian Economic Lubricant Co.
LIMITED
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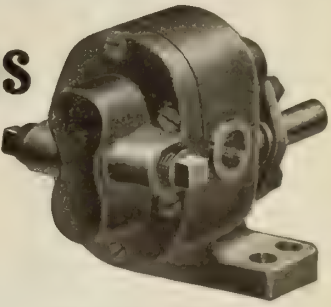
ROPER Circulating Oil Pumps

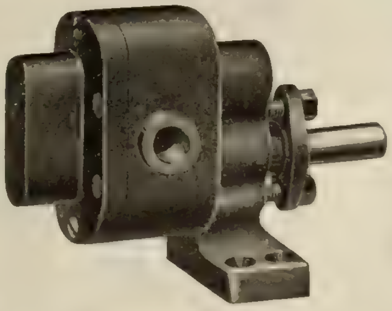
LOOK at the three types of oil pumps illustrated herewith, and read carefully the particulars relating to each. *We know* that these pumps are not equalled, much less surpassed, by any other pumps on the market. They are the product of specialization, long and severe experience and exceptional genius. They are found in thousands of plants because they are

Money-Savers

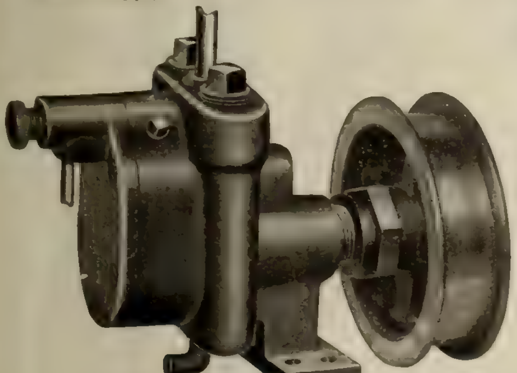
Which means, in the last analysis, they **excel all competing models.** Not the first price but the ultimate cost is the right test to apply.



Type 2. One-way.



Type 1. One-way



Type 1. Reversing

Type 1. One Way Type 1 One-Way Pump is especially designed for use on machines in which the cutting tools operate constantly in one direction, although by belting separately to the pump it may be used on a **reversing machine.**

Type 1. Reversing—Our Reversing Pumps are simple, self-priming and **low in cost. The reversing feature** is accomplished by simple ball valves, which also form a double check valve in the pump, making unnecessary any check valve in the pump line.

Type 2. One Way- Where it is known that the delivery will be cut off or varied at times with the pump running, our Type 2 pumps provide the best as well as the cheapest way of accomplishing this result.

C. F. ROPER & CO.

HOPEDALE, MASS., U.S.A.

MAGNOLIA ANTIFRICTION METAL
TRADE MARK
TRADE MARK

A GOOD DEMONSTRATION OF MAGNOLIA'S WORTH UNDER TRYING CONDITIONS

Magnolia Metal Co., Hancock, Mich., March 4th, 1916.

Dear Sirs,—Your letter of recent date received. I have had considerable experience with Magnolia Metal, and if the following is of any interest, you are at liberty to use it if you see fit:

In 1911 I was appointed chief engineer of the Yacht "Madeira." On taking charge of it I was told that the main shaft bearing was a trouble maker. This bearing was located 38 feet aft of the crank shaft bearing, and near the shaft tunnel. The shaft was 6" in diameter, and the average revolutions were 95 per minute. The shaft I discovered, whipped more or less and the construction of the hull was such that installing an extra bearing meant a large expense as well as considerable lost time. All grades of babbitt had been tried but none of them was successful.

The bearing had a large opening on top, and for a few days I worried along on tallow and graphite as a lubricant. This, however, failed on a trip from Havana to Key West. On arrival at the latter port I ordered some Magnolia Metal and rebabbitted the bearing. The trouble ceased at once, and instead of keeping it sludged with oil and grease I purchased a compression cup, and four or five ounces of grease were sufficient for a day's run.

During my nine years' experience as a Marine Engineer, and five as a Stationary Engineer, I have never known Magonlia Metal to fail, and always recommend it for use especially under severe conditions.

The chief engineer of the Old Court Street Electric Light Station in Buffalo, told me one time, during my apprenticeship, that there was only one high grade babbitt and that was Magnolia Metal.

Yours very truly,

R. C. DE MARY.

PRACTICAL ENGINEER POCKET BOOK:

Over 600 pages. A valuable reference work imported from England and sold as an advertising medium at the low price of 40c. post paid.

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Electric Travelling Cranes
(Direct or Alternating Current)

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(Stationary or Travelling)

Up-to-date design. Built for fast, continuous service.
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Theoretically Correct

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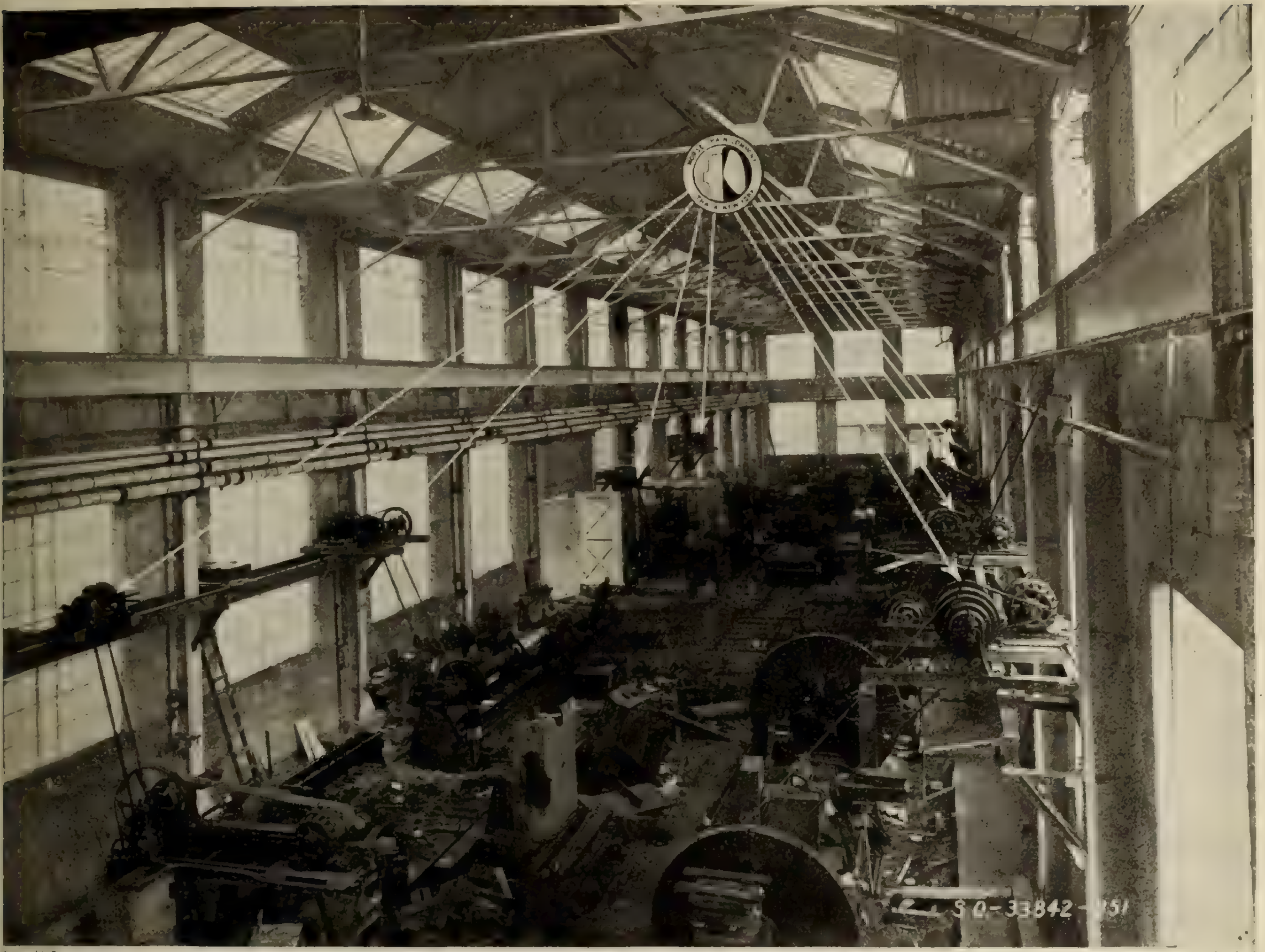
RAWHIDE OR METAL



New machine shop of Robins Dry Dock & Equipment Co., Brooklyn, New York.

Completely equipped with Silent Chain Drives "MORSE," Of Course

The illustration shows a shop where each machine has its individual countershaft, and each countershaft is driven by an electric motor through a MORSE Silent Chain.

This method of driving machines permits most convenient mounting of both motor and countershaft and assures a positive speed ratio between the two.

The MORSE Chain on the first reduction eliminates belt slip and lost power, and the grinding noise of gearing at high speed. With a sustained efficiency of almost 99 per cent., the chain assures maximum productive capacity at all times and at any speed.

Among the many notable shops and factories lately equipped with MORSE Silent Chain Drives are, Remington Arms & Ammunition Co., 390 drives averaging 24 hp. each; Morrow Mfg. Co., 86 drives averaging 22 hp. each; American Graphophone Co., 24 drives averaging 27½ hp. each; Brown-Lipe Chapin Co., 13 drives averaging 35 hp. each; etc., etc.

Remember, these firms pay more to get MORSE Chains than they would pay for any other make. Would they buy in such large quantities if there was any question of value?

Our free bulletins give reasons for the decided preference for MORSE "Rocker-Joint" Chains for both large and small powers. Copies mailed upon request.

MORSE CHAIN CO., ITHACA, N.Y.
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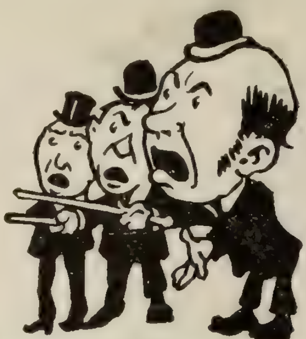

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Not mere arguments

Have always been the big selling talk for

Ford Tribloc
CHAIN HOIST

Steel Working Parts Instead of Iron
Ford was first to use them, a fact which immediately distinguished the Tribloc from all other makes of hoists.

The Patented Loop Hand-Chain Guide
A big safety feature—it protects the working parts and prevents gagging of the hand-chain, no matter at what speed or angle you may wish to operate the Tribloc. Another fact which helped to establish the superiority of the Tribloc.

A Five-Year Guarantee
Not just the usual one-year guarantee "against imperfections in workmanship and materials." We give the purchaser a guarantee that really protects, a fact which proves our own confidence in the Tribloc and the claims we make for it.

FORD TRIBLOC

Our Catalogue is full of facts showing the superiority of the Tribloc. Why not write for a copy now?

Ford of Philadelphia

FORD CHAIN BLOCK &
MANUFACTURING COMPANY
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THIS
ELEVATING TRUCK
greatly reduces cost of producing
SHELLS
or any factory product where numerous operations are required.

All material is stacked on the platforms. To move material the truck is backed under the platform; the handle of the truck is then pushed down, keeping the button depressed, which raises the truck bed, and with it the loaded platform, at the same time automatically locking it in its raised position.

When hauled to the desired position the button is pressed and the handle raised, lowering the platform to the floor. The truck is then drawn from underneath and is ready to move another platform.

Raising and lowering of the truck can be operated with one hand—can be raised or lowered at any angle. Specially designed ball-bearings throughout.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises and** PRESSES WITH ATTACHMENTS FOR PRESSING IN BAND — fixtures especially adapted for the manufacture of 18-pr. Shrapnel Shells.

You will profit by getting in touch with us now for prices and full information.

THE CHAPMAN DOUBLE BALL BEARING CO. OF CANADA
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TRANSMISSION BALL BEARING CO., INC.
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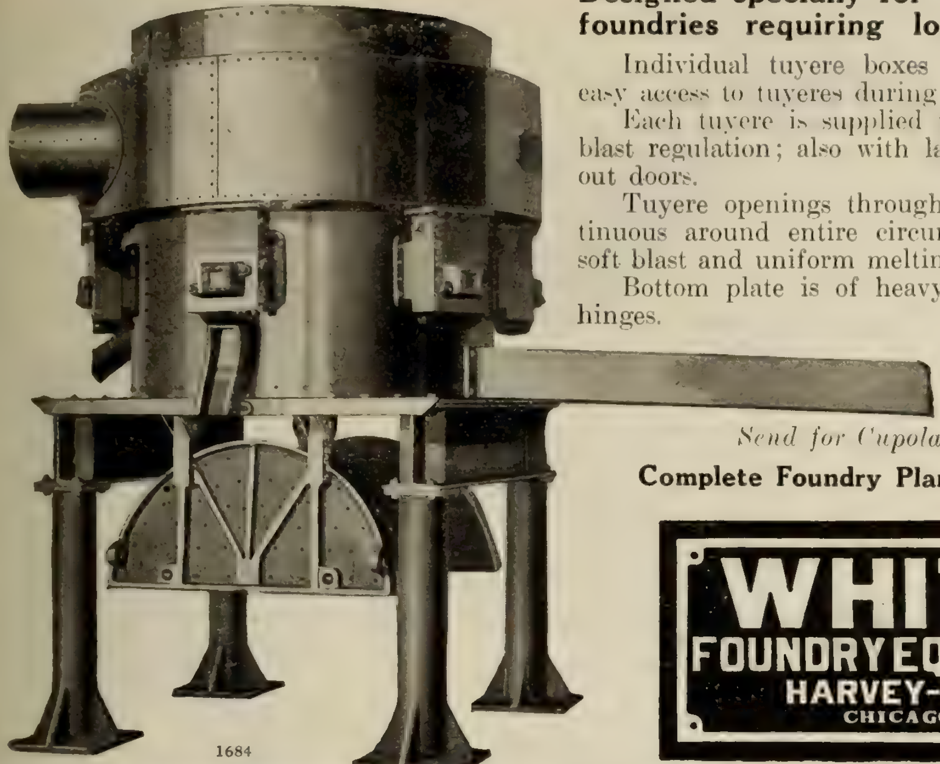
SPECIAL WHITING CUPOLA



Designed specially for pipe, car wheel and all foundries requiring long, continuous heats.

Individual tuyere boxes with ample openings give easy access to tuyeres during the heat.

Each tuyere is supplied with individual damper for blast regulation; also with large side and bottom clean-out doors.

Tuyere openings through lining are large and continuous around entire circumference of cupola, giving soft blast and uniform melting.

Bottom plate is of heavy steel plate with cast steel hinges.

Over a score in operation, giving excellent results.

Send for Cupola Catalog No. 118.

Complete Foundry Plants—Cranes of all Kinds

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The High-Speed, Heavy-Duty Babbitt

A first-class all-round babbitt. It will not only take care of high speed, but will stand up to heavy work in an extraordinary way.

For saw mills, planing mills, threshing engines, traction rolling mills, pulp machinery, and all classes of stationary engines, it is without equal.

The Babbitt Metal that gives satisfaction day in and day out. **Sales over $5,000,000 annually.**

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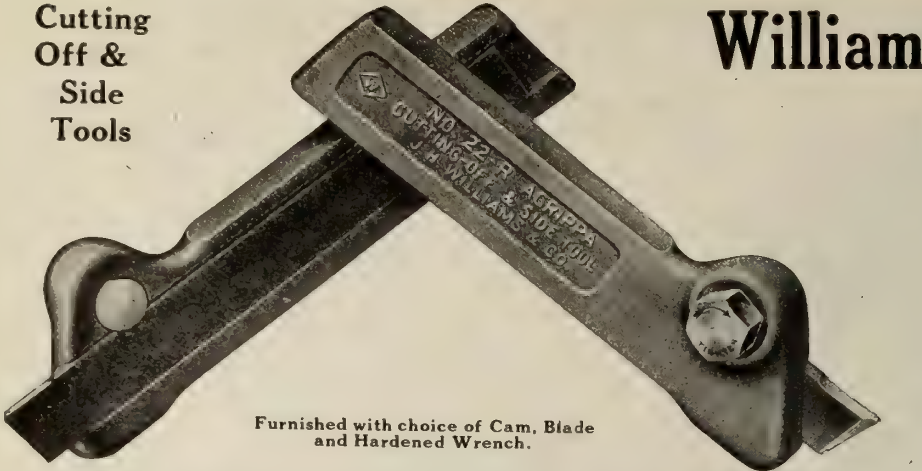
Williams' "Agrippa" Tool Holders

"THE HOLDERS THAT HOLD"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CUTTING-OFF & SIDE TOOL
J.H. WILLIAMS & CO.

Furnished with choice of Cam, Blade and Hardened Wrench.

This "AGRIPPA" is no loafer. Even if its work is *cut off*, it undertakes any old job on the *side*.

Interchangeability of cutters means direct economy.

Order them from your dealer. WE guarantee them.

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The Wrench People

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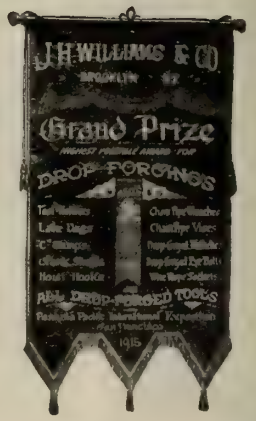
40 So. Clinton Street, Chicago, Ill.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ALL DROP-FORGED TOOLS
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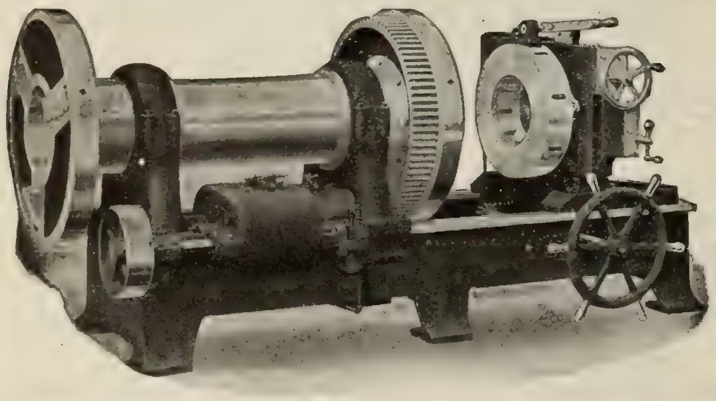

If You Thread Pipe, You Need This Machine

A BIGNALL & KEELER PIPE MACHINE will handle a range of from eight to ten sizes of pipe. They do not require mechanics to either install or operate them. They are equipped with the Peerless Die-head; have cut-off and reaming tools. The small sizes up to three-inch have thread-measuring gauge. Each machine goes under the belt and is tested out on each size of pipe.

BIGNALL & KEELER MACHINES are Satisfying Machines
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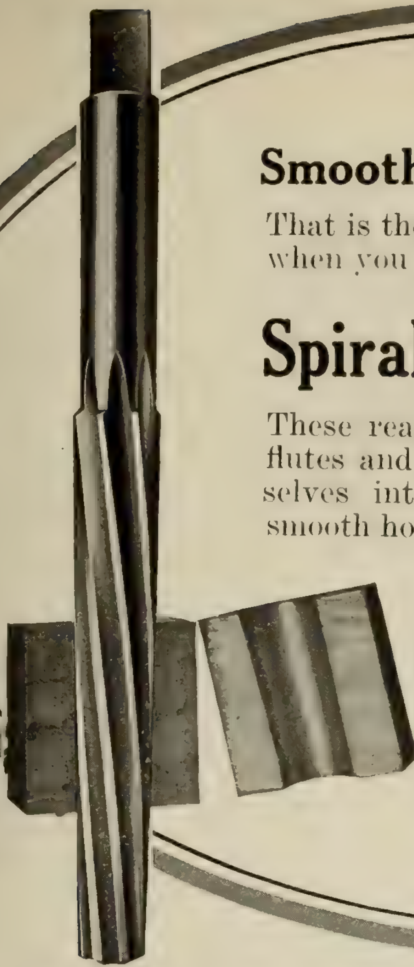
CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS



Smooth as Glass

That is the kind of holes you get when you use

Spiral Fluted Reamers

These reamers are made with left-hand spiral flutes and will neither chatter nor draw themselves into the work. They produce round, smooth holes, true to size.

Our Catalog is of handy size for ready reference. Send for a copy.

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Galt, Ontario

Sales Agents; THE CANADIAN FAIRBANKS-MORSE COMPANY, LIMITED, Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary

Grinding Tapered Bodies of Connecting Rods

One of the largest gas engine and pump manufacturers in the middle west grinds tapered bodies of connecting rods to get good finish on these parts. It is putting in extra work not necessary for accuracy, therefore big production is required.

The photograph shows the machine grinding one of these rods, the tapered body of which is 30 inches long. The shaft is a drop forging, the finished small diameter is 1⅜ in., and the large diameter 1⅞ in. From 0.020 in. to 0.030 in. is removed—enough to clean up all lathe tool marks—the rod coming to the grinding machine after a roughing lathe cut only has been taken.

The wheel used is a Norton Alundum, 24 x 2 x 5 in., grain 24, grade M, running at a periphery velocity of 6,000 ft. per minute.

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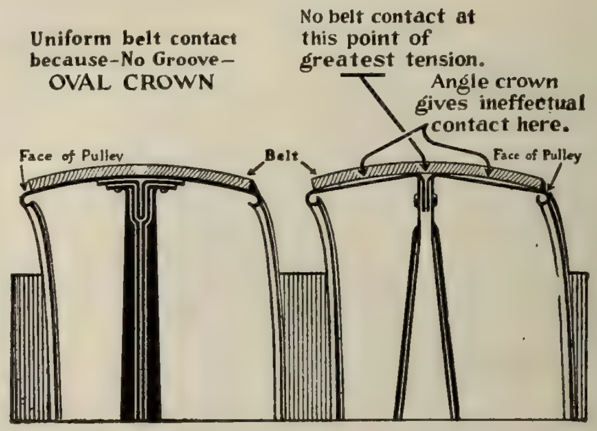
Oneida Steel Split Pulleys

If you are not using this "closest approach to pulley perfection," we have in store for you an additional means of cutting down expense and improving your plant.

For your own best interest—for the sake of your factory overhead — look into this matter of steel pulleys.

And when investigating, you might as well start in at the top, with the steel pulley that has actively demonstrated its positive superiority over all other steel pulleys—the pulley of such construction that not only makes practicable its use for ordinary line shaft work, but is also successfully built, without a change of design, in sizes capable of transmitting 750 H.P.—and more if necessary.

Let us fill your next pulley order with an Oneida. For your convenience we keep on hand a "perpetual stock" of all sizes—your urgent needs can be filled at once.


Uniform belt contact because-No Groove-OVAL CROWN
No belt contact at this point of greatest tension.
Angle crown gives ineffectual contact here.
Face of Pulley
Belt
Face of Pulley

This advantage is tangible.

Unless a pulley has a face insuring efficient belt contact, it is not an economical pulley to use.

The Oneida is a one-piece, perfect oval crown, with no groove running through the center. All of the face surface is efficient surface; the belt uniformly hugs the crown, producing the greatest amount of belt adhesion with the least belt tension. Operating conditions being the same, the Oneida will, for this reason, transmit from 5 to 20 per cent. more power than a pulley having an angle crown that requires greater belt tension to force efficient belt contact, and that has a center groove which subtracts belt area from the most vital point of the face—the center.

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The Canadian Fairbanks - Morse Co., Limited

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CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

Foundrymen's Convention and Equipment Exhibition

Staff Article

The Conventions of the American Foundrymen's Association and American Institute of Metals with their affiliated Exhibition held recently in Cleveland, Ohio, were featured by record attendances, and by a high standard of papers read and discussed at the various sessions. The Exhibition was an unqualified success from every standpoint, and was fully indicative of the remarkable progress made in foundry equipment and operation in recent years.

THE 21st Annual Convention of the American Foundrymen's Association was held at Cleveland, Ohio, during the week of September 11th. As usual, joint and also independent simultaneous sessions were held with the American Institute of Metals. The exhibition of foundry equipment and supplies, and machine tools which was formerly conducted by an independent corporation, was this year held under the joint management of the two associations. The first exhibition of foundry equipment and supplies took place in Cleveland in 1906, being the last time it and the convention were held in that city until the present year. This in itself was an interesting feature as it served to show the remarkable progress which has been made in the foundry industry during the intervening period.

Exhibition Feature.

The convention was held in the Hotel Statler, and the exhibition at the Wigmore Coliseum where 60,000 square feet of floor space was available for exhibitors. This space however was inadequate owing to the popularity of the exhibition, so an annex with 10,000 square feet space was erected on vacant ground adjoining the main building. All the available space was occupied, the number of exhibitors being 150. The exhibition was a complete success both as regards attendance and character of exhibits. It was the largest exhibition of foundry equipment and supplies that has ever been held in the United States. The exhibit included all types of modern foundry equipment, both heavy and light, stationary and in operation; general metal working machinery, cutting and welding equipments, pattern lumber, office specialties, coke, pig iron, non-ferrous metals, etc. The whole made a very attractive and interesting display, complete in that it included everything that is required and employed in the foundry. A noticeable feature brought out in the exhibit was the increasing tendency towards labor saving and reduction of operating costs.

Convention Feature

The convention opened on Monday, September 11th, at the Hotel Statler, with a record attendance, the afternoon session being devoted to the annual addresses by president R. A. Bull of the American Foundrymen's Association and president Jesse L. Jones of the American Institute of Metals.

A new departure was inaugurated this year in order to permit of a closer inspection of the exhibits and participation in the entertainment features without encroaching on the technical sessions as in the past. The arrangement consisted of having one meeting per day, in the morning, leaving the afternoons free for other purposes. Joint sessions were held on Monday and Tuesday mornings, these being followed by

GENERAL VIEW OF EXHIBITS IN ANNEX

separate meetings of the two organizations on Wednesday, Thursday and Friday mornings.

The program of the American Foundrymen's Association was most complete. It contained three interesting symposiums, forty papers and addresses and eleven committee reports. General topics were considered on Wednesday, followed by steel and malleable sessions on Thursday and gray iron and steel on Friday. The program of the American Institute of Metals was also very complete. Tuesday was devoted to a joint session with the American Foundrymen's Association while in addition, the program contained twenty-one papers on all phases of brass foundry and rolling mill work. Brass foundry practice was discussed on Wednesday, heat treatment and corrosion on Thursday, while on Friday papers were read on physical tests, metallography, etc. The final meeting of the two organizations was a joint session held on Friday when the new officers were installed and the convention finally closed. A proposal to amalgamate the two associations was defeated. The executive committee of the American Institute of Metals reporting the matter, expressed the fear that amalgamation of the two bodies might result in less prominence of the organization which has now a membership of 350.

VIEW OF EXHIBIT NEAR MAIN ENTRANCE TO COLISEUM

New Officers, A.F.A.

The American Foundrymen's Association elected the following officers for the ensuing year. J. P. Pero, Missouri Malleable Iron Co., St. Louis, president; Benjamin D. Fuller, Westinghouse Electric & Mfg. Co., Cleveland, vice-president; A. O. Backert, Penton Publishing Co., Cleveland, secretary-treasurer. The remaining members of the board of directors are as follows: R. A. Bull, Granite City, Ill.; Henry A. Carpenter, Providence, R. I.; Alex. T. Drysdale, Burlington, N.J.; C. E. Hoyt, Chicago; Alfred E. Howell, Nashville, Tenn.; W. A. Janssen, Davenport, Ia.; S. T. Johnston, Chicago; V. E. Minich, New York City; Jos. T. Speer, Pittsburgh; H. B. Swan, Detroit; S. G. Fagg, Philadelphia, and S. B. Chadsey, Toronto, Ont

New Officers, A.I.M.

The American Institute of Metal elected the following officers for the ensuing year: President, Jesse L. Jones, Westinghouse Electric & Mfg. Co., Pittsburgh, second term; secretary, W M. Corse, Titanium Alloy Mfg. Co., Niagara Falls, N.Y.; senior vice-president, George C. Stone, New Jersey Zinc Co., Palmerston, N.J. Other vice-presidents are: R. S. B. Wallace, National Cash Register Co., Dayton, O.; W. B. Price, Scovill Mfg. Co., Waterbury, Conn.; George K. Burgess, bureau of standards, Washington; DeCourcey Brown, Goldsmith Thermit Co., New York City; Harold J. Roast, James Robertson Co., Montreal; J. P. Salter, Ohio Brass Co., Mansfield, O.; F. H. Schultz, H. B. Mueller Co., Decatur, Ill.; W. A. Cowan, National Lead Co., New York City, and H. S. Gulick, Moore Brass & Metal Co., St. Louis.

Plant Visitations.

The arrangement whereby all sessions were held in the morning left the rest of the day free for visits to plants in

GENERAL VIEW OF EXHIBITS NEAR MAIN ENTRANCE TO COLISEUM the district, a closer inspection of the exhibits at the Coliseum, and other relaxations. As Cleveland ranks third in the United States in the number of foundries within the city limits, a great opportunity was thus afforded to witness operations in modern plants. Although plant visitation was limited to two days, Thursday and Friday, a considerable number of visitors availed themselves of the opportunity of an inspection of the Cleveland Furnace Co. plant on Wednesday afternoon. The inspection of plants by visitors was arranged for at appointed hours on the two days named. The most modern shops in the city were selected and those visited included:—The Ferro Machine & Foundry Co.; Interstate Foundry Co.; Westinghouse Electric & Mfg. Co.; West Steel Casting Co.; City Foundry Co.; and the Best Foundry Co., of Bedford, Ohio.

VIEW IN THE SOUTH-EAST CORNER OF THE COLISEUM

Entertainments.

The entertainment program included a ball game between the Cleveland and Detroit teams of the American League on Tuesday afternoon; a theatre party on Tuesday evening, and a trip to Euclid Beach Park on Wednesday night. The banquet was held at the Hotel Statler on Thursday evening and was attended by about 460 guests. The principal address was delivered by Newton D. Baker, U.S., Secretary of War, while Irving Bacheller the noted poet and novelist delivered a humerous talk on "The Cheerful Yankee."

Convention Papers, A.F.A.

Symposium on **"The Results of Closer Co-Operation Between the Engineer and the Foundry,"** as relating to:

"Gray Iron," by D. W. Sowers, Sowers Mfg. Co., Buffalo.

"Steel," by John Howe Hall, Taylor-Wharton Iron & Steel Co., High Bridge, N.J.

"Malleable Iron," by G. F. Meehan, Ross-Meehan Foundries, Chattanooga, Tenn.

"Non-Ferrous Metals," by C. E. Chase, Modjeski & Angier, Chicago.

Symposium on **"The Influence of Gating on Castings,"** covering:

"Gray Iron," by B. D. Fuller, Westinghouse Electric & Mfg. Co., Cleveland.

"Steel," by William Gilmore, Hubbard Steel Foundry Co., East Chicago, Ind.

"Malleable Iron," by A. M. Fulton, Fort Pitt Malleable Iron Co., Pittsburgh.

"Non-Ferrous Metals," by R. R. Clarke, Pennsylvania Lines West, North Side, Pittsburgh.

"Waste Foundry Sand," by H. B. Swan, Cadillac Motor Car Co., Detroit, and H. M. Lane, consulting engineer, Detroit.

"Report of Work on Molding Sand," by S. W. Stratton, director, U. S. Bureau of Standards, Washington, D.C.

"The Significance of the Fire Waste," by Franklin H. Wentworth, secretary, National Fire Protection Association, Boston.

"What the Pratt Institute Has Done, Is Doing and Hopes to Do, in the Training of Men for the Foundry Industry," by Samuel S. Edmunds, Pratt Institute, Brooklyn.

"Analyzing Foundry Operations as a Basis for Improvement in Shop Conditions," by R. E. Kennedy, University of Illinois, Ubana, Ill.

"Foundry Work at the University of Nebraska," by John Grenman, University of Nebraska, Lincoln, Neb.

"Foundry Costs," by Clinton H. Scovell, Clinton H. Scovell & Co., Boston.

"Profit-Sharing as a Factor in Preparedness," by C. E. Knoeppel, C. E. Knoeppel Co., New York.

"How Some Cleaning Room Problems Have Been Solved," by H. Cole Estep, The Foundry, Cleveland.

"The Introduction of the Molding Machine in Foundries," by A. O. Backert, Penton Publishing Co., Cleveland.

Symposium on **"Electric Furnace Practice"**:

"The Ideal Electric Furnace for the Steel Foundry," by F. J. Ryan, E. B. McKee and W. D. Walker; Snyder Electric Furnace Co., Chicago.

"The Electric Furnace in the Foundry," by E. B. Clarke, Buchanan Electric Steel Co., Buchanan, Mich.

"Gronwall-Dixon Electric Melting and Refining Furnace," by John A. Crowley, John A. Crowley Co., New York.

"Electric Furnace Practice in the Manufacture of Steel Castings," by T. S. Quinn, Lebanon Steel Foundry, Lebanon, Pa.

"Electric and Converter Steel Compared," by Peter Blackwood, Blackwood Steel Foundry Co., Springfield, O.

"The Manufacture of Manganese Steel Castings," by W. S. McKee, American Manganese Steel Co., Chicago.

"The Presence of Alumina in Steel," by G. F. Comstock, Titanium Alloy Mfg. Co., Niagara Falls, N.Y.

Malleable Session.

"The 25 Ton Air Furnace," by F. C. Rutz, Rockford Malleable Iron Works, Rockford, Ill.

"What is the Normal Fracture of Good Malleable Iron?" by Enrique Touceda, Albany, N.Y.

"The Commercial Side of the Malleable Iron Industry," by W. G. Kranz, National Malleable Casting Co., Cleveland.

"The Application of Malleable Iron Castings in Car Construction," by Frank J. Lanahan, Fort Pitt Malleable Iron Co., Pittsburgh.

"Suggested Standards for Pattern Parts," by W. W. Carlson, Kansas State Agricultural College, Manhattan, Kan.

Gray Iron Session.

"The Effects of Different Mixtures on the Strength of Chilled Car Wheels," by G. S. Evans, Lenoir Car Works, Lenoir City, Tenn.

"Semi-Steel Classified," by David McLain, McLain's System, Milwaukee.

"Use of By-Product Coke in Foundries," by George A. T. Long, Pickands, Brown & Co., Chicago.

"The Use of Borings in Cupola Operations," by James A. Murphy, Hooven, Owens & Rentschler Co., Hamilton, O.

"The Use of Cheaper Materials," by C. C. Kawin, Charles C. Kawin Co., Chicago.

"One-third of a Century in a Gray Iron Foundry," by Alfred E. Howell, Phillips & Buttorff Mfg. Co., Nashville, Tenn.

"Thermal Reactions in Gray Iron," by Thomas Turner, The University, Birmingham, Eng.

"Application of the Match-Plate to Foundry Work," by J. K. Grill, International Harvester Co., Chicago.

Steel Session.

"The Use of Titanium in the Manufacture of Steel Castings," by W. A. Janssen, Bettendorf Co., Davenport, Ia.

"Acid Versus Basic Steel for Making Castings," by E. F. Cone, The Iron Age, New York.

"Alloy Steel Castings," by David Evans, Chicago Steel Foundry Co., Chicago.

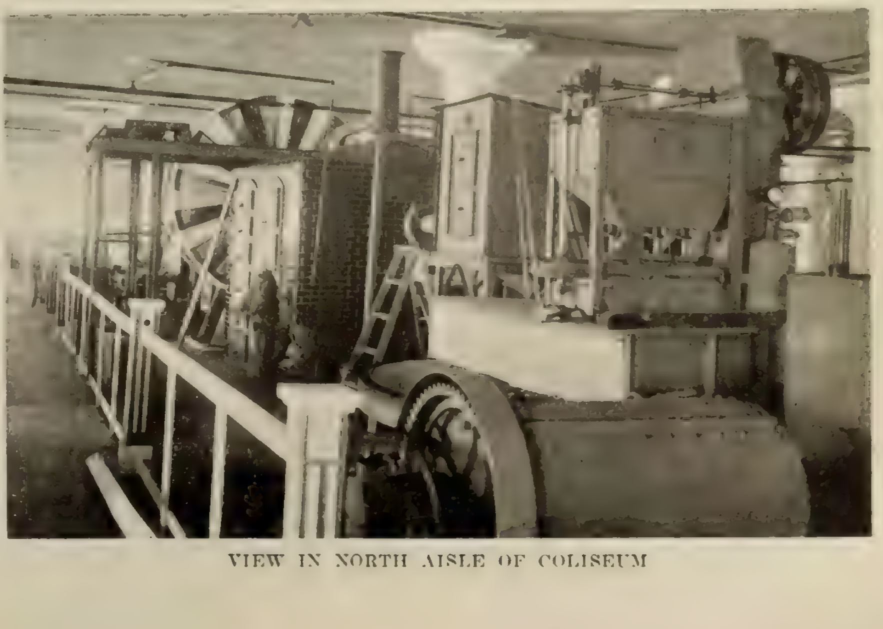
"Theory and Practice in Gating and Heading Steel Castings," by Ralph D. West, West Steel Casting Co., Cleveland.

"The Small Open-Hearth as a Flexible Unit for Either Large Steel Foundries or General Jobbing Shops," by Frank Carter, Milwaukee, Wis.

CONVENTION PAPERS, A.I.M.

Symposium on **"The Results of Closer Co-Operation Between the Engineer and the Foundry,"** as relating to:

"Gray Iron," by D. W. Sowers, Sowers Mfg. Co., Buffalo.


VIEW IN NORTH AISLE OF COLISEUM

"Steel," by John Howe Hall, Taylor-Wharton Iron & Steel Co., High Bridge, N.J.

"Malleable Iron," by G. F. Meehan, Ross-Meehan Foundries, Chattanooga, Tenn.

"Non-Ferrous Metals," by C. E. Chase, Modjeski & Angier, Chicago.

Symposium on **"The Influence of Gating on Castings,"** covering:

"Gray Iron," by B. D. Fuller, Westinghouse Electric & Mfg. Co., Cleveland.

"Steel," by William Gilmore, Hubbard Steel Foundry Co., East Chicago, Ind.

"Malleable Iron," by A. M. Fulton, Fort Pitt Malleable Iron Co., Pittsburgh.

"Non-Ferrous Metals," by R. R. Clarke, Pennsylvania Lines West, North Side, Pittsburgh.

"Waste Foundry Sand," by H. B. Swan, Cadillac Motor Car Co., Detroit, and H. M. Lane, consulting engineer, Detroit.

"The Significance of the Fire Waste," by Franklin H. Wentworth, secretary, National Fire Protective Association, Boston.

"What the Pratt Institute Has Done, Is Doing and Hopes to Do, in the Training of Men for the Foundry Industry," by Samuel S. Edmands, Pratt Institute, Brooklyn.

"Analyzing Foundry Operations as a Basis for Improvement in Shop oCnditions," by R. E. Kennedy, University of Illinois, Urbana, Ill.

"Foundry Work at the University of Nebraska," by John Grenman, University of Nebraska, Lincoln, Neb.

Foundry Practice.

"Twenty-Five Years' Experience in the Brass Foundry," by E. A. Barnes, Fort Wayne Electric Co., Fort Wayne, Ind.

"Evolution of the Die Casting Process," by Charles Pack, Doehler Die Casting Co., Rochester, N.Y.

"How a Large Manufacturing Concern Disposes of Its Old Metal," by J. M. Bateman, Western Electric Co., Cleveland.

"The Reclamation of Brass Ashes," by Arthur F. Taggart, Hammond Laboratory, Yale University, New Haven, Conn.

"The Small Leaks of a Brass Foundry," by Charles T. Bragg, Ohio Brass Co., Mansfield, O.

"The Application of the Oxy-Acetylene Welding Process in the Repair of Defective Non-Ferrous Castings," by S. W. Miller, Rochester Welding Co, Rochester, N.Y.

"Alloys to Withstand Internal Air Pressure," by S. D. Sleeth, Westinghouse Air Brake Co., Wilmerding, Pa.

"Making Thin-Walled Castings," by R. S. B. Wallace, National Cash Register Co., Dayton, O.

Heat-Treatment, Corrosion, Etc.

"Deterioration of Muntz Metal," by H. S. Rawdon, United States Bureau of Standards, Washington, D.C.

"The Initial Stress Produced by the Burning-In of Manganese Bronze," by Paul D. Merica and C. P. Karr, United States Bureau of Standards, Washington, D.C.

"A Curious Case of Corrosion of Tinned Sheet Copper," by Paul D. Merica, United States Bureau of Standards, Washington, D.C.

"Notes on the Occurrence and Significance of Tinned Crystals in Electrolytic Copper," by H. S. Rawdon, United States Bureau of Standards, Washington, D.C.

"The Annealing Properties of Copper," by G. V. Caesar and G. C. Gerner, Hammon Laboratory, Yale University, New Haven, Conn.

"Some Uses and Properties of German Silver as Applied to the Optical Trade," by G. C. Holder, American Optical Co., Southbridge, Mass.

Physical Tests, Metallography, Etc.

"Aluminum Castings and Forgings," by P. E. McKinney, United States Navy Yard, Washington, D.C.

"Copper-Aluminum-Iron Alloys," by W. M. Corse, Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

"Physical Tests on Common High Brass Taken Parallel and at Right Angles to the Direction of Rolling," by William B. Price and Philip Davidson, Scovill Mfg. Co., Waterbury, Conn.

"Seasoning Cracks and the Self-Annealing of Brass," by W. Arthur, Frankford Arsenal, Frankford, Philadelphia.

"Co-operation with the Metal Industries in Metallographic Work," by C. H. Mathewson, director, Hammond Laboratory, Yale University, New Haven, Conn.

Exhibitors, Exhibits and Representatives.

Ajax Metal Co., Philadelphia, Pa.—Ingots of various metals manufactured. Representated by G. H. Clamer, first vice-president and secretary; C. F. Hopkins, general works manager; F. M. Willeson, New England and New York State manager; C. F. McRae, Detroit representative, and L. E. Purnell, Pittsburgh representative.

Alexander Bros. Lumber Co., Cleveland — Pattern and flask lumber specialists. Represented by H. L. Spitler, vice-president; and M. F. Fitzgerald, secretary.

Amalgamated Machinery Corporation, Chicago.—No. 23 Shell Boring Machine. Represented by N. A. Mears.

American Foundry Equipment Co., Cleveland, O.—For description of Exhibit see Sand Mixing Machine Co.

American Gum Products Co., New York.—Goulac Core Binder. Represented by Gordon I. Lindsay, general manager; W. E. Baird, manager foundry department; John F. Gaffney, R. H. Mills and U. W. Frink.

American Foundrymen's Association, Department of Safety.—Victor T. Noonan, Director of Safety of the Industrial Commission of Ohio, chairman. Exhibit of safety and welfare work in Foundries and shops. Loaned by the National Safety Council.

American Molding Machine Co., Terre Haute, Ind.—Jolting machine. Represented by W. C. Norcross, president, and Glen B. Hastings, western representative.

Arcade Manufacturing Co., Freeport, Ill.—Twenty-four inch roll-over machine, piston machine, jolt stripper, No. 2 modern molding machine, core jolt machine, 8-inch air squeezer, No. 90 combined jolt and squeezer and No. 2 hand squeezer. Represented by E. H. Morgan, president; Chas. Morgan, vice-president; L. L. Munn, secretary; Henry Tscherning, master mechanic; R. E. Turnbull, August Christen and G. D. Wolfley, representatives.

Armstrong Cork Co., Pittsburgh, Pa.—Nonpareil insulating brick for furnaces, ovens, blast mains, boiler settings, etc. Nonpareil high pressure covering for steam lines, boilers, feed water heaters, etc. Nonpareil cork covering for drinking water lines, tanks, etc. Linotile for office floors. Represented by P. W. Lamson, Cleveland district manager, and E. C. Lloyd, sales engineer.

E. C. Atkins & Co., Inc., Indianapolis, Ind.—Saws for all purposes, particularly metal cutting saws for all classes of metals and types of sawing, such as circular metal cutting saws, friction discs, metal cutting band saws, hand and power hack saws and frames, saw fitting tools and Kwik Kut power hack saw machines. Represented by T. H. Endicott, special metal saw representative, ThomasA. Carroll, trade service department, and A. Mertz, Ohio metal saw representative.

Ayer & Lord Tie Co., Inc., Chicago.—A. & L. interior creosoted wood block floor. Represented by A. H. Noyes, secretary and treasurer; W. H. Blythe , F. W. Maechler, B. S. McConnell, S. C. Conway, and R. G. Inslee.

B. & B. Mfg., Indianapolis, Ind.—Thirty-inch hand jar and squeeze machine, 30-inch power squeezer and 24-inch power squeezer. and W. J. Parker.
Represented by Wm. I. Ballentine, president,

Beighlee Electric Co., Cleveland, O.—Beighlee indicating and recording pyrometer equipment. Represented by W. H. Chappel, secretary, and W. O. Little, New York representative.

Berkshire Mfg. Co., Cleveland.—Automatic molding machine, air and hand squeezer molding machines, jolt and squeeze molding machines, vibrators, etc. Represented by R. H. York, president; W. A. Price, treasurer; C. L. V. Evans, assistant treasurer; W. D. Fras manager; F. Hulec and G. L. Cannon, representatives.

Charles H. Besly & Co., Chicago.—Represented by Edward P. Welles, president; Charles A. Knill, Ralph W. Young, Leo. E. Jacobs and George Klemp.

S. Birkenstein & Sons, Chicago.—Non-ferrous metals. Ingot copper, pig tin, spelter, lead, antimony, bismuth, manganese bronze, phosphor bronze ingots, brass ingots. Castings made from special alloys showing working qualities. Represented by Harry Birkenstein, member of firm; Lee Kahn, metallurgical director; M. Schero, and Chas. B. Raphael, salesmen.

Blystone Mfg. Co., Cambridge Springs, Pa.—Core sand mixer with screen and motor attached, and power dump. Represented by W. J. Pees, president, and Luther G. Conree, general manager.

Brass World Publishing Co., New York — Brass World & Plater's Guide, and technical books relating to the foundry trade. Represented by C. N. Manfred, business manager; George K. Meyers, M. G. Rosenthal and S. E. Rosenthal.

Brown Hoisting Machinery Co., Cleveland.—Tramrail equipment with switch, turntable, trolleys and chain hoist. Hand traveling crane with trolley and hoist. Represented by A. R. Leeds and F. D. Johnson.

Brown Specialty Machinery Co., Chicago.—Hammer core machines, electric duplex shaker and revolving barrel sand blast machine. Represented by E. A. Rich, Jr., president; J. E. Sweet, sales manager; John Laycock, factory superintendent, and A. G. Coburn, mechanical superintendent.

Buckeye Products Co., Cincinnati, O.—Parting compounds, vibrators, high temperature furnace cement, core compounds, metal fluxes, patent snap flask guides and metal melting furnaces. Represented by C. J. Goehringer, president; D. S. Marfield, secretary; R. B. Ferguson, B. Bernbaum, C. S. Weigert, C. Gysin, J. B. Carpenter and A. J. Johnson, representatives.

Campanhia Braisleira de Matallurgia, Buffalo, N.Y. - Sensand-Arens process for casting pipe. Represented by A. Arens and D. L. Savaud.

Carborundum Co., Niagara Falls, N.Y.—Carborundum and Aloxite products, including Carborundum and Aloxite wheels, Carborundum rub bricks, Carborundum and Aloxite cloth discs, Carborundum sharpening stones, Carborundum grains and powders and Carborundum firesand. Represented by C. E. Hawke, sales manager; G. T. Estabrook, Cleveland sales manager; W. U. Parrott, C. W. Barden and W. Walters, O. C. Dobson, C. D. Sargent, and T. B. Woodrow, representatives.

Cataract Refining & Mfg. Co., Buffalo, N.Y.—"Bison" core oils and compounds—parting. Cores and castings made with use of above cutting lubricants, cutting oils. Operating "bolt-cutter" using "Acme" cutting lubricant. Represented by H. C. Hutchins, vice-president; J. E. Chism, assistant to vice-president; J. Purvis, Jr., sales manager, core oil department; D. L. Baldwin, western sales manager, Chicago; E. P. Hughes, central sales manager, Detroit; A. A. Schaefer, eastern sales manager, New York; E. H. Coburn, T. E. Kenefick, H. C. Newton, C. W. Seibold and W. E. Williams. A. C. Breese, F. E. Deacon, R. M. Hitch, R. L. Middleditch, F. N. Tweedy and G. W. Zimmerman.

Champion Foundry Machinery Co., Chicago.—Champion Electric Sand Riddles in operation. Represented by Henry O. Magnuson, president and secretary; Anton Magnuson, vice-president and treasurer; W. B. F. Magnuson, salesman.

Chicago Eye Shield Co., Chicago.—Eye protectors of all kinds. Represented by Robert Malcolm and Dr. Herman Brennecke.

Chicago Pneumatic Tool Co., Chicago.—Chicago air compressor, Keller rammers, Keller and Chicago chipping hammers, pneumatic geared hoists, Duntley electric drills, Chicago hose couplings, Little Giant grinders and Little Giant air drills. Represented by J. G. Osgood, vice-president; A. C. Andresen, T. D. Slingman, T. G. Smallwood, L. J. Wakefield, C. D. Smith and L. E. Summers, manager Detroit plant.

Cincinnati Pulley Machinery Co., Cincinnati, O.—Avey ball bearing sensitive drilling machines, motor driven, in operation. Represented by L. Patterson, president; J. G. Hey, vice-president and general manager; C. K. Cairns, sales manager; J. F. Mirrielees, superintendent, and D. A. Patterson, operator.

Charles J. Clark, Chicago.—The Clark blast meter. Represented by Charles J. Clark.

Cleveland Blow Pipe & Mfg. Co., Cleveland.—Dust collecting system for the removal of dust from emery polishing and buffing wheels, consisting of motor driven exhaust fan, dust trap, galvanized pipe, elbows and various types of hoods, sheet metal shower bath, copper spraying can and photographs. Represented by Edward Coney, manager, and E. E. Toth, secretary.

Cleveland Pneumatic Tool Co., Cleveland.—Riveting hammers, chipping hammers, air drills, corner drills, compound drills, rotary drills, angle gears, holder-ons, corebreakers, sand rammers, valve grinders, emery grinders, Bowes air hose couplings, Never Slip hose clamps, veribest air hose, hose clamp tools, etc. Represented by Claus Greve, president; H. S. Covey, secretary ;L. W. Greve, treasurer; Geo. H. Hall, assistant treasurer; John De-Mooy, assistant sales manager; Arthur Scott, superintendent; J. T. Graves and W. L. Orton, salesmen.

Cleveland Tool & Supply Co., Cleveland, O.—Dealers in machinery, factory, mills and plating supplies, and seamless steel tubing. Represented by Robert Locker and W. B. Pleadwell.

Cleveland Wire Spring Co., Cleveland.—Steel barrels, steel boxes, waste cans, steel racks, stools and steel core trays. Represented by

Continued on page 76.

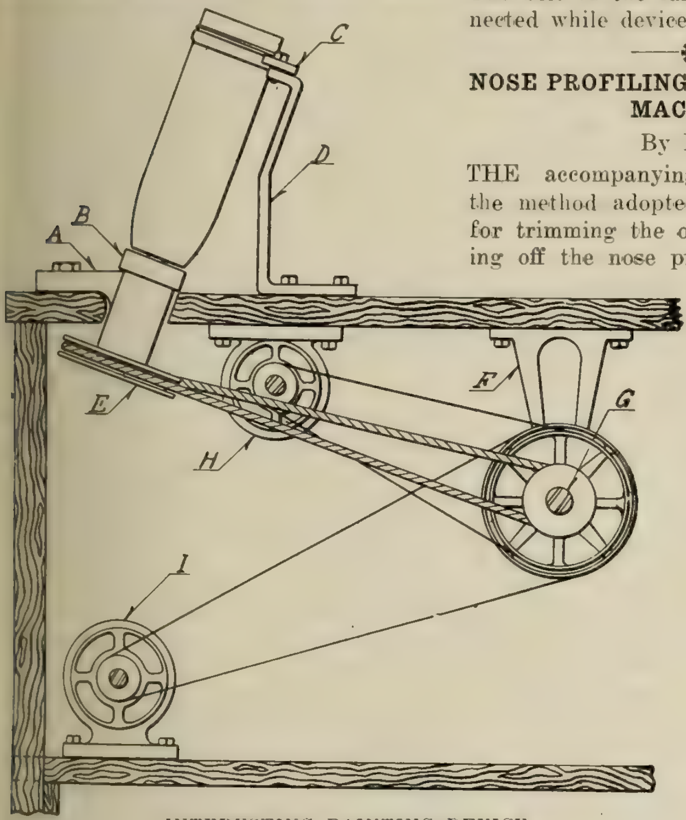
PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data and Ideas Evolved from Actual Practical Application and Experience

INTERESTING PAINTING DEVICE

By H. Brown.

AMONG the many operations that are necessary for the production of munitions, that of painting the exterior surface of the shells—while probably of minor importance—requires careful consideration, as the economical and efficient handling of this operation depends largely upon the methods adopted for revolving the shell while the paint is being applied. The device here shown, while similar in some respects to many others, embodies a few special features that may be of interest to readers. The bracket A, that carries the shell support, and revolving shaft, B, is secured to the bench, with the shaft inclined at an angle to allow the copper band to ride on a pair of small rollers, C, that are fastened to the upper portion of the rest, D. By this arrangement the shell is prevented from wobbling, so often seen when the shell is revolved in a vertical position. The shop in which this device was installed, had two sources of power, to provide for any emergency through the failure of one or the other. Continual operation on this device was therefore assured by the placing of two small motors, H and I; one on the under side of the bench and the other secured to the main cross brace. Both of these were connected to the counter shaft, G, which was supported by the hangers, F, located on the lower side of the bench. The belt of the idle motor was disconnected while device was in operation.

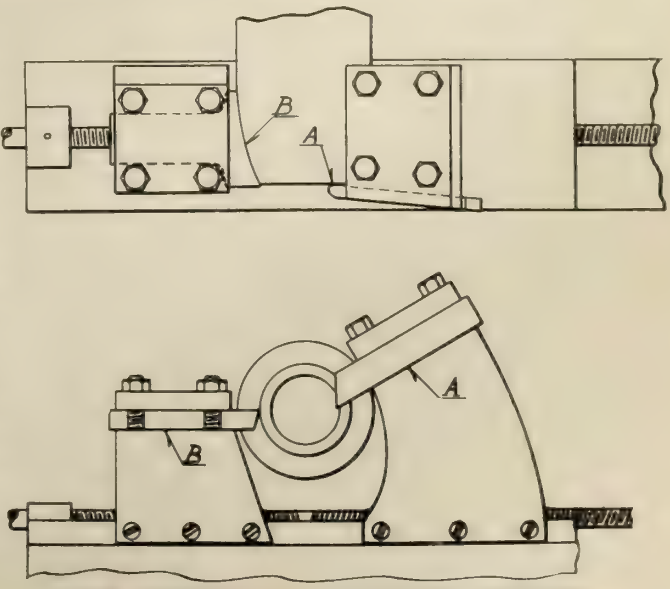


INTERESTING PAINTING DEVICE.

NOSE PROFILING ON CUTTING-OFF MACHINE

By R. M.

THE accompanying sketch illustrates the method adopted in one shell shop for trimming the open end and roughing off the nose profile. The machine used for this purpose was an old cuttting-off machine, equipped with a front and back tool-slide. The tool-support at the back was specially constructed so that the facing tool A could be set at a slight angle to provide sufficient clearance for the cutting edge. The front tool, B, which shaped the nose contour, was designed to finish the profile at one operation, the tool being advanced at right angles to the work without any lateral movement; ample rigidity being secured by the width of tool support and the four stud tool rest. By means of the right and left hand screws, the tools were fed to the work, the rear tool cutting a little in advance of the other. The marked success of this arrangement has resulted in a similar machine being constructed which has proved highly satis- highly satisfactory in operation both as to quality and quantity.

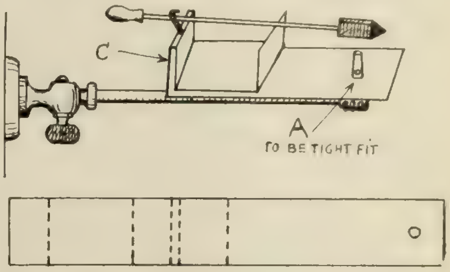


NOSE PROFILING ON CUTTING-OFF MACHINE.

SIMPLE HEATER FOR LIGHT SOLDERING IRONS

By J. E. Noble

TAKE a strip of tin, make a hole in one end and fold it at the dotted lines as in Fig. 2, to the form shown in Fig. 1. Remove the gas tip from the burner tube and file a hole in the tube, as at A or use the shank from an upright mantle burner, force a narrow piece of wood in at C. Punch a small hole in the tin on top, and screw in the hook. This holder will remain on an ordinary gas bracket and can be slipped on or off in a few seconds.

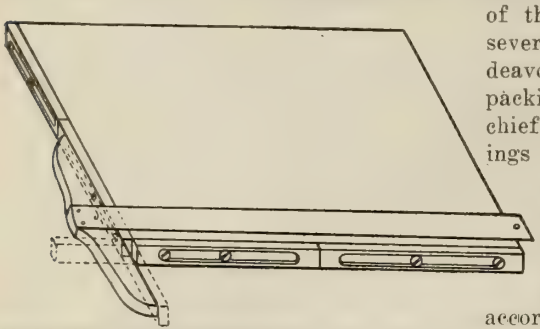


FIGS. 1 AND 2. SIMPLE HEATER FOR LIGHT SOLDERING IRONS.

HOLDING THE TEE-SQUARE STRAIGHT.

J. E. Cooley

WHEN using the tee-square near the edge of the drawing-board, so that part of the head of the square extends beyond the latter, it is quite difficult to hold the square straight and draw the lines true, as the least little pressure of the drawing-pencil against the straight-edge of the square causes it to wiggle especially at its outer end. Many drawing-boards have two steel straight-edges that are fastened on the left-hand and lower side of the board.. If these are sawed in half and an elongated slot is made in them as seen in the illustration, they can be moved so as to extend beyond the edge of the board, and thus give a firm support or bearing along the entire length of head on the tee-square.

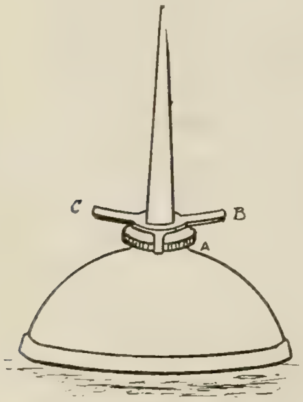


HOLDING THE TEE SQUARE STRAIGHT.

OIL-CAN CLIP.

By J. E. C.

A GOOD deal of awkwardness is displayed in the act of picking up an oil-can, because there is no convenient means of taking hold of it properly. Often in attempting to pick one up, it slides away or falls off the machine to the floor. An oil-can should be so arranged that it can be easily clutched and used on the instant. By this is meant, getting a hold with the index and fore-finger under the spout, and the thumb below the base to squirt the oil. Usually however, on most oil-cans the space between where the spout is screwed to the can, as at A, is so narrow there is no possibility of doing this. If a small clip is made as shown, the oil-can can be picked up without any trouble. The clip is made from sheet-stock inserted over the spout through the hole, and two sides are folded under the knurled edge as shown. The two projections C and B extend out just far enough to get a sufficient hold with the index and forefinger.



OIL CAN CLIP.

PACKINGS FOR SUPERHEATED STEAM

MOST of the packings used in England for steam jointings have been in the past made abroad, and in consequence of the difficulty of obtaining supplies, several British firms have been endeavouring to make in that country packings of equally good quality. The chief difficulty has been to obtain packings which can be used for joints in superheated steam pipes. Several samples have been tested in the apparatus for testing the blowing-out pressure of joints at the National Physical Laboratory, and according to the report of that institution, the makers have been so far successful in producing joint rings varying from 1-32-in. to $\frac{1}{8}$-in. in thickness which will stand a pressure of 250 lb. per square inch at a temperature of 1000 deg. Fah. to 1100 deg. Fah., without any signs of breaking down.

ELIMINATION OF GERMAN CONTROL OF TUBE WORKS

GERMAN-OWNED shares of the British Mannesmann Tube Co., Ltd., hitherto in the hands of the Public Trustee, have been sold by that individual to a group of British capitalists, including Sir Hugh Bell, A. J. Dorman, Balfour Williamson & Co., and Higginson & Co. The concern has large weldless tube mills at Swansea, and will erect additional tube mills at Newport, Mon.

LEATHER VS. SUBSTITUTE BELTING.

By N. G. Near.

I WAS interested in this sentence, in a recent issue of your journal: "Woven belting—is never likely to displace leather in the estimation of a host of engineers." Perhaps the wish is father to that thought, and, per placed in all fields of its use. Yet it is a fact that in several fields the leather belt is practically eliminated.

In the operation of a clay plant, for instance, it has been found that canvas and rubber belts are giving better service for the money than leather belts, besides the workers in those plants find it more difficult to keep the leather belt clean. On main drives, though even in these plants, in the cement field, and elsewhere, the leather belt still seems to have preference, but the fact that the substitute belt is endeavoring to put the leather belt out of business is worthy of note.

Doubtless the main reason for the rise of the substitute belt is cost. Leather is going up, and up. The price of substitute belting, although rising, isn't rising so rapidly, so, even though the substitute may not last long, it will be used if it will prove as efficient in transmission and if it can be shown that each dollar thus invested will produce more returns than each dollar invested in leather belting. These things are not easy to prove, but, experience seems to be teaching us that in all fields leather is not always the most economic selection.

NEW ELECTRO-CHEMICAL INDUSTRY IN NORWAY

A French-American syndicate is about to start a large electro-chemical works in Norway, in the Telemarken district. Some 100,000 h.p. are said to be needed for their purposes, and it was understood that this power would be drawn from the Toke. This, however, turns out not to be the case, the requisite power is to be supplied by the Maar Falls, in Tinn. When the necessary damming and regulation has been done a capacity of 135,000 h.p. is calculated upon. When the Maar Falls are fully exploited an aggregate of 180,000 h.p. may even be anticipated. Two or three power stations can be built, and the locality at Maarvik is well suited for factories, the sea being very deep there and the place well adapted for quay construction.

* * *

STAINLESS steel is expected to be the subject of great developments when Sheffield manufacturers are enabled to devote more time to its applications. Where steel is subject to the influence of earth and water this new material will be widely adopted, and in many cases of machine shop equipment its use will be welcome. Machinists' fine tools offer a wide field for its use, steel tapes and scales being also suitable for production in this material, the possibility of making these latter articles having been proven by the successful manufacture of stainless wafer blades for safety razors.

* * *

THE Staffordshire pottery manufacturers are, as a body, promoting experiments in order to develop the manufacture of hard porcelain, so as to compete in this product with German and Austrian manufacturers, and they hope thus to build up a new and probably remunerative trade in this material in place of the cheaper sorts of bone china.

* * *

Wrinkle for hot boxes.—Get a cake of Sapolio and scrape a little of it (fine) into a tin, mix with some water and pour into the bearing while the machine is running. Let it run a few minutes, then give it some oil, and you will find that you have a nicer bearing than you could scrape, and it does not hurt the shaft any.

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

IS CHARACTER MORE IMPORTANT THAN ABILITY

By A. L. Haas.

IN actual deed and fact there is more than one kind of ability in a general sense. Besides ability plain, there is also capability and suitability, to say nothing of sensibility to form terms in a broad generalization of men.

Ability is potential, an elastic term which conveys no specific qualification. Capability and suitability, on the other hand, mean fitness to an intended purpose or a destined end.

Half the troubles of management lie in the selection of suitable and capable subordinates. It is difficult, if not impossible, to predicate the possibilities of an intelligent and able man until he is tried out. His qualities in a new environment are unknown. Hence the importance laid upon former experience in the particular field of effort.

It is often considered correct, and acted upon as a general rule, that a specific training tends by its specialization to unfit an individual for other and differing work. For example, few highly trained technical men make first-rate salesmen, they have the knowledge of the goods, but their main interest is in the technique of their craft, not in its commercial application. Few scientific men prove to be practical in their views, the rigidity of their training and its divorce from practical ends tends to unfit them for the rough and tumble of manufacture, trade or commerce. From these aspects the scientific mind is an adjunct, not an end in itself.

The foregoing may be true or not; what is perhaps more pertinent is that few technical or scientific men obtain the opportunity to prove their worth along commercial lines. Certain it is that the possession of brain does not imply business acumen which is itself the product of other factors besides intelligence potential or actual.

Unquestionably one of the greatest assets in life is an instinctive judgment of the worth of other men. This is not so much a natural endowment as a matter of close observation coupled with digestion and assimilation of experience. The man who fails to cultivate in addition to his technical ability that wider study of mankind which is man, is by this reason alone certain to be handicapped at some time in his career. It is as important for a subordinate to be able to gauge and handle his superiors that he may find grace in their sight, as it is for the man in control to correctly estimate worth in an inferior. There is strong probability that a subordinate so endowed will later on have the opportunity of estimation from the upper berth.

The cultivation of a critical faculty with regard to staff and their several values is not less than the importance of a word of praise judiciously bestowed. It implies no slimy attitude on the part of the subordinate any more than a paternal attitude on the part of the employer to render relations of a more intimate character possible with real gain to both parties.

A man of wide experience recently enunciated a dictum he had just discovered in the words "that the best work done was in no instance done for a cash consideration at all." The answer came from the listener promptly. "Were you ever under the misapprehension that it was?"

Many a man has dated a successful career from a sympathetic word of appreciation from his chief; who knows how many original ideas have been lost due to the prejudice which robs a junior of the credit due to him for suggestion or new idea?

There is a type of individual whom it is not safe to praise, another who cannot develop in face of hostility sensed or openly shown. The sensitive, nervous man, intuitive and shrinking in a hostile environment, is not so rare as to be uncommon. He is finely strung, apt to possess a superior mentality and even moderate browbeating will cause him to act stupidly and so sacrifice his worth in an employer's eyes. Many instances of this type must be known to everyone in the business. A safe assumption in the handling of men is that no two can be similarly dealt with. Each man must be individually considered if the best results are desired. Ability is a possession found in combination with many other qualifications and in individuals of most diverse types. Getting the utmost effort out of a crowd of men needs tact and diplomacy of a high order.

It is a sure mistake to assume that resemblance is a guide to selection and to imagine that men for identical work should be to a sealed pattern.

There is ground for belief founded upon experience that the normal individual possessing real character will (opportunity offered and responsibility assumed), put forth greater effort and develop rapidly. Harsh treatment at the start may, and often does, cause him to fail. Judicious handling engendering the feeling that effort will be noticed and sympathetically regarded, will enable the man to succeed.

There is only one word of advice possible to those finding themselves in a position where the atmosphere is hostile and that is to "get out."

Character and real grit are of greater value than mere brilliance, and strange to relate they are rarer qualities. It is a seathing assertion, but none the less true that brains are cheap and the discovery of character expensive.

A fair mind, judicially inclined, whose honesty of purpose is evident, is of the greatest value in the handling of a labor force. Patience, tact, and discrimination are indispensable factors; it is character that tells in the long run, if only that aspect known as "hanging on" realized as grit to overcome trouble. Ability is common, suitability, and capability not so ordinary a possession, few testimonials specify ability other than in general terms; character is however stressed, this seems to prove the point at issue in this article.

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THE MUNITIONS WORKER

By J. R. Tate.

IT is the dawn of another day, and while all are apparently sleeping, I hear the voice of some happy soul singing in time to the steps of his horse. I listen until both fade away in the distance and all is again quiet. It is the early milk man working that his many customers may have health and strength for the toils of the day to come. And why should he not be happy, in his duty, every step taken, every effort put forth, all to bring health to his fellow workers and their dear families This man surely has a duty worth while. No wonder he sings, no wonder he is happy, he and his faithful horse completing the duties of their day, that others may live and be happy.

But say, have I a duty? am I doing my duty? The very word seems to put me under bond. What obligations are there on me? here comfortably resting. What duty have I? Yet do I not hear it every hour of the day. Duty calls, your country calls, your King calls! Calls who? They cannot call me; I'm a munitions worker. Am I? Well what am I doing. What have I done. What did I do yesterday. What am I planning to do to-day to justify me in hiding behind the excuse of being a munitions worker? Am I really a munitions worker or a munitions slacker?

Yesterday I saw a large picture of the

man in khaki shaking hands with the munitions worker. I wonder if I am worthy of that hand-shake? Am I, as was written on the picture helping to serve the guns? If not, why am I not in khaki? Oh! but a voice says, "The manufacturers are becoming wealthy, what need is there for your exerting yourself?" "But if," I say, "if that was so, what has that to do with the war? Am I not being well paid to help in this war? Say- that sounds different, being well paid, to help win the war, and right here at home out of range of Kaiser Willie's souvenirs. No manufacturer can do my work. No! nobody but myself can do the small part I am going to do, and if I don't do it, then so much goes undone, so much less is sent on to the front so much short are my countrymen. Short of perhaps one more shell, all because I was a munition slacker. And then I questioned my having a duty. Why! it is so plain! I am an important wheel in this great machine. And I see the long chain of stops on account of my stopping, and at the end of it I see the last shell fired. If they only had another one! but I rested I did not concern myself. And the shell was not there, and the enemy came on and on and my chums and my friends fought bravely, but they had not that one more shell. The one I could have made. Tomorrow I will read their names in the long list, and I will be free from any blame, free from suspicion, free from the brand of a slacker. Yet not free from the knowledge of myself. But stop this is developing into a nightmare.

The alarm clock rings. It startles me, yet did I ever welcome it so? It is my reveille, time to get up, time to start, time to buckle up for the day's work, time to strike another blow to crush this military monster. Then no more dreaming, no more shirking, no more excuses, but let me up that I may perhaps not sing while on the way to my post, but approach with an eager step, to grasp the levers with a determined grip, that I may hear the rumble of the great machines, echoes as it were from the front, that I may feel the thrills of imagination that I also am in the fight, into it to win. And then at the end of this day, I will have no ill-concern, but will know that I, the munition worker, have done my duty, have done my bit, have also helped to serve the guns.

* * *

MACHINISTS' INSTRUCTION COURSE—IV.

WHILE many shops have special tools and appliances for their particular work, yet there are general tools common to every workshop for use on the drilling machine, such as angle plates, V-blocks, vise, screw jacks, parallel pieces, etc. When the work reaches the drill hand it is usually marked off for the hole or holes. A circle equal to the diameter of the hole required is marked on the job, with a centre punch mark in the centre of the circle and small punch marks in the circumference of the circle. The first thing to do is to enlarge the centre punch mark to give the drill a start, as without a fairly large punch mark it is difficult to drill to the marked off lines. A piece of an old round file makes a good centre punch, but be sure to get it softened first and hardened only at the business end. Never strike the end of any hardened tool with a hammer—many mechanics have lost an eye through carelessness in this way. Don't try to make a deep centre punch mark in a light cast iron job—you will most likely break it if you do. If the work has a smooth surface and the lines of the circle are clearly visible, drill to the lines rather than the punch marks.

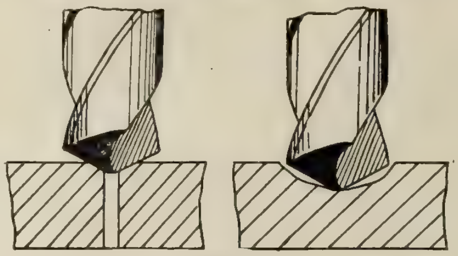


FIG. 17.

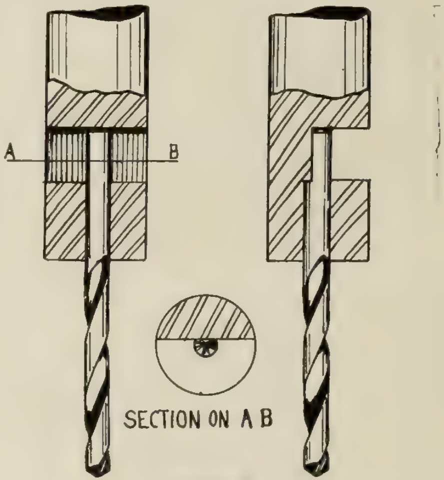


FIG. 18.

Drilling Large Holes

In drilling large holes, put a small drill through first, called a lead hole (see Fig. 17); this allows the pressure of the drill to come direct on the cutting edges instead of on a thick point. An exception to this rule would be the drilling of a concave surface. In this case the steadying influence of the drill point would be a distinct advantage, and the small drill could be put in after the large drill was below the concave surface if the depth of the hole made it worth while. A very simple and effective method of making an extension drill useful for making lead holes is to take a piece of cold rolled steel long enough to grip in the chuck, drill a hole in the end the size of the drill we wish to extend, then file or shape at the end of the drilled hole a slot to fit a flat surface that has been filed on the end of the drill, Fig. 18.

The next important step is to prevent the job running round with the drill. Apprentices as a rule are careless in this respect; they often try to hold the job with their hands, thinking it too much trouble to hunt for bolts, etc., to make the job secure. This is the cause of broken drills, and often of more serious accidents. You will have to learn to use your own judgment in this respect, as every job must be handled on its own merits, but it is better to err on the safe side.

Some jobs, such as rough holes in a flat bar, need not be bolted down. Put the job on a piece of wood of even thickness, hard wood preferred. Then fix a bolt with a piece of pipe on it in one of the slots of the table, as in Fig. 19, which will form a good stop for all jobs of that description. For jobs that need to be bolted down, the common U-clamp is the most convenient. This consists simply of a piece of square iron bent to leave a slot in which the bolt fits easily, Fig. 20. Sometimes in places where the nut would be in the way, it is convenient to have a set in it.

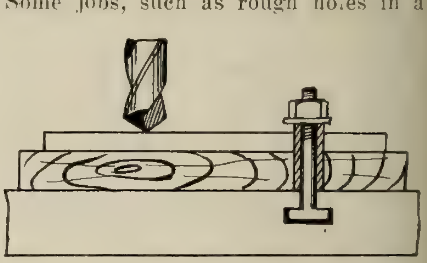


FIG. 19.

In bolting work of any description to the drill table, see that there is room under your job for the drill to go clear through without making a hole in the table. It may be necessary to put parallel pieces or other packing under the job. Have your bolt or bolts as near the job as possible, and your packing piece as far away as is convenient, and your packing pieces the same height.

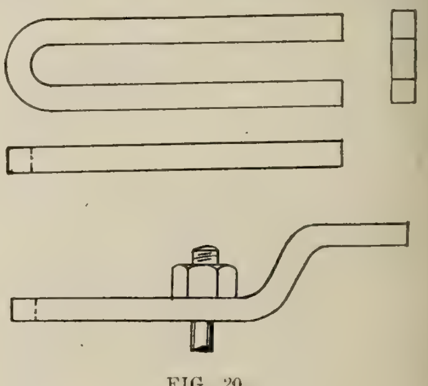
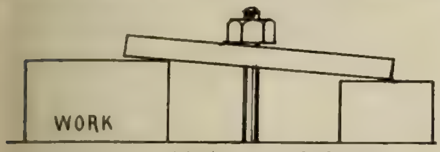


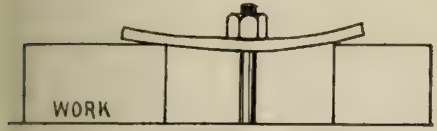
FIG. 20.

Some wrong ways of bolting a piece of work down are shown in Fig. 21, also the right way.

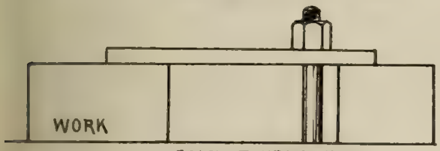
In drilling holes in thin sheet iron, bolt the piece or pieces solidly down on a piece of scrap iron, and drill into the scrap iron until the drill is cutting the full size into the scrap. If you simply place it over a hole in the table, the hole will look as if it had been done with a dum-dum bullet.



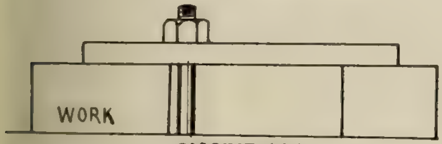
PACKING PIECE TOO LOW



PACKING PIECE TOO THIN



BOLT AT WRONG END



CORRECT WAY

FIG. 21.

Drawing the Hole

Very often when you start to drill a hole, the drill will not cut true to the circle marked off, but will cut to one side. In this case cut a light groove with a round-nosed chisel on the side toward which the drill is to be drawn, or on the wide side. Don't wait until your drill is cutting nearly the full size before you draw it over, or you may not be able to draw it over. Draw it over as soon as you detect the error, then cut out your chisel marks with the drill and repeat the operation until your drill is cutting true to the lines.

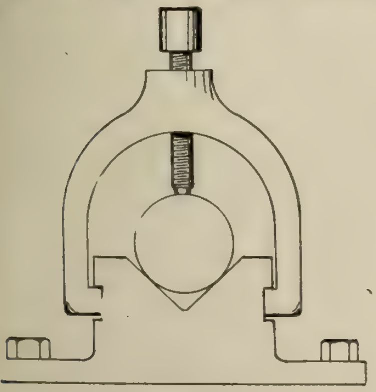


FIG. 22.

To drill through the centre of round bars, bolt a vee block to the table, or if the bar is a long one a pair of vees. Set your drill exactly vertical to the centre of the vee with the centre punch mark for the hole directly under the point of the drill. For repetition work the vee block and clamp, illustrated in Fig. 22, will be found simple, accurate, and quick after it is once set.

In repair work it is often found necessary to drill a hole through a sleeve, collar, or double eye to suit an existing hole in a round bar where the hole, through someone's bad workmanship, does not go through the centre of the bar. In this case place the round bar in the vee block, and put the drill through the hole, Fig. 23, bolting the vee block down and fastening the table in such a position that the drill is free to move up and down in the hole. Now replace the bar with the collar to be drilled, leaving the vee block in the same place, and with care the holes in the collar will coincide with the holes in the bar. If the hole is to be drilled in the bar, set your drill from the collar in the same way, and for many other jobs which it would be difficult to mark off, this method can be used to advantage. In drilling holes in round bars for slots it makes the best job to drill half-way through the bar from each side, provided the holes are properly marked off.

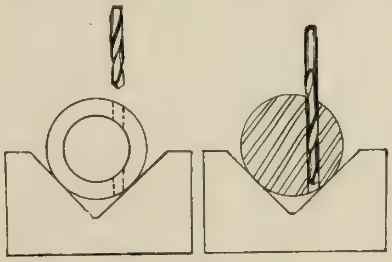


FIG. 23.

Useful Items of Equipment

A pair of angle plates are among the most useful tools for fastening work to the drill, and if they are both alike and properly designed, they form quite a number of very useful combinations. Bolted face to face, they can be made to form any angle; standing on end they form vees for drilling round stock endways; side by side they form parallels for drilling pipes, etc. (see Fig. 24).

An overhanging arm as in Fig. 25, is often useful for drilling wheels and pulleys that are too large to go on the table. In drilling, tapping and clearance holes, as in bearings and caps for same, drill the clearance holes in the cap first, then use the cap as a guide or jig for the tapping hole, putting the clearance drill into the tapping hole until it begins to cut full size, which will prevent the tap raising a burr; then change the drill to tapping size and drill the tapping holes.

In drilling circular rows of holes in large rollers or other large round work, such as boiler tubes, etc., fix up some kind of a rig, such as four small rollers or pulleys fastened to a wooden frame made of scantlings, or four wooden wedges nailed to a board, or some other device that circumstances will permit, and your ingenuity devise. The object to attain is to fix up your job in such a way that it can be turned round, and have each part to be drilled come under the drill in turn without resetting.

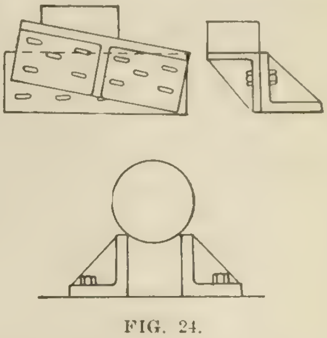


FIG. 24.

In some cases where two holes are to be drilled in line with each other at opposite sides of a casting, it is impossible to drill right through at one setting, as also with a long hole through a bar or shaft. In these cases a centre is fixed either in a casting bolted to the base of the machine, or else fitted to the hole in the centre of the table. The centre punch mark for one hole is placed on the fixed centre, and the other is brought directly under the drill. Great care must be taken to have the fixed centre directly in line under the centre of the drill spindle. Drill one end, then turn the job over and repeat the operation. When turning the job end for end, if the hole drilled is too large to sit on the conical part of the centre, it must be temporarily bushed with a concentric bush—that is, one that is turned and bored true. Fasten the job securely before you start to drill, the method of doing this depending entirely upon the nature of the job and the tools available, as all that can be done here is to give general principles and instructions.

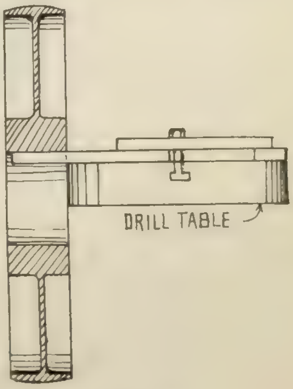


FIG. 25.

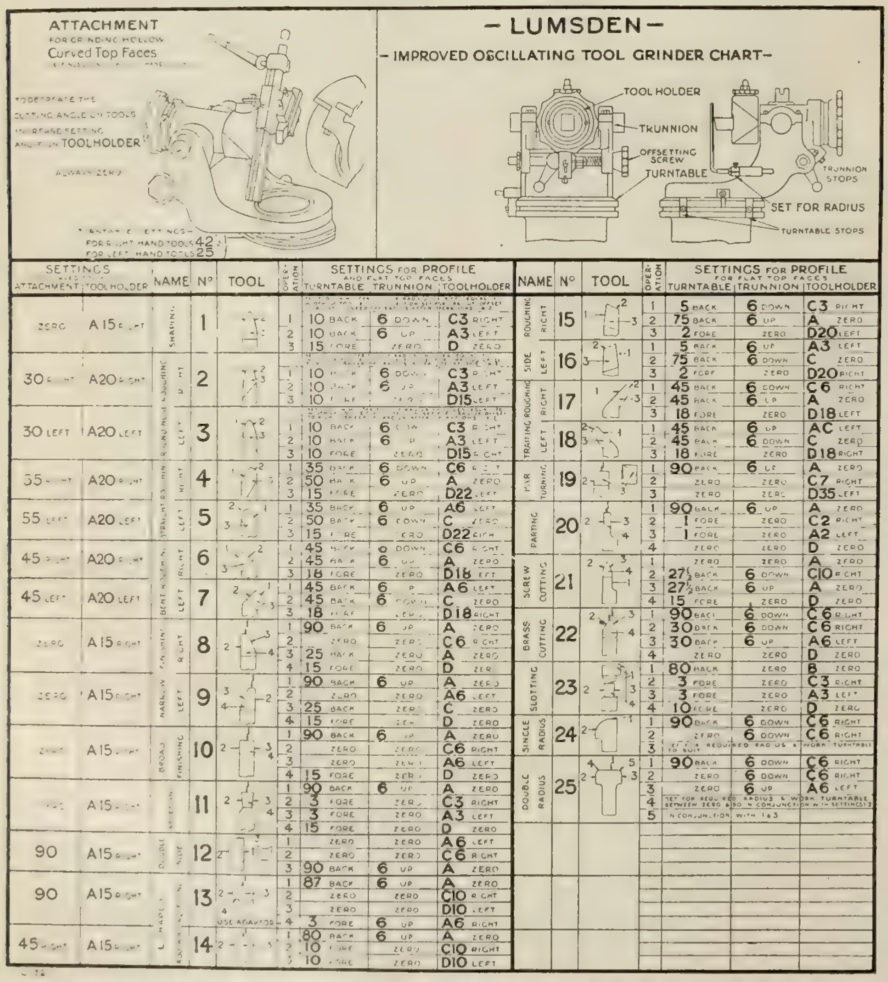
Evolving Standard Cutting Tools After a Definite Plan--III.

"Herbert's Monthly Review"

This series of articles dealing with the practical side of the subject of cutting tools may be said to be supplemental to what appeared in our issues of July 20 and 27; cutting tools from the theoretical and analytical view point were then discussed. As efficiency in the machine shop depends largely on the character of the tools used, it is believed to easily worth while for those concerned to not only sift this tool question to its fundamentals, but for each individual shop to establish a standard tool scheme to suit its own special conditions.

TOOL No. 12—to continue the series description, is a somewhat unusual product, and it is only possible to make such a tool commercially by means of the Lumsden curved face attachment. It is a double side tool, so shaped that it can be used for finish facing on both sides of the tool. To do this, a hollow curve is ground in the top face parallel to the sides of the tool. This tool is very useful for facing down the sides of cams on a solid cam shaft, saving the use of an extra tool. In the same way, thrust bearings on propeller shafts, collars and flanges, bushes on mandrels to be faced on both ends, are all suitable work for this tool. It is well adapted, too, for facing bosses, inside or outside castings on boring machines. As this tool wears mostly on the sides, it is preferably made from steel of a section having the depth one and a half times the width.

Grinding Instructions.—First grind sides 1 and 2, giving 6 degrees of clearance to each. Next grind the end at right angles to the two sides, also giving 6 degrees of clearance. The final operation is the grinding of the hollow curved top face, using the attachment. Set the tool parallel to the slide, which should be tilted to about 15 degrees "right" to give the curvature which satisfies most conditions. Continue the grinding till a cutting edge is obtained on both sides. If it appears that an edge will be given on one side sooner than the other, adjust the grinding wheel sideways. If the tool width is greater than, say, 1 in. and the 15 degrees setting of the slide gives too keen a rake, the rake can be decreased by tilting the slide a little more, say, to A.20 right.


ATTACHMENT
FOR GRINDING HOLLOW
Curved Top Faces
TO DECREASE THE CUTTING ANGLE ON TOOLS INCREASE SETTING ANGLE ON TOOLHOLDER
ALWAYS ZERO
TURNTABLE SETTINGS—
FOR RIGHT HAND TOOLS 42½
FOR LEFT HAND TOOLS 25
TOOL HOLDER
TRUNNION
OFFSETTING SCREW
TURNTABLE
TRUNNION STOPS
SET FOR RADIUS
TURNTABLE STOPS

— LUMSDEN —

— IMPROVED OSCILLATING TOOL GRINDER CHART —

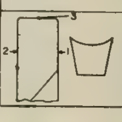
SETTINGS		NAME		Nº	TOOL	OPERATION	SETTINGS FOR PROFILE AND FLAT TOP FACES		
ATTACHMENT	TOOLHOLDER						TURNTABLE	TRUNNION	TOOLHOLDER
ZERO	A15 RIGHT	SHAPING		1		1	10 BACK	6 DOWN	C3 RIGHT
						2	10 BACK	6 UP	A3 LEFT
						3	15 FORE	ZERO	D ZERO
30 RIGHT	A20 RIGHT	ROUND NOSE ROUGHING	RIGHT	2		1	10 BACK	6 DOWN	C3 RIGHT
						2	10 BACK	6 UP	A3 LEFT
						3	10 FORE	ZERO	D15 LEFT
30 LEFT	A20 LEFT		LEFT	3		1	10 BACK	6 DOWN	C3 RIGHT
						2	10 BACK	6 UP	A3 LEFT
						3	10 FORE	ZERO	D15 RIGHT
55 RIGHT	A20 RIGHT	STRAIGHT ROUGHING	RIGHT	4		1	35 BACK	6 DOWN	C6 RIGHT
						2	50 BACK	6 UP	A ZERO
						3	15 FORE	ZERO	D22 LEFT
55 LEFT	A20 LEFT		LEFT	5		1	35 BACK	6 UP	A6 LEFT
						2	50 BACK	6 DOWN	C ZERO
						3	15 FORE	ZERO	D22 RIGHT
45 RIGHT	A20 RIGHT	BENT ROUGHING	RIGHT	6		1	45 BACK	6 DOWN	C6 RIGHT
						2	45 BACK	6 UP	A ZERO
						3	18 FORE	ZERO	D18 LEFT
45 LEFT	A20 LEFT		LEFT	7		1	45 BACK	6 UP	A6 LEFT
						2	45 BACK	6 DOWN	C ZERO
						3	18 FORE	ZERO	D18 RIGHT
ZERO	A15 RIGHT	NARROW FINISHING	RIGHT	8		1	90 BACK	6 UP	A ZERO
						2	ZERO	ZERO	C6 RIGHT
						3	25 BACK	ZERO	A ZERO
						4	15 FORE	ZERO	D ZERO
ZERO	A15 RIGHT		LEFT	9		1	90 BACK	6 UP	A ZERO
						2	ZERO	ZERO	A6 LEFT
						3	25 BACK	ZERO	C ZERO
						4	15 FORE	ZERO	D ZERO
ZERO	A15 RIGHT	BROAD	FINISHING	10		1	90 BACK	6 UP	A ZERO
						2	ZERO	ZERO	C6 RIGHT
						3	ZERO	ZERO	A6 LEFT
						4	15 FORE	ZERO	D ZERO
ZERO	A15 RIGHT	[illegible]		11		1	90 BACK	6 UP	A ZERO
						2	3 FORE	ZERO	C3 RIGHT
						3	3 FORE	ZERO	A3 LEFT
						4	15 FORE	ZERO	D ZERO
90	A15 RIGHT	DOUBLE	SIDE	12		1	ZERO	ZERO	A6 LEFT
						2	ZERO	ZERO	C6 RIGHT
						3	90 BACK	6 UP	A ZERO
90	A15 RIGHT	L SHAPED	[illegible]	13	USE ADAPTOR	1	87 BACK	6 UP	A ZERO
						2	ZERO	ZERO	C10 RIGHT
						3	ZERO	ZERO	D10 LEFT
						4	3 FORE	6 UP	A6 RIGHT
45 RIGHT	A15 RIGHT	[illegible]		14		1	80 BACK	6 UP	A ZERO
						2	10 FORE	ZERO	C10 RIGHT
						3	10 FORE	ZERO	D10 LEFT

NAME		Nº	TOOL	OPERATION	SETTINGS FOR PROFILE FOR FLAT TOP FACES		
					TURNTABLE	TRUNNION	TOOLHOLDER
ROUGHING	RIGHT	15		1	5 BACK	6 DOWN	C3 RIGHT
				2	75 BACK	6 UP	A ZERO
				3	2 FORE	ZERO	D20 LEFT
SIDE	LEFT	16		1	5 BACK	6 UP	A3 LEFT
				2	75 BACK	6 DOWN	C ZERO
				3	2 FORE	ZERO	D20 RIGHT
TRAILING ROUGHING	RIGHT	17		1	45 BACK	6 DOWN	C6 RIGHT
				2	45 BACK	6 UP	A ZERO
				3	18 FORE	ZERO	D18 LEFT
	LEFT	18		1	45 BACK	6 UP	AC LEFT
				2	45 BACK	6 DOWN	C ZERO
				3	18 FORE	ZERO	D18 RIGHT
BAR	TURNING	19		1	90 BACK	6 UP	A ZERO
				2	ZERO	ZERO	C7 RIGHT
				3	ZERO	ZERO	D35 LEFT
PARTING		20		1	90 BACK	6 UP	A ZERO
				2	1 FORE	ZERO	C2 RIGHT
				3	1 FORE	ZERO	A2 LEFT
				4	ZERO	ZERO	D ZERO
SCREW	CUTTING	21		1	ZERO	ZERO	A ZERO
				2	27½ BACK	6 DOWN	C10 RIGHT
				3	27½ BACK	6 UP	A ZERO
				4	15 FORE	ZERO	D ZERO
BRASS	CUTTING	22		1	90 BACK	6 DOWN	C6 RIGHT
				2	30 BACK	6 DOWN	C6 RIGHT
				3	30 BACK	6 UP	A6 LEFT
				4	ZERO	ZERO	D ZERO
SLOTTING		23		1	80 BACK	ZERO	B ZERO
				2	3 FORE	ZERO	C3 RIGHT
				3	3 FORE	ZERO	A3 LEFT
				4	10 FORE	ZERO	D ZERO
SINGLE	RADIUS	24		1	90 BACK	6 DOWN	C6 RIGHT
				2	ZERO	6 DOWN	C6 RIGHT
				3	SET FOR REQUIRED RADIUS & WORK TURNTABLE TO SUIT		
DOUBLE	RADIUS	25		1	90 BACK	6 DOWN	C6 RIGHT
				2	ZERO	6 DOWN	C6 RIGHT
				3	ZERO	6 UP	A6 LEFT
				4	SET FOR REQUIRED RADIUS & WORK TURNTABLE BETWEEN ZERO & 90 IN CONJUNCTION WITH SETTINGS 1 2		
				5	IN CONJUNCTION WITH 1 & 3		

FIG. 1. THE LUMSDEN TOOL GRINDING CHART, A COPY OF WHICH IS FURNISHED WITH EVERY LUMSDEN OSCILLATING TOOL GRINDER.

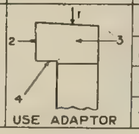
Tool No. 13 is used for undercutting tee slots; for turning the recesses at the end of internal screw threads, and for planing square grooves in the sides of castings. In order to present face 4 to the grinding wheel, it is necessary to hold this tool for the fourth operation in the adapter furnished with the machine. The tool shank is, therefore, set at right angles to the toolholder axis. Care should be taken to see that the tool shank is parallel to the machined faces of the adapter, other the angles given on the chart will not be reproduced on the tool. The section of steel from which this tool should be made will depend somewhat on circumstances. For a planing tool a section of 1½ to 1 is suitable; for recessing inside holes it may be necessary, where the hole is small, to forge the end of the tool to a round section, with a small projection for the cutting nose.

Nº12 - Double Side.

SETTINGS		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL HOLDER			TURN TABLE	TRUNNION	TOOL HOLDER
90	A.15 Right		1.	ZERO	ZERO	A.6 Left
			2.	ZERO	ZERO	C6 Right
			3.	90 Back	6 Up	A Zero

Grinding Instructions.—For operations 1 and 2 grip the tool in the machine toolholder in the usual way with the tool base on the holder base; also for operation 3 if the top face is ground flat, which it would be for cutting cast iron. For operation 4 grip the tool in the adapter, as mentioned above, and the adapter shank in the machine toolholder. Set the tool in the adapter with its shank horizontal and pointing towards the wheel; the top face should be downwards. When set to the angles given in the chart, face 4 will come in contact with the front of the wheel, while the shank will lie along and nearly

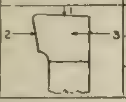
Nº13-L Shaped Recessing

SETTINGS		TOOL	OPERATION	SETTINGS		
ATTACHMENT	TOOL-HOLDER			TURN-TABLE	TRUNNION	TOOL-HOLDER
90	A.15. Right	 USE ADAPTOR	1.	87 Back	6 Up	A ZERO
			2.	ZERO	ZERO	C10 Right
			3.	ZERO	ZERO	D10 Left
			4	3 Fore	6 Up.	A6 Right

touching the side of the wheel. For grinding a curved top face the operation is very similar to that on tool No. 12—that is, the tool shank is set parallel to the slide.

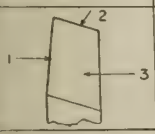
Tool No. 14 is a combined turning and facing tool very much in demand for machining chuck work on capstan and combination turret lathes. It economizes tool space on these machines by eliminating the extra side tool. It also facilitates output, saving the change over from one tool to another when changing from turning to facing or vice versa. For either turning or facing separately, it is not, of course, as efficient as a standard tool designed solely for the one operation; but where the two operations are carried out on the one piece, it becomes efficient through the time it is possible to save.

Nº 14-Combined Turning and Facing

SETTINGS ATTACHMENT	SETTINGS TOOLHOLDER	TOOL	OPERATION	SETTINGS TURNTABLE	SETTINGS TRUNNION	SETTINGS TOOLHOLDER
45 Right ●	A 15 Right	 1 2 3	1.	80 Back	6 Up	A Zero
			2.	10 Fore	ZERO	C.10 Right
			3	10 Fore	ZERO	D 10 Left

Grinding Instructions. — These are fairly straight forward. The three finished faces are ground in the order specified; top face 3 being given a flat top face for cutting cast iron and a hollow curved top face for cutting steel. When grinding a curved top face, the curvature should come at 45 degrees to the tool shank; this leaves the point between faces 1 and 2 standing above the remainder of both cutting edges; therefore, the curvature given to the tool should not be too small or the point will be too delicate. Care should be taken on this score.

Nº 15-Side Roughing R.H.

TOOL	OPERATION	SETTINGS TURNTABLE	SETTINGS TRUNNION	SETTINGS TOOLHOLDER
 1 2 3	1	5 Back	6 Down	C 3 Right
	2.	75 Back	6 Up	A Zero
	3.	2 Fore	ZERO	D 20 Left

Tools No. 15 and 16 are standard side facing tools. They are an improvement on the generally accepted form of side tool, which is forged with the cutting edge offset from the shank. The Lumsden standard side tool needs no forging; the cutting edge is ground at 5 degrees to the side of the tool, this necessitating the tool being set at a similar angle in the tool rest, in order to bring the cutting edge in correct relation to the work. These tools are much more efficient than the usual type of side tool, which is costly to forge and weak when made. It is also soon rendered useless by regrinding. The Lumsden tool is stronger, and has a considerably longer life than the offset tool. In case the 5 degrees inclination of the tool in the tool rest cannot be allowed, then a tool forged to a similar shape to No. 13 with the cutting edge ground parallel to the side of the tool is better than the offset tool. It is not practicable to grind this tool with a hollow curved top face, as it would then become similar to tool No. 12. The depth of the section of steel from which these tools are made should be twice the width.

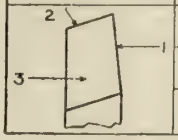
Grinding Instructions.—There are no points worthy of special mention in the grinding of these tools, provided the directions given on the chart are followed. If, however, the tool be used for facing down the ends of work, it will be necessary either to remove the corner behind face 2 or to use the following settings for operation 2, making the angle 1 degree less than the angle of a standard 60 degrees centre:

	Turntable.	Trunnion.	Toolholder.
No. 15.	59 black.	6 up.	A zero.
No. 16.	59 black.	6 down	C zero.

If a tool like No. 13 is used, the settings for the three operations will be for tool No. 15, as follows:—

	Turntable.	Trunnion.	Toolholder.
Op. 1	Zero.	Zero.	C. 6. Right.
Op. 2	75 black.	6 up.	A. Zero.
Op. 3	Zero.	Zero.	D. 20 Left.

Nº 16-Side Roughing L.H.

TOOL	OPERATION	SETTINGS TURNTABLE	SETTINGS TRUNNION	SETTINGS TOOLHOLDER
 1 2 3	1.	5 Back	6 Up	A3 Left
	2.	75 Back	6 Down	C Zero
	3.	2 Fore	ZERO	D 20 Right

For facing cast iron, the toolholder setting for operation 3 should be D.10 left; all other settings are the same.

Tools No. 17 and 18 are compromises to take care of conditions that should not exist. They will be more generally used as planing tools, though they can be used for turning as well. These tools are called Trailing Roughing Tools, because they trail all over the work in di-

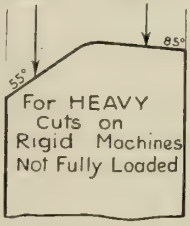
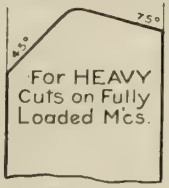
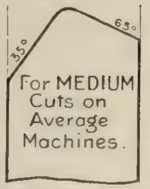
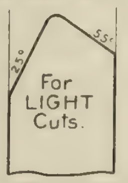
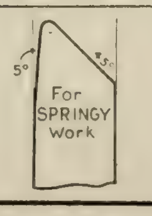
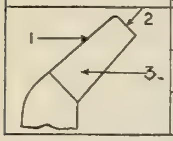
PROFILE.			RAKE.		
SIDE ANGLE FRONT ANGLE	SIDE ANGLE.	FRONT ANGLE.	For STEEL with a Tensile Strength of	SIDE CUTTING ANGLE Toolholder Setting	FRONT CUTTING ANGLE Turntable Setting
 55° 85° For HEAVY Cuts on Rigid Machines Not Fully Loaded	TURNTABLE		20 TONS	D.18. LEFT	25 FORE.
	55 BACK	85 BACK	30 TONS	D.15. LEFT	21 FORE.
	TRUNNION.		40 TONS	D.12. LEFT	17 FORE.
	6 DOWN	6 UP	50 TONS	D.9. LEFT	12 FORE.
	TOOLHOLDER.				
	C.6. RIGHT	A. ZERO.	FOR CAST IRON	D.6. LEFT	8 FORE
 45° 75° For HEAVY Cuts on Fully Loaded M'cs.	TURNTABLE.		20 TONS	D.22 LEFT	22 FORE.
	45 BACK	75 BACK	30 TONS	D.18. LEFT	18 FORE.
	TRUNNION.		40 TONS	D.14. LEFT	14 FORE.
	6 DOWN	6 UP	50 TONS	D.11. LEFT	11 FORE.
	TOOLHOLDER.				
	C.6 RIGHT	A. ZERO.	FOR CAST IRON	D.7. LEFT.	7 FORE
 35° 65° For MEDIUM Cuts on Average Machines.	TURNTABLE.		20 TONS	D.25. LEFT.	18 FORE.
	35 BACK	65 BACK	30 TONS	D.21. LEFT	15 FORE.
	TRUNNION.		40 TONS	D.17. LEFT	12 FORE.
	6 DOWN	6 UP	50 TONS	D.12. LEFT.	9 FORE.
	TOOLHOLDER.				
	C 6 RIGHT	A. ZERO.	FOR CAST IRON	D8 LEFT.	6 FORE.
 25° 55° For LIGHT Cuts.	TURNTABLE.		20 TONS	D.28. LEFT	14 FORE.
	25 BACK	55 BACK	30 TONS	D23 LEFT.	11 FORE.
	TRUNNION		40 TONS	D.18. LEFT	9 FORE
	6 DOWN	6 UP	50 TONS	D.14. LEFT	7 FORE.
	TOOLHOLDER				
	C.6 RIGHT	A. ZERO.	FOR CAST IRON	D.9. LEFT.	4 FORE
 5° 45° For SPRINGY Work	TURNTABLE		20 TONS	D 30. LEFT.	3 FORE.
	5 BACK	45 BACK	30 TONS	D.25. LEFT.	2 FORE.
	TRUNNION		40 TONS	D.20 LEFT.	2 FORE.
	6 DOWN	6 UP	50 TONS	D.15. LEFT	1 FORE.
	TOOLHOLDER				
	C.6. RIGHT.	A ZERO	FOR CAST IRON	D 10 LEFT	1 FORE

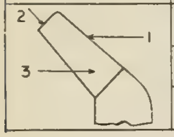
FIG. 3. CHART SHOWING VARIATIONS OF TOOL FOR DIFFERENT CLASSES OF WORK.

rection of the feed, thus allowing a slight amount of spring, which does away with chatter. Chatter is caused by weakness or slackness in slides or bearings. The trailing tool is a much easier tool to make, and one equally as satisfactory in use as the popular "swan-neck" tool, so beloved of planer hands. It is included in the Lumsden Chart, merely because the conditions calling for its use are allowed to exist; not because it has any claims of efficiency. It is not practicable to grind these tools with hollow curved top faces. As the tool must have a certain amount of spring it should be made from a section of steel with depth twice the width, and the nose should be forged down till the width across the end is a little more than half the width of the shank.

Nº17-Trailing Roughing R.H.

TOOL	OPERATION	SETTINGS		
		TURN-TABLE	TRUNNION	TOOL-HOLDER
	1.	45 Back	6 Down	C.6 Right
	2.	45 Back	6 Up	A Zero
	3.	18 Fore	ZERO	D.18 Left

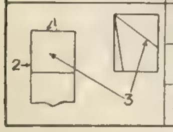
Nº18 Trailing Roughing L.H.

TOOL	OPERATION	SETTINGS		
		TURN-TABLE	TRUNNION	TOOL-HOLDER
	1.	45 Back	6 Up	A 6 Left
	2.	45 Back	6 Down	C Zero
	3.	18 Fore	ZERO	D.18 Right.

Grinding Instructions.—These tools should be forged so that face 1 is approximately at 45 degrees with the side of the tool. In operation 1 the angle given for the turntable setting is based on this assumption; if, however, the forging will not allow this angle to be given to the tool without weakening it excessively, the grinding should follow the forging, the clearance angles given by the trunnion and toolholder settings not being affected by any variation from, say, 40 to 50 degrees. Forging should be done within those limits. Only face 1 is ground with clearance. Eighteen degrees side and front cutting angle combined give approximately 25 degrees rake to the cutting edge. If the tool is intended for cutting cast iron, this rake should be decreased. The settings for operation 3 are:—

	Turntable.	Trunnion.	Toolholder.
No 17.	8 fore.	Zero.	D. 8. Left.
No. 18.	8 fore.	Zero.	D. 8. Right.

Nº19-Bar Turning.

TOOL	OPERATION	SETTINGS		
		TURN-TABLE	TRUNNION	TOOL-HOLDER
	1.	90 Back	6 Up	A Zero
	2.	ZERO	ZERO	C7 Right
	3.	ZERO	ZERO	D35 Left

Tool No. 19 is a knife tool for turning bar stock in turret lathes, using steadies at the back of the work. It is an extremely simple tool to make; care must be exercised, however, in grinding the side and top faces to see that no more metal is removed than will give a cutting edge. This leaves the cutting edge practically level with the top of the tool. The section of steel from which this tool is made must be ascertained from the tool-boxes of the machines on which it will be used.

Grinding Instructions.—The grinding of the end and side (faces 1 and 2) present no difficulties whatever. When starting on the top face, stop the oscillation of the wheel and cut into the tool for a length equal to about twice the maximum depth of cut allowed for in the tool-box of the machine. When the wheel has obtained a good hold on the tool, run the wheel back a little and start the oscillation again, regulating the amount so that the maximum stroke is obtained without the wheel leaving the work. Then continue the grinding till an edge is given. The 35 degrees of rake given to the top face has been proved by long experience to give the best results; this angle can, therefore, be standardized, no variations being allowed.

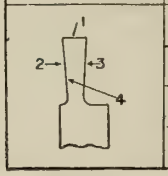
Tool No. 20 is a standard parting tool, and illustrates in a marked manner the importance of keeping clearances down to the minimum. The Chart shows that the two flanks should be ground at 1 degree with the side of the tool, giving 2 degrees of clearance. Even these small angles weaken the tool considerably, and broken parting tools are of frequent occurrence. They can be safely and advantageously decreased to half a degree and 1 degree respectively, provided the base of the tool is surfaced before grinding. This surface can be done in the curved face attachment, setting the tool and slide horizontal and parallel to the face of the wheel. The settings for this operation are:—

90 Right.	90 Black.	Zero.	B. Zero.
Attachment	Turntable	Trunnion	Toolholder

The tool can then be passed across the face of the wheel by means of the lever at the end of the slide. It is strongly recommended that the bases of parting tools should be so surfaced, as the tools can then be safely made from a narrower section of steel. A section of two to one is satisfactory. The end should be forged down to half the tool width for a length equal to a little over twice the width, preferably leaving one side of the nose level with the side of the tool. The top face can be ground with a hollow curved top face, but this is hardly to be recommended, as it tends to cause "grab." It is better to leave the face flat and with no rake at all.

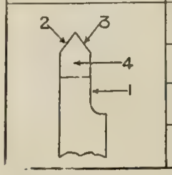
Grinding Instructions.—First touch up the end of the tool, giving 6 degrees of clearance. Then grind the flank that is level with the side of the tool, only just cleaning it up. The other side can then be ground till the nose is of the required width, say, a little less than half of the width of the shank. The top face should be just cleaned up.

Nº 20-Parting

TOOL	OPERATION	SETTINGS		
		TURN-TABLE	TRUNNION	TOOL-HOLDER
	1	90 Back	6 Up	A Zero
	2.	1 Fore	ZERO	C 2 Right
	3.	1 Fore	ZERO	A2 Left
	4.	ZERO	ZERO	D Zero

Tool No. 21 is included because, in spite of the strides made in thread milling and chasing by means of specially prepared chasers, there are still numbers of screw threads cut in the lathe. The angles given on the Chart make this tool suitable for standard Whitworth threads 10 per inch and finer; in other words, face 2 has more clearance than face 3 to accommodate the lead angle of the thread. For coarser threads the clearance on face 2 should be increased by means of the toolholder setting; this will depend on the diameter of the work. The corner of the two front faces should approximately follow the lead angle of the thread. Any increase in lead angle should be added to the setting C.10 right in operation 2, while the same increase should be given to the toolholder setting in operation 3, making A. Zero into A. degrees left.

Nº21-Screw Cutting.

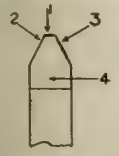
TOOL	OPERATION	SETTINGS		
		TURN-TABLE	TRUNNION	TOOL-HOLDER
	1.	ZERO	ZERO	A Zero
	2	27½ Back	6 Down	C.10 Right
	3.	27½ Back	6 Up	A Zero
	4.	15 Fore	ZERO	D Zero

Grinding Instructions.—First grind face 1, making the tool nose about 5/16 in. to ⅜ in. thick; the tool nose can be forged if desired. The two cutting edges are then ground, utilizing the toolholder settings to give the requisite clearances. The top face should be given a rake of 15 degrees by means of the turntable setting if the work is steel. If cast iron, the rake can be 10 degrees.

Tool No. 22 is a standard tool for cutting brass and any grade of bronze that partakes of the brittle nature of brass. For bronzes that cut more like steel, the standard tool for steel will be better, though it will usually be desirable to make the rake a little less keen, say, 10 to 15 degrees. The standard brass cutting tool is one that will be most often used in brass finishing and capstan lathes. The section of steel used should, therefore, be ascertained from the toolholders of the machines on which the tools will be used.

Grinding Instructions.—These call for practically no comment, as all the operations are straightforward. When grinding the angled faces 2 and 3, care should be exercised to make them about the same length, leaving about 1/16 in. to 1/8 in. flat on face 1.

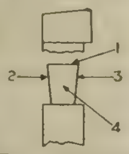
Nº22-Brass Cutting.

TOOL	OPERATION	SETTINGS		
		TURN-TABLE	TRUNNION	TOOL-HOLDER
	1.	90 Back	6 Down	C6 Right
	2.	30 Back	6 Down	C6 Right
	3.	30 Back	6 Up	A6 Left
	4.	ZERO	ZERO	D Zero

Tool No. 23 is a slotting tool. The type of tool used on slotting machines differs from all others in that the top face of the tool is the end. As slotting tools usually have a large amount of overhang, some provision must be made in the clearance of face 4 for a certain amount of spring. This face, therefore, according to the Chart, is given 10 degrees of clearance through the turntable setting. The end or top face is given 10 degrees of rake. The tool shown in the Chart is suitable for a slab finishing cut or for cutting keyways. For roughing cuts, face 4 should be ground to a diamond shape and the corners rounded by hand. This makes two further settings necessary over and above the four operations indicated, though if the forging is correctly done operations 2 and 3 may be omitted. The two extra settings will be:

	Turntable.	Trunnion.	Toolholder.
Op. 5.	3 fore.	Zero.	D. 35. Right.
Op. 6.	3 fore.	Zero.	D. 35. Left.

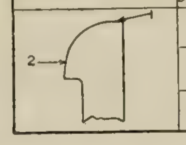
Nº 23-Slotting.

TOOL	OPERATION	SETTINGS		
		TURN-TABLE	TRUNNION	TOOL HOLDER
	1	80 Back	ZERO	B Zero
	2.	3 Fore	ZERO	C3 Right
	3	3 Fore	ZERO	A3 Left
	4	10 Fore	ZERO	D Zero

If the tool is required for slotting keyways, then the width of face 4 must be carefully regulated when grinding faces 2 and 3 to the desired width. Care must be also taken not to grind so much off face 4, that the tool will not slot to the full depth of the keyway.

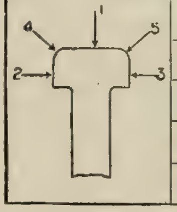
Grinding Instructions.—Contrary to the usual rule of grinding the profile of the cutting edge first, in this case it is preferable to grind the top face or end of the tool first, next the sides, and finall the profile. This tool is necessarily forged, and if the portion between the nose and the shank proper is at all slender in relation to its length, some means of securely gripping it in the toolholder must be arranged, otherwise the angles will not be accurately produced through spring of the tool.

Nº 24-Single Radius

TOOL	OPERATION	SETTINGS		
		TURN-TABLE	TRUNNION	TOOL-HOLDER
	1	90 Back	6 Down	C6 Right
	2.	ZERO	6 Down	C6 Right
	3.	Set for required Radius & Work Turntable to suit		

Tools No. 24 and 25 are included in the Lumsden Chart to show that radius tools can be very easily and quickly shaped. If the radius or radii required are smaller than half the width of the shank, there is no need to forge them.

Nº25-Double Radius.

TOOL	OPERATION	SETTINGS		
		TURN-TABLE	TRUNNION	TOOL-HOLDER
	1	90 Back	6 Down	C6 Right
	2	ZERO	6 Down	C6 Right
	3	ZERO	6 Up	A6 Left
	4.	Set for required Radius & Work Turntable between Zero & 90 in conjunction with settings 1 & 2.		
	5.	In conjunction with 1 & 3		

The radius gauge furnished with Lumsden grinders is not a very rigid device and close accuracy cannot be obtained. If, therefore, the tools are required for precision work, the radius ground should be checked by means of a plate gauge. If this shows the radius ground to be too small, adjust the tool forward a little in the toolholder; if too large, adjust it back a little to suit.

Grinding Instructions.—Fix the tool in the toolholder so that it projects over the centre of the turntable a little more than the desired radius. Next offset the tool, by means of the endwise adjustment of the trunnion bearings, an amount equal to the distance between the centre of the tool shank and the centre of the radius to be ground—this can be measured approximately on the top of the tool. Set the trunnion and the toolholder to give 6 degrees of clearance on both front and side of tool. Clean up the end of the tool and set the stop, which limits the forward movement of the wheel. Run the wheel back, swing the turntable round to zero, and grind the side of the tool, bringing the wheel up to the stop again. Run the wheel back a little, then swing the turntable from zero to 90 degrees, feeding the wheel forward, using but slight oscillation, until the stop is reached. The desired radius should be then merged into the front and side imperceptibly.

◆

ONTARIO'S NICKEL PRODUCTION

PRODUCTION of nickel and copper ore in Ontario during the past ten years, shown below, has yielded about three per cent. nickel, and over one and one-half per cent. copper. This is exceptionally high-grade ore. Under present conditions it might be treated profitably for its copper content alone.

In addition to nickel and copper the Sudbury ores contain small quantities of the precious metals, gold, silver, platinum and palladium. The actual quantities are not reported. According to the International Nickel Company there was no production of these metals from Canadian ores at their works in 1912 and 1914.

	Tons Ore Raised.	Tons Nickel in Matte.	Tons Copper in Matte.
1906	343,814	10,776	5,260
1907	351,916	10,602	7,003
1908	409,551	9,563	7,501
1909	451,892	13,141	7,873
1910	652,392	18,636	9,630
1911	612,511	17,049	8,966
1912	737,656	22,421	11,116
1913	784,097	24,838	12,938
1914	1,000,364	22,759	14,448
1915	1,325,974	34,039	91,608
Total....	6,670,766	182,824	104,343

Previous to 1906, 2,700,000 tons of ore were raised, 2,100,000 tons were smelted of which 48,000 tons were nickel in matte and 36,000 tons were copper in matte.

◆

MANUFACTURERS of both lathes and grinders agree that, as a rule, shafts should be rough turned to within .015 in or .020 in. above finished size, rather than within .010 in. or less. This is done for several reasons. The lathe operator can use a coarser feed, thereby cutting down his lathe time. It allows him a greater range in size and eliminates the possibility of the grinding wheel failing to take out the tool marks. Also a coarser feed makes an easier operation for the grinder, as the coarser the feed the easier it is on the wheel. In small diameter shafts, which are liable to spring when roughing in the lathe, it is evident that sufficient metal should be left that the grinding wheel will be sure to true up the shaft.—Lodge & Shipley Manual.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

IMPROVED CENTRIFUGAL BOILER FEED PUMP

THE development of the steam turbine and the high efficiency multi-stage centrifugal pump have gone hand in hand, but up to the present, it has not been entirely practicable to reconcile the speeds of the two machines so that each would work at its best efficiency. It has been necessary, heretofore, either to reduce the speed of the turbine and sacrifice much of its efficiency, or else speed up the pump with similar results. To overcome this difficulty, the Cameron Pump Works, 11 Broadway, New York, have designed and built a multi-stage centrifugal pump, known as the "BT" type.

Fig. 1 shows the construction of one of these three-stage pumps. The high speed feature—the pump can operate with a steam turbine driven speed of 3,100 r.p.m.—is a virtue of impeller design. With the ordinary impeller the diameter cannot be reduced sufficiently to get high speed without sacrificing vane length, and consequently, efficiency, for a certain vane length is very necessary in order that the impeller perform its function without excessive loss. Small external diameter and adequate vane length are obtained in this pump by bringing the vanes well down into the impeller hub, at the same time so turning them that the incoming water is guided smoothly and with little loss into the outer portion of the vane where the velocity is generated that is finally converted into useful pressure by means of the external diffusion vane. Additional advantages in the small impeller are light weight and low fibre stresses in the material.

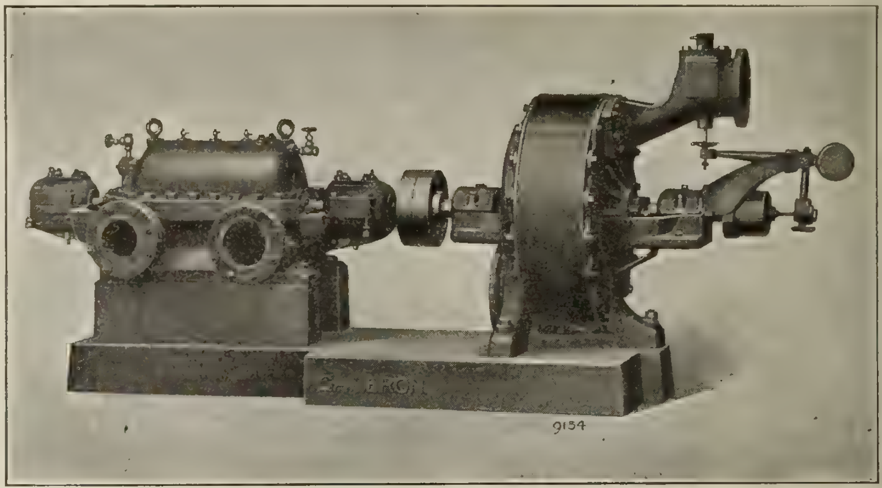


FIG. 2. SHOWING PUMP COUPLED TO STEAM TURBINE.

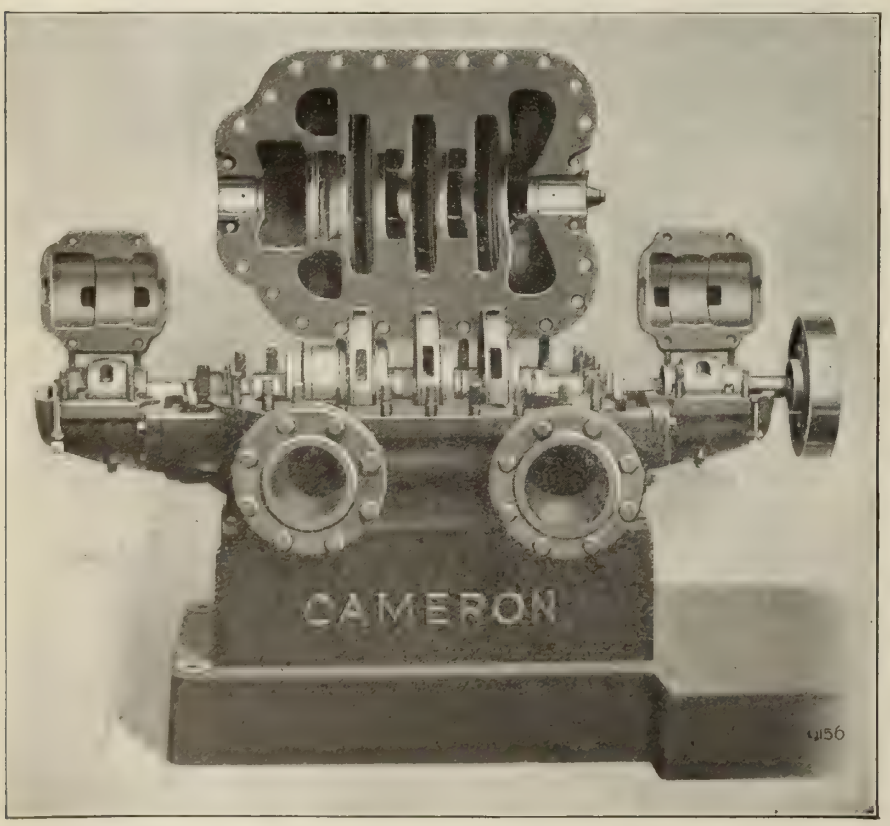


FIG. 1. SHOWING CONSTRUCTIONAL FEATURES OF PUMP.

The casing is divided along the horizontal outer line, and both the suction and discharge connections are in the lower half of the casing. The upper half is readily removable, giving full access to the revolving element. There are suitable openings for draining the pump and for displacing the air when starting. Inlet and outlet nozzles can be arranged either on the same or opposite sides, an important advantage where pumps are installed in limited space.

The shaft is made of high grade forged steel accurately machined and ground, and wherever it comes in contact with the fluid being pumped, it is thoroughly protected by bronze sleeves, which prevent the stuffing box packing from scoring the surface of the shaft. Each impeller is cast in one piece and is of the enclosed type. Surrounding each impeller hub is a pair of rings—one stationary, attached to the casing, and one revolving, attached to the impeller. By the use of double rings instead of a single ring, it is possible to restore the initial tightness of the joint between the low and high pressure sides of each stage without any fitting, whereas a new single ring would have to be of special diameter, and then fitted to the impeller hub, or the casing, to make a tight joint.

The diffusion ring surrounds the impeller at its periphery, although it is not in contact with it. It contains a series of openings, which receive the water from the impellers at high velocity and by means of gradually increasing area toward the periphery, reduce the velocity into pressure and enable it to advance to the entrance of the next impeller with much less loss of energy than would be the case if the high velocity of ejection were maintained.

To take care of thrust, which manifests itself in all multi-stage units, this pump is equipped with a simple internal hydraulic balancing device. This device consists of a revolving disc attached to the shaft at the inboard or high pressure end. Opposite this disc is a stationary drum of the same diameter. Water at high pressure connects with the space between the disc and the drum, causing the disc to react against the opposing thrust, neutralizing it and holding the rotor in proper relation to the casing. The slight leakage involved in this process is piped back to the suction.

On this pump there are two ring-oiled bearings, self-aligning, one located on each side of the casing. The bearing bodies are horizontally split, with removable caps, and the bushings are also split and lined with high-grade bearing metal. Bushings and bearing bodies have a spherical fit, automatically maintaining the alignment of the shaft. The bearings are of ample proportions to prevent heating, and the oil chamber is of liberal capacity. The bearings are supported by strongly ribbed brackets, cast integral with the lower casing, thus counteracting any possible tendency towards even slight vibration. These brackets are located sufficiently distant from the stuffing boxes to permit of adjustment of the glands. Felt washers are provided to prevent oil escaping from the bearings.

The stuffing boxes are deep and are provided with water seals, consisting of a lantern gland in each box connected to the water from the discharge side of the pump through a concealed passage, and so arranged that it can be readily cleaned. The stuffing box gland is fitted with swing bolts to give quick and easy access to the stuffing box.

When the pump is direct-connected, it is supplied with a shaft coupling of the flexible type to compensate for slight variation in alignment. The bed plate under the pump is if one piece box construction heavy enough to give a rigid support, and with cross ribs to prevent distortion. Fig. 2 shows this pump entirely assembled.

* * *

Galt, Ont.—A member of a firm organized in Toronto for the manufacture of railroad supplies has been in Galt recently looking over local conditions with a view to locating the plant.

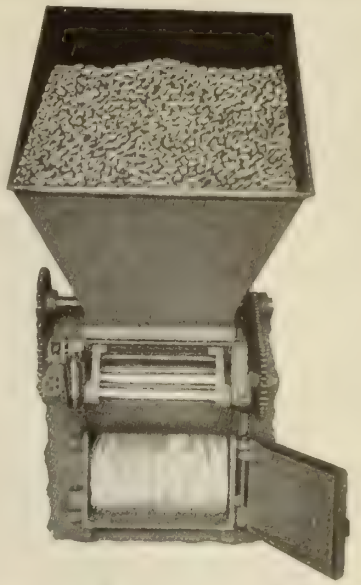
A SPRINKLER STOKER WITH ROTARY DISTRIBUTOR

A MECHANICAL stoker of the sprinkler type, combining novel features tending toward simplicity and reliability of working, has been placed on the market by the Galt Foundry Co., Galt, Ont. The apparatus is known as the Galt Sprinkler Stoker, and is specially designed to feed and spread the coal continuously over the grates, as opposed to the intermittent methods of hand firing, or to the practice of dividing the furnace chamber into zones — coking and ash belts.

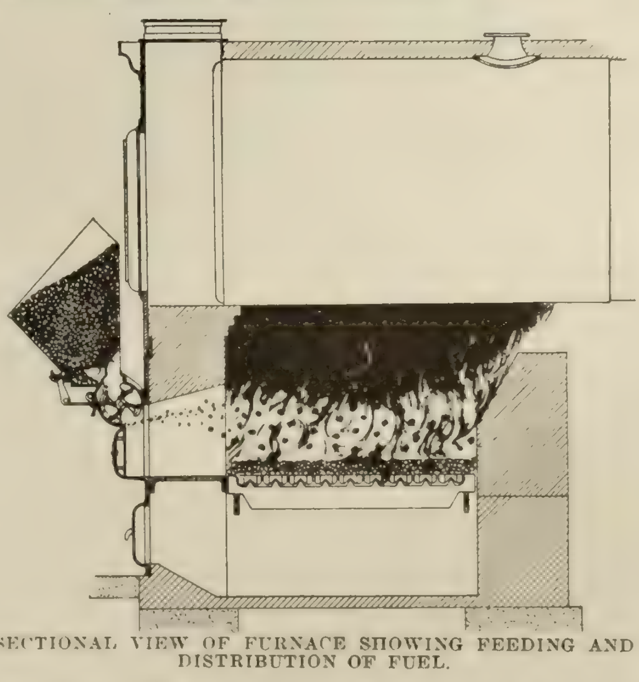
The stoker is entirely self-contained, being assembled on a frame casting which hangs upon the boiler front in place of the regular fire-door, the feeding mechanism covering only a narrow space across the upper part of the fire-door opening. A fire-door is fitted in the supporting frame, giving access to the furnace at all times.

Situated above the feeding mechanism is a feed hopper having a capacity of about 300 lbs. of fuel, which can be conveniently detached when required for access to the flues and tubes. The fuel in the hopper is drawn down and moved across the bed plate of the stoker by the reciprocating motion of the feed plate produced by means of the rocker arms shown in sectional illustration, these arms in turn being actuated by a rocker arm connected to an eccentric on the main shaft, the rate of feed being controlled by a hand wheel.

The spreading of the fuel over the grate surface is accomplished by means of the rotary stoker or feeding device, which is operated independently of the feed regulating device, and at a constant speed which can be adjusted for different depths of grates. As the fuel is forced over the edge of the bed plate it falls on a curved plate or tray where it is caught by the revolving blades and thrown into the furnace. The revolving blades have an alternate helical face which spreads the fuel successively to either side so that even distribution of the fuel is accomplished.



FIRE DOOR GIVES FREE ACCESS TO FIRE AT ALL TIMES.



SECTIONAL VIEW OF FURNACE SHOWING FEEDING AND DISTRIBUTION OF FUEL.

These distributor blades are heavy steel castings freely suspended, so that, when operating, they are held in position by centrifugal force, and thus may yield if an unusual obstruction is encountered.

All rotating shafts on the stoker are carried in removable bronze bushed bearings. The distributor and eccentric shafts are driven by heavy roller chain of ample size running on machine cut sprockets. The self-contained fire-door is of ample proportions for hand-firing in case of emergency, or for regular banking of the fires, which can be done without interruption to the working of the mechanism.

* * *

A saw belted direct from a 7 horse-power motor would not rip anything. A 10 horse-power motor was put in, but the machine still refused to work. It was a large self-feed saw with pulley on arbor for an 8-inch belt. A 7-inch belt was being used. To save the motor, the 7-inch belt was taken off and replaced by a 4-inch one. The saw now works well. he motor would not stand the sudden jerks sent to it by the wide belt.

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ENEMY PATENTS

IN view of the frequent comment regarding the ease desirability of annexing enemy patents under present conditions, it may perhaps be not inappropriate to sound a note or warning regarding the popular supposition that valuable ideas are lying waiting for our manufacturers to pick them up free of cost, etc. Incidents are coming to light every day which show that the germs of dishonesty and trickery were long ago prominent in the make-up of the Teutonic people, and it is this tendency on the part of our enemies to "put it over" the other fellow that constitutes a serious feature in handling anything savoring of Germanism.

The experience of an English firm was brought to light during the hearing recently of their application for licenses to use three German patents in connection with the manufacture of ammonia from hydrogen and nitrogen by the synthetic process. Patent law universely calls for the specification to be drawn up clearly and concisely so that any party skilled in the art or science of the subject may be enabled to carry out and put into practice the idea or ideas which constitute the invention, yet it has been a recognized German custom for patentees to so describe their inventions that while they would be accepted by patent office authorities, there would be some slight unseen deviation or omission which prevented their being easily put into practice.

The patents referred to were owned by the Badische Anilin Co., and the English applicants stated that in addition to the specifications being involved and non-intelligible, the actual work of endeavoring to put the process on a commercially profitable basis had taken fifteen months of experiment and research, at a cost of $7,500 before a satisfactory result could be obtained. It is not surprising, therefore, that the applicants suggested the royalty be purely nominal, and the granting of the license meantime, with a decision at a later date on the question of royalty would seem to indicate, at least a common-sense if not a sympathetic attitude on the part of the authorities.

While we have not been aware of any great activity by Canadian firms in investigating enemy patents, any such efforts are to be condemned, as, even if no immediate find of value results, the increased breath of view which accrues from such comparisons is bound to be reflected in later developments, while the strengthening of faith in ones own product is not the least the result of what might otherwise seem to be a fruitless investigation.

A PROMISING DEVELOPMENT

THE development of trade between the various colonies of the Empire should continue to increase after the war at a gratifying rate because of the similarity of product in demand in the various Dominions as distinct from the United Kingdom. Electrical material was one of the lines in which Britain showed to disadvantage in foreign and colonial trade. The disadvantage was the result of superior quality, conservative design, and occasional lack of salesmanship. The first of these is admirable withal, and worthy of all due emulation, but the necessity for giving people what they want, eliminates any argument in favor of unsuitable construction, while if the time and terms of the attempted sale are ill-judged, the inability to extend business is easily understood.

In the matter of electrical equipment manufacture, the Dominion is well favored, by circumstances in the past and conditions in the future. Such a simple matter as the type of lamp socket used in overseas trade is one slight instance of favorable circumstance. With the exception of the United Kingdom, the use of screw sockets is practically universal all over the world. Some British firms in the past have offered the bayonet type of socket and lost the business rather than make both types. Makers in this country are in the more fortunate position of finding their own article and the foreigner's almost identical.

Home Office requirements in Britain have evolved super-excellent apparatus which is not in such demand abroad because of the absence of similar restrictions, which, however desirable from the standpoint of safety and reliability, cannot compete commercially with the ordinary grades of material in common use. The similarity in conditions and requirements between our own country here and such new markets as are offered by Russia, Africa, Australia, etc., is bound to be a strong help in obtaining a fair portion of former enemy trade in electrical lines.

◆

STEEL SHORTAGE BECOMING MORE ACUTE

IT is now obvious that the iron and steel market has entered upon another period of activity, and its effect on business will be widespread. Conditions are, of course, abnormal and the unexpected may happen, but even admitting this, there is little or no relief in sight to what is fast approaching a serious situation. A point was reached some time ago previous to last June, where consumers would not place contracts for steel unless they were obliged to do so, and consequently held off, hoping for a return to more normal conditions and lower prices. The trend of events since then has upset their calculations, and many have been forced into the market, while others will no doubt hold off indefinitely. It is with regard to the latter that the most serious aspect of the situation presents itself, for, principally on this account buildings are being held up, public works restricted and many developments postponed until steel can be obtained in a reasonable time and at a lower price.

It will thus be observed that the present unprecedented prosperity in the steel trade has its disadvantages as well as its benefits, the latter affecting the mills only. It is impossible to enumerate the finished products that have advanced even during the past twelve months, as so many lines have been affected, and few more so than machinery. All kinds of machine tools and heavier equipment are much higher than before the war, while supplies have also been seriously affected. Boiler plates were never so scarce, while steel rails are practically unobtainable inside of twelve months. The mills, notwithstanding their increased facilities, are unable to cope with the demand for steel, and their unfilled tonnages are steadily getting heavier, with the result that higher prices are inevitable.

INDUSTRIAL NOTABILITIES

WILLIAM H. MARSH, Secretary and Manager and a Director of Standard Underground Cable Co., was born in Baltic, Ohio, Jan. 10, 1882, the son of Julius P. and Catherine Marsh. Following an education at Public Schools, he studied at National Normal University, Lebanon, Ohio; Polytechnic Institute, and Pratt Institute, Brooklyn, N.Y.

Commencing his business career as Cable Installation Foreman with the Standard Underground Cable Co., Pittsburgh, in 1900, he became Superintendent of Construction and Cable Engineer for that company in New York, 1903, and was appointed to his present position 1911.

WILLIAM H. MARSH.

Mr. Marsh was responsible for the successful installation of the power cables in the tunnels of the Pennsylvania Railroad from New Jersey to Long Island, and has occupied a prominent part in the work of installing underground conduit and electric cable systems in many of the larger cities in Canada and the United States, having had charge of such work in Toronto when Niagara power was first used there. He also originated the use of compressed air for the purpose of drawing cables into conduits.

A member of the Hamilton Board of Trade, Mr. Marsh is also Chairman of the Hamilton Branch of the Canadian Manufacturers' Association, 1916; member of the Canadian Electrical Association; member of the National Electric Light Association.

Mr. Marsh's clubs are: Hamilton, Hamilton Golf and Country, Canadian Rotary (all of Hamilton); Engineers', Montreal. His societies are A.F. & A.M.; his recreations, golf, fishing, and his religion Protestant. He resides at 14 Robinson Street, Hamilton, Ontario.

—Photo, Courtesy British and Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$18 95
Lake Superior, charcoal, Chicago	19 75
Michigan Charcoal, iron	28 00
Ferro nickel pig iron (Soo)	25 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base, Toronto	3.50
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.50
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.25
Bars, 2 in. and up	3.75
Structural shapes	3.25
Plates	3.75

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs. C.L.	Per 100 lbs. L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$30 00
Electrolytic copper	31 00	30 00
Castings, copper	30 00	29 00
Tin	44 50	44 00
Spelter	13 00	14 00
Lead	9 00	9 00
Antimony	16 00	18 00
Aluminum	68 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4 75	$4 50
Heads	5 00	4 75
Tank plates, 3-16 in.	5 25	4 75

WROUGHT IRON PIPE

Prices in effect Sept. 12, 1916.

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 12	5 25
½ in.	4 00	5 57
¾ in.	4 83	6 96
1 in.	7 14	10 29
1¼ in.	9 66	13 92
1½ in.	11 55	16 64
2 in.	15 54	22 39
2½ in.	24 57	35 39
3 in.	32 13	46 28
3½ in.	38 64	55 66
4 in.	45 78	65 95

Lapweld

2 in.	$17 76	$24 24
2½ in	26 33	36 56
3 in.	34 43	47 81
3½ in.	41 40	57 50
4 in.	49 05	68 13
4½ in.	59 69	83 19
5 in.	69 56	96 94
6 in.	90 24	125 80
7 in.	121 40	165 40
8 in. x 25 lbs. per ft.	127 50	173 80
8 in. x 25 lbs. per ft.	146 90	200 20
9 in.	176 00	239 40
10 in. x 32 lbs. per ft.	163 20	322 40
10 in. x 40 lbs. per ft.	210 10	286 30

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$16 25	$18 50
Copper, crucible	19 25	22 50
Copper, heavy	19 25	22 00
Copper wire	19 25	22 00
No. 1 machine compos'n	14 75	17 00
No. 1 compos'n turings	12 75	14 00
New brass clippings	13 75	15 00
No. 1 brass turnings	12 25	12 00
Heavy melting steel	9 25	10 00
Boiler plate	11 75	10 50
Axles, steel	15 50	15 00
Axles, wrought iron	18 75	19 00
Tires, steel	11.75	11.00
Rails	13 50	13 00
Shafting	16 50	16 00
Malleable scrap	10 00	11 00
Pipe, wrought iron	10 00	9 00
Stove plate	10 00	10 50
Heavy lead	6 00	6 25
Tea lead	5 00	5 25
Scrap zinc	7 50	7 75
Aluminum	35 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent
Coach and lag screws	45
Stove bolts	62½
Plate washers	25
Machine bolts, and less	35
Machine bolts, 7-16 and over	25
Blank bolts	30
Bolt ends	25
Machine screws, flat head, iron	u6 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts, hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$5.1
Structural rivets, as above	5.0
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent
Sq. & Hex. Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts, over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	65
Coupling bolts	net
Planer head bolts, without fillet	15
Planer head bolts, with fiillet	net
Planer head bolt nuts, up to 1 in.	60
Planer head bolt nuts, over 1 in.	55
Planer bolt washers .... list plus	10
Hollow set screws ...... list plus	20
Collar screws .... list plus	20
Thumb screws	20
Thumb nuts	75

BILLETS

	Per gross to
Bessemer billets, Pittsburgh	$45 0
Open-hearth billets, Pittsburgh	45 0
O. H. sheet bars, Pittsburgh	45 0
Forging billets, Pittsburgh	69 0
Wire rods, Pittsburgh	55 0

NAILS AND SPIKES

Standard steel wire nails, base	$3.85	$3.80
Cut nails	3 40	3 40
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs.		$3 90

MISCELLANEOUS

Solder, guaranteed	0.27½
Solder, strictly	0.25½
Babbitt metals	**.11 to .60**
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	**13.87**
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	**0.95**
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	030½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	0.83
Linseed oil, boiled, single bbls.	0.86
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.11
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	55
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	25
3-fluted drills over 1½ in.	15
Bit stock	55
Ratchet drills	15
Machine bits for wood	20
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	30
Sockets	30
Sleeves	50
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	5 25	4 80
Canada plates, dull, 52 sheets	4 75	4 75
Canada Plates, all bright	6 30	6 50
Apollc brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 25	6 15
Premier, 10¾ oz.	6 50	6 40

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch.	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$20 00	.....
1¼ in.	23 00	.....
1½ in.	26 00	22 50
1¾ in.	26 00	18 00
2 in.	27 00	17 50
2¼ in.	29 50	.....
2½ in.	32 50	23 00
3 in.	44 00	27 00
3¼ in.	.....	30 50
3½ in.	50 00	32 00
4 in.	57 00	40 00

Prices per 100 feet. Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2:00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.39 to .49
Tin	.50 to .53
Zinc	.18 to .21

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 in.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.10
Emery in kegs, American.	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.30
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Que., Sept. 25, 1916.—Unceasing activity continues to reflect the prosperous condition of all branches of the country's industries. While the crop returns may not be as satisfactory as at first indicated, the general trade conditions will not be affected in the same proportion as a failure under normal conditions, as the general prosperity is largely the result of war requirements. Trade conditions cannot be better indicated by reference to the new war loan now being issued which promises to far exceed the amount required.

Pig Iron.

A stronger tendency has developed in pig iron, and with the increasing demand, prices are showing an upward trend. Production is still proceeding at full capacity, and the abnormal requirements of the trade may mean still higher prices.

Steel.

The curtailment of production, which was so marked a few weeks back, is gradually resuming the condition that prevailed before the warm weather set in. In addition to better working conditions, more help is available, owing to men being released from the harvest fields. The pressure upon the steel mills is becoming greater, and the scarcity of steel is more pronounced, and it seems apparent that the high prices now prevailing will be still further advanced and it is very unlikely that the situation will be relieved this year. Pittsburg quotations on billets and sheet bars have recently been advanced, and it is anticipated that the top has not yet been reached, as many of the mills are booked well into 1917, with no abatement in the general demand. The steel plate requirements for shipbuilding purposes are in excess of the supply, as the mills are able to furnish but a portion of that needed to carry on the heavy work that is being placed on this branch of the industry. Another feature that bears upon the plate situation is the large volume of business being done by car companies who in many cases are seriously handicapped by the lack of raw material. With the general upward trend of steel prices, it is expected that an early advance will be made on sheets. The mills are so pressed that deliveries are being extended; the makers in some instances being unable to ship material in the specified time. Owing to the heavy consumption of wire and wire products, a scarcity is beginning to loom up, which is thought will result in further advances on these lines. Recent demand for wrought iron pipe and boiler tubes is heavy, indicating renewed activity, and reflecting the trade conditions in this branch of the steel industry. While some price changes are reported on the New York market, and all quotations are very firm, local dealers are holding quotations at last week's figures.

Metals.

The metal situation is anxiously awaiting the closing of the pending contract for enormous quantities of copper required by the British and French Governments; the exact amount of this order is not yet known, but reports are circulated that it is in the neighbourhood of 200,000 tons. Tin is apparently strong at present, but the stability of the situation is doubted in some quarters. Spelter is very quiet and developing a weaker tendency. Lead is quiet after the advance. The demand for antimony is light on a declining market.

Copper.

Despite the high prices that copper is commanding at the present time, the demand continues to be very heavy. This does not apply alone to the war requirements, as the consumption of copper for domestic purposes is also of considerable proportion, owing to industrial expansion, following the abnormal conditions of the past two years. The output of marketable metal is somewhat restricted, as a result of labor troubles and the curtailed production owing to lack of sufficient refining facilities to take care of the smelted product. The interest of the trade at present is centered on the pending negotiations of an excessive

British contract, which, if closed, will result in the largest sale yet made in the history of the industry. The London market is very firm, showing an advance of 10s on spot and £1 on futures. The New York market is quiet, but very firm in anticipation of heavy business. Electro has declined ⅛c, while castings are a little stronger on a similar advance: current quotations being 28½c and 26¼c respectively. Lake is steady at 28¼c. Local dealers report a fair market, but quotations firm and unchanged at 31c for Lake and Electrolytic, and 30c for castings.

Tin.

The market in tin is very firm, and while no great activity is reported, there is a tendency to advance prices, following the strong tone of the British market, which has shown a general advance of over ⅝c. per pound. New York reports an advance of ½c., putting the nominal quotation at 38⅞c per pound. The local situation is fairly active and dealers are asking 44½c, an advance of ½c per pound.

Spelter.

The market is very quiet, the past few days having taken on a still weaker tendency. The steadying condition so marked a few weeks ago seems to have entirely disappeared, and present indications point to a still lower market. Increased interest in the galvanized trade may steady the spelter situation, but it is thought that sheet mills are well supplied for immediate needs. The New York situation is easier, quotations having fallen off ⅛c per pound; the nominal price being now 9½c per pound. Dealers here report a quiet situation, but are still quoting last week's price of 13c per pound.

Lead.—While the market has become very quiet, and inquiries are not heavy, it is thought that the lack of interest is of short duration, as everything points to an early activity both here and abroad. Local dealers report a fairly active market with an advance of ¼c per pound, the nominal quotation being 9 cents per pound.

Antimony.—Inquiries for antimony are very light, and in the absence of any great demand, the market is exceedingly quiet with a declining tendency. A drop of ⅜c. per pound on the New York market puts the present quotation at 11⅜c per pound. The market here is quiet, following a brief show of activity. Prices are unchanged at 16c per pound.

Aluminum.—Nothing has transpired to alter the situation, and quotations are firm at 68c.

Machine Tools and Supplies.

Activity throughout the machine tool industry has again increased. In addition to the heavier shell requirements the demand for domestic equipment for ordinary purposes is showing constant improvement. Delays on shipment are becoming greater, and buyers are experiencing some difficulty in obtaining delivery, which in some cases is being extended. A steady demand is maintained upon all classes of machine tool accessories and supplies. Prices are well maintained.

Scrap.

The apparent scarcity of heavy melting steel scrap is resulting in a firmer position being taken by dealers and sellers of this material. The increase in the demand for various grades of pig iron is also affecting the old metal market. Dealers report an active demand for various kinds of old metals, but while New York prices are stronger, the quotations here are unchanged.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Toronto, Ont., Sept. 26.—The extraordinary success of the latest war loan reflects the prosperous conditions prevailing in this country, and will have a stimulating effect in business circles. As the money will be spent on munitions and other war supplies, the greater part of the loan will remain in the country, and will consequently benefit considerably those industries associated with war orders. It also means more large orders for munitions and a continuance of the present activity in our steel mills and shell plants.

Steel

The situation in the steel trade is getting tighter and the market steadily gaining in strength. With the demand on the increase and deliveries getting more backward, indications point to higher prices on steel bars, plates and tubes before the end of this year. The problem of deliveries on steel products is becoming increasingly important, as the demand is getting ahead of the supply, notwithstanding the increase in capacity of the mills to take care of a much heavier tonnage. The U. S. Steel Corporation have withdrawn prices on bars in this market on account of the difficulty in naming delivery dates, due to the heavy unfilled tonnage, which is increasing each month. This indicates that a further advance may be made in prices in the near future, which would no doubt be followed by similar action by Canadian mills. An advance in boiler tubes may be announced, as prices are very firm and demand heavy. The mills are sold up for five to six months on locomotive and merchant tubes. There is an extraordinary demand for plates in the primary market, principally for ships, and higher prices are inevitable as the mills are sold up for at least ten months. The great scarcity of steel rails has reached a point where the Government may remove the duty temporarily to permit the railways to satisfy their more urgent requirements. The shortage is due to the mills producing shell steel almost exclusively, only one mill now rolling rails and in smaller tonnages than formerly.

Black sheets have advanced to 3c in the United States, and there is a possibility of still higher prices, as an advance of $3 a ton is looked for in sheet bars. Blue annealed sheets continue in good demand at unchanged prices. The galvanized sheet market is stronger on account of the increased strength of spelter and high cost of sheets; quotations, however, are unchanged.

Increasing strength characterizes the steel market in the United States, and indications point to higher prices. Buyers of steel are finding it difficult to place their orders excepting for far distant deliveries, but are buying at prices which hitherto they had refused to consider. There is practically no limit to the demand for steel now, with the result that the mills are getting more congested than ever.

Pig Iron

The pig iron market is very strong, and there is some talk locally of an advance in prices. The demand for basic iron continues very heavy, while there has been better inquiry for foundry grades. The pig iron market in the States is stronger and prices have advanced on some grades. Bessemer is now quoted at $22.20, gray forge $18.95 Pittsburg, and basic Valley furnace, $18.25 per ton. Hamilton No. 1 is unchanged at $24, and Victoria No. 1 at $25.

Scrap

The market for old materials is holding fairly steady, and business is brisk. Scrap copper has advanced, but otherwise quotations are unchanged. The advance in copper is equal to 1½c per pound, which brings crucible copper up to 22½c; heavy copper 22c, and copper wire 22½c per lb. Lead is a shade higher, heavy lead being quoted at 6.25c and tea lead 5.25c per pound.

Machine Tools

The machine tool market continues active, business being confined almost entirely to large-swing lathes for munition plants. Owing to the demand for this class of equipment, both in Canada and the States, deliveries are getting more backward. The market for smaller tools, such as milling machines and tool makers' lathes, is quiet, as they are very hard to get.

Supplies

The general situation with regard to supplies is unchanged, but the market is very firm. There have been few price changes made during the week, but there is a decided upward tendency in values and an advance in some lines, principally steel and brass goods, may be looked for. Owing to prevailing conditions in the steel market, some lines of supplies are hard to get and dealers' stocks are low. Linseed oil and turpentine are unchanged, while lead has advanced 50c per 100 lbs., following increased strength in the pig lead market. Gasoline is firm and unchanged, but it is believed that prices of crude oil may advance, as production has declined, although there has been no falling off in the demand.

Metals

The continued strength of copper and advance in the price of lead are the principal features of interest in the metal markets this week. In the case of copper the strength will be maintained, as the demand promises to be exceptionally heavy for many months. Lead, on the other hand, is more liable to fluctuate, as past events have proved. There is little of interest to note in the other metals, although the position of spelter has improved to some extent. The market locally is steady and the situation satisfactory.

Copper.—Reports of heavy purchases of copper by the Allies have not as yet materialized, but they will sooner or later have to come on the market. For this reason producers are indifferent, as they are practically sold up for the remainder of this year. Export buying, however, is heavy, as is also domestic demand. Brass mills are buying large supplies of copper, and more will be needed to cover war orders, which have been booked recently. The market is very strong, and further advances are expected. Local quotations unchanged and firm at 30c per pound.

Tin.—There has been a reaction in the London market, but New York is unchanged and quiet. A buying movement in tin is looked for, as stocks are being used up, and will have to be replenished. Local price is 44c per pound.

Spelter.—The market is quieter, following improved business last week, but prospects look better for a more active demand. Spelter is quoted locally at 14c per pound.

Lead.—The market is more active, the "Trust" having advanced their price twice during the week, to 6.75c and finally to 7c New York. Independents are quoting a shade lower at 6.97½c New York for both spot and November deliveries. Lead has advanced ¼c locally, and is quoted at 9c per pound.

Antimony.—The market is stagnant and prices nominal at 18c per pound.

Aluminum.—The market is a little stronger, but prices are nominally unchanged at 68c per pound.

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Montreal, Que.—The Dominion Steel Corporation has just signed a contract covering the company's entire output of steel for high explosive shells for the first six months of 1917.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC
H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA
D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES
E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA
J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA
Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE
Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN
G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND
Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA
L. D. Wilgress, Omsk, Siberia.
C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Ploschad 9, Petrograd.

NEWFOUNDLAND
W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND
W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA
W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM
N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.
J. E. Ray, Central House, Birmingham. Cable address, Canadian.
J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.
F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.
J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.
Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES
Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.
R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN
C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM
W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Fergus, Ont.—Beatty Bros., are building an extension to their foundry.

Ottawa, Ont.—The Ottawa Car Co. will build an addition to their plant.

Tillsonburg, Ont.—The Maple Leaf Harvest Tool Co. has decided to proceed with an extension to its plant.

Dauphin, Man.—The Dauphin Milling Co. is in the market for a Corliss engine, size about 15 in. x 36 in. stroke.

Toronto, Ont.—The Canada Metal Co. will build an addition to their plant on Fraser Avenue, to cost about $25,000.

Fergus, Ont. — The Superior Barn Equipment Co., will soon have completed the building of their new factory.

Winnipeg, Man.—The C. N. R. has let the contract for the erection of a machine shop at Rainy River, Ont., to cost $8,000.

Trail, B.C.—The Consolidated Mining & Smelting Co. have recently installed plants for making nitric acid and aluminum.

Georgetown, Ont.—Harley-Kay have purchased the machine business and plant of the Georgetown Foundry and Machine Co.

Nelson, B.C.—The West Kootenay Power & Light Co. will construct an 8,000 h.p. unit addition to its plant at Upper Bonnington Falls.

Espanola, Ont.—It is understood that the Spanish River Pulp & Paper Co. are considering the erection of a sulphite plant here, which will have a capacity of 70 tons.

New Westminster, B.C. — Henry Schaake has leased a site on Tenth Street, on which he proposes to erect a machine, pattern and boiler shop to cost about $70,000.

Brantford, Ont.—Good progress is being made on the new factory for the Dominion Steel Products Co. The main building will be 370 ft. by 90 ft., and will be completed by October 25.

Hamilton, Ont—The Brown-Boggs Co. have taken out a building permit for reconstruction and extension to their factory. H. G. Cristman & Co., have been awarded the contract at $2500.

Merritton, Ont.—The extensions to the sulphite mill of the Riordon Pulp and Paper Co. are nearly completed and good progress is being made with the installation of the bleaching apparatus. The outlook is that the company will be turning out bleached sulphite at this plant next month and, when the new apparatus is in full operation, the entire output of the Merritton works will be bleached.

Espanola, Ont—It is reported that the Spanish River Pulp & Paper Co. is considering the erection of a sulphite plant at Espanola, Ont., to have a capacity of 70 tons. It is pointed out that the company has for some time felt the need of a sulphite division at this point, the nearest chemical pulp plant being at Fraser Falls. The four new grinders at the Espanola plant will soon be in operation, making a total of 28 in all.

General Industrial

Granby, Que.—The Granby Elastic Web Co. are building a factory here.

Montreal, Que.—The Canada Starch Co., of this city, will build a factory at Fort William Ont.

London, Ont.—An elevator will probably be built at Port Stanley at a cost of $100,000. A by-law may be submitted to the ratepayers in January.

Camrose, Alta.—The Columbia Grain Co., of Winnipeg, will build an elevator here, probably next spring. A warehouse is being built now. Thomas Dub is the local manager.

Municipal

Nokomis, Sask.—The Town Council will install an electric light and power plant.

Lindsay, Ont.—The Town Council propose extending the system of water mains.

New Glasgow, N.S.—Tenders will be called shortly for the construction of waterworks extensions, estimated to cost $100,000.

Hull, Que.—The City Council will make considerable extensions to the waterworks system. Cast iron pipe will be required.

Chatham, N.B.—The Town Council will purchase a semi-diesel oil engine, direct-connected, a dynamo and an exciter at a cost of $13,600.

Aylmer, Que.—The Town Council are issuing $45,000 debentures for the purpose of constructing a rapid sand gravity filtration plant.

Sherbrooke, Que.—The Waterworks Committee are considering the installation of a vertical plunger pump, with a capacity of 4,000,000 gallons.

Kingsville, Ont.—The Town Council are considering making improvements to the waterworks system. F. W. Thorold, of Toronto, is the consulting engineer.

Niagara Falls, Ont.—By-law granting tax exemption for ten years to the Perfection Motor & Tire Co., Madison, Wis., was passed by the ratepayers on September 18.

New Glasgow, N.S.—The City Council have decided to extend the water distribution system, and will require a considerable quantity of 10 in., 12 in., and 16 in. cast iron pipe.

Hamilton.—The City Council have decided to invite tenders on two kinds of steam pumps for the Beach pumping station and will also have an estimate prepared as to the cost of a twenty million gallon reservior.

Dunnville, Ont.—The vote by the ratepayers of Dunnville last Monday on the by-law to install the Hydro-Electric power and light was: For, 412; against, 19. On the by-law to issue debentures for $53,000 to take over the total electric plant in connection with the Hydro, the result was: For, 412; against, 10. The by-law to extend the franchise of the Dominion Natural Gas Company for another ten years resulted: For, 460; against, 9.

Tenders

Toronto, Ont.—Tenders will be received up to Tuesday, October 3, 1916, for the supply and delivery of 20-inch cast iron pipes, cast iron special castings and valves. Specifications may be obtained at the Works Department, Room 12, City Hall.

Toronto.—Tenders will be received until October 2, addressed to the Chairman of the Toronto Harbor Commissioners, and marked "Tenders for Cherry Street Bascule Bridge." All information may be obtained by applying to E. L. Cousins, chief engineer and manager.

Oshawa, Ont.—Tenders are invited for work and material required in the construction of a heating chamber, and also for the installation of a complete steam heating system in the car barn and workshops of the Oshawa Railway Co. Plans and specifications may be seen at the office of the superintendent at Oshawa.

Hawkesbury, Ont.—Tenders will be received until October 2 for installing an electric pump-driven turbine, of one of the following capacities: Half a million Imperial gallons per 24 hours; three-quarter million gallons, and one million Imperial gallons. Specifications will be furnished on application to M. Gareau, clerk of the municipality.

Toronto, Ont.—Tenders will be received up to Tuesday, October 3, 1916, for the supplying of: Four standard gasoline equipments installed complete, with galvanized steel tanks 14-gauge of 500 gallons capacity each. Forms of tender and specifications can be obtained upon application at the office of the Fire Department, Adelaide Street Fire Hall, Toronto.

Toronto.—Tenders will be received by the Chairman, Board of Control, City Hall, Toronto, up to October 3, 1916, for the manufacture, supply and erection of one twelve-inch venturi meter and register, indicator recorder at the Main Sewage Disposal Works, Toronto. Specifications may be seen and forms of tender obtained at the Works Department, Room 6, City Hall.

Ottawa, Ont.—Tenders will be received until Monday, October 2, 1916, for the supply of post office sorting cases Nos. 1257, 1259 and 1264. Plans and specifications to be seen on application to the Clerk of Works, Postal Station "F," Toronto, Ont.; to the overseer of Dominion Buildings, General Post Office, Montreal, P.Q., and at the Department of Public Works, Ottawa.

Peterborough, Ont.—Tenders will be received by Ed. M. Elliott, Esq., County Clerk, Peterborough, Ont., up to Saturday, Sept. 30, for taking down and rebuilding the west pier of the Wallace Point Bridge, over the Otonabee River and Trent Valley Canal. For plans, specifications, forms of tender, and other information, apply to the engineers, Bowman & Connor, 31 Queen Street W., Toronto.

Winnipeg, Man.—Tenders, addressed to the Chairman, Board of Control, will be received up to Tuesday, October 3rd, 1916, for the supply and delivery, f.o.b. cars Winnipeg, of quantities of lead-covered paper insulated cable. Instructions to bidders, specification and form of tender may be obtained at the office of the City Light and Power Department, 54 King Street.

Toronto.—Tenders for stores, office and garage buildings at Murray and Caer-Howell Streets, addressed to the Chairman of the Toronto Electric Commissioners, will be received until Oct. 2, 1916. Plans and specifications will be open for examination and explanation at the office of the architects, 908 Royal Bank Building, Toronto, and a further set of plans and specifications may be inspected, but not obtained, at the office of the purchasing agent of the Hydro-Electric System, Hermant Building, Toronto.

Ottawa.—Tenders will be received up to October 2 for the undermentioned metal supplies for delivery to H.M.C. Dockyards at Halifax, N.S., and Esquimalt, B.C.: Items 1, steel angles, bars, sheets and plates; 2, iron bars, fire bar; 3, brass bars and sheets; 4, copper sheets and bars; 5, solder tin and alloys; 6, tubes brass and copper. Forms of tender and full information may be obtained by application to the Department at Ottawa, or to the Naval Store Officers at H.M.C. Dockyard, Halifax, N.S., and Esquimalt, B.C. In making application for forms, the particular item or items for which forms are required should be clearly stated.

Personal

P. F. Fosnight, Canadian representative of the Vanadium-Alloys Steel Co., Pittsburgh, Pa., was married recently at Hamilton, Ont.

J. C. Wallace, president of the American Shipbuilding Co., of Cleveland, Ohio, paid a visit recently to the chief officials of the Western Drydock and Shipbuilding Co., Port Arthur, Ont.

Charles J. Barr, formerly general superintendent of the Tennessee Coal, Iron and Railroad Co., has been appointed general manager of the Algoma Steel Corporation, Sault Ste. Marie, Ont.

Lord Shaughnessy and an inspection party of C. P. R. directors, including R. B. Angus, Sir Edmund Osler, Sir Herbert Holt, W. D. Matthews, A. M. Nanton and E. W. Beatty, have left Vancouver on their return East.

George R. Archdeacon has been appointed general manager of the Canadian Hart Accumulator Co., St. Johns, Que. Mr. Archdeacon was formerly upon the staff of Messrs. Ferranti and the Chloride Electrical Storage Co., in England.

W. J. Parker, who was assistant sales manager of the Standard Tool Co., is now associated with E. E. Lenarz in the Cleveland Power Transmission Co., Garfield Buildings, Cleveland, Ohio. The Company specializes in small tools such as carbon and high-speed drills, reamers, cutters, etc.

Contracts Awarded

Fort William, Ont.—Barnett & McQueen Co. have been awarded the contract for an extension to the elevator by the Ogilvie Flour Mills.

London, Ont.—A contract has been awarded by the Dominion Government for the construction of a $100,000 concrete pier at Port Stanley.

Montreal, Que.—The Northern Electric Co., Montreal, has secured a contract for about $300,000 worth of underground cables for the Montreal Tramways Co.

Trade Gossip

The International Metal Works, of Brockville, Ont., have been incorporated with a capital of $30,000.

The Berlin Furniture Co. has changed its name to that of the Jacques Furniture Co., and the capital stock has been increased to $850,000.

The Canadian Sarco Engineering Co. have obtained an order from the town of Le Pas, Man., for two De Laval sewage pumps, to be direct connected to Canadian Westinghouse motors.

The International Engineering Co., Amherst, N.S., have been awarded a contract for two 600 h.p. water tube boilers by the Goodyear Tire & Rubber Co., for their new plant at New Toronto, Ont.

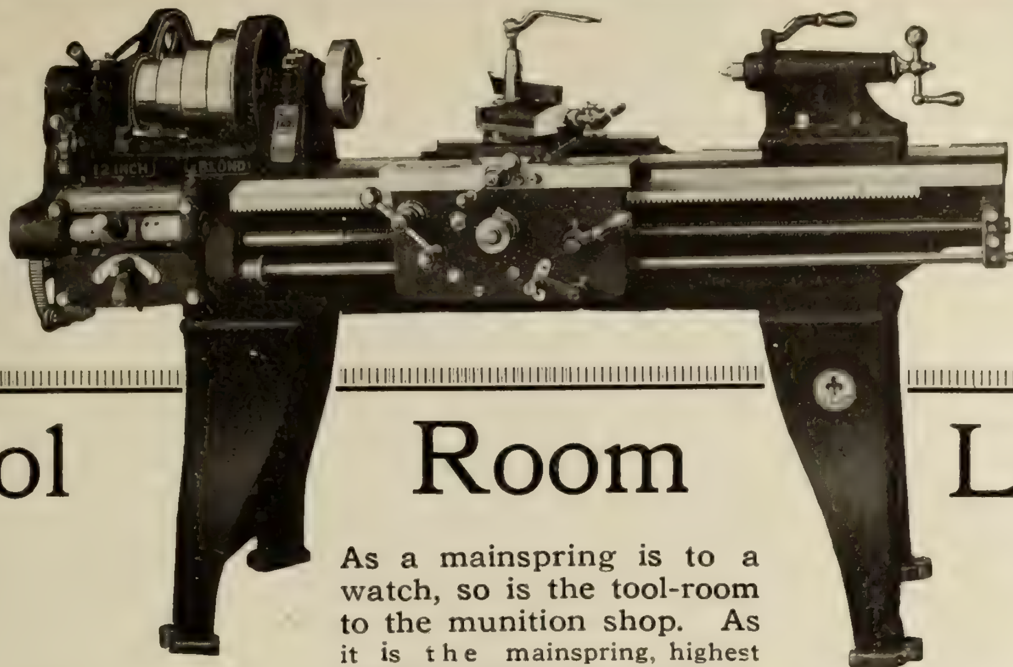
The Turbine Equipment Co., Toronto, are installing a 24-in. De Laval pump, 16 million gallons daily capacity against 60 ft. head, at Sidney, N.S. It is direct connected to a 250 h.p. Canadian Westinghouse motor.

Orillia, Ont.—The first ferro-molybdenum to be produced commercially in Canada was run September 20 at the plant of the International Molybdenum Co. here. Three electric furnaces are now running steadily.

Trade Openings in Britain.—Applications from firms in the United Kingdom for the names of manufacturers or producers of the following articles have been recently received at the commercial intelligence branch of the Board of Trade in London.

Electrical Apparatus—Plated metal fronts and reflectors for portable electric hand lamps.

Machinery Equipment — Automatic machines for making cup and square hooks; baling presses; button-making



Tool Room Lathe

As a mainspring is to a watch, so is the tool-room to the munition shop. As it is the mainspring, highest efficiency, then, is required. In this regard we invite your inquiries for this lathe which we claim will give this highest efficiency. It's a 14" x 6' LeBlond Lathe with taper draw-in attachment and collets, relieving attachment and oil pan. It is a superior machine that will give entire satisfaction.

64-66 Front St. West — **The A.R. WILLIAMS Machinery Co., Limited** — Toronto, Canada

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GEOMETRIC
O.K.

HAVE YOU GIVEN THE GEOMETRIC O.K. TO YOUR SCREW THREADS?

A Consulting Engineer writes us that he always recommends Geometric Thread-Cutting Tools. The reason is not hard to know. It is for this same reason that Geometric Screw-Cutting Tools are sought for every make of Screw Machine.

We are always glad to have thread-cutting propositions submitted to us. There is no charge for our recommendations. Send along your specifications, and our experts will recommend tools for your consideration. May we have your address for our mailing list, so that we can send you our publication, THREADS, each month? That will help us get acquainted. It is free.

THE GEOMETRIC TOOL CO., New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal. **The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.**

machinery; distillation plant for carboniferous shale; machines for marking small pieces of round steel, about 6 in. long by $^1/_4$ in. diameter; machinery for oiling silk; winnowing machines.

Vancouver, B.C.—Industrial plants are being laid down at different places along the main line of the Pacific Great Eastern, and it is expected that in a short time there will be opened up extensive sawmills at Green Lake, near Mons, as well as other points.

Armstrong Bros. Tool Co., Chicago, are building a 50 x 70 ft. steel and brick addition to their drop forging department. They are also erecting a reinforced concrete fireproof building, 60 x 130 ft., four floors, to be used for finished stock warehouse, shipping department and offices. These buildings, with new machinery and equipment to be installed, will largely increase the company's facilities.

Russian Market So Offered Canadians.—The Trade and Commerce Department, Ottawa, has received a report from C. F. Just, recently sent to Petrograd as Canadian Trade Commissioner, in which it is stated that a market for agricultural implements, other than harvesting machines, exists in the Petrograd district. Mr. Just sends a warning that Canadian firms should not delay in taking advantage of this new market. The formation of a point selling agency is suggested.

The Independent Pneumatic Tool Co. have recently made arrangements with the Garlock-Walker Machinery Co., 70 Front Street, Toronto, to act as their agents for the sale of "Thor" pneumatic tools in the Province of Ontario, east to Belleville. A stock of "Thor" tools will be carried by the Garlock-Walker people in Toronto, and they will be able to give customers the very best of service. The Independent Pneumatic Tool Co. also maintain their own branch office at 334 St. James Street, Montreal.

Dominions Royal Commission.—The eastern itinerary of the Dominions Royal Commission, enquiring into methods of developing trade within the Empire, is announced. The commission will leave Winnipeg on October 11, and sit at Fort William October 12-13; Toronto, 14-22; Ottawa, 23-24; Montreal, 24-31, and Quebec, from November 1 to 4, when the commission will sail for England. Two years ago they visited the Maritime Provinces, when their enquiry was interrupted by the outbreak of the war.

Hudson Bay Railroad.—J. D. McArthur, who is building the Hudson Bay Railway, states that the line has been graded almost to Port Nelson, and steel has been laid for nearly three hundred miles. The contractors will have the road completed next year, or within the estimated time, but at the present are hindered by a shortage of labor. Great numbers of men have left the construction camps for the military camps. They were replaced in part by drafts from the alien interment camps, but this supply has now been exhausted.

Montreal, Que.—It is reported that the management of the Shawinigan Water & Power Co. have come into possession of a secret process for the manufacture of high-speed steel, and that the process is one which will produce that much-sought-after commodity much more profitably than it can be done at present. This steel is in great demand for shell purposes, and is only obtainable at advancing prices. The Shawinigan people are said to have secured a plant in Montreal, which will be in operation around October 15.

Another Bridge at Niagara Falls.—The Ontario & Niagara Connecting Bridge Co., an American concern, will construct a $1,000,000 span near the point where the transmission line of the Niagara, Lockport & Ontario Power Co. crosses the stream in the town of Lewiston. The bridge site was selected at a meeting of the company's commissioners in the office of Frank A. Dudley at Niagara Falls, N.Y. The bridge will be for steam and electric railroads, vehicles and pedestrians. It will be of steel and concrete.

Canadian Locomotive Co. Meeting.—At the annual meeting of the Canadian Locomotive Co., held at Kingston, Ont., on September 20, all the old directors were re-elected, as follows:—Aemilius Jarvis, Toronto, president; J. J. Harty, Kingston, vice-president; Robert Hobson, Hamilton; J. L. Whiting, Kingston; Warren P. Soper, Ottawa; H. W. Richardson, Kingston. Executive—Frank G. Wallace, Kingston, general manager; William Casey, manager; J. J. Harty, sales manager; J. H. Birkett, secretary-treasurer. At the close of the meeting the directors reported that the prospects were very bright for the future, with plenty of orders on hand. The big order from Russia for 50 locomotives has been completed, and at the present time negotiations are on with foreign countries for more orders.

May Remit Duty on Steel Rails.—It was semi-officially announced on Sept. 20 that the Dominion Government is likely to temporarily remit the duty on steel rails imported into Canada. The reason given is that owing to the strain upon

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department is able to present the following list of the moreimportant British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL

Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE

Valparaiso, British Consul General.

COLOMBIA

Bagota, British Consul General.

ECUADOR

Quito, British Consul General.

EGYPT

Alexandria, British Consul General.

FRANCE

Havre, British Consul General.
Marseilles, British Consul General.

INDIA

Calcutta, Director General of Commercial Intelligence.

ITALY

Genoa, British Consul General.
Milan, British Consul.

MEXICO

Mexico, British Consul General.

NETHERLANDS

Amsterdam, British Consul.

PANAMA

Colon, British Consul.
Panama, British Vice-Consul.

PERU

Lima, British Vice-Consul.

PORTUGAL

Lisbon, British Consul.

RUSSIA

Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN

Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN

Stockholm, British Consul.

SWITZERLAND

Geneva, British Consul.

URUGUAY

Monte Video, British Vice-Consul.

VENEZUELA

Caracas, British Vice-Consul.

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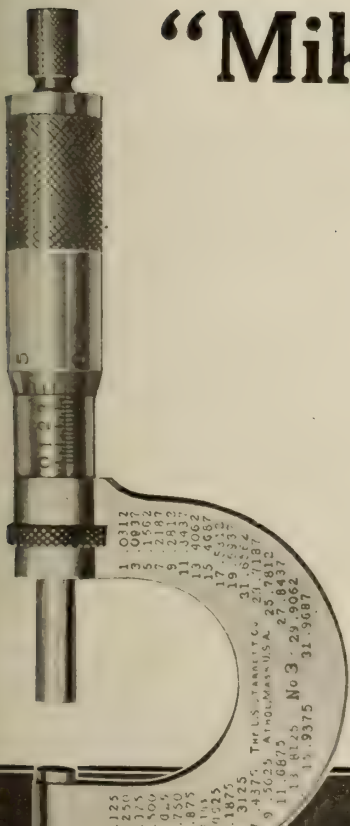
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the steel rail industries in Canada in turning out shells and other war munitions there has necessarily been a reduction in the output of rails, and that the railways are now confronted with a shortage in supply. If the Government finds that the steel companies cannot meet orders placed by the railway companies there will be a remission of the tariff duty on a sufficient number of rails brought in from the United States to meet immediate requirements. This same course was pursued in 1912, when the railway companies found they could not get enough rails from the Canadian mills, although in that case the arrangement was made with the mills in order to enable them to fill their orders.

Marine

Port Arthur, Ont.—The Government hydrographic steamer La Canadienne, which went aground in Black Bay a week ago, has been released, and will be put in the Port Arthur drydock for repairs.

Victoria, B.C.—The Victoria Machinery Depot has been awarded the contract for repairing the British schooner Coquitlam City, and it is expected that the work will cost in the neighborhood of $4,000, Mr. Forsyth, of Brisbane, Queensland, owns the vessel.

Halifax, N.S.—The steamer Amelia which plys between Picton, N.S. and Prince Edward Island recently got $100,000 salvage for towing into port the Belgian steamer Indutionaire which had been abandoned near the Magdalen Islands. It took the Amelia over five days to bring her prize to port at Port Mulgrave. The value of the Indutionaire's cargo, which was lumber, is estimated at $200,000.

Refrigeration

Montreal, Que.—The Montreal Arena Co. are building an ice storage.

Grande Prairie, Alta.—R. S. McDonald, of this town, proposes establishing a creamery here.

Vancouver, B.C.—The New England Fisheries Co. will build an extension to their plant, to cost about $50,000.

Railways—Bridges

Hamilton.—The City Council, at a special meeting held Sept. 19, approved of the proposal to construct a Hydro-Electrical Railway line from Port Credit to St. Catharines, via Hamilton.

Baysville, Ont.—The Central Radial Committee at a meeting held recently decided to inaugurate a campaign in favor of the proposed Gravenhurst-Baysville Hydro-Electric Railway.

Deseronto, Ont.—A meeting of the mayors of the different towns interested, was held here recently to advance the scheme of an electric railway under the management of Hydro-Electric Commission to be constructed and run from Picton through Deseronto to Napanee.

Wood-Working

Vancouver, B.C.—The Alberta Lumber Co. will build a mill to cost approximately $100,000.

Simcoe, Ont.—Fire destroyed the planing mill of J. E. Butler & Sons, at Vittoria. Loss, $3,000; no insurance.

Harriston, Ont. — The Harriston Casket Co., have decided to rebuild their plant which was recently destroyed by fire.

St. Thomas, Ont. — The Canadian Woodenware Products Co.'s plant which was recently destroyed by fire will probably be rebuilt.

Aylmer, Ont.—Fire completely destroyed Staley's sawmill just east of Glenholin on Sept. 18. The origin of the fire is unknown.

Chicoutimi Que.—A. Gagnon's saw mill was totally destroyed by fire with a loss of $40,000. The mill will be rebuilt and new machinery will be required.

New Incorporations

Elora, Ont.—The Canadian K. K. Co. has been incorporated to manufacture machinery, tools, iron, steel, etc. The new concern is capitalized at $40,000, by Charles L. Dunbar, Leo W. Goetz, and H. M. McTague, of Guelph, Ont.

The A. L. Johnson Shoe Co. has been incorporated at Ottawa, with a capital of $200,000, to manufacture boots and shoes at Montreal. Incorporators: A. L. Johnson, J. S. Hough, and A. E. Dilts, all of Montreal.

Hamilton Brass, Ltd., has been incorporated at Toronto, with a capital of $40,000, to manufacture all kinds of metal ware at Hamilton, Ont. The provisional directors are: H. S. Lees, J. M. Telford and R. P. McBride, all of Toronto.

Manville Asbestos Co. has been incorporated at Ottawa, with a capital of $1,000,000, to manufacture asbestos products, with head office at Montreal. Incorporators are: G. W. MacDougall, W. B. Scott and J. G. Cartwright, all of Montreal.

Chelmsford Creamery, Ltd., has been incorporated at Toronto, with a capital of $10,000, to establish and operate a creamery at Chelmsford, Ont. The provisional directors are: H. J. Gratton, John Bradley and G. Pacquet, all of Chelmsford, Ont.

Scrap Metals, Ltd., has been incorporated at Ottawa, with a capital of $49,000, to manufacture and deal in cast, wrought, sheet and wire metal and hardware products, etc., at Montreal. Incorporators are: E. J. Lyons, H. A. Larin, and A. G. Laporte, all of Montreal.

FOUNDRYMEN'S CONVENTION AND EQUIPMENT

(Continued from page 336.)

James W. Campbell, secretary and treasurer, and Chas. H. Erickson, superintendent; J. B. Marshall, western representative and Charles C. Klingman, department manager.

Thomas E. Coale Lumber Co., Philadelphia, Pa.—Michigan soft cork white pine pattern lumber and California sugar pine. Represented by Thos. E. Coale, president; E. C. Anderson, assistant to president, and A. Warren Anderson, salesman.

Curtis Pneumatic Machinery Co., St. Louis, Mo.—Air compressor, reciprocating hoist, single I-beam crane, closed hopper hand blast, single I-beam trolley, photographs of representative installations of Curtis pneumatic elevators, and such equipment that we manufacture which is not exhibited itself. Represented by L. C. Blake, Charles E. Stamp, and F. F. Seaman.

Dalton Adding Machine Co., Cincinnati, O.—Dalton adding, listing and computing machines, hand and electric driven. Represented by R. Lancaster Smith, Ohio, sales agent; D. C. Boyer, A. J. Anderson, A. S. Harris, Miss W. Flynn.

Davenport Machine & Foundry Co., Davenport, Ia.—Molding machines.—Represented by Carl Falk, manager molding machine department, and John T. Anderson, superintendent and manager.

Davis-Bournonville Co., Jersey City, N.J.—Stationary and portable type oxy-acetylene welding and cutting apparatus, including the Davis neutral flames torch, also No. 2 Oxygraph, and No. 1 radiograph for automatically cutting steel. Represented by Hugh H. Dyar, district sales manager, Cleveland; Harry W. Gill, Hugo A. Lindholm, Wm. H. Joyce and Alex. Blaser.

Wm. Demmler & Bros., Wewanee, Ill.—Automatic coremaking machine in operation. Represented by H. L. Demmler.

Joseph Dixon Crucible Co., Jersey City, N. J.—Graphite products, including crucibles, stoppers, nozzles, sleeves, phosphorizers, stirrers, foundry facings and a full line of the Dixon products. Represented by D. A. Johnson, manager, Chicago branch; H. C. Sorenson, F. R. Brandon and J. A. Biel.

Electric Controller & Mfg. Co., Cleveland.—Stereopticon views of lifting magnets and automatic machine tool controllers in operation at various plants. Represented by F. R. Fishback, district manager, and M. Converse and W H. Beatty, sales department.

Excelsior Tool & Machine Co., East St. Louis, Ill.—Automatic grinding and polishing machine for polishing stove tops, motor driven. Automatic grinding and polishing machine for polishing pipe, motor driven. Motor driven double arbor polishing and buffing lathe. Represented by T. F. Philippi, president.

Federal Foundry Supply Co., Cleveland—Foundry Supplies. Represented by W. J. Adams, president; Ralph Ditty, treasurer and

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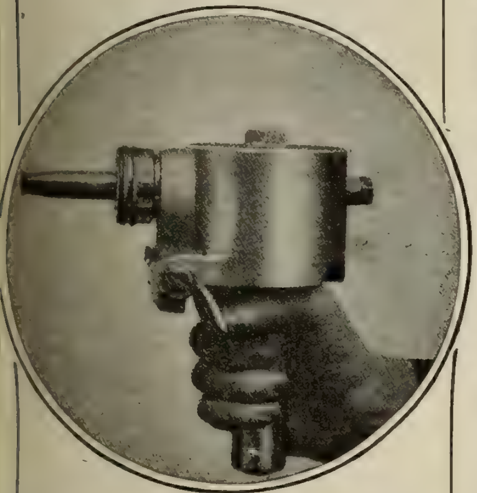

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general manager; Thos. Ware, secretary; E. Kaye, C. A. Collins, I. D. Adams, L. H. Heyl, John Bayer, W. J. Smith and John Mertes, salesmen.

Felt & Tarrant Mfg. Co., Chicago.—Adding and calculating machines. Represented by William F. Sims

Foundry Equipment Co., Cleveland.—Stationary Core ovens of the roller drawer type, brass furnaces, aluminum furnaces, sprue cutters, squeezers, crucible lever lifters, coremakers' benches and oil burners. Represented by Julius Tuteur, president; F. A. Coleman, general manager, and C. A. Barnett, treasurer.

The Foundry and The Iron Trade Review, Cleveland. A display of artistic gray iron castings which have been collected in all parts of the world. Represented by A. O. Backert, George Smart, H. Cole Estep, J. D. Pease, R. V. Sawhill, E. C. Kreutzberg, A. L. Klingeman, L. C. Pelott, S. H. Jasper, A W. Howland and F. V. Cole.

Gardner Machine Co., Beloit, Wis. — Disc grinders for metal grinding, both belt and motor driven, to carry disc wheels ranging in diameter from 12 inches to 53 inches. Patternmakers' disc grinders and roll sanders, belt and motor driven polishing lathes in various sizes, ring wheel chucks, abrasive discs, and a general line of disc grinder supplies. Finished samples of work done on disc grinding machines. Represented by L. W. Thompson, president; F. E. Gardner, vice-president; E. B. Gardner, secretary; W. B. Leishman, treasurer; D. C. Graves, W. L. Townsend; J. M. Gardner, and E. L. Beisei.

General Electric Co., Schenectady, N.Y.—Industrial control, arc welding equipments, electric motors, "Mazda" damps, cloth gears and pinions. Centrifugal blowers and flow meters. Represented by J. A. Ham, J. A. Seede, J. Eaton, R. E. Wooley, O. W. Buddington, L. W. Shugg, W. J. Hanley, G. E. Guy, and J. A. Boers.

Gisholt Machine Co., Madison, Wis.—A display of the Periodograph as a means of obtaining accurate job time records at low expense. Applications to various factor conditions will be shown. Represented by W. J. Hannum, R. M. Carter and H. E. Preston, sales representatives.

Goldschmidt Thermit Co., New York City.—A complete line of samples of various metals and alloys produced by the Thermit process. Samples of ferro-silicon. Sample thermit welds and photographs of important work. Represented by DeCourcey B. Brown and H. G. Spilsbury, metallurgical engineers; J. G. McCarty, H. D. Kelley and Edwin B. Bloom, representatives.

Gordon Sand Co., Conneaut, Ohio.—Represented by F. E. Gordon, president; U. E. Kanavel, sales manager; W. R. Thompson and H. A. Keener.

Graceton Coke Co., Graceton, Indiana Co., Pa.—Foundry coke. Represented by C. M. Lingle, general manager; M. F. Brandon, mining engineer; W. H. Gates, mine superintendent, and T. M. Doherty, coke superintendent.

Great Western Mfg. Co., Leavenworth, Kans.—Combs gratory foundry riddles with rectangular sieve for continuous riddling, and "Combs" gyratory riddle for contractors' use. Represented by F. A. Pickett, secretary, and George W. Combs, superintendent.

F. A. Hardy & Co., Chicago.—Complete line of safety glasses, helmets and eye protectors for industrial uses, making a specialty of the Hardy welding glass with "Noviweld" lenses and the "Harco" safety gass. Represented by C. S. Wells, Chicago, and W. B. Gosman, New York.

Benj. Harris & Co., Chicago.—Metals. Represented by Nathan Harris, Oscar Harris and Louis Goldman.

Hauck Mfg. Co., Brooklyn, N.Y.—Compressed air and hand pump cupola lighters, skin-drying outfits, kerosene torches, core oven burners, ladle heaters, rivet forges, blacksmith and brazing forge, aluminum melting furnace. Represented by A. Busch Hauck, vice-president, and A. P. Link.

Hayward Co., New York.—Hayward electric motor clam shell bucket, two-line clam shell buckets, two-line orange peel buckets, and drag scraper buckets. Represented by C. F. Hutchings and H. M. Davison.

Herman Pneumatic Machine Co., Pittsburgh, Pa. Herman plain jarring machines, showing mechanical construction. Represented by Thos. Kaveny, president and general manager; A. M. Frauenheim, vice-president; Alfred Herman, vice- president and superintendent; H. T. Frauenheim, treasurer; Robert Ringle, works manager and engineer; Andrew Rodgers, R. P. Morgan and Robert Walker, sales representatives.

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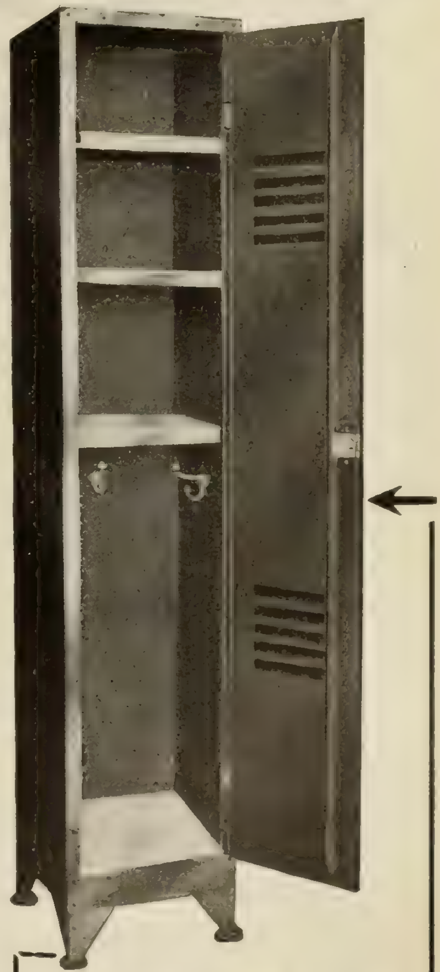

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Hoevel Manufacturing Corporation, New York.—Catalogues, photographs, drawings and other descriptive material of complete line of sand blast machines and axiliary equipment, especially revolving barrel sand blast machines, rotary table sand blast machines, sand blast chambers with turn table and rotary floor, and many special machines, dust filters, dust arresters, etc. Represented by H. F. Hoevel, president; F. W. Weiss, vice-president, and L. B. Passmore, western representative.

Holland Core Oil Co., Chicago.—General exhibit of cores made with "Holland" oils. Featuring radiation and automobile work, made with Holland special foundry linseed. Represented by H. L. Baumgardner, secretary and treasurer, and A. L. Fay, salesman.

Herman A. Holz, New York.—"The Brinell Meter." Portable apparatus for determining the Brinell hardness of metals and metal products. Represented by W. O. Little, sales engineer.

Imperial Brass Mfg. Co., Chicago.—Imperial oxy-acetylene welding, cutting and decarbonizing equipment. Imperial oxy-hydrogen welding and cutting equipment. Represented by Frank McNellis, president; Charles E. Young, manager sales promotion; J. F. Schroeter, sales representative, and J. Meskan, foundry foreman.

Independent Pneumatic Tool Co., Chicago.—Thor pneumatic tools. Represented by J. D. Hurley, vice-president, and general manager, Chicago; W. R. Gummere, Cleveland manager, and R. T. Scott, Pittsburgh manager.

Ingersoll-Rand Co., New York City. — Imperial type belt driven compressor, Imperial motor hoist and complete line of "Little David" pneumatic tools, including sand rammer, riveters, chippers and drills. Represented by George A. Gallinger, manager pneumatic tool sales; W. A. Armstrong, manager Cleveland office, and George C. Williams.

International Molding Machine Co., Chicago.—Molding machines. Represented by Edward A. Pridmore, president; W. W. Miller, vice-president; J. W. Dopp and F. W. Hamel.

Interstate Sand Co., Zanesville, O.—Molding and silica sands, fire clays. Represented by E. M. Ayers, president; L. K. Brown, vice-president, and F. L. Moore, sales manager.

The Iron Age, New York.—Trade publications. Represented by W. H. Taylor, president; M. C. Robbins, general manager; Chas. S. Baur, advertising manager; Fritz J. Frank, secretary; D. C. Warren, New England manager; H. H. Roberts, Philadelphia manager; W. B. Robinson, Pittsburgh manager; Emerson Findley, central western manager; F. S. Wayne, western manager; A. I. Findley, editor; E. F. Cone, associate editor; F. L. Prentiss, central western editor, and O. J. Abell, western resident editor.

Jamison Coal & Coke Co., Pittsburgh, Pa.—Foundry coke. Represented by W. G. Ireland and E. J. Clancy.

Jennison-Wright Co., Toledo, O. — Kreolite wood blocks and structural timbers. Display will consist of several types of factory floor blocks designed to meet all conditions to be found in machine shops, foundries, pickling rooms, annealing rooms, forge shops, driveways, loading platforms, etc. Represented by H. G. Jennison, president; W. E. Wright, manager sales; F. W. Cherrington, chief engineer; E. M. Humphrey, H. P. Consaul and A. W. Cobley, salesmen.

Charles C. Kawin Co., Chicago.—Represented by Charles C. Kawin, president, and John F. Nellis, vice-president, Chicago; R. J. Courtney, Wm. J. Mulcahy, and J. H. Hopp, representatives.

Julius King Optical Co., Chicago.—Complete line of safety goggles, helmets, etc. Represented by W. G. King, vice-president; J. J. Duffy, F. W. King and A. G. Larson, salesmen.

Lake Erie Smelting & Refining Co,, Cleveland, O.—Copper, spelter, tin, red ingots and yellow ingots. Represented by Emil A. Stotter, L. B. Stotter, Thomas Thomson and Harry Price.

Lakewood Engineering Co., Cleveland O.—Industrial cars, industrial track, factory trucks and handling buckets. Represented by W. A. Meddick and L. R. Wilson.

H. M. Lane Co., Detroit, Mich. Represented by H. M. Lane, T. A. Leyshon, and C. T. Holcroft.

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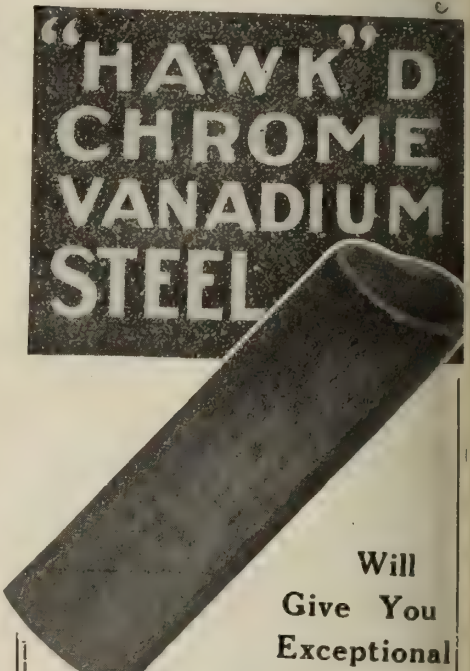

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Lees-Bradner Co., Cleveland, O.—Gear cutting machine and thread milling machine. Represented by E. J. Lees and H. T. Bradner.

Lehigh Coke Co., South Bethlehem, Pa.—Samples of Lehigh foundry coke. Photographs showing its manufacture. Represented by D. A. Barkley, general sales agent, and Robert MacDonald, assistant sales agent.

Life Saving Devices Co., Chicago.—Lungmotor, a mechanical resuscitating device operated entirely by hand. Represented by E. H. Lyon, special representative.

Lincoln Electric Co., Cleveland. — Electric arc welder and water motor. Represented by R. E. Kinkead, sales engineer.

Lucas Machine Tool Co., Cleveland.—Fifty-ton Lucas power forcing presses, specially adapted for straightening heavy malleable iron castings. Represented by J. A. Leighton, Jr., and F. P. Sprague, special representatives.

David Lupton's Sons Co., Philadelphia, Pa. — Special sash to provide light and ventilation in industrial buildings. Represented by Clarke P. Pond, sales manager; Wm. C. Pfleider, and George J. Wagner.

Maclean Publishing Co., Ltd., Toronto, Ont. —Canadian Machinery and Manufacturing News, Canadian Foundryman and Metal Industry News. Represented by R. G. Langrill, central U.S. representative; B. L. Thompson, special representative, and A. G. Webster, associate editor.

The Macleod Co., Cincinnati, O. Sand blast tumbling barrels, sand blast hose machine, portable oil burners, dust arrester, and oxy-acetylene welding and cutting apparatus. Represented by Walter Macleod, Oscar P. Gwinner, and August Schmidt.

Mahr Manufacturing Co., Minneapolis, Minn. —Portable foundry torches, and portable oil burning rivet forge. Represented by J. A. Mahr, F. N. Brooker and F. A. Davis.

Malleable Iron Fittings Co., Branford, Conn. —Full line of foundry vibrators with accessories. Represented by George B. Pickop, assistant superintendent, and John C. Page, superintendent of brass and pattern departments.

Manitowoc Electric Implement Co., Manitowoc, Wis. — Electric vibrators for plate, bench, tub, etc. Represented by Rude Stockinger, assistant secretary, and Frank Brixius, engineer.

J. S. McCormick Co., Pittsburgh, Pa.—Electric sand riddler, general foundry supplies. Represented by J. S. McCormick, president; T. E. Malone, secretary, secretary; S. R. Costley and A. T. Richardson.

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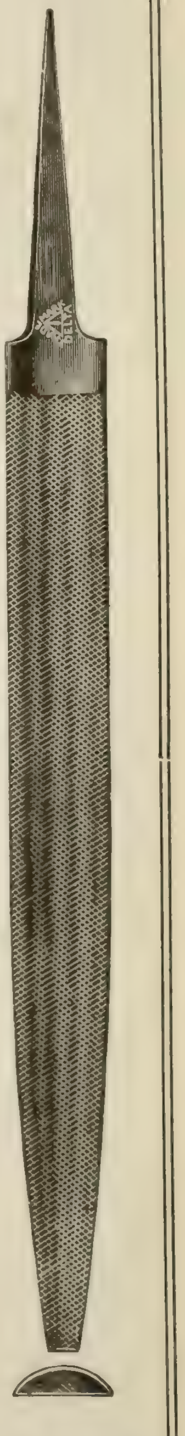

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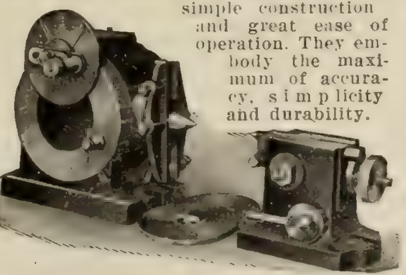

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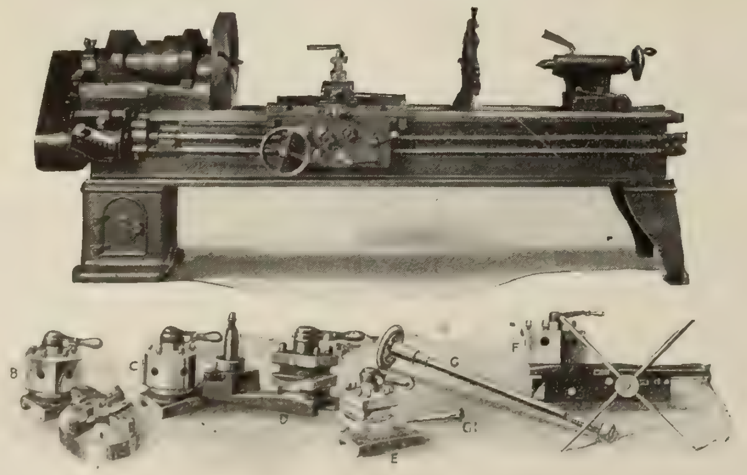

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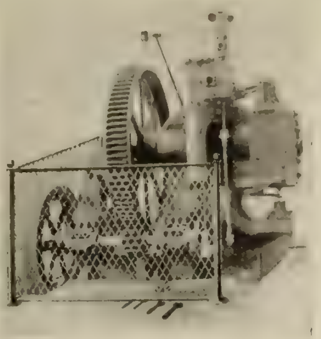

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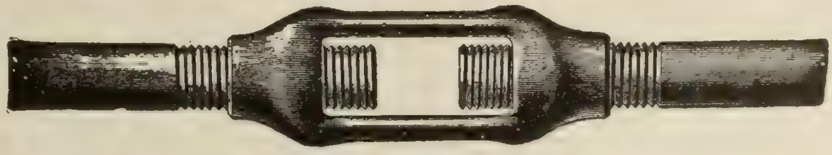

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FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

WE HAVE FOR SALE THE FOLLOWING equipment: Complete nickel and copper plating plant, including direct connected dynamo and motor; one second operation cast iron plug machine, and two first operation cast iron plug machines manufactured by the Brown Engineering Corporation; 2 16-inch turret lathes; 1 38-inch engine lathe, 20-foot bed. The above outfit will be sold en bloc or separate. Apply direct to Foundry & Machine Co., Ltd., Montreal. (13)

FOR SALE—McDOUGALL ENGINE LATHE. 20" swing, 10' bed; never been used. Baker Keyseater No. 2, good as new. Boring Mill. 2 bars, will bore up to 30" dia. Boston Forge Blower, 27", good condition. Crescent Swing Cut-off Saw, almost new. 7½ H.P. Westinghouse D.C. Motor, in good order. Gurney Platform Scale, 2,000 lb., 16" wheels. Mandrills, Couplings, Hangers, Post Boxes, Pulleys, Belting, Cap Screws, Bolts, etc. Special prices on above, write for particulars. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (14)

PATENTS

TAKE NOTICE THAT THE UNDERSIGNED are prepared to grant licenses, at a reasonable price, to anyone desiring to use the methods of producing electric oscillations described and claimed in Canadian Letters Patent No. 119,908, issued on the 10th day of August, 1909, to Roberto Clemens Galletti. They are also prepared to receive offers for the purchase of the patent. Ridout & Maybee, 59 Yonge Street, Toronto, attorneys for the patentee.

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 40, 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN LAMP FACTORY
ST. CATHARINES, ONTARIO

SITUATIONS WANTED

TOOL MAKER IN CHARGE DESIRES change. Competent to take charge of machine shop or tool room. Good references. Box 225, Canadian Machinery. (17)

SUPERINTENDENT—FIRST-CLASS PRACtical mechanical man is open for an engagement as works manager or superintendent. Can give best of reference as to character and ability to handle help and produce results Box 227, Canadian Machinery.

ARE YOU LOOKING FOR A SUPERINtendent? There's money in making shells, if you know how. If you don't, let me make them for you, any size. I'm open for a contract with any concern that is looking for a live wire production Superintendent. Address Box 230, Canadian Machinery. (13)

WANTED

WANTED — 250-VOLT D.C. GENERATOR — 75 to 150 k.w., direct connected to steam engine; must be in good condition. Write to The Kaufman Rubber Co., Berlin, Ont. (13)

WANTED—ELECTRIC TRAVELLING GANtry crane, span about 57 ft., clearance 50 ft., overhanging at one end; load 15 tons. State full particulars and price. Thor Iron Works, Limited, Toronto, Ont. (27)

WANTED—12" BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Aplly Box 218, Canadian Machinery.

FOREMAN FOR LARGE WINNIPEG MAchine shop — must be aggressive and mechanic with good practical experience in jobbing, stock and transmission work. When applying, state age, experience and salary expected. Applications treated confidentially. Box 229, Canadian Machinery. (16)

SUPERINTENDENT FOR 4.5 SHELL FACtory all equipped and tooled for 400 to 500 shells per day. Shipping since May. Must have ability to thoroughly organize, and be capable of producing maximum results in short time, and have previous shell experience. To the right man we will pay a liberal salary and bonus. State fully (in confidence) past experience, present record and salary expected. Box 228, Canadian Machinery. (14)

MOTORS

ONCE more we step to the fore with an exceptional motor offer. Coming as it does in the midst of a motor famine goes further to prove the far-reaching abilities of our service department.

We have for October delivery the following new Westinghouse C.C.L. Motors:

No.	H.P.	Phase	Cycle	Volt	R.P.M.
3	40	3	25	550	750
3	30	3	25	550	750
2	20	3	25	550	750

We have for immediate shipment the following new and second hand motors:

No.	H.P.	Phase	Cycle	Volt	R.P.M.
3	2¼	1	25	110/220	1400
1	3	1	25	110/220	1440
1	5	3	25	550	1440
1	5	3	25	550	700
1	5	3	25	550	1400
2	7½	3	25	550	1400

No.	H.P.	Phase	Cycle	Volt	R.P.M.
1	10	3	25	550	1500
2	10	3	25	550	1400
2	10	3	25	550	720
1	10	3	25	550	1440
1	10	3	25	550	1120
2	15	3	25	550	1440
1	100	3	25	550	750

1 10 Ton 40 ft. Span, 3 Motor Crane, Direct Current.

The A. R. WILLIAMS MACHINERY CO., LIMITED
64-66 FRONT STREET WEST, TORONTO

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

FOR SALE

Best quality steel bars, 2" rounds, .30 to .40 carbon, Government inspected for shell parts, and we offer same for immediate shipment from stock, at reasonable price.

Address all letters

Canada Forge Company
Limited
Welland - Ontario
(13)

FAIRBANKS-MORSE
New and Used Machinery

In Stock at Toronto

1—⅞" 4-spindle National Acme Automatic; used.
2—No. 3 1" Foster Hand Screw Machines.
4—No. 4 1½" Smurr & Kamen Turret Lathes.
1—14" x 5' Seneca Falls Lathe; used.
1—10" x 5' Seneca Falls Lathe; used.
2—18" x 8' Springfield Lathes; new.
5—20" x 9', 19 16" x 7', 3 16" x 9' Fairbanks-Morse Lathes; new.
2—No. 1 Racine Hacksaws; new.
1—No. 304-A Oster Pipe Machine; new.
1—20" x 8' Hendey Lathe; used.
1—Gisholt 16" Special Lathe, type C, 6½ bore.
1—Walcott 20" x 8' Engine Lathe.
5—Barnes 18" x 8' Engine Lathes; new.
1—McDougall 16" x 6' Engine Lathe, with taper attachment; new.
7—Potter & Johnson No. 6A Automatics; used.

In Stock at Montreal

2—16" F. M. Single Purpose Lathes; used.
1—Hendey 16" x 8' Lathe, taper attachment, Q.C.G.; used.
2—American 16" x 6' Tool-room Lathes; new.
2—Barnes 18" x 8' Lathes; new.
1—Walcott 20" Lathe, 3-step cone, D.B.G. and Q.C.G.; new.
3—Walcott 18" Lathes, 3-step cone, D.B.G. and Q.C.G.; new.
1—Rivett Precision Lathe; used.
1—Seneca Falls 9" x 4' Star Q.C.G. Tool-room Lathe.
1—Brown & Sharpe No. 1½ Universal Miller; used.
1—Ford-Smith Plain Miller; new.
W. & M. Drill Grinder; new.
1—Hall No. 6 Cutting-off Machine, 6" Shells; new.

This is only a partial list of our stock of Machine Tools.

CFM

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3¼" Gridley Automatic
40" x 16' Conradson, heavy duty
40" x 12' New Haven
26" x 8' Davis
24" x 8' Lodge & Shipley
21" x 10' LeBlonde, D.B.G.
20" x 10' American
17" x 6' Garvin
16" x 6' Pratt & Whitney
16" x 5' Windsor, wire feed
15" x 5½' fox, American
2" x 24" Jones & Lamson flat turret
No. 22½ Garvin, wire feed
No. 2 Garvin, wire feed
8" x 31" Brown & Sharpe

Engine Lathes

42" x 20' Fifield
36" x 16' Putnam
30" x 10½' Pond
26" x 40" x 20' London Gap
26" x 14' Hamilton, D.B.G. (4)
26" x 14' Gleason, D.B.G. (2)
24" x 13' New Haven
24" x 10' LeBlonde
24" x 10' Peerless
24" x 10' Lodge & Shipley, patent head
22" x 12' American, all-geared head
21" x 8' Back-geared single purpose (4)
20" x 12' Lodge & Shipley, patent head (2)
20" x 10' Reed
20" x 8' Walcott, D.B.G. (2)
20" x 8' Hercules, heavy duty
20" x 8' American
20" x 8' Ames
20" x 7' Fay & Scott
19" x 8' LeBlonde, D.B.G.
18" x 10' MacGregor-Gourlay
18" x 8' Walcott, D.B.G. (2)
18" x 8' New Haven
18" x 6' Barker (2)
18" x 6' New Haven
16" x 10' MacGregor-Gourlay, D.B.G
16" x 6' Prentice (2)
16" x 6' Porter
14" x 6' American

Upright Drills

24" Bickford, shaft-driven (2)
24" London, back-geared, sliding head
24" Kerkhoff, back-geared, sliding head
22" Barnes, back-geared, sliding head
20" Bertram, power feed
No. 10A Baush, 16 spindle
16" Avey, high speed, 4-spindle, sensitive
16" Canedy-Otto
15" Barnes
14" Excelsior
14" Garvin, 4-spindle
10" Barnes, friction
60" Bertram Semi-universal Radial
48" Gang, plain radial, tapping attachment
36" New Century, plain radial
32" Canedy-Otto wall radial

Iron Planers

30" x 30" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
24" x 24" x 6' Gray
20" x 20" x 5' Bertram

Milling Machines

No. 5 Becker-Brainard, plain
No. 3 Cincinnati Universal
No. 12 Brown & Sharpe plain
No. 1½ Brown & Sharpe Universal
Louden Universal
24" Bertram, plain
Holden-Morgan Thread Miller

Presses

No. 12 Geared Rhodes, roller feed
No. 5 Waterbury, inclinable
No. 3 Michigan Inclinable
No. 190 Brown-Boggs inclinable

Miscellaneous

24" Gould & Eberhardt, B.G. Shapers (2)
No. 10 Racine Hack Saws (2)
No. 1 Racine Hack Saws (5)
Nos. 3 and 4 Robertson Hack Saws
Lo-Swing Lathes (2)
32" x 9' Special Facing and Tapping Machine
40" Binsse Horizontal Boring Mill
12" x 66" Landis plain grinder
12" x 42" Landis plain grinder
No. 2 Diamond Universal Grinder
No. 14 Besly Grinder
No. 60 Heald Cylinder Grinder
No. 2 Garvin Automatic Tapping Machine
No. 1 Garvin Automatic Tapping Machine
No. 2 Cochrane-Bly Filing Machine
¼" Shuster Riveters (3)
9½' Bertram Bending Rolls
15" London Punch and Shear
30-ton Lucas Forcing Press.

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.
Front St. W., - - Toronto, Ont.

Rebuilt Machine Tools

NEW YORK'S GREATEST STOCK

It will pay you to go through our machine shops and warehouses before placing your orders. We have to-day 437 machine and iron-working tools to select from.

If you cannot call, write or telephone us your wants.

We have photographs of many of the machines.

New York Machinery Exchange (Incorporated)

Offices: 50 Church Street, New York

MACHINE SHOPS AND WAREHOUSES:

222-234 Culver Avenue JERSEY CITY 63-83 Pollock Avenue

List of

Second-Hand Machinery

on hand for immediate delivery, subject to prior sale

1—No. 2 Brown & Sharpe Vertical Chucking and Boring Machine; excellent condition.

1 No. 4 Quint Vertical Turret Drilling and Chucking Machine: excellent condition.

1 24" x 24" x 7' Lodge & Davis Planer, fitted with full electric equipment and in good condition.

1—4¼" Belt-driven Gridley Automatic; excellent condition.

2- 4¼" Motor-driven Gridley Automatics: excellent condition.

1 26" x 48" x 10' J. J. McCabe Lathe: good condition.

1—No. 12 16-spindle Pratt & Whitney Multiple Drill. ½" capacity in steel, ⅝" capacity in cast iron: excellent condition.

1 Foster Ring Turret: good condition.

1—22" x 22" x 4' Whitcomb Planer.

1 18" Warner & Swasey Plain Head Turret Lathe.

1—14" Flather Engine Lathe, rod and screw feed, plain rest, slip change gears.

1—14" Pratt & Whitney Engine Lathe, screw feed, plain rest, slip change gears.

1—No. 15 Toledo Punch, 18" throat.

1 No. 12 Badger Punch and Shear.

1 30" Collier Circular Shear.

1—16" Steptoe - McFarland Lathe.

1—12" Shepard Gap Lathe.

1—No. 2 Mitts & Merrill Keyseater.

1 No. 2 10" Massillon Punch; new.

2—20" Barnes Drills.

1 ¼" Shuster Riveter.

2 Marvel Hack Saws.

1—14" Fox Drill.

1 24" Ohio Shaper.

1 14" Steptoe Shaper.

1 Shinn Metal Band Saw.

C. E. Fales Machinery Co.

Kerr Building, Detroit, Mich.

High-Grade

MACHINE TOOLS

The list below is a small portion of our present stock. Write for complete lists.

36" x 20' Fitchburgh lathes.
12—26" 48" x 14' new style McCabe double spindle heavy pattern new lathes.
2—26" 48" x 18' new style McCabe double spindle heavy pattern new lathes.
20" x 8' Prentice, H. S., C. R., T.A.
3-19" x 8' Sidney new lathes, swing, 21".
2-19" x 8' Sidney new lathes, quick change, swing 21".
2-17" x 8' Sidney new lathes, quick-change, swing 19".
2-18" x 10' Rahn Mayer, H.S., C.R.
18" x 10' Cincinnati, H.S., C.R.
18" x 8' 6" Rahn Mayer H.S., C.R.
9-17" x 8' National, quick change, new.
14" x 10' Prentice, taper attachment.
2-13" x 7½' Carroll, Jamieson, new.
40" swing, 3¾" H.S. Conradson Semi-Automatic turret.
1" x 8" New Pierce screw machine.
4 ¼" Hartford Automatic screw machine with slotting attachment.
⅜" Pratt & Whitney screw machine.
36" Baker Bros. tapping and boring drill.
36" Currie & Snyder sliding head drill.
No. 3½ Fox Miller, vertical attachment, index head.
No. 210 Heald wet ring grinder.
12" x 66" Landis universal, grinder.
20" Cincinnati B.G. Shaper.
20" Steptoe new S. G. Shaper.
24" American B. G. shaper.
18" x 18" x 5' Pond planer.

FRANK TOOMEY, INC.

127-131 North Third St., PHILADELPHIA, PA., U.S.A.

IMMEDIATE SHIPMENT

We have for immediate shipment large stocks of different well-known manufacturers' small tools in standard sizes, including

CARBON AND HIGH SPEED TWIST DRILLS—REAMERS—MILLING CUTTERS—TOOL STEEL AND SPECIAL TOOLS — TAPS — DIES — SCREW PLATES.
NEW AND SECOND-HAND MACHINERY.

These are new, first quality goods. We foresaw demand and purchased heavily. If you are having difficulty obtaining these lines, write or wire us. If you send order at once, we will reserve stock subject to confirmation when you receive our prices.

THE CLEVELAND POWER TRANSMISSION CO.
CLEVELAND, OHIO

SMALL TOOLS

QUALITY FIRST
DOMINION MACHINERY CO.
TORONTO

SPECIAL MACHINES
OF UNQUESTIONABLE VALUE
Returnable Without Question If Not As Represented

1 Nearly new 20 x 10 Lodge & Shipley Engine Lathe, double back gear, quick change gear, with 14" four jaw chuck.
1 20 x 10 Rahn Engine Lathe, double back gear, with chuck 14"—4 jaw.
1 15 x 8 Carroll Jamieson Engine Lathe, quick change gear, chuck. New.
1 14 x 6 Bertram Hollow Spindle, compound rest engine lathe.
1 15 x 8 Stevens Engine Lathe, hollow spindle, compound rest.
1 18 x 8 American Tool Works Engine Lathe, quick change gear.
1 24 x 14 London Machine Tool Co. Lathe, hollow spindle, compound rest, 18" chuck.
1 24" Barnes back geared sliding head drill.
1-25" Davis back geared stationery head drill. Good as new.
1-14" Henry & Wright high speed ball bearing drill.
1—14" Avey high speed ball bearing drill.
1 14" three spindle ball bearing Henry & Wright drill.
1 14" Reed Sensitive Drill with chuck.
1 16" New Ohio back geared shaper, delivery, 2 weeks.
1 28" New Ohio back geared shaper, delivery, October.

All the above used tools guaranteed. We have other machines. Ask for what you don't see listed.

DOMINION MACHINERY COMPANY
TORONTO, ONTARIO, CANADA
Office—110 Church Street Factory—14 Darling Avenue

MANUFACTURERS

Write for particulars of floor space now available for manufacturing, and statement regarding labor supply. This city has 58,000 people, of whom over 12,000 are engaged in over 250 industries, manufacturing over 70 distinct lines. *Economic manufacturing and distributing centre for the Dominion.* Unusual combined advantages and inducements. For free report on any line of industry, apply

INDUSTRIAL COMMISSIONER
City Hall, London, Ont.

(13)

Canadian Agents Wanted

Agents wanted to represent a well-known British line of

Chain Belting, Chain Gearing, Etc.

Apply Box 222
CANADIAN MACHINERY

MACHINERY FOR SALE

2—70 Gallon Hydraulic Pumps.
1—100 Gallon Hydraulic Pump. Offer Bargain on above.
1—125 H.P. Motor, 3 Phase, 60 Cycle, 220 Volts, General Electric. Price—$1200.00.
2—90 H.P. General Electric Motors, 3 Phase, 60 Cycle, 220 Volt. Price $700.00 each.
2—Sheldons No. 3 Cast Iron Fans.

NATIONAL STEEL CAR COMPANY LIMITED
HAMILTON, CANADA

(13)

YOU'LL FIND WHAT YOU WANT

In the Classified Advertising Section of Canadian Machinery. Watch it each week for all kinds of new and used machinery.

YOU MAY WANT WHAT YOU FIND.

Manufacturers Wanted!

FROM time to time we receive inquiries from parties wishing us to put them in touch with firms in Canada who are in a position to manufacture their lines for them.

SOMETIMES the inquiring parties are located in the United States, sometimes in Great Britain, frequently in Canada. The lines involved range from hardware specialties to mill machinery. Sometimes the interested parties would prefer that the Canadian manufacturers undertake the selling of the products as well as the making of them.

WE would like to hear from metal-working firms who are in a position to take on the manufacture of new lines. Just at present we have an inquiry relating to a steam trap which is enjoying a big sale in the United States. The owner of the patent would like to make arrangements for its manufacture and sale in Canada.

TWO other concerns expect to start operations in the near future and would like us to put them in touch with reliable manufacturers. Details are withheld for the present.

ANOTHER reader would like to know of some firm in a position to build heavy mill machinery.

THESE communications are confidential of course, but we shall be pleased to bring interested parties together. We would like to hear from any Canadian manufacturer who may be interested in the above or similar inquiries. We would like to have their names immediately available.

Canadian Machinery
and
Manufacturing News

143-153 University Ave. - Toronto, Ont.

Used Machinery for Immediate Delivery

BORING MILLS.

51" Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52" Niles Car Wheel Boring Mill.

DRILLS.

22" Aurora, S.H., B.G., P.F.
24" Hamilton, B.G., P.F.
25" Fitchburg, S.H., B.G., P.F.
26" Hoefer, B.G., P.F.
32" Hamilton, S.H., B.G., P.F.
32" Hoefer, S.H., B.G., P.F.
34" Barnes, S.H., B.G., P.F.
4" Baker Tapping and Drilling Machine.
2½' Dreses Radial
3½' Industrial Radial
12 Spindle Multiple
6 Spindle V.C.
No. 30C Baush, 12 spindles

GEAR CUTTERS

20" G. & E., for spur and bevel
24" x 7" G. & E., for spur
36" Walcott, for spur
No. 14 Brown & Sharpe

GRINDERS

No. 3 Landis Universal
14" x 20" B. & S. Universal
Gisholt Tool Grinder

LATHES

12" x 4' Hendey, C.R., Q.C.G., taper
12" x 5' Davis, C.R.
14" x 5' P. & W., R. and F., taper
14" x 6' Fairbanks, C.R., taper
15" x 6' Goddard, C.R., taper
16" x 6' Prentice, C.R.
16" x 6' Sebastian, P.R.
16" x 6' Walcott, C.R.
16" x 8' Lodge & Shipley Pat. Head, C.R., Q.C.G.
16" x 10' Greaves & Klusman, C.R.
17" x 10' Blaisdell, C.R.
18" x 6' Bradford, C.R., taper
18" x 8' Lodge & Shipley, Pat. Head, C.R., taper
18" x 12' American, C.R., Q.C.G.
18" x 12' Greaves & Klusman, C.R.
20" x 10' Flather, C.R.
21" x 12' New Haven, C.R.
24"-40" x 12' McCabe Double Spindle, C.R.
24" x 16' Schumacher & Boye, C.R.
30" x 14' Reed, C.R.
32" x 16' Blaisdell, C.R.
36" x 28' American, C.R.

MILLING MACHINES

No. 12 B. & S., plain
No. 34 Oesterlein, plain
No. 1½ Garvin Universal
No. 2 Cincinnati Universal
No. 2 Cincinnati Vertical, High Power
No. 32 Plain Kempsmith—Lincoln
No. 3 Cincinnati Universal
No. 13 P. & W. Lincoln
No. 4 Becker Vertical

PLANERS

Morton Portable
22" x 22" x 6' Gray, one head
30" x 30" x 8' Woodward & Powell, one head
30" x 30" x 12' Cincinnati, two heads
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Cincinnati, two heads
36" x 36" x 16' Sellers, one head
39" x 39" x 12' New Haven, one head
40" x 38" x 14' Putnam, one head
40" x 40" x 12' New Haven, one head, one side head

PRESSES

No. 3 Delivouk & George, O.B., Inc.
No. 30 A. Perkins, O.B., Inc.
No. 133 Ferracute, Double Action, O.B., Inc.
No. 5½ Walsh, O.B., Inc., geared
No. 174 Consolidated Double Crank
No. 25 Toledo, O.B., Inc., Cam Drawing

SHAPERS

15" Hendey Friction
16" Walcott
16" Niles, B.G.
16" Rockford, B.G.
20" Rockford, B.G.
26" Putnam

SCREW MACHINES

No. 1 Chicago Automatic
1 3-16" Hartford Automatic
2" Cleveland Automatic
2¾" Cleveland Automatic
⅝" P. & W. Plain
1" B. & S. Plain
16" P. & W. Plain

MISCELLANEOUS

No. 4 Warner & Swasey Turret Lathe
No. 2 Warner & Swasey Turret Lathe
No. 2 Baker Keyseater
Whitton Centering Machine
1½" Acme Bolt Cutter
2—Springfield Stud Lathes
Blount Speed Lathe

Write for our Stock List.

The H. A. Stocker Machinery Company, 566-572 W. Randolph St., CHICAGO, ILL.

Immediate Delivery

NEW STEAM ENGINES

Two 5 x 6 Vertical steam engines, 8 horse	**$105.00 each**
Two 6 x 6 Vertical steam engines, 10 horse	**125.00 "**
One 7 x 8 Vertical steam engine, 15 horse	**175.00**
One 8 x 8 Vertical steam engine, 20 horse	**200.00**
Two 4 x 6 Horizontal steam engines, 6 horse, with base	**100.00 "**
One 5 x 6 Horizontal steam engine, 8 horse, with base	**125.00**
Five 6 x 6 Horizontal steam engines, 10 horse, with base	**135.00 "**
Five 6 stroke engines, with base, 10-15 H.P.	**150.00 "**
Two 6 x 6 Automatic, with base, 12-20 H.P.	**250.00 "**
Two 7 x 6 Automatics, with base, 15-25 H.P.	**275.00 "**
One 8 x 8 Automatic, with base, 20-42 H.P.	**500.00**
One 10 x 10 Automatic, with base, 39-82 H.P.	**700.00**
One 11 x 10 Automatic, with base, 47-85 H.P.	**725.00**

YOUNG, CORLEY & DOLAN, Inc.
115 Broadway, NEW YORK CITY
Telephone: Rector 7866

(tf)

MACHINE TOOLS — SECOND-HAND

LATHES.

14 x 6 Bradford Lathe, compound rest.
14 x 6 Porter Lathe, compound rest.
14 x 8 Sebastian Lathe, compound rest.
14 x 6 Reed Lathe, elevating rest.
16 x 8 Bradford Lathe, compound rest.
16 x 8 Reed Lathe, elevating rest T.A.
20 x 8 Reed Lathe, compound rest.
26 x 12 New Haven Lathe, compound rest.
26 x 12 Star Lathe, compound rest.
32 x 16 New Haven Lathe, compound rest.

PLANERS.

16 x 16 x 4 ft. Pease Planer.
18 x 18 x 4 ft., Pratt & Whitney Planer.

SHAPERS.

10" Pratt & Whitney Crank Shaper.
16" Steptoe Crank Shaper.
24" Hendey Shaper.
26" Morton Draw-Cut Shaper.

TURRET MACHINERY.

No. 1 Warner & Swasey Universal Turret Lathe.
No 4 Foster Geared Head Turret Lathe.
2 x 26 Pratt & Whitney Turntable Turret Lathe.
2½" Cap. Pearson Geared Head Screw Machine.
3— 4¼" Cleveland Automatic Screw Machines
7 x 14 Potter & Johnston.

DRILLS.

3' Arm Bickford Radial Drill
4-Spindle 14" Foote-Burt Sensitive Drill.
16" Sipp High Speed Ball Bearing Drill.
8-Spindle Western Machine Tool Company's Multiple Drill with 18" circular head.

MISCELLANEOUS.

12 x 42 Landis Plain Grinder.
6" Bilgram Bevel Gear Planer.
40-lb. Bradley Cushion Helve Hammer.
No. 2, 24 x 48 Springfield Automatic Planer Type Surface Grinder
2" Landis Pipe Machine.
4" Hurlbut & Rogers Cutting-off Machine.
7-A Racine High Speed Power Hack Saw.
No. 2 Garvin Profiling Machine.

THE W. M. PATTISON SUPPLY CO.
777 ROCKWELL AVENUE - - - CLEVELAND, OHIO
Branch Office: 1534 Dime Bank Building, Detroit, Mich.

FOR SALE

GRINDING MACHINES
1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16" x 66" Landis Crank Shaft Grinder (18 months old).
2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES
58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13" Gisholt Semi-Automatic (12 mos. old).
20 21" Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES
1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES
1 8-spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.

2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS
1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES
38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES
2 Noble & Westbrook No. 1 (new).

PROFILERS
1 No. 3H Becker (new).

PLANERS
1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 40" x 40" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS
1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES
1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES
1 12" Jackson (new).

KEY SEATERS
1 No. 1 Catlin (new).

SCREW MACHINES
1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2" x 24" Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼" capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES
1 No. 3 La Pointe (nearly new).

BOLT CUTTERS
1 2" Landis Double Head (nearly new).

BORING AND TURNING MACHINES
1 4' Bickford Boring & Turning Mill (nearly new).
1 20" swing 4-Spindle Moline Vertical Boring Machine with 18" x 36" table.

BULLDOZERS
1 No. 4 Williams White (old).
1 No. 1 Williams White.

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1 Large Filing and Sawing Machine with 12" stroke.

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1 No. 3 Walsh Punch Press.
1 Moser 1½" stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8" throat capacity ¼" x ¼".
1 27½" throat lever punch ½" capacity 1¼" stroke.
1 Thompson Bevel Shear ½" capacity.

PIPE MACHINES
1 6" Saunders.

SHAPERS
1 14" Hendey Geared Friction.
1 20" Hendey Geared Friction.

TAPPING MACHINES
1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2" collapsible taps (new).

THREAD ROLLING MACHINES
1 Waterbury Farrell ⅜" capacity (nearly new).

THREADING MACHINES
5 Special Threading Machines for threading 3" steel shells (nearly new).

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1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

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1 No. 284 Bement Lincoln Miller, perfect condition	$ 250
2 No. 7 Becker Brainard Lincoln Millers, perfect, each	475
1 No. 24 Oesterline Heavy Plain Miller	1070
1 No. 3 Kempsmith Plain Miller, Sept. delivery	1450

SHAPERS.

1 12" Juengst Crank Shaper, excellent condition	275
1 24" Gould & Eberhardt Shaper, perfect condition	650
1 [illegible] Smith & Mills Crank Shaper perfect condition	450

BORING MILLS.

4 [illegible] Niles Vertical Boring Mills, excellent condition each	2650
5 [illegible] Sellers Vertical Boring Mills, excellent condition each	2650

GRINDERS.

1 10 x 36 Landis Plain Self Contained Grinder	1600

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1 24 x 6 Seneca Falls, Pan Bed, CR; hollow spindle, complete	425
2 No. 5½ Sloan Chace [illegible] Lathes, CR, 5 step cone, set [illegible] each	350
1 28" swing x 16' bed Ames PCF chuck complete	390
1 18" swing x 8' bed [illegible] Lathe, CR PCF chuck	375
1 30" swing x 9' bed New Haven, Turret Tool Post, chuck taper attachment, complete	$ 460
1 -22" swing x 10' bed Niles, CS, FCF, 5 step cone, 3" bed, HS, complete	775
1—40" swing x 14' bed, Harris Lathe, CR, PCF, SS, complete with chuck	800
1—20" swing x 8' bed LeBlonde, CR, PCF, 5 step cone, 2½" belt, hollow spindle, complete	875
1 66" inch swing x 16' bed Pond, CR, PCF, HS, 4½" hollow spindle, 5" belt, complete	2000

PLANERS.

1--24 x 24 x 6 Gray Planer, excellent condition	675
1--30 x 30 x 16 Bement Extra Heavy, perfect condition	750
1 30 x 30 x 7 Flather High Duty Planer, perfect condition	850
1 30 x 30 x 8 Pond •Extra Heavy Type, perfect condition	1200

DRILLS.

1 4' Fosdick Plain Radial; single pulley drive; same as new	1150
1 24" Sliding Head Prentiss Back Geared Drill	150
1 24" Sibly Upright Drill, perfect con- perfect condition	1200
1 4' Niles Plain Radial Single Pulley Drive, gear box feed, perfect condition	1050

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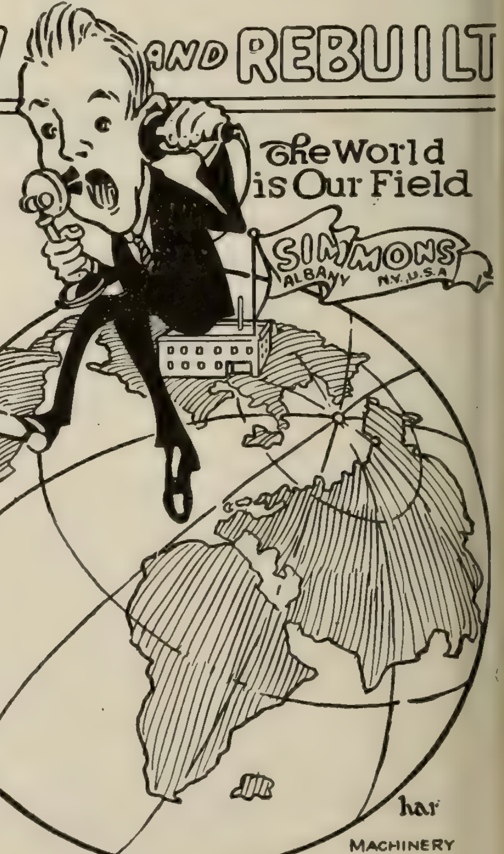
1 No. 78 N Bliss Press, double acting, good as new	550
1 48" x 12 Gould-Eberhardt Gear Cutter, all attachments, perfect condition	750



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4.5 Mark VII Plant For Sale

Immediate Delivery

The following machines have been changed from the mark V shell to the mark VII. We will dispose of these machines with their tooling. Every machine has been examined and put into first-class shape.

1—18″ x 7 Special Purpose Fairbanks-Morse Lathe. .	$ 750
2—18″ x 8′ Special Purpose Lathes, absolutely new . . . . . Each	850
5—30″ American Turret Lathes, Triple Geared; 36″ turret base; will take both 3″ and 4″ boring bars; extension heads on turrets; special small turret or cross-slide with six 1½″ holes; 20″ 3 jaw Universal steel chucks; Power Feed and Power Reverse. All tooled, boring bars, pot chuck, etc. . . . . . . Each	1300
1—22″ x 10′ Pond Engine Lathe; back geared and screw feed. All tooled for outside profile operation on Mark VII. shell	525
1—22″ x 10′ London Single Drive Engine Lathe; quick change gear box with screw and rod feed. All tooled for outside profile operation on Mark VII. shell	700
1—24″ x 10′ Lodge & Barker Back Geared Engine Lathe; screw feed. All tooled for outside profile operation on Mark VII. shell	500
2—24″ Morse Turret Lathes; with 3-jaw Universal chuck; 16″ base turret having six 3″ holes. All tooled, with pot chuck, for hogging-out base of Mark VII. shell . . . . Each	800
1—Jenckes Band Turning Machine; collet chuck. This machine has band-turned about 15,000 shells. All tooled for Mark VII. shells	900
1—24″ x 12 Bertram Engine Lathe, all tooled with special milling fixture for threading the base recess of Mark VII. shell	$ 900
2—24″ Morse Special Turret Lathes; carriage feed; all tooled with pot chuck and forming tool for finish base recess of Mark VII. shell. . . . . . . Each	900
1—15″ x 6′ Blaisdell Engine Lathe, back geared. . . .	200
1—4.5 Brown-Boggs Marking Machine, latest model. New	200
1—Special Sand Blast Box (can be used in open shop), all ready for air pressure	50
1—High Speed Rivetting Hammer, all tooled for rivetting base of Mark VII. shell	150
1—Special Painting Machine, with 110 volt alternating current motor	50
30—4.5 Shell Platforms with tops holding 50 shells each . . . . Each	4
1—150-ton Hydraulic Nosing Outfit, consisting of 1 Triple Action Pump (Perrin); 1 Accumulator (Perrin); 1 Nosing Press (Perrin), with Mark VII. die complete; 1 Chapman Banding Attachment for Press.	1075
1 7-Hole Gas Furnace (Frankfort), relined	350
1 Blower for Furnace	35

We have all gauges for both Mark V and Mark VII Shells, consisting of plug, length, outside diameter, form, thread and seating gauges.

Our Nosing Die Outfit is the best for the Mark VII shell. Leading manufacturers, such as P. L. Robertson Co., Milton; Wilford & Co., Lindsay; Manitoba Engines, Ltd., Brandon; etc., are using our dies.

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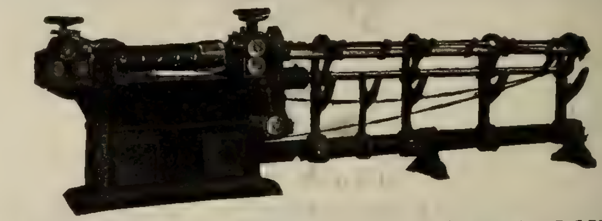

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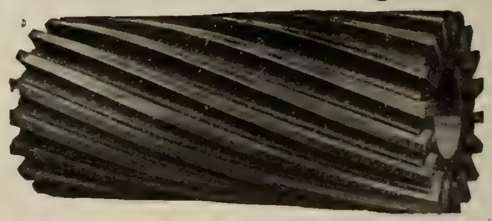

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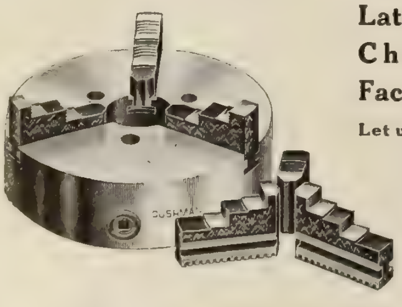

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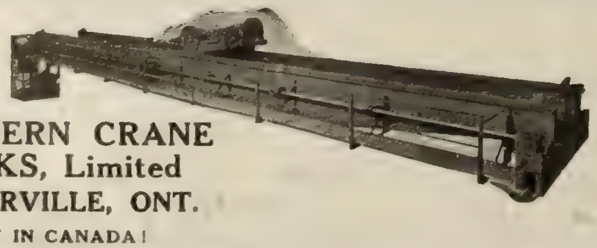

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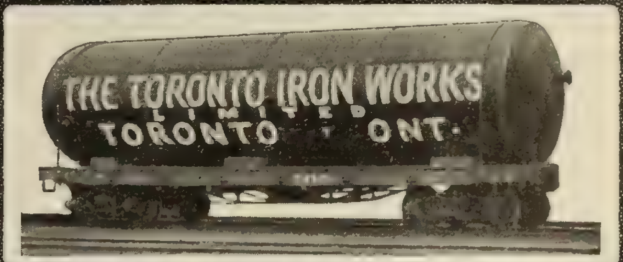

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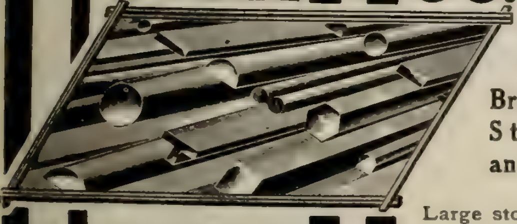

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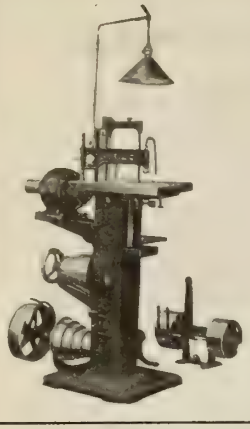

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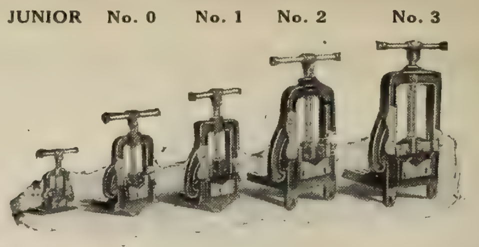

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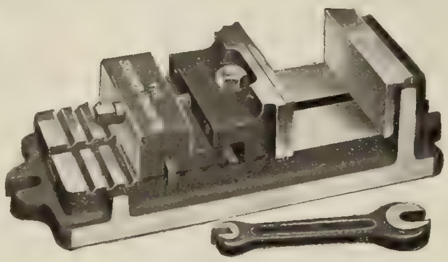

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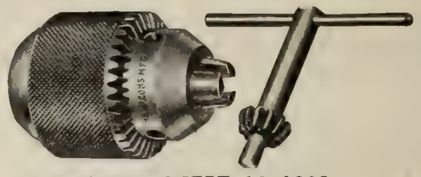

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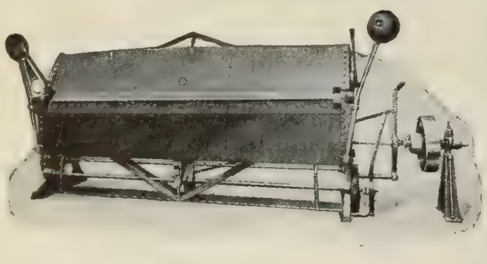

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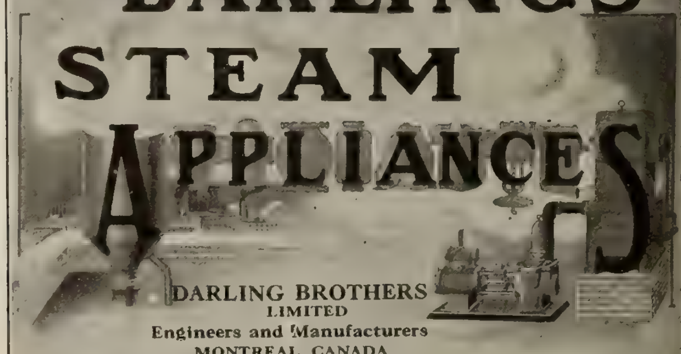

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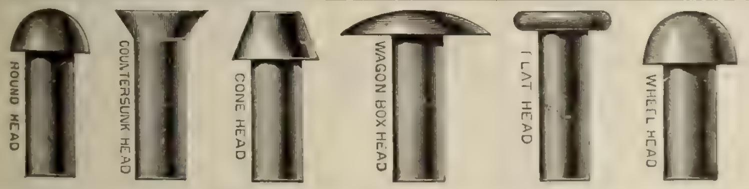

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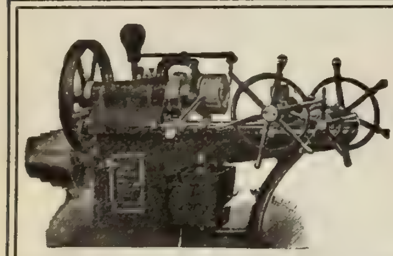

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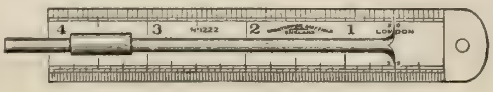

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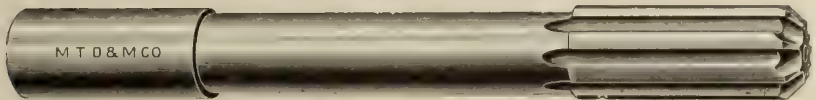

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DRILL PRESSES
Aurora Tool Works, Aurora, Ind.
W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machinery Co., Toronto.

DRILL SOCKETS
Modern Tool Co., Erie, Pa.

DRILLING MACHINES, GANG
Barnes, W. F. & John, Co., Rockford, Ill.
Canada Machinery Corporation, Galt, Ont.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
John Bertram & Sons Co., Dundas.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corporation, Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rockford Driling Mach. Co., Rockford, Ill.

DRILLING MACHINES, RADIAL AND TURRET
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Dominion Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Turner Machine Co., Danbury, Conn.

DRILLING MACHINES, SENSITIVE
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Can. Blower & Forge Co.. Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rockford Driling Mach. Co., Rockford, Ill.
A. R. Williams Machy. Co., Toronto.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.
United States Electrical Tool Co., Cincinnati.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy. Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Celfor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
L. S. Starrett Co., Athol, Mass.

DRILLS, CORNER (PNEUMATIC)
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Lachapelle, J. D., & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.
A. R. Williams Machy. Co., Toronto.
Wisconsin Electric Co., Inc., Racine, Wis.

DRILLS, HIGH SPEED
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Can. Fairbanks-Morse Co., Cleveland.
H. A. Drury Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Morse Twist Drill & Machine Co., New Bedford.
W. F. & John Barnes Co., Rockford, Ill.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas. Ont.

DRILLS, MULTIPLE SPINDLE
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.

DRILLS, PNEUMATIC
John F. Allen Co., New York.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago.
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy Co., Montreal.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy Co., Montreal.
Morse Twist Drill and Machine Co., New Bedford.

DRILLS, TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong. Whitworth of Canada, Ltd., Montreal.
Boker & Co., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Celfor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill and Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

DRINKING FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

DRYING APPLIANCES
Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

DUMP CARS
Can. Fairbanks-Morse Co.. Montreal.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

DUST ARRESTERS (FOR TUMBLING MILLS
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

DYNAMOS AND ELECTRICAL SUPPLIES
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Dominion Machy. Co., Toronto, Ont.
Lachapelle, J. D., & Co., Montreal, Que.
Lancashire Dynamo and Motor Co., Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

ELEVATOR ENCLOSURES
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ont.

ELEVATORS AND BUCKETS
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Whiting Foundry Equipment Co., Harvey, Ill.

ELEVATING AND CONVEYING MACHINERY
Banfield, Edwin J., Toronto.
Can. Matthews Gravity Carrier Co., Toronto, Ont.

EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada. Toronto.
Stow Mfg. Co., Binghamton, N.Y.

EMERY AND EMERY WHEELS
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Mach. Co., Hamilton, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

EMERY WHEELS, DRESSERS AND STANDS
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Norton Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

ENGINES, BALANCED VALVE
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Plessisville Foundry Co., Plessisville, Que.

ENGINES, GAS AND GASOLINE
Can. Fairbanks-Morse Co., Montreal.
Lachapelle, J. D., & Co., Montreal, Que.
H. W. Petrie, Toronto.

ENGINES, HORIZONTAL AND VERTICAL
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.

ENGINEERING BOOKS
The MacLean Publishing Co., Ltd., Toronto.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
H. W. Petrie, Toronto.

FANS
Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.

FAUCETS
Puro Sanitary Drinking Fountain Co., Hayde
ville, Mass.

FENCE, IRON FACTORY
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Canada.

FILES
Aikenhead Hardware Co., Toronto, Ont.
Delta File Works, Philadelphia, Pa.
Nicholson File Co., Port Hope, Ont.

FIRE ESCAPES
Canada Wire & Iron Goods Co., Hamilton, On
Dennis Wire & Iron Works, London, Ont.

FISH PLATES
Can. Steel Foundries, Ltd., Montreal, Que.

FLEXIBLE SHAFTS
Stow Mfg. Co., Binghamton, N.Y.

FORGES, HAND, ETC.
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE
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Canadian Billings & Spencer, Ltd., Welland.
Dom. Forge & Stpg. Co., Walkerville, Ont.
Hammond Steel & Forging Co., Syracuse, N.Y.
McKay, James Co., Pittsburgh, Pa.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
J. H. Williams & Co., Brooklyn, N.Y.

FORGINGS, SPECIAL HAMMER
Hammond Steel & Forging Co., Syracuse, N.Y.

FORGING HAMMERS, BELT-DRIVEN
Bliss, E. W., Co., Brooklyn, N Y.
J. H. Williams & Co., Brooklyn, N.Y.

FORGING HAMMERS, STEAM OR AIR
Erie Foundry Co., Erie, Pa.

FORGING MACHINERY
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Erie Foundry Co., Erie, Pa.
National Machinery Co., Tiffin, Ohio.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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American Pulley Co., Philadelphia, Pa.
Baird Machine Co., Bridgeport, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Toronto.

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Graton & Knight Mfg. Co., Montreal.

FURNACES, ANNEALING, ETC.
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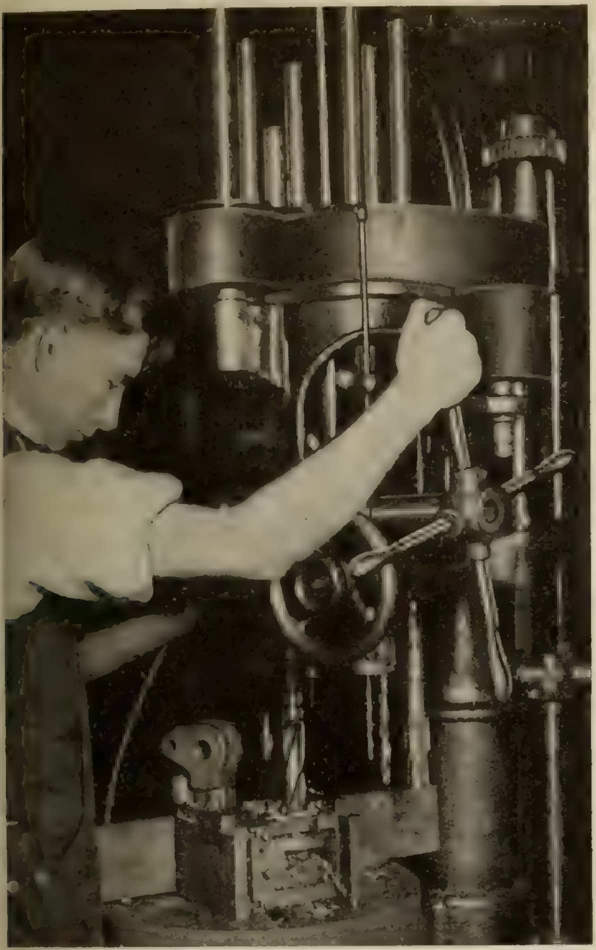
Lachapelle, J. D., & Co., Montreal, Que.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey Ill.

FURNACES, BLAST
Toronto Iron Works, Ltd., Toronto.

FURNACES, BRASS, MALLEABLE
Whiting Foundry Equipment Co., Harvey, Il.

FURNACES, HEAT TREATING, HARDENING AND TEMPERING
Northern Crane Works, Ltd.. Walkerville, Ont.



In Service Several Years—*but as accurate and fast as ever*

One of the four Turner Turrets owned by the A. O. Norton Co., Boston, one of which is in operation at their Canadian plant at Coaticook, Quebec.

The casting is a malleable iron socket for a 100-ton Norton Jack. The operations are: 1st Spindle, drill 1⅛", hole through two ¾" sections. 2nd Spindle, a double cutting tool reams the lower section and counterbores the upper section. 3rd Spindle, drill a 5" hole 2¾" deep. 4th Spindle, drill ¼" hole through two ¼" lugs. 5th Spindle, drill 5-16" hole ½" deep. 6th Spindle, drill 3-16" hole and counterbore to ½". **And all this work is done on the Turner Turret in 8 minutes.**

The TURNER TURRET

is built in several sizes, and is designed especially to perform several operations upon a piece of work at a single setting. On all work within its range it is more economical than a big chucking machine because its initial cost is about half that of the larger tool. Also, it is fast—and accurate, because it performs its work at one setting of the piece. The TURNER TURRET is a rapid producer on shell parts.

Mail is your blue prints, and let us give you estimates on the Turner Turret. Ask for catalog

TURNER MACHINE COMPANY
DANBURY, CONN., and Newark, N.J. U.S.A.

Incorporated with Turner. Atherton & Co., Ltd., Denton, Manchester and Stockport, Eng.

Isn't It?

WE tool manufacturers are keenly alive to the urgency of your need for our product and every one of us is exerting every effort to fill your requirements—you are getting the best that's in us.

The Danger Point

But in this striving for increased production there is a point beyond which none of us can go *if we have your best interests at heart.* Our desire to serve you promptly must always be tempered by the knowledge that you value the trustworthiness of your tools above all else—today trustworty tools are worth more to you than ever before.

Stamina or Haste?

Unfortunately such tools cannot be hastily made—the safeguards of quality take time. Perhaps the precautions which we take to insure the unswerving stamina of "Cleveland" tools *could* be relaxed and the deliveries speeded just a trifle as a result.

But - - -

Yes—but aren't the results worth the little additional time involved—isn't it a comfortable feeling to know that your tools are capable of sustained effort—the kind that will help you speed up *your* deliveries unhampered by unexpected breakage in the shop?

Isn't it?

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Dom. Forge & Stpg. Co., Walkerville, Ont.

FUSE CAP MACHINERY
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GALVANIZING MACHINERY
Erie Foundry Co., Erie, Pa.

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GAS PRODUCER PLANTS
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Bawden Machine Co., Toronto, Ont.
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Cleveland Twist Drill Co., Cleveland.
Foundry & Mach. Co., Montreal, Que.
Garvin Machine Co., New York.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Hartford, Conn.
Stereotype Co., Indianapolis, Ind.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

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Brown Engineering Corp., Toronto, Ont.
Can. Steel Foundries, Ltd., Montreal, Que.
Lyman Tube & Supply Co., Montreal, Que.
Webber Bros. Mach. Co., Toronto, Ont.

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Hamilton Gear & Machine Co., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
The Smart-Turner Machine Co., Hamilton.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.

GEARS, CUT, MORTISE, ANGLE, WORM
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
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Hull Iron & Steel Foundries, Ltd., Hull, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.

GEARS, RAWHIDE
Hamilton Gear & Machine Co., Toronto.
Gardner, Robt. & Son, Montreal.
Grant Gear Works, Boston, Mass.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.

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Dominion Machinery Co., Toronto.
Lancashire Dynamo & Motor Co., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy Co., Toronto.

GRAIN FOR POLISHING
Norton Co., Worcester, Mass.

GRAPHITE
Aikenhead Hardware Co., Toronto, Ont.

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Can. Matthews Gravity Carrier Co., Toronto, Ont.

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Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Gray Mfg. & Machine Co., Toronto.
Niles-Bement-Pond Co., New York.
Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.

GRINDERS, CUTTER
Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Pratt & Whitney Co., Dundas, Ont.

GRINDERS, DIE CHASER
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

GRINDERS, DRILL
Aikenhead Hardware Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
United States Electric Tool Co., Cincinnati, O.

GRINDERS, CYLINDER, INTERNAL
Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Greenfield Machine Co., Greenfield, Mass.
Modern Tool Co., Erie, Pa.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.

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Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Dominion Machy. Co., Toronto, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Greenfield Machine Co., Greenfield, Mass.
Norton Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machy. Co., Toronto.
Wisconsin Electric Co., Milwaukee, Wis.

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Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Greenfield Machine Co., Greenfield, Mass.
H. W. Petrie, Ltd., Montreal.
Tabor Mfg. Co., Philadelphia, Pa.

GRINDERS, UNIVERSAL, PLAIN
Modern Tool Co., Erie, Pa.

GRINDERS, VERTICAL SURFACE
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Pratt & Whitney Co., Dundas, Ont.
Stereotype Co., Indianapolis, Ind.

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Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.
Wisconsin Electric Co., Inc., Racine, Wis.

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Aikenhead Hardware Co., Toronto, Ont.
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Carborundum Co., Niagara Falls.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Norton Co., Worcester, Mass.
H. W. Petrie, Toronto.

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Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Canada.
Ford-Smith Mach. Co., Hamilton, Ont.
New Britain Mach. Co., New Britain, Conn.

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Aikenhead Hardware Co., Toronto, Ont.
Boker & Co., H., Montreal, Que.
Diamond Saw & Stamping Works, Buffalo, N.Y
Foss & Hill Machy. Co., Montreal.
H. W. Petrie, Ltd., Montreal.
Racine Tool & Machine Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
Victor Saw Works, Ltd., Hamilton, Canada.
Zenith Coal & Steel Products, Montreal, Que.

HACK SAW FRAMES
Aikenhead Hardware Co., Toronto, Ont.
Garvin Machine Co., New York City.

HACK SAW MACHINERY
Peerless Machine Co., Racine, Wis.

HAMMERS, AIR
Erie Foundry Co., Erie, Pa.

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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canadian Billings & Spencer, Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
High Speed Hammer Co., Rochester, N.Y.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.

HAMMERS, HELVE POWER
Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.

HAMMERS, POWER
Beaudry & Co., 8 Oliver St., Boston, Mass.
Erie Foundry Co., Erie, Pa.

HAMMERS, PNEUMATIC
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toro
Independent Pneumatic Tool Co., Chicago, Il

HAMMERS, MARKING
Matthews, Jas. H. & Co., Pittsburgh, Pa.

HAMMERS, MOTOR-DRIVEN
Beaudry & Co., 8 Oliver St., Boston, Mass.

HAMMERS, NAIL MACHINES
Whitman & Barnes Mfg. Co., St. Catharines,

HAMMERS, STEAM
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.

HAND LEATHERS OR PADS
Graton & Knight Mfg. Co., Montreal.

HANGERS
Baird Machine Co., Bridgeport, Conn.
Dodge Mfg. Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
The Smart-Turner Machine Co., Hamilton.

HARDNESS TESTING INSTRUMENT
Shore Instrument & Mfg. Co., New York.

HEATING AND VENTILATING ENGINEERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

HEAT GAUGES, HARDENING AND ANNEALING
Shore Instrument & Mfg. Co., New York.

HINGE MACHINERY
Baird Machine Co., Bridgeport, Conn.

HINGES
London Bolt & Hinge Works, London, O

HOISTING AND CONVEYING MACHINERY
Can. Matthews Gravity Carrier Co., Toronto,
Jenckes Mach. Co., Sherbrooke, Que.
Northern Crane Works, Walkerville, Ont.
H. W. Petrie, Ltd., Montreal.
Whiting Foundry Equipment Co., Harvey,

HOISTS, CHAIN, ELECTRIC AND PNEUMATIC
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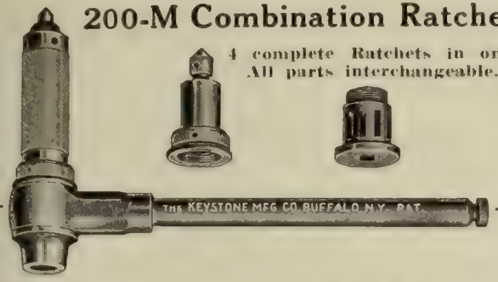

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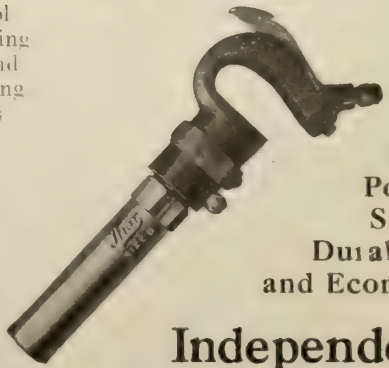

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H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

PRESSES, HYDRAULIC
Bawden Machine Co., Toronto, Ont.
John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, BALING
William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

PRESSES, SCREW
Barnes, W. F. & John, Co., Rockford, Ill.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Erie Foundry Co., Erie, Pa.

PRESSURE REGULATORS
Can. Fairbanks-Morse Co., Montreal.

PROPELLERS
Ontario Specialties, Ltd., Ottawa, Can.

PULLERS, WHEEL
The Crane Puller Co., Arlington, Mass.

PULLEYS
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Dodge Mfg. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Ltd., Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PULLEY MACHINERY, DRILLING AND TAPPING
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.

PUMPS, AIR
Bawden Machine Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Darling Bros., Ltd., Montreal, Que.
D'Olier Centrifugal Pump & Machine Co., Philadelphia, Pa.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

PUMPS, HIGH PRESSURE
Charles F. Elmes Eng. Works, Chicago.
Darling Bros., Ltd., Montreal, Que.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

PUMPS, ALL KINDS
Bawden Machine Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PUMPS, HYDRAULIC
Charles F. Elmes Eng. Works, Chicago, Ill.
Darling Brothers, Montreal.
Metalwood Mfg. Co., Detroit, Mich.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto.

PUMPS, LUBRICANT AND OIL
Cincinnati Lubricant Pump Co., Cincinnati, Ohi
Roper, C. F., Co., Hopedale, Mass.

PUMP LEATHERS
Graton & Knight Mfg. Co., Montreal.

PUNCHES AND DIES
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

PUNCHES, PNEUMATIC
Jno. F. Allen Co., New York.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

PYROMETERS
Peacock Bros., Montreal, Que.
Shore Instrument & Mfg. Co., New York City.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES
John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

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RAIL BENDERS
Niles-Bement-Pond Co., New York.

RAILROAD TOOLS
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMERS, ADJUSTABLE
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedfo
Pratt & Whitney Co., Dundas, Ont.
Stereotype Co., Indianapolis, Ind.
Whitman & Barnes Mfg. Co., St. Catharines, O

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto, Ont.
Boker & Co., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McKenna Bros. Brass Co., Pittsburgh.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
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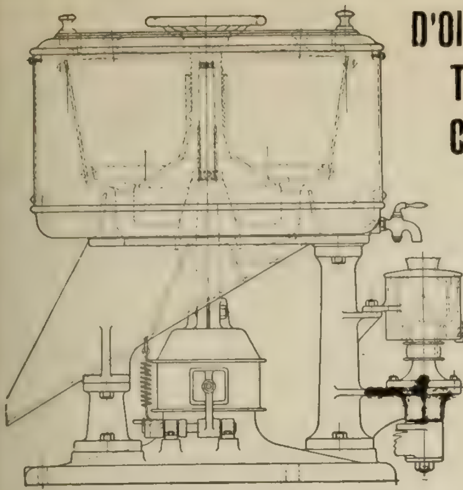
Morse Twist Drill & Machine Co., New Bedfor
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedfor
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.



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For recovering and filtering oil from automatic machined parts, metal chips, turnings, scrap, etc.

A large-capacity, extremely efficient machine, especially designed and built to care for the "rush" character of work and the increasing volume of shop output now prevailing.

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Weston type, self-balancing basket, 30 in. diameter, motor driven.

Bottom chute discharge and conical unloading valve.

Centrifugal oil filter attachment.

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The centrifugal oil filter, with which the machine is equipped, is operated by the main driving belt, the complete unit being therefore self-contained, simultaneously recovering and filtering the oil from the chips, turnings, etc.

D'Olier Centrifugal Pump and Machine Co.
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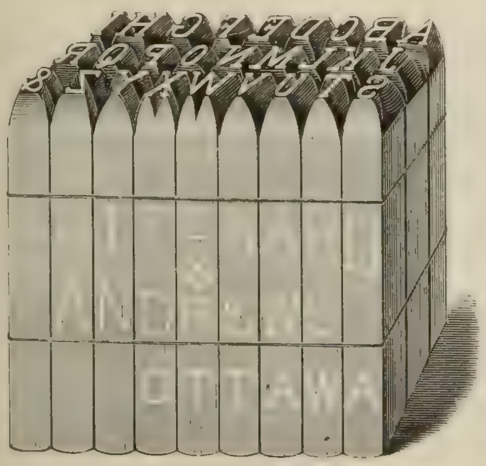

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National Machinery Co., Tiffin, O.
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H. W. Petrie, Toronto.

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Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.

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James Chesterman & Co., Ltd., Sheffield, Eng.
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Gray Mfg. & Machy. Co., Toronto, Ont.
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Oliver Machy. Co., Grand Rapids, Mich.

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Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt. & Son, Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
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H. W. Petrie, Toronto.
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Hunter Saw & Machine Co., Pittsburg, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

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Shore Instrument & Mfg. Co., New York City.

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Garvin Machine Co., New York.
A. B Jardine & Co., Hespeler.
Milholland, W. K., Co., Indianapolis, Ind.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Stereotype Co., Indianapolis, Ind.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

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New Britain Machine Co., New Britain, Conn.
Windsor Machine Co., Windsor, Vt.

SCREWS
Galt Machine Screw Co., Galt, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
Wells Bros. Co. of Canada, Galt, Ont.

SCREW SLOTTERS
Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY
Baird Machy. Co., W. J., Detroit, Mich.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
New York Machinery Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Simmons Machine Co., Albany, N.Y.
H. A. Stocker Co., Chicago, Ill.

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Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

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Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Hendey Machine Co., Torrington, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.

SHAFTING
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Dodge Mfg. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
A. R. Williams Machy. Co., Toronto.

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Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

SHAVINGS, SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

SHEARING MACHINES, ANGLE IRON, BAR AND GATE
John Bertram & Sons Co., Dundas.
Bertrams, Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.

SHEARS, POWER
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

SHEARS, PNEUMATIC
John F. Allen Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada.

SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Steel Bending Brake Works, Ltd., Chatham, Ont.

SHEET METAL STAMPINGS
Coleman Fare Box Co., Toronto, Ont.
Dominion Forge & Stpg. Co., Walkerville, Ont.

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Perrin, Wm. R., Toronto.
West Tire Setter Co., Rochester, N.Y.

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Can. Blower & Forge Co., Kitchener, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.

SHRAPNEL SHELL MARKER
Brown-Boggs Co., Hamilton, Ont.
Noble & Westbrook Mfg. Co., Hartford, Conn.

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Armstrong Bros. Tool Co., Chicago.

SILVER SOLDER
Geo. H. Lees & Co., Hamilton, Ont.

SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

SLOTTERS
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.

SMOKESTACKS.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke, Que.

SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedfor
J. H. Williams & Co., Brooklyn, N.

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Aikenhead Hardware Co., Toront , Ont.
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SOLDERS
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Tallman Brass & Metal Co., Hamilton.

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Baird Machine Co., Bridgeport, Conn.
Banfield, Edwin J., Toronto.
W. H. Banfield & Sons, Toronto.
John Bertram & Sons Co., Dundas.
Baird Machine Co., Bridgeport, Conn.
Bawden Machine Co., Toronto, Ont.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Brown Engineering Corp., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Cunningham & Sons, St. Catharines, Ont.
Charles F. Elmes Eng. Works, Chicago.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
Grant Mfg. & Machy. Co., Bridgeport, Conn
John H. Hall & Sons, Brantford.
Himoff Machine Co., New York, N.Y.
Jardine, A. B., & Co., Hespeler.
Jenckes Mach. Co., Sherbrooke, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
D. McKenzie Machinery Co., Guelph, Ont.
Root & Van Dervoort Engr. Co., East Moline, Ill.
Smart-Turner Machine Co., Hamilton, Ont.
Webber Bros. Mach. Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.

SPIKE MACHINES
The Smart-Turner Machine Co., Hamilton.

SPIRAL CONVEYORS
Can. Matthews Gravity Carrier Co., Toronto, Ont.

SPRING COILERS
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.

SPRINGS, MACHINERY
Barnes, Wallace, Co., Bristol, Conn.
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Cleveland Wire Spring Co., Cleveland.
Jas. Steele, Ltd., Guelph, Ont.

SPROCKETS, CHAIN
Grant Gear Works, Boston, Mass.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.

SPROCKET WHEELS, CAST
Perrin, Wm. R., Toronto.

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Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Canada.

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STAMPING MACHINERY
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.

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Matthews, Jas. H. & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Can.

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H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.

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Steel Bending Brake Works, Ltd., Chatham, Ont.

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Tivani Electric Steel Co., Belleville, Ont.
Vanadium-Alloys Steel Co., Pittsburgh, Pa
Zenith Coal & Steel Products, Montreal, Que.

STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Union Drawn Steel Co., Hamilton, Ont.

STEEL DRUMS
Smart-Turner Machine Co., Hamilton, Ont.

STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.

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Armstrong Whitworth of Canada, Ltd., Montreal.
Boker & Co., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Ltd., Montreal.
Hawkridge Bros. Co., Boston, Mass.
H. W. Petrie, Toronto.
Tivani Electric Steel Co., Belleville, Ont.
Vanadium Alloys Steel Co., Pittsburg, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Young, Corley & Dolan, Inc., New York, N.Y.
Zenith Coal & Steel Products, Montreal, Que.

STEEL DIE ENGRAVING
Noble & Westbrook Mfg. Co., Hartford, Conn.

STEEL VANADIUM
Boker & Co., H., Montreal, Que.
Drury, H. A., Co., Montreal, Que.
Tivani Electric Steel Co., Belleville, Ont.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa.

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New Britain Machine Co., New Britain Conn

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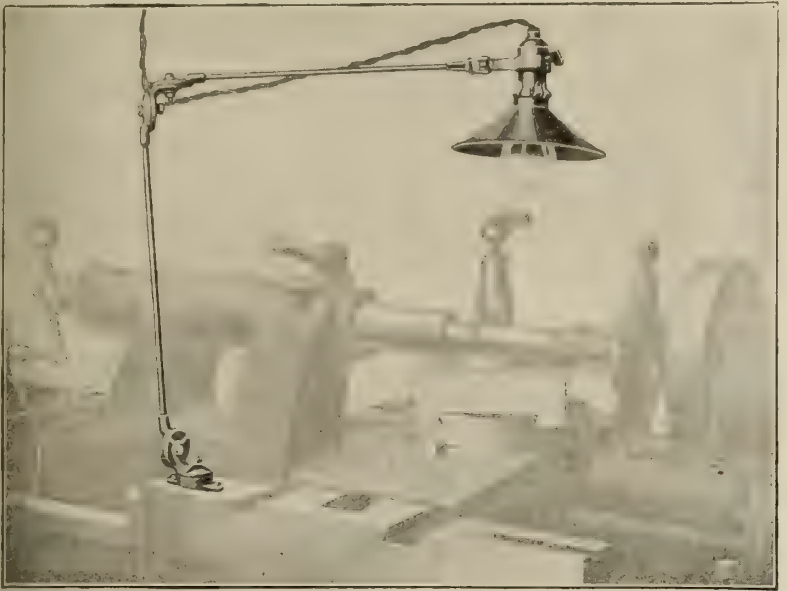

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Bertrams, Ltd., Edinburgh, Scotland

STUD DRIVER
Keystone Mfg. Co., Buffalo, N.Y.
D'Olier Centrifugal Pump & Machine Co., Phila-

SWITCHES, RAILWAY
Can. Steel Foundries, Ltd., Montreal.

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Bowser, S. F., & Co., Inc., Toronto, Ont.
Dominion Forge & Stpg. Co., Walkerville, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

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Jenckes Mach. Co., Sherbrooke, Que.
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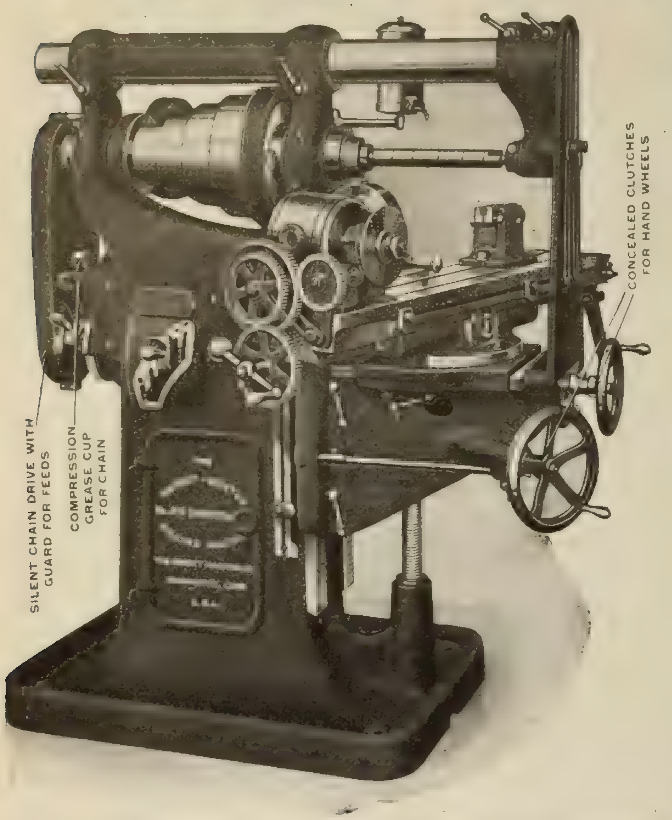
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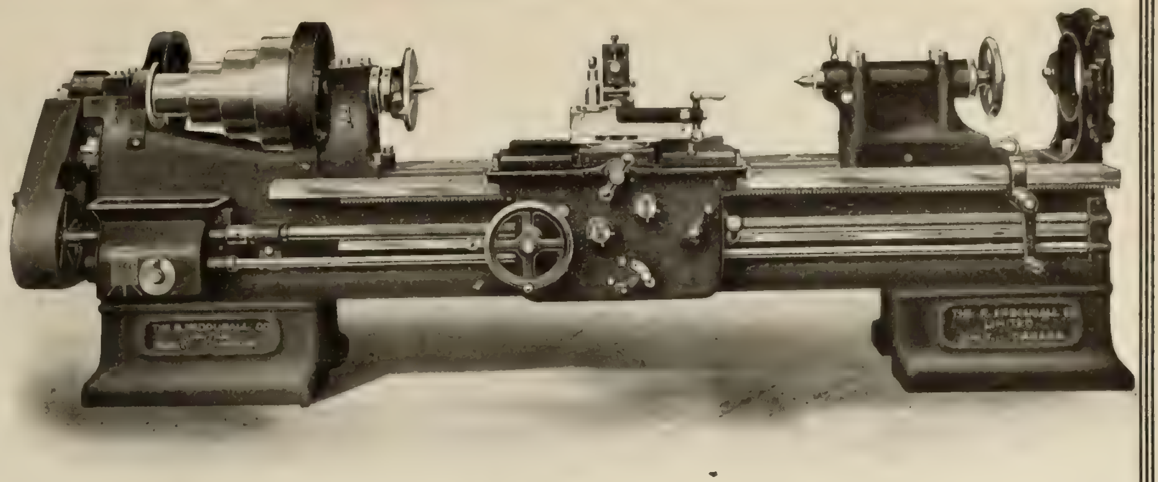

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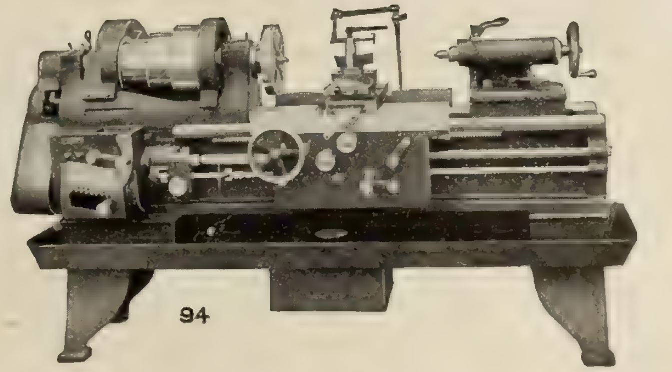

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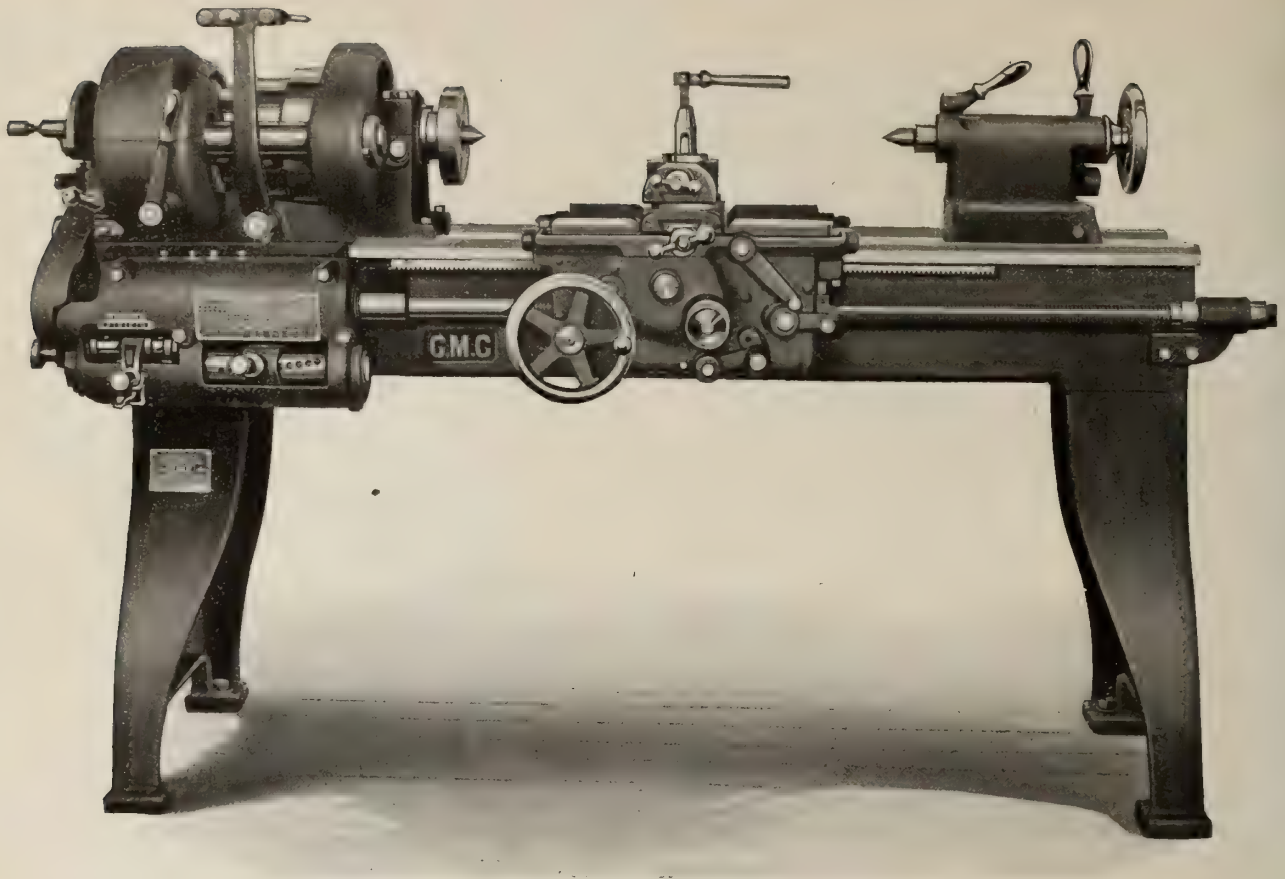
305 ST. JAMES STREET - - - - MONTREAL, QUE.



C.M.C.

A Lathe that marks an advance on the Engine Lathe sold to-day in its

UNIQUE
COMBINATION
OF HANDINESS
CONVENIENCE
AND
DURABILITY

This 14" Quick Change Engine Lathe

IS A NEW C.M.C. TOOL WITH A GREAT RANGE OF USEFULNESS

The thread-cutting range on this lathe is without changing a single gear, from 32 threads per inch to 5" lead, or by changing two gears on plate, from 64 threads per inch to 5" lead, or one thread in 5". By making extra change gears for the quadrant plate, practically any thread can be cut between the limits of 100 threads per in. and 5" lead. Meets the demand for a quick change Engine Lathe with all modern improvements of practical value.

Send for full details. A postcard will do.

For the convenience of the Trade, we have opened Showrooms in Toronto, at Brock Avenue Subway, where a full line of our machinery can be inspected.

CANADA MACHINERY CORPORATION
LIMITED
GALT, ONTARIO

BUILDERS OF MACHINE TOOLS AND WOODWORKING MACHINERY

EXPORT NUMBER

EDITORIAL INDEX PAGE 115
BUYERS' DIRECTORY PAGE 101
ADVERTISING INDEX PAGE 116

CANADIAN MACHINERY
AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XVI—No. 14 Publication Office: Toronto, October 5, 1916 Subscription Price $3.00 per Year

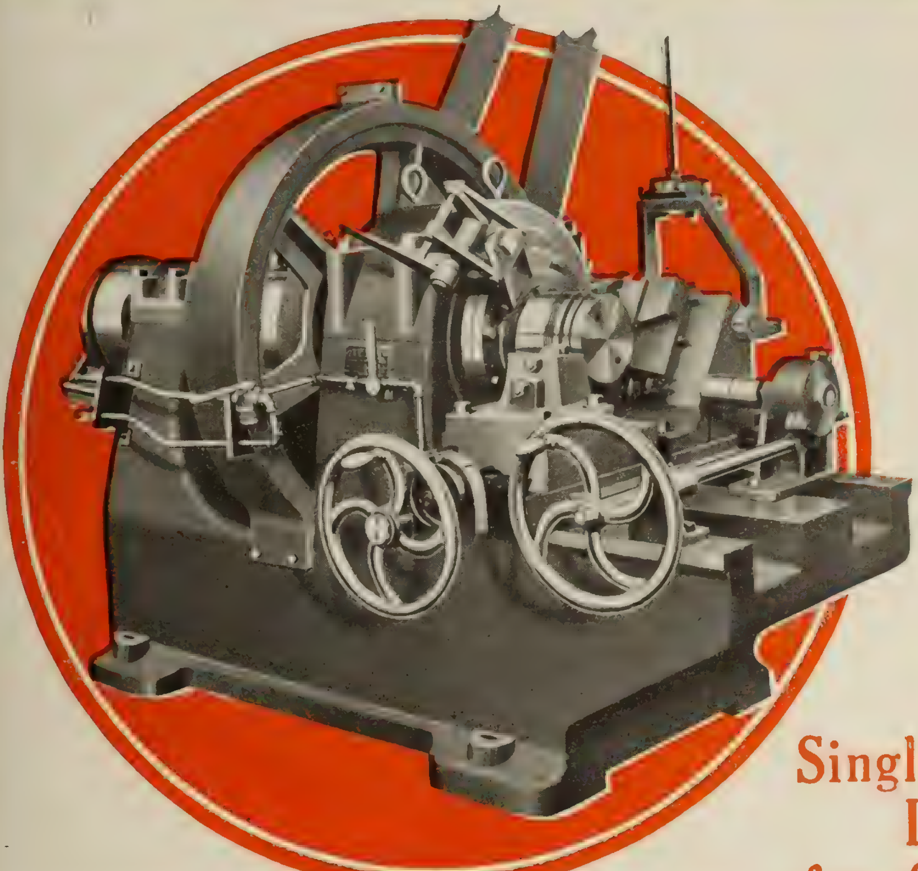


ILLUSTRATION shows our Banding Lathe for 8" shells.

The very best material and workmanship are embodied in this machine tool.

Note the liberal proportions. They mean an extra measure of long, heavy service.

Single Purpose Lathes for Shell Work

Jenckes Band Turning Lathes will give the best production of anything in shell banding tools yet designed. They put new speed to shell banding operations.

We manufacture these machines for 18 pdr., 4.5", 5", 6", 8", 9.2", 12" and 14" shells.

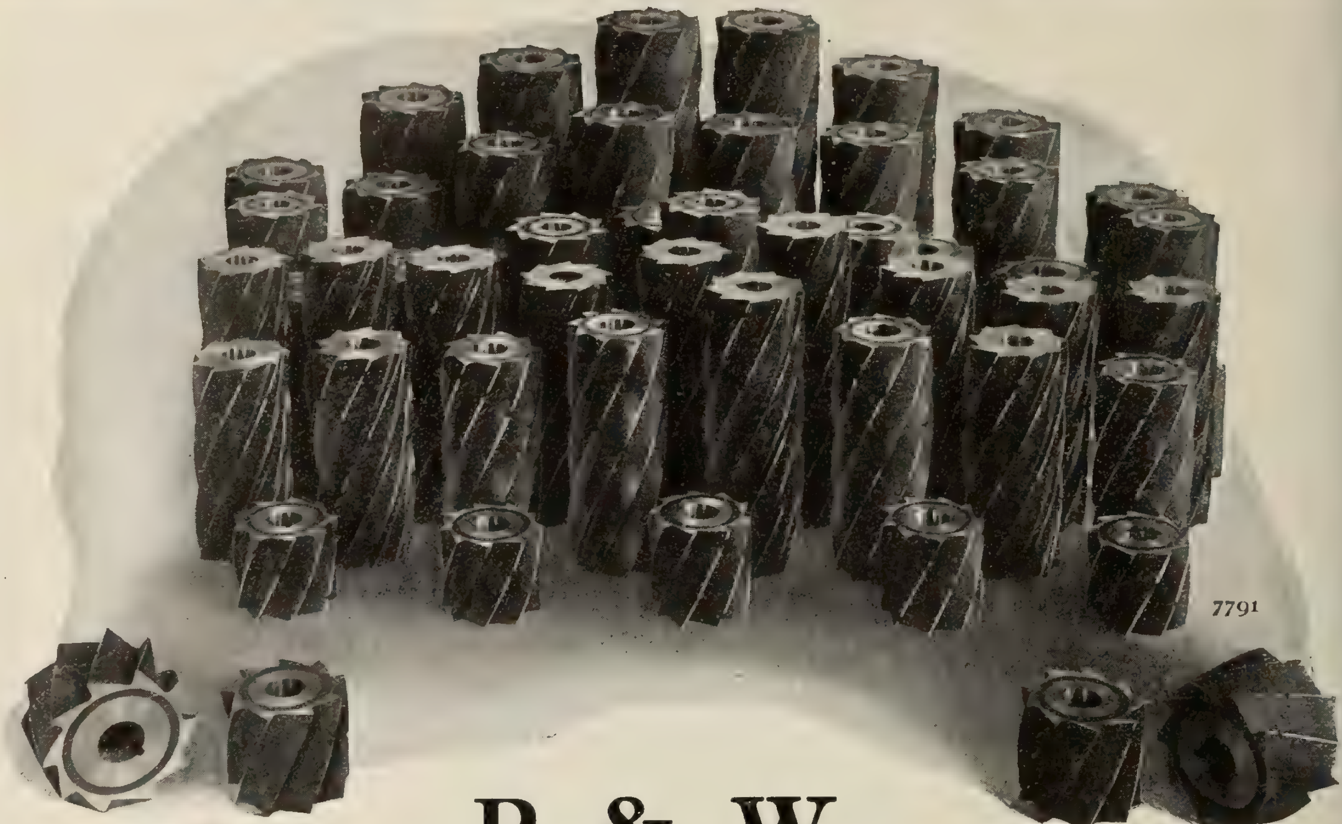
These machines are also tooled when required for the mm. sizes corresponding to Russian and French ammunition.

THE JENCKES MACHINE COMPANY, LIMITED

Works: SHERBROOKE, QUE.; ST. CATHARINES, ONT.

SALES OFFICES: 727 Traders' Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver

The Answer to Your
Heavy Duty Cutter Problem



P. & W.

Coarse-Tooth High-Speed Milling Cutters

We are prepared to furnish promptly coarse-tooth milling cutters of High Speed Steel adapted primarily to the heavier class of milling.

Long Life. Such cutters have the advantage of long life as the large teeth permit of more grindings. It will also be seen that less time is required to sharpen.

Increased Production. The ample chip room insures a remarkably free cutting action and will increase production by a high percentage with less power required to drive.

Strong Teeth. The teeth being larger are exceptionally strong and will easily stand the heaviest feeds without breaking.

Place a trial order with our nearest store.

Pratt & Whitney Company of Canada, Limited

DUNDAS	**MONTREAL**	**WINNIPEG**	**VANCOUVER**
Ontario	**723 Drummond Bldg.**	**1205 McArthur Bldg.**	**B.C. Equipment Co.**

JB&SCO

Bertram
MACHINE
TOOLS

We offer for immediate shipment:

6—32 in. x 14 ft. Bertram Double Back Geared Quick Change Engine Lathes.

Also 250 lb., 350 lb., 600 lb. and 2000 lb. Single Frame Steam Hammers.

1½-in. and 2-in. Acme Single Bolt Cutters.

and 1½-in. and 2-in. Acme Double Bolt Cutters.

THESE MACHINES ARE ALL IN STOCK READY FOR SHIPMENT.

The John Bertram & Sons Company
Limited
Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

JB&SCO

The Publisher's Page

TORONTO October 5, 1916

Some Facts About Canada

THE area of Canada represents one-third of the British Empire. Bounded by three oceans, her coast line of 13,000 miles is equal to half the circumference of the earth.

The boundary line between the United States and Canada is 3,000 miles long, 1,600 miles by land, 3,000 miles through water.

Canada is larger than the United States, including Alaska, by 111,992 square miles; is larger than 30 United Kingdoms and 18 times the size of France.

In 1868, area of the four provinces forming Confederation was 662,148 square miles; now Parliament exercises jurisdiction over 3,729,665 square miles in nine provinces.

Canada's land area, exclusive of the Territories and the Yukon, and excluding swamplands and forests is 1,401,000,000 acres. Thirty-one per cent., or 440,000,000 is fit for cultivation and of this acreage only 110,000,000 acres are occupied and 34,000,000 acres under cultivation.

Canada's eight longest rivers: Mackenzie, 2,525 miles; St. Lawrence, 1,900; Yukon (in Canada) 1,765; Nelson (to head of Bow) 1,660; Saskatchewan (to head of Bow) 1,205; Columbia, total 1,150, in Canada 465. Peace, 1,065; Churchill, 1,000.

Total area of Prairie Provinces, 479,262,438 acres viz.; Manitoba, 161,414,758 acres; Saskatchewan, 155,092,480 acres; Alberta, 162,755,200 acres.

Less than one-tenth of the arable land is under cultivation.

The expansion of Canadian trade has been very marked. Export trade for the year ending June, 1916, is over $500,000,000 in excess of the preceding year. Especially notable is the increase of manufactured goods. The following table gives a comparison of the Export Trade for 1915 and 1916:

	Twelve Months Ending	
Exports by Countries	June, 1915	June, 1916
United Kingdom	$249,198,346	$557,909,038
United States	185,055,566	300,440,538
Australia	5,543,359	8,542,065
British Africa	3,908,752	5,964,615
British East Indies	654,084	1,437,186
British Guiana	727,866	1,344,525
British W. Indies	4,355,614	5,009,944
Newfoundland	4,484,152	5,720,487
New Zealand	2,537,584	3,819,266
Other British	2,279,377	3,941,158
Argentine Republic	601,645	2,592,806
Belgium	2,122,075	515,274
France	23,400,448	35,469,254
Holland	4,854,661	1,919,350
Japan	1,000,614	1,093,719
Other Foreign	10,413,298	33,856,779

CANADIAN MACHINERY
and Manufacturing News
143-153 University Avenue, Toronto

Quality **Service**

Courtesy in Business

* * *

Fittingly framed and hanging in the Offices of one of the most important Public Service Corporations on this North American Continent is the following

> **'Did you say Please and Thank you?'**

Broad minded men direct the destiny of that Corporation, men who know that public or private enterprises to be lastingly successful must operate for the public good.

Quality and Service are the two important factors in our business life today, but Courtesy is the door through which they must enter.

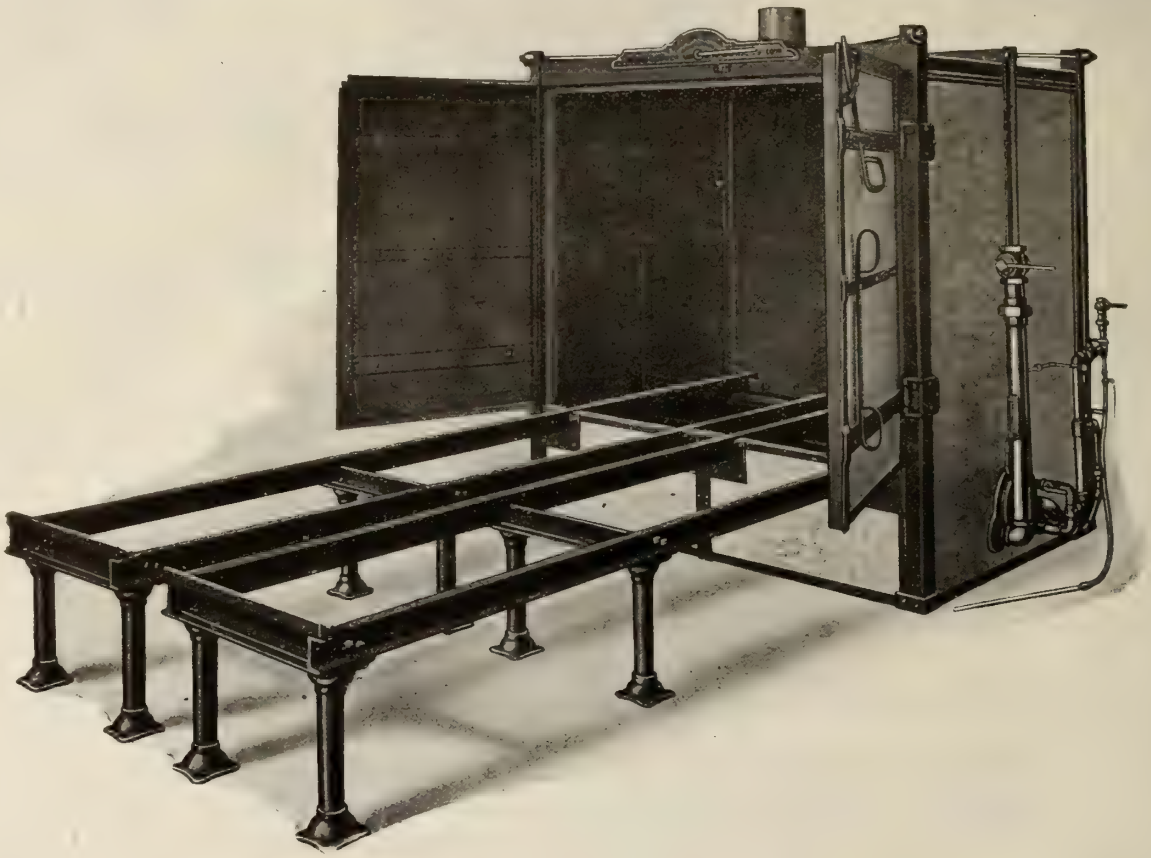
We are large producers of Hamilton Pig Iron and our output of Open Hearth Steel Blooms and Billets, Iron and Steel Bars of all shapes and size runs into enormous tonnage.

The products of our mills include practically everything that can be manufactured from Iron and Steel and these we distribute to thousands of satisfied customers.

Our business is an extensive one and a successful one. The World is our market: but our prosperity and success in the future, as in the past, depend upon the continued confidence, co-operation and good-will of the people we serve.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG



A convenient type of Crawford Sectional Oven largely used by manufacturers turning out Shells up to twenty-eight pounds each.

The method of heating explained in previous issues is the same with all types of Crawford Ovens—no direct flame coming in contact with the material in the oven.

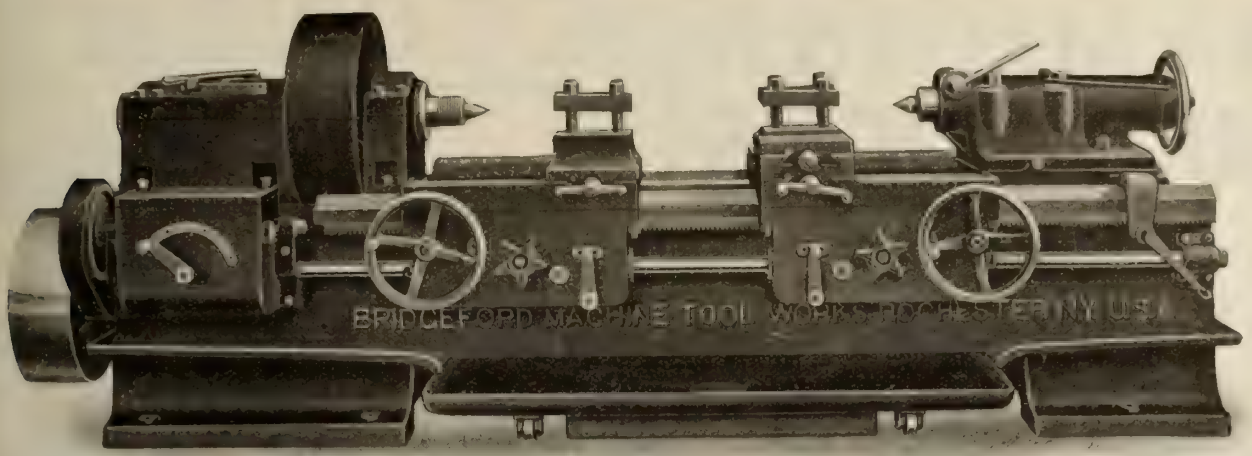
Either city, natural, gasoline or producer gas can be used with either type of oven.

Ovens and trucks built for baking the varnish or finish on any number or size of shells required at a time.

The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN., U.S.A.

Canadian Representatives : THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA



"BRIDGEFORD" 27-inch HEAVY DUTY LATHE

The Ideal Machine for Rough-Turning Shells

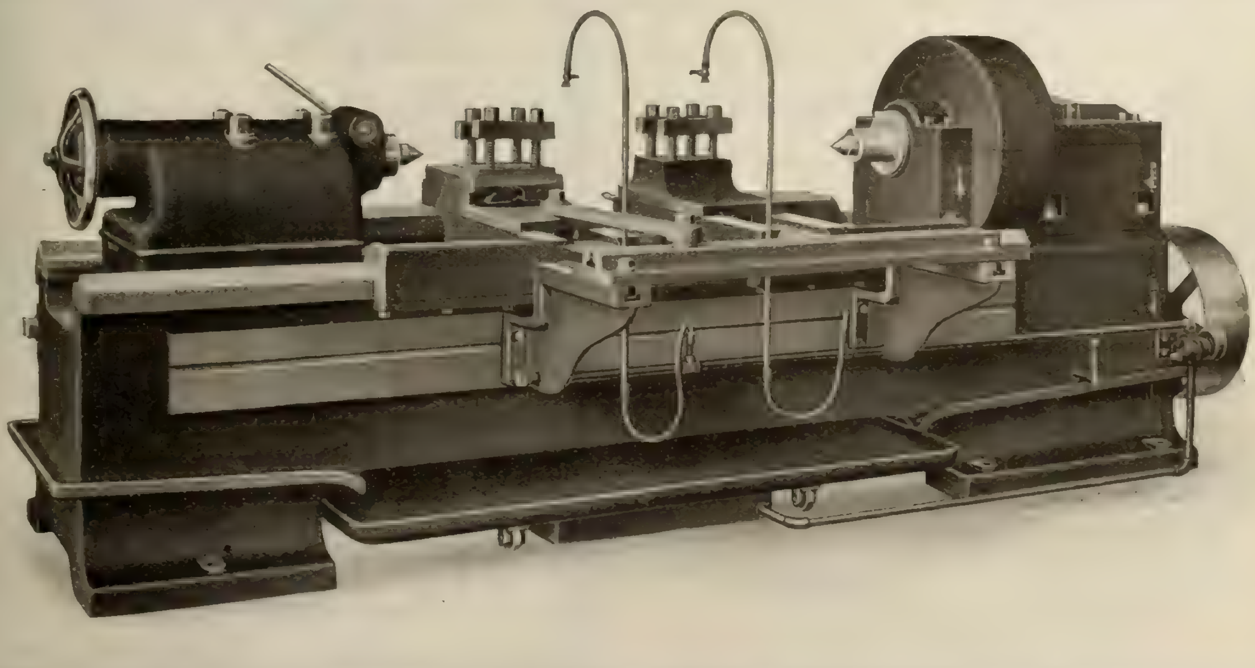
This is an especially heavy duty machine, and as shown in the engravings, is arranged for rough-turning 8″, 9.2″ or 12″ shells. Power is transmitted through 8″ driving belt, with three instantaneous speed changes through hardened steel gearing. Main driving gear 6½″ face. Four instantaneous feed changes—all through cut steel gearing, running in oil. Leading shell manufacturers have from 70 to 120 of these machines in operation—giving remarkably satisfactory results.

Owing to greatly increased facilities, we can make early deliveries on Bridgford lathes. Write us.

BRIDGEFORD MACHINE TOOL WORKS

HEAVY LATHE SPECIALISTS FOR 20 YEARS

237 MILL STREET **ROCHESTER, N.Y.**



HAMMOND DIE BLOCKS

FOR

Difficult Dies and Record Runs

Speed in Machining

Safety in Hardening

SPECIAL

Trimmer Tool Steels

for hot and cold work

HAMMERED crucible cold trimmer Die Tool Steel means longer runs between grindings—less wasted time dragging down production.

Our Products

"Hammered from Ingot to Finished Bar"

HAMMOND STEEL & FORGING CO.

FINE TOOL STEELS

Specialists in Manufacture of
HIGH GRADE HAMMERED FORGINGS
WELDLESS RINGS, HAMMERED ALLOY
STEELS, SPECIAL SHAPES

DETROIT OFFICE:
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MAIN OFFICES
and MILLS:
Syracuse, N. Y.

ECONOMY

Rapid production is dependent on the use of

Economical Tools and Steel.

It is safer NOT to specify High Speed Steel but

Demand "TYR," the Economy Steel.

(MADE IN CANADA)

Armstrong, Whitworth of Canada,
Limited
OFFICES: 22 Victoria Square, Montreal, P. Q.
Dominion Bank Building, Toronto, Ont.
WORKS: Longueuil, P. Q.

Red Cut Superior High Speed Steel

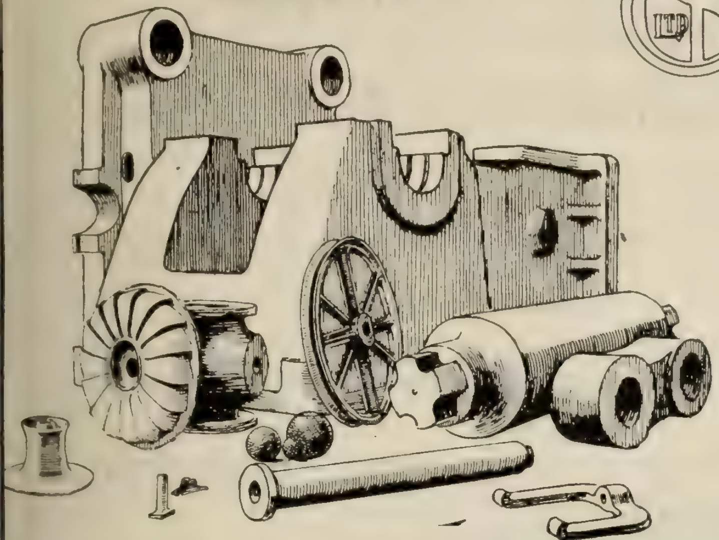
Quality First
THE BEST FOR MACHINING
ALL HARD MATERIALS

Are your tools made of **Red Cut**?

Send for folder

VANADIUM-ALLOYS STEEL COMPANY
PITTSBURGH, PA.
Works at Latrobe, Pa.

1 OZ. TO 60 TONS



WE ARE MAKERS
OF
STEEL
CASTINGS

MANGANESE, VANADIUM, TITANIUM,
CHROME, NICKEL, ETC.

OF ANY SIZE & OF ANY
KIND SUCH AS

HYDRAULIC, MILL GEAR,
LOCOMOTIVE, ROLLING STOCK,
MARINE,
ETC.

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

INTRA STEEL
LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO, LIMITED, SHEFFIELD, ENGLAND

Sole Agents for Canada:

H. BOKER & CO., Inc.
(Formerly Hermann Boker & Co.)
332 St. James Street, Montreal, P.Q.

Established 1837 Incorporated 1914

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX
High Speed Steel, Atlas LX
Chrome Vanadium Steel

Carbon Tool Steel
"Deward" Oil Tempering, Non-Shrinking

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

YOUNG, CORLEY AND DOLAN, Inc.

115 BROADWAY, NEW YORK CITY, U.S.A.

PIG IRON

M·A HANNA &Co

"Victoria" Foundry and Malleable, made by The Canadian Furnace Co., Port Colborne, Ont., Canada

M.A. HANNA & Co. Sales Agents: CLEVELAND, O., U.S.A.

JAMES McKAY COMPANY, PITTSBURGH, PENNA., U.S.A.
Manufacturers of

SHELL FORGINGS

We have the Equipment and Experience and can execute orders for

Nose Sockets Base Plates Adapter Plates

For any size Shells. Can execute orders promptly.

SPECIAL FORGINGS—We can make any forging that can be made under Drop Hammers.
CHAINS AND ACCESSORY FORGINGS—We have a complete line.

Address our Representative: JOHN A. BUCHANAN, King Edward Hotel, Toronto

If any advertisement interests you, tear it out now and place with letters to be answered.

Just Off the Press

To Canadian Manufacturers: Your copy of this latest catalog on steel lettering dies and stamps is now ready for distribution.

You will find, we believe, that this is the largest and most complete catalog, covering the particular subject, ever distributed in Canada. It embraces steel dies and stamps that can be used in your plant and every plant in Canada irrespective of the nature of the business.

Fully illustrated with half-tone reproductions. Prices shown so that a minimum of time is required to determine cost of your requirements. Handsomely printed and bound, and of a standard catalog size for easy filing. Forty-six pages of valuable information. Notice some of the subjects covered:

Steel hand stamps.
Steel letters and figures (hand made).

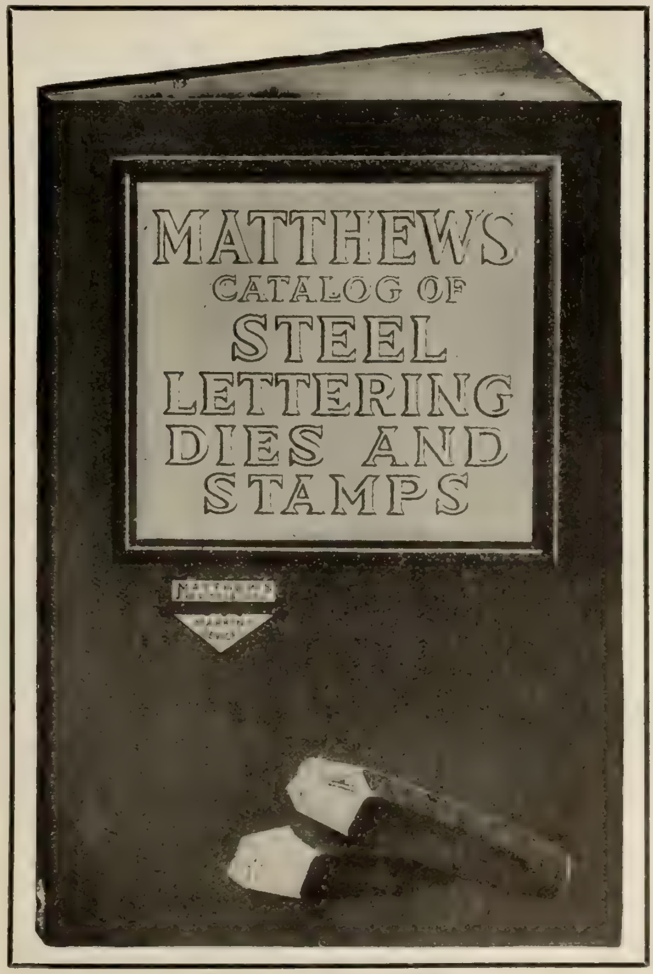
Symbol stamps for inspection.

Nine different styles of interchangeable hand type holders.

Dies for billet marking.

Steel roller stamps.
Stencil dies.

Embossing dies.



THIS IS THE BOOK

Barrel embossing outfits.

Inspection hammers.

Steel dies for use in presses or special marking machines.

Dies for tin plate.

Machines for embossing tags. (metal).

Lumber marking stamps and hammers.

Important Notice: The only catalog ever distributed covering completely all kinds of dies and stamps for shell marking.

Write to the Nearest Branch of Canadian Distributors for Your Copy, or to:

JAS. H. MATTHEWS & COMPANY, Inc.
Pittsburgh *66 YEARS IN BUSINESS* **Pa., U.S.A.**

To better serve Canadian manufacturers and to do business with you in a Canadian way, we announce:

Exclusive Canadian Distributors:
Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Saskatoon, Victoria

Tools Cut Well When Red Hot—

To users of High-Speed Steel this will appear to be an astounding statement, but a trial is all that is needed to convince you that speeds, cuts and heats that are disastrous to High-Speed Steel tools are "Child's play" for tools made of

STELLITE

HIGH SPEED TOOL METAL

MADE IN CANADA
STELLITE

It will astonish you to find that by using Stellite how much you can increase the speed of your lathe, for there is no temper in Stellite.

That is the reason why it cuts as well when red hot as when cold. So you can abolish your cutting compound.

Production—Big Production—is a vital question these days. Stellite will give it to you. Stellite will increase your output 20 to 300% at no cost for extra equipment.

Can you afford to ignore the big production advantages Stellite offers you?

Made in Canada by

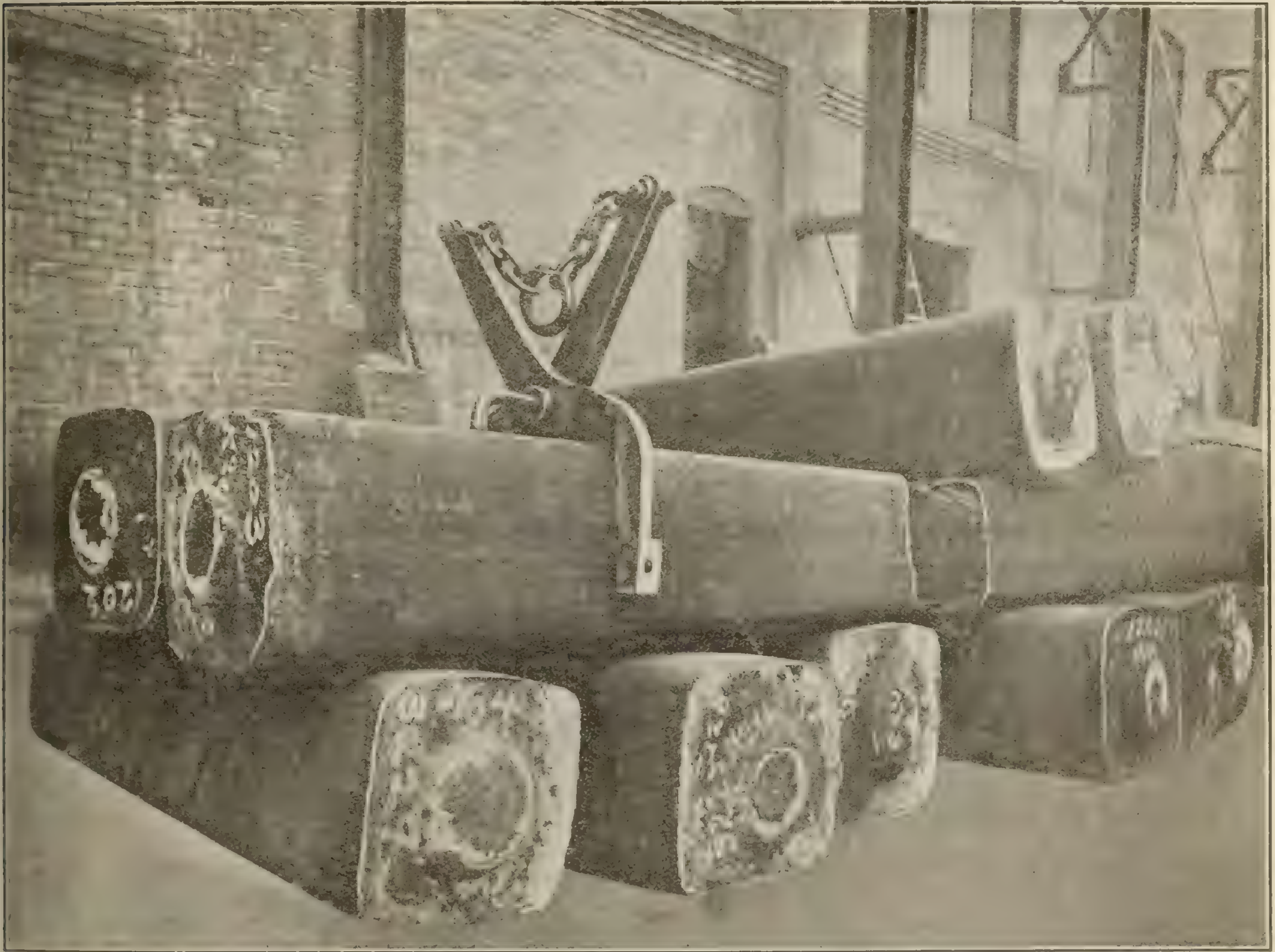
The Deloro Mining and Reduction Co., Limited
DELORO, ONTARIO

The Canadian B. K. Morton Co., Limited
SOLE SELLING AGENTS FOR CANADA AND NEWFOUNDLAND
49 Common St., MONTREAL, QUE. 86 Richmond St. East, TORONTO, ONT.

Nova Scotia Steel & Coal Company

Limited

New Glasgow, Nova Scotia, Canada



THREE AND ONE-HALF AND FIVE-TON "FLUID COMPRESSED" STEEL INGOTS.

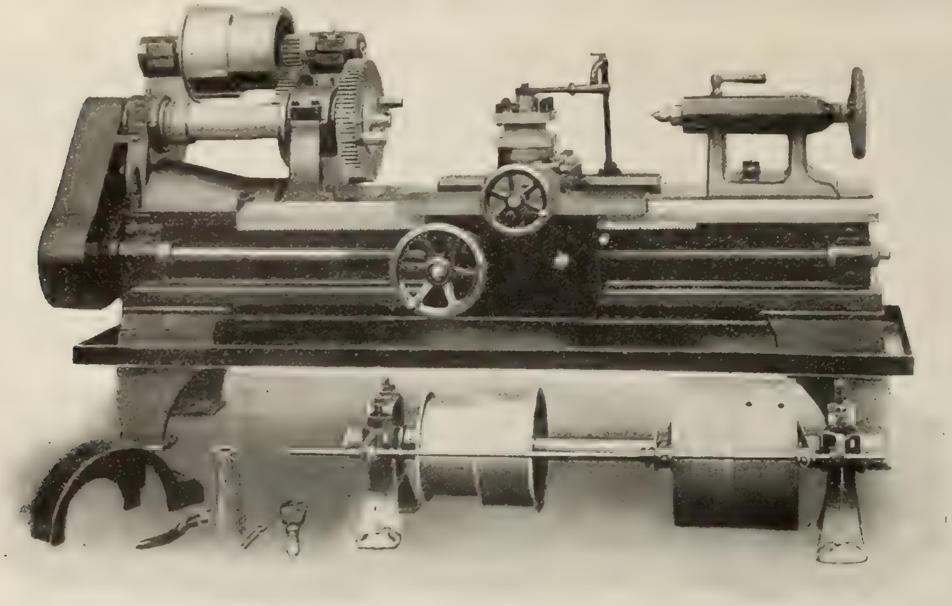
The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress, and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high-grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade; in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.

The Yeates Heavy-Duty Shell Lathe

A Heavy-duty Machine Tool that stands the strain of the shell plant of to-day. A lathe that is built for service and durability—the kind reputations are founded upon.



This lathe is equipped with turret tool-post and screw feed. It is made in two sizes. Small size, o 22" swing lathe will tak 3.25 and 4.5 shells, an large size, or 26" swin will take shells from 6" t 10". These may be mad with heavy turrets a ordered.

Prompt Delivery on Small Lathes.

Yeates Machiner

London, Ontario, Canad

GARLOCK-WALKER MACHINERY CO.

LIMITED

G&W MACHINERY

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

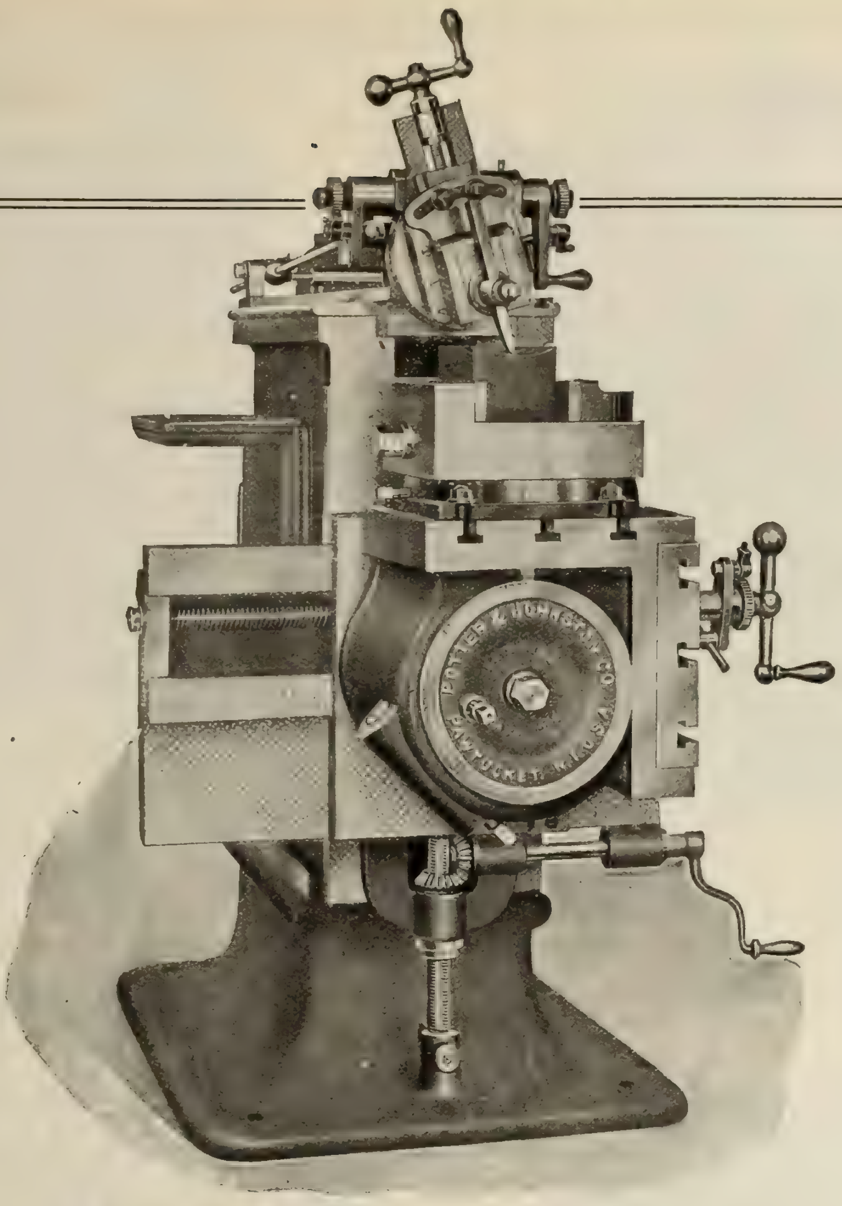
WE HAVE AT TORONTO FOR IMMEDIATE DELIVERY:—

New **Davis 6" Cutting-off Machines,** fully equipped, size of hole in spindle 6⅞".
New **Giddings & Lewis** 18" x 8' Heavy Duty Engine Lathes, 3- step Cone, Double Back Gears, regular equipment.
New Heavy Duty Lathes for turning 8" and 9.2" Shells.
Thor pneumatic hammers and drills.
Appleton Grinder—Challenge No. 1—slightly used.
Special 16,000 lb. 40" Boring Lathes for 6" Projectiles.
Immediate Delivery—Special Price—Write for Cuts, etc.
Good Delivery now on Lodge & Shipley 24" Lathes.
Ask for information about machines for any operation on 3", 4.5", 5", 6", 8" or 9.2" Projectiles.

—Our Experience Is At Your Service—

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds



Potter & Johnston 15-inch Universal Shaping Machine

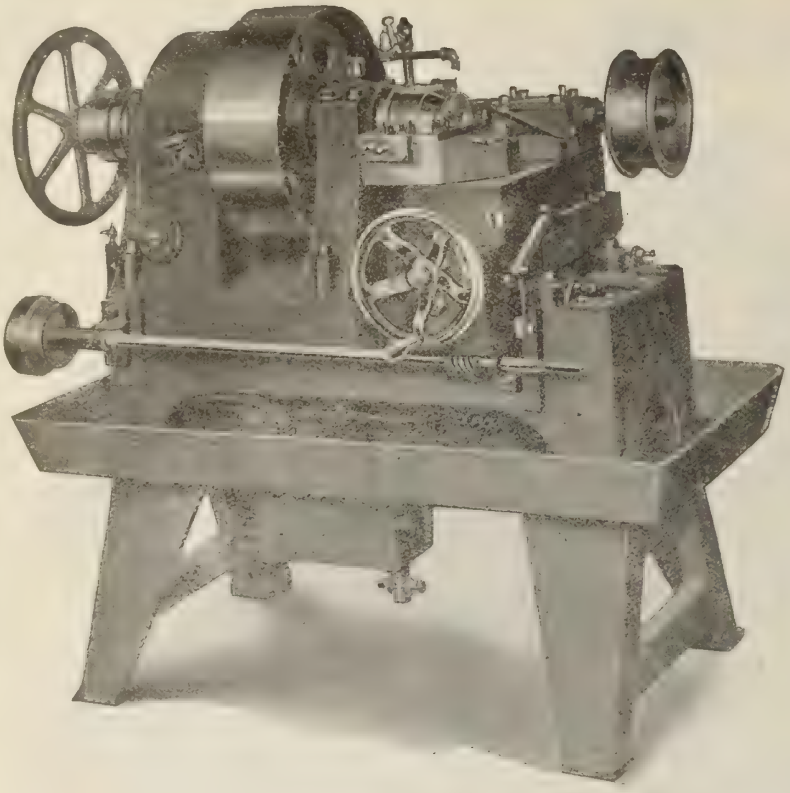
Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA



For Turning, Facing and Milling the thread on Gas Check Plugs for 6-inch High Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells. Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

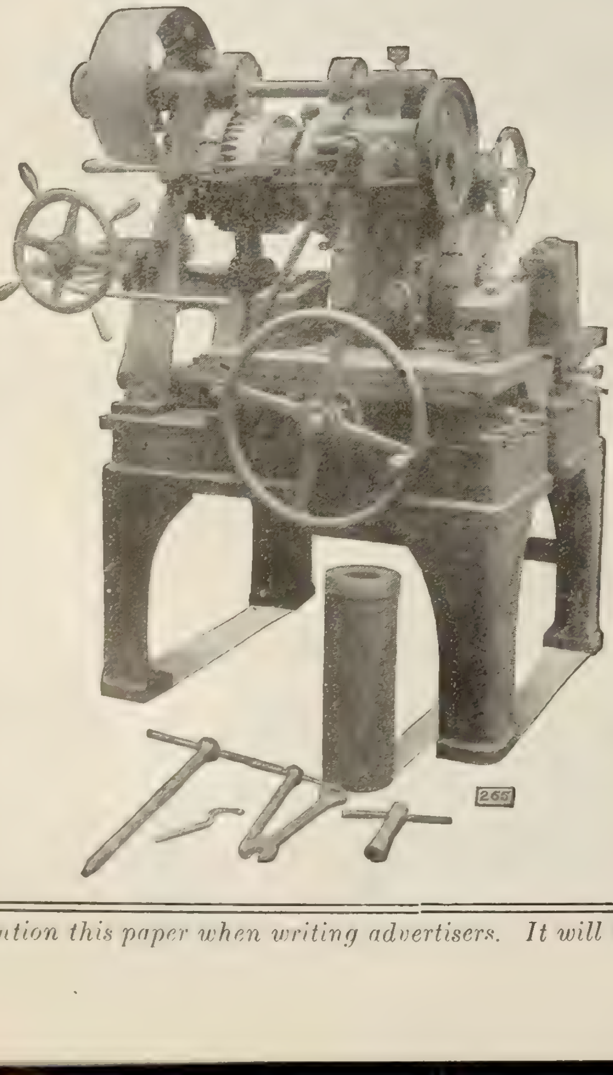
Write for prices and deliveries.

Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield

STAIR BUILDING, TORONTO, ONT.



CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

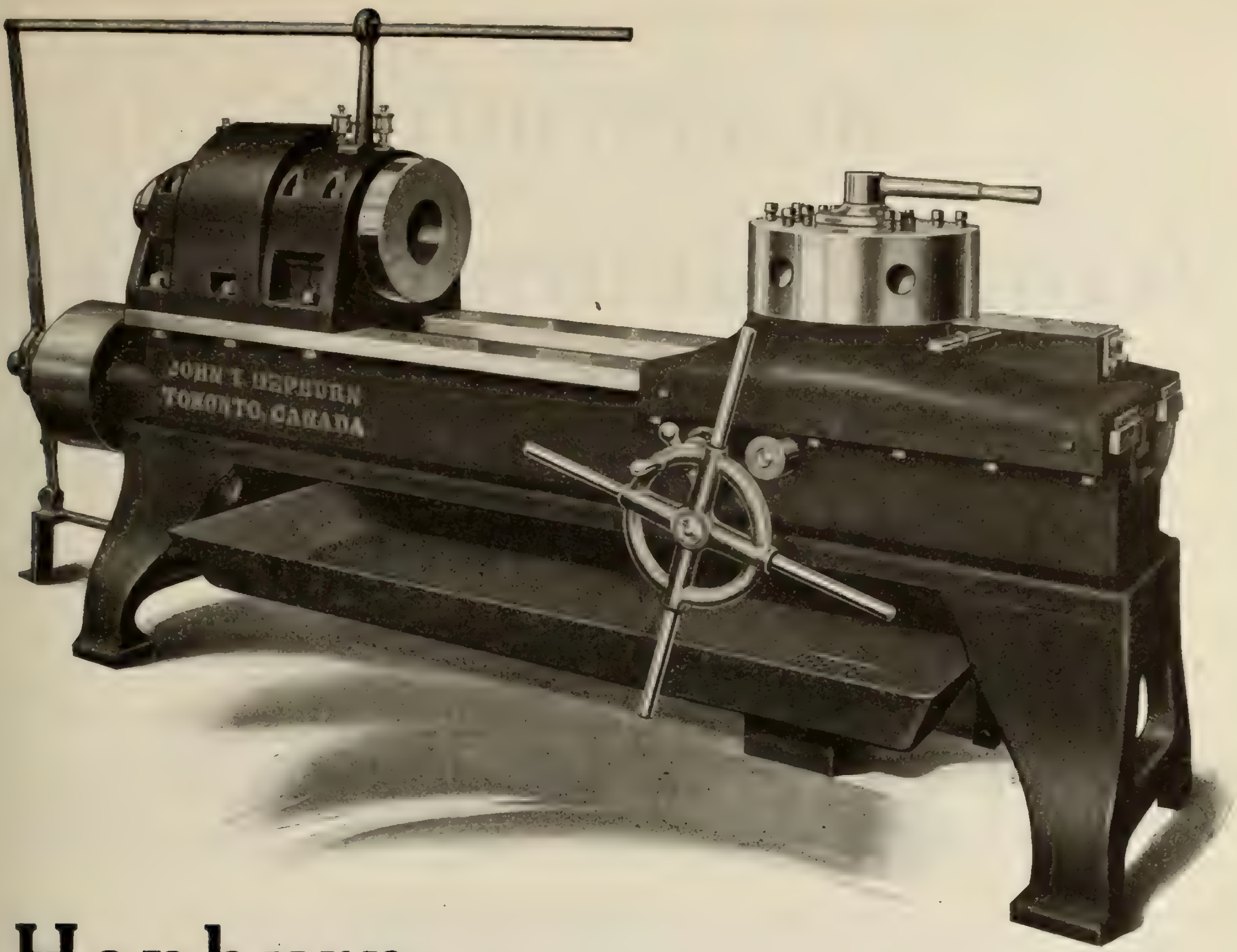
Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE

Wm. Kennedy & Sons
LIMITED

OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal



Hepburn Heavy-Duty Shell Lathes

SPLENDID shop records stand back of Hepburn Shell Lathes—they have proven they are up-to-the-minute machine tools from the standpoint of **speed, accuracy, power, strength, simplicity and design.**

We manufacture Turning and Turret Lathes up to and including 9.2″

We invite correspondence from all in the market for shell lathes.

Quick delivery—Hepburn capacity gives you the advantage of immediate delivery and enables us to give the very best of service.

John T. Hepburn, Limited,
18 to 60 Van Horne Street
TORONTO, CANADA

HEAVY DUTY

Ammunition Lathes

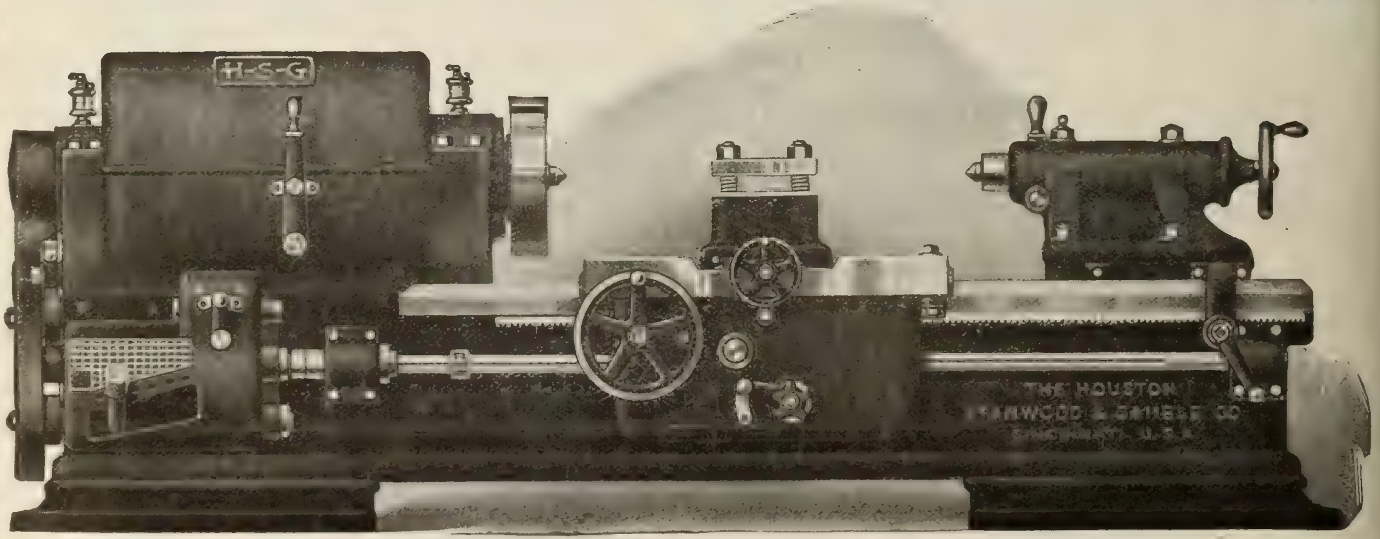
FOR

Immediate Delivery

FULL INFORMATION ON REQUEST TO

HYDE ENGINEERING WORKS

27 WILLIAM STREET - - - MONTREAL, P.Q.



H-S-G TRADE MARK single-pulley, high-powered, all-geared engine lathe built in three sizes, 28", 30" and 36" swing.

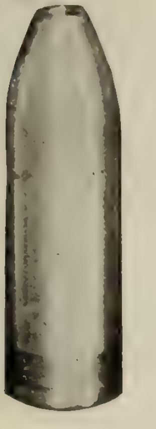
This is a heavy duty lathe. For instance, the 30" swing lathe has 7" face drive pulley, 8" x 10" front spindle bearing and other parts of correspondingly liberal dimensions. The net weight with 13 ft. long bed is 18,500 pounds. The design and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

CINCINNATI, U.S.A.

Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto

BAWDEN



Heavy Duty Shell Lathes

have remarkable shop records

What Have They Done?

This is the question of questions to ask when about to buy a lathe. Not what is the maker's name; not the promise of appearances.

But what have they done in the shop?

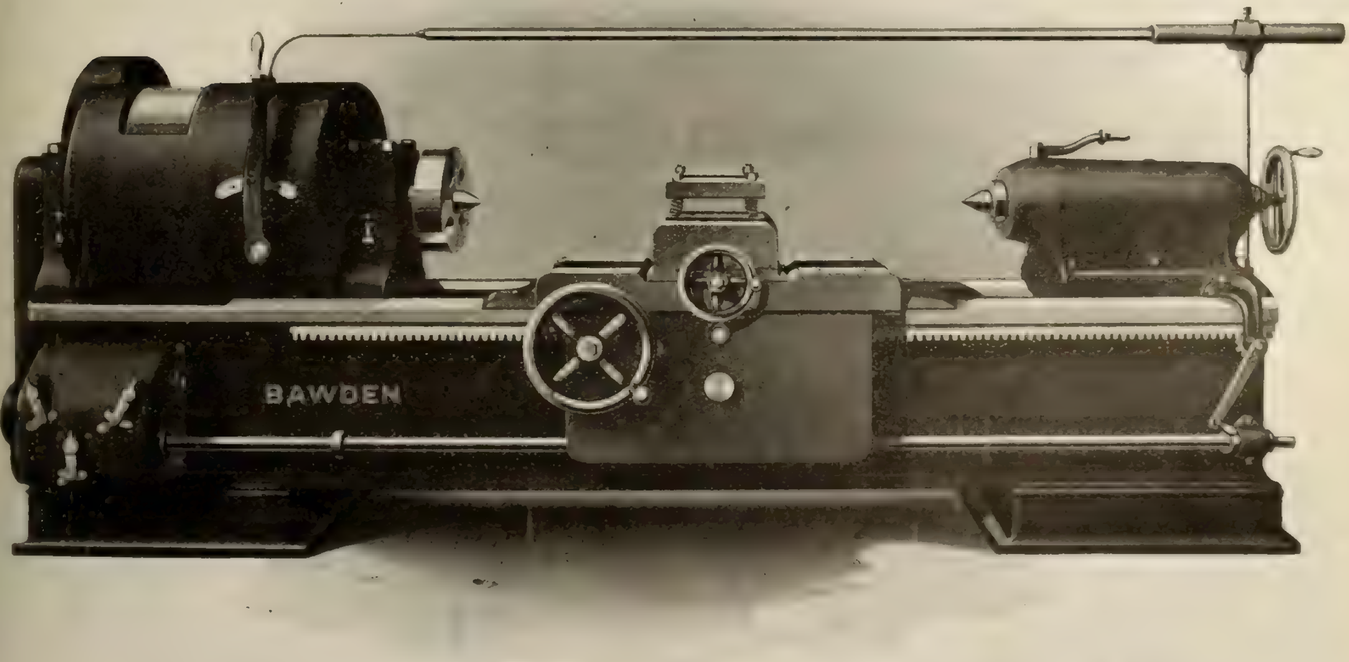
This is the test we invite you to apply in the case of Bawden Lathes. We'll give you their records and the names of the Shops; and you can verify them.

Can you ask a fairer exhibition of our faith in our Lathe?

Bawden Heavy Duty Lathes possess tremendous Strength, are the perfection of accuracy and have complete rigidity.

Send for complete Specifications. Buy our **records**, not our Say-sos.

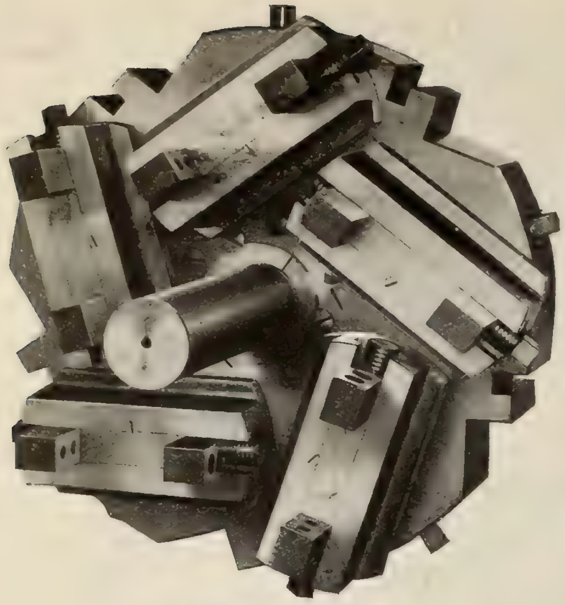
N.B. We manufacture a full line of Gauges for all sizes of British, Russian and French Shells and Component parts



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

The Bawden Machine Co., Limited

TORONTO, CANADA



The HEART *of the* "New Britain" Automatic Chucking Machine

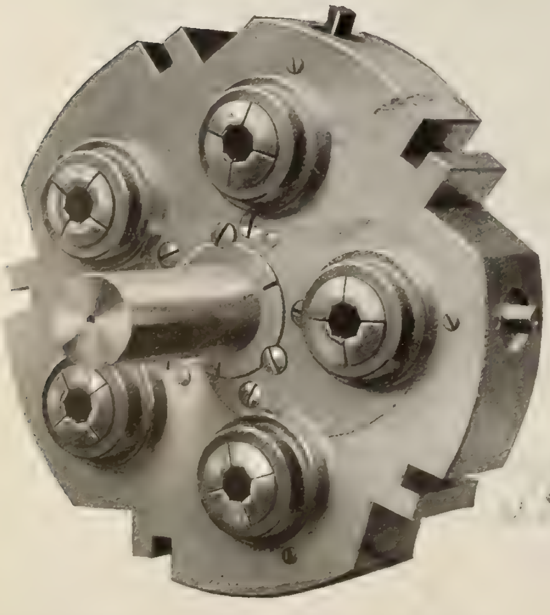
ABILITY to perform all operations **simultaneously,** as well as **automatically** is the secret of the "New Britain" Automatic's extraordinary productions in handling castings, forgings and second-operation screw-machine work.

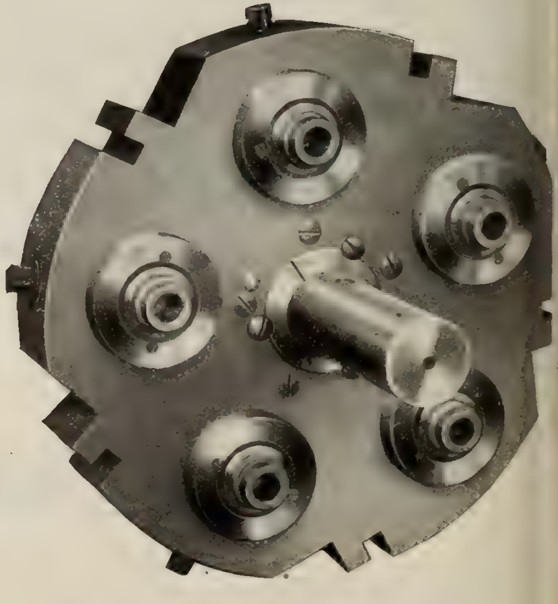
The heart of the machine is the universal turret, adapted for accommodating interchangeably the several work-holding devices illustrated: two and three-jaw chucks, draw-back collets and threaded draw-back arbors.

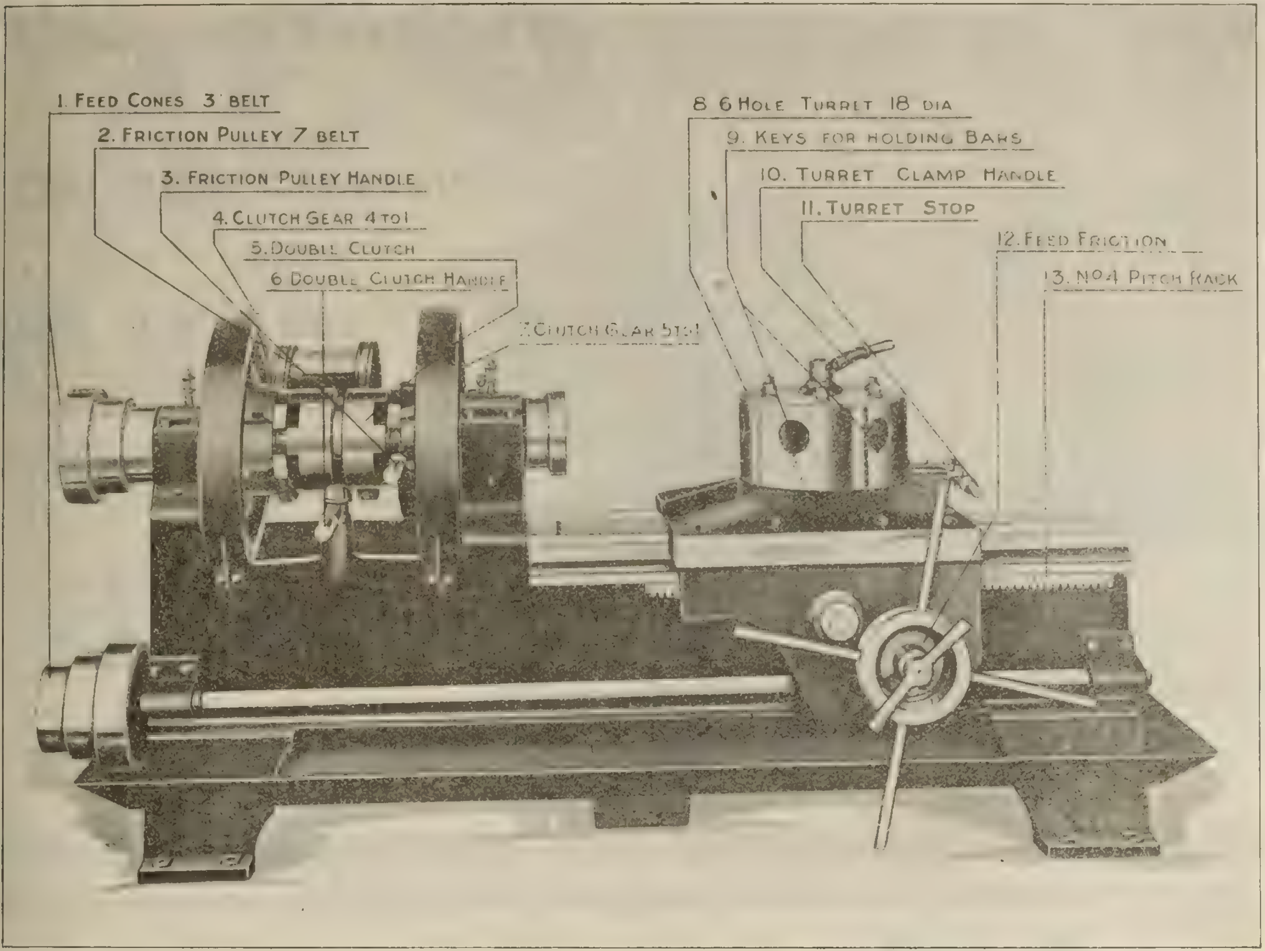
Four or five pieces of work (according to variety of operations) are thus advanced to the tool-carrying spindles at once. The provision of one more chuck than spindles allows finished piece to be removed and rough blank to be inserted without loss of time while the machining operations are progressing in all the other turret positions.

Does a 300% to 500% increase in production appeal to you? Send blue-prints of chuck work and let us show you how it can be obtained.

THE NEW BRITAIN MACHINE CO., NEW BRITAIN, CONN., U.S.A.






1. Feed Cones 3" belt
2. Friction Pulley 7 belt
3. Friction Pulley Handle
4. Clutch Gear 4 to 1
5. Double Clutch
6 Double Clutch Handle
7. Clutch Gear 5 to 1
8 6 Hole Turret 18 dia
9. Keys for holding Bars
10. Turret Clamp Handle
11. Turret Stop
12. Feed Friction
13. No 4 Pitch Rack

SPECIAL SHELL LATHE

For boring and turning shells from 9.2 down. Above cut shows bed turret for boring operations. We have them in stock for both boring and turning.

Among other good features, note the following:—

No. 1—3" belt on feed.
" 2—7" belt and 75 H.P. friction.
" 8—18" turret.
" 9—Keys for boring bars.
" 12—External Feed friction.
" 13—Four-pitch rack.
Note ratio of gearing.

Note Sheet Steel Oil Pan.
No countershaft required.
Bronze bearings throughout.
Sight feed oilers.
Hardened and ground thrust collars.
An overplus of strength throughout.
Workmanship guaranteed.

This lathe will give you satisfaction.

Immediate Shipment From Stock
(Subject to Prior Sale)

The Foundry & Machine Co., Limited
1167 Carriere Road
Montreal, Canada

NOSING DIES

of

CHILLED CAST IRON

FOR

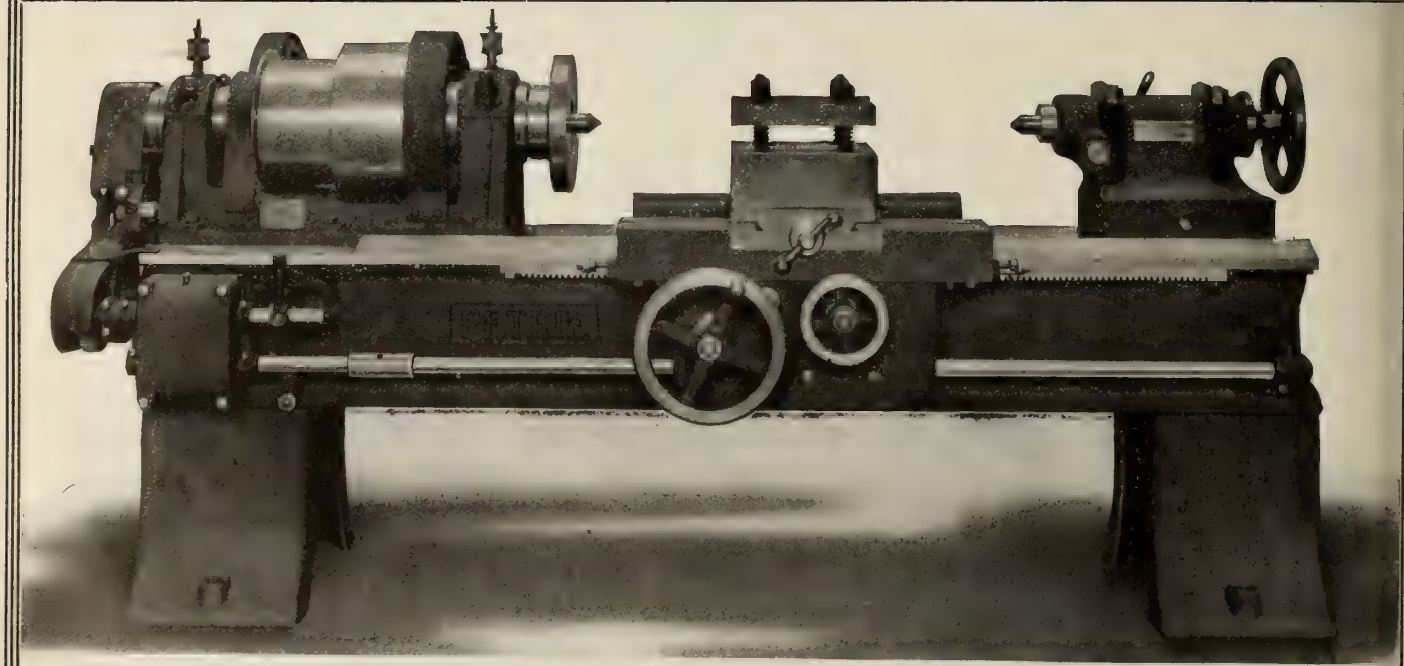
4.5", 5" and 6" H.E. Shells

We have one in use now that has nosed over 21,000 shells and is still doing business.

CHEAP AND EFFICIENT

Write or wire for particulars.

Marsh & Henthorn, Ltd.
Belleville, Ontario



Petrie 20-inch Heavy Duty Manufacturing Lathe

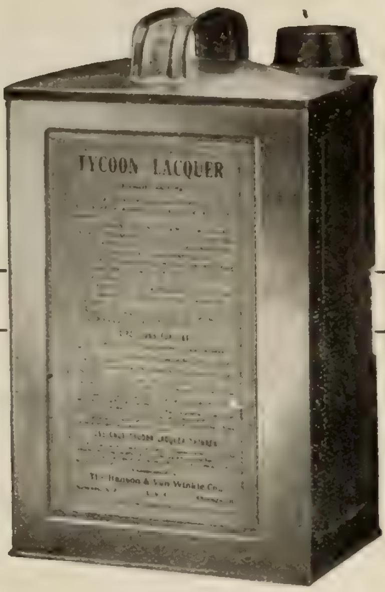
A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

Made in Canada Reasonable Price Prompt Deliveries

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.

LACQUERS



For All Metals

Made in Canada

OUR PRODUCT—About twenty-five years ago we began the manufacture of all kinds of lacquers for metals. We have always employed high-priced, skilled experts, who exercise every precaution in all branches of the manufacture. During these years our experts have been constantly experimenting, sparing neither labor nor expense, which has been the means of bringing our product to its present high standard.

We do not recommend the use of cheap lacquers, but can furnish them when required. Cheap lacquers are for cheap work only. It has always been our aim to maintain the highest possible standard in the quality of all our lacquers. We are manufacturing the full line of high-class material as made by the Hanson-Van Winkle Co., Newark, N.J., and as we carry a complete stock of all grades, can assure the Canadian trade of prompt shipment from Toronto, thus saving custom duty and avoiding long delay in transit.

Submit your proposition and secure our advice.

Our men will gladly call at your plant and make a personal study of your requirements.

Ask us to send you samples.

The Canadian Hanson & Van Winkle Company

15-25 Morrow Avenue, West Toronto, Canada

SHELL WORK

CISCO 18-in. Engine Lathes

are being used on

12-INCH SHELL WORK

WHY?

Because they are **superior** to almost **any 20-inch, equal to many 22-inch** Lathes made in **Strength, Durability and Accuracy**

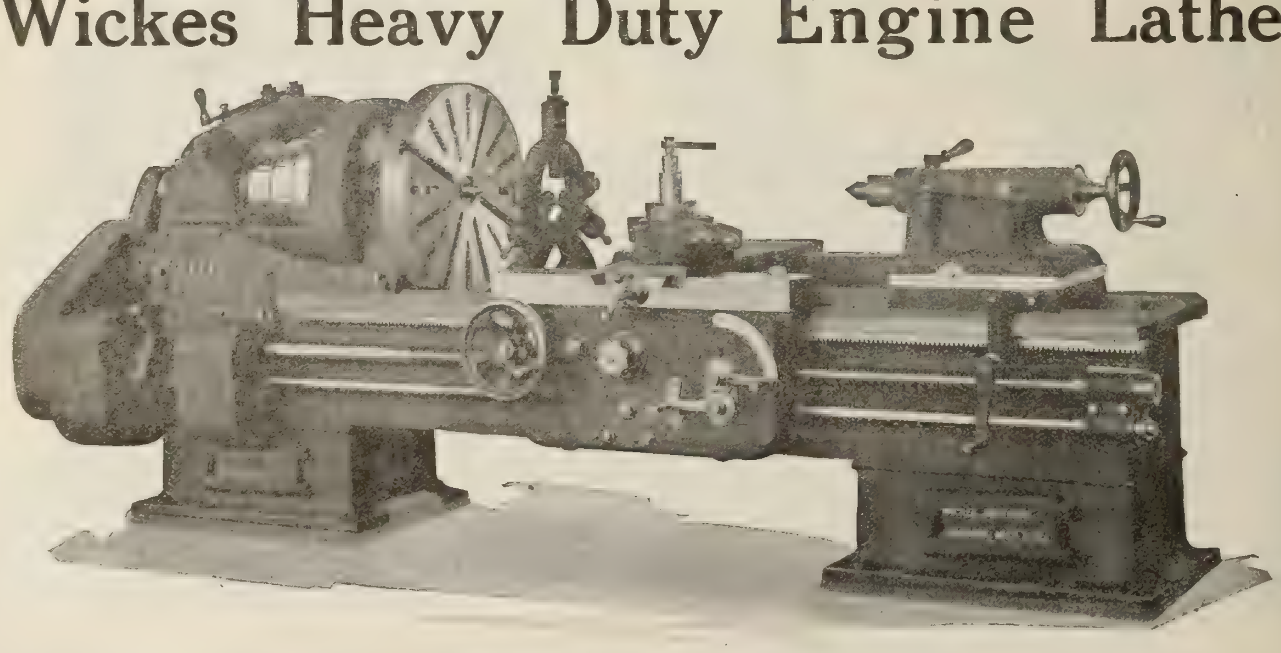
BUY THE LATHE WITH THE PULL

Sold in Canada
by
WILLIAMS

Made in Cincinnati U.S.A.
by
THE CINCINNATI IRON AND STEEL CO.

Makers of 14-in., 16-in., 18-in., 24-in. Engine Lathes

Wickes Heavy Duty Engine Lathe



The Wickes 26″ Heavy Duty Lathe.

Built in lengths from 8 ft. up. Has 3-step cone, is double back geared and has double plate apron.

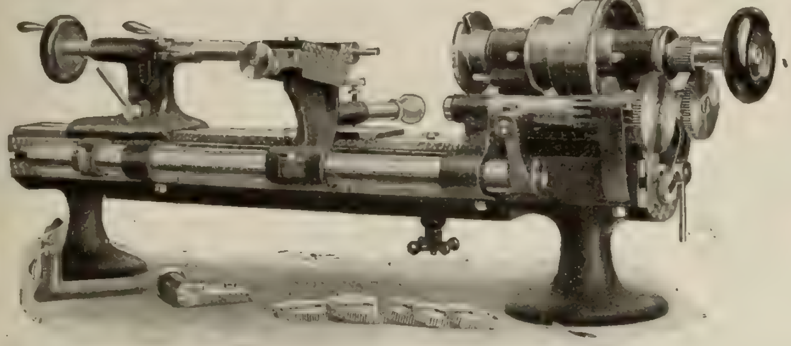
This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.

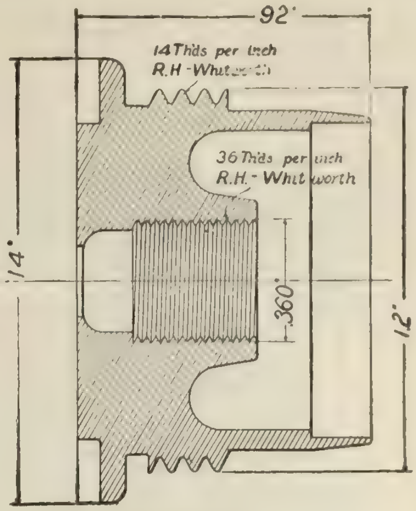
Let us tell you about this lathe and our 20″, 32″, also our 17″ Rapid Production Lathe for Automobile and other work.

We can make prompt shipment.

WICKES BROTHERS Saginaw, Michigan

THE CATARACT BENCH LATHE WITH CHASING ATTACHMENTS





We have sold many of our lathes to Canadian concerns who are eminently satisfied with results. Will you be next?

For work requiring greatest accuracy and rapidity, THE HARDINGE CATARACT BENCH LATHE will not disappoint you. Machine equipped with Automatic Chuck Closer for rapid operation of chuck, and with chasing bar arranged with multiple point, chasing tool is producing from ten to twelve hundred 14-pitch Whitworth threads on primers in TEN HOURS. Prompt deliveries. Catalogue No. 15 is ready to mail TO YOU. You are invited to write for it to-day.

HARDINGE BROTHERS, Inc., 1770 Bertau Ave., CHICAGO, U.S.A.

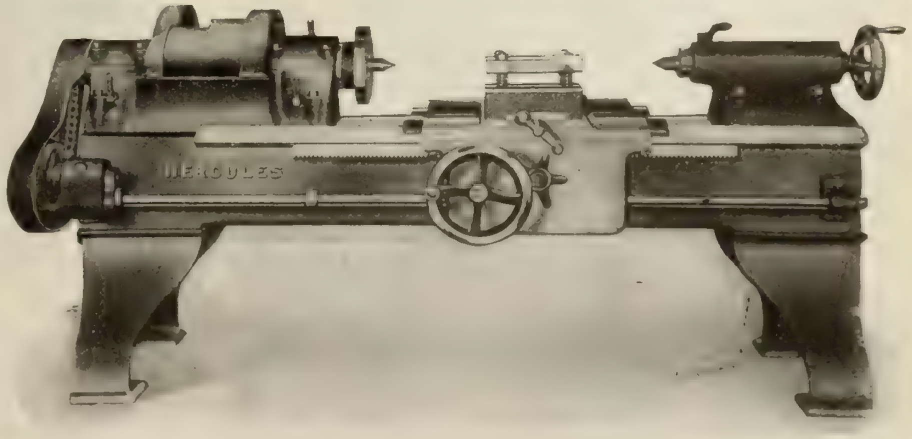
How Lathe Simplicity Solves Labor Problems

The great simplicity, the compact, convenient design, make the Hercules Lathe an ideal single-purpose machine. To train an unskilled laborer to perform accurately one or two operations on this machine requires but a short time. The rugged, powerful construction then enables that laborer to turn out precise work continuusly at the maximum speed.

Where skilled mechanics are not always available — the Hercules Single-Purpose Lathe is the logical machine tool.

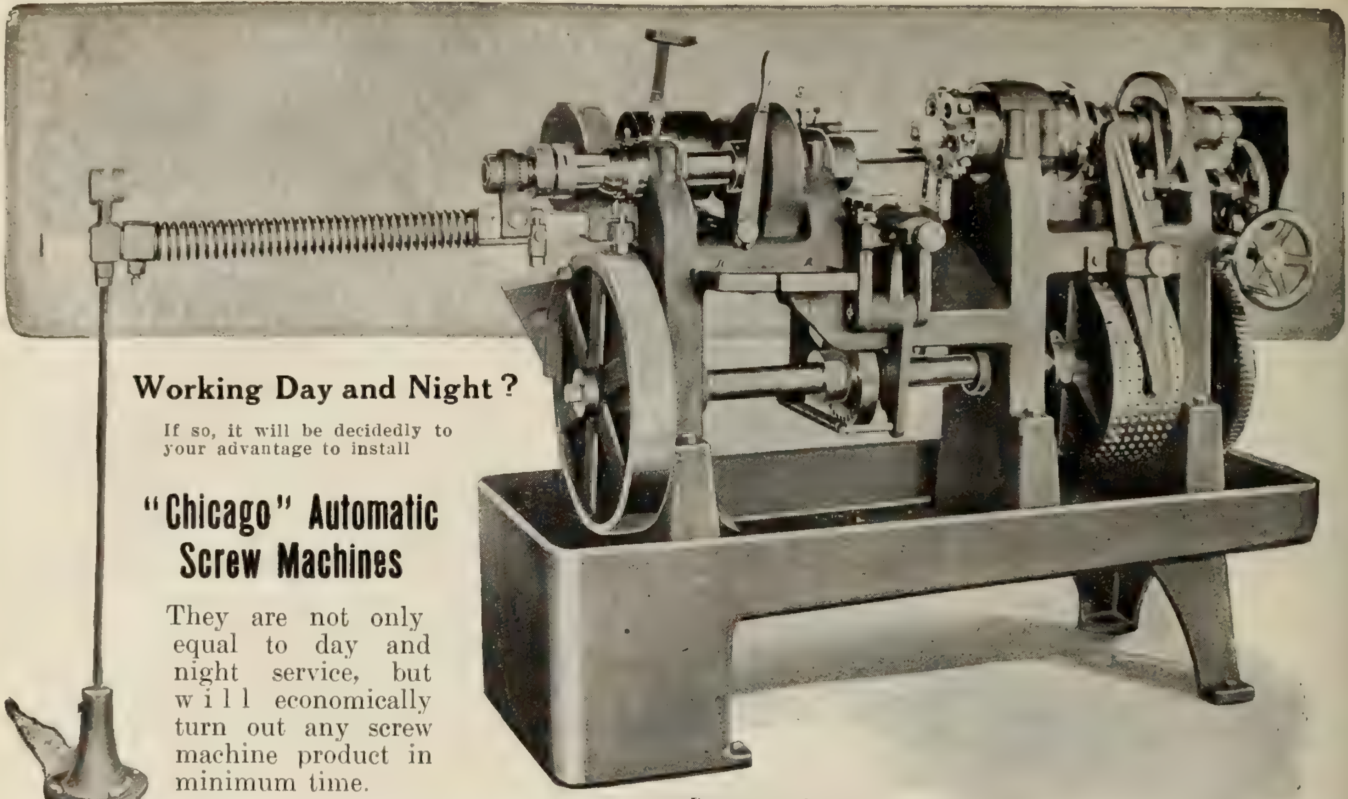
At the present time, we can still make early deliveries.

Write—at once — for full details.



HIMOFF MACHINE COMPANY, INC.

128 MOTT STREET, NEW YORK CITY



Working Day and Night?

If so, it will be decidedly to your advantage to install

"Chicago" Automatic Screw Machines

They are not only equal to day and night service, but will economically turn out any screw machine product in minimum time.

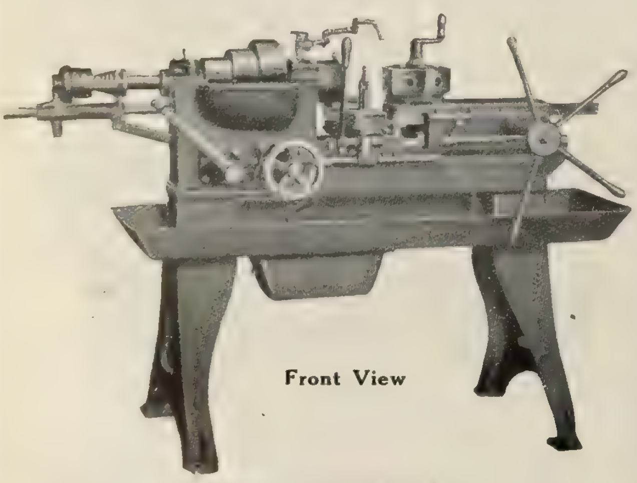
Drop a card now for specifications.

READY FOR OPERATION IN YOUR PLANT IN LESS THAN SIX WEEKS from the time your order reaches us.

The John MacNab Machinery Co., 90 West Street NEW YORK.

European Representative: John MacNab, Hyde, England.

The "Steno"
1"x7" TURRET HAND SCREW MACHINE



Front View

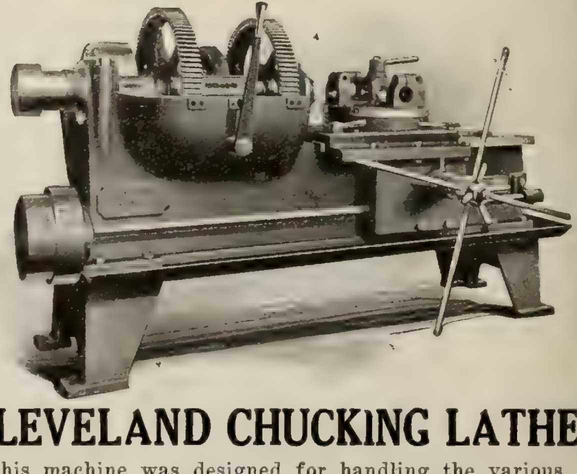
IMMEDIATE DELIVERY

Increased production enables us to offer a limited number of these exceptionally well built machines for immediate delivery.

THE STENOTYPE COMPANY
INDIANAPOLIS, INDIANA, U. S. A.

Makers of the "STENO" Duplex Surface Grinder and "STENO" Milling Cutters, Reamers, Fixtures, Jigs and Gauges.

Unskilled Labor Can Produce High-Grade Work with the



CLEVELAND CHUCKING LATHE

This machine was designed for handling the various drilling, turning, boring and forming operations on 3" to 6" shrapnel and high-explosive shells. It is rugged, powerful, easy to handle, and will produce the same uniform, accurate results with unskilled labor as other machines with experienced mechanics. That's a big point to consider now that skilled men are hard to get. Let us show you the possibilities of these machines. We can make prompt deliveries of machines with solid turret, turret on cross slide, and with tail stock.

Circular on request.

CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE OHIO, U.S.A.

The Ford-Smith Machine Company

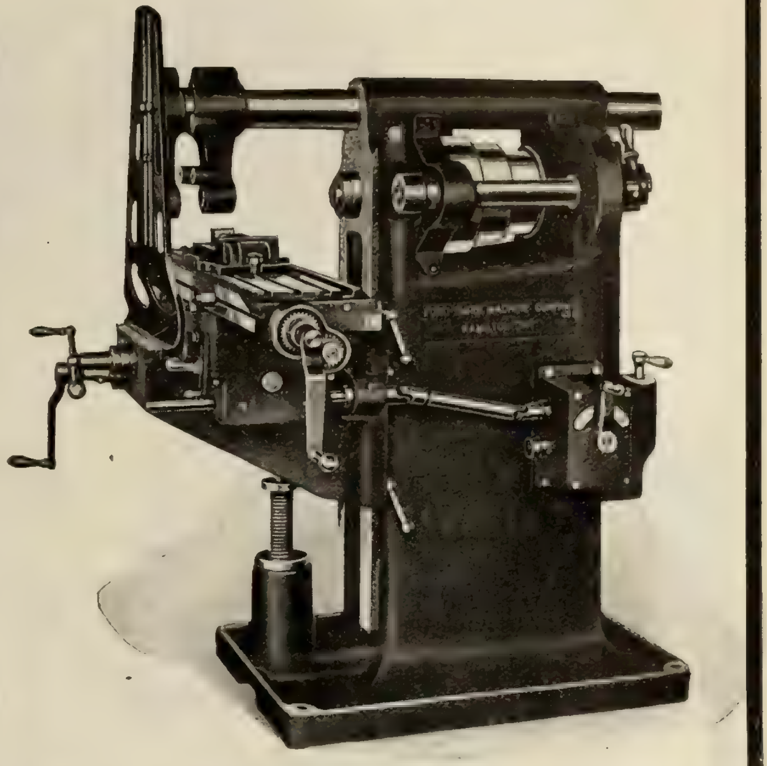
SIMPLICITY DESIGN DURABILITY WORKMANSHIP

Ford-Smith

27" x 19" x 7½"

Milling Machines

We can make interesting deliveries on these machines, either through our regular dealers or direct from our plant.

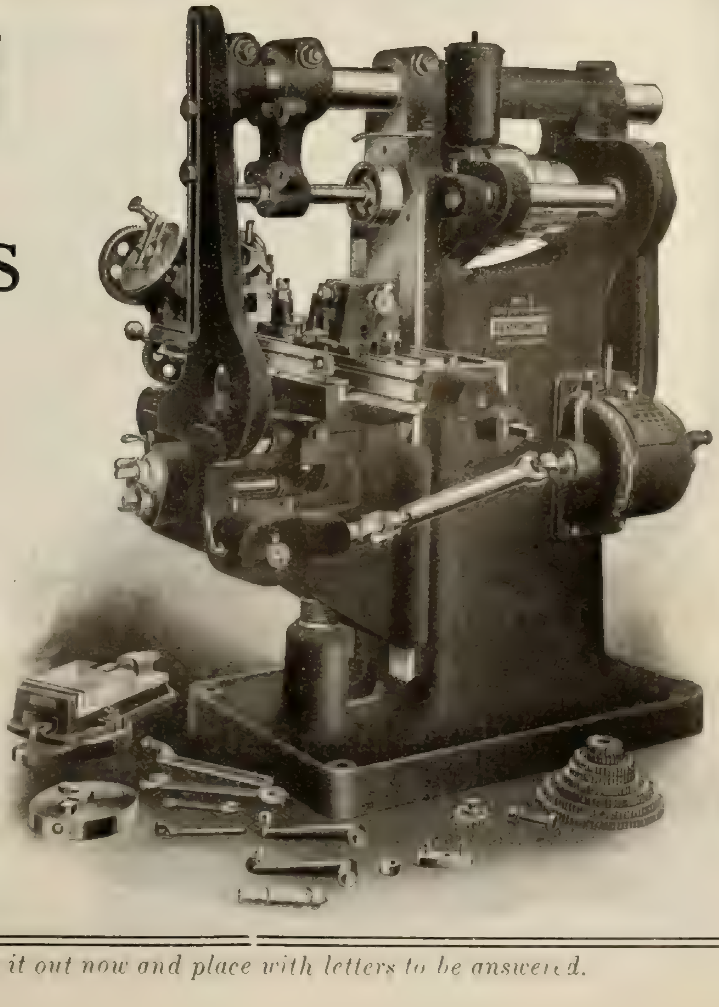


Our Catalog illustrates various features exclusive with Ford-Smith Millers and will be gladly forwarded on request.

The Ford-Smith Machine Company
LIMITED
Hamilton - - - Canada

KEMPSMITH

UNIVERSAL MILLING MACHINES



When installing a Universal Milling Machine for tool room work, one of the prime considerations is simplicity of machine and convenience of operation.

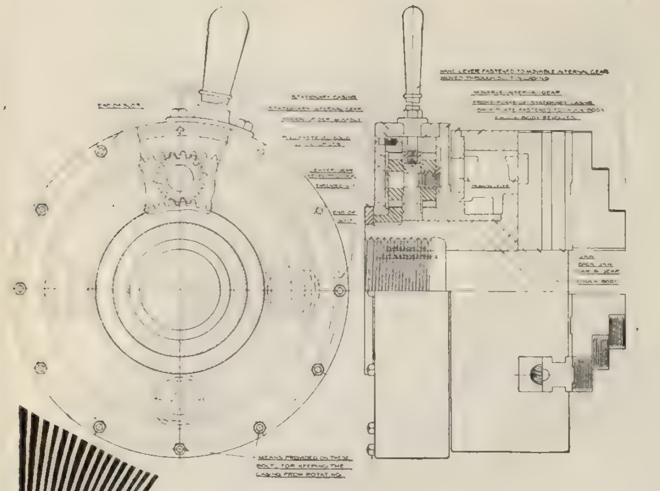
Kempsmith Milling Machines are notable leaders in these two requirements. Note especially that all feeds are reversed by one lever at the front of the knee. Likewise all power feeds are tripped and engaged by one compound lever, also located at the extreme front of the knee. The swiveling table is clamped rigidly at any angle by a quarter turn of a single bolt.

Our catalogue illustrates and describes more fully the features mentioned. A copy will be gladly sent on request.

Kempsmith Manufacturing Co.
MILWAUKEE, U. S. A.

Agents:—Foss & Hill Machinery Co., Montreal
General Supply Company, Toronto and Ottawa
Western Supply and Equipment Co., Calgary

Study the Diagram



And Know Why

Barker Wrenchless Chucks

Are different from any others.

One unique feature and striking achievement in machine shop practice is the ability to open and close it while the machine is in motion.

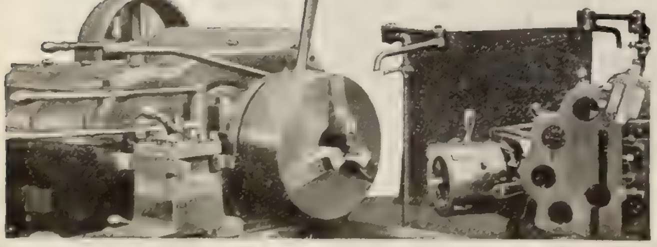
The operating mechanism is combined with the chuck proper, forming a single unit. It takes no more and possibly less time to mount than an ordinary chuck.

The planetary gear arrangement is so enclosed that no chips, dirt or grit can injure it—it is strong, sturdy and durable—not an experiment, but a tried and proven piece of mechanism.

Eliminates cost of installation of air compressor pipe system, valves, etc., and does the work more effectively. Overhang one-third less than any air chuck same capacity.

Send for free illustrated descriptive literature—it is worth money to you to investigate. No obligation incurred.

Thomas Elevator Co.
20 S. Hoyne Ave.
Chicago, Ill.



Once Known—Always Used

M. E. C. Collapsible Taps

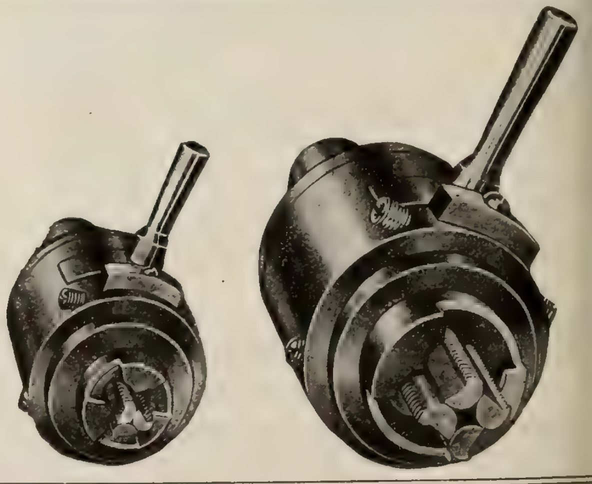
are giving extraordinary service on Shrapnel and Cartridge SHELL work.

It will be Greatly to your interest to get a line on the value of this tap. WRITE SOME USERS—we'll gladly send names and addresses.

Full particulars and details of our liberal proposition on request.

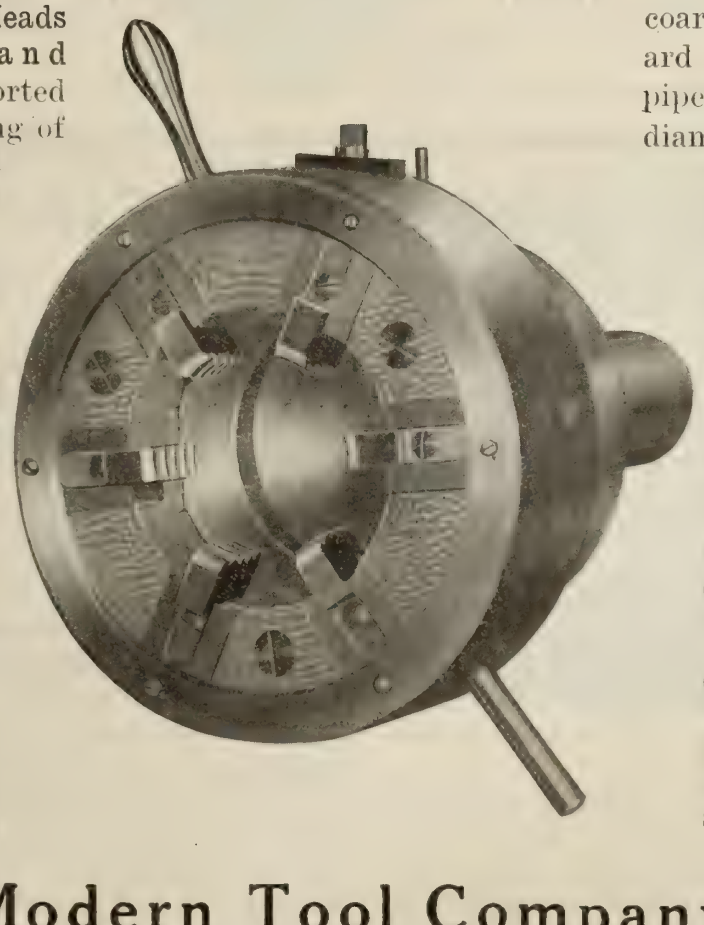
Manufacturers Equipment Co.
175 North Jefferson St., CHICAGO, U.S.A.

Canadian Agents:
A. R. WILLIAMS MACHINERY CO., Winnipeg
GEO. A. TODD, 826 Traders Bank Bldg., Toronto



The "Modern" *Speed* Die

SPEEDS UP OUTPUT AND ELIMINATES SPOILED PIECES



"MODERN" Die Heads are Self-opening and Adjustable —supported to insure the cutting of a perfectly straight thread of full size and accurate lead.

Plenty of chip room—Cleaning Improvement which permits cleaning without dissembling the head.

The Chaser Blocks, in which the Chasers or cutting dies are held, are firmly supported by a tool steel cam ring.

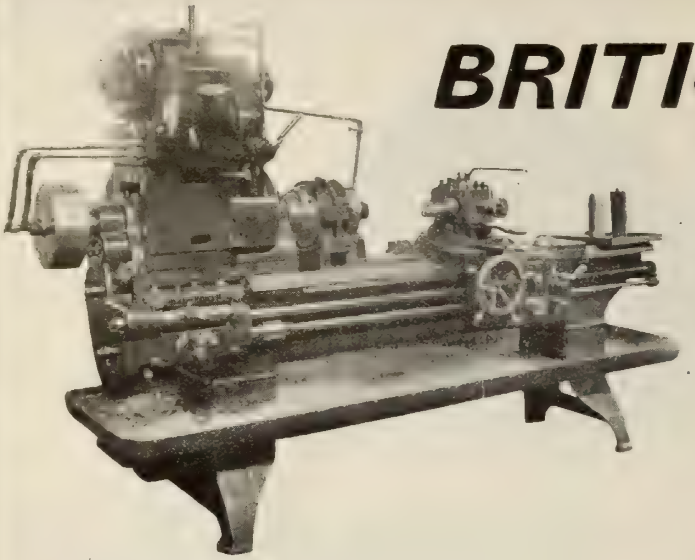
Sizes range from 1-16" to 6"—made in a single style that will cut all threads, coarse or fine, of standard or special pitch and pipe threads, on any diameter within the capacity of the respective Heads, and any length.

If interested in a larger output of precision work and a wider range with a minimum investment, write for information regarding "MODERN" Self-opening Die Heads.

On shell work "MODERN" Dies are being recognized as the standard threading tools.

Modern Tool Company

Main Office and Works: State and Peach Sts., Erie, Pa.



BRITISH "TANKS"

Increase Efficiency of Allies

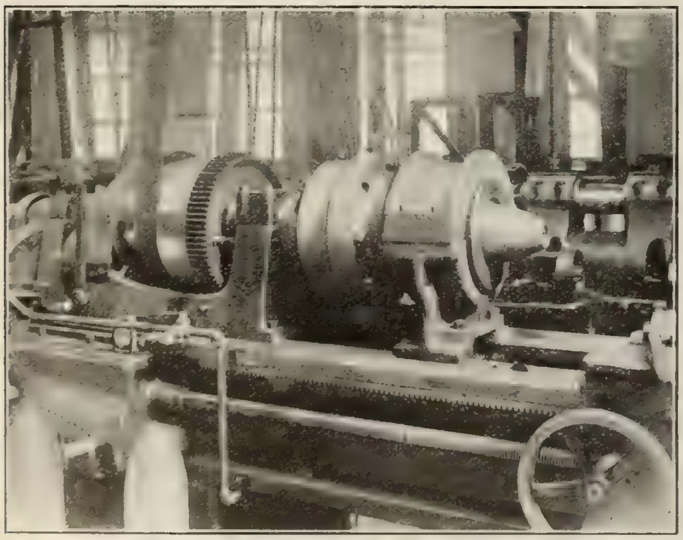
THE manufacturers behind this gigantic war machine must also increase their efficiency by installing reputable time and labor-saving devices in their machine shops.

The air-operated Collet Chuck shown in the illustration has increased the chucking efficiency of this Turret Lathe 20% to 25%.

Mail Blue Prints for estimates.

Our air-operated Chucks, Mandrels and Arbor Presses are being used extensively by Shell Manufacturers in both Canada and United States, and in no instance have they failed to live up to our guarantee as time and labor-saving equipments.

J. R. Stone Tool & Supply Co.
DETROIT, MICH.



Cut shows Chuck on nosing operation. This is one of over two hundred in this Canadian plant.

A Big Efficiency Unit in Your Shell Plant

A. J. LAVOIE'S

LOW PRESSURE

Compressed Air Chuck

This chuck can be applied to any make of lathe, without alteration to the machine, and will increase production from 25% to 75%. It grips and releases the shell while in motion—no need to stop your machine.

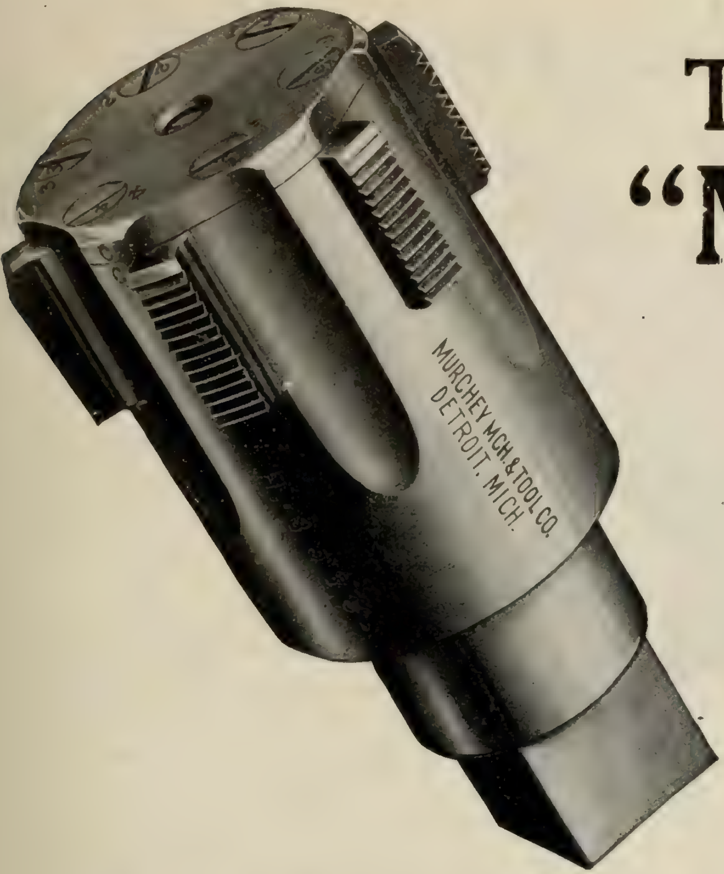
It is a single unit combination attached to the face plate of lathe, supported by an additional heavy duty bearing, thus making a heavy duty lathe out of a light machine. A small lever operates the chuck. Will operate with a pressure of 60 lbs. per sq. in.

This chuck is **built on the duplicate part system. It is simple, effective and fool-proof.**

It grips the shell in a predetermined position. The jaws will not slip on the shell. It has shell interior and exterior adjustable stops

A trial on one of your lathes will convince you that this is THE Chuck for shell work.

The Montreal General Tool Co.
673-5 Notre Dame Street, Maisonneuve, Montreal, P.Q.



The New
"Murchey"
Six Chaser
Hand Sizing
Tap

One set of these chasers will last as long as a solid tap. They can be ground any number of times and adjusted each time to compensate for wear. When chasers wear out they can be replaced at a low cost.

You cannot grind a solid tap without sacrificing size and accuracy. After one or two sharpenings the tool is of no further use—it is scrapped.

These new Murchey Taps set a much higher standard of tap service and economies—try them and see for yourself. We are confident that you'll want more when you get a taste of their remarkable value.

Can only be furnished on 2" size and larger.

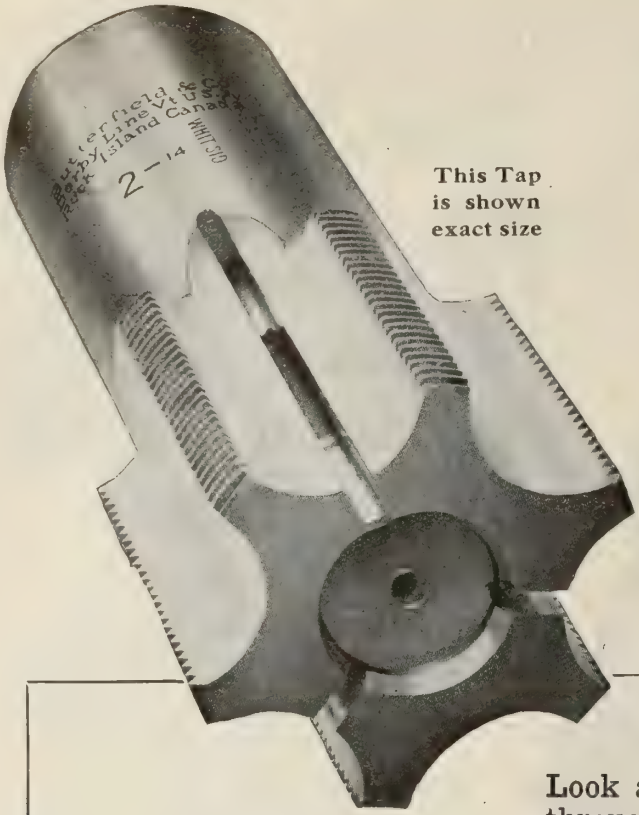
This tool furnished with a pilot ahead to pilot the tap if desired.

We manufacture collapsing taps and self-opening dies.

Send for full details. A post card will do.

Absolutely
Accurate
↑
Ten Times
More Durable
Than the
Solid Tap

Murchey Machine & Tool Company
75 PORTER STREET **DETROIT, MICH., U.S.A.**



This Tap
is shown
exact size

For—

FASTER FEEDS
FASTER SPEEDS
LONGER SERVICE

Look at that solid strength through the shank of this tap — it means power that will stand up under the heavy strain of exceptional production.

BUTTERFIELD
TOOLS

are the highest development of over 35 years' experience.

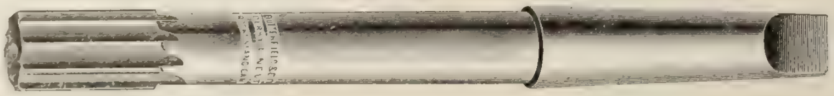
Try them and you'll have a new idea of tap service, economy and efficiency.

Our new catalog illustrates and describes all the Butterfield Products. May we send you a copy?

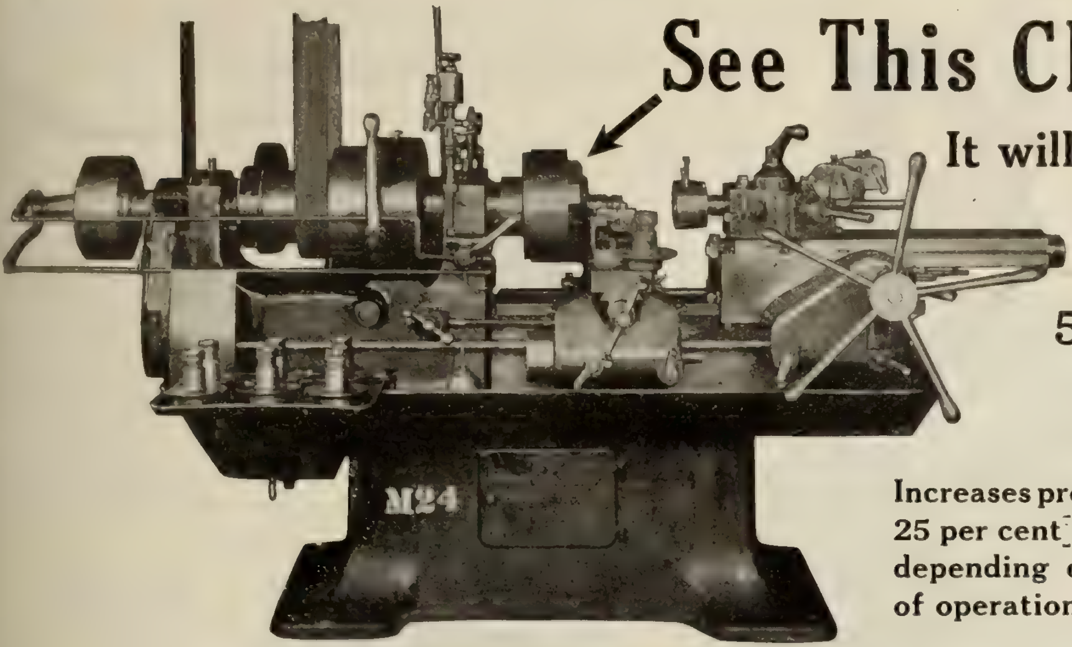
Butterfield & Company, Inc.

ROCK ISLAND, QUEBEC
Toronto Office: **826 Traders Bank Bldg.** - **H. A. Harrison,** ***Manager***
PHONE MAIN 1382

Taps,
Dies



Reamers,
Etc.



See This Chuck!

It will Chuck a Piece of Work in 5 Seconds

Increases production from 25 per cent to 50 per cent, depending on the length of operation.

Are you making Shells, Shrapnel, Fuses or Piston Rings?

If you are, get in touch with us. We want to lay a cost-cutting plan before you. We want to prove to you that

Detroit Pneumatic Chucks

will chuck a piece of work in five seconds. THIS is just about fifty-five seconds quicker than it can be chucked by hand.

The shorter the operation, the more chucking and the greater the saving with DETROIT "AIRGRIP" CHUCKS.

They fit all hollow spindles and are made entirely of steel. Gripping power is adjustable.

Made in two-jaw and three-jaw types. All sizes from 6" to 18" diameter.

Our Chucks are made entirely of steel; our workmanship is of the very highest grade; our air cylinder is a decided improvement over anything else on the market, as packing on piston is adjusted automatically.

We are just completing a new factory which will be in operation in thirty days and will be the largest and best equipped plant in the United States for the exclusive manufacture of pneumatic chucks.

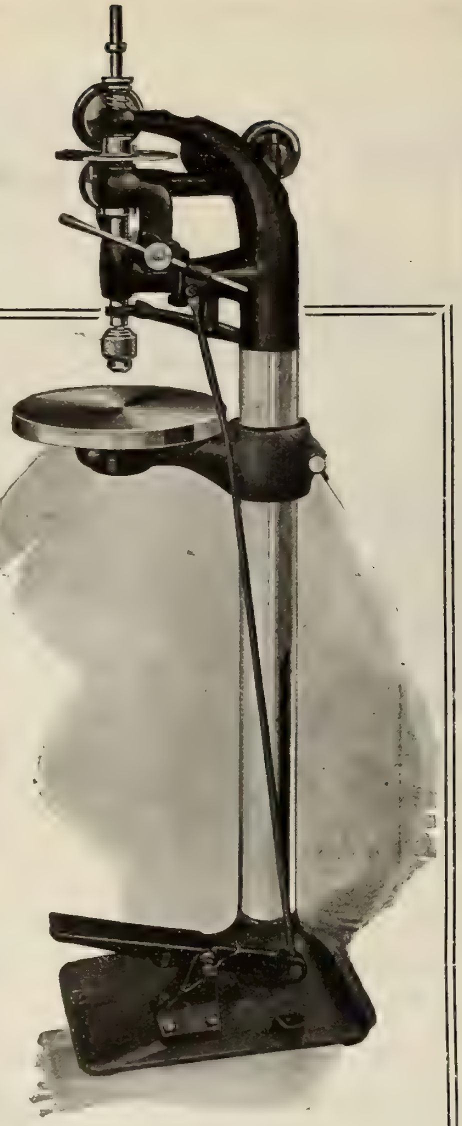
We have some open territory and will be glad to hear from good, live agents.

"We can chuck parts of any kind"

DETROIT PNEUMATIC CHUCK CO.

DETROIT, MICHIGAN

This Tapper Lowers Costs



Our claim is that the

R. & S. Tapping Machine

is the speediest and most sensitive tapper built. This claim is based on a knowledge of what other tappers do.

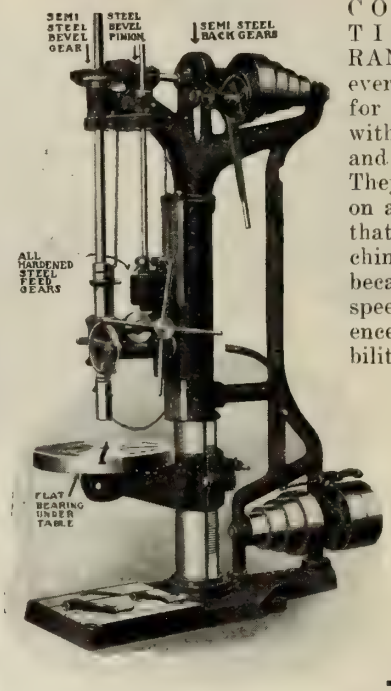
If our claim is borne out by the testimony of its users and by the performance of the Machine itself, there is sound reason why you should at least investigate the R. & S. Tapping Machine.

Our Catalogue will give you fuller particulars. Send for it.

Rickert-Shafer Company
Erie, Penna. U.S.A.

Agents for Great Britain—ALFRED H. HERBERT, Limited, Coventry, England.

AURORA
Drilling Machines



COVER AN EXCEPTIONALLY WIDE RANGE OF WORK, and every provision is made for handling this work within closest time limits and at lowest labor costs. They will save you money on any work in your shop that's suitable for machine tools of this kind because of their unusual speed, accuracy, convenience, strength and durability.

Ask for Details.

Stationary Head, sizes 20"-21"

Sliding Head, sizes 22"-44"

The Aurora Tool Works
AURORA - IND.

You can drive high speed drills up to 2½" diameter

with the new box-column type

Heavy Duty "Rockford"
Drilling Machine

THE ROCKFORD

This Rockford machine tool meets the most exacting requirements.

It is **STRONG, RIGID, ACCURATE AND FAST,** with individual features. Built in three styles.

ROCKFORD DRILLING MACHINE CO.
ROCKFORD, ILL., U. S. A.

Rockford Machines Cut Costs.

HEAVY MACHINERY FORGINGS

Best
Open-Hearth Steel
Hydraulically Pressed
and Annealed

We are fully equipped for the manufacture of heavy Marine and Locomotive Forgings, such as Crank Shafts, Connecting Rods, Axles, Crank Pins, etc. We also do a general line of Heavy Blacksmith Work.

We are equipped to give you the very best there is in quality and service.

LET US SHOW YOU. Send a Trial Order. Our prices are moderate.

Canada Forge Company, Limited

WELLAND, ONTARIO

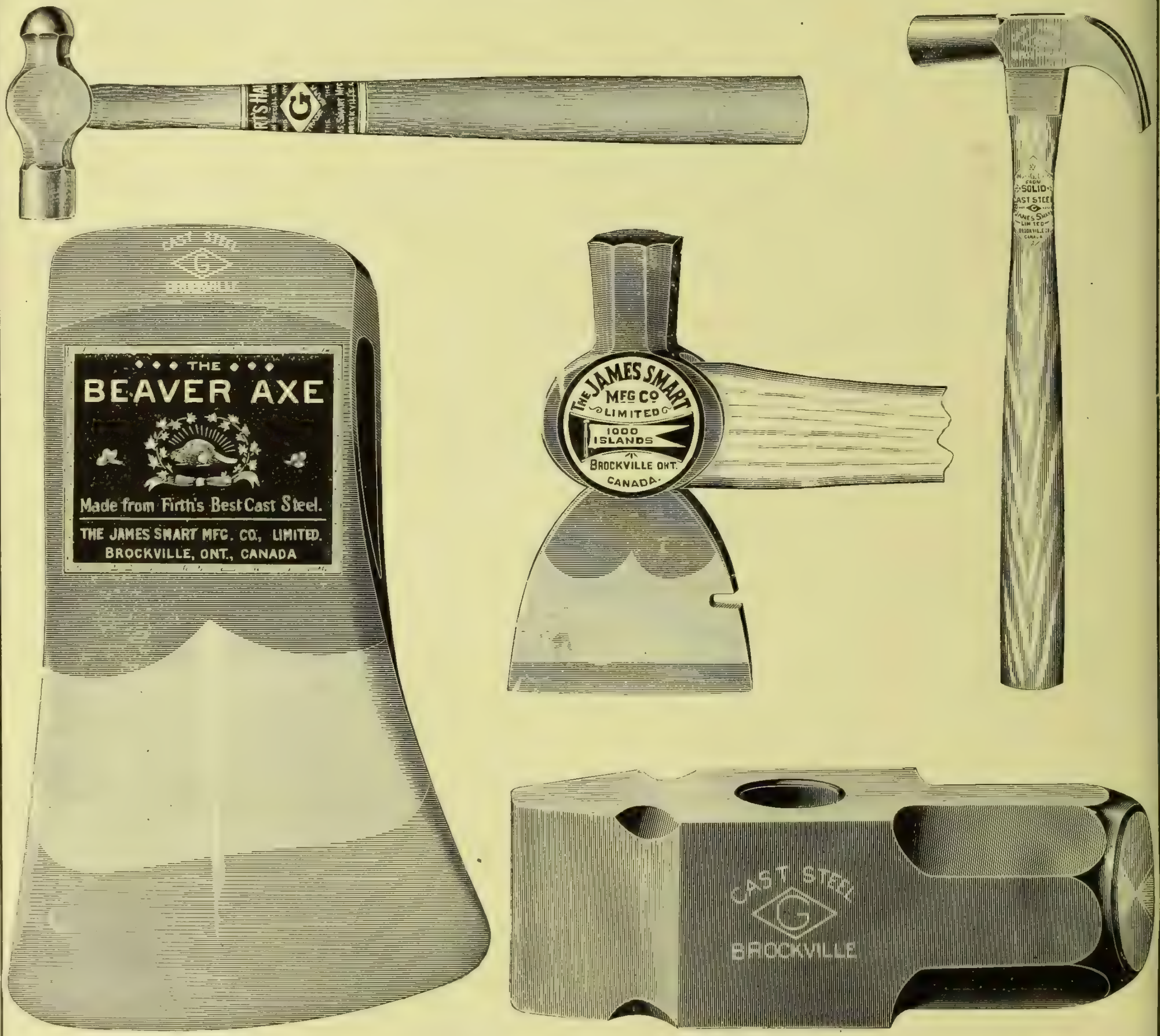
Some of the Lines of High-Grade

HAMMERS, SLEDGES, HATCHETS AND AXES

Manufactured at the Brockville Plant of

Canada Foundries and Forgings, Limited

(The James Smart Mfg. Co., Limited)


CAST STEEL
G
BROCKVILLE
THE BEAVER AXE
Made from Firth's Best Cast Steel.
THE JAMES SMART MFG. CO., LIMITED
BROCKVILLE, ONT., CANADA
THE JAMES SMART MFG CO LIMITED
1000 ISLANDS
BROCKVILLE ONT.
CANADA
SOLID
CAST STEEL
CAST STEEL
G
BROCKVILLE

Catalogues and all information promptly furnished on application.

Address:
The James Smart Mfg. Company, Limited
Brockville, Ont. and Winnipeg, Man.

British Representatives:
Canadian United Mfrs. Agency, Limited
12 Charterhouse Buildings, London, E.C.

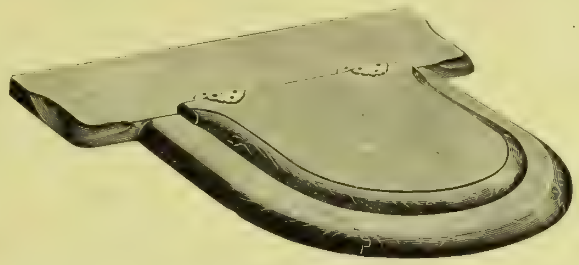
If any advertisement interests you, tear it out now and place with letters to be answered.

Established 1854

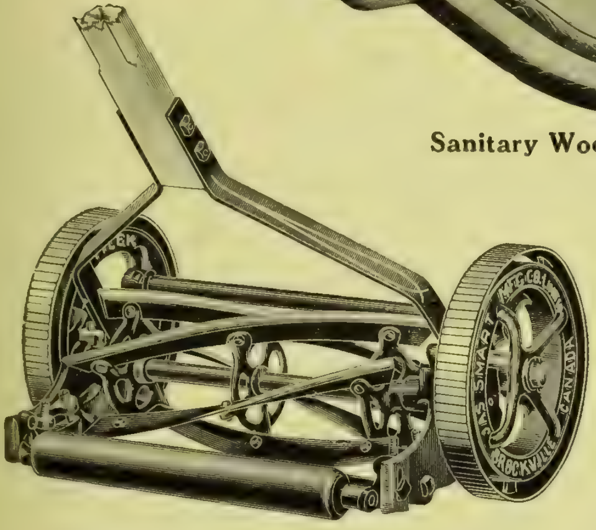
The James Smart Mfg. Co., Limited

Brockville, Ont.

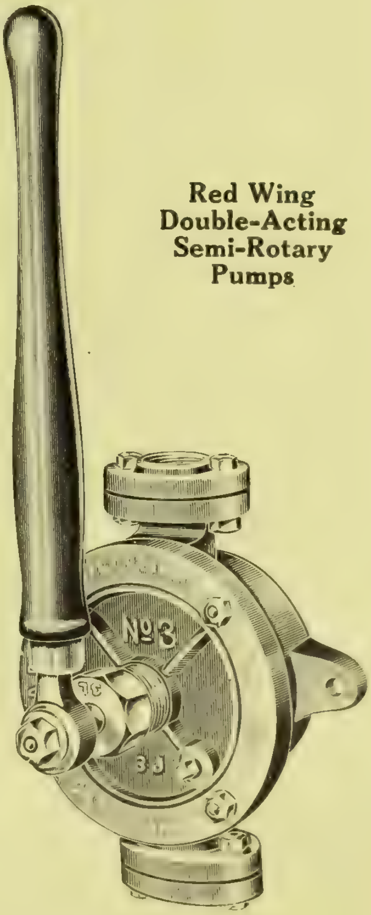
Owned and operated by Canada Foundries & Forgings, Limited



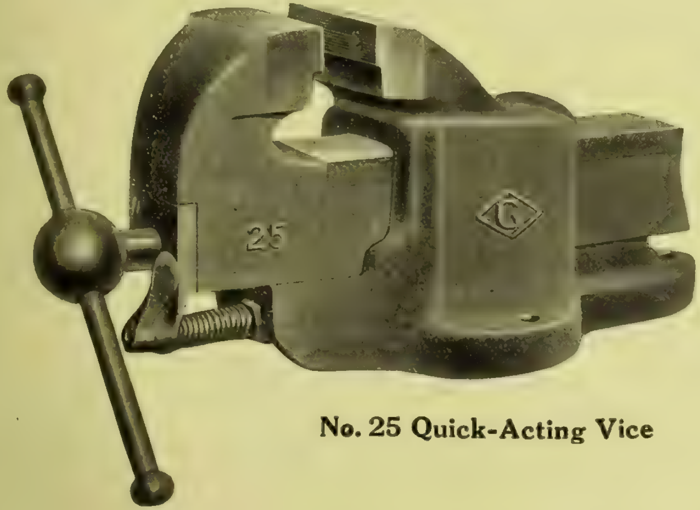
Sanitary Woodenware



"Brockville" Lawn Mowers



Red Wing
Double-Acting
Semi-Rotary
Pumps



No. 25 Quick-Acting Vice

Above are illustrations of a few of our Export Specialties.

Our lines embrace:

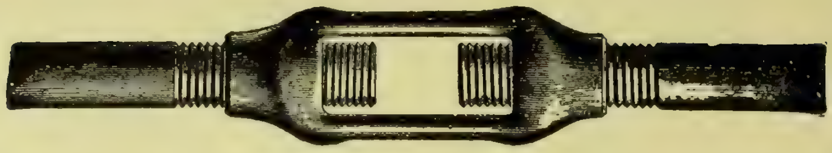
STOVES, RANGES AND FURNACES

HARDWARE—Builders', Housefurnishing, Cabinet Makers', Carriage Makers' and Stationers'; Pumps, Jack Screws, Lawn Mowers, etc.

TOOLS—Hammers, Sledges, Hatchets, Axes.
School Furniture, Plumbers' Cabinetware.

Catalogues and all information promptly furnished

British Representatives: Canadian United Mfr's Agency, Ltd.,
12 Charterhouse Bldgs., London, E.C.



TRADE MARK

Plyers,
Structural Wrenches,
Track Wrenches,
Machine Wrenches,
Eye Bolts, Lathe Dogs,
Journal Box Wedges,
etc.

ALL KINDS OF SPECIAL DROP FORGINGS

Send Models or Blue Prints for Estimates
WRITE FOR CATALOG.

A TRIAL WILL CONVINCE YOU THAT DEALING WITH US IS VERY PROFITABLE.

Canadian Billings & Spencer
LIMITED
Welland, Ontario

CELFOR

We Make Just One Line—

High-Speed Tools

IT stands to reason that, since this is our only line, we've gone ahead very far ahead – in quality, ahead in design, ahead in the efficiency of our tools.

No other business or line of manufacture interferes with our single business. This means that our whole energies and all the facilities of our plant are devoted to the making of high-speed tools.

The significance of this, that we keep on hand ample stocks to fill orders *promptly.*

Celfor
TOOL
COMPANY

Our catalogue—see illustration. Ask for it by its number—No. 15. This catalogue you ought to have if you use high speed tools.

Yours for your name and address.

Type "J" High-Speed Twist Drill—gives maximum speed—and the maximum number of holes per grind—and good, clear down to the shank.

Celfor Tool Company

Buchanan, Mich.

Canadian Agents: Rudel-Belnap Machinery Company, Toronto, Montreal

The "Famous Five" Files

are cut from special steel, made to our own formulas, which formulas have proven best after years of investigation and practical experience.

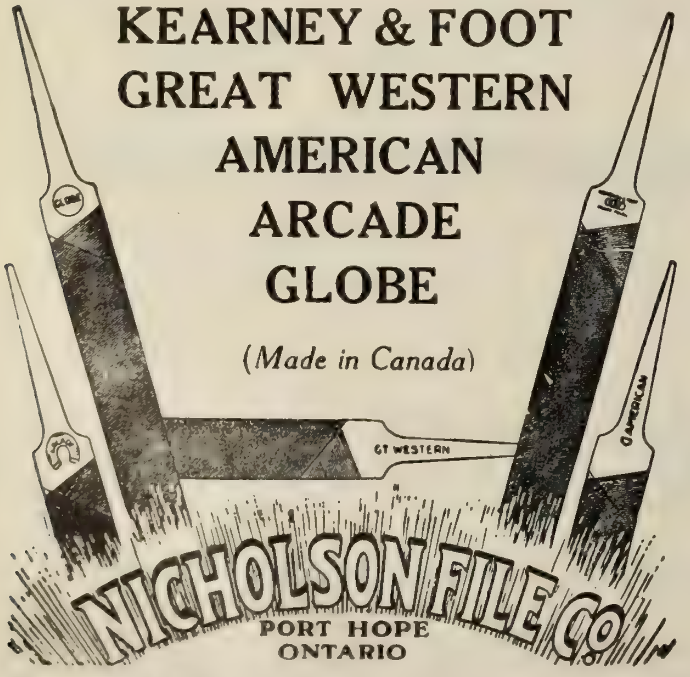
The "heat treatment" of the steel differs for various grades of Files, and the teeth are especially adapted to the kind of work they are intended for.

Among the "Famous Five" there is an exact type of File for your grade of work. Specify it when you order.

The "Famous Five" Are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(*Made in Canada*)



PORT HOPE
ONTARIO

Shell-Steel Cutting Time

on the PEERLESS High Speed Heavy Duty Metal Cutting Saw

PEERLESS
PEERLESS MACHINE CO. RACINE WIS. U.S.A.

Owing to the toughness of this material it was selected for cutting time, and under extreme feed the actual time on cutting 5 in. round is 7¼ min. Regular stock blade was used, 12 x ¾, 18 gauge, 10 pitch.

A machine that will stand up for such heavy duty work must be properly designed and rigidly constructed, and to stand the wear and tear the right grade of material and workmanship must be embodied, and that is just what you will find in the PEERLESS High Speed.

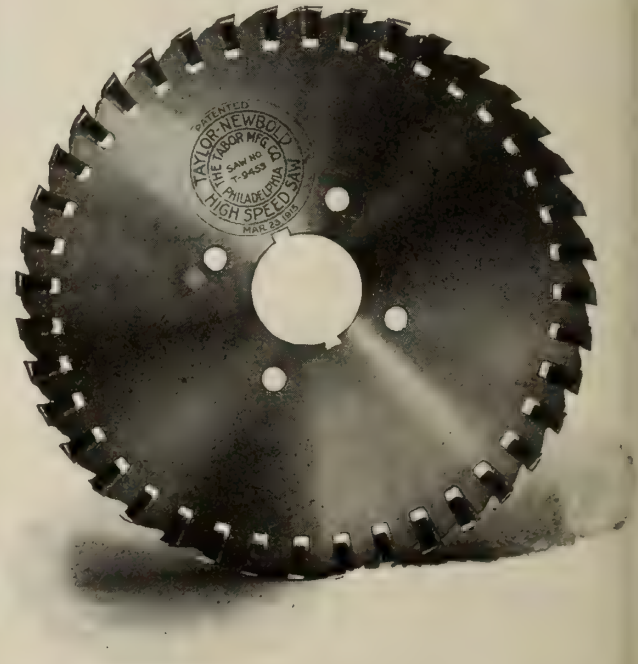
As a real time saver in operating and adjusting, it is in a class by itself. For an example, more than six cuts per minute can easily be made on a ½ in. round cold rolled steel bar. This covers the time in starting and stopping on each cut. The PEERLESS not only saves time, but also increases the production.

Again we say, the actual time saved in operating and adjusting the PEERLESS High Speed is a big item that is well worth investigating.

Again we suggest, before considering any other cutting-off equipment, write us for a complete description.

PEERLESS MACHINE COMPANY
1607 Racine Street RACINE, WISCONSIN

THE IMPROVED TAYLOR-NEWBOLD



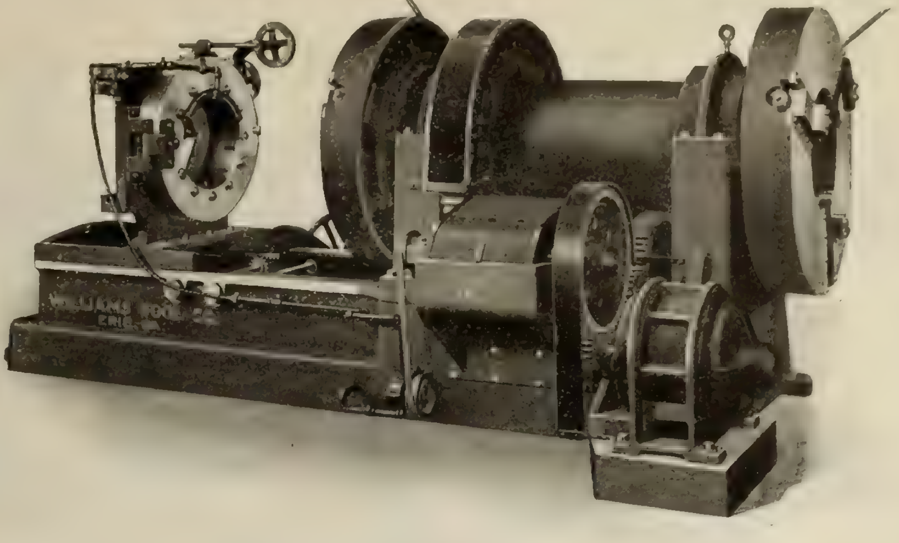
INSERTED TOOTH COLD SAW

Write for Bulletin T-S

Tabor Mfg. Co., Philadelphia, U.S.A.

WILLIAMS PIPE MACHINES

Received
Highest Award
at
Panama
Exposition



The Following Letter Explains Why:

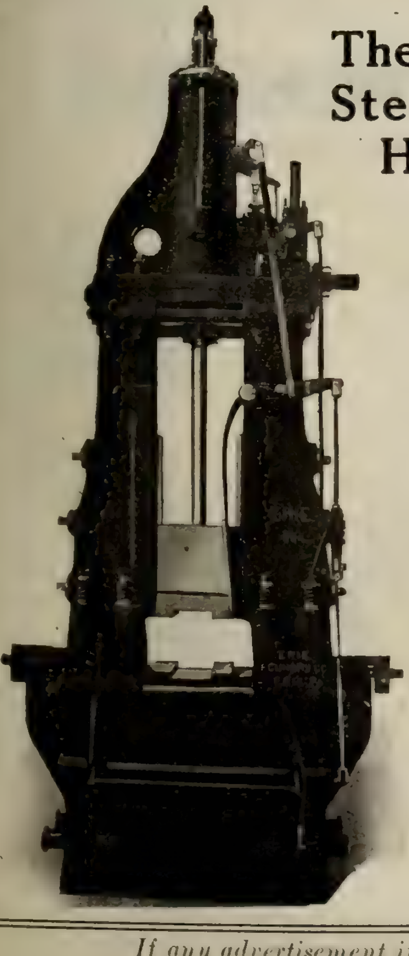
Williams Tool Co., Erie, Pa.: Rochester, N.Y., 12-3-14.

Gentlemen:—We are so pleased with our No. 3 Pipe Machine, and it is doing such splendid work for us at a minimum of expense that we are now considering the advisability of displacing two smaller machines for one of your No. 1½ or No. 2 motor drive.

The machines which we would displace, if we make a change, are belt drive, are (names of two of the oldest and best known machines on the market) equipped with nipple holders, extra dies, etc. Both of these machines are still in fairly good condition. On what basis could we make an exchange with you?

Yours very truly, SAMUEL SLOAN & CO.

WILLIAMS TOOL CO. - - - ERIE, PA.



The "ERIE" Steam Drop Hammer

is the last word in Hammer construction. Ask any user.

A list will be supplied upon request.

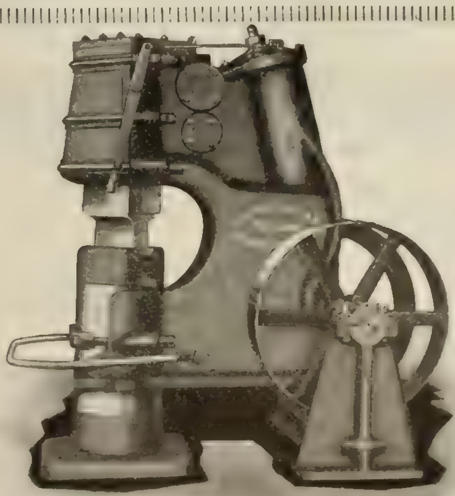
We also build Trimming Presses.

Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

Erie Foundry Co.

ERIE, PA.

YEAKLEY HAMMERS



Power Hammers for all purposes, as well as a complete line of Power Forging Tools.

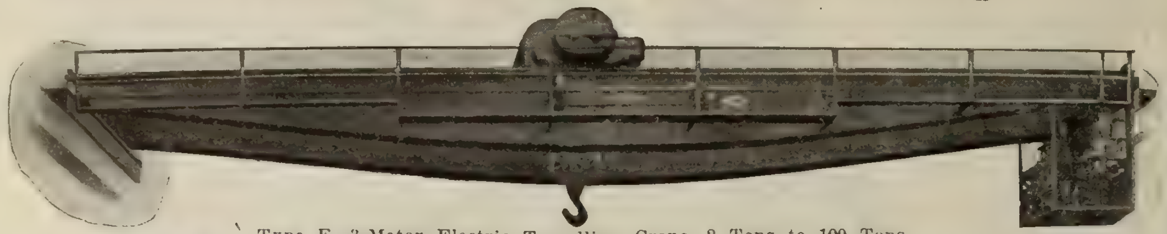
WRITE FOR CATALOG 10

WILLIAMS, WHITE & COMPANY
MOLINE, ILL., U.S.A.

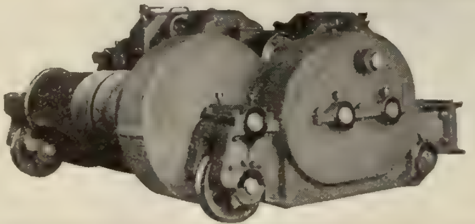
Branch Offices: Pittsburgh, Chicago, New York, Detroit.

CANADIAN MADE **CANADIAN MADE**

Electric and Hand Traveling Cranes

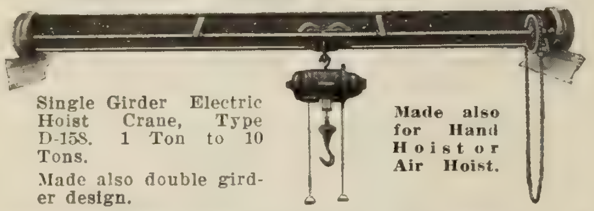


Type E—3-Motor Electric Travelling Crane, 2 Tons to 100 Tons.



Northern Type E Crane Trolley, Rigid, Enclosed Construction. Patented in Canada.

We make a wide range of CRANE and HOIST designs. All sizes and capacities, 1 ton to 100 tons.



Single Girder Electric Hoist Crane, Type D-158. 1 Ton to 10 Tons.

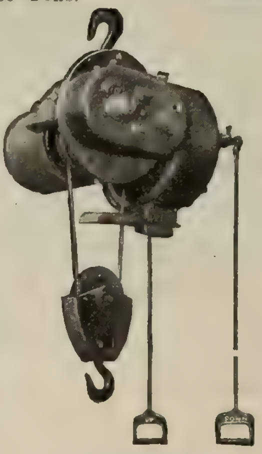
Made also double girder design.

Made also for Hand Hoist or Air Hoist.

Get our prices and specifications before you buy.

In asking prices, state SERVICE, CAPACITY, SIZE OR SPAN POWER, and, if electric, KIND OF CURRENT.

Catalogs free.



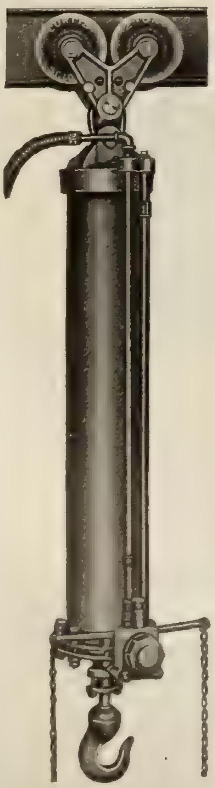
Type D Electric Hoists —½ to 10 Tons.

Air Hoists, Trolleys and Tracks.

Type No. 20 Air Hoist.

Northern Crane Works, Limited

Walkerville, Ontario, Canada



CURTIS, St. Louis, U.S.A.

AIR COMPRESSORS — AIR HOISTS — TROLLEYS AND TROLLEY SYSTEMS—SAND BLASTS—PNEUMATIC AND HYDRO-PNEUMATIC ELEVATORS—JIB AND TRAVELING CRANES.

We have specialized for over 22 years on pneumatic machinery. We have developed the simple air cylinder into a straight line motor with wonderful speed control and dependability capable of the widest application to hoisting problems.

Our new controlled-splash oiling system with regulatable sight feed cylinder oiling is something entirely new in air compressor design.

Complete catalogs and descriptive circulars on our entire line furnished on request.

Curtis Pneumatic Machinery Co.

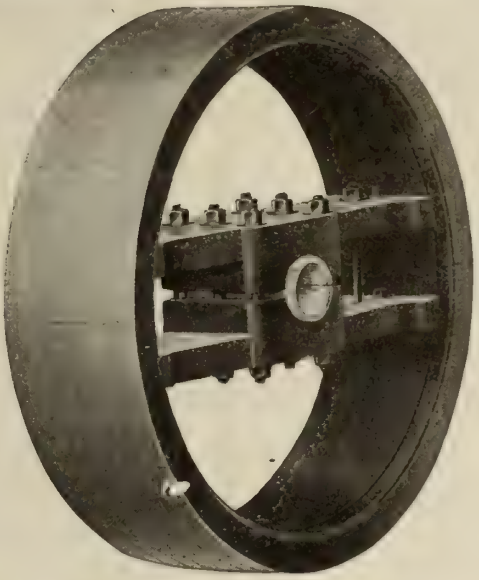
1585 Kienlen Avenue - St. Louis, U.S.A.
New York Office - 532F Hudson Terminal

PULLEYS

No Keys

No Set Screws

In Perfect Balance



Lighter

Stronger

Better Belt Surface

The Dodge Standard Wood Split Pulley

The Wood Split Pulley is better than either cast iron split pulleys or steel split pulleys for the following reasons—

The wood pulley is lighter, stronger, better balanced, and provides a very much better belt surface. It costs 33 1-3% less money and provides 50% more returns in horse-power value. It may be run at very much higher speeds with no danger of bursting—also it may be had quicker and in a greater range of sizes.

It costs less to get—less to put on—and less to keep.

We make approximately 300 Dodge pulleys every day—everybody uses them.

There are more Dodge pulleys making ammunition than any other kind—you can get them quick.

Every pulley is thoroughly nailed. Every pulley is guaranteed for Double Belts.

We are Canada's greatest pulley makers.

If you have not our Books, write us.

DODGE MANUFACTURING COMPANY

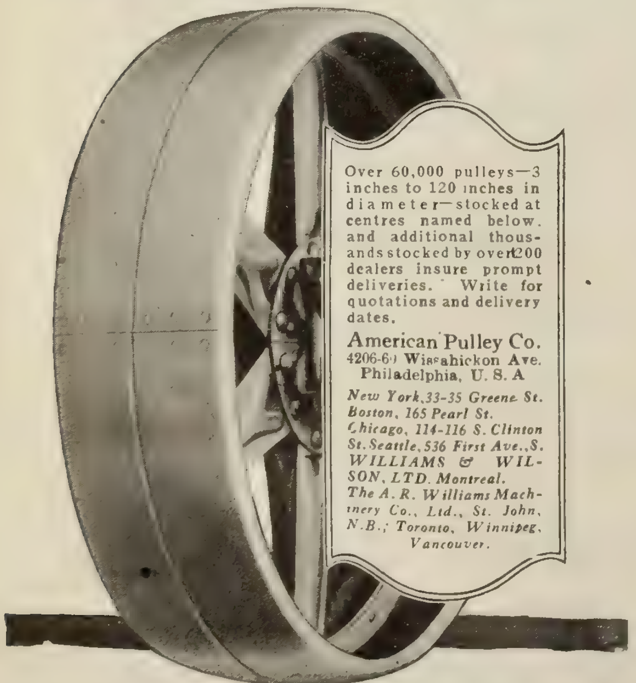
Toronto - - Montreal

Aside from the *service* they give—you can get them so *quickly.*

WE have always made it a point to render a two-fold service with American Pulleys—first, a country-wide dealer distribution that always makes it easy to get any standard American Steel Split Pulley you want; and secondly, a pulley so good that it will give greater dollar for dollar value than any other pulley on the market.

The 20-year service record of American Pulleys is proof of the pulley service they give — an organization of over 200 dealers located at strategic points throughout the United States and Canada and backed up by 5 warehouses of our own, containing over 60,000 pulleys. This is the service we render pulley buyers in order to give them quick deliveries at any time.

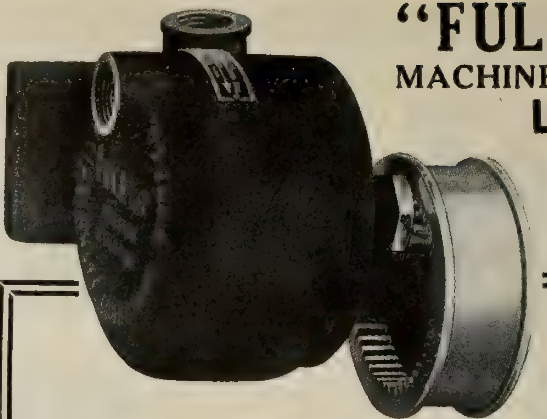
AMERICAN
STEEL SPLIT PULLEY



Over 60,000 pulleys—3 inches to 120 inches in diameter—stocked at centres named below, and additional thousands stocked by over 200 dealers insure prompt deliveries. Write for quotations and delivery dates.

American Pulley Co.
4206-60 Wissahickon Ave.
Philadelphia, U. S. A.

New York, 33-35 Greene St. Boston, 165 Pearl St. Chicago, 114-116 S. Clinton St. Seattle, 536 First Ave., S. WILLIAMS & WILSON, LTD. Montreal. The A. R. Williams Machinery Co., Ltd., St. John, N.B.; Toronto, Winnipeg, Vancouver.



"FULFLO"
MACHINE TOOL Lubricant PUMP

You can drive your machines faster

but your cutting tools won't stand it — the speed burns them up.

A cutting tool will stand up to higher speed and heavier feeds, providing it is kept cool.

The "FULFLO" Machine Tool Lubricant Pump supplies a good "HEAVY" stream of compound sufficient to carry away all the heat.

No gears or other close-fitting parts to be affected by the grit, dirt, or small chips that are always present in the coolant. No clogging.

The only working part is the impellor. Since no check valve, reverse valve or any other kind of valve is present in the pump or pipe, other than the stop cock, the usual valve troubles are eliminated.

Easily attached to any machine. **Insist that the new machines you buy be equipped with the "FULFLO."**

The Cincinnati Lubricant Pump Co.
126 Opera Place Cincinnati, U.S.A.

DEPENDABILITY

Should have first consideration.

LEVIATHAN and ANACONDA BELTING

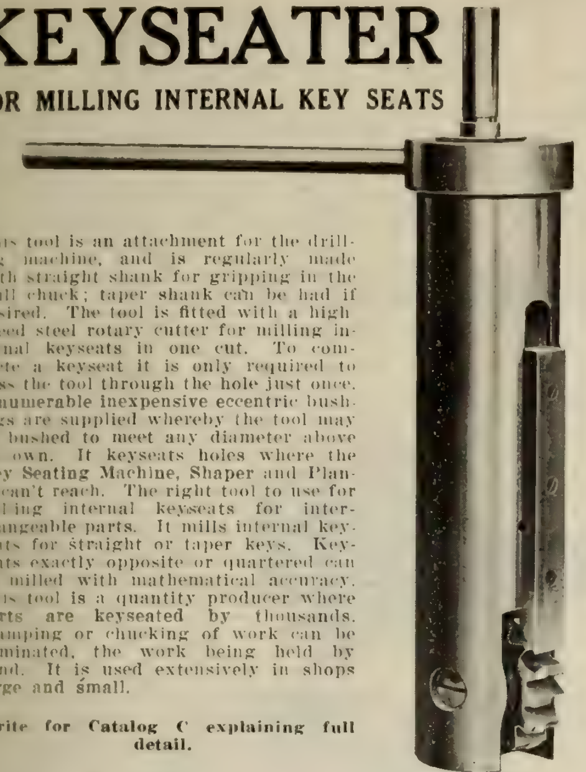
LEVIATHAN AND ANACONDA
ELEVATING
TRANSMITTING
CONVEYING
BELTING

are not low first cost beltings, but you are interested in the *ultimate* cost. We are responsible for every foot of LEVIATHAN and every foot of ANACONDA until it earns in actual service its full cost as compared with the service of any other belt of any kind, under the same or similar conditions, barring accidents. What it does beyond that wins and maintains your confidence.

Let us help you solve your belting problems.

Main Belting Co., of Canada
LIMITED
10½ St. Peter St., Montreal

WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE.



KEYSEATER

FOR MILLING INTERNAL KEY SEATS

This tool is an attachment for the drilling machine, and is regularly made with straight shank for gripping in the drill chuck; taper shank can be had if desired. The tool is fitted with a high speed steel rotary cutter for milling internal keyseats in one cut. To compete a keyseat it is only required to pass the tool through the hole just once. Innumerable inexpensive eccentric bushings are supplied whereby the tool may be bushed to meet any diameter above its own. It keyseats holes where the Key Seating Machine, Shaper and Planer can't reach. The right tool to use for milling internal keyseats for interchangeable parts. It mills internal keyseats for straight or taper keys. Keyseats exactly opposite or quartered can be milled with mathematical accuracy. This tool is a quantity producer where parts are keyseated by thousands. Clamping or chucking of work can be eliminated, the work being held by hand. It is used extensively in shops large and small.

Write for Catalog C explaining full detail.

NATIONAL MACHINE TOOL CO.

2270-2272 SPRING GROVE AVE. - CINCINNATI, O., U.S.A.

Agents for Canada: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria. Agents for British Isles: Alfred Herbert, Ltd., Coventry, England. Agents for Australia: R. L. Scrutton & Co., Ltd., Sydney, Australia.

ECONOMIC WATER OIL

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the **COST** of your **CUTTING MIXTURE** BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with **30 to 50** gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be **satisfactory**, but will produce very **ECONOMIC RESULTS.**

One TRIAL ORDER will **prove** our STATEMENT.

Made in Canada

Canadian Economic Lubricant Co.

LIMITED

1040-1042 Durocher St. MONTREAL

ONE MAN can do as much trucking with this

ELEVATING TRUCK

as several men with several ordinary trucks

IT EFFECTS ENORMOUS SAVINGS IN TIME AND LABOR IN HANDLING SHELLS OR ANY OTHER FACTORY PRODUCT WHERE NUMEROUS OPERATIONS ARE REQUIRED.

All material is stacked on the platforms. To move material the truck is backed under the platform; the handle of the truck is then pushed down, keeping the button depressed, which raises the truck bed and with it the loaded platform, at the same time automatically locking it in its raised position. When hauled to the desired position the button is pressed and the handle is raised, lowering the platform to the floor. The truck is then drawn from underneath and is ready to move another platform. **Raising and lowering of the Truck can be operated with one hand only.**

—can be raised or lowered at any angle.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises and Presses, with attachments for pressing in** hand—fixtures especially adapted for the manufacture of 18-pr. Shrapnel Shells.

We shall be pleased to submit prices and give any particulars required.

The Chapman Double BallBearing Company

OF CANADA, LIMITED

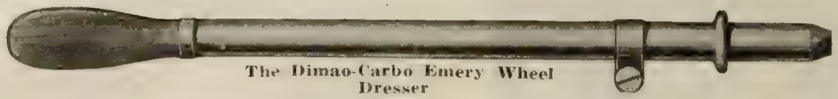
339-351 Sorauren Avenue,
Toronto, Canada

Transmission Ball Bearing Co., Inc.
1407 West Ave., Buffalo N.Y.

GRINDING WHEEL DRESSERS

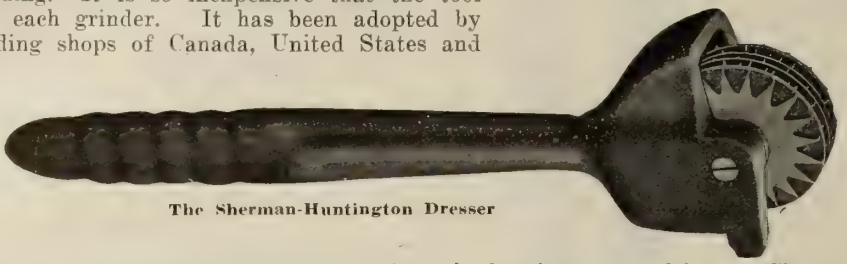
No one type of Grinding Wheel Dresser is adapted for all kinds of wheels, any more than one size or grade of wheel is adapted for all classes of work. We manufacture Dressers for every class of wheel, and, being specialists, are frequently in position to make valuable suggestions to customers as to the best type of Dresser for their particular needs.

Any of our Dressers will be cheerfully sent, subject to approval and can be returned should they not be found satisfactory.



The Dimao-Carbo Emery Wheel Dresser

Owing to the high price of Diamond Dressers, the Diamo-Carbo is rapidly coming into favor as an econômical substitute for the Diamond. It will do practically the same work as will the Diamond, excepting in some instances of precision grinding. It is so inexpensive that the tool can be left with each grinder. It has been adopted by many of the leading shops of Canada, United States and Great Britain.



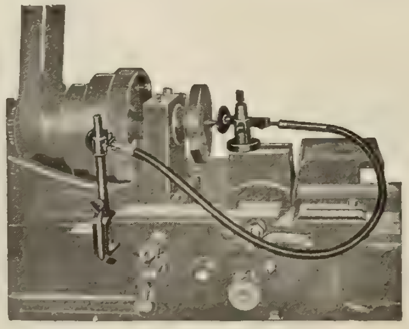
The Sherman-Huntington Dresser

For rough work the Huntington Dresser mounted on the bearings covered by our Sherman patent give the best results. They are made in two sizes: No. 1 with Cutters 1¼" diameter and No. 2 with cutters 2⅜" diameter. We also make the ordinary Huntington Cutters. All of our Dressers of this type are equipped with our protection hood which continually protects the face of the user from flying particles and is a very valuable feature at no added cost.

Write for booklet and trial offer.

THE CANADIAN DESMOND-STEPHAN MFG. CO., Limited, Hamilton, Ont., Can.

Alfred Herbert, Limited, Agents for Great Britain



CENTER GRINDER

(Improved)

CHEAP! PRACTICAL! DURABLE!

The most popular tool of its kind on the market. Adjusted in a moment.

An occasional use will keep your Lathe centers in perfect order.

Stow Mfg. Co.

Binghamton, N.Y., U.S.A.

London, Eng., Stock, 85 Queen Victoria Street.
Oldest Portable Tool Manufacturers in America.

One Thor—
More Thors

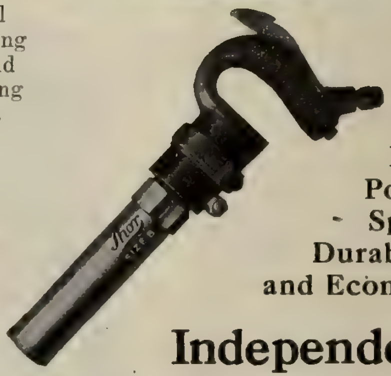
Thor

New Pistol
Grip Chipping
Calking and
Flue Beading
Hammers

Single
Valve

No
Vibration

Shipped
on Trial
Free



More
Power,
Speed,
Durability
and Economy

Independent
Pneumatic Tool Co.

CANADIAN OFFICE:
334 St. James St., MONTREAL, QUE.

General Offices: Thor Building, Chicago, U.S.A.
Branches: New York, Pittsburgh, Detroit,
San Francisco, Birmingham

Mention this paper when writing advertisers. It will identify the proposition about which you require information.

"I'll Remember that Name 'SPARTAN'

"The trade mark says 'Spartan.' I suppose it was named after those old Spartans—the fellows who could stand 'most everything.

"This belt was on the machine when I started in here three years ago and it has certainly stood some hard service. Doesn't slip, stretch or glaze. Guess the boss knew what he was doing when he picked this belt—why, it's good for years yet. I'll keep that G & K Spartan trade mark in mind—I may be able to use the information some day."

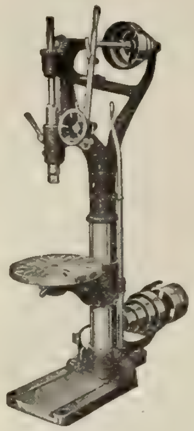
The operator is pretty close to the belt. He appreciates a good one because he is often the loser from a poor one. Any Graton & Knight belt makes good because it is made from selected hides tanned by superior processes. Heat, cold, strain, water, oil, or acid fumes have no ill effect on "Spartan" Belting. It's the belting supreme.

A New G & K catalog is just off the press. Lists our complete and extensive line—belts for all purposes. A postal brings a copy.

SPARTAN
1851 G&K
TRADE MARK REG. U.S. PAT. OFF.

THE GRATON & KNIGHT MFG. COMPANY
Oak Leather Tanners and Belt Makers
WORCESTER, MASS., U.S.A.

Representatives in Canada: THE CANADIAN FAIRBANKS-MORSE COMPANY, Limited.
St. John, Toronto, Quebec, Hamilton, Montreal, Ottawa, Vancouver, Victoria.
"Consult our Engineering Department in connection with your Transmission Problems."



The BARNES DRILLS

TRADE W.F. & J. Co. MARK

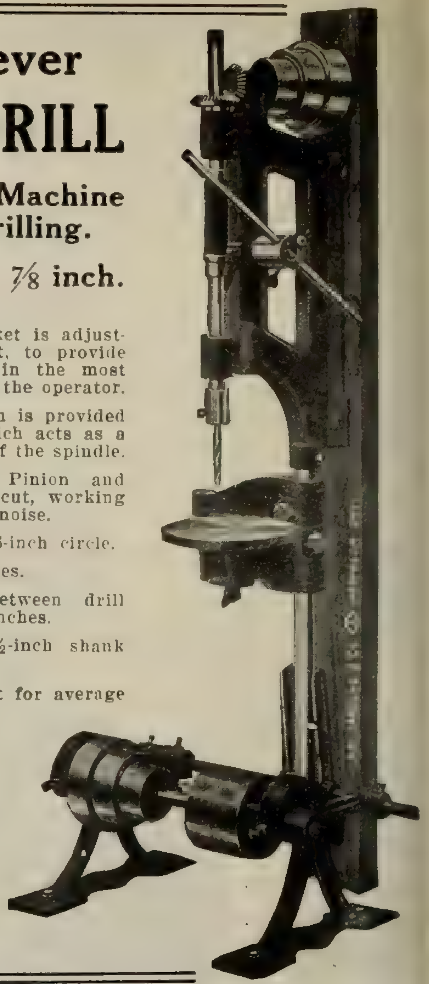
Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

W. F. & JOHN BARNES CO.

104 Ruby Street - ROCKFORD, ILL.
Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal



16 in. Lever

POST DRILL

A Giant Little Machine For Light Drilling.

Will drill up to 7/8 inch.

The Feed Lever Socket is adjustable on the feed shaft, to provide for setting the lever in the most convenient position for the operator.

An adjustable friction is provided for the feed shaft, which acts as a balance to the weight of the spindle.

Bevel Gears, Feed Pinion and Rack are all machine cut, working smoothly and without noise.

Drills to centre of 16-inch circle.

Run of feed 5¼ inches.

Greatest distance between drill spindle and table, 22 inches.

Spindle bored for ½-inch shank twist drills.

Speed of countershaft for average work, 300 per minute.

A. B. Jardine & Co.

Hespeler, Ontario

WE MANUFACTURE

Special Machinery, Tools and Gauges for the manufacture of Munitions.

WE MAKE TO ORDER

Special Machinery for any purpose.
Gauges, Tools, Cut Gears, Molds for rubber, Etc., Etc.

BROWN ENGINEERING CORPORATION, Limited

415-419 King St. W., TORONTO, Ont.

TURNTABLES

RIGID, self-contained construction. No tipping, no getting out of line, no journal friction.

Load is carried on conical chilled rollers, running on machined path, giving long life and smooth, easy operation.

Tops furnished plain or with raised or grooved tracks. Smaller sizes with plain tops kept in stock, also frogs.

Send for Catalog 78.

Complete Foundry Equipments
Cranes of all types

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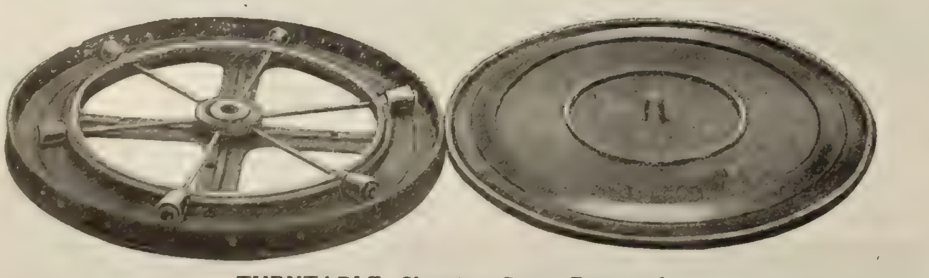

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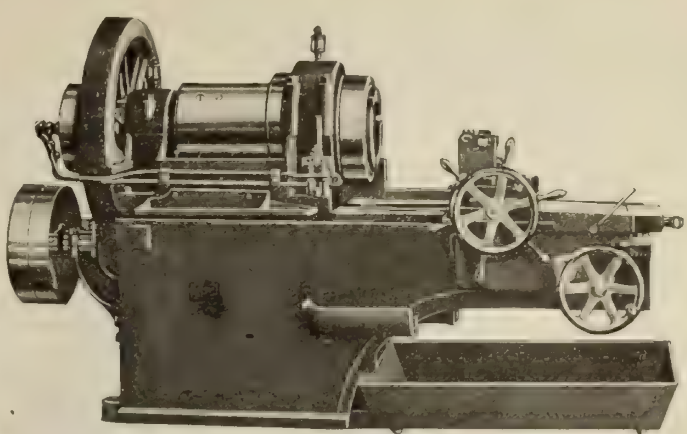
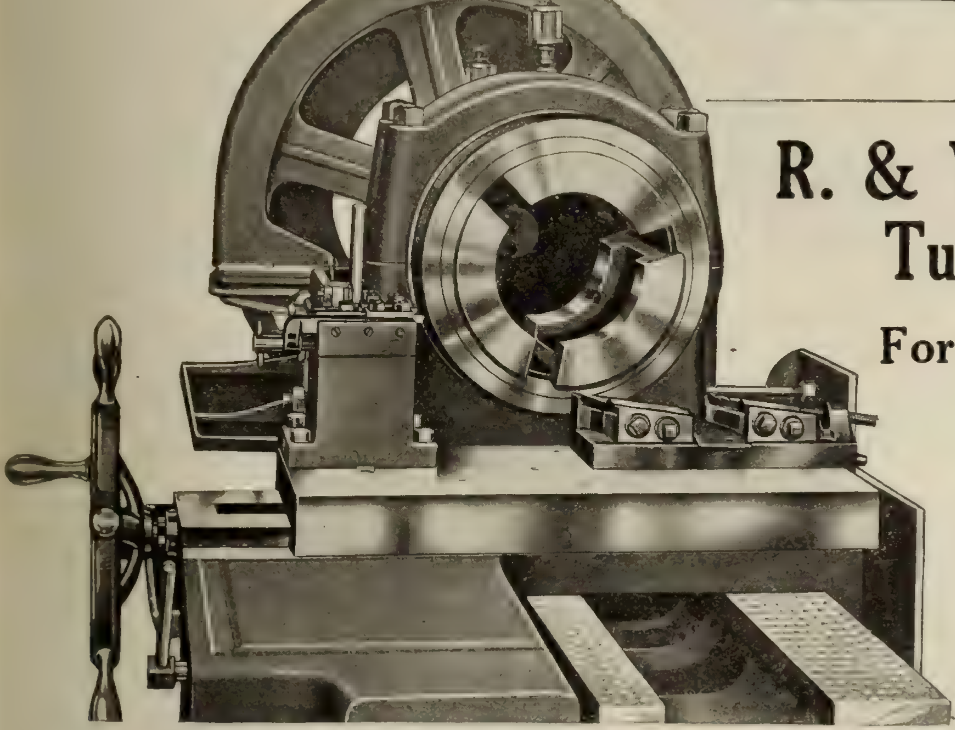


SIDE VIEW



R. & V. Copper Band Turning Lathe

For 6", 8" and 9.2" Shells

Illustration gives view of carriage, showing tool-slide and chuck body.

WE have brought out a line of Special Single Purpose Lathes for the manufacture of High Explosive Shells, specializing on

Cutting-Off Lathes
Outside Roughing Lathes
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Inside Boring Lathes
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They are all of exceptionally heavy construction and simple design to meet the severe service and special requirements of the Munition manufacturers.

These machines are making records equalled by few, and are already favorably known.

If you are a manufacturer of, or contemplate making shells, write us for estimates and deliveries.

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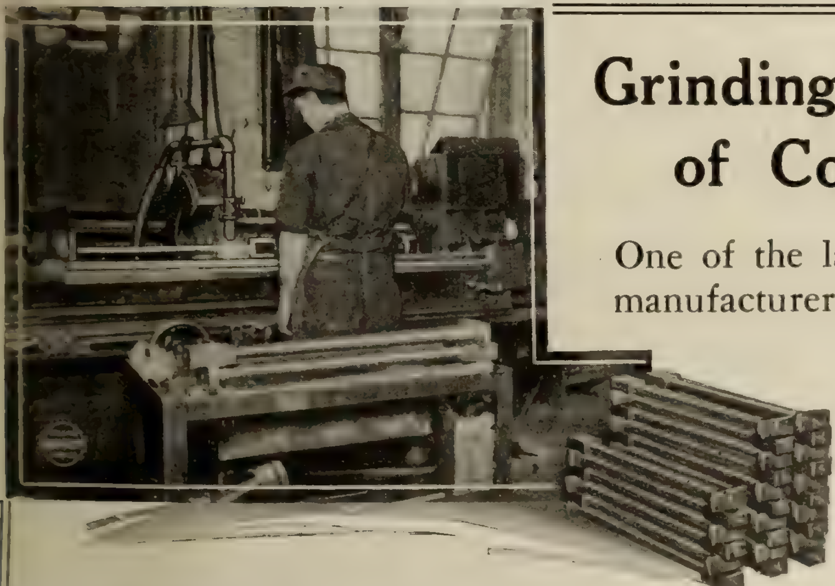

Grinding Tapered Bodies of Connecting Rods

One of the largest gas engine and pump manufacturers in the middle west grinds tapered bodies of connecting rods to get good finish on these parts. It is putting in extra work not necessary for accuracy, therefore big production is required.

The photograph shows the machine grinding one of these rods, the tapered body of which is 30 inches long. The shaft is a drop forging, the finished small diameter is 1⅜ in., and the large diameter 1⅞ in. From 0.020 in. to 0.030 in. is removed—enough to clean up all lathe tool marks—the rod coming to the grinding machine after a roughing lathe cut only has been taken.

The wheel used is a Norton Alundum, 24 x 2 x 5 in., grain 24, grade M, running at a periphery velocity of 6,000 ft. per minute.

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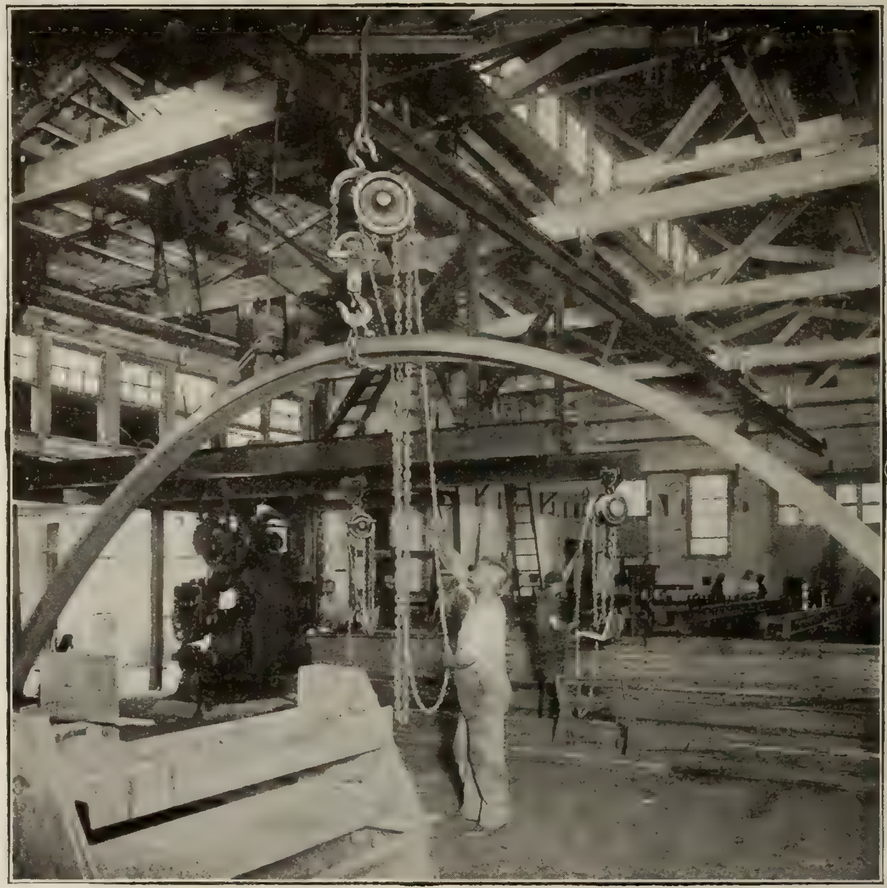

Yale Triplex Blocks

"A Line of Steel from Hook to Hook"

Yale Steel Chain, exclusively a Yale product, is made with smooth, die-formed links, with a clean **electric weld** on the **side,** where it carries the strain of but half the load.

Yale Steel Chain—a Yale Steel Vital—resists shock or sudden strain. During its manufacture every link must pass sixteen inspections and tests.

Before a Yale Steel Chain can leave our factory every link must bear, without injury, a test load of 2½ times its rated capacity.

And in addition to these individual tests, the Yale Steel Chain when assembled in the block itself must undergo the 50 per cent. overload test and final inspection.

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The Canadian Fairbanks-Morse Co., Limited

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CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

Canada Foundries & Forgings Limited

Brockville and Welland, Ont.

Staff Article

PLANT OF THE CANADA FORGE CO. DEVOTED TO THE PRODUCTION OF HEAVY MACHINERY FORGINGS

Interest is imparted to the various products of the plants herein described, by the fact, that, while their output represents succeeding stages of manufacture, much of their output is of primary importance to subsequent work by firms in other fields of industry. The broad field of distribution thus available is therefore independent of any limited class of industrial effort, and imparts a unique character to these establishments as a whole, which renders them largely indicative of the state of the country's general manufacturing activity.

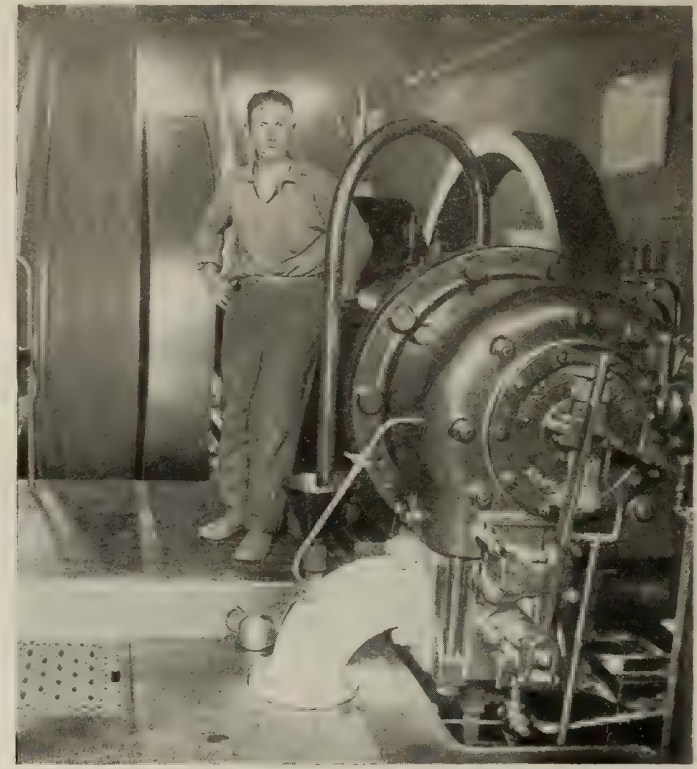
As a producer of a wide range of finished and semi-finished goods, Canada Foundries and Forgings, Limited, occupies a position of present prominence, with all the promise of future potentiality to be derived from the various plants, which, previous to their acquisition by this company, had already established themselves as permanent members of Canada's manufacturing community.

Canada Foundries and Forgings, Ltd., was incorporated in 1912, when it took over the properties of The James Smart Manufacturing Co., Ltd., Brockville; The Canada Forge Co., Ltd., Welland, and Canadian Billings & Spencer, Ltd., Welland, all situated in Ontario, and enjoying established reputations as first rank producers in their respective lines. While sharing in the depression of 1913 and 1914, the outbreak of hostilities and the subsequent readjustments of world trade have maintained the various plants in a hitherto unprecedented state of productive activity. These three plants, by virtue of their community of interests and progressively related products, form a unit which, from a manufacturing standpoint, possesses an envious range of products adapted to a wide market both at home and abroad. Thus it is that while much of the activity has been due to the requirements of semi-manufactured products for war purposes, there has arisen at the same time an ever-increasing demand for many lines of hardware for domestic consumption and export. As a result of the present tide of prosperity, the various plants have attained a high degree of excellence in their equipment which augers well for their successful participation in the future world trade.

GENERAL VIEW OF MOULDING DEPARTMENT WITH MOULDS LAID OUT READY FOR POURING.

The James Smart Manufacturing Co. has been in existence over 60 years, and manufactures stoves, furnaces, ranges, hot air generators, lawn mowers, hammers, axes, and tools of a similar character, including all lines of hardware. Next in seniority is the Canada Forge Co., with a record of eleven years' active production of high grade machinery forgings, such as crank shafts, generator and motor shafts, marine forgings, large engine parts, and many similar lines. Canadian Billings & Spencer commenced operations two years later as a branch establishment of the Billings & Spencer Co., Hartford, Conn. This plant specializes on drop forging work of all sizes and descriptions, much of its product being of a finished nature, such as wrenches, turnbuckles, eyebolts, clamps, lathe dogs, etc., thus covering much of the ground intermediate between the two first mentioned plants, while the product of the three plants together finds outlets in almost every line of industry and commerce, from large engineering shops, building mammoth machines, to the smallest hardware store selling wrenches, hand hammers, axes, and domestic hardware.

The office of the holding company is situated at Brockville in the eastern part of the Province of Ontario, the officers and board of directors being at present constituted as follows:—President, Wm. M. Weir, Montreal; Vice-President, J. Gill Gardner, Brockville; Sec-Treas., John H. A. Briggs, Brockville, who, with the following gentlemen, constitute the board:—Henry Bertram, Dundas, Ont.; F. D. Canfield, New York; Hon. Geo. P. Graham, Brockville; F. C. Billings, Hartford, Conn.; John T. Dillon, Titusville, Pa.; Thos. J. Dillon, Welland, Ont; Clarence F. Smith, Montreal; H B.. Housser, Toronto; Hon. W. J. Shaughnessy, Montreal.



ONE OF THE PRODUCER GAS ENGINES IN THE POWER PLANT.

MAKING SLEDGE HAMMERS IN THE FORGE SHOP.

JAMES SMART MANUFACTURING CO.

THE plant of the James Smart Manufacturing Co. is located in the city of Brockville, Ont., and though apparently out of the beaten track of the industrial life of the country is ideally situated, both for home and export trade, being adjacent to the main line of both the C.P.R. and G.T.R., on the north shore of the St. Lawrence River, 126 miles above Montreal.

While the record of this enterprising concern may not be unique in all respects, it is truly representative of the rise, development and steady growth of Canadian trade and industry. The James Smart Manufacturing Co. is one of the landmarks of Brockville, and an important contributor to the town's commercial prosperity. Like many another of Canada's industrial assets, the early progress of this company was such as to necessitate the construction of wings and additions to the original plant, until the general appearance of the building reflects the long but constant growth of the enterprise. The business was first established in the early fifties, being founded by James Smart in 1854. It became incorporated in 1881 and has since that date progressed steadily, and may now be considered as one of the oldest, best known and most efficient manufacturing plants in Canada.

It is not alone on the Canadian trade that the sound reputation of the firm has been established, as for many years the arms of progress have extended out to lands beyond the seas, bringing back to Canada some portion of the world's trade that is rightfully hers. The products of the factory are now being exported to great Britain, Australia, South Africa, and other countries, and trade conditions are being studied to enlarge on their present field, while the company also maintains a branch office and warehouse in Winnipeg, Man., to handle its extensive and rapidly growing North West and Pacific Coast trade.

Range of Output.

To fully describe the various articles manufactured would be impossible in the space here permitted, as almost every conceivable piece of forged or cast hardware is produced. Among the principal lines are heating stoves and ranges, warm air furnaces and registers. Their speciality in furnaces is the well known "Kelsey Warm Air Generator," which has revolutionized the practice of warm air heating giving results in the way of ventilation combined with thorough warming that cannot be attained by any other method. In the general hardware department, builders' house furnishings, cabinet and carriage makers' hardware in cast and wrought iron and brass, pumps and plumbers' goods, wrought steel butts and hinges, lawn mowers and rollers, jack screws, vises, warehouse trucks, copying presses, and many lines of labor saving tools and machines are produced in large quantities.

VIEW OF PART OF THE MACHINE EQUIPMENT IN THE WOODWORKING DEPARTMENT.

Moulding Shop.

As castings of all sizes enter largely into nearly all of the lines of general hardware produced, the moulding shop may be considered one of the leading departments. Including the building where the brass furnaces are located, the total floor space is approximately 25,000 square feet, and will accommodate 80 workmen. Two cupolas—one of 25 tons and the other 5 tons capacity—are installed; the molten metal being distributed to the various sections of the shop by means of one and two ton ladles, travelling on monorails overhead. For the rapid production of the smaller castings, moulding machines are used exclusively; over 20 of these being in continuous operation. In order to meet the constantly increasing demand for certain brass castings, it has been necessary to augument the brass equipment, until at present 8 brass furnaces are operating for 23 hours each day, with an output of about three tons of metal.

Adjacent to the moulding shop is the tumbling room, where the smaller castings are subjected to the rumbling process to remove the sand. This department contains 14 mills, and in connection with the foundry, there is a three story fire-proof stone building, 60 x 40 feet, containing approximately 7,000 patterns.

Machine Shop and Wood Working Departments.

The main machine shop, three stories high, is 160 x 60 feet, with a total floor space of about 30,000 square feet. This shop is fully equipped for maintaining a maximum production of all sizes and types of machined hardware. In order to handle the large variety of work that passes through the shop, it is difficult to arrange the machinery so that each piece will follow a set course, but by means of jigs and fixtures, adaptable to several machines, the progress of the work has been arranged in a systematic and efficient manner.

A new wood working shop has been recently completed. It is 3 stories high, 140 x 80 feet, of modern construction, well lighted and fully equipped. The chief products of this department are school furniture, plumbers' cabinetware, hammer handles, etc., in addition to manufacturing all necessary shipping crates and boxes. A small section of this building is used for the pattern shop, where all the wooden patterns are designed and constructed. A feature of this department is the completeness with which safety devices are applied to all of the machines and apparatus.

Hammer and Axe Department.

High grade cast steel hammers, sledges, hatchets and axes constitute the main articles manufactured in the forging department, which is equipped with 12 trip hammers, two heavy drop hammers, eight forging presses and all the necessary furnaces and auxiliary equipment required for the efficient and economical handling of the various makes and sizes. To facilitate the rapid progress of the work, and at the same time turn out a uniform product, all the forging machines are fitted with special jigs and dies, so that each piece—as it is finished—is a duplicate of its fellow. The various operations in the making of these forgings are very interesting, and

A CORNER OF THE MACHINE SHOP.

the speed and accuracy that is maintained in their production is truly remarkable.

In connection with the forging department is the grinding room, where the tools are edged, scale removed and otherwise shaped and polished. Twelve 6 ft. wet grind stones are used in this process. These stones, and all other grinders or dust producers, are fitted with exhaust system to carry off the dirt and dust.

Power Supply.

Power is supplied to the main machine shop and forging department by two 150 h.p. Crossley and Hunter gas engines, operated by producer gas. These engines are belt connected to the main shaft, and provision is made by means of two Dodge clutches, so that one or both sections of the shafting can be operated as desired. The hammer and axe department is operated by means of a rope drive of 100 h.p., the remaining 200 h.p. being used in the machine shop.

The entire plant is lighted from a unit in the engine room, there being 1,400 lights throughout the building. Cluster lights are fitted in the main machine shop. Throughout the plant are several electric elevators for facilitating the transfer of material from one department to another.

In addition to being connected, by siding, with the two leading railroads, there is a wharf 450 feet long, which will accommodate vessels of 18 feet draft. During recent years, considerable land has been reclaimed by filling in the shallow portions of the river, adjacent to the company's property. The entire plant, while composed of many buildings, is very compact, and with the shipping facilities at hand and a plentiful supply of labor, the future progress of this industry is well assured.

GENERAL VIEW OF NO. 1 FORGE SHOWING HYDRAULIC PRESS EQUIPMENT AND WORK IN PROGRESS.

CANADA FORGE CO.

THE plant of the Canada Forge is situated on the south-eastern outskirts of the town of Welland, and is favorably situated in regard to all of the essentials required for the economical production and distribution of semi-manufactured steel product. As indicated by its name, the plant specialize in forgings, these being of the heavies class such as are produced under hydrau

HEATING A LARGE SHAFT IN THE FURNACE PREPARATORY TO FORGING INTO SHAPE.

lic presses and steam hammers, and distinct from drop forgings, which are the special product of one of the affiliated plants. Although much of the original equipment was steam operated, the production of hydraulic press forgings has developed to such an extent that the consumption of electric energy for hydraulic pumping purposes now greatly exceeds the amount of power derived from steam generators.

HEAT TREATING FURNACE WITH MOVABLE FLOOR ON TRUCKS. USED FOR IMPARTING THE PROPER DEGREE OF STRENGTH TO FORGINGS, SHAFTS, ETC.

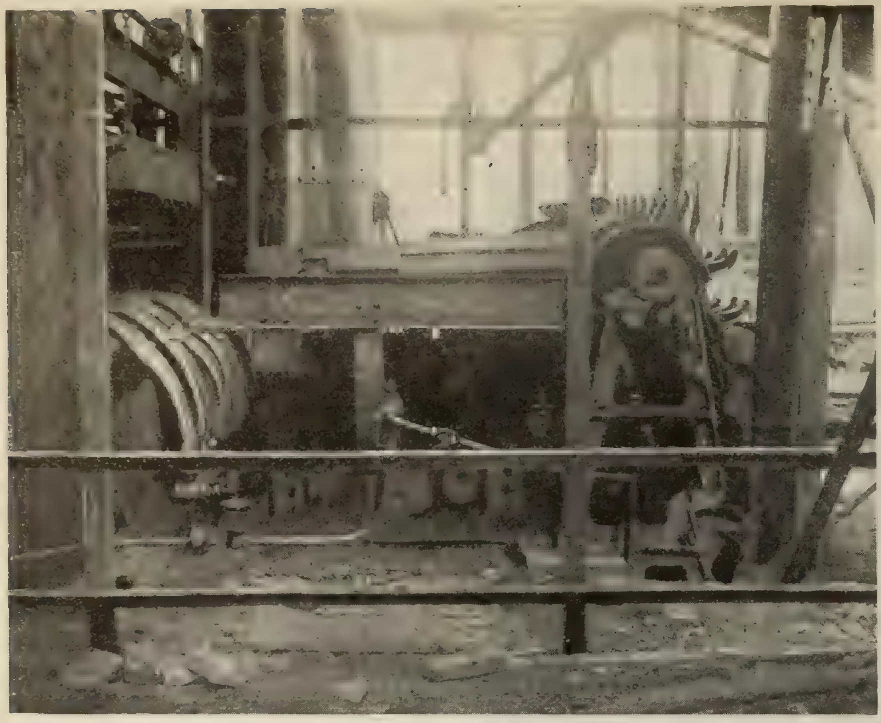
The location of Welland near the principal source of electric power in Ontario, and its nearness to the coal-fields of Pennsylvania and the adjacent ironworking plants of Hamilton, Port Colborne, and Buffalo afford every opportunity for obtaining power, fuel, material and labor under the most favorable conditions.

Inception and Growth.

Since the year 1905, when the company was organised by T. J. Dillon, its growth has been steady and consistent. The year of its birth found Canada on the crest of a wave of prosperity, which despite the collapse in the neighbouring States two years later, did not abate until the slackening of world-wide industry in 1912-13 presaged the occurrence of present day events. This extended spell of activity during its early existence enabled a firm foundation to be laid which not only proved invaluable in withstanding the stress during early hostilities, but has caused the plant to become an integral part of Canada's industrial life with every indication of expanding beyond the confines of this land.

The main forge buildings which form the title illustration of this article, are of steel construction and arranged to provide a maximum of ventilation. Recent developments have called for extensive additions to the plant, one of which, shown in another illustration, has been laid out for the special purpose of facilitating the shipment of large quantities

WORKING A HEAVY CRANKSHAFT FORGING UNDER THE 2,000 LB. STEAM HAMMER.



APPARATUS FOR AUTOMATICALLY FEEDING BILLETS INTO A CONTINUOUS FURNACE. FLEXIBLE PIPES AT LEFT CONVEY COOLING WATER INTO SPECIAL RAILS ON FURNACE FLOOR.

of material now being produced.

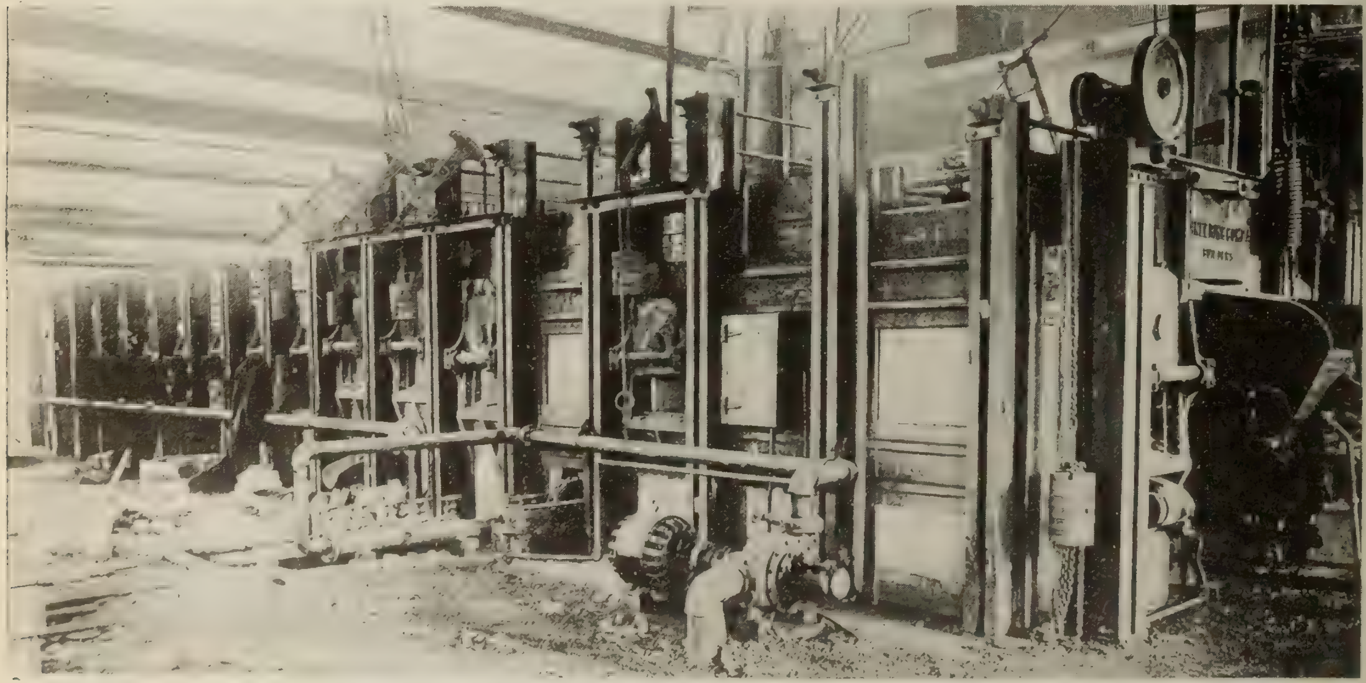
The total area of the works is 4 acres, of which about two-thirds are covered by buildings, consisting of offices, machine shop, No. 1 forge, No. 2 forge, and shipping shed. Spur sidings from the Grand Trunk R. R. traverse the yards at suitable points.

Reception and Handling of Work.

Raw material in the shape of ingots, bars, etc., is received at the north end of No. 1 forge, the yard being served by overhead travelling cranes, the track for which extends through No. 1 forge, across the next yard and on to the south wall of No. 2 forge. Three 15-ton Reliance electric cranes are mounted on the tracks, all of them having 5-ton auxiliary lifting tackle. In order to obtain maximum service from all, and avoid any one crane being idle because of its location, suitable equipment has been provided, so that each crane is equally adapted for work at any particular part of the shop.

Crane magnets are freely used, the type of apparatus adopted being that made by the Electric Controller and Construction Co. Another device consists of a Brown Hoist rotating attachment for use when a crane is serving the hammer or forging press. This is an endless chain apparatus of heavy construction which is conveniently attached to any crane, the attachment carrying its own electric motor which pulls the chain around and turns the suspended forging

A 5-TON OVERHEAD ELECTRIC TRANSPORTER WHICH DELIVERS WORK TO THE LATHES IN MACHINE SHOP.



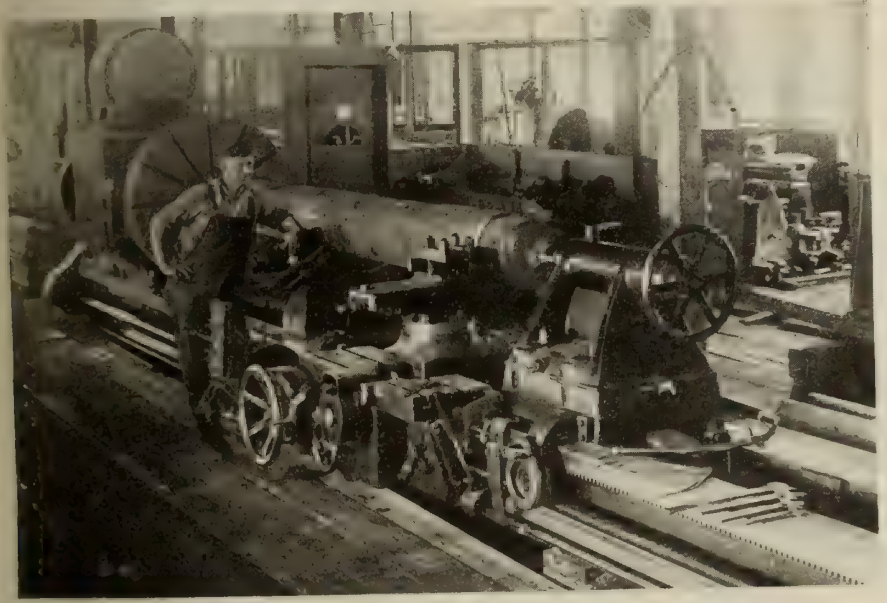
CONTINUOUS BILLET HEATING FURNACE. IN THE FOREGROUND IS A MOTOR-DRIVEN WATER CIRCULATING PUMP FOR COOLING PART OF THE STRUCTURE, AND ABOVE IT, TO THE LEFT, CAN BE SEEN A FEW LINKS OF THE ENDLESS CHAIN FOR DELIVERING HOT BILLETS.

in the desired manner. This apparatus can be distinguished in the photograph showing the steam hammer at work, another illustration showing the forging being heated in a furnace preparatory to hammering.

LOADING SPECIAL FORGINGS IN RAILROAD CARS BY MEANS OF AN ELECTRO-MAGNET SUSPENDED FROM THE OVERHEAD CRANE.

No. 1 Forge Equipment.

With the exception of four hardening furnaces which are gas fired, all of the furnaces are heated by coal. These furnaces are designed and built by the company's engineers, the method of burning the fuel being by an underfed stoker with forced draft from fans. The forging equipment of No. 1 forge includes—1-2,000 lb. double frame Bement steam hammer, 1-1,500 lb. single frame Bertram steam hammer, 1-500 ton hydraulic forging press built by the Wm. Tod Co., and 3-350 ton and 5-200 ton forging presses. Separate furnaces are provided for heating the work for each hammer, press, or group of presses, the waste heat from three of the furnaces being utilized to generate steam for the hammers in 2 return tubular boilers built by E. Leonard and Sons. In addition to the overhead travelling tranes, conveniently situated jib cranes are provided for the steam hammers.



MOTOR-DRIVEN SHAFTING LATHE, 48 IN. SWING BY 36 FT. BED WITH MOTOR-DRIVEN CARRIAGE.

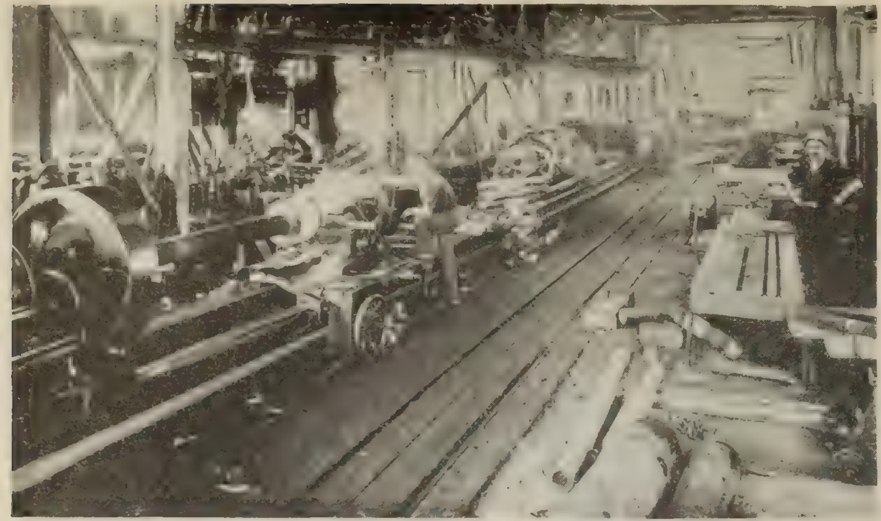
The 500 ton Tod press was specially installed for producing the highest class of forgings, such as crankshafts of all kinds, large connecting rods, locomotive forgings and axles for railroads and street cars, piston rods, gear blanks, and marine forgings. It exerts its maximum power under a working pressure of 3,000 lbs. per square in., supplied by a special three throw motor-driven Deane pump of the horizontal type, having plungers 1 9-16 in. dia. by 15¾ in. stroke driven by an 85 horse-power C.G.E. motor running at 500 revs per min. By means of adjustable ballast weights on the 12ft. stroke Wood accumulator, the press may be operated at 3,000, 2,000, or 1,000lbs. per sq. in. Forgings up to 30in. dia. can be handled in this press, the weight of the forging being limited only by the capacity of the handling appliances.

The remaining presses in No. 1 forge are operated by 4 sets of Deane 4in. by 12in. high pressure pumps, each driven by a 125 horse-power Crocker Wheeler motor running at 750 revs. per min. Individual Wood accumulators are provided for each set of pumps.

Annealing Furnace Equipment.

A special feature of equipment is an annealing furnace with movable floor carried on trucks. This furnace, a photograph of which is reproduced, is particularly adapted for handling medium-sized forgings in quantity, and has proven particularly useful in treating shell blanks, piercing and drawing punches, etc., as the trucks are run out on the floor where loading can be rapidly done, at the same time allowing the furnace itself to be kept at a working heat. When filled up as shown, the trucks are

SEMI-FINISHED CRANK SHAFTS, PUNCHES AND DIES IN MAIN BAY OF MACHINE SHOP.



VIEW OF MACHINE SHOP SHOWING PART OF SHAFTING LATHE EQUIPMENT.

run right in, which enables a uniform heat to be given to all parts of the work, after which the trucks are either run out again and the work allowed to cool en masse, or it may be quenched in oil or left to cool down with the furnace according to the grade of material.

EXTENSION IN COURSE OF ERECTION AT FORGE PLANT TO PROVIDE ADDITIONAL SHIPPING FACILITIES.

No. 2 Forge.

This building has been specially equipped for the production of repetition work, such as shell parts and similar articles, and contains 2-500 and 2-300 ton Southwark forging presses operated by 4 Deane high pressure pumps each driven by Canadian Westinghouse motors of 250 horse-power, in conjunction with Wood accumulators.

Perhaps the most interesting feature is a continuous billet heating furnace, of which two views are reproduced. At the right hand of the general view is a Combustion Engineering Co. underfed stoker which supplies fuel, and at the opposite end is the continuous automatic charging gear which elevates the billets on a species of endless belt, and feeds them into the heating chamber which is built with a slope down toward the middle of the furnace. . Water-cooled rails facilitate the passage of the billets along the heating chamber, the pipe connections being plainly noticeable in one of the illustrations.

After travelling the length of the chamber, the billets have attained the necessary temperature and are deposited on a travelling chain placed transversely across the bottom of the furnace. This chain is endless and in constant motion, so as to avoid excessive heating, and as the billets fall on it, they are discharged through a suitable opening in the opposite side where the forging presses are located. This furnace was installed complete by the Hare Engineering Co., and is an interesting example of modern metallurgical equipment.

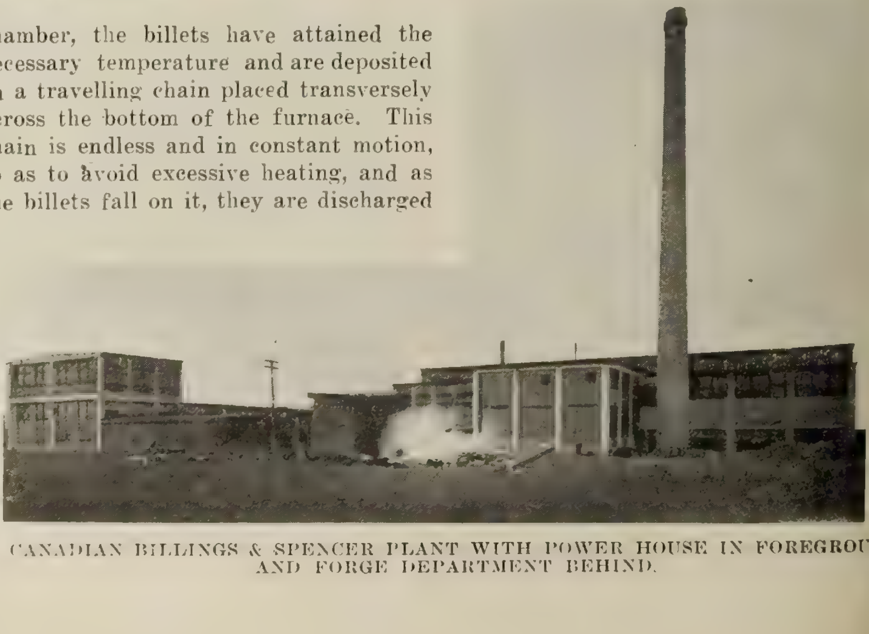
In this department are also installed two National forging machines for the production of smaller articles such as shell sockets, nose pieces, etc. Each of these is driven by a 75 horse-power Canadian Westinghouse motor, and forms a complete unit with its own furnace equipment, etc.

ONE OF THE MOTOR-DRIVEN FORGING MACHINES.

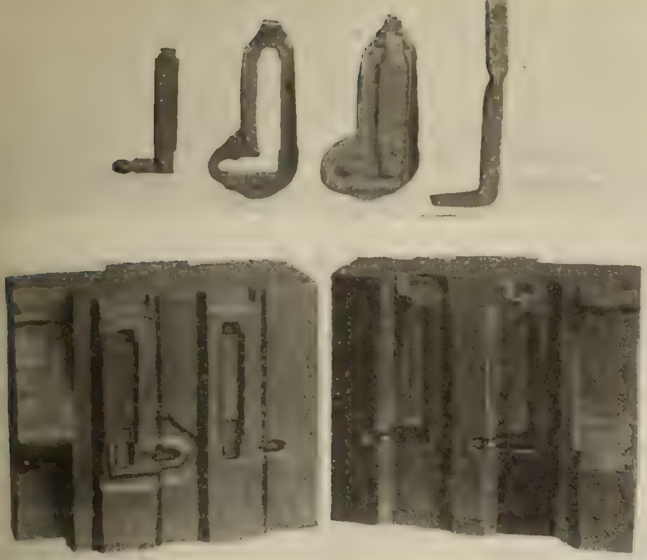
All of the tracks are arranged so that the overhead cranes can be used for unloading the rough stock and conveying it direct to the various furnaces and hammers. After being forged much of the work is rough machined, and for this purpose a fully equipped machine shop 100ft. by 75ft. is provided.

Machine Shop.

The forgings are transported to the various machines by a 5 ton Niles elec-



CANADIAN BILLINGS & SPENCER PLANT WITH POWER HOUSE IN FOREGROUND AND FORGE DEPARTMENT BEHIND.



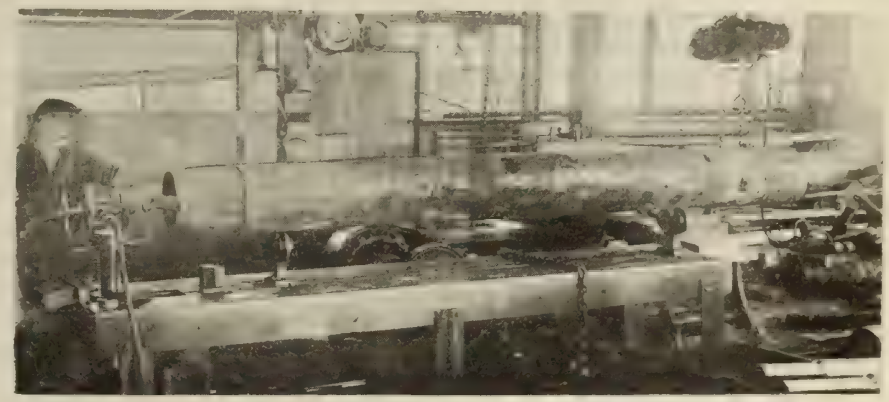
UPPER: A RIFLE BOLT IN DIFFERENT STAGES OF DROP FORGING. LOWER: DIES FOR FORGING SAME.

TYPICAL EXAMPLES OF THE DIE SINKER'S ART. NOTE THE DIES FOR SPANNER WRENCH AT RIGHT

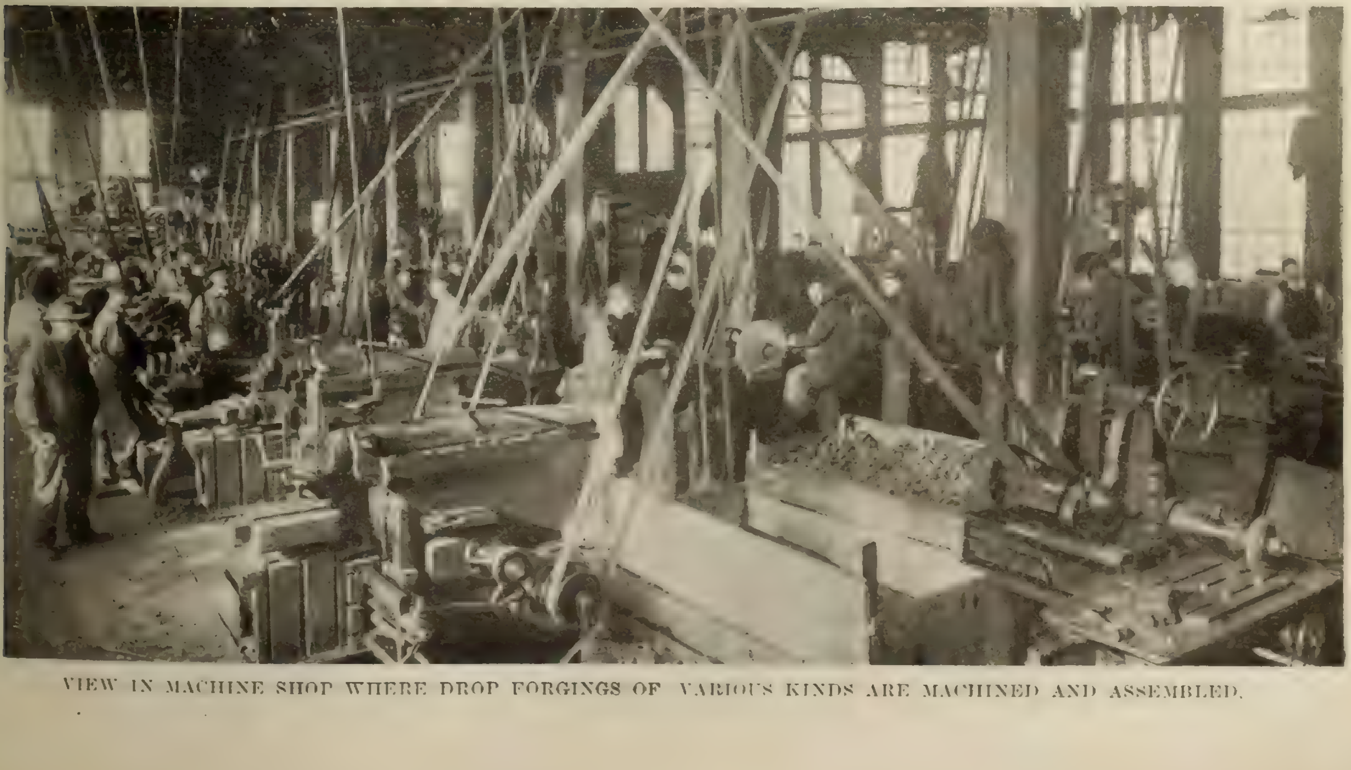
the trolley on a system of overhead tracks. Preliminary work such as marking-off and centering is done on a table specially equipped for this work. The shaft is supported on roller brackets and an air drill is mounted at one end for drilling the centres. Before going into the lathes, such articles as crankshafts have the webs sawn out in cold sawing machines, which are also employed in roughing up die blocks for hammers, cutting large bars, and slabs, etc. Two such machines are in use, a Higley and a Newton, the former with a single saw for plain work, and the latter with a double saw for crankshaft work. Both tools are motor driven and use saws with inserted high speed steel teeth.

Lathe Equipment

The large lathe equipment consists of representative machines by well known makers, including one 48 in. x 36 ft. Bertram shafting lathe, with 25 horsepower motor drive, and individual motor drive on carriage for power traverse; one 36 in. x 42 ft. Bertram shafting

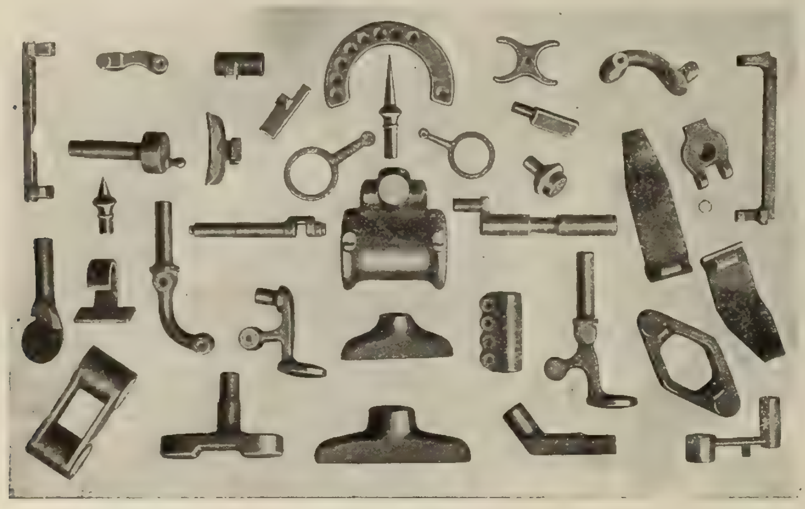


A LARGE ENGINE SHAFT FORGING BEING CENTERED ON THE ENDS ON A SPECIAL TABLE WITH AIR DRILL AT ONE END, PREPARATORY TO TURNING IN THE LATHE.

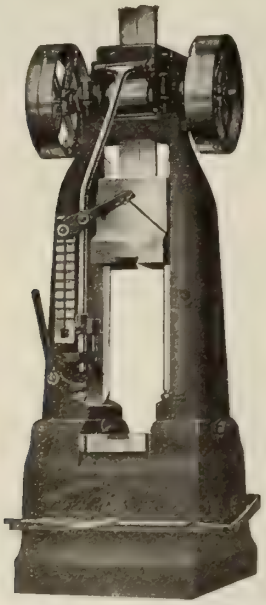


VIEW IN MACHINE SHOP WHERE DROP FORGINGS OF VARIOUS KINDS ARE MACHINED AND ASSEMBLED.

lathe; one 36 in. 30 ft. Pond shafting lathe; one 30 in. x 18 ft. Bridgeford lathe; one 30 in. x 18 ft. and one 28 in. x 10 ft. LeBlond heavy duty lathes, both motor-driven by 15 horse-power motors. The medium lathe (18 in. to 24 in.) equipment is quite extensive, including many examples of Canadian and American makes, such as Bertram, C. M. C., Cisco, Hamilton, Sidney and Gleason, while other types of machines include one 6-ft. Niles radial drill, one 20 in. x 96 in. Norton grinder, with 30 horse-power Westinghouse motor; one Niles slotter for crankshaft and similar work, and one London planer.



SAMPLES OF FORGINGS FOR VARIOUS PURPOSES PRODUCED ON DROP HAMMERS.



TYPE OF BOARD HAMMER INSTALLED IN DROP FORGE DEPARTMENT.

It will be evident that forging work, of almost any description and in any desired state of completion, can be produced in large quantities from such a plant. Equipment has been kept abreast of the latest and best practice, in which connection special attention has been devoted to the heat treating of commercial forgings so as to secure the best service which the material in use can be made to give.

CANADIAN BILLINGS & SPENCER

As a branch of the original firm of Billings & Spencer at Hartford, Conn., the Canadian plant was very favorably placed with regard to such essential features of the work as equipment and experience. The demand for drop forged articles has been of steady growth, keeping pace with the manufacturing development of the country in many other lines. The advent of this plant in 1907 was timely, and its existence to-day has been of great value to many firms, whose increased output during the last two years has been largely dependent on the resources of this plant.

Equipment

Drop forging is a highly specialized branch of industry, and while much of its success is dependent on equipment and skill of operation, the initial factor of importance is the making of the dies. The resourcefulness and accuracy dis played by die-sinkers, in fashioning hug blocks of metal so that spaces and hollows are provided in which the hot meta is formed to shape, is truly admirabl and the illustrations of die blocks an sample forgings will serve to convey t the reader a slight idea of the skill an labor which must be expended befor even a simple form of article can b drop forged. The only limit to dro forging is the skill of the die-sinker.

The hammer department is equippe with both board and steam stamps. Th board hammers or stamps are of th type illustrated, which is built by th company. In addition to marketin these hammers for 25 years, the co stant use of them in their own shop has resulted in their being constantl improved until Model D represents th most modern tool of its kind. A 5,00 lb. steam drop hammer is a notabl item in this department and extend the range of work very considerabl Bull-dozing and heading machinery i also installed.

Subsequent work involves annealin pickling, and, in many of the stap lines produced, machinery also. Th machinery shop equipment is arrange for the quantity production of wrenche clamps, lathe dogs, thumb screws, tur buckles, etc., and also includes sever special machines for use in die-sinkin

Electric power for operating the var ous machines is purchased from loc supply sources hence the power hous requirements are limited to the suppl ing of steam for the hammers, picklin repartment, etc. With the exception the mechanical stroker, the equipme including water tube boiler, feed wat heater, etc., was supplied by Goldie McCullock Co.

A special trimming and grinding d partment is employed on finishing stoc forgings preparatory to machining.

A DIE-SINKER AT WORK ON DIE BLOCKS FOR A COMPLICATED FORGING.

Port of Vancouver Harbor Development: Present and Future

Contributed

To insure the future position of the Port of Vancouver as the premier port of the Pacific Ocean is the avowed intention of the Harbor Commissioners of that city. Increased activity in shipping and shipbuilding, along with unequalled, natural advantages, insure the ultimate success of the plans described herewith. The extent of the work, and completeness of the arrangements indicate a firm resolve on the part of the authorities to assist as far as lies in their power in maintaining the supremacy of British world trade.

WHETHER or not the plans of the Vancouver Harbor Commissioners will make the proposed port facilities self-supporting, the intention is to provide a sufficiently comprehensive scheme to make the harbor the equal of any port in America in point of convenience for handling freight, and the low cost of such freight handling and of the wharfage charges for goods transhipped between vessels and railway cars. There is another feature, and that is the providing of industrial sites with terminal rail and water facilities, and with it goes, in the terminal railway scheme, the common privilege of freedom to all railways seeking entrance to Vancouver harbor.

Plans so far gone on with by the harbor commissioners since taking office in 1913 have been the building of the Government wharf and elevator on Burrard Inlet, and the dredging of the channel in False Creek with the reclamation of a forty-acre area close to Granville Street bridge. The last item is almost completed now, and the deepening of the False Creek channel is fast nearing completion. When the announcement was made early in June by Mr. H. H. Stevens, M.P., that the harbor board was perfecting a somewhat ambitious scheme of harbor improvements, involving $5,000,000, and projected to extend over a period of five to ten years in construction, widespread interest was taken by the business public generally. One objection only was taken, and that was the secrecy with which such a semi-public proposition had been carried out. The matter was there upon taken up with the members of the Board of Trade and a full and complete statement was given out.

What Plans Include

Included in the programme laid down by the commissioners, and for which they have secured approval by Dominion Order-in-Council, is the terminal railway referred to, the purchase of certain waterfront properties on Burrard Inlet and of Kitsilano Indian reservation on False Creek. The full list of properties under negotiation at present is:

Kitsilano Indian Reserve, False Creek, 80 acres, estimated cost $700,000.

Waterfront property at Port Moody, on Burrard Inlet, approximately 88 acres, with water frontage of half a mile, estimated cost $550,000.

E. H. Heaps Co.'s mill property, Cedar Cove, Burrard Inlet, 16¾ acres, estimated cost $650,000.

Wharf property of the Great Northern Railway Co. and the waterfront property immediately east of that property—estimated cost in all, $1,800,000.

Right-of-way from the Kitsilano Reserve to the Heaps property, estimated to cost $1,552,861.25.

Portion of right-of-way of Pacific Great Eastern, estimated cost $516,267.

The total estimated cost of properties thus to be acquired is set at $5,769,128.25. The harbor commissioners anticipate being able to exchange properties in the waterfront now in their possession for some of these parcels they wish to secure, thus reducing the outlay cost to the board by $2,448,833.50. That would leave a balance of $3,320,294.75. The commission proposes to float a Government-guaranteed bond issue of $5,000,000 for the purpose of acquiring the properties and of putting in the improvements planned. The net cost estimated above, together with the $200,000 bond issue already made, and which it is proposed to retire by way of consolidating the bonded debt in the one issue, will leave $1,479,705.50 available for harbor improvements and terminal facilities.

The proposed terminal railway begins at Kitsilano Reserve, extends on the south side of False Creek to Glen Drive east of Main Street, thence to Harris Street, and thence to the Great Northern wharf. The proposed route takes in the existing B. C. E. R. transfer track on the south side of False Creek. The entire distance is 4.84 miles, the actual feet measurement, according to the plans, being from point to point, as shown on the sketch plan prepared by the harbor engineer, being:

	Feet.
Kitsilano Reserve to Granville Street bridge	1,540
Granville to Connaught bridge	5,855
Connaught to Main Street bridge	3,580
Main Street to Glen Drive	4,860
Glen Drive to Harris Street	3,710
Harris Street to Great Northerr dock	2,025
Great Northern dock to Dominion dock	3,990

It is the plan of the harbor commissioners to build large ocean docks at Kitsilano Reserve on English Bay. In this connection it is interesting to note that when the C. P. R. first built into Vancouver it secured a charter for what is still officially known as the English Bay branch, and which extends from English Bay Junction at the Burrard Inlet end of Columbia Street, through the False Creek yards and by way of Kitsilano railway bridge to the Kitsilano waterfront. The old railway bridge, rebuilt when the line to Steveston was constructed, long hung a disused wreck, falling to pieces over the entrance to False Creek. It had never been used for much more than to secure the standing of the charter for the English Bay branch. The intention of this branch was to connect with ocean docks projected to be built on the Kitsilano waterfront. Early maps of the city show the four piers which were planned to be built in connection with this dock scheme.

Another part of the proposed improvements on Kitsilano Reserve has to do with furnishing industrial sites. Speaking on this subject on June 20, Mr. Stevens, M.P., stated:

"Now, as regards the Kitsilano Reserve, make no mistake. The board is in possession of that reserve and we are going to arbitrate the matter. But you can get this very clear. We are going to build ocean docks there to handle ocean steamers and place industrial sites, and we are going to have our own railroad to connect those sites with our Government dock on Burrard Inlet."

The Port Moody portion of the commissioners' scheme was to provide that class of wharfage which was bound to be needed for the handling of bulk cargoes. All parts of the proposed improvements had been closely discussed and studied, declared Mr. H. H. Stevens, when in conference with the Board of Trade committee on June 23. "Each unit in this scheme," he said, "has been investigated, and we are satisfied that the units will be self-sustaining without any charge on shipping."

False Creek Improvements

With respect to the forty-acre reclaimed area on False Creek at Granville Street bridge, when complaints were made at the Board of Trade conference, that the spoil filled in behind the bulkheads had silted out into the channel, it was pointed out that the bulk-heading is fifty feet back from the head line as planned, so that there is plenty of allowance made for any working out of the spoil from the fill. It was the intention to let the sand slope out to the property line, as people leasing sites on the reclaimed area would wish to build wharves to suit themselves.

The channel now nearing completion in False Creek is 350 feet wide, and it is the intention to have it 22 feet deep from English Bay right up to Main Street, where the proposed retaining wall is to be put in. This makes it available for many craft of considerable size which have not heretofore been able to make use of it. The spoil from the upper portion of False Creek dredging work has been deposited in the big fill made by the Canadian Northern at the head of False Creek, under the contract made with the City of Vancouver. That from the section of the creek nearer English Bay has been made use of to make the fill at Granville Street.

Time and Cost of Construction

To carry out the proposed improvements, the terms of the Order-in-Council approving it, fix five years as the minimum time in which the work shall be done, and that it might be ten years before it was entirely completed. Seattle is spending $6,000,000 on harbor improvements. That Vancouver will have developed and advanced sufficiently in five years to warrant all the expenditure proposed by the Harbor Board is the argument put forth. The terminal railway is held to be one of the necessities of the port. That the Dominion cabinet approved of the plans of the commissioners is clearly shown. That they took every reasonable precaution and safeguard to protect the interests of those using the port is also easily established. The Order-in-Council reads in part, speaking of the conditions on which the $5,000,000 of bonds are to be secured, that they are to be used in "the gradual development extending for a period of five years of such items in the programme as in the judgment of the commissioners, with the approval of the Minister of Marine and Fisheries, promise to become immediately revenue producing, with the further condition that the plans, specifications and estimates of all work for the development of the above property or with the provision of other facilities shall receive the approval of the Minister of Marine and Fisheries before any work is started or expenditure on the same is incurred."

The entire cost of those harbor and wharf improvements so far carried out in Vancouver has been borne by the Dominion Government. These are the False Creek dredging referred to, the dredging at the entrance to Burrard Inlet, which has been carried on for over two years, and the Government dock and grain elevator on the main harbor front.

The question of harbor improvements has long been a live issue in Vancouver, and the opinion has always been expressed generally among those informed on the subject, that the Dominion Government had the chief responsibility in the matter, as ports on the eastern seaboard of Canada had been improved at large expense undertaken by the Dominion. In comparison with Vancouver, the work done at the port of Montreal is frequently referred to. The development of that port commenced on January 13, 1898, when the Dominion Government advanced $2,000,000 at 3 per cent. On May 23, 1901, another $1,000,000 was voted. On July 10, 1903, $3,000,000 was advanced, and on July 13, 1906, a further grant of $250,000 was issued to redeem debentures issued in 1876.

On April 27, 1907, another loan of $3,000,000 was made, and on May 4, 1910, no less than $6,000,000 were voted at 3½ per cent. to retire 100,000 debentures maturing in 1910.

On March 12, 1912, another $6,000,000 at 3½ per cent. was voted to retire debentures of the par value of $600,000 maturing at the rate of $200,000 per annum in each of the years 1913, 1914, 1915.

This money was lent by the Dominion Government to the port of Montreal and all the port is required to pay is the interest. In the case of Vancouver, the Government would have followed the same policy had it not been for the war, but the Commissioners state that after the war, they have the assurance of the Government to stand behind the terminal scheme.

The operation of the railway terminals has proved to be one of the most important and successful features of the development of Montreal harbor. On the north bank of the St. Lawrence River, adjoining the cities of Montreal and Maisonneuve in their most congested industrial districts, the harbor railway terminals extend. The total distance, measured along the river bank, is seven miles, but the total mileage of tracks is 44.9.

Existing Wharf Accommodation

Owing to present conditions in shipping, with very little freight arriving from the United Kingdom as in years preceding the war, there is no lack of shed accommodation on the docks now in existence, and no danger of congestion such as frequently occurred in the active years of expansion in 1912 and 1913. Storage space on the docks available for in and outbound cargo is covered by Evans, Coleman & Evans' dock with two piers, one 650 feet long and 100 feet wide, the other 810 feet long and 75 feet wide; Johnson dock with a shed 600 feet long; Balfour, Guthrie & Co. dock with shed 400 feet long and 100 feet wide; Great Northern dock with a shed the same size; C.P.R. docks with some ten sheds in all, of varying dimensions; Dominion Government dock with two sheds 800 feet by 80 feet.

Quite recently the Canadian Pacific Railway Company let the contract for the construction of another pier for ocean vessels at their docks. Additional shed space will be provided when this pier is built.

Harbor dues have yet to be agreed upon in respect of charges made by the Board of Harbor Commissioners. That body drafted by-laws including a tonnage tax of 3 cents per ton and the bylaws were approved by Dominion Order-in-Council in 1914. Opposition by the Vancouver Board of Trade, however, has prevented action being taken so far to enforce the collection of the proposed tax. Other port charges now in force and which are compulsory, consist of pilotage in and out, sick mariners' dues and bill of health. Pilotage charges are $1 a foot draft of vessel and 1 cent per ton. Sick mariners' dues are 1½ cents a net ton. British bill of health costs $1, and the American bill of health, if a vessel clears for that port, $5. On an average vessel of 3,000 tons the pilotage charges in and out would be $104 and with the sick mariners' dues and bills of health the total cost at present is $150. When the harbor commissioner's tax of 3 cents per ton is imposed an additional $90 would be charged. The charge, however, it is pointed out, would not be collected on more than five entries in any one calendar year, so that vessels plying in regular service would not have to add that amount to their dues every trip they made.

Comparison with Seattle port charges shows that in addition to pilotage, and other items there is a federal tonnage tax of 6 cents, which is just double that proposed by the Vancouver harbor commissioners. The cost to a 3,000-ton vessel entering and clearing from Seattle would be $288, so that even if the 3-cent tonnage tax were imposed in the port of Vancouver the total dues on a vessel would still be less than in the Sound port.

INCREASE IN ONTARIO METALS OUTPUT

RETURNS of production for the first six months of 1916, made to the Ontario Bureau of Mines by the metalliferous mines and works of the province are summarized in the accompanying table, which also gives comparative quantities and values for the corresponding period of 1915.

The production for the six months ending June 30, 1916, shows a material increase in value of all metals over that for the first six months of 1915, with the single exception of iron ore.

Gold

If the present rate of production is maintained, Ontario should reach the

$10,000,000 mark for 1916, as compared with $8,500,000 for 1915. Of the total yield the Porcupine camp contributed all with the exception of $545,434, produced by the Croesus, in Munro township, the Rognon, near Dryden, the Tough-Oakes at Kirkland Lake, and the Canadian Exploration Company at Long Lake, near Sudbury. The Hollinger Consolidated and Dome Mines are the big producers of the Porcupine camp. Before the year is out Boston Creek will probably be contributed to Ontario's gold production. Development is proceeding on some of the more promising claims at Kowkash, situated east of Lake Nipigon, on the Transcontinental Railway.

Silver

Since the beginning of 1916 the price of silver has advanced considerably, the average being 62½c per ounce, low 56½ and high 77¼c. As a result, production has been stimulated, and the value as compared with 1915 figures shows a considerable increase. Although the ounces sold were less than for the corresponding six months' period of 1915, the total production was greater, over 1,000,000 ounces remaining to be marketed. Undoubtedly the life of the Cobalt camp will be prolonged as a result of introducing flotation treatment for handling low-grade dumps and slimes. Nipissing still leads in output with a valuation of $1,766,561. The Mining Corporation of Canada (Cobalt Lake and Townsite City) is the next large producer followed by Kerr Lake, Coniagas, McKinley-Darragh-Savage, Seneca-Superior, etc., in the order named.

Cobalt

With the outbreak of war the European market for Cobalt oxide was suddenly cut off. However, new markets and new uses for metallic cobalt have improved the situation. High-grade steels are now produced from cobalt alloys. Metallic cobalt production is greatly in excess of last year.

Nickel

Metallic nickel from cobalt ores is produced at the refining works of the Deloro Smelting and Reduction Company, Limited, formerly known as the Deloro Mining and Reduction Company. The output shows an increase over the 1915 production, which was not marketed during the six months' period.

Copper

Apart from the nickel-copper deposits of Sudbury, there has been a revival of copper ore mining in Ontario, partly due to the high price of the metal. The old Tip-Top mine and other properties near Mine Centre, in the district of Rainy River, are now producing. The Rand Syndicate is operating near Timagami. The Sable River Copper Company, at Massey has erected a mill and is using the flotation process for the treatment of copper ore.

Nickel-Copper Matte

The smelters of the Canadian Copper Company, at Copper Cliff, and the Mond Nickel Company, at Coniston, are turning out nickel-copper matte at an unprecedented rate. The production, as compared with the first six months of 1915, shows an increase of nearly 40 per cent. The valuation of the metallic contents of the matte has been made on a basis of 10 cents per pound for copper and 25 cents for nickel. The figures given for metallic copper and nickel separately show that the prices were over 18 and 42 cents per pound, respectively.

In addition to the above-mentioned companies, the Alexo mine, near Porquis Junction, produces a small amount of nickel-copper ore, which is treated at the Coniston smelter.

Molybdenite

This mineral occurs widely in Ontario, but is mined chiefly in Renfrew county. It is wanted at the present time for use in the manufacture of high-speed tool steel, and for this purpose molybdenum will probably replace tungsten to some extent. The demand for molybdenum steel, to be used in munition factories, comes largely from the allied nations, Britain, France, and Russia. Molybdenite concentrates, containing 85 per cent. for more of Mo. S. 2, are worth about one dollar per pound. Ferro-molybdenum is now (September) being manufactured for the first time in Canada by the Orillia Molybdenum Company, at Orillia, and the Tivani Electric Steel Company at Belleville.

Iron Ore and Pig Iron

The only shipments of iron ore were from the Magpie mine, operated by the Algoma Steel Corporation of Sault Ste. Marie. Although iron ore production shows a decrease as compared with the same period in 1915, that of pig iron shows a material increase, both in tonnage and value.

CANADA'S GOLD OUTPUT

THE total production of gold in Canada in 1915 is estimated by the Canadian Department of Mines at 916,076 fine ounces valued at $18,936,971, as compared with 773,178 fine ounces valued at $15,983,607 in 1914, an increase of $2,593,964, or 18.5 per cent. Although the production has more than doubled since 1907, it has not yet reached the high mark attained during Klondike's best years. The 1915 output was exceeded during each of the four years from 1899 to 1902.

Of the total production in 1915, about $5,550,987 was derived from placer and alluvial mining, $9,195,307 in bullion and refined gold and $4,230,677 contained in matte, blister, copper, residues and ores exported. Ontario has now become the largest gold-producing province in Canada, thee production in 1915 from fifteen properties being reported as $8,386,956, or 44 per cent. of the total production in Canada, as against against a production in 1914 of $5,545,509, an increase of $2,842,447, or 50 per cent.

THE FOREST WEALTH OF QUEBEC.

FEW people, even among those living in the neighborhood of Canadian forests, have anything like a true conception of the vastness of Canada's wooded areas and timber wealth. The regions contiguous to the Eastern Townships of Quebec constitute a locality of increasing interest at a time like the present when lumber prices incessantly increase.

Rivers and railway lines penetrate the forests beyond the boundaries of the Eastern Townships so that the raw material is very conveniently transported to the mills. Large numbers of men are given employment and prosperity is evident in the comfortable homes of the populace.

The principal soft woods growing in the Eastern Townships are pine and poplar. The hard woods are maple, birch, beech, ash and elm. Almost every farm has its cordwood stock and sugar bush with some timber to spare for special building purposes or export.

Several large lumber firms have their head offices in Sherbrooke. From here they direct their operations which extend to all parts of the province. These concerns operate both on their own freehold hold properties and also on leased Crown lands. Last year the Quebec Government had over 70,000 square miles of timber limits under license. The production of lumber from one section of these limits amounted to 736,790,594 feet, board measure. In addition there was marketed 345,206 cords of pulpwood, 44,000 posts and rails, 109,000 pickets, 608,429 railway ties, 3,808 cords of firewood, 9,278 poles, and 109,406 cubic feet of square timber. The government revenue from Crown land licenses reached the sum of $1,126,907, all of which shows the great wealth and possibilities of a limited but important section of the province.

* * *

RECENT returns show a considerable revival of export trade as regards sewing machines for countries in Europe, South American, and Australia, and textile machinery is being shipped to France, China, South America, the East Indies, Japan, the Netherlands and Russia. Makers of typewriters have no reason to complain of their export trade with countries in Europe, South America, India, the Straits Settlements and Australia

Some Important Factors in the Conduct of Export Business

By E. V. Pannell

Apart from a broad knowledge of foreign markets, a no less essential requisite, for the successful conduct of export business, is an intimate knowledge of the various factors directly affecting the efforts of exporters. Where, what and how, are three aspects of the case which require continual investigation to insure a consistent growth of our country's foreign trade.

At the cessation of the European war many hundreds of factories, now working upon war material, will be condemned either to idleness or to the production of implements and machinery for the arts of peace. It will be the desire of every Canadian manufacturer to take a share in and increase the export trade of the Dominion. The South American, Australian, Japanese and Russian markets will be expected to afford openings for new business connections where none before existed, and this will prove to be Canada's opportunity. Europe will, of necessity, be occupied to a great extent in rehabilitating and equipping the countries devastated by the war; whilst the United States manufacturers may be expected as ever to devote the major part of their outputs to the demands of their highly protected home market.

Points to Investigate

A manufacturing concern, which has always been engaged in filling domestic demands, is sometimes reluctant to embark upon export trade from mere conservatism, thereby passing up much profitable business. In any event, it will be of value to appoint from the Sales Department a commission to investigate the opportunities of business in a foreign market. The most important points to investigate are: (a) Demand; (b) import duties; (c) freight rates; (d) system of credit; (e) foreign exchange.

Demand

First and most important is the demand for the goods. Is our friend the Canadian manufacturer supplying a commodity of equal value to that already obtainable in the foreign country at a lower cost, or some new appliance hitherto unknown there, the demand for which can be created? In either case trade may be anticipated. The Dominion Government has stationed in fourteen different countries trade commissioners and agents. The duty of these officials is to report upon the opportunities in the respective countries for Canadian export business. In addition, the British Consular service affords a valuable means of obtaining information regarding the possibilities of a new market. Private correspondents are also a means towards the same end, but it is doubtful whether any of these methods can be compared with the personal investigation of travelling to the country and studying the requirements on the spot.

Tariffs

Tariffs are sometimes referred to as being prohibitive; in other words, as excluding the purchase of any imported goods. This is, however, very seldom the case. Where a high tariff is in force the home producer will regulate his prices in line with the import duties, and the prices paid by the ultimate consumer will be very little different whether for domestic or foreign supplies. A close study of the tariffs is, however, very necessary as a preliminary to export business, mainly to ascertain the correct classification for the goods. For instance, in many countries a lower tariff is in force for agricultural machinery than for other classes of machines; it will readily be seen that there is liable to be some ambiguity unless the goods are properly declared.

Freight Rates

Ocean freight rates are usually quoted in shillings or dollars per ton of 2,240 lbs., or 40 cubic feet. As a rule, for most types of cargo the measurement rate applies, so it is important to bulk the cargo down into reasonably small cases. At the present time rates are away up, due to the scarcity of and unprecedented demand for tonnage, but with the large number of vessels which will be released at the end of the war, freights will reach a more favorable level. The law of supply and demand causes fluctuations in the freight market in normal times, and not the least important function of the exporter's office is securing freights at the most favorable turn of the market.

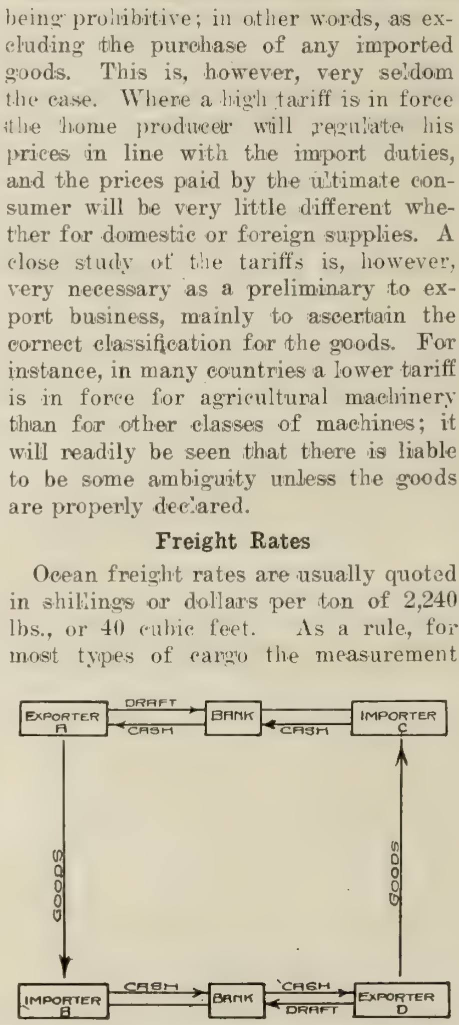


DIAGRAM ILLUSTRATING REMARKS ON EXCHANGE.

Credit Systems

Terms of payment for export shipments usually favor the exporter, being cash against shipping documents at the place of shipment. For instance, in the case of a lot of machinery consigned to Bordeaux the original bill of lading will be obtained from the shipping company and attached to the triplicate Consular invoice duly certified by the French Consul and the certificate of insurance. These documents being presented at the purchaser's agents in Toronto, the cash is paid over in full. Where no such agent exists, the purchaser will make a deposit with a Toronto bank for the amount to be handed over in exchange for the order bill of lading duly endorsed. Certain machinery manufacturers specify the terms "50 per cent. with order and 50 per cent. on shipment" as applying to all export business, whilst others are content to wait for a portion of the purchase price until the goods have been delivered and erected. Far more latitude in credits must be allowed if an energetic nation-wide export trade is to be stimulated. The secret of German commercial success in the South American market lies in the long credits which the exporters, with the help of their banks, were able to give.

Influence of Exchange

The prevailing rate of exchange plays an important part in stimulating or depressing the export trade. It must be remembered that the foreign customer always figures the cost of the goods in his own currency, whereas the exporter's price will be based upon the Canadian dollar. If, therefore, the dollar commands a premium in terms of sterling, francs, lira, or whatever it may be, the cost of goods would be higher to the importer and trade will be discouraged. Take the case of exchange upon London, of which the normal or par rate is $4.86 2-3 to the £, the value to-day is only about $4.75, so that other things being equal, Canadian goods cost the English importer 2½ per cent. more than under normal conditions. This is, of course, a reaction from the heavy demand for American and Canadian goods, causing a very large number of drafts on London, which operates to the detriment of the sterling exchange. The diagram illustrates the manner in which export trade reacts upon the foreign exchange. The Canadian exporter A ships goods to a customer in England B, and, presenting his draft at a Toronto bank acting for B, draws cash. In the meantime, B has paid cash into his local bank with instructions to liquidate A's draft in Toronto. So the net result is that A sells the goods and gets cash, whilst B buys the goods and pays cash. The rest is up to the banks. If this were only a one-sided process, the Toronto banks would soon become loaded up with drafts on London and depleted of their cash, whilst the London banks would be in just the opposite state.

Imports Must be Considered

But it must be remembered that import trade as well as the export has to be financed. C is a Canadian importer buying goods from England and paying cash in Toronto. In this way the local bank is both receiving and paying cash on account of goods bought and sold, and at the same time accumulating drafts on London. In the same way the London bank is accumulating drafts on Toronto without disturbing the cash balance. The drafts are handled by bill brokers, and are ultimately exchanged and cancelled. Now it will be seen from the foregoing that any great disparity between the value of exports and imports will disturb the cash distribution. An abnormally high export trade from Canada to England will result in an abnormally large number of drafts upon London. Balance can be restored only by stimulation of the Canadian import trade or by the shipment of bullion from England. This latter course is never resorted to until other methods have failed. Such methods, adopted by the Bank of England, comprise increase in the rate of discount at which foreign drafts are accepted; in other words, raising the bank rate. Drafts or bills upon London being plentiful at the present time is another way of saying that the pound sterling is cheap in terms of foreign currency, hence the low rate of exchange.

Empire wide commercial relations could be greatly fostered by a more unified system of chartered banks giving better facilities for exporter and importer.

BRITAIN'S EXPORT TRADE IN JULY

THE vital importance of Britain's commerce as a means of sustaining the Empire in the present crisis is fully recognized by her overseas Dominions, all of which are emulating to good purpose the example set by the Mother Country. In an analysis on the official figures relating to exports and imports of the United Kingdom in July last, the British Trade Review makes interesting comment on present commercial activity between Britain and her colonies, as well as with other countries, the possibilities of further markets for Canadian products being apparent in many cases where supplies formerly obtained from the Central Powers are no longer available. The returns should also lead enemy countries to think and to realize the hopelessness of a struggle with a Power whose credit and supplies will outlast unprecedented periods of warfare, and which can, if it be necessary, renew and carry on war again and again throughout the twentieth as easily as throughout the eighteenth century.

Exports Show Increasing Value

During the month under notice, despite the absence of five million men with the colors, exports were valued at £54,210,000, a value even greater than that of July, 1914, when no war existed, and some £11,000,000 greater than the export values of July a year ago. During July last there were exported larger quantities of beer, ale, spirits, wrought copper, cotton yarn, worsted yarn, woollen tissues, woollen carpets, and linen yarn and piece goods than in July, 1915. In these commodities quantities have increased as well as values. In coal and fuel, iron and steel, cutlery and hardware, machinery, cotton yarn, piece goods, and other cotton manufactures, woollen yarn, jute piece goods, silk goods, clothing, boots and shoes, and china and earthenware, greater values were exported compared with July, 1915.

Enemy Trade of Little Significance

The total British exports were valued at £46,323,000; but to these must be added the transshipment trade in foreign and colonial goods, which is being carried on to the value of nearly £8,000,000 per month, and in connection with which the loss of enemy countries' trade has been more than made up by increased business with neutrals and Allies being in July last greater than in July immediately before the war. This tends to show that Britain is already independent of the trade with enemy countries; that she is doing very well without it; and that, so far as her international commerce is concerned, she could continue the blockade of enemy countries for generations without any serious loss on balance to her international position.

Details Disclose Demand

An examination of the details of the returns throws some interesting light on exports in war time. The increase in the shipments of beer, ale, and spirits is, to a large extent, accounted for by the large number of British troops abroad, but increased supplies went also to the United States. Preparations of cocoa are being sent more largely to Australia, and the export trade in biscuits has returned almost to the 1914 position, excepting as regards South Africa. There is an increase in the quantities of British spirits shipped to the United States, South Africa, the British West Indies, Australia, and New Zealand. Tobacco is also sent abroad more freely, the quantities of cigarettes being for the seven months about double those exported in the same period of 1914. While the total shipments of coal have fallen off, larger quantities have been sent to France, Norway, Portugal, West Africa and Gibraltar. Oil seed exports show a steady decline, for the satisfactory reason that the oil-crushing industry has been developed at home. Of hides and undressed skins the United States have taken for the seven months about double the quantity of 1915, and more have also gone to Canada.

Machinery and Metal Products.

Of pig iron there was exported so far in 1916 about as much as in 1914, France and Italy taking largely increased supplies. Wrought iron exports are also as high as two years ago, China, South Africa, the Argentine, the East Indies, Japan, Australia, New Zealand, and Chile buying freely. Wire is going more largely to the East Indies, and wire manufactures to South Africa, the East Indies, and Australia. Bridge, boiler, and other iron and steel plates, are in great demand for France and Japan, and black sheets for France and Australia. The exports of galvanized sheets show a marked decline all round; but tinned plates are being shipped more largely to France, Portugal, China and Australia. In nails and rivets, tubes and pipes, anchors and cables the quantities exported are well maintained; while in steel bars and angles the shipments have risen from 127,000 tons in the seven months of 1914 to 406,000 tons in the same period of the present year, the principal buyer being France, which took more than 75 per cent. of these exports. France and the United States have between them been taking more than half of Britain's unwrought tin exports.

Colonial Prosperity

The prosperity of Australia, New Zealand and South Africa is reflected in the cutlery and hardware exports; and now that German competition is eliminated more demand is made for these commodities in Cuba, Chile, Brazil, the Argentine, as well as in the British Dominions. In carbons and electric glow lamps there is a most satisfactory export trade, due to the absence of the Central Powers from the market. France, Russia, Spain, India, Ceylon, and Australia continue to take fairly large quantities of general machinery, and South Africa has increased its purchases of mining machinery.

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PRACTICAL GOVERNMENT ASSISTANCE TO MANUFACTURERS

IN the immediate future, thanks to arrangements made recently in England by Right Honorable Sir George E. Foster, Minister of Trade and Commerce, there will be exhibited in this country a collection of more than 8,000 samples of goods of German and Austrian manufacture.

The work of getting these together has been carried out by British Consuls and Trade Commissioners in some seventy different markets all over the world and are being sent to this country with the special object of showing manufacturers here what lines are available for the application of their manufacturing resources.

The goods are divided into eight classes, and include textiles, hard and soft haberdashery, fancy and leather goods, glassware and crockery, general hardware, tools, and miscellaneous. Many of the lines shown in the hardware and tools' sections are not readily adaptable to production in plants at present operating on shells, and because of this feature, the display may not be immediately productive in regard to certain goods. The two sections named, however, include many articles, the manufacture of which is already established here, viz., enamel and aluminum ware, nails and screws, brass taps and fittings, stocks and dies,—horse-clippers, pliers, machinists' tools, electrical fittings, cutlery, etc.,—are a few of articles whose production can be immediately extended.

Lest any Canadian firms should feel diffident as to altering designs or patterns in order to duplicate samples, it is of interest to note that manufacturers who attended the exhibition in the United Kingdom were asked to make a detailed list of their own existing product which could be used to replace the enemy goods. It is understood that a similar course will be followed in this country, and an excellent opportunity will thus be available for setting forth the merits of many distinctively Canadian articles.

The action of the Department of Trade and Commerce cannot be too highly commended and the fact that they are sending out admission tickets to firms who wish their foremen and expert employees to inspect the goods is in itself evidence of the far-reaching influence which the event is expected to have on Canadian industry.

* * *

DEVELOPING PRESENT HELP

THE desirability of formulating a definite educative policy for engineering employees becomes more apparent with the increasing scarcity of labor and if all expectations regarding coming competition in the world's markets are realized, the value of intelligent and adaptable help will be still more appreciated. Firms whose first appearance has been in the munitions business may, as a result of a certain measure of success, feel that if they can make shells, they can make anything. For these, when they enter the transition period, there may be a rude and expensive awakening.

Many of these plants are 75 per cent. manned by illiterate help whose visible signs of intelligence are limited to the turning of a hand wheel in one direction till it stops, and then in the opposite direction. Most of them are men past the age where knowledge is eagerly assimilated because of its possible future value, and once having learned a simple part of the work, are not anxious to trouble about a wider field for their labors. The handicap under which a plant will work with help like that, will be very great when long-continued repetitive work like shell-making is discarded, and a more general and varied product is called for.

Now is the time when relations with help must be strengthened with a frank interestedness and open-mindedness which will convince the workman that a continuance of present prosperity into the future, let alone a moderation of it, will be in great part dependent on his adaptability and skill.

Where men have only taken machine shop jobs for the money, no beneficial results can be looked for, but where men, young or old, show mechanical instinct of any degree, they should be encouraged by every means possible to develop their mind along mechanical lines so that in days to come, the prosperity of the country and themselves will not suffer from lack of technical training and ability. No one can influence them more than their employers, and no time is more opportune than the present.

* * *

COST OF PAPER IN CANADA

THE present anomalous state of the paper trade in Canada is practically without precedent. Although the increased cost of paper in this country is due to the high cost of labor, the fact remains that Canadian mills are exporting about 2,000 tons of paper daily as against less than 1,000 during the same time in 1914.

The great increase in the amount of paper going out of the country at the present high prices emphasizes the reasonableness of the claim of Canadian publishers for fair treatment from paper manufacturers. The tendency of some foreign manufacturers, especially in the steel and iron industry, to maintain separate home and foreign prices has acted prejudicially in the case of Canadian firms competing with similar United States concerns, and the adoption of a similar policy in regard to Canadian paper is, we believe, worthy of the support of shareholders in Canadian paper mill securities.

INDUSTRIAL NOTABILITIES

WILLIAM MICHAEL WEIR, President, Canadian Foundries & Forgings Ltd.; Vice-President, J. A. Mackay & Co., Ltd., Investment Securities, Montreal, and Director, Ateras Wharf and Warehousing Co., Havana, Cuba, was born in Quebec, July 26, 1873, the son of William E. and Mary A. (McGoldrick) Weir.

After having been educated at Ottawa University, Mr. Weir, in 1895, was appointed Assistant Secretary-Treasurer, Ottawa Electric Co., Ottawa, holding this position till 1901, since when his activities have been mainly in the financial field, being respectively Bond Salesman, E. H. Gay & Co., of Boston and Montreal, 1901-1906; Canadian Manager of E. H. Gay & Co., at Montreal, 1907-1909; formed partnership with J. A. Mackay, 1909; business incorporated as J. A. Mackay & Co., Ltd., when he became Vice-President, 1910.

WILLIAM MICHAEL WEIR.

Mr. Weir married Florence E. Neville, November 25, 1903, his family consisting of two sons and five daughters. He holds a Captaincy in the 55th Irish Canadian Rangers and is a member of the following clubs: Royal St. Lawrence Yacht; Garrison (Quebec); Brockville; Welland; Kanawaki.

Yachting and golfing are his principal recreations while he is Roman Catholic in religion. Mr. Weir resides at 58 Aberdeen Ave., Westmount, Quebec.

—Photo, Courtesy *International Press.*

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

THE ENGINEER OF TO-DAY

By N. G. Near.

IMAGINE, if you can, a lawyer who does not subscribe for a law paper, or who has no law books in his office. He would be a "poor excuse" for a lawyer, indeed. It would soon become evident to everybody who knew him that he was not up-to-date. He could not work long on the knowledge he had gained while at college, or that he had gained in some other office. I know of no such lawyer. I doubt if there is one, especially one that could truthfully be "called" a lawyer.

Again, imagine a doctor who refused to subscribe for a doctor's journal. He may be a graduate of the best known medical school in the world, yet, if he lays down flat after finishing his course and refuses to learn more, it would not be long and he would be properly termed a "back number." The function of the medical journals, like the engineering journals, is to keep its readers informed along the lines of latest practice. "Kinks" are to be found in medical papers just as in our papers. The journal is the proper channel for up-to-dateness. The book and the library are for reference to precedence and good practice in days gone by. Journals and books are indispensable.

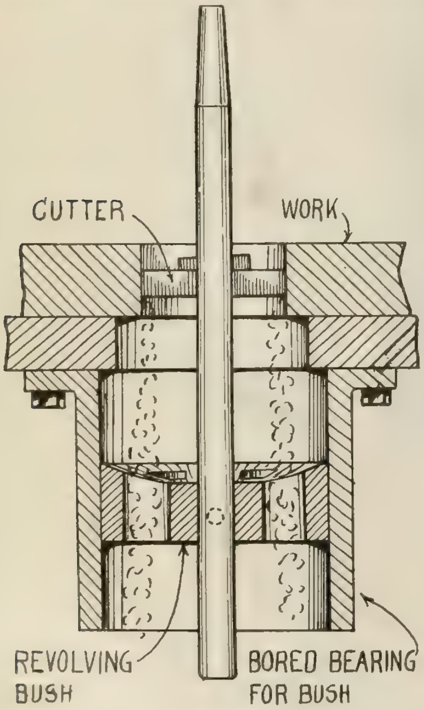


FIG. 26.

The same may be said for the teacher. Teachers of any profession should be intensely up-to-date. It is impossible for them to do too much reading and studying.

Contractors, architects, concrete specialists, textile men, coal miners, machinists—every trade worker, in fact—should subscribe for some paper or other in his field in order to keep from dragging along behind the times. The paper subscribed for and read should be the best. The best paper is the one that is not too high above the reader's head and that is not so elementary as to teach nothing new—the paper must be alive to the present.

The engineering profession is just as important as are any of the above. There are more "new things" in engineering than in other lines, and therefore more to read about. The steam turbine, for example, has made enormous strides. Inventions of engineers make possible such highly developed sensations as the aeroplanes which loop the loop and fly circles around birds, the submarine, the battleship, enormous guns, the automobile, the steam railroad, and all electrical contrivances. All of these great things have been achieved since Watt made coal usable in the form of power. Power has therefore been the greatest civilizing agency and is now more important than ever.

Every engineer, no matter what his position, should read. Keep up with the times. Don't be a man of yesterday, last week, last year, or last generation.

Read!

Then apply what you have learend.

* * *

MACHINISTS' INSTRUCTION COURSE—V.

WHEN a hole is too large to be finished with a drill, it is either dulled first, or the hole is cored out in the foundry and is then finished with a boring bar, so that boring may be said to be the finishing of hole that has been previously made. This is done by a bar carrying one or more cutters. There is a great variety of boring bars and cutters, but the practical method of operation is much the same in all cases.

Regarding Boring Bars

Use a boring bar as large in diameter as the cored or drilled hole will permit, and as short as is consistent with the depth of hole to be bored, leaving a good length of bearing in the guiding or supporting bush when the cutter commences to cut. See that the tang at the end of the boring bar fits the drill spindle, and in large bars it is well to have a small hole right through the end of the drill spindle and the taper shank of the boring bar, so that a pin driven in this hole supports the weight of the bar. A boring bar is much more likely to come loose in the drill spindle than a drill, so that some such device is necessary. Some people use a set screw, but this is unsatisfactory and dangerous unless a safety set screw is used.

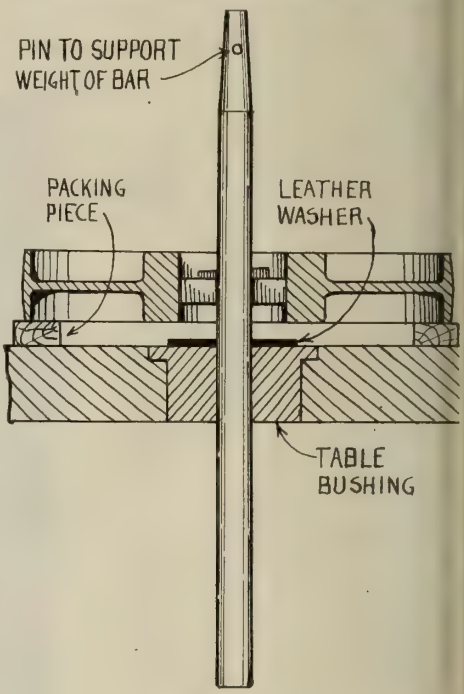


FIG. 27.

Be sure that the bar is a good fit in the table bushing, an easy, free fit, yet not slack. This is very important, as it is impossible to do a good job if the end of the bar is allowed to wobble. In setting up the job, see that the bar will enter the table bushing without being deflected to one side. Set your table first, that is if the job will permit you doing so, with the bar free to move round and up and down in the bush. It might not be possible to set up some jobs this way because the bar could not be raised high enough to pass over the job underneath. In these circumstances place the job on the table first, then pass the boring bar through the job into the table bushing, and swing the whole arrangement under the drill spindle together

Keeping Cuttings Clean

Cut out a large leather or rubber washer and press it tightly on to the bar to prevent the cuttings from getting into the bush. Another method I have seen in operation, designed by E. Dobney, to prevent the cuttings getting into the bushing, is to have a long sleeve or bushing cast or bolted on to the underside of the drill table, with bushings made to fit, and fastened on to the boring bar with set screws. The bushings are slightly hollowed on the top, so that the cuttings would fall toward the centre and pass through slots cast in the bushing quite clear of the working surface. See Fig. 26.

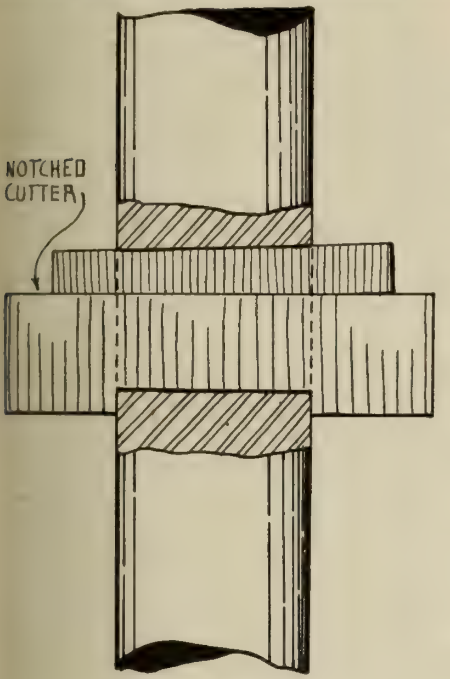


FIG. 28.

All holes to be bored ought to be marked off carefully. The centre of the bar must be in the centre of the finished hole, independent of the centre of the original or cored hole. In setting up the job with the haemaphrodites, or jenny-legs, or odd legs, as they are variously called, put the pointed leg in the punch, mark on the circumference of the circle to be finished and let the other leg just touch the bar. Move the job around until each punch mark is an equal distance from the bar. After taking one cut through and the hole is cleaned up, which means that the cutter is cutting all round, test with the haemaphrodites again, only this time measure from the punch marks to the edge of the hole. If the job has been set up true, the measurements from all the punch marks in the finished circle to the edge of the hole will be equal.

Finishing Holes

It is not good practice to finish boring a cored hole with one cut, as the cutter is nearly always sure to cut more to one side than the other. This causes the bar to spring and chatter and the hole will not be round. When the hole is uneven to begin with, always finish with a light cut.

In some jobs the centre of the table cannot be used as a support for the bar. In this case improvise a bearing by bolting a piece of cast iron bored out to suit the bar, to the bedplate or baseplate of the drill, or perhaps to an angle plate. Again the job may not permit of any guide or support, such as boring a blind hole. Always finish with a reamer, if possible—if you haven't one, the only thing you can do is to finish with light cuts. When boring to a standard size the finishing cutter should be notched out to fit the bar and turned up in the lathe. Having very little clearance in the finishing cutter makes a smoth hole, too much clearance developes chattering.

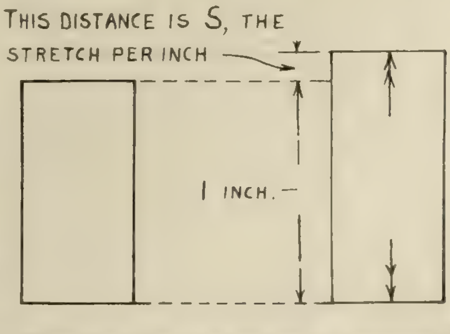
* * *

WHAT IS MEANT BY YOUNG'S MODULUS

By N. G. Near.

NO doubt many an engineer has wondered what "Young's Modulus" means. Sometimes it is called the "Modulus of Elasticity." It is frequently used in engineering literature, but the authors never stop long enough with their writings to give an explanation, and the reader, therefore, skips the words "Young's Modulus" and loses the sense of the paragraph, or, perhaps, the whole article.

In the little sketch herewith, I show exactly what it means. Nearly every material is elastic to some extent. Steel, wrought iron, cast iron, glass, leather, rubber, etc., all are elastic.



Consider the illustration to represent a piece of steel one inch long. Its cross sectional area is one square inch. Now, by applying a tensional force to the piece shown on the left, it is bound to "stretch" to some extent, as indicated on the right.

Measure the stretch in inches and the pulling force in pounds. Divide the latter by the former and the result is Young's Modulus.

Stated algebraically, the forula is:

$$E = \frac{\text{Stress}}{\text{Strain}} = \frac{f}{s}$$

Where E = Young's Modulus.
" f = The unit stress in pounds per sq. in.
" s = The stretch in inches.

Since, in my example, I have used a piece just one inch long with a sectional area of one square inch, we just have to divide the total pull by the whole area.

Stated in a different way, "Young's Modulus is the unit stress necessary to stretch a piece to twice its original length." Perhaps that is more easily remembered. Of course, this is true, provided the material will not lose its elasticity. For instance, if the piece of steel shown will not lose its elasticity, and if a great enough force is applied (30,000,000 pounds would do it), it could be stretched to a length of two inches, or twice its original length. The modulus of elasticity of steel is therefore 30,000,000.

The modulus of elasticity of such a soft metal as copper is only 12,000,000. Of leather, rubber, etc., it is naturally much less.

* * *

UNFAIR TO IMPORTERS

NUMEROUS protests have reached the Dominion Government from Canadian importers regarding the burdensome operation of a provision of the Customs law as enacted under the late Government. This provision requires the collection of duty based upon the fair market price in the country of origin at the time of shipment.

In the case of a deferred shipment and these have been more the rule than the exception of late—this results in a considerable hardship to the importer for the reason that prices have been steadily advancing in a wide range of commodities. The duty on such shipments is collected on the basis of the advanced price rather than upon the actual purchase price.

The difference is in many cases so great as practically to wipe out the importers' margin of profit. This, unless the importer is in a position to revise his selling arrangements in Canada, is often a serious difficulty. Both the Customs Department and the Department of Trade and Commerce have had the matter brought before them by correspondence and by deputations.

The answer is, of course, that as the collection is made under statute, no change can be made except by Act of Parliament.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	19 20
Lake Superior, charcoal, Chicago	19 75
Michigan Charcoal, iron	28 00
Ferro nickel pig iron (Soo)	25 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base Toronto	3.40
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.50
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.25
Bars, 2 in. and up	3.75
Structural shapes	3.25
Plates	3.75

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs.	
	C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$31 00
Electrolytic copper	31 00	31 00
Castings, copper	30 00	30 00
Tin	43 50	44 00
Spelter	13 00	14 00
Lead	9 00	9 00
Antimony	15 00	18 00
Aluminum	70 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4 75	$4 50
Heads	5 00	4 75
Tank plates, 3-16 in.	5 25	4 75

WROUGHT IRON PIPE

Prices in effect Sept. 12, 1916.

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3 00	$ 4 50
¼ in. and ⅜ in.	3 12	5 25
½ in.	4 00	5 57
¾ in.	4 83	6 96
1 in.	7 14	10 29
1¼ in.	9 66	13 92
1½ in.	11 55	16 64
2 in.	15 54	22 39
2½ in.	24 57	35 39
3 in.	32 13	46 28
3½ in.	38 64	55 66
4 in.	45 78	65 95

Lapweld

2 in.	$17 76	$24 24
2½ in	26 33	36 56
3 in.	34 43	47 81
3½ in.	41 40	57 50
4 in.	49 05	68 13
4½ in.	59 69	83 19
5 in.	69 56	96 94
6 in.	90 24	125 80
7 in.	121 40	165 40
8 in. x 25 lbs. per ft.	127 50	173 80
8 in. x 25 lbs. per ft.	146 90	200 20
9 in.	176 00	239 40
10 in. x 32 lbs. per ft.	163 20	322 40
10 in. x 40 lbs. per ft.	210 10	286 30

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	16 75	$18 50
Copper, crucible	19 75	22 50
Copper, heavy	19 75	22 00
Copper wire	19 75	22 00
No. 1 machine compos'n	15 25	17 00
No. 1 compos'n turnings	13 25	14 00
New brass clippings	13 75	15 00
No. 1 brass turnings	12 25	12 00
Heavy melting steel	9 50	10 00
Boiler plate	12 00	10 50
Axles, steel	15 75	15 00
Axles, wrought iron	19 00	19 00
Tires, steel	12 00	11 00
Rails	13 75	13 00
Shafting	16 75	16 00
Malleable scrap	10 25	11 00
Pipe, wrought iron	10 25	9 00
Stove plate	10 25	10 50
Heavy lead	6 00	7 00
Tea lead	5 00	5 25
Scrap zinc	7 50	7 75
Aluminum	35 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	45
Stove bolts	62½
Plate washers	25
Machine bolts, and less	35
Machine bolts, 7-16 and over	25
Blank bolts	30
Bolt ends	25
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts, hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$5.25
Structural rivets, as above	5.15
Wood screws, flathead, bright	80
Wood screws, flathead, brass	47½
Wood screws, flathead, bronze	40

MILLED PRODUCTS

	Per Cent.
Sq. & Hex. Head Cap Screws	50
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Finished Nuts up to 1 in.	50
Finished Nuts, over 1 in.	37½
Semi-Fin. Nuts up to 1 in.	50
Semi-Fin. Nuts over 1 in.	37½
Studs	45
Taper pins	65
Coupling bolts	net
Planer head bolts, without fillet	15
Planer head bolts, with fillet	net
Planer head bolt nuts, up to 1 in.	60
Planer head bolt nuts, over 1 in.	55
Planer bolt washers .... list plus	10
Hollow set screws ...... list plus	20
Collar screws .... list plus	20
Thumb screws	20
Thumb nuts	75

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$45 00
Open-hearth billets, Pittsburgh	45 00
O. H. sheet bars, Pittsburgh	45 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3.85	$3.80
Cut nails	3 40	3 40
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs.		$3 90

MISCELLANEOUS

Solder, guaranteed	0.27¾
Solder, strictly	0.25¾
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	030½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	0.83
Linseed oil, boiled, single bbls.	0.86
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.50
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.12
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
Standard drills to 1½ in.	55
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	25
3-fluted drills over 1½ in.	15
Bit stock	55
Ratchet drills	15
Machine bits for wood	20
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	30
Sockets	30
Sleeves	50
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	5 25	4 80
Canada plates, dull, 52 sheets	4 75	4 75
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 25	6 15
Premier, 10¾ oz.	6 50	6 40

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$20 00	.....
1¼ in.	23 00	.....
1½ in.	26 00	22 50
1¾ in.	26 00	18 00
2 in.	27 00	17 50
2¼ in.	29 50	.....
2½ in.	32 50	23 00
3 in.	44 00	27 00
3¼ in.	.....	30 50
3½ in.	50 00	32 00
4 in.	57 00	40 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

Ist Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.	
Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.39 to .40
Tin	.50 to .53
Zinc	.18 to .21

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	45 00	45 00
Copper sheet, tinned, 14 x 60; 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.10
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Que., Oct. 2, 1916.—Industrial and commercial activity continue satisfactory and the volume of business shows no signs of diminishing. The steel situation which has been very steady for some months, is again showing indications of moving and in an upward direction. In addition to the activity due to the war considerable progress is being made in the manufacture of articles, which have hitherto been made in other countries. While actual operations along these lines have not yet developed very far, the interest taken in these new products is likely to increase. To offset the shortage of labor, some factories, are beginning to employ female help and are meeting with very encouraging results.

Pig Iron.

The pig iron situation is becoming stronger, as indicated by the price advances quoted and pending. The requirements for steel making pig iron continue to tax the producing capacity of the furnaces and the volume of foundry pig used is showing considerable increase.

Steel.

Recent developments are again reflecting the actual condition of the steel market and the trade is expecting a general upward movement in prices. The present strength is not entirely due to war requirements as the needs of domestic trade are responsible for much of the recent demand. It is a noticeable fact that the export requirements cannot be entirely satisfied, as agents here are unable to secure the desired material. While no definite confirmation has been received, it is generally conceded that billets and sheet bars will shortly be advanced. The expected addition of $5 will put the mills price at $50 per ton. Increased facilities for the production of ferromanganese has had the effect of lowering the price, which is now quoted at $164, a reduction in two weeks of $11 per ton.

Increased demand for plates is adding to the pressure already on the steel mills. Deliveries are being extended and consumers are experiencing much inconvenience in covering their requirements. In addition to the activity now developing in car construction the shipyards are also buying heavily and the capacity of the mills is being taxed to the limit. The possibility of a stronger situation in sheet bars is adding strength to sheets, as indicated by an advance of from $2 to $5 per ton on the New York market. While galvanized sheets are firm at present, higher prices are looked for. It is anticipated that the additional strength of steel will soon be reflected in wire and wire products. It is possibly for this reason that the demand has recently increased. The pressure on the tube mills, owing to the abnormal demand is excessive, but relief is looked for, when increased production facilities, now under way, are completed. The local situation is at present unchanged but price quotations may undergo a revision, at any time.

Metals.

The general tone of the metal market remains the same. Recent developments in copper have established a firmness in this metal that will likely be maintained for an extended period. Tin continues steady and firm but spelter is quiet and easier. Lead is firm but inactive. Antmony is weaker on a dull market. Aluminum is fairly active and higher.

Copper.—Following the closing of the recent large order by the British and French Governments, the market has been comparatively quiet. The extent of this order will insure maximum production for many months and in all probability the market will retain its present strong position, well into the coming year. Those consumers who have refrained from covering their requirements may do so now, knowing that the firm tone of the market will likely be maintained for some time. The London situation is indicated in a further advance of £2 on standard and £3½ on electro. The nominal quotations on the New York market are 28½c for lake, 28⅝ for electrolytic and 26⅝ for castings. Dealers here report a firm and steady market with prices unchanged at 31c per pound.

Tin.—The market shows a tendency to become stronger, but the buying movement is not very active. Many consumers are still drawing on stocks purchased some time ago and are apparently waiting the settling of the present unstable condition. The difficulty of securing shipping permits and possible loss in transit, still appears to be a guiding factor, although the available supply of tin is of sufficient volume to cover existing requirements. However, little buying has yet been done for next year's business, and activity may be renewed at any time. A general advance of £2, is reported on the London market, and the strength of the New York situation is indicated by an advance of ½c. The local situation is quiet and quotations have declined 1 cent, the current price being 43½c per pound.

Spelter.—The market is unsettled but indications point to an advance as there appears to be a shortage of outside offerings and producers are not over anxious to come into the market. The strong position of copper may result in an improvement in the spelter situation, but some time may elapse before the change will develop. The local situation is quiet and unchanged, price being 13c per pound.

Lead.—The market is still quiet, the demand being fair but not sufficient to affect the general tone. Prices are well maintained. Local price is 9c per pound.

Antimony.—The refusal of the market to respond to the additional shrapnel orders has resulted in a weaker situation, which is indicated in the decline in quotations. Dealers here report a very quiet situation, with the market becoming easier, the current price of 15c being one cent lower than last week.

Aluminum.—With a slight increase in the demand coupled with a temporary shortage, dealers have advanced prices 2c, the quotation being 70c per pound.

Machine Tools and Supplies.

Activity throughout the machine tool industry continues to indicate a fairly heavy demand for machine shop equipment, especially tools suitable for heavy munition work. In addition to shell requirements, active inquiry is being made for special machinery, showing an improvement in certain lines of domestic trade. The production of many articles, previously made in other countries, is now being favorably considered in Canada and enquiries on the necessary equipment may result in many of these lines becoming part of this county's industrial production. Firmness continues to feature the small tool supplies, the demand being maintained with prices holding strong.

Scrap.

In keeping with the strong position of steel and metals in general, the scrap situation is active and very firm; prices having advanced in most lines of old materials. The requirements for steel making purposes have placed an extra heavy demand on various grades of scrap, the result being a general advance of ¼ cent on the local market. Boiler plates and steel tires are now 12c per pound, steel axles 15¾c, wrought iron axles 19c, rails 13¾c, shafting 16¾c, and malleable, wrought iron pipe and stove plate are quoted at 10¼c per pound. Heavy melting steel is now 9½c per pound. All copper scrap has advanced ½c, now ranging from 16¾c for light to 19¾c is for heavy and copper wire. Machine composition and turnings are up ½c, quotations being 15¼c and 13¼c respectively.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Toronto, Ont., Oct. 3.—Not the least important feature of the prevailing prosperity in Canada is the marked improvement in the financial conditions of many companies, particularly those engaged upon war orders. These concerns have been able to liquidate their liabilities and in many cases have accumulated reserves which has placed them in a sound financial position, and will enable them to develop their business, and also withstand dull trade when it comes. This is especially true of the steel companies, which are doing phenomenal business, and all records have long ago been broken both as regards output and profits. Other indications of trade activity are the marked increase in bank deposits and clearings, and also in the big increase in Customs revenues. The revenue for the first six months of the fiscal year, April to September inclusive, amounted to $70.564,547, being an increase of $25,803,717 over the corresponding period last year. For September alone the statement shows that the revenue amounted to $12,110,182, compared with $8,029,665 for September, 1915, representing an increase of approximately 50 per cent.

While factories working on war orders, directly or indirectly, are exceptionally busy and production is exceeding all previous records, the maximum output has not by any means been attained owing to scarcity of labor, particularly of the skilled variety. Shortage of raw materials is also in many cases seriously affecting the situation. War orders are, of course, taking precedence over all other business, with the result that purely domestic trade is to some extent suffering. Apart from the labor situation, the outlook in business circles was perhaps never brighter, and further stimulus will be given to trade by another war credit for $50,000,000, which has recently been established for the purpose of financing purchases by the British Government of munitions and supplies in Canada.

Steel

There is no sign of any break in the extraordinary activity which prevails in the steel trade, and indications point to a continuance of present conditions for an indefinite period. There is no improvement in the situation as regards the scarcity of steel, the demand is exceeding the supply to a greater degree than at any other period in the history of the trade. Although the mills are operating at capacity, they are unable to keep pace with the demand for steel for munitions and general purposes, and are getting further behind all the time on deliveries. The serious shortage of steel rails, which has developed, is due to the war, as those steel mills, with the one exception, which have rail mills, are engaged in producing shell steel and are not taking orders for rails. The urgent demand for steel for munitions precludes the possibility of much improvement in the situation in the meantime, although the proposed remission of the tariff duties to permit rails coming in from the United States may help matters. Whether this will give the desired relief is uncertain, as the mills in that country are congested, and may not be able to make satisfactory deliveries. Much concern is manifest in the trade on account of the proposed increase in freight rates on iron and steel from interior points to the seaboard for export. The steel manufacturers are protesting and some compromise may be affected.

The market continues very firm, and all prices have an upward tendency. Recent advances include 15c on boiler and structural rivets, while it is expected that higher prices on steel and iron bars will be announced in the near future. Boiler tubes and plates will probably advance shortly, the latter being particularly firm and hard to get just now.

The market for galvanized sheets in

the United States is considerably stronger and higher prices are anticipated, in which case an advance may be looked for in this market. The reason for the renewed strength is the unusually heavy demand, and also because of the continued high cost of black sheets. The demand for both black and blue annealed sheets is heavy and the market is stronger. As sheet bars will be higher for fourth-quarter delivery, sheet prices will no doubt be advanced in the near future.

Increased activity characterizes the steel market in the United States. The scarcity of steel is becoming more serious, and there is little expectation of any relief in the situation, as capacity production is looked for during the greater part of 1917. The mills are in a sold-up condition, and they are getting further behind on deliveries. Although prices of steel products are now higher than they ever have been, it is certain that the market has not stopped advancing. Wire products and pipe are higher, while sheets are advancing, and higher prices on bars, plates and shapes are looked for any time. The export demand is apparently unlimited, while domestic consumption has increased considerably.

Pig Iron

The pig iron market continues firm, and it is possible that prices of domestic iron will advance. Several brands of United States pig iron have made a further advance during the week, the new prices being as follows:—Basic, Valley furnace, $19; Bessemer, $22.95; and gray forge, Pittsburgh, $19.20. Foundry iron remains steady, but the consumption of steel-making brands is steadily increasing.

Scrap

The market for old materials is firmer, and although there are no important changes to note this week, it is possible that copper may advance in the near future owing to the increased strength in that market. The lead market is stronger and heavy lead has advanced. Prices of heavy melting steel have been well maintained, the demand being good and market firm. Business continues good and the general situation satisfactory.

Machine Tools

Business continues brisk, but would be considerably better if conditions in the shell plants were more favorable. The shortage of labor and difficulty that is being experienced in getting sufficient supply of forgings are adversely affecting production. If the machine shops were able to operate at capacity, as they should be doing, then the demand for tools would be heavier. The demand for heavy duty lathes continues to be the principal feature in the trade, and new designs are still being placed on the market. These special tools for machining munitions continue to keep local machine shops busy, and in some cases considerable export business has been done. Deliveries are fairly good on large lathes, but still very slow on milling machines and grinders.

Supplies

Business continues very good and prices firm, with a higher tendency. Lead wool has advanced 1c, and is now quoted at 12c per pound. Plumbers' oakum is higher at 7½c per pound. Gasoline and benzine are unchanged, but an advance in crude oil is looked for in the United States, which would likely result in higher prices on gasoline here. Brass wire has advanced, and is now quoted at the following discounts:—3 to 24-gauge, list plus 40 per cent., and 25 to 30-gauge, list plus 25 per cent.

Metals

The metal markets generally are firmer, but prices are unchanged, with the exception of copper, which has advanced. The most interesting feature this week has been the closing of a big order for copper by the Allies with American producers. This will have the effect of keeping the market steady. There is little of interest to note in the other metals and prices have been maintained.

Copper.—The market is strong and active, following the big order for about 450,000,000 pounds of copper, which has been placed in the United States by the Allies. The order represents three months' output, and is by far the largest order of its kind ever closed. Delivery is to be made over the first six months of 1917, and the price is stated to be between 26 and 27 cents. The new contract following on reports of the sold out condition of the producers emphasizes the broad extension of current activity. As the buying of copper for domestic account continues heavy, the fact that a quarter of the 1917 output of the American copper producers is bespoken in one block postpones the date at which new orders for home account can be filled well on to the end of the year. Copper has advanced 1c per pound, and is now quoted locally at 31c per pound.

Tin.—The market is firmer, with quotations well maintained, due to increased demand. London market has vanced, and New York is also slightly higher, but local quotations are unchanged at 44c per pound.

Spelter.—The market has improved on large buying recently, and is now firmer, although quotations are unchanged. It is expected that the recent large order for copper will eventually benefit the spelter market, which might result in higher prices. Local prices, 14c per pound.

Lead.—The market is firm and fairly active at unchanged prices, the "Trust" figure still being 7c, New York. The lead situation is a strong one, and will possibly remain so for the remainder of the year. Local quotation, 9c per pound.

Antimony.—Quotations are unchanged and nominal, and the market continues dull. Local price, 18c per pound.

Aluminum.—Sellers report good demand, and the market holds steady at 68c per pound.

Solders.—Prices of solders have advanced ¼c per pound, following the increase in cost of lead. "Guaranteed" is quoted at 27¾c and "Strictly" at 25¾c per pound.

AUSTRALIAN COMMISSION WILL STUDY METHODS OF CANADIAN MANUFACTURERS

ACCORDING to a report received at Ottawa by the Trade and Commerce Department by Canadian Trade Commissioner Ross at Melbourne, the Commonwealth Government has appointed a commission to visit Canada and the United States to investigate and report upon methods of manufacture and production, and the conditions of employment on this continent. The commission will consist of representative manufacturers of Australia, together with six representatives of the workers. It will spend about four months in Canada and the United States, and the industries to be specially investigated are iron engineering and allied trades, timber, building materials, leather, textiles, paper and trades in the preparation of foodstuffs.

In connection with the proposed commission, it is interesting to note that Canada's trade with Australia during the past year has shown a very large increase. Canadian imports from Australia during the twelve months ending June, 1916, total $3,251,558, an increase of nearly 500 per cent. as compared with the preceding 12 months. Canadian exports to Australia during that period totalled $8,542,065, an increase of almost three millions.

ACTIVITY IN AUSTRALIAN LEAD SMELTING

THE Sulphide Corporation, Ltd., a smelting works 10 miles from Newcastle, Australia, is operating at capacity, employing about 450 men, working three shifts of 8 hr. each, according to U.S. Consul Lucien N. Sullivan, of Newcastle. There are three smelting furnaces of respectively 150, 100 and 50 tons capacity of bullion turned out daily, the ore treated being about three times the amount of bullion produced. The gold and silver contents are high, but no separation is made there, the pig lead being shipped to England and Sydney for refining. The weekly output is at present (August, 1916), bullion containing 585 oz. of gold, 61,434 oz. of silver and 685 tons of lead. The company's mines are located in the Broken Hill district.

C. P. R. WORLD-WIDE ACTIVITIES

IF all the trackage over which the Canadian Pacific Railway has control—that is, all the leased lines, or lines taken bodily over, or with running rights be included in a grand total, the company operates to-day 20,000 miles of tracks. This fact alone would tell of the bigness of the corporation which, thirty years ago, issued its first annual statement on a sheet of note paper. The company owns 100,000 miles of telegraph; 10,000,000 acres of unsold lands, worth $200,000,00; and controls shipping to the extent of 40,000 tons. One of the notable features of the great corporation is, that it takes account of so many things, which, at the first blush, might not seem to be related to railway transportation. The comfort of the inner man on the trains is, of course, of prime moment; but note how the C. P. R. went out of its way to provide dietetic gastronomy. The railway company milks its own cows, and makes its own soap. It bakes its own bread; and it bores a tunnel through the mountains above the clouds It grows its own potatoes, and its policies are of world-wide import and significance.

RECORD STEEL PRICES

CURRENT prices for steel products in the United States are the highest in the industry's history. Eight leading products now average $61.63 a ton, which is 56 cents a ton higher than the previous high level on May 1 last. A year ago these same products averaged $33.40 a ton, and at the beginning of 1915, $29.94 a ton. The course of the average for twelve months follows:

1916.	
September	$61.63
August	60.40
July	60.17
June	60.79
May	61.07
April	56.40
March	53.59
February	46.27
1915.	
January	43.40
December	39.68
November	35.45
October	34.58

GALV. CORRUGATED SHEETS

THAT there is a substantial demand in New Zealand for corrugated galvanized sheets, is reported by Canadian Trade Commissioner Beddoe. There is a duty on galvanized corrugated sheets in New Zealed of £2 a ton on goods made in the British Empire and £2 8s. a ton on foreign goods, thus providing a preference of 8s. a ton for Canadian goods as compared with foreign goods.

He says: "There is a difficulty in securing mild steel bars and structural iron in New Zealand. Orders have recently been filled for mild steel bars from India at prices below the latest Canadian quotations. This is a business that has arisen since the war and will be watched with considerable interest."

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia .

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Ploschad 9, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Bagotville, Que.—The Ha-Ha Bay Sulphite Co. propose erecting a paper mill.

Glenora, Ont.—J. C. Wilson & Co. will build a machine shop, 150 ft. by 50 ft.

Quebec, Que.—Price Bros. will enlarge their newsprint sulphite and wood pulp mill at Chicoutimi.

Hamilton, Ont.—The Dominion Steel Castings Co. will build a factory here to cost about $75,000.

Hamilton, Ont.—The Dominion Steel Foundry Co. propose making further additions to their plant to take care of the increase in business.

Hamilton, Ont.—A permit has been issued to the Canadian Steel and Wire Goods Co. for erection of addition to factory at a cost of $1,500.

Toronto, Ont.—The city architect has issued to the Russell Motor Car Co. a permit to erect machine shops on Dufferin Street, corner of Liberty, to cost $40,000.

Niagara Falls, Ont.—Fire of an unknow origin broke out on Sept. 24 in the Dominion Chain Co.'s factory and caused damage to the extent of about $500.

Toronto, Ont.—The Willys-Overland, Ltd., are making extensive improvements to their plant here, and also propose making important additions in the near future to take care of the increase in volume of business.

Ottawa, Ont.—Tenders for another section of the Welland Canal—section four—will likely be invited before long, but the remaining four sections will be left till after the war concludes. The work at sections one, two, three and five is now about half done. Upwards of twelve hundred men are employed.

Quebec, Que.—The International Paper Co. are building an addition to their mill at Donnacona, near here. A paper making machine is being installed at a cost of about $150,000. About fifty-three tons of paper are made daily, and the new equipment will double the capacity. Mr. McKee is manager of the mill.

Dundas, Ont.—The inter-switching station of the Provincial Hydro-Electric Commission, which was burned out about two months ago, is back in service. Chief Engineer F. A. Gaby announced that the work of re-equipping the station had been completed, and that Toronto and other municipalities were now being served via Dundas instead of directly from Niagara.

Municipal

Lethbridge, Alta.—The by-law to authorize an expenditure of $100,000 on a water filtration plant was passed by the ratepayers on Sept. 22 by a large majority.

Sherbrooke, Que.—The Waterworks' committee have recommended the purchase of a Gould horizontal pump and turbine combined, of 4,800,000 gallons capacity per 24 hours.

Lethbridge, Alta.—The by-law to submitted to the ratepayers on October 17 to sanction an issue of $17,076 in debentures to cover the cost of an extension to the electric light systems, an ash flue at the power house, and for extending the electrical system.

Winnipeg, Man.—A committee of engineers, consisting of Gen. H. W. Ruttan, J. G. Sullivan, and R. S. Lea, have reported that the aqueduct from Shoal Lake to Winnipeg will carry out in every particular the work for which it is designed. They estimated that the work can be completed at a cost of $6,867,700, or about $230,000 less than the original estimate.

Winnipeg, Man.—J. B. Challies, superintendent of the Water Power Branch of the Dominion Department of the Interior, in a report to the City Council, states that Manitoba, and particularly Winnipeg, is very favorably situated as regards water power available for development. John R. Freeman, of New York; J. B. McRae, of Ottawa, conducted an investigation upon which the report was based.

Dundas, Ont.—The town council expects to have completed shortly the concrete storage dam at Greensville. By its construction it will give the town a possible reserve storage for its water supply of nearly twenty million gallons of water. This supply will be available without requiring pumping. The dam is of solid concrete construction, and is designed for a head of 23 feet. Its over all length is 100 feet. The work is being carried out under the direction of the Dundas Public Utilites Commission. E. H. Darling is the consulting engineer.

St. Catherines, Ont.—By a light vote of 680 to 132 the ratepayers carried a cheap natural gas by-law granting a franchise to the Relief Amalgamated Gas Co. to supply natural gas to St. Catherines through the system of mains now owned by the city. The company is to supply natural gas at 45 cents for the first thousand and 40 cents for each succeeding thousand feet per month to consumers. The company also gets an option to buy the city's plant at $90,000 or $100,000 should the natural supply become exhausted, and go into business of making a supply.

General Industrial

Guelph, Ont.—The Dominion Linens Co. will build an extension to their factory here.

Saskatoon, Sask.—The Saskatoon Bread Co. will build a factory here to cost about $15,000.

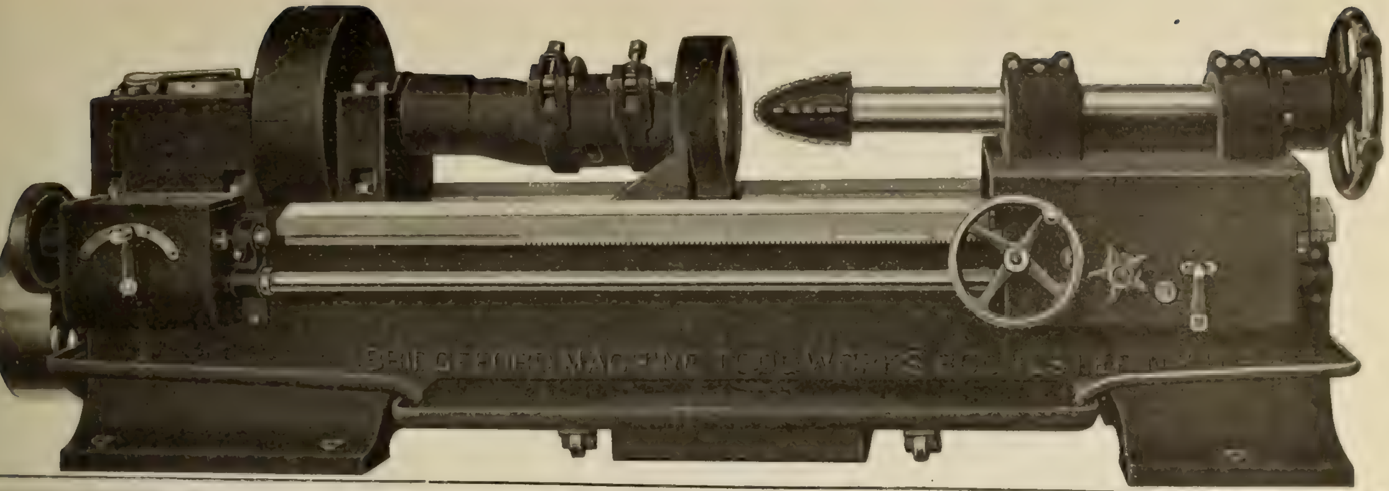
Peterborough, Ont.—The Quaker Oats Co. propose making considerable extensions to their factory here.

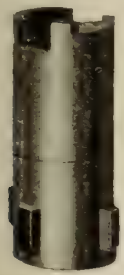
Belleville, Ont.—The Maple Leaf Tires, Ltd., have commenced the erection of a factory, estimated to cost $100,000. The president is H. C. Long, Toronto.

St. Thomas, Ont.—A. F. Voege, manager of the Canadian Woodenware Co., whose plant was destroyed by fire recently, will rebuild at once. Mr. Voege expects to have new machinery here next week, and when this is installed, will commence operations.

Winnipeg, Man.—The Carnefac Stock Food Co, has approved the plans of J. S. Metcalf, architect, and will erect at once, on the site formerly occupied by the mills of the Rice Malting Co., which were destroyed by fire at St. Boniface, a two story concrete elevator block 38 by 42 feet, at the cost of $25,000.

Port Arthur, Ont.—An agreement has been signed between the city and an Eastern Ontario syndicate under which a pulp mill will be established in Port Arthur on the north waterfront. The first unit is to be started within thirty





Rough Bore, Straight Diameter

Rough Bore, Inside Radius

Finish Bore, Straight Diameter

Finish Bore, Inside Radius

Boring Economy

Two great factors in economic boring operations are the Bridgeford Boring Lathe and the Davis Boring Heads. Combining the massive strength of this Bridgeford Lathe and the tough, superior quality of a specially constructed Boring Head and you have an ideal combination that will save you at least 25 per cent. to 50 per cent. on your Boring operations. The lathe is a machine of ideal proportionate strength, the stresses have been scientifically calculated, the vital points strengthened, resulting in a smooth-running, perfectly balanced unit that ensures efficiency, economy, speed and superior production.

Bridgeford 9.2" Boring Lathe

The lathe is of the heavy duty, low swing type, having a specially designed carriage with auxiliary hand feed for internal profile. Carries a 6 inch steel bar with male taper, allowing for light designs of cutter heads; 3 automobile style speed changes, all running in oil bath. A chip tray is attached and is used in conjunction with stationary lubricant tank. Regular equipment comprises everything except chuck, steady rest and cutter.

Davis Boring Heads

The boring heads are a new construction. Having benefited by the experiences of the "pioneering days" this type of head has been constructed, making a direct cut in the cost of boring operations of 25 per cent. to 50 per cent. Being made of that superior quality high speed steel you will have boring heads that will last, that will prove to you their saving power.

A 25% to 50% saving on boring operations will be welcomed by shell manufacturers. Illustrated here are four boring heads: Rough bore, straight diameter; finish bore, straight diameter; rough bore, inside radius; finish bore, inside radius. These heads may be adapted to any lathe and will give you economical, speedy and efficient service.

Write us for particulars.

The A. R. Williams Machinery Co.
64-66 Front St W. - Toronto, Ont., Canada

days of the approval of the agreement and be completed and operating within one year. It is to have a capacity of fifty tons of pulp per day. Inside of five years this capacity is to be increased to 150 tons of pulp per day, whereupon the company will receive a deed for a further tract of land, making a total of ninety-seven and one-half acres. Aimwell G. McIntyre, of Toronto, is one of the principal members of the syndicate.

Marine

New Glasgow, N.S.—The keel has been laid for the 2,000 ton steel steamship which the Nova Scotia Steel and Coal Co. is building here.

Montreal, Que.—A report has been received here from London that the Manchester liners have added three vessels to their fleet for the Canadian trade.

Digby, N.S.—The steamer Mikado, of the St. Mary's Bay Steamship Co., and commanded by Captain Sinclair Cann, of Westport, went ashore on a ledge on the eastern side of the St. Mary's Bay entrance of Petit Passage on September 23, and it is expected will prove a total loss. The Mikado was built in Shelburne in 1896 and is 82 feet long, 18 beam, 7 deep and registers 80 tons gross.

Sidney, N.S.—The steamer Storstad, which rammed the Empress of Ireland two years ago, was again in a collision which will cost the owners of the other craft something like $20,000 to repair, while the Storstad escaped with only minor injuries. The accident occurred at North Sydney recently while the Storstad, in ballast, was coming down from the coal pier of the Dominion Coal Co., and another Norwegian steamer, the Hafters, was on her way to a berth at the pier. The impact ripped a number of plates off the latter steamer and badly damaged her bow. Who the blame rests upon will be fought out in the courts.

To Prevent Delays to Munition Ships.—An Order-in-Council has passed under the War Measures Act, providing regulations designed to prevent delays to ships employed by the Admiralty through collision or through desertions. Injury to a ship so employed through negligence or design on the part of the master of another ship is made an offence against the Act. A seaman who deserts, is absent without leave, or who is too drunk to perform his duties and so delays the ship, violates the Act. Ships' officers, naval and military officers, constables and peace officers are given authority to enforce the regulations and maximum penalty of five thousand dollars and five years' imprisonment is provided for each violation.

Building Notes

Parliament Buildings Contract.—The final revision of the contract for the construction of the Parliament Buildings was made on September 28 at a session of the Parliamentary Committee. The contract will be executed finally. The effect of the new arrangement with regard to the manufacturing plant is that the Government will assume the cost of depreciation, the plant remaining the property of the contractors when the work is done. As arranged previously, the contracts are to be paid at the rate of 8 per cent. on the cost of the new buildings up to $4,000,000; 7 per cent. on any additional cost up to $5,000,000. No percentage is to be paid on the cost over $5,000,000.

Refrigeration

Winnipeg, Man.—Steps are now being taken to secure the incorporation of the Ontario and Manitoba Storage Co., whose intention it is to build a cold storage plant at the foot of Notre Dame Avenue, for the purpose of keeping perishable fruit shipped in from Ontario in good condition indefinitely. The building will be started this fall. It will have a frontage on Notre Dame Avenue of 170 feet with a depth of 80 feet and a height of five storeys. Charles Chamberlain, of this city, is interested.

Tenders

Prince Albert, Sask.—Tenders will be received by the undersigned up to Oct. 11, 1916, for lubricating oils, cotton waste, cotton rags, or wiping cloths, required at the power station for six months. Specifications and particulars obtained on application to the City Electrical Superintendent, J. B. Brown, city clerk.

Ottawa, Ont.—Tenders will be received by the undersigned until Tuesday, October 10, 1916, for the structural steel required in the erection of the above building. Plans and specifications and any other information required can be obtained at the office of the architects, John A. Pearson and John O. Marchand, Centre Block, Parliament Hill, Ottawa.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department is able to present the following list of the moreimportant British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL

Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE

Valparaiso, British Consul General.

COLOMBIA

Bagota, British Consul General.

ECUADOR

Quito, British Consul General.

EGYPT

Alexandria, British Consul General.

FRANCE

Havre, British Consul General.
Marseilles, British Consul General.

INDIA

Calcutta, Director General of Commercial Intelligence.

ITALY

Genoa, British Consul General.
Milan, British Consul.

MEXICO

Mexico, British Consul General.

NETHERLANDS

Amsterdam, British Consul.

PANAMA

Colon, British Consul.
Panama, British Vice-Consul.

PERU

Lima, British Vice-Consul.

PORTUGAL

Lisbon, British Consul.

RUSSIA

Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN

Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN

Stockholm, British Consul.

SWITZERLAND

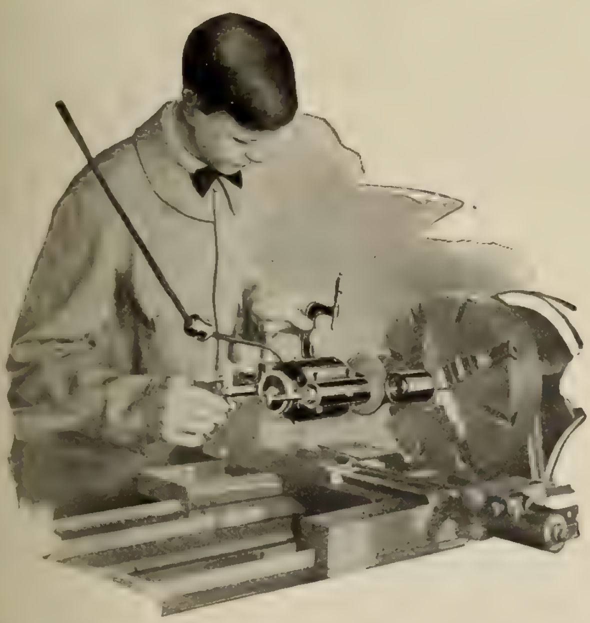
Geneva, British Consul.

URUGUAY

Monte Video, British Vice-Consul.

VENEZUELA

Caracas, British Vice-Consul.

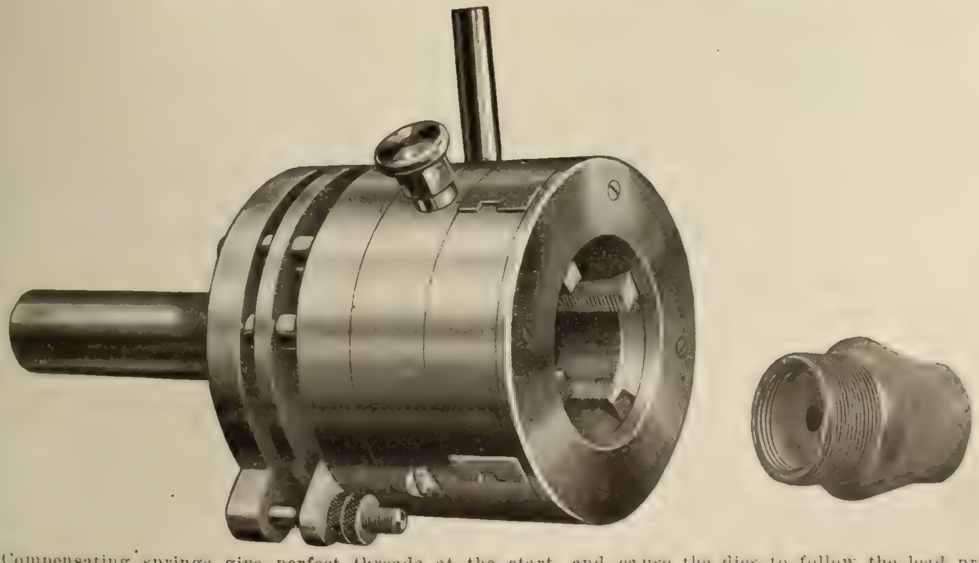


Aikenhead's DUMORE
PORTABLE
GRINDER

The great many uses that the DUMORE can be put to makes it a tool that is in constant use. It is a light, convenient tool to use. It can be set up in a lathe, milling machine or shaper in a few minutes, and is ready for work; simply attach it to an ordinary lamp socket. The motor is a Universal Motor operating on direct or alternating current; furnished to operate on any lighting circuit.

Aikenhead Hardware Limited
17 TEMPERANCE STREET - TORONTO

"The Die Head That Thinks"



GEOMETRIC
STYLE "D-D"

With such precision does the Geometric Style "D-D" Die **Head perform every action,** it has been called the Die Head that thinks.

Compensating springs give perfect threads at the start, and cause the dies to follow the lead properly. The head will float in either direction. On heavy turrets it is not necessary for the operator to follow the thread closely. Fine adjustments can be made for length right in the Die Head itself, without changing the stop on the machine.

The Style D-D Die Head illustrated above is cutting a 2-inch, 14 thread on fuse plugs, on a hand operated turret.

Are you among the small minority of screw thread makers who have not discovered Geometric advantage?

The Geometric Tool Company, New Haven, Conn., U.S.A.

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

Montreal, Que.—Tenders for furnishing all labor and materials and constructing the Church Bridge and appurtenances forming a part of the Aqueduct Enlargement Work for the City of Montreal, P.Q., address to the Board of Commissioners, Montreal, will be received at the office of the Board of Commissioners, at Montreal, until Tuesday, October 10, 1916. All shall be in accordance with the plans and specifications on file in the office of the Chief Engineer of Public Works of Montreal, from whom copies may be obtained upon depositing $25.00.

Contracts Awarded

Aylmer, Que.—The City Council has awarded a contract to the New York Continental Jewell Filtration Co., Montreal, for a mechanical filter for the waterworks plant.

The Wm. Hamilton Co., Peterborough, Ont., have received an order from the Houpt Paper Mills for a 30-in. 240 h.p. water turbine to drive the new mill on the Napanee River at Camden East, Ont.

Montreal, Que. — The Dominion Bridge Co., has been awarded the contract for 3,000 tons of steel shapes for the International Nickel Co. plant, which will be erected at Port Colborne, Ont.

Railways—Bridges

Victoria, B.C.—The importance of bridging Seymour Narrows so as to connect Vancouver Island with the mainland by rail was urged from the viewpoint of Imperial defence recently before the Dominion Royal Commission.

Welland, Ont.—The Hydro Electric Commission have asked the Town Council to pass a resolution requesting the Lieutenant-Governor in Council to authorize the submission of a by-law to the electors for the building of a hydro radial line from Welland to Port Colborne to Fort Erie and Bridgeburg. The total cost of right-of-way construction and equipment is estimated at $2,000,000.

New Incorporations

The Dominion Soap Co. has been incorporated at Ottawa, with a capital of $50,000, to manufacture soap, powders, creams, etc., at Hamilton. Incorporators: J. A. Henderson, F. A. Magee and John Clayden, all of Hamilton, Ont.

The F. E. Partridge Rubber Co. has been incorporated at Ottawa, with a capital of $125,000, to manufacture rubber products of all kinds at Montreal. The incorporators are: G. V. Cousins, N. R. Currie and F. E. Partridge, all of Montreal.

The Sunbury Copper Co. has been incorporated at Toronto, with a capital of $1,000,000, to acquire and develop mineral lands and deposits, with head office at Toronto. Incorporators are: R. H. Parmenter, W. S. Morlock and S. D. Fowler, all of Toronto.

Canadian Wood Products, Ltd., has been incorporated at Toronto, with a capital of $40,000, to manufacture wood products of all kinds, with head office at Toronto. Provisional directors are: K. F. Mackenzie, A. R. Reid and A. T. Shortt, all of Toronto.

Brunner Mond Canada, Ltd., has been incorporated at Ottawa with a capital of $3,000,000 to manufacture soda ash, caustic soda and other chemicals. Head office in Toronto and the incorporators are James S. Lovell, Charles D. Magee and Ernest H. Stewart, all of Toronto.

The Dodge Metal Hose Co. of Canada has been incorporated at Ottawa, with a capital of $150,000, to manufacture metal hose, couplings and connections. Head office at Toronto, and the incorporators are: D. L. McDonald, E. G. Gibson and O. N. Birchard, all of Toronto.

The Tip-It Welding Co., has been incorporated at Ottawa with a capital of $20,000 to manufacture all kinds of engineers' hardware, contractors, builders' and machinists' supplies at Montreal. The incorporators are H. Weinfield, M. M. Sperber and Y. Fortier of Montreal.

Charles Jackson & Sons, with incorporation in Great Britain, has been granted a license to carry on business as manufacturers of linoleum, floor cloth and similar materials, in the Province of Ontario, with a capital not to exceed $40,000. W. H. Baker, of Toronto, is the attorney.

The Western Power Co. of Canada, Ltd., has been incorporated at Ottawa with a capital of $10,000,000 to carry on the business of an electric light and power company with headquarters at Montreal. Incorporators are C. M. Holt, A. Chase-Casgrain and E. M. McDougall all of Montreal .

The Panther Rubber Co. has been incorporated at Ottawa, with a capital of $100,000, to take over the Canadian business of the Panther Rubber Co., of Stoughton, Mass., and to manufacture rubber goods of all kinds. The head office is at Sherbrooke, Que., and the incorporators are: H. F. Fraser, F. S. Rugg and C. A. Joslin, all of Sherbrooke, Que.

Trade Gossip

The Doty Engine Co., of Goderich, Ont., has changed its name to that of the Britannic Engine Co.

Edmonton, Alta.—Reports from the Peace River country indicate that important developments in the potash industry may be expected. Active boring will commence next spring on Salt Prairie, and already machinery for the purpose has been stored at Vermilion Chutes.

Tungsten Found in Canada.—Tungsten deposits are now being worked experimentally near the banks of the Miramichi River, in New Brunswick. Three veins of ore are reported, one being 26 in. thick. A concentrating plant of 20 tons daily capacity and a crusher have been installed.

Antimony in Alaska.—The considerable demand for antimony during the last year has stimulated the development of certain Alaskan deposits of that metal, from which ore to the value of about $74,000 was mined and shipped during 1915, according to a report published by the United States Geological Survey.

Toronto, Ont.—The committee on organization for advertising Toronto has recommended an expenditure of $600,000 per year for three years, the money to be raised from the business organizations, and the city to make a contribution. Efforts will be made to attract new industries and stimulate local enterprises.

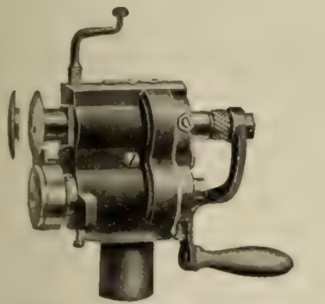
Developments on St. Lawrence Route.—Reports from London England, indicate that tentative arangements are being considered whereby the shipping companies will organize to develop transatlantic trade on the St. Lawrence River. By this means the volume of trade on the St. Lawrence route will be largely increased.

The Eastern Car Co., Halifax, N. S., has completed the first contract for 1,000 cars for France, and expects to begin deliver next month on the second French order, calling for 3,000 cars. Work is also being commenced on 500 freight cars for the Canadian Government Railways. The company is negotiating for a contract to build 4,000 cars for another foreign Government.

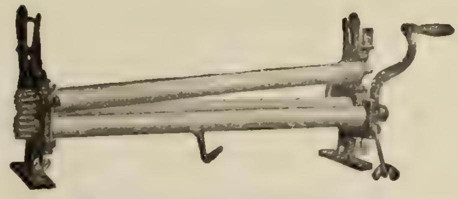
Tungsten Prices in Great Britain.—Ferrotungsten prices in Great Britain have just been revised by the Minister of Munitions. A cablegram to *Commerce Reports* says the new basis is 5s. 6d. per pound of contained tungsten, with powdered tungsten at 6s. 3d. per pound based on 60s. per unit, the price of products on a sliding scale rising or falling

Sheet Metal Working Machinery

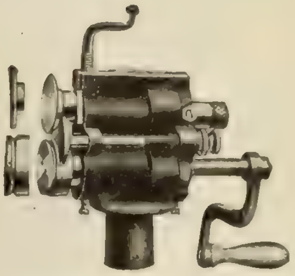
Of Any Description



Encased Large Burr

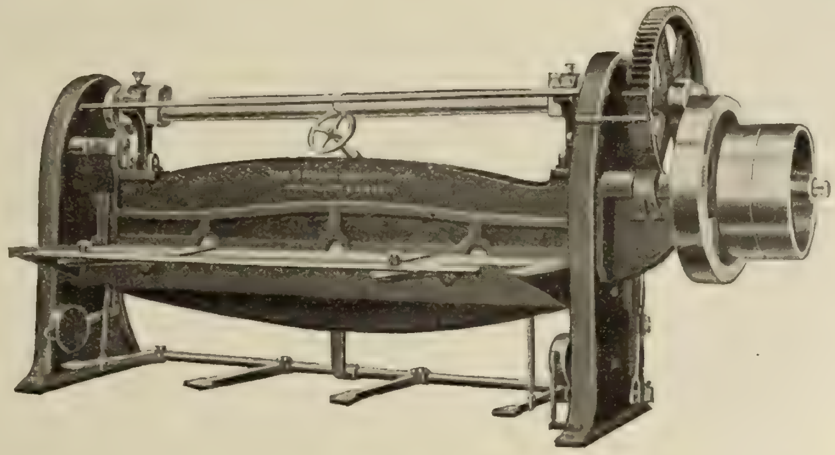


No. 9. Slip Roll Former

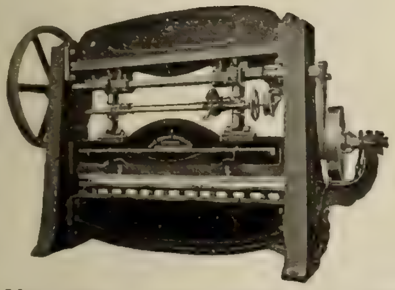


Encased Small Turner

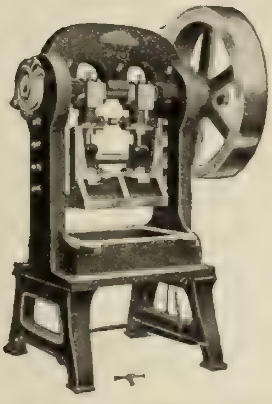
For
Quality
Efficiency
Durability



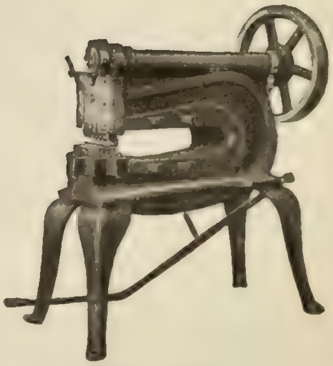
For
Speed
Accuracy
Production



No. 500. Power Brake or Press



No. 20½. Power Press



No. 126.
Deep Throat Power Punch

THE BROWN, BOGGS CO., LIMITED

HAMILTON, CANADA

Manufacturers of

Tinsmiths' Heavy Sheet Metal Working Machinery, Canners' and Evaporating Machinery, etc.

Montreal Agent:
W. L. HALDIMAND, Jr.

Western Agents:
BISSETT & WEBB, Winnipeg

British Columbia Agents:
E. A. EARL & CO., Vancouver

1d. per pound with each variation of 1s. per unit of ore.

The Allied Machinery Trust Co., of New York, which has been organized for the purpose of marketing American machine tools in Europe, has been acquired as a subsidiary by the American International Corporation. P. B. Sheridan, formerly general manager of the Brown Hoisting Machine Co., Cleveland, O., has been elected president of the Allied Machinery Co.

Manila Needs C.O$_2$.—Before the outbreak of the war practically all of the carbonic acid gas used in Hong-Kong, other than that produced locally by a manufacturer of aerated waters, was imported from Germany, and since then dealers have fortunately been able to replenish their stocks from Manila. This latter source, however, has temporarily failed, and many inquiries are now being received.

Granby August Output.—August production of Granby Consolidated was $3,218,847 pounds of copper, against $4,268,846 pounds in July. A shut-down of several furnaces at the old Grand Forks smelter was responsible for the loss. Within the past fortnight, however, one of the idle furnaces has been put into blast, and the other will be blown in shortly, so that production from that property should be normal for October.

Dollar Credits.—The term "Dollar Credits" frequently referred to lately in connection with war orders means the setting aside by the Canadian banks of certain funds here for the use by the British Government. It does not necessarily mean another war loan, but is a method of using available money for the purchase of munitions and war supplies in Canada, thus being of material financial assistance to the Imperial Government.

Sweden's Lumber Industry.—Lumber, wood pulp and their manufactures make up nearly half the total exports of Sweden. The State-owned forests show a net profit of approximately $3,000,000. The Swedish lumbering industry is conducted scientifically and is under rigid supervision. Timber-cutting for sale may not be undertaken before the State foresters have marked each tree ripe for sale, and only a certain number are marked, so as not to endanger the future of the industry.

Oil Steamer Sarnolite Launched.—Promptly at one o'clock on September 27 the oil tank steamer Sarnolite was successfully launched at the yards of the Collingwood Shipbuilding Co. This is the third vessel of the type built for lake and ocean traffic for the Imperial Oil Co. by the Collingwood Shipbuilding Co., two vessels of the same size having already been placed in commission this year. The vessel is built of steel and fully equipped with engines, machinery, etc., by the local firm.

The christening ceremony was performed by Mrs. C. O. Stillman, of Sarnia. Among the distinguished party from outside points were: C. O. Stillman, vice-president of the Imperial Oil Co.; Mrs. Stillman and Mrs. Ellsworth, of Sarnia; T. B. F. Benson, representative of Lloyd's Shipping Registry of Toronto; Hugh Calderwood, of Barrie, and Mr. P. J. Lynch and Miss Lynch, of Allandale. After the ceremony a banquet was given at the Globe Hotel by the Collingwood Shipbuilding Co. to the launching party. On behalf of the builders Mrs. Stillman was presented with a beautiful gold wrist watch as a souvenir of the occasion, by Sanford H. Lindsay, secretary-treasurer.

Proposed Nickel Refinery.—As a result of pressure put on the International Nickel Co., the management has set aside $5,500,000 from its cash on hand for the construction of a refinery at Port Colborne, Ont., and the extension of its smelters and other facilities. All this money will be spent in Canada. It has been realized by the directors of the company that the present capacity of its plant is inadequate to meet the demands for nickel. Consequently the new construction programme will be begun immediately and will be rushed.

Paper Plant for Canada.—Nathaniel M. Jones of Bangor, Me., announced recently that a conference of capitalists in New York, the sale of the largest pulp and paper mill in the Canadian Maritime Provinces to a syndicate of Maine and New York men was arranged The property, for which it is said $2,000,000 will be paid, includes mills at the Reversing Falls, near St. John, N.B., and large timber lands in New Brunswick. The syndicate includes Hugh Chisholm of Portland, President of the Oxford Paper Company, and Maynard S. Bird, also of Portland.

Empire-Made Goods.—New Zealand is starting a campaign for the purchase of nothing but "Empire-made" goods, viz., goods made in the British dominions. It has begun in Auckland, and may spread all over New Zealand. The Auckland Provincial Industrial Association has appointed a committee to obtain the co-operation of merchants, manufacturers, storekeepers, and others in a demonstration in favor of Empire-made products. It is proposed to distribute patriotic posters emphasizing the need for purchasing only these products wherever possible.

Will Develop Export Paper Trade.—With the incorporation of the Canadian Export Paper Co. in Montreal, with a capital of $500,000, is taken the first step in an extensive plan, for the further development of the export field in the paper industry. The charter provides for the importation, exportation, manufacturing and handling of paper of all kinds, and allows the company to act as agents for the manufacture of and dealers in paper. It is stated by officials of the large paper companies who are back of the scheme that the newly-formed company will include most of the newspaper manufacturing industry of the Province of Quebec.

Customs Revenues.—Canada's Customs revenue so far this year is better than the revenue of last year by more than fifty per cent. A statement recently issued under the directions of Hon. J. D. Reid, Minister of Customs, gives the revenue for the first six months of the fiscal year—that is, to the end of September, to the amount of $70,564,547.46. The increase as compared with the revenue for the corresponding period of last year is $25,803,717.28. The statement for September shows that the increase is being well maintained, the Customs revenue for the month amounting to $12,110,181.93, compared with $8,029,665.17, an increase of $4,080,516.76, or slightly over fifty per cent.

C. G. E. Exhibit of Munitions.—The exhibit of munitions manufactured by the Canadian General Electric Co. and Canadian Allis-Chalmers, and shown at the Canadian National Exhibition, Toronto, attracted so much attention that these companies have decided to continue it for a time at their general office building, corner of King and Simcoe Streets, Toronto. Shrapnel and high explosive shells of many kinds for both army and navy, cartridge cases, primers and other munitions are shown completed and also in course of manufacture. The processes of manufacture are shown completed and also illustrated by beautiful photographic transparences which give vivid ideas of the operations. The exhibition will be open to the public daily from 10 a.m. to 4 p.m., except on Saturday, when it will close at 1 p.m.

Delivery of Coal to Coast Vessels.—The Dominion Government has appointed a special commission to investigate conditions relating to delivering coal to coasting vessels in the Maritime Province waters. The commission consists of Wilfrid E. Tupper, inspector of subsidized steamship service of the Department of Trade and Commerce; Archibald R. Tibbits, officer in charge of harbor commissioners, Department of Marine and Fisheries, and J. Fred McDonald, of New Glasgow, Nova Scotia,

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METAL STAMPINGS
We are manufacturers of stamped parts for other manufacturers.
We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.
We can finish steel stamping in Nickel, Brass or Copper.
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372 Pape Avenue, Toronto, Can.

collector of Customs. For some time owners of small vessels, particularly sailing ships, have been complaining against alleged discrimination in favor of steam coal carrying vessels. Protests from Prince Edward Island have been particularly vigorous. The Island Legislature at its last session by resolution asked for a Royal Commission.

Personal

J. G. Buckeye has resigned his position with the Buckeye Machine Co., Calgary, Alta., effective October 1, and expects to engage in business for himself.

J. A. Johnston, who for some time has filled the position of district inspector of the Ontario Hydro-Electric Commission, has been appointed manager of the Brockville Light and Power Department.

O. J. Root, president of the Root and Vandervoort Engineering Co., East Moline, Ill., who is making a business trip through Canada, paid a visit to Toronto on his way to St. John, N.B. Mrs. Root is accompanying her husband.

Nicholas Quesnel, who, for the past six years, has been with the Boiler Inspection and Insurance Co., Toronto, has joined the staff of the Boiler Inspection Branch of the Department of Public Works, Parliament Buildings, Toronto.

J. J. Main, a member of the production department of the Imperial Munitions Board, has recovered from his recent serious illness, and has just returned to Toronto from a brief visit to Montreal. He will immediately resume his duties.

J. E. Dailey, formerly with the Brier Hill Steel Co., and more recently with the Algoma Steel Co. at its Sault Ste. Marie works, has just been appointed superintendent of the Youngstown Iron & Steel Co.'s open-hearth plant, vice Archibald Smith, resigned. The change will become effective about October 1.

J. W. Flavelle chairman of the Imperial Munitions Board, is leaving early in October for England. It is understood that the object of his visit is to take up directly with the Minister of Munitions maters affecting the present output of munitions in Canada and arranging for production during the coming winter.

Wood-Working

Danville, Que.—The Danville Chair & Specialty Co.'s factory was recently destroyed by fire, the loss being estimated at $8,000.

MACHINE WORK
If you find it hard to get your machine work done, send it to
WEBBER'S
Better Work Reasonable Prices
WEBBER BROS. MACHINE CO.
Phone Hill. 2746
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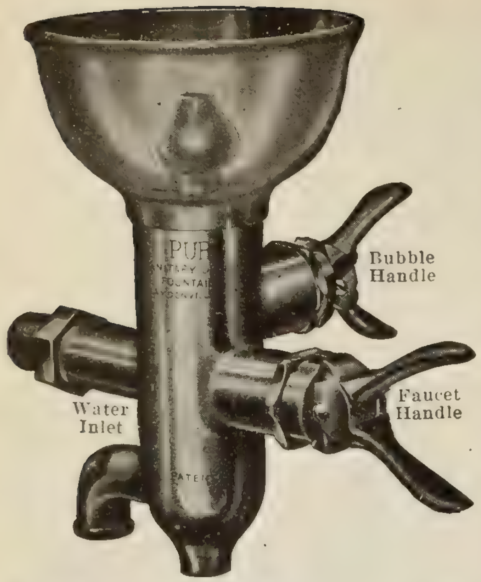
"HAWK'D"
CHROME
VANADIUM
STEEL

Will Give You Exceptional
Shell Forging
Production
WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.
Comes to you heat-treated and ready for use.
It does not stick to the work.
There are many cases where each punch has turned out over 2,000 shells.
It means more shells, per machine per day.
STEEL OF EVERY DESCRIPTION.
Hawkridge Brothers Company
303 Congress St., BOSTON, MASS.
U.S.A.



Saving or Wasting?

The manner in which you handle the drinking water problem in your plant may seem to be a small matter to you —but investigate. The results will be surprising.

The old-time faucet is costly. Running hour after hour, day after day, its ceaseless flow is costing you money, yet without any better service.

Puro Saves 35%

A Puro Sanitary Drinking Fountain will cut that water bill 35%. We can prove that it has done that for others.

It will give every employee a safe, saner draught of bubbling water free from the contamination of the common drinking cup.

In a word, it is the only sanitary Drinking Fountain that is really safe, sanitary, simple, automatic in control, and easy to attach.

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Catalogues

The "S-C" Pump Governor is the subject of bulletin B 25, issued by the "S-C" Regulator Co., Fostoria, Ohio. The distinctive features of this apparatus are dealt with in detail accompanied by a material specification, principal dimensions, operation and rules for installing etc. The illustrations show a sectional view of the governor and also an installation.

The "S-C" Regulating Co., Fostoria, Ohio, have distributed to the trade a bulletin B 26, entitled "Feed Water Regulation Engineering" in which the subject is dealt with in connection with the "S-C" feed water regulator. This type of regulator is illustrated and described and its method of operation is also fully described while mention is made of the exclusive features. A partial list of customers is included.

Fluid Meters.—The Bailey Meter Co., Boston, Mass., have issued bulletin No. 5 illustrating and describing some of the different types of recording meters and testing instruments which they have developed and perfected in recent years. In the introduction the application of the various types of meter is dealt with followed by a full description of each. The illustrations show interior, exterior and sectional views and also typical charts.

Pneumatic Tools.—Folder illustrating and describing an interesting line of pneumatic tools made by the Canadian Ingersoll-Rand Co., Montreal. The tools described include "Little David" drills and hammers "Imperial" air hoists and "Crown" sand rammers. The folder contains tables giving particulars covering each size of tool while the illustrations show them in operation, featuring their wide range of application.

The Webster & Perks Tool Co., Springfield, Ohio, have issued a new and attractive catalogue to the trade in which attention is called to the many improvements made in their line of horizontal threading, bolt pointing and special tapping machines. Each type of machine is illustrated and described together with a statement of the output, list of attachments and brief specifications. The concluding pages contain illustrations and particulars covering solid spring dies, die collars and holders etc. A table of speeds for cutting bolts and tapping nuts is included.

Corliss Engines.—The Hoover, Owens, Rentschler Co., Hamilton, Ohio, have issued two bulletins, Nos. 119 and 201, describing the series E heavy duty and series C box girder Hamilton Corliss

We are qualified Tool, Die, Jig, Gauge and Fixture Makers.

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Windsor Machine & Tool Works.
WINDSOR, ONT.

MORTON MANUFACTURING CO.
PORTABLE PLANERS
DRAW CUT SHAPERS
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FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
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"Barnes-made" SPRINGS

are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

Write for booklet No. 7-T.

Established 1857.
THE WALLACE BARNES COMPANY
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Man'frs of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire

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A half-page advertisement in **MacLean's Magazine**, every issue for a year (12 times), costs $469.20.
Figured out proportionately, it means:

$164.22	to influence	Ontarians,
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Really, when you break it up this way, the amount per province for a whole year's powerful influence is ridiculously small.

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Can perform a service for you, at a price, which you cannot have rendered by any other single medium, or at so low a cost.

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Published by
The MacLean Publishing Co., Limited
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engines. In each bulletin the various parts of the engine are illustrated and described in detail together with views showing installations. Bulletin 119 contains tables giving the dimensions, weights, and horse power of the various sizes of the series E type of engine.

Manganese Steel Chains.— Bulletin No. 171 issued by the Jeffrey Mfg. Co., Columbus, Ohio, deals with a line of manganese steel chains, sockets and attachments for elevators and conveyors for severe service in handling gritty or abrasive material. The bulletin is illustrated and also includes price lists for combination manganese and all manganese steel chains.

The Limit System is the title of a very attractive catalogue and booklet that is being distributed to the trade by the Swedish Gauge Co., of New York, through their Canadian representative, H. E. Streeter, 504 McGill Building, Montreal. This catalogue features the "Johanssen" combination standard gauges, setting forth the accuracy of construction and universal use to which this system of gauging can be adapted. It is claimed that the methods of manufacture are so exact that a guarantee of accuracy is assured to a limit of one hundred thousandth of an inch; and the extreme flatness of the surfaces permits two or more blocks to be used as one gauge, with the same degree of accuracy as when using a single block. In addition to a brief description, a large number of cuts are shown, illustrating in a practical way the innumerable uses to which these gauges, either singly or in combination, can be applied. Several pages at the back of the book are reserved for illustrating and describing the "Johanssen" adjustable limit snap and plug gauges, and also a tolerance plug gauge.

Book Review

Central Station Management, by H. C. Cushing, Jr., and Newton Harrison. 397 pages, 7½ in. x 4¾ in. Published by the D. Van Nostrand Co., New York. Price $2.00 net. This is a new book dealing with the principles of central station management as adopted by many successful electric light and power stations in the United States. The various phases of the subject are discussed in a comprehensive and practical manner, emphasis being laid on the necessity of close attention to details; necessary for successful operation. Both the commercial and technical features of central station management are dealt with, considerable space being devoted to the question of rates and cost of power. Other subjects discussed include street and interior lighting, while one chapter is devoted to district heating from central stations, in which it is shown how this can be done with profit. The book contains thirty-two chapters, of which twenty-five are devoted to management and distribution, while the remaining chapters deal in a general way with the power plant end of the subject. The book is not too technical, but contains much valuable information covering a subject full of important details, a careful consideration of each being essential to obtain satisfactory results. Another service the book performs is to show how central stations can be managed efficiently and at the same time with proper consideration of the public which it serves, thus establishing cordial relations between the producer and consumer; a desirable condition for a public service company to operate under. The book is printed in clear type and is bound in substantial cloth covers.

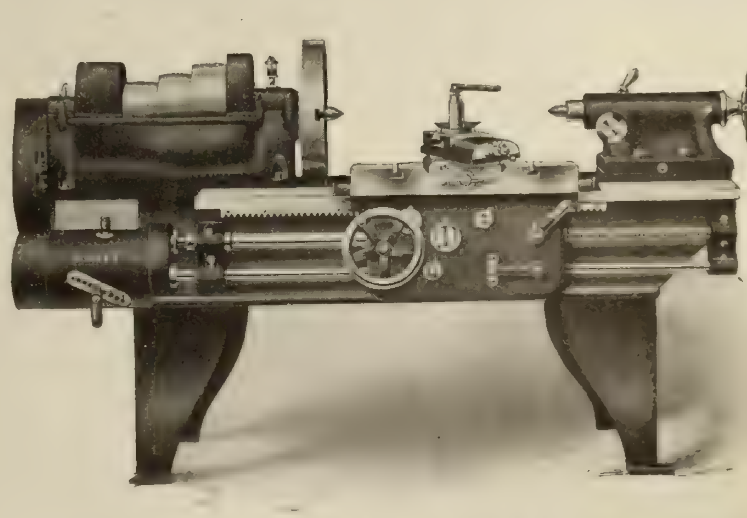
* * *

CAREFULLY follow the instructions for heat treating the particular brand of tool steel you are using. In many up-to-date shops, tools for cast iron, very hard iron, steel, cast steel, etc., are all treated differently, though they may be all of the same stock. A tool will generally work better and stand up longer if it has been ground down at least 1-32 in. after hardening. Never pass a tool tightly against the wheel when grinding. —Lodge & Shipley Manual.

SIDNEY
ENGINE
LATHE

A "Heavy Turning" Tool of Wonderful Accuracy

Some of the important features



17-inch and 19-inch plain change engine lathe, all double back geared. Built 8, 10 and 12-foot lengths of bed.

20 per cent. steel mixture in bed casting. Heavy carriage vee 2½ inches wide.

High carbon rack pinned and bolted to bed.

50-point carbon steel head stock spindle offset 1 inch off centres for heavy duty work.

40-point carbon lead screw 17-16 inch diameter, 2 pitch thread.

Let us tell you of the many other interesting details. Write for full particulars.

THE SIDNEY TOOL COMPANY, Sidney, Ohio, U.S.A.

Canadian Agents: ONTARIO: The A. R. Williams Machinery Co., Toronto; QUEBEC: The Foss & Hill Machinery Co., Montreal

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Display rates on application.

FOR SALE

16 H.P. IDEAL GAS ENGINE - ALSO quantity of pulleys. Chipman & Millman, Brantford, Ont. (16)

6½ H.P. WESTINGHOUSE AND 1,3 H.P. Toronto & Hamilton Electric Co. 60-cycle motors, in first-class order. Geo. H. Lees & Co., Hamilton. (17)

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 227, Canadian Machinery. (15)

FOR SALE—2 2" MURCHEY COLLAPSIBLE taps for nosing shells; 1 No. 6 2" collapsible tap; maker, The Manufacturers' Equipment Co. McGregor & McIntyre, Toronto, Ont. (14)

FOR SALE STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

A SNAP IN TURRET LATHES SLIGHTLY used on shell work. Fourteen splendid machines at bargain prices. Do you need these machines? If so, drop a line to Box 953, Woodstock. Ont.

FOR SALE—ONE 2 H.P., 60-CYCLE CHAPman & Walker motor, single phase, 110 volts, or will exchange for a 2 H.P., 25 cycle motor, 550 volts, three-phase. Address The R. S. Bickle Company, Woodstock, Ont. (14)

For Sale Cheap

1—Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.

1—12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 3 tons capacity; complete, less the Hoist.

1—Brantford (Gas) Bake Oven and 4 Racks.

1 Linderman 2-Spindle Boring Machine.

1 - 26" Drill, London Machine Tool Company.

1 Bowser 40 Gal. Varnish or Oil Pump and Tank.

11 New 1-13 16" High Speed Twist Drills, No. 5 Morse Taper Shank.

30 Used 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.

M. BEATTY & SONS
Limited
Welland, Ont.

BUSINESS FOR SALE — MACHINE SHOP with a good, steady run of work and always busy. A good opening for a young man to get into business. Owner has other interests. Box 224, Canadian Machinery. (13)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

FOR SALE.—ONE BROWN-BOGGS MARKing Machine, suitable for 6" Mark XVI. or Mark III. English Shells. Only object in selling is that other methods of marking have been adopted. Price on application. Taylor-Forbes Co., Ltd., Guelph. (14)

ONE REED TURRET LATHE, 8' BED, swing 28"; 4 2" holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 226, Canadian Machinery. (16)

FOR SALE—ONE 16" x 8' HENDEY LATHE, with taper attachment, $1,100.00; one 22" x 10' Blaisdell lathe, with taper attachment, $1,300.00; one 24" Gould & Eberhardt shaper, $800.00. The above machines are in first-class condition. For particulars apply Box 221, Canadian Machinery.

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

WE HAVE FOR SALE THE FOLLOWING equipment: Complete nickel and copper plating plant, including direct connected dynamo and motor; one second operation cast iron plug machine, and two first operation cast iron plug machines manufactured by the Brown Engineering Corporation; 2 16-inch turret lathes; 1 38-inch engine lathe, 20-foot bed. The above outfit will be sold en bloc or separate. Apply direct to Foundry & Machine Co., Ltd., Montreal. (13)

FOR SALE—McDOUGALL ENGINE LATHE, 20" swing, 10' bed; never been used. Baker Keyseater No. 2, good as new. Boring Mill, 2 bars, will bore up to 30" dia. Boston Forge Blower, 27", good condition. Crescent Swing Cut-off Saw, almost new. 7½ H.P. Westinghouse D.C. Motor, in good order. Gurney Platform Scale, 3,000 lb., 16" wheels. Mandrills, Couplings, Hangers, Post Boxes, Pulleys, Belting, Cap Screws, Bolts, etc. Special prices on above, write for particulars. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (14)

PATENTS

THE PROPRIETOR OF LETTERS PATENT No. 143153, relating to "improvements in rails, especially tram-rails, for preventing the formation of so-called rifles," desires to dispose of the patent or to grant license to interested parties at reasonable terms, with a view to the adequate working of the patent in Canada. Inquiries to be addressed to Aktiebolaget Elasticitet, Gothenberg, Sweden. (14)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Mochinery Co., 643 Yonge Street, Toronto, Ont.

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 4), 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN
LAMP FACTORY
ST. CATHARINES, ONTARIO

SITUATIONS WANTED

TOOL MAKER IN CHARGE DESIRES change. Competent to take charge of machine shop or tool room. Good references. Box 225, Canadian Machinery. (17)

SUPERINTENDENT—FIRST-CLASS PRACtical mechanical man is open for an engagement as works manager or superintendent. Can give best of reference as to character and ability to handle help and produce results. Box 227, Canadian Machinery.

ARE YOU LOOKING FOR A SUPERINtendent? There's money in making shells, if you know how. If you don't, let me make them for you, any size. I'm open for a contract with any concern that is looking for a live wire production Superintendent. Address Box 230, Canadian Machinery. (13)

WANTED

WANTED — 250-VOLT D.C. GENERATOR — 75 to 150 k.w., direct connected to steam engine; must be in good condition. Write to The Kaufman Rubber Co., Berlin, Ont. (13)

WANTED TO MANUFACTURE A FEW lines of metal products, sheet metal preferred. We have complete equipment for high-class work. Give complete description and rating in first letter. Apply Box 221, Canadian Machinery. (17)

WANTED—12" BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Aplly Box 218, Canadian Machinery.

FOREMAN FOR LARGE WINNIPEG MAchine shop — must be aggressive and mechanic with good practical experience in jobbing, stock and transmission work. When applying, state age, experience and salary expected. Applications treated confidentially. Box 229, Canadian Machinery. (16)

SUPERINTENDENT FOR 4.5 SHELL FACtory all equipped and tooled for 400 to 500 shells per day. Shipping since May. Must have ability to thoroughly organize, and be capable of producing maximum results in short time, and have previous shell experience. To the right man we will pay a liberal salary and bonus. State fully (in confidence) past experience, present record and salary expected. Box 228, Canadian Machinery. (14)

MOTORS

ONCE more we step to the fore with an exceptional motor offer. Coming as it does in the midst of a motor famine goes further to prove the far-reaching abilities of our service department.

We have for October delivery the following new Westinghouse C.C.L. Motors:

No.	H.P.	Phase	Cycle	Volt	R.P.M.
3	40	3	25	550	750
3	30	3	25	550	750
2	20	3	25	550	750

We have for immediate shipment the following new and second hand motors:

No.	H.P.	Phase	Cycle	Volt	R.P.M.
3	2¼	1	25	110/220	1400
1	3	1	25	110/220	1440
1	5	3	25	550	1440
1	5	3	25	550	700
1	5	3	25	550	1400
2	7½	3	25	550	1400

No.	H.P.	Phase	Cycle	Volt	R.P.M.
1	10	3	25	550	1600
2	10	3	25	550	1400
2	10	3	25	550	720
1	10	3	25	550	1440
1	10	3	25	550	1120
2	15	3	25	550	1440
1	100	3	25	550	750

1—10 Ton 40 ft. Span, 3 Motor Crane, Direct Current.

The A. R. WILLIAMS MACHINERY CO., LIMITED
64-66 FRONT STREET WEST, TORONTO

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

Wanted to buy or sell Scrap Iron, Metals, etc.

At the present time we are paying the following prices:

No. 1 Scrap Wrought Iron, $13.75 gross ton.
Heavy Scrap Copper, $20 per cwt.
Mixed Heavy Scrap Brass, $13 per cwt.
Heavy Scrap Lead, $5.75 per cwt.
Scrap Aluminum, $32 per cwt.
Scrap Babbitt, $8 per cwt.

Our Motto: Honest dealings and prompt settlements. Make us a trial shipment.

L. S. TARSHIS & SON
88-98 Wellington Street, Montreal

Long Distance is Calling!

Telegrams and Long Distance Telephone Messages are not uncommon among the replies to ads in our Classified Advertising Section.

FAIRBANKS-MORSE
New and Used Machinery

In Stock at Toronto

[illegible] 6-spindle National Acme Automatic; used.
[illegible] No. 3 1" Foster Hand Screw Machines.
4 No. 4 1½" Smart & Kamen Turret Lathes.
[illegible] 20" x 5' Seneca Falls Lathe; used.
2 18" x 8' Springfield Lathes; new.
5 20" x 9', 19 16" x 7', 3 16" x 9' Fairbanks-Morse Lathes; new.
2 No. 1 Racine Hacksaws; new.
1 No. 34A Oster Pipe Machine; new.
1 20" x 8' Hendey Lathe; used.
1 Gisholt 16" Special Lathe, type C, 6½ bore.
1 Walcott 20" x 8' Engine Lathe.
5 Barnes 18" x 8' Engine Lathes; new.
7 Potter & Johnson No. 6A Automatics; used.

In Stock at Montreal

3 Gisholt 16" Turret Lathes; new.
2 Gisholt 25" Turret Lathes; new.
Waving and Grooving Machines, 6" shells, new.
1 Hendey 16" Lathe; used.
2—American 16" x 6' Tool Room Lathes, new.
1 Rivett Precision Lathe; used.
1—Brown & Sharpe No. 1½ Universal Mill; used. used.
1—Valley City No. 1½ Universal Mill; used.
2 Ford Smith 24" Wet Tool Grinders; new.
1 Wilmarth & Morman Drill Grinder; new.
3 20" Back-geared Drills; new.
1 25" Sliding Head Drill, new.
1 Banfield Plug Miller, 6" shells; new.

This is only a partial list of our stock of Machine Tools.

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3¼" Gridley Automatic
40" x 16' Conradson, heavy duty
40" x 12' New Haven
26" x 8' Davis
24" x 8' Lodge & Shipley
21" x 10' LeBlonde, D.B.G.
20" x 10' American
17" x 6' Garvin
16" x 6' Pratt & Whitney
16" x 5' Windsor, wire feed
15" x 5½' fox, American
2" x 24" Jones & Lamson flat turret
No. 22½ Garvin, wire feed
No. 2 Garvin, wire feed
8" x 31" Brown & Sharpe

Engine Lathes

42" x 20' Fifield
36" x 16' Putnam
30" x 10½' Pond
26" x 40" x 20' London Gap
26" x 14' Hamilton, D.B.G. (4)
26" x 14' Gleason, D.B.G. (2)
24" x 13' New Haven
24" x 10' LeBlonde
24" x 10' Peerless
24" x 10' Lodge & Shipley, patent head
22" x 12' American, all-geared head
21" x 8' Back-geared single purpose (4)
20" x 12' Lodge & Shipley, patent head (2)
20" x 10' Reed
20" x 8' Walcott, D.B.G. (2)
20" x 8' Hercules, heavy duty
20" x 8' American
20" x 8' Ames
20" x 7' Fay & Scott
19" x 8' LeBlonde, D.B.G.
18" x 10' MacGregor-Gourlay
18" x 8' Walcott, D.B.G. (2)
18" x 8' New Haven
18" x 6' Barker (2)
18" x 6' New Haven
16" x 10' MacGregor-Gourlay, D.B.G
16" x 6' Prentice (2)
16" x 6' Porter
14" x 6' American

Upright Drills

24" Bickford, shaft-driven (2)
24" London, back-geared, sliding head
24" Kerkhoff, back-geared, sliding head
22" Barnes, back-geared, sliding head
20" Bertram, power feed
No. 10A Baush, 16 spindle
16" Avey, high speed, 4-spindle, sensitive
16" Canedy-Otto
15" Barnes
14" Excelsior
14" Garvin, 4-spindle
10" Barnes, friction
60" Bertram Semi-universal Radial
48" Gang, plain radial, tapping attachment
36" New Century, plain radial
32" Canedy-Otto wall radial

Iron Planers

30" x 30" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
24" x 24" x 6' Gray
20" x 20" x 5' Bertram

Milling Machines

No. 5 Becker-Brainard, plain
No. 3 Cincinnati Universal
No. 12 Brown & Sharpe plain
No. 1½ Brown & Sharpe Universal
Louden Universal
24" Bertram, plain
Holden-Morgan Thread Miller

Presses

No. 12 Geared Rhodes, roller feed
No. 5 Waterbury, inclinable
No. 3 Michigan Inclinable
No. 190 Brown-Boggs inclinable

Miscellaneous

24" Gould & Eberhardt, B.G. Shapers (2)
No. 10 Racine Hack Saws (2)
No. 1 Racine Hack Saws (5)
Nos. 3 and 4 Robertson Hack Saws
Lo-Swing Lathes (2)
32" x 9' Special Facing and Tapping Machine
40" Binsse Horizontal Boring Mill
12" x 66" Landis plain grinder
12" x 42" Landis plain grinder
No. 2 Diamond Universal Grinder
No. 14 Besly Grinder
No. 60 Heald Cylinder Grinder
No. 2 Garvin Automatic Tapping Machine
No. 1 Garvin Automatic Tapping Machine
No. 2 Cochrane-Bly Filing Machine
¼" Shuster Riveters (3)
9½' Bertram Bending Rolls
15" London Punch and Shear
30-ton Lucas Forcing Press.

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.
Front St. W., - - Toronto, Ont.

Rebuilt Machine Tools
New York's Greatest Stock

PUNCHES—SHEARS—ROLLS

Sellers & Co. Double Angle Shear, capacity 8" x 8" x 1" angles; weight 41,000 lbs.
Pels & Co. Beam Shear "T-40."
No. 3 Hilles & Jones Punch and Shear.
Bement Punch, 30" throat, capacity 2" in 1".
8 ft. Lennox Rotary Splitting Shear.
Long & Allstatter Size "D" Bar Shear, 3½" capacity; weight 20,000 lbs.
Bass Double End Punch and Shear, 20" throats, capacity 1¼" in ¾".
Cleveland Combined Punch and Shear, 26" throat, capacity 1" in 1".
Hains Double End Punch and Shear, 12" and 21" gaps, capacity 1" in 1".
Cockburn Direct Acting Punch, capacity 1" in 1".
Bertsch & Co. Splitting Shear, capacity ¾" plates.
Kling Bros. Punch, 24" throat, capacity 1¼" in ¾".
Cleveland Punch, 22" throat, capacity 1" in 1".
Wilson Double End Punch and Shear, 6" throats, capacity ¾" in ½".
Bement Plate Shear, 26" throat, ⅝" capacity.
Hilles & Jones 12 ft. Ship Plate Rolls.
Kling 8 ft. Boiler Plate Rolls.

PRESSES

Toledo Double Crank Geared Forging Press, weight 20,000 lbs
Farrel Double Crank Geared Press; weight 9,000 lbs.
PG-6 Ferracute Geared Punching Press; weight 12,000 lbs.
No. 4 Bliss Straight Side Double Crank Geared Press; weight 11,000 lbs.
No. 2 Bliss Straight Side Double Crank Press; weight 5,000 lbs.
Sellers Hydraulic Wheel Press, 100-ton capacity.
Hoe & Co. Hydraulic Vertical Press, 500-ton capacity.
No. 4 Farrel Punching Press, 1½" stroke.
No. 1 Bliss Straight Sided Press, 8" stroke.

LATHES

114" x 22' Pond Screw Cutting Engine Lathe; takes 12' 6" between centers, quadruple geared; face plate drive; diameter of face plate 9' 3"; diameter of main spindle bearing 11"; compound rest, power cross feed.
Two 38" x 24' New Haven Screw Cutting Engine Lathes.
36" x 15' New Haven Screw Cutting Engine Lathe.
36" x 14' Fifield Screw Cutting Engine Lathe.
34" x 16' Perkins Screw Cutting Engine Lathe.
32" x 14' Bogert Screw Cutting Engine Lathe.
30" x 28' Pond Screw Cutting Engine Lathe.
30" x 20' Putnam Screw Cutting Engine Lathe.
28" x 16' Fifield Screw Cutting Engine Lathe.
28" x 18' Gray Screw Cutting Engine Lathe.
26" x 12' Blaisdell Screw Cutting Engine Lathe.
Two 24" x 12' Johnson Screw Cutting Engine Lathes.
Two 24" x 10' Reed-Prentice Screw Cutting Engine Lathes.
Two 24" x 10' Hendey Quick-Change Gear Screw Cutting Engine Lathes, motor driven.
24" x 10' Bridgeport Screw Cutting Engine Lathe.
Two 22" x 10' Davis Quick-Change Gear Screw Cutting Engine Lathes.
18" x 10' Greaves-Klusman Quick-Change Gear Screw Cutting Engine Lathes.

New York Machinery Exchange
50 Church St., NEW YORK CITY

Immediate Delivery
NEW STEAM ENGINES

Two 5 x 6 Vertical steam engines, 8 horse	$105.00	each
Two 6 x 6 Vertical steam engines, 10 horse	125.00	"
One 7 x 8 Vertical steam engine, 15 horse	175.00	
One 8 x 8 Vertical steam engine, 20 horse	200.00	
Two 4 x 6 Horizontal steam engines, 6 horse, with base	100.00	"
One 5 x 6 Horizontal steam engine, 8 horse, with base	125.00	
Five 6 x 6 Horizontal steam engines, 10 horse, with base	135.00	"
Five 6 stroke engines, with base, 10-15 H.P.	150.00	"
Two 6 x 6 Automatic, with base, 12-20 H.P.	250.00	"
Two 7 x 6 Automatics, with base, 15-25 H.P.	275.00	"
One 8 x 8 Automatic, with base, 20-42 H.P.	500.00	
One 10 x 10 Automatic, with base, 39-82 H.P.	700.00	
One 11 x 10 Automatic, with base, 47-85 H.P.	725.00	

YOUNG, CORLEY & DOLAN, Inc.
115 Broadway, NEW YORK CITY
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(tf)

NOVEMBER
2

is the date of the next

EXPORT NUMBER.

Reservations should be made at once for this important issue.

Write to-day for full particulars.

Canadian Machinery
and Manufacturing News
143-153 University Ave. - Toronto

3 Replies Waiting For Box 221

Please Call at Once

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue - Toronto

FOR SALE

ENGINE LATHES, 14" x 6" Reed heavy Duty; oil pan bed; no back gears; belt feed.

THREAD MILLING MACHINES, Lees-Bradner.

MARKING MACHINE, No. 3 Dwight-State; work-holder, dies and die-holder.

DRILL PRESSES, Barnes 22" self-oiling, heavy duty; all geared; capacity ½" to 2" high speed drill. Vanadium steel spindles and gears.

All in good condition. Immediate delivery. (15)

INDUSTRIAL WORKS, Bay City, Mich.

List of Second-Hand Machinery

On hand for immediate delivery, subject to prior sale

1—No. 2 Brown & Sharpe Vertical Chucking and Boring Machine; excellent condition.
1—No. 4 Quint Vertical Turret Drilling and Chucking Machine; excellent condition.
1—24" x 24" x 7' Lodge & Davis Planer, fitted with full electric equipment and in good condition.
1—4¼" Belt-driven Gridley Automatic; excellent condition.
2—4¼" Motor-driven Gridley Automatics; excellent condition.
1—26" x 48" x 10' J. J. McCabe Lathe; good condition.
1—No. 12 16-spindle Pratt & Whitney Multiple Drill, ½" capacity in steel, ⅝" capacity in cast iron; excellent condition.
1—Foster Ring Turret; good condition.
1—22" x 22" x 4' Whitcomb Planer.
1—18" Warner & Swasey Plain Head Turret Lathe.
1—14" Flather Engine Lathe, rod and screw feed, plain rest, slip change gears.
1—14" Pratt & Whitney Engine Lathe, screw feed, plain rest, slip change gears.
1—No. 15 Toledo Punch, 18" throat.
1—No. 12 Badger Punch and Shear.
1—30" Collier Circular Shear.
1—16" Steptoe-McFarland Lathe.
1—12" Shepard Gap Lathe.
1—No. 2 Mitts & Merrill Keyseater.
1—No. 2 10" Massillon Punch; new.
2—20" Barnes Drills.
1—¼" Shuster Riveter.
2—Marvel Hack Saws.
1—14" Fox Drill.
1—24" Ohio Shaper.
1—14" Steptoe Shaper.
1—Shinn Metal Band Saw.

C. E. FALES MACHINERY COMPANY
KERR BUILDING, DETROIT, MICH.

Watch These Pages

Every week new propositions are offered to you here. Look them all over. You may find at least one to interest you.

CANADIAN MACHINERY
Classified Advertising Section
143 University Ave., Toronto, Canada

TRADE DOMINION MACHINERY CO. TORONTO MARK

Our Motto Protects You

Every Tool Will Stand Investigation

LATHES.

1—24 x 14 London Engine Lathe.
1—20 x 10 London Engine Lathe.
1—20 x 10 Rahn, double back-gear.
1—20 x 10 Lodge & Shipley, quick-change gear and double back-gear.
1—18 x 10 American Engine, quick-change gear.
1—15 x 8 Carroll-Jamieson Engine.
1—15 x 6 Bertram Engine.

SHAPERS.

1—24" Cincinnati.
1—18" Barker.
1—15" Sumacher.
1—20" Ohio Machine Tool Co.; new.

DRILLS.

1—24" Barnes, sliding head.
1—10" Davis, back-geared.
1—14" Henry & Wright.
1—14" Avey.
1—14" Three-spindle Henry & Wright.
1—14" Reed.

MISCELLANEOUS.

1—No. 4 Pangborne Sand Blast.
1—10 x 10 Curtis Air Compressor with idler and box ready for motor.
1—6" Curtis & Curtis Pipe Machine with full set of new dies.
1—9.2 Cut-off Machine.
2—Dominion Tool-room Grinders. Delivery 30 days.

We are manufacturing High-grade Machines for waving, base turning, and cut-off machine for 6" and 9.2 shells.

Get particulars of our 9.2 Copper Band Milling Machine. We can save you money.

DOMINION MACHINERY CO.
TORONTO, ONTARIO, CANADA
Office—110 Church Street
Factory—14 Darling Avenue

If any advertisement interests you, tear it out now and place with letters to be answered.

Manufacturers Wanted!

FROM time to time we receive inquiries from parties wishing us to put them in touch with firms in Canada who are in a position to manufacture their lines for them.

SOMETIMES the inquiring parties are located in the United States, sometimes in Great Britain, frequently in Canada. The lines involved range from hardware specialties to mill machinery. Sometimes the interested parties would prefer that the Canadian manufacturers undertake the selling of the products as well as the making of them.

WE would like to hear from metal-working firms who are in a position to take on the manufacture of new lines. Just at present we have an inquiry relating to a steam trap which is enjoying a big sale in the United States. The owner of the patent would like to make arrangements for its manufacture and sale in Canada.

TWO other concerns expect to start operations in the near future and would like us to put them in touch with reliable manufacturers. Details are withheld for the present.

ANOTHER reader would like to know of some firm in a position to build heavy mill machinery.

THESE communications are confidential of course, but we shall be pleased to bring interested parties together. We would like to hear from any Canadian manufacturer who may be interested in the above or similar inquiries. We would like to have their names immediately available.

Canadian Machinery
and
Manufacturing News

143-153 University Ave. - Toronto, Ont.

Used Machinery for Immediate Delivery

BORING MILLS.

51" Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52" Niles Car Wheel Boring Mill.

DRILLS.

22" Aurora, S.H., B.G., P.F.
24" Hamilton, B.G., P.F.
25" Fitchburg, S.H., B.G., P.F.
26" Hoefer, B.G., P.F.
32" Hamilton, S.H., B.G., P.F.
32" Hoefer, S.H., B.G., P.F.
34" Barnes, S.H., B.G., P.F.
4" Baker Tapping and Drilling Machine.
2½' Dreses Radial
3½' Industrial Radial
12 Spindle Multiple
6 Spindle V.C.
No. 30C Baush, 12 spindles

GEAR CUTTERS

20" G. & E., for spur and bevel
24" x 7" G. & E., for spur
36" Walcott, for spur
No. 14 Brown & Sharpe

GRINDERS

No. 3 Landis Universal
14" x 20" B. & S. Universal
Gisholt Tool Grinder

LATHES

12" x 4' Hendey, C.R., Q.C.G., taper
12" x 5' Davis, C.R.
14" x 5' P. & W., R. and F., taper
14" x 6' Fairbanks, C.R., taper
15" x 6' Goddard, C.R., taper
16" x 6' Prentice, C.R.
16" x 6' Sebastian, P.R.
16" x 6' Walcott, C.R.
16" x 8' Lodge & Shipley Pat. Head, C.R., Q.C.G.
16" x 10' Greaves & Klusman, C.R.
17" x 10' Blaisdell, C.R.
18" x 6' Bradford, C.R., taper
18" x 8' Lodge & Shipley, Pat. Head, C.R., taper
18" x 12' American, C.R., Q.C.G.
18" x 12' Greaves & Klusman, C.R.
20" x 10' Flather, C.R.
21" x 12' New Haven, C.R.
24"-40" x 12' McCabe Double Spindle, C.R.
24" x 16' Schumacher & Boye, C.R.
30" x 14' Reed, C.R.
32" x 16' Blaisdell, C.R.
36" x 28' American, C.R.

MILLING MACHINES

No. 12 B. & S., plain
No. 34 Oesterlein, plain
No. 1½ Garvin Universal
No. 2 Cincinnati Universal
No. 2 Cincinnati Vertical, High Power
No. 32 Plain Kempsmith—Lincoln
No. 3 Cincinnati Universal
No. 13 P. & W. Lincoln
No. 4 Becker Vertical

PLANERS

Morton Portable
22" x 22" x 6' Gray, one head
30" x 30" x 8' Woodward & Powell, one head
30" x 30" x 12' Cincinnati, two heads
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Pond, one head, arranged for two
36" x 36" x 12' Cincinnati, two heads
36" x 36" x 16' Sellers, one head
39" x 39" x 12' New Haven, one head
40" x 38" x 14' Putnam, one head
40" x 40" x 12' New Haven, one head, one side head

PRESSES

No. 3 Delivouk & George, O.B., Inc.
No. 30 A. Perkins, O.B., Inc.
No. 133 Ferracute, Double Action, O.B., Inc.
No. 5½ Walsh, O.B., Inc., geared
No. 174 Consolidated Double Crank
No. 25 Toledo, O.B., Inc., Cam Drawing

SHAPERS

15" Hendey Friction
16" Walcott
16" Niles, B.G.
16" Rockford, B.G.
20" Rockford, B.G.
26" Putnam

SCREW MACHINES

No. 1 Chicago Automatic
1 3-16" Hartford Automatic
2" Cleveland Automatic
2¾" Cleveland Automatic
⅝" P. & W. Plain
1" B. & S. Plain
16" P. & W. Plain

MISCELLANEOUS

No. 4 Warner & Swasey Turret Lathe
No. 2 Warner & Swasey Turret Lathe
No. 2 Baker Keyseater
Whitton Centering Machine
1½" Acme Bolt Cutter
2—Springfield Stud Lathes
Blount Speed Lathe

Write for our Stock List.

The H. A. Stocker Machinery Company, 566-572 W. Randolph St.,
CHICAGO, ILL.

USED
MACHINE TOOLS
ALL KINDS

THE MOTCH AND MERRYWEATHER MACHINERY CO
CLEVELAND OHIO

EACH PIECE
OVERHAULED
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IMMEDIATE SHIPMENT

We have for immediate shipment large stocks of different well-known manufacturers' small tools in standard sizes, including

CARBON AND HIGH SPEED TWIST DRILLS—REAMERS—MILLING CUTTERS—TOOL STEEL AND SPECIAL TOOLS — TAPS — DIES — SCREW PLATES.
NEW AND SECOND-HAND MACHINERY.

These are new, first quality goods. We foresaw demand and purchased heavily. If you are having difficulty obtaining these lines, write or wire us. If you send order at once, we will reserve stock subject to confirmation when you receive our prices.

THE CLEVELAND POWER TRANSMISSION CO.
CLEVELAND, OHIO

SMALL TOOLS

FOR SALE

GRINDING MACHINES
1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16" x 66" Landis Crank Shaft Grinder (18 months old).
2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES
58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13" Gisholt Semi-Automatic (12 mos. old).
20 21" Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES
1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES
1 8-spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.
2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS
1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES
38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES
2 Noble & Westbrook No. 1 (new).

PROFILERS
1 No. 3H Becker (new).

PLANERS
1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 40" x 40" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS
1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES
1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES
1 12" Jackson (new).

KEY SEATERS
1 No. 1 Catlin (new).

SCREW MACHINES
1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅝" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2" x 24" Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼" capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES
1 No. 3 La Pointe (nearly new).

BOLT CUTTERS
1 2" Landis Double Head (nearly new).

BORING AND TURNING MACHINES
1 4' Bickford Boring & Turning Mill (nearly new).
1 20" swing 4-Spindle Moline Vertical Boring Machine with 18" x 36" table.

BULLDOZERS
1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES
1 Large Filing and Sawing Machine with 12" stroke.

PUNCHES AND SHEARS
1 No. 3 Walsh Punch Press.
1 Moser 1¼" stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8" throat capacity ¼" x ¼".
1 27½" throat lever punch ½" capacity 1¼" stroke.
1 Thompson Bevel Shear ½" capacity.

PIPE MACHINES
1 6" Saunders.

SHAPERS
1 14" Hendey Geared Friction.
1 20" Hendey Geared Friction.

TAPPING MACHINES
1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2" collapsible taps (new).

THREAD ROLLING MACHINES
1 Waterbury Farrell ⅜" capacity (nearly new).

THREADING MACHINES
5 Special Threading Machines for threading 3" steel shells (nearly new).

SPOT WELDERS
1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

Write us what you want new or second-hand.

32 North Clinton Street, Chicago **W. F. Davis Machine Tool Co.** **403 Singer Building, New York City**

MACHINE TOOLS NEW AND REBUILT

SPECIAL AMERICAN LATHE.

1 24 x 24 x 6 High Duty American Planer. Adams Vertical Attachment. Same as new	$1050
9—22" Swing x 8' Bed American Q.C.G. D.B.G. four sided Turret Tool Post, complete used 3 months	1050

MILLERS.

1 No. 284 Bement Lincoln Miller, perfect condition	250
2 No. 7 Becker Brainard Lincoln Millers, perfect, each	475
1 No. 24 Oesterline Heavy Plain Miller	1070
1 No. 3 Kempsmith Plain Miller, Sept. delivery	1450

SHAPERS.

1 12" Juengst Crank Shaper, excellent condition	275
1 24" Gould & Eberhardt Shaper, perfect condition	650
16" Smith & Mills Crank Shaper perfect condition	450

BORING MILLS.

4 72" Niles Vertical Boring Mills, excellent condition each	2650
5 60" Sellers Vertical Boring Mills, excellent condition, each	2650

GRINDERS.

1 Standard No. 6 Universal Tool and Cutter Grinder	400
10 x 36 Landis Plain Self Contained Grinder	1600

LATHES.

1 14 x 6 Seneca Falls, Pan Bed, CR; hollow spindle, complete	425
2 No. 5½ Sloan Chase Bench Lathes, CR, 3 step cone set collets in 16th, each	300
1 -28" swing x 10' bed Ames, PCF, chuck, complete	$ 300
1—18" swing x 8' bed Porter Lathe, CR, PCF, chuck	375
1 30" swing x 9' bed New Haven, Turret Tool Post, chuck taper attachment, complete	460
1 22" swing x 10' bed Niles, CS, FCF, 5 step cone, 3" bed, HS, complete	775
1—40" swing x 14' bed, Harris Lathe, CR, PCF, SS, complete with chuck	800
1—20" swing x 8' bed LeBlonde, CR, PCF, 5 step cone, 2½" belt, hollow spindle, complete	875
1 66" inch swing x 16' bed Pond, CR, PCF, HS, 4½" hollow spindle, 5" belt, complete	2000

PLANERS.

1 24 x 24 x 6 Gray Planer, excellent condition	675
1—30 x 30 x 16 Bement Extra Heavy, perfect condition	750
1 -30 x 30 x 7 Flather High Duty Planer, perfect condition	850
1 -30 x 30 x 8 Pond Extra Heavy Type, perfect condition	1200

DRILLS.

1 4' Fosdick Plain Radial; single pulley drive; same as new	1150
1—24" Sliding Head Prentiss Back Geared Drill	150

MISCELLANEOUS.

1 -No. 68-N Bliss Press, double acting, good as new	550
1—48 x 12 Gould-Eberhardt Gear Cutter, all attachments, perfect condition	700

The World is Our Field
SIMMONS
ALBANY N.Y. U.S.A.
har
MACHINERY

Simmons Machine Company, Inc.

903 Singer Building,
New York City

989 Broadway,
Albany, N.Y.

4.5 Mark VII Plant For Sale

Immediate Delivery

The following machines have been changed from the mark V shell to the mark VII. We will dispose of these machines with their tooling. Every machine has been examined and put into first-class shape.

3—30" American Turret Lathes, Triple Geared; 36" turret base; will take both 3" and 4" boring bars; extension heads on turrets; special small turret or cross-slide with six 1½" holes; 20" 3 jaw Universal steel chucks; Power Feed and Power Reverse. All tooled, boring bars, pot chuck, etc., each	$1300
1—22" x 10′ Pond Engine Lathe; back geared and screw feed. All tooled for outside profile operation on Mark VII. shell	$525
1—22" x 10′ London Single Drive Engine Lathe; quick change gear box with screw and rod feed. All tooled for outside profile operation on Mark VII. shell	$700
1—24" x 10′ Lodge & Barker Back Geared Engine Lathe; screw feed. All tooled for outside profile operation on Mark VII. shell	$500
2—24" Morse Turret Lathes; with 3-jaw Universal chuck; 16" base turret having six 3" holes. All tooled, with pot chuck, for hogging-out base of Mark VII. shell, each	$800
1—Jenckes Band Turning Machine; collet chuck. This machine has band-turned about 15,000 shells. All tooled for Mark VII. shells	$900
1—24" x 12 Bertram Engine Lathe, all tooled with special milling fixture for threading the base recess of Mark VII. shell	$900
2—24" Morse Special Turret Lathes; carriage feed; all tooled with pot chuck and forming tool for finish base recess of Mark VII. shell, each	$900
1—15" 6′ Blaisdell Engine Lathe, back geared	$200
1—4.5 Brown-Boggs Marking Machine, latest model. New	$200
1—Special Sand Blast Box (can be used in open shop) all ready for air pressure	$50
1—Special Painting Machine, with 110 volt alternating current motor	$50
30—4.5 Shell Platforms with tops holding 50 shells each	$4
1—150-ton Hydraulic Nosing Outfit, consisting of 1 Triple Action Pump (Perrin); 1 Accumulator (Perrin); 1 Nosing Press (Perrin), with Mark VII. die complete; 1 Chapman Banding Attachment for Press	$1075
1—7-Hole Gas Furnace (Frankfort, relined)	$350
1—Blower for Furnace	35
1—Roelofson Band Turning Lathe, suitable for undercutting, grooving, or similar operations. This machine has a collet chuck	$450

We have all gauges for both Mark V and Mark VII Shells, consisting of plug, length, outside diameter, form, thread and seating gauges.

Our Nosing Die Outfit is the best for the Mark VII shell. Leading manufacturers, such as P. L. Robertson Co., Milton; Wilford & Co., Lindsay; Manitoba Engines, Ltd., Brandon; Canadian Westinghouse, Hamilton, etc., are using our dies.

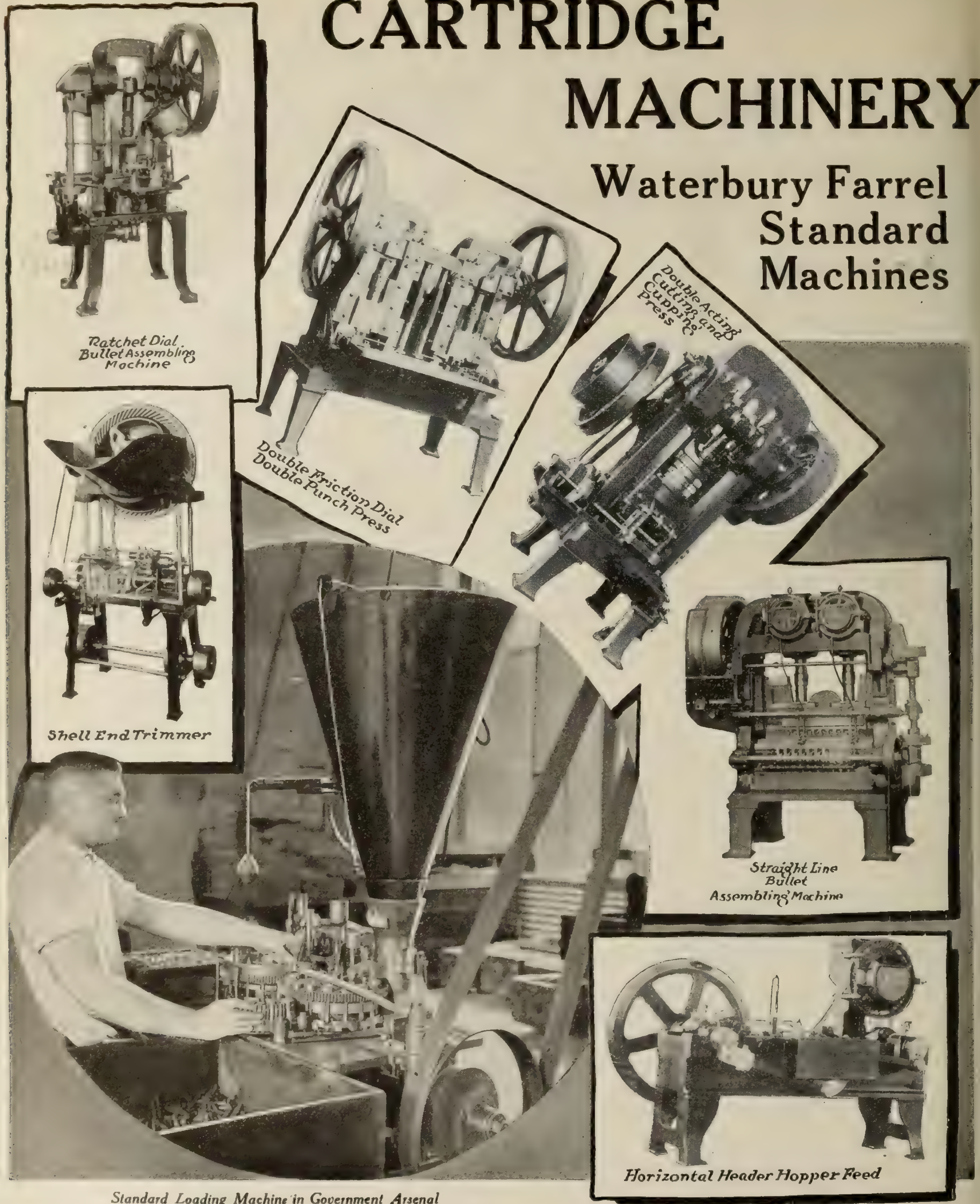
We have lately designed a special combined milling and seating attachment for any engine lathe. It is, therefore, unnecessary to use a special purpose machine for this work. This attachment insures accurate seating in alignment with the milled thread.

Toronto Type Foundry Company, Limited

50 Coleman Avenue, TORONTO, ONT.

CARTRIDGE MACHINERY

Waterbury Farrel Standard Machines



Ratchet Dial Bullet Assembling Machine

Double Friction Dial Double Punch Press

Double Acting Cutting and Cupping Press

Shell End Trimmer

Straight Line Bullet Assembling Machine

Horizontal Header Hopper Feed

Standard Loading Machine in Government Arsenal

The Waterbury Farrel Foundry & Machine Co., of Waterbury, Conn., U.S.A., has appointed me to be the sole manufacturer for export of their entire line of Cartridge and Shot Shell-Making Machinery. Proposals and Estimates covering complete plants or separate units required for export will be furnished on request.

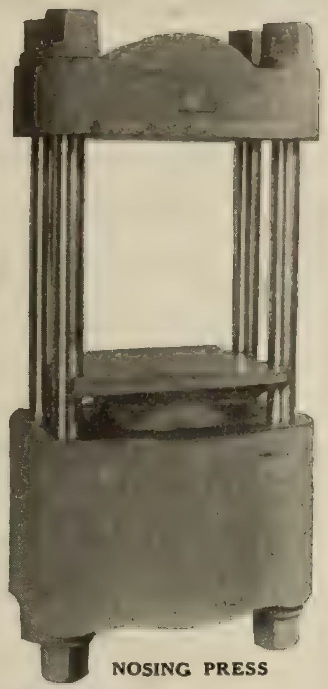
FREDERICK S. BLACKALL, Woolworth Tower, New York, U.S.A.

PRESSES

Pumps
and
Accumulators

FOR ALL
PURPOSES

Made in
Canada



NOSING PRESS

WILLIAM R. PERRIN, Limited
TORONTO

HYDRAULIC MG MACHINERY

Your Hydraulic Presses Can Be No Stronger Than Their Hydraulic Pumps and Valves

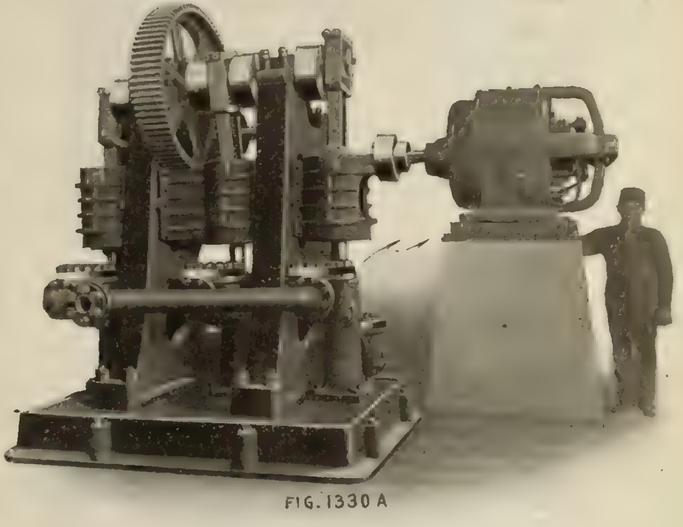


FIG. 1330 A

Pot Valve Type, Motor Driven, Triplex Hydraulic Pump

A CHAIN is no stronger than its weakest link. It cannot be made stronger by merely strengthening its weak links. The same thing is true of your Hydraulic Press and Pump Equipment.

You cannot make this hydraulic equipment stronger; you cannot make your hydraulic presses give better service, to produce better work at a reduced cost, by merely bettering and strengthening the already strong parts the presses.

But you can make this hydraulic equipment stronger; you can make your hydraulic presses give better service; you can make them produce better and faster work at a reduced cost by bettering and strengthening your **pumps, valves and fittings.**

Then why not let us tell you about our extensive line of Hydraulic Pumps, Valves and Fittings, which are the result of 40 years in exclusive building of Hydraulic Machinery?

We also build Hydraulic Presses. No matter where you are located or what "Your Pressing Needs" may be we have a design of hydraulic press which will do your work in the best possible way one that will save time, labor and repair bills. Write us.

Four Way
Balanced
Poppet
Operating
Valve

The Hydraulic Press Mfg. Co.
89 Lincoln Avenue
Mount Gilead, Ohio, U.S.A.

Eastern Office: Room 1105-R. 39-41 Cortlandt St., New York City. Canadian Agents A. R. Williams Machinery Co., Ltd., Toronto, Ont.; Canadian Fairbanks-Morse Co., Montreal.

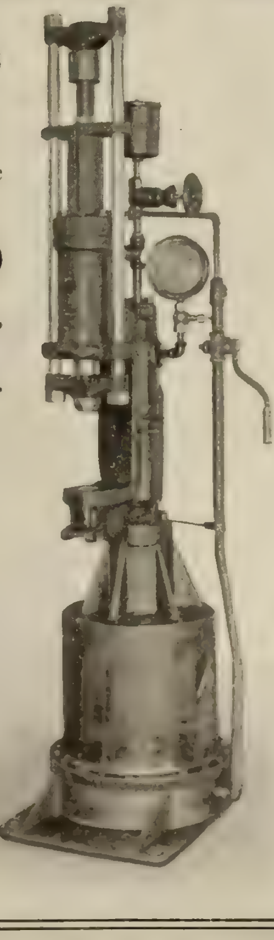
FOR YOUR MG PRESSING NEEDS

Three Machines In One

No tool in your shop is more efficient than this

METALWOOD

Combination Forcing, Broaching and Straightening Press.



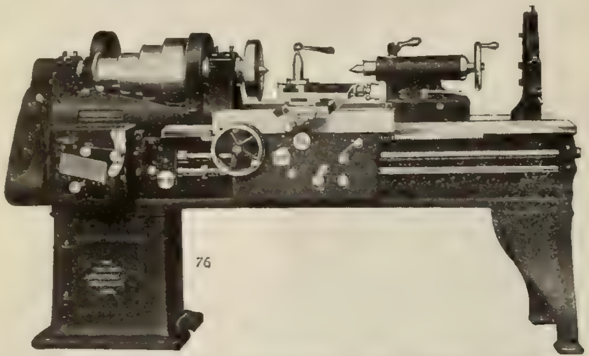
It is one of the handiest of shop tools for all work such as pressing in bushings, broaching, and the straightening of small shapes. Auxiliary tables and fixtures not shown in illustration. Once installed, a multitude of special uses for the machine keep suggesting themselves and its speed makes it a **great producer.**

**Metalwood
Mfg. Co.**

Leib & Wight Sts.,
DETROIT, MICH.

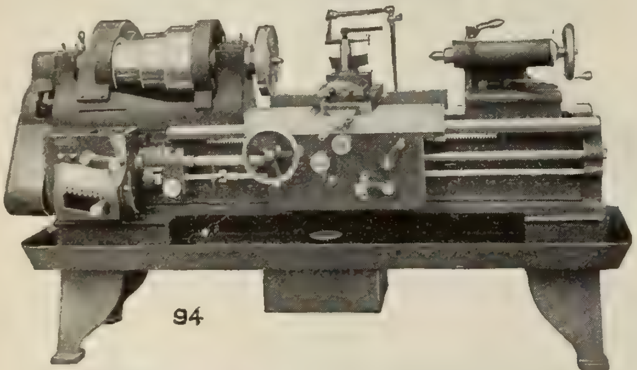
In Wearing Qualities Cincinnati Lathes

last longest as actually demonstrated by many years of service.



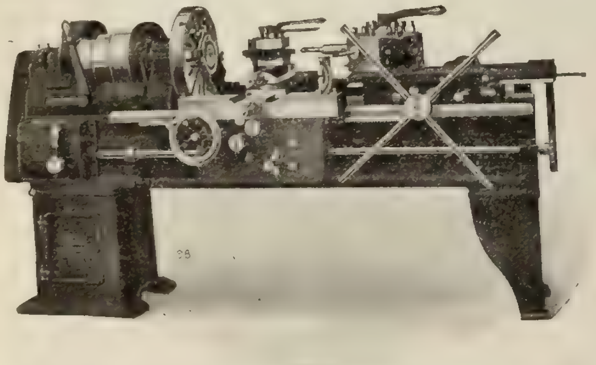
76

CUT No. 76 shows our machines as regularly furnished with a CABINET leg under headstock, DOUBLE WALL APRON, AUTOMATIC STOP, 'CHASING DIAL, 3 or 4 step cone, any length of bed complete ready for use.



94

MACHINE in Cut No. 94 is fitted with 3-step cone, double back gears, oil pan and pump. Our QUICK CHANGE SCREW CUTTING BOX gives an unlimited range for cutting standard or metric threads and by simply shifting the lever.



98

ABOVE cut No. 98, shows a Cincinnati Lathe fitted with friction back gears, HEXAGON TURRET on BED, power feed, and a SQUARE TOOL BLOCK used in compound rest. Such attachments as taper, relieving, draw-in, turning, turrets, etc., may be added at any future time.

A customer wrote us recently that they are operating them at 500 feet surface speed with 0.035 feed taking 3/16" cut on steel. Have us convince you of their superiority.

The Cincinnati Lathe & Tool Company

Oakley, Cincinnati - Ohio, U. S. A.

STEEL

Electric Furnace Steels, Carbon and High Speed Steels

Made in Canada from Canadian ores

Tungsten and Chrome Steels
Nickel and Vanadium Steels

All classes for tool, shear blade and die requirements, also steel castings.

Our ore is practically free from Sulphur and Phosphorus, and contains Titanium, Vanadium, Cobalt, Chromium and Manganese.

This ore makes the finest of steels, and when alloyed with Tungsten and Molybdenum, the finest of high-speed steels.

Tivani Electric Steel Co.,

Limited
Belleville, Canada

MORE SPEED LESS BLADES

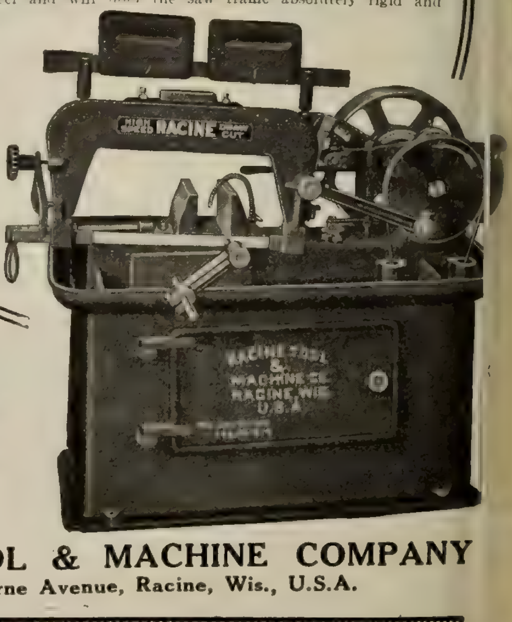
One Canadian Steel Company uses 120

RACINE METAL CUTTERS

and has saved $11,019.50. Particulars on request.

These machines are popular everywhere because they work fast and are easy on the blades—because springing is absolutely prevented by the mechanically correct design and construction.

The heavy, rigid saw frame guide of the Racine is made of the best grade of semi-steel and will hold the saw frame absolutely rigid and work at all times, insuring a straight cut with the least possible waste of material.

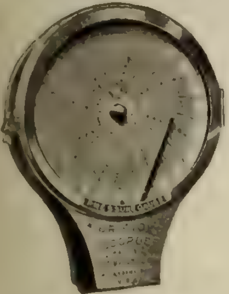

HIGH SPEED RACINE DRAW CUT
RACINE TOOL & MACHINE CO. RACINE WIS. U.S.A.

There are other Racine features well worth investigation — the **Positive Automatic Lifting Device, the Combination Vise, the Cooling System, etc.** May we tell you about them and about our unusual trial offer?

RACINE TOOL & MACHINE COMPANY

15 Melbourne Avenue, Racine, Wis., U.S.A.

Hints to Buyers



Every Steam Boiler

Should Have a Recording Gauge

Write for a copy of our new catalog No. 1 1001, and learn how you can secure continuous night and day records of your steam pressure.

TRADE MARK
BRISTOL'S
REG. U. S. PAT. OFFICE.
Recording Gauges

Pay for themselves in service. One user said, "Since we put in this Recorder there have been days when it earned for us more than its cost."

THE BRISTOL CO., WATERBURY, CONN.

Branch Offices:
Boston New York Chicago Pittsburgh San Francisco

RICHMOND MFG. CO.

Makers of

Shell Gauges, Tools
and
Special Machinery

16 GOULD ST. - TORONTO

We guard your purchases and tell you if you are getting what you are supposed to get.

Once you have formed the habit of consulting us for expert advice you wonder how you got along without our service.

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Head Office and Main Laboratories—MONTREAL
Branch Offices and Laboratories:
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Allen Safety Set Screws

Made by a patent process which increases the strength of the metal over 30%.

All sizes from 1/4" to 1" carried in stock by Williams & Wilson, Montreal, Canada.

THE ALLEN MFG. CO.
Hartford, Conn., U.S.A., and 173 Princess St., Manchester, England

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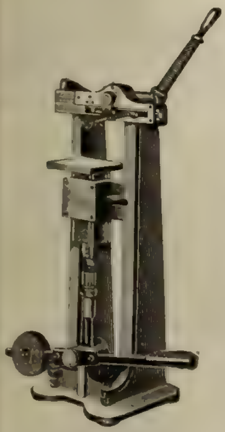

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TRADE MARK

For Marking Shrapnel Shells

or they will mark any article, either round or flat. Power or Hand Machines recommended.

Steel Stamp and Die Cutting by expert engravers.

Send for Catalogue.

Noble & Westbrook Mfg. Co.
Hartford, Conn., U. S. A.

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HARTFORD, CONN.

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WITH

Absolutely Accurate Automatic Feed

In sizes to work blanks up to 6 inches long, 7/16 in. diameter stock. Capacity from 80 to 200 rivets per minute, according to size.

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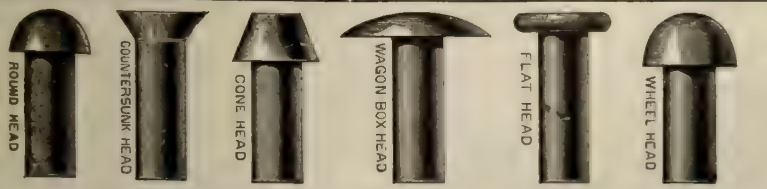

WE MANUFACTURE RIVETS of every description, 1/2 inch. dia. and smaller

PARMENTER & BULLOCH CO., LTD.
GANANOQUE, ONT.

If any advertisement interests you, tear it out now and place with letters to be answered.

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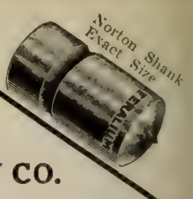
CUT GEARS

HAMILTON
GEAR & MACHINE CO.

Cor. Concord
& Van Horne

TORONTO

Poor Gears don't pay dividends. No, nor your maintenance bills either.



Landis Shank
Exact Size

FERALIUM
THE ULTIMATE IN DIAMOND SETTING
IT IS GUARANTEED

Finest Diamonds
and Diamond Tools
THE GENERAL SUPPLY CO.
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Sole Canadian Agents for
GEO. A. JOYCE CO., Ltd.
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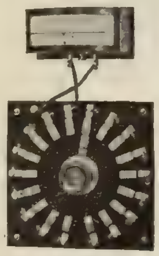
Our Ballas Diamonds Give Excellent Service



If YOU are Making SHRAPNEL

You need a

TRADE MARK
TWINKO
THWING INSTRUMENT COMPANY

Indicating or Recording
PYROMETER

It will insure the metal being treated at the right temperature. Don't take any risks.

Write for Bulletins Nos. 6 and 7.

THWING INSTRUMENT COMPANY
441 N. 5th St., Philadelphia, Pa.

Canadian Representative:
JAS. DE VON, 227 Davenport Road, Toronto, Ont.

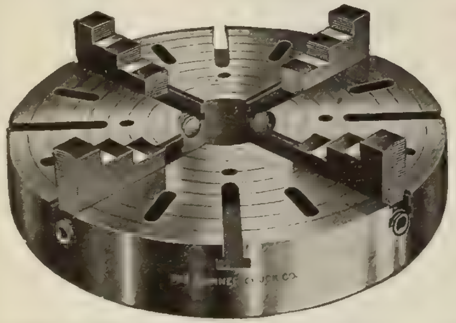
The Garvin Machine Co.

Manufacturers of

Milling Machines; Profiling Machines; Cam Cutting Machines; Screw Machines; Monitor Lathes; Die Slotting Machines; Screw Slotters; Tapping Machines; Duplex Horizontal Drills; Gang Drill Presses; Four-Head Right-Angle Drills; Wrenchless Chucks; Spring Coilers; Cutter Grinding Machines; Surface Grinders; Hole Grinders; Hand Lathes and Special Machinery.

We Want All To Have Our Catalog—Send For It To-day.

Spring and Varick Streets, New York City, U.S.A.



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FOR HIGH SPEED WORK
IRON OR STEEL BODY

The last word in chuck construction. Wide jaws: hardened steel thrust bearings; adjusting screws of large diameter, threaded full length; jaws ground after hardening, etc.

Write us to-day for prices.

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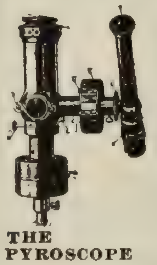
Factory and Main Office: New Britain, Conn.
London Office: 149 Queen Victoria Street
San Francisco Office: Rialto Building.



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For Hardness Testing

in shop and laboratory use the
Standard Scleroscope

Universally adopted; direct reading; inexpensive, and the only instrument that agrees with others of its kind in all parts of the World, thus solving problems of ordering materials to specification.

BOOKLET FREE.

Heat Indication

by optical means is fast becoming the correct thing. The PYROSCOPE has solved the problem. Perfect constancy, inexpensive, no electricity used. Built to stand rough usage and upon common-sense lines. Used by the Government and best firms.

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THE TORONTO IRON WORKS
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WITH HARDENED STEEL JAWS

Manufactured By
THE ARMSTRONG MFG. CO.
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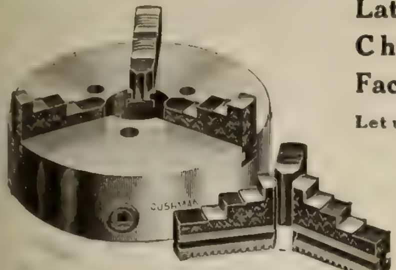

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Lathe Chucks, Drill Chucks, Portable Face Plate Jaws.

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STEEL TUBING
BUTTED & BRAZED
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CASTINGS

Made Especially to Suit Requirements

By making and treating our castings to suit conditions for which they are required we can give you a product that will deliver a maximum of good service.
NOTHING TOO LARGE OR TOO SMALL FOR US TO HANDLE.

The Galt Malleable Iron Co., Limited
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VIKING
WATERPROOF CEMENT LEATHER BELTS

Will Save You Much Money, Time, Trouble and Worry

"Viking" Belts are just in their element when in wet places and under adverse conditions.
A trial will convince you that they are all-round savers.

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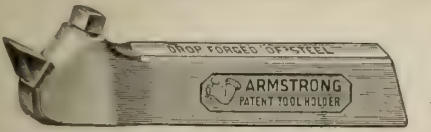
You want Tool Holders that have made good
ARMSTRONG TOOL HOLDERS
Won The
GRAND PRIZE
THE HIGHEST POSSIBLE AWARD AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.



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Armstrong Bros. Tool Co.
"The Tool Holder People"
306 N. Francisco Ave., CHICAGO, U.S.A.

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Cold Drawn, Turned and Polished Steel, Rounds, Squares, Hexagons and Flats, Steel Piston Rods, Pump Rods.

Special facilities for Keyseating up to 6 in. diameter.

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Canadian Drawn Steel Co.
Limited
HAMILTON CANADA

Beaudry Hammers
FOR GENERAL FORGING.

Save Fuel, Time and Labor. Cut Forging Costs in Two.

BELT OR MOTOR DRIVEN

BEAUDRY & COMPANY, Inc.
8 Oliver Street, Boston, Mass.

Gardner Disc Grinder

Gardner Disc Grinders are made in all sizes, types and combinations. We can successfully meet any disc grinding problem in existence. Largest builders of Disc Grinding machinery in the world.

Gardner Machine Co.
The Disc Grinding Authorities
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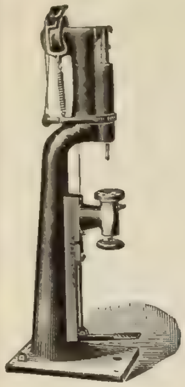
Canadian Agents: A. R. Williams Machinery Co.



IS YOUR RIVETING PROFITABLY DONE?

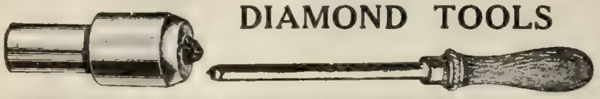
Our Elastic Rotary Blow Riveting Machine does profitable work, because one machine will do the work of several hand riveters, and do it better.

Every head is perfectly formed, any shape, round, flat, oval, rectangular, etc.

Catalogue C tells more about it.

The F. B. SHUSTER COMPANY
New Haven, Conn.
Formerly John Adt & Son. Established 1866

Also makers of Wire Straighteners and Cutter, Cotter Pin Machines, etc.



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Diamond Tools for trueing emery and all grinding wheels.
Diamond Tools are electric welded and do not shake loose.
Made to Order Any Style.

Diamond Circular and Prices on request.

Diamond Tool Co., Canning & Donnacona Sts., Montreal, P.Q.

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ALL WOOD—COMBINATION—IRON—STEEL

Every pulley fully guaranteed.
Write for interesting printed matter.

The Positive Clutch & Pulley Works, Ltd.
Montreal Factory: Aurora, Ont. Toronto

NORTON JACKS

For all kinds of heavy lifting

Send for complete catalogue showing 50 styles
10 to 100 tons capacity.

Made only by
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Press Attachments, Automatic.
Metal and Wire Forming Machines.
Tumblers—Large Line.
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Special Machines.

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In stock and to order any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.

Grant Gear Works, Inc., **151 Pearl St. Boston, Mass. U.S.A.**
G. B. GRANT

SEE PAGE 86

The HURLBUT-ROGERS CUTTING-OFF MACHINE

Cuts Off In Half The Time

The Hurbut-Rogers Cutting-Off and Centering Machine is a big producer because there are TWO TOOLS instead of one, working in the same cut.

VERY POWERFUL, RIGID AND ACCURATE.

Pays its cost in savings effected in very few months.

ASK FOR FULL DETAILS.

The Hurlbut Rogers Machinery Co.
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FOREIGN AGENTS: England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle on-Tyne.
H. W. PETRIE, TORONTO, CANADA.

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COAL COKE HACK SAW BLADES
CARBON STEEL MACHINERY STEEL
HIGH SPEED STEEL

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THE LANDIS MACHINE COMPANY

Manufacturers of

Bolt Cutters, Bolt Pointing Machines, Pipe and Nipple Threading Machines, Pipe Threading and Cutting Machines, Chaser Grinders, Bolt Cutter Die Heads, Bolt Pointing Heads, Pipe and Nipple Threading Die Heads and Stationary Pipe Die Heads.

Exclusive Canadian Representatives,
Williams & Wilson, Montreal, Canada.

Write for Catalogue No 22. **Waynesboro, Pa.**

Don't Keep It--Sell It!

If you have a lathe
- a drill
- a milling machine
- a planer
- a chain block
- a chuck
- a motor
- a crane
- a stock of belting
- an engine
- a compressor

or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue TORONTO, ONT.

Canadian Machinery BUYERS DIRECTORY

If what you want is not listed here write us, and we will tell you where to get it. Let us suggest that you consult also the advertisers' index facing the inside back cover, after having secured advertisers' names from this directory. The information you desire may be found in the advertising pages. This department is maintained for the benefit and convenience of our readers. The insertion of our advertisers' names under proper headings is gladly undertaken, but does not become part of an advertising contract.

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Carborundum Co., Niagara Falls, N.Y.
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Gardner Machine Co., Beloit, Wis.
Norton Co., Worcester, Mass.
H. W. Petrie, Toronto.
H. W. Petrie, Ltd., Montreal.

ACETYLENE
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.

ACETYLENE GENERATORS
L'Air Liquide Society, Montreal, Toronto.

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Charles F. Elmes Eng. Wks., Chicago.
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Cleveland Twist Drill Co., Cleveland.
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Roelfson Machine & Tool Co., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.

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Canadian Fairbanks-Morse Co., Montreal.
Canada Metal Co., Toronto.
Foss & Hill Machy Co., Montreal.
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
H. W Petrie, Toronto.
Tallman Brass & Metal Co., Hamilton.

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Canadian Fairbanks-Morse Co., Montreal.
Chapman Double Ball Bearing Company, Toronto.
Lyman Tube & Supply Co., Montreal, Que.

BALL BURNISHING MACHINES
H. W. Petrie, Toronto.

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Baird Machine Co., Bridgeport, Conn.
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Charles F. Elmes Eng. Works, Chicago, Ill.
Niles-Bement-Pond Co., New York.
Webber Bros. Mach. Co., Toronto, Ont.

BELLS, MARINE
Ontario Specialties, Ltd., Ottawa, Can.

BELT LACERS
Clipper Belt Lacer Co., Grand Rapids, Mich

BELT DRESSING AND CEMENT
BELT LACING, LEATHER
Aikenhead Hardware Co., Toronto, Ont.
Foss & Hill Machy Co., Montreal.
Graton & Knight Mfg. Co., Worcester, Mass.

BELTING, CHAIN
Canadian Fairbanks-Morse Co., Montreal.
Morse Chain Co., Ithaca, N.Y.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

BELTING, LEATHER
Canadian Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Graton & Knight Mfg. Co., Worcester, Mass.
Main Belting Co., Montreal.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

BELTING, STITCHED COTTON DUCK
Dominion Belting Co., Hamilton, Ont.
Main Belting Co., Montreal.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

BENCH LEGS, STEEL
New Britain Mach. Co., New Britain, Conn.

BENCH DRAWERS, FRICTIONLESS
New Britain Mach. Co., New Britain, Conn.

BENDING MACHINERY
John Bertram & Sons Co., Dundas.
Bertrams, Limited, Edinburgh, Scotland.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Berlin, Canada.
Dominion Machinery Co., Toronto.
Charles F. Elmes Eng. Works, Chicago.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo, O.
Steel Bending Brake Works, Chatham, Ont.

BILLET MARKERS
Matthews, Jas. H., & Co., Pittsburgh, Pa.

BINS, STEEL
Dennis Wire & Iron Works, London, Canada.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke.
Toronto Iron Works, Ltd., Toronto, Ont.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
H. W. Petrie, Ltd., Montreal.

BLOW PIPES AND REGULATORS
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.

BLUE PRINTING MACHINERY
Wickes Bros., Saginaw, Mich.

BLUE PRINTS
Wickes Bros., Saginaw Mich.

BOARTZ
Geo. A. Joyce Co., Ltd., New York, N.Y.

BOILERS
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MacKinnon, Holmes Co., Sherbrooke, Que
H. W. Petrie, Ltd. Montreal.
H W Petrie, Toronto.
Wickes Brothers, Saginaw, Mich.

BOILER MAKERS' SUPPLIES
Jno. F. Allen Co., New York.

BOLT CUTTERS AND NUT TAPERS
Aikenhead Hardware Co., Toronto, Ont.
Canada Machinery Corp., Galt, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
Galt Machine Screw Co., Galt, Ont.
London Bolt & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machinery Co., Toronto.

BOLT THREADING MACHINERY
Cook, Asa S., Co., Hartford, Conn.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
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H. W. Petrie, Toronto.
Stow Mfg. Co., Binghampton, N.Y.

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Dominion Machinery Co., Toronto.
Garlock-Walker Machy. Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
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Roelofson Machine & Tool Co., Toronto, Ont.
Stow Mfg. Co., Binghampton, N.Y.

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Foss & Hill Machy Co., Montreal.
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Ontario Specialties, Ltd., Ottawa, Can.
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Wm. Kennedy & Sons, Ltd., Owen Sound.
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Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Wm. Kennedy & Sons, Ltd., Owen Sound.
Galt Malleable Iron Co., Galt.
Ontario Specialties, Ltd., Ottawa, Can.

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Galt Malleable Iron Co., Galt.

CASTINGS, NICKEL STEEL.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.

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Shelton Metallic Filler Co., Derby, O.

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Gardner, Robt., & Son, Montreal.
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Hurlbut, Rogers Machy. Co., South Sudbury, Mass.
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Pratt & Whitney Co., Dundas, Ont.

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Lyman Tube & Supply Co., Montreal, Que.
H. W. Petrie, Ltd., Montreal.
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The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Toronto Testing Laboratory, Ltd., Toronto.

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Garvin Machine Co., New York.

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Cushman Chuck Co., Hartford, Conn.
Detroit Pneumatic Chuck Co., Detroit, Mich.
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Skinner Chuck Co., New Britain, Conn.
Thomas Elevator Co., Chicago, Ill.
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Garvin Machine Co., New York.
New Britain Machine Co., New Britain, Conn.
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H. W. Petrie, Toronto.
Smart-Turner Machine Co., The, Hamilton.
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John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

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Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.

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Baird Machine Co., Bridgeport, Conn.
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Independent Pneumatic Tool Co., Chicago, Ill.

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Crane Puller Co., Hopedale, Mass.

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Northern Crane Works, Walkerville.

CRANES, GANTRY.
Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, GOLIATH AND PNEUMATIC
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, PORTABLE.
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Garvin Machine Co., New York.
Morse Twist Drill and Machine Co., New Bedford.
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Garlock-Machinery, Toronto.
Garvin Machine Co., New York.
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Wm. Kennedy & Sons, Owen Sound, Ont.
Peerless Machine Co., Racine, Wis.
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Pratt & Whitney Co., Dundas, Ont.
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Root & Van Dervoort Engr. Co., East Moline, Ill.
Tabor Mfg. Co., Philadelphia, Pa.

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A. B. Jardine & Co., Hespeler, Ont.
Modern Tool Co., Erie, Pa.
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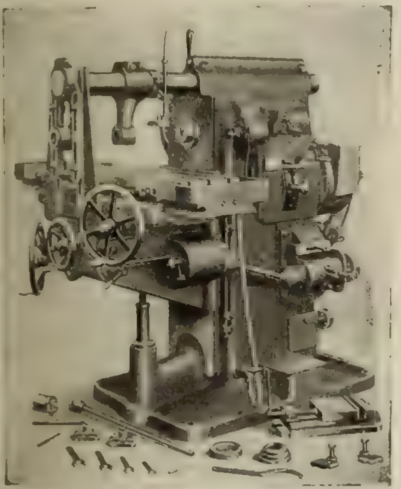

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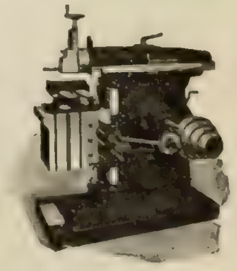

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Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
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Garlock-Walker Machy. Co., Toronto, Ont.
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Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
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H. W. Petrie, Toronto.
Rockford Driling Mach. Co., Rockford, Ill.
A. R. Williams Machy. Co., Toronto.

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Foss & Hill Machy. Co., Montreal.
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Pratt & Whitney Co., Dundas, Ont.
United States Electrical Tool Co., Cincinnati.

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Foss & Hill Machy. Co., Montreal.
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Niles-Bement-Pond Co., New York.
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United States Electrical Tool Co., Cincinnati, O.
A. R. Williams Machy. Co., Toronto.
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Cleveland Twist Drill Co., Cleveland.
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H. A. Drury Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Morse Twist Drill & Machine Co., New Bedford.
W. F. & John Barnes Co., Rockford, Ill.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, MULTIPLE SPINDLE
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Pratt & Whitney Co., Dundas, Ont.

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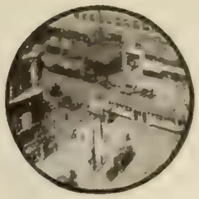

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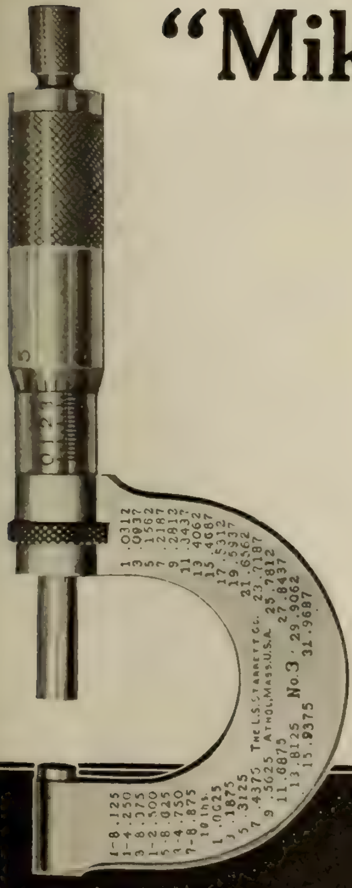

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10ths.
1 .0625
3 .1875
5 .3125
7 .4375
9 .5625
11 .6875
13 .8125
15 .9375
1 .0312
3 .0937
5 .1562
7 .2187
9 .2812
11 .3437
13 .4062
15 .4687
17 .5312
19 .5937
21 .6562
23 .7187
25 .7812
27 .8437
29 .9062
31 .9687
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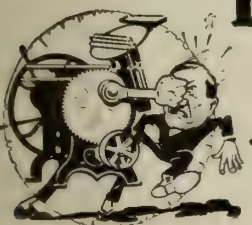

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Darling Bros., Ltd., Montreal, Que.
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Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
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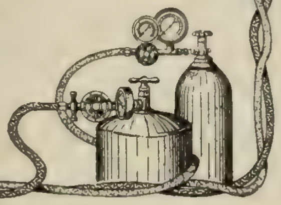

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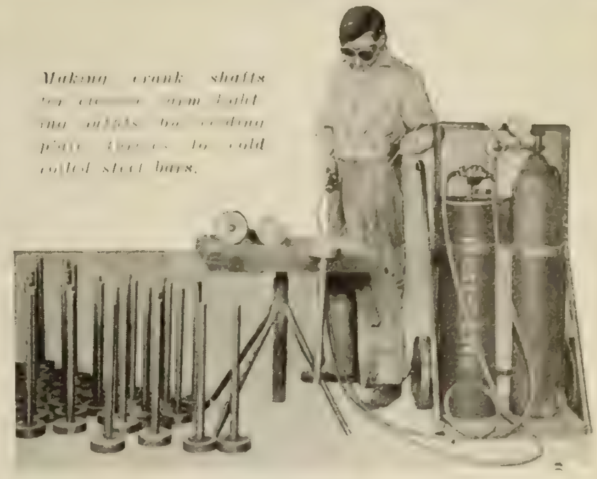

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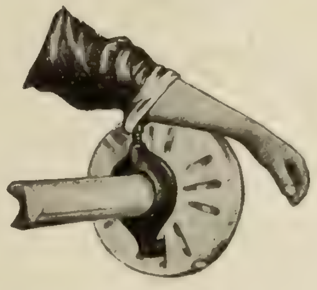

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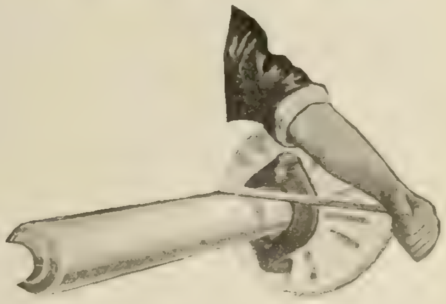

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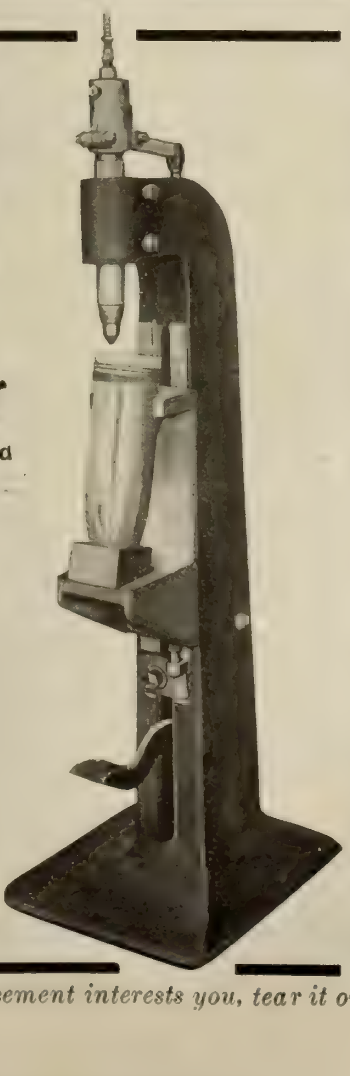

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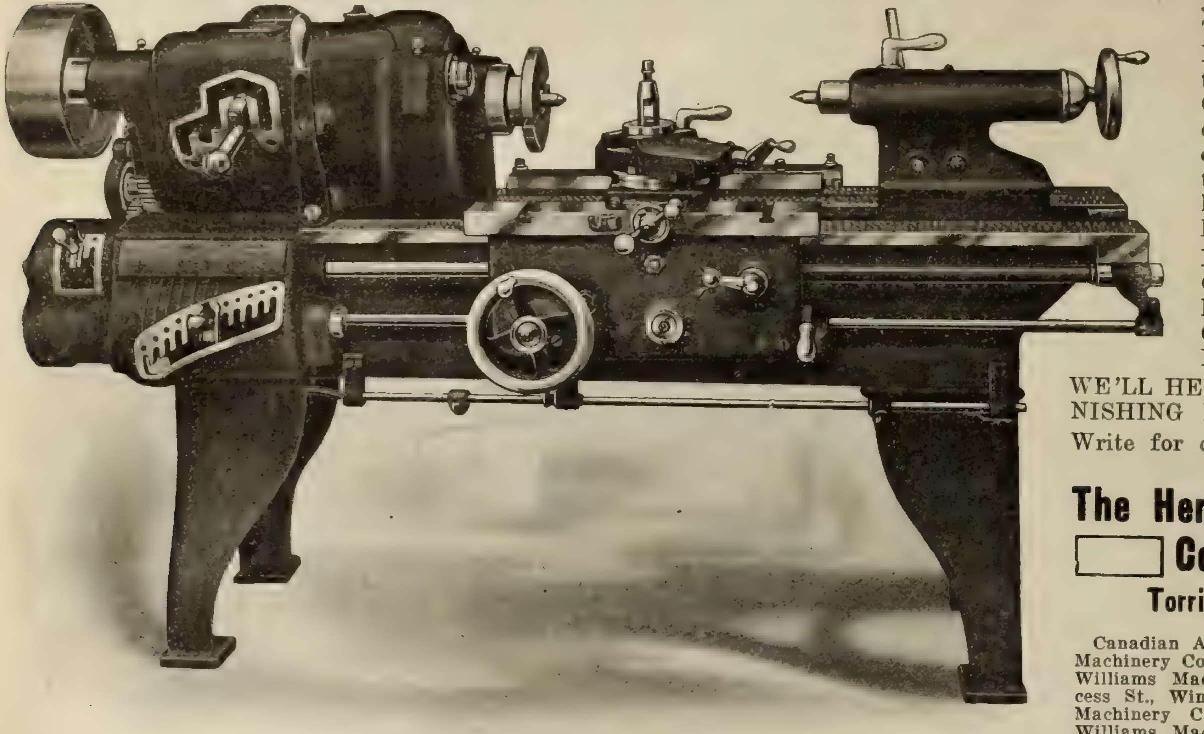

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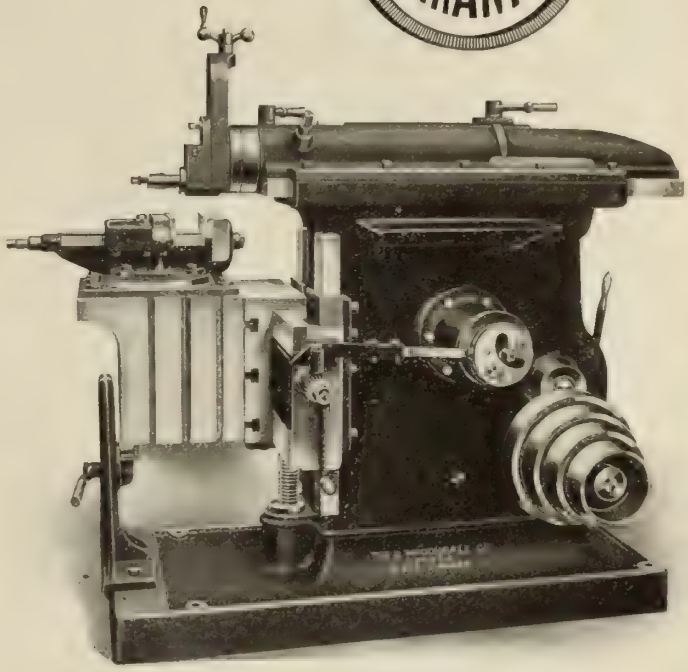

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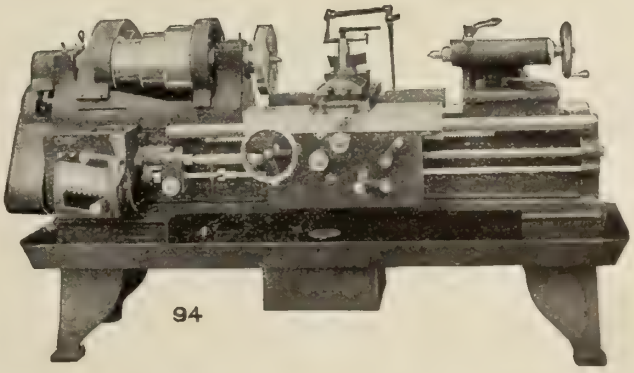

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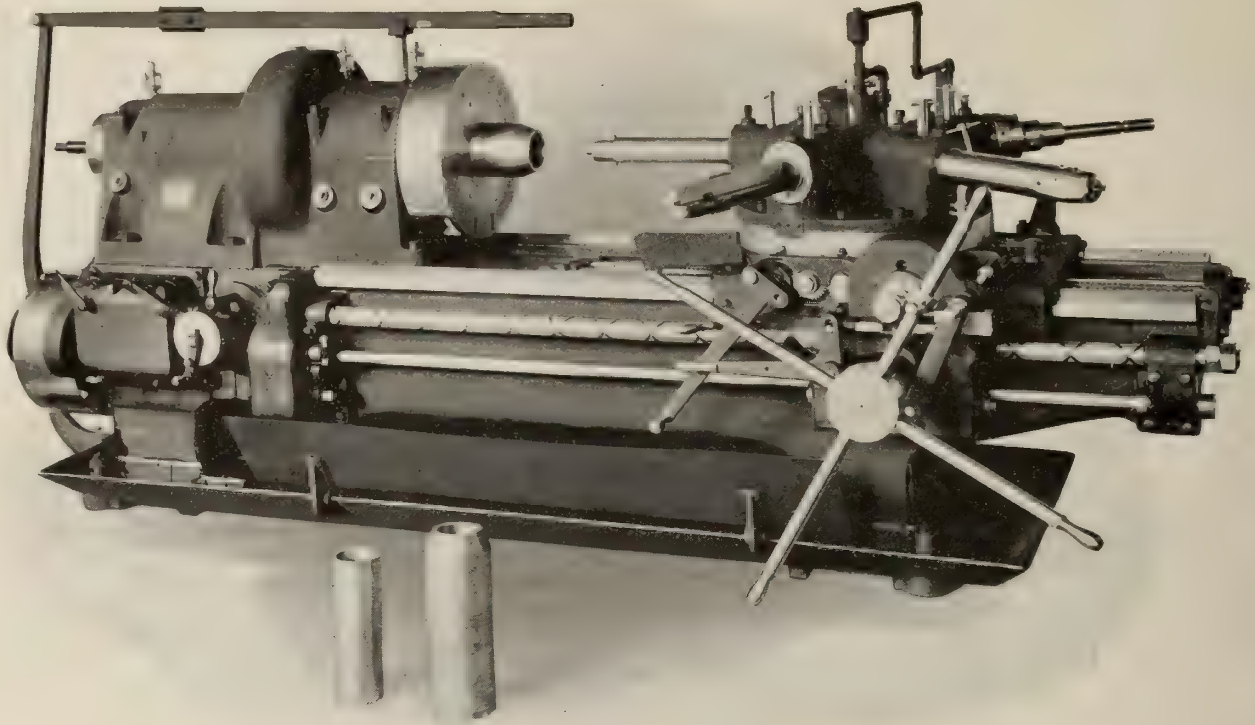

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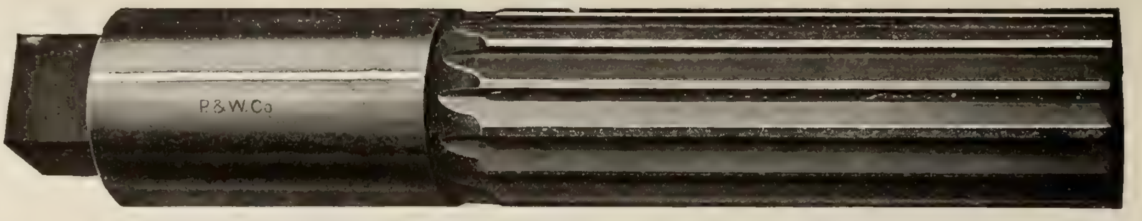

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1. The section of the tooth is greater than when flat relief is used and therefore the reamer is stronger.
2. Reamer does not chatter.
3. Smoother hole is produced.
4. Working size of reamer can be retained longer.

Eccentric relief is a Patented Feature of

All P. & W. Reamers

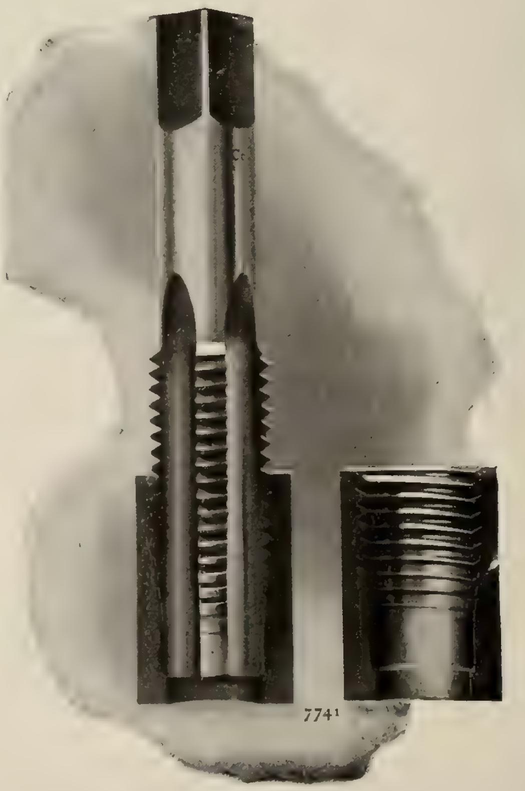
Do Your Taps Cut Like This?

Illustration to right shows P. & W. Taper Hand Tap, after being forced by power nearly through a nut in which the hole was purposely drilled considerably smaller than the root diameter of the tap.

P. & W. TAPS
Freest Cutting **Longest Life**

This, of course, left an excessive amount of work for the tap to do. Yet, because of the design and construction of the tap, there was no evidence of imperfect threading or any indication whatsoever of the hard usage to which the tool had been put.

Write for *Catalog No. 8, "Small Tools,"* showing our complete line.



"The Tap with the Con-Eccentric Land"

Pratt & Whitney Company of Canada, Limited

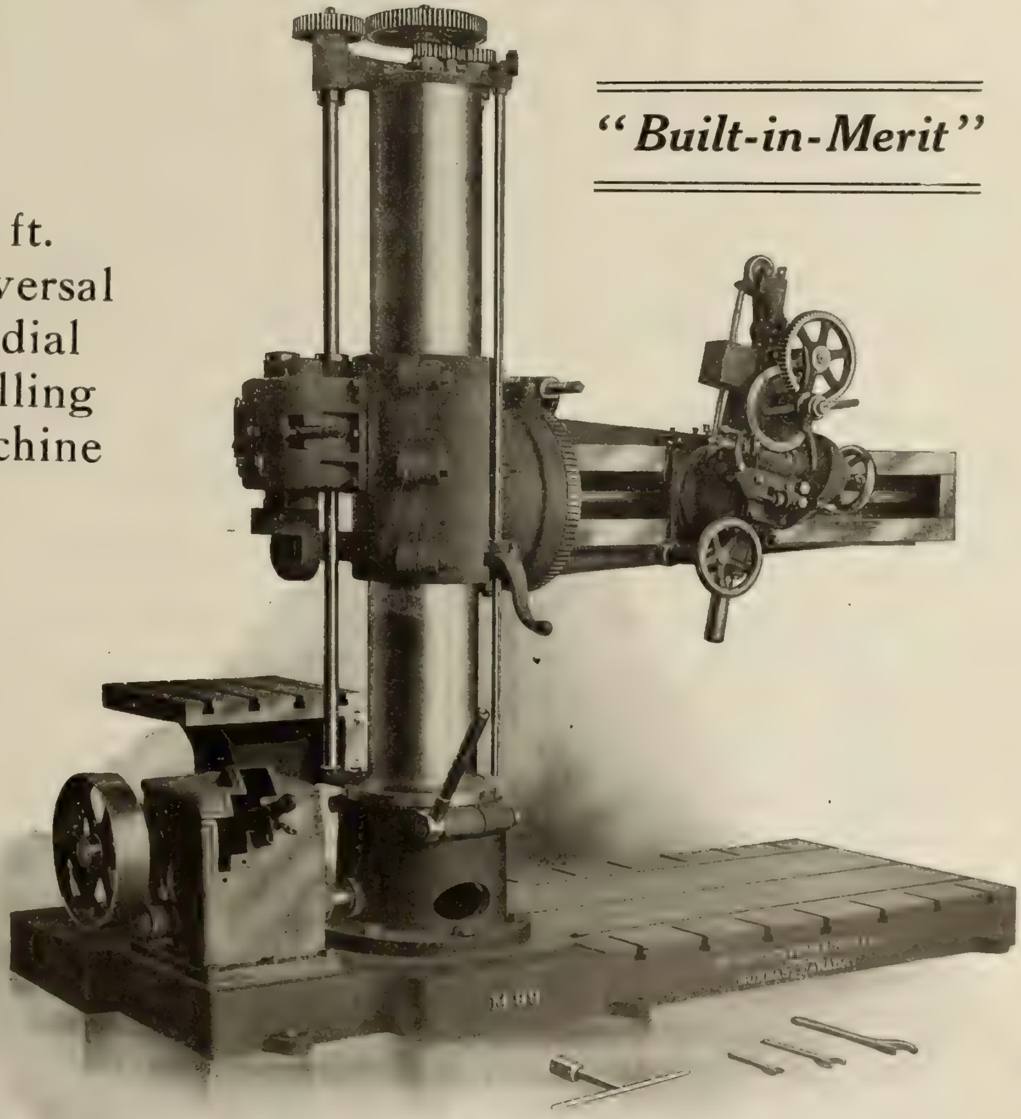
DUNDAS
Ontario

MONTREAL
723 Drummond Bldg.

VANCOUVER
B.C. Equipment Co.

WINNIPEG
1205 McArthur Bldg.

BERTRAM MACHINE TOOLS



"Built-in-Merit"

6 ft.
Universal
Radial
Drilling
Machine

DROP US A LINE FOR PHOTOGRAPHS AND FULL DETAILS
on any machine or machines in which you are interested

The John Bertram & Sons Company
Limited

Dundas, Ontario, Canada

MONTREAL	VANCOUVER	WINNIPEG
723 Drummond Bldg.	609 Bank of Ottawa Bldg.	1205 McArthur Bldg.

The Publisher's Page

TORONTO October 12, 1916

They Say—

> "Therefore please hold page 11 of the October Export Number and we will get our data and cuts to you early next week."
>
> "I am glad to tell you that we received a very nice inquiry from Russia from your last Export Number, the prospects looking very encouraging for some nice business. Your paper is to be congratulated for the progress it is making."

The above is quoted from a letter received this week from a firm who are unquestionably leaders in their line in the United States. Coming from this source it is especially encouraging. And note the following:

> "We thank you for your letter of the 18th inst. We are steady advertisers in CANADIAN MACHINERY and are pleased to say we received many inquiries through our advertisement and *with us every inquiry so far has meant a sale.*
>
> We would be pleased to have your artist draw up sample ads. of various sizes and submit for our approval. We believe him to be more capable in his particular line than we could be.
>
> Trusting we may hear from you on this matter by return mail, we remain."

This firm have been consistent advertisers for some time and have developed a tremendous business in the Dominion. Through one dealer alone they have sold 1,000 machines in Canada in the past year. Letters of like nature received from advertisers of varied lines are very gratifying, testifying as they do to a service to both reader and advertiser.

We have been especially pleased with the enquiries and orders received from many sources abroad through the Export Numbers. Great Britain, Russia, South Africa New Zealand and India have all given evidence that the Export Numbers are bearing their message to the far countries By to-day's mail we have received the following letters from Russia.

Odessa, Russia, July 26th, 1916.

Canadian Machinery,
143-153 University Ave.,
Toronto.

Dear Sirs,—

Please send me your journal. Thanking you, I remain.

Yours truly,
M. Barenboim.

Rostow on Don, South Russia,
Aug. 18th, 1916.

Canadian Machinery,
143-153 University Ave.,
Toronto.

Dear Sirs,—

We would like to subscribe to Canadian Machinery. Please send your subscription form and particulars.

Yours very truly,
P. Aksenon & Co.

Our foreign circulation is made up o firms such as these—a carefully selecte list of the machine tool dealers of th different countries—all potential buyers o the advertised lines.

CANADIAN MACHINERY
and Manufacturing News
143-153 University Avenue, Toronto

Quality Service

Courtesy in Business

* * *

Fittingly framed and hanging in the Offices of one of the most important Public Service Corporations on this North American Continent is the following

'Did you say Please and Thank you?'

Broad minded men direct the destiny of that Corporation, men who know that public or private enterprises to be lastingly successful must operate for the public good.

Quality and Service are the two important factors in our business life today, but Courtesy is the door through which they must enter.

We are large producers of Hamilton Pig Iron and our output of Open Hearth Steel Blooms and Billets, Iron and Steel Bars of all shapes and size runs into enormous tonnage.

The products of our mills include practically everything that can be manufactured from Iron and Steel and these we distribute to thousands of satisfied customers.

Our business is an extensive one and a successful one. The World is our market: but our prosperity and success in the future, as in the past, depend upon the continued confidence, co-operation and good-will of the people we serve.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO, LIMITED, SHEFFIELD, ENGLAND

Sole Agents for Canada:

H. BOKER & CO., Inc.

(Formerly Hermann Boker & Co.)

332 St. James Street, Montreal, P.Q.

Established 1837 Incorporated 1914

Don't make patterns for your Gears

We make

Machine Moulded Gears

Any size up to 18 feet in diameter, in either steel, semi-steel or grey iron. No patterns required.

TRADE MARK

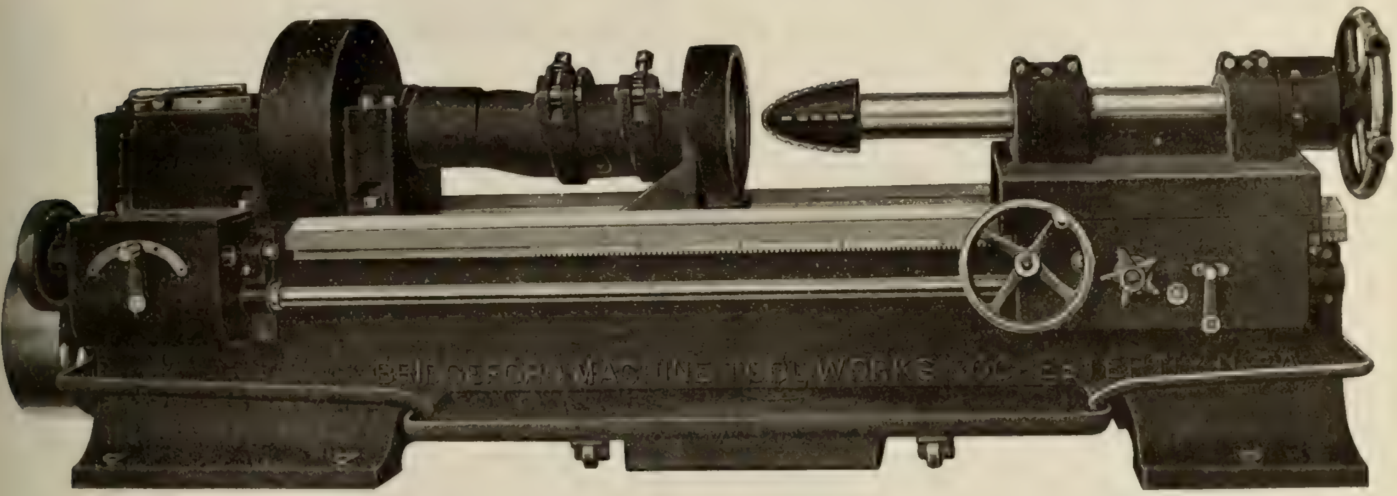
Also manufacturers of all parts pertaining to Cement Mill Machinery, Crushing, Mining and Dredging Plants in "Adamantine," Chrome, Manganese and Nickel Steel.

Let us figure on your requirements; Write

HULL IRON & STEEL FOUNDRIES, Limited

HULL, P.Q., CANADA

BRIDGEFORD



9.2" Boring Lathe

Massive Strength. This is a machine of ideal proportionate strength, the stresses have been scientifically calculated, the vital points strengthened, resulting in a smooth-running, perfectly balanced unit that ensures efficiency, economy, speed and superior production.

It is a machine of the heavy duty, low swing type, having a specially designed carriage with auxiliary for internal profile. Carries a 6" steel bar with male taper, allowing for light design of cutter heads; 3 automobile style speed changes, all hardened and running in oil bath. A chip tray is attached and used in conjunction with stationary lubricant tank. Regular equipment comprises everything except chuck, steady rest and cutter.

BRIDGEFORD MACHINE TOOL WORKS

HEAVY LATHE SPECIALISTS FOR 20 YEARS

237 MILL STREET
ROCHESTER, N.Y.

HAMMOND
DIE BLOCKS
FOR
Difficult Dies and Record Runs
Speed in Machining
Safety in Hardening
SPECIAL
Trimmer Tool Steels
for hot and cold work

HAMMERED crucible cold trimmer Die Tool Steel means longer runs between grindings—less wasted time dragging down production.

Our Products
"Hammered from Ingot to Finished Bar"

HAMMOND STEEL & FORGING CO.
FINE TOOL STEELS
Specialists in Manufacture of
HIGH GRADE HAMMERED FORGINGS
WELDLESS RINGS, HAMMERED ALLOY STEELS, SPECIAL SHAPES

DETROIT OFFICE:
1257 David Whitney Bldg.
Phone: CHERRY 1898

MAIN OFFICES and MILLS:
Syracuse, N. Y.

EXTRA
Die Steel

is produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

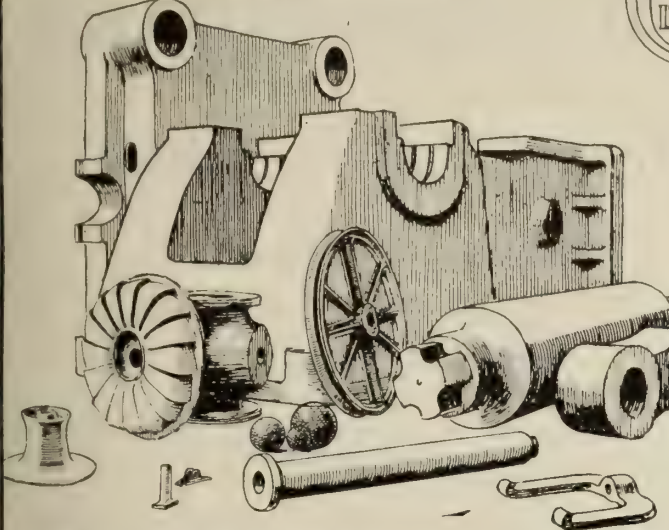
You get extra service from "EXTRA" DIE STEEL. A trial is convincing.

STEEL
H-A-DRURY COMPANY LIMITED
MONTREAL TORONTO NEW YORK

Manufactured By SANDERSON BROTHERS & NEWBOULD, Limited
SHEFFIELD, ENGLAND

Red Cut
Superior
High Speed
Steel

Quality First
THE BEST FOR MACHINING
ALL HARD MATERIALS
Are your tools made of Red Cut?
Send for folder
VANADIUM-ALLOYS
STEEL COMPANY
PITTSBURGH, PA.
Works at Latrobe, Pa.



WE ARE MAKERS
OF
STEEL
CASTINGS

MANGANESE, VANADIUM, TITANIUM, CHROME, NICKEL, ETC.

OF ANY SIZE & OF ANY
KIND SUCH AS

HYDRAULIC, MILL GEAR,
LOCOMOTIVE, ROLLING STOCK,
MARINE,
ETC.

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

PIG IRON

"Victoria" Foundry and Malleable, made
by The Canadian Furnace Co.,
Port Colborne, Ont., Canada

M.A. HANNA & Co. **Sales Agents:**
CLEVELAND, O., U.S.A.

JAMES McKAY COMPANY, PITTSBURGH, PENNA., U.S.A.
Manufacturers of

SHELL FORGINGS

We have the Equipment and Experience and can execute orders for

Nose Sockets Base Plates Adapter Plates

For any size Shells. Can execute orders promptly.

SPECIAL FORGINGS—We can make any forging that can be made under Drop Hammers.
CHAINS AND ACCESSORY FORGINGS—We have a complete line.

Address our Representative: JOHN A. BUCHANAN, King Edward Hotel, Toronto

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX	Carbon Tool Steel
High Speed Steel, Atlas LX	"Deward" Oil Tempering, Non-Shrinking
Chrome Vanadium Steel	

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

YOUNG, CORLEY AND DOLAN, Inc.

115 BROADWAY, NEW YORK CITY, U.S.A.

ARMSTRONG, WHITWORTH OF CANADA, LIMITED
22 VICTORIA SQ. MONTREAL P.Q.
"T.Y.R."
Highspeed Steel
(Made in Canada)
Works: LONGUEUIL, Que.
DOMINION BANK BLD'G TORONTO

Immediate shipment of all standard sizes and shell-turning sizes can be made from stock.

MADE IN CANADA

STEEL

Electric Furnace Steels, Carbon and High Speed Steels

Made in Canada from Canadian ores

Tungsten and Chrome Steels
Nickel and Vanadium Steels

All classes for tool, shear blade and die requirements, also steel castings.

Our ore is practically free from Sulphur and Phosphorus, and contains Titanium, Vanadium, Cobalt, Chromium and Manganese.

This ore makes the finest of steels, and when alloyed with Tungsten and Molybdenum, the finest of high-speed steels.

Tivani Electric Steel Co.,
Limited
Belleville, Canada

WHITING CRANES

Cut shows type "E" Service Jib Cranes fitted with chain blocks and air hoists in Big Four shops, Indianapolis, Ind. Just the thing for serving planers and machine tools.

Any Span or Capacity

SEND FOR CATALOG 110

Complete Foundry Equipments

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB

Cranes of All Kinds

STEEL

for SHRAPNEL SHELLS AND SHELL BLANKS

Only Company in Canada producing steel ingots by the "HARMET" Liquid Process.

REASONS WHY THESE INGOTS ARE SUPERIOR TO THE ORDINARY KIND:

1. Prevention of cracks, due to shrinkage; of internal stresses and resulting cracks and fissures.
2. Early cessation in the crystallization of the metal, and the production of fine crystallization of the metal, without cleavage planes.
3. Lessening of segregation, i.e., reduction of tendency to carbon and other impurities to concentrate in the central and upper parts of the ingot.
4. Prevention of "Pipes" or interior cavities, and thus preservation of absolute solidity in the ingot.
5. Improvement in physical properties.
6. Reduction in waste of ingot.

WE CAN SUPPLY FORGINGS OF ALL SHAPES AND SIZES MADE OF ORDINARY OR "HARMET" FLUID COMPRESSED OPEN-HEARTH STEEL ON THE SHORTEST NOTICE.

Nova Scotia Steel and Coal Company

Limited

Head Office:
NEW GLASGOW,
N.S.

Western Sales Office,
Room 14 Windsor Hotel,
MONTREAL

Tools Cut Well When Red Hot—

To users of High-Speed Steel this will appear to be an astounding statement, but a trial is all that is needed to convince you that speeds, cuts and heats that are disastrous to High-Speed Steel tools are "Child's play" for tools made of

STELLITE

HIGH SPEED MADE IN CANADA STELLITE *TOOL METAL*

It will astonish you to find that by using Stellite how much you can increase the speed of your lathe, for there is no temper in Stellite.

That is the reason why it cuts as well when red hot as when cold. So you can abolish your cutting compound.

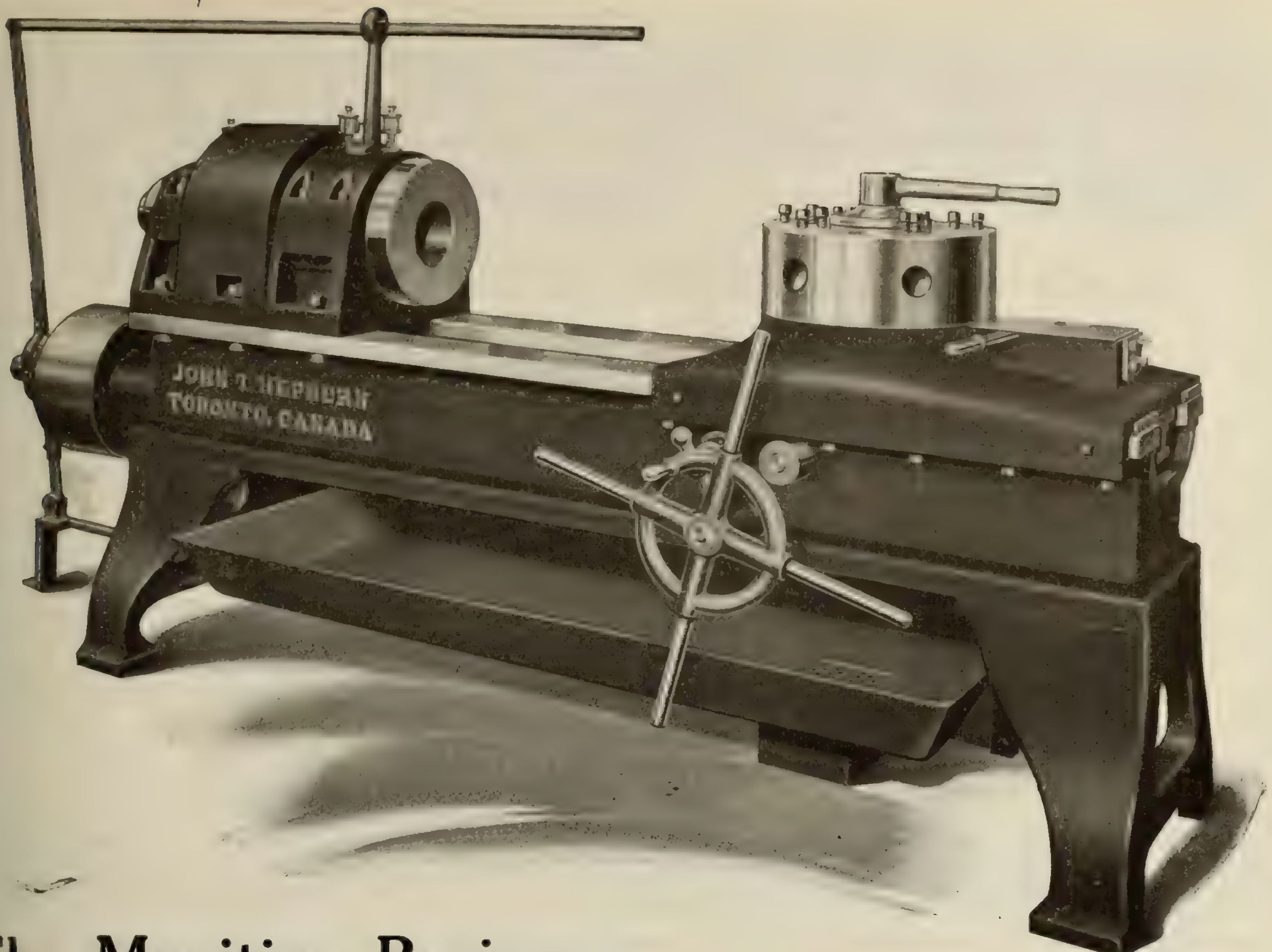
Production—Big Production—is a vital question these days. Stellite will give it to you. Stellite will increase your output 20 to 300% at no cost for extra equipment.

Can you afford to ignore the big production advantages Stellite offers you?

Made in Canada by

The Deloro Mining and Reduction Co., Limited
DELORO, ONTARIO

The Canadian B. K. Morton Co., Limited
SOLE SELLING AGENTS FOR CANADA AND NEWFOUNDLAND
49 Common St., MONTREAL, QUE. 86 Richmond St. East, TORONTO, ONT.



The Munition Business demands the most powerful Machine Tools

WHOSE LATHES WILL YOU BUY?

This question is important—very important. It has been answered by many, after years of investigation, this way:

HEPBURN HEAVY DUTY SHELL LATHES

NOTABLE FOR SPEED, ACCURACY, POWER, STRENGTH, SIMPLICITY AND DESIGN.

You go along a well-travelled road when you go the Hepburn way.

Let us give you names of buyers and users of our Lathes. We invite correspondence.

We manufacture Turning and Turret Lathes up to 9.2".

Quick delivery assured.

John T. Hepburn, Limited

18 to 60 Van Horne Street
TORONTO, CANADA

GARLOCK-WALKER MACHINERY CO. LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

WE HAVE AT TORONTO FOR IMMEDIATE DELIVERY:—

New **Davis 6″ Cutting-off Machines,** fully equipped, size of hole in spindle 6⅞″.
New **Giddings & Lewis** 18″ x 8′ Heavy Duty Engine Lathes, 3- step Cone, Double Back Gears, regular equipment.
New Heavy Duty Lathes for turning 8″ and 9.2″ Shells.
Thor pneumatic hammers and drills.
Appleton Grinder—Challenge No. 1—slightly used.

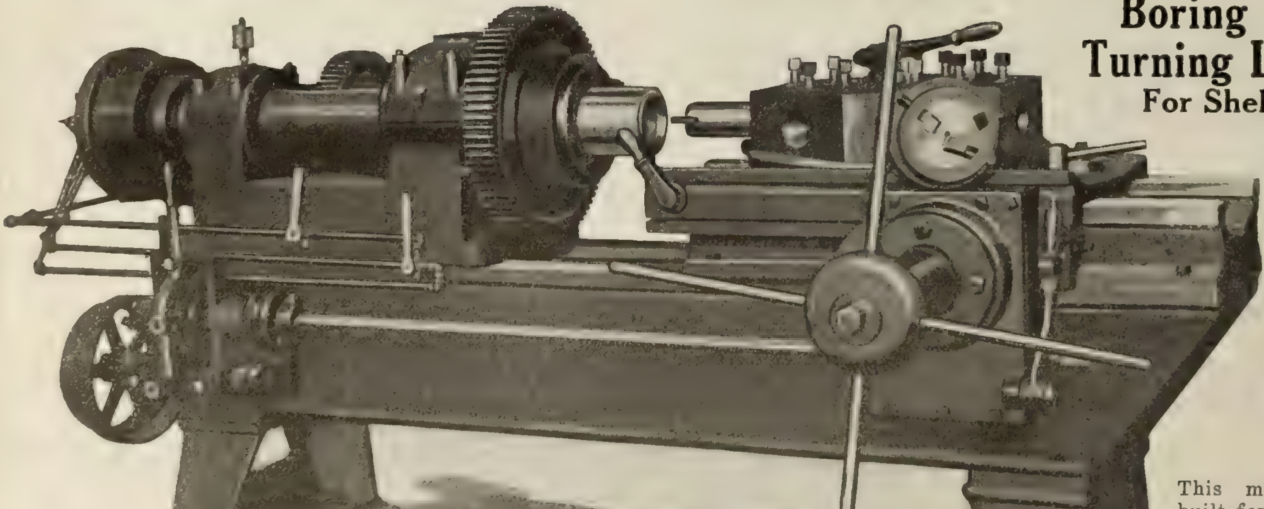
Special 16,000 lb. 40″ Boring Lathes for 6″ Projectiles.
Immediate Delivery—Special Price—Write for Cuts, etc.
Good Delivery now on Lodge & Shipley 24″ Lathes.
Ask for information about machines for any operation on 3″, 4.5″, 5″, 6″, 8″ or 9.2″ Projectiles.—Our Experience is at Your Service—

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds

Boring and Turning Lathe

For Shell Work



This machine is built for base facing, or boring the 6″ shell. It is made with a 6 side turret and being compound geared has a very powerful drive.

Very Rapid, making possible heavy production, the feed is by means of a worm and gearing in the apron.

WRITE FOR DELIVERIES.

THE JENCKES MACHINE COMPANY, LIMITED

Works: SHERBROOKE, QUE.; ST. CATHARINES, ONT.

SALES OFFICES: 727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

The Bawden Machine Co., Limited

TORONTO, CANADA

Bawden Heavy Duty Shell Lathes

They have made good—in scores of munitions plants in Canada

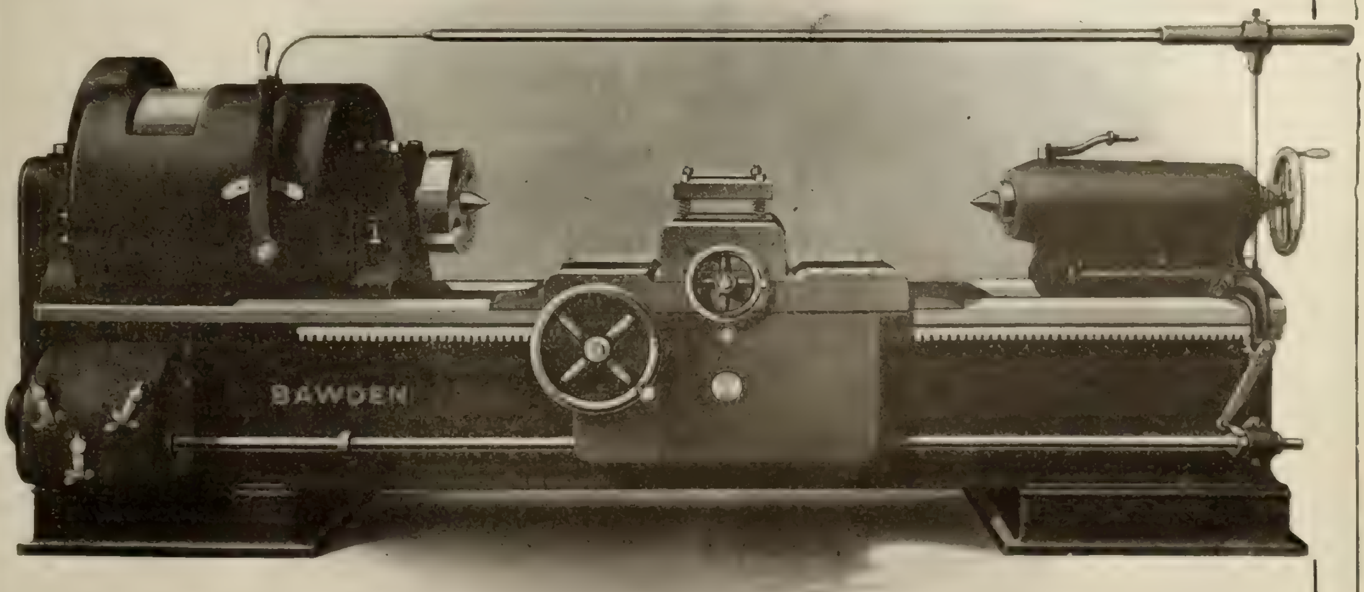
They have replaced Lathes that promised well—at first—but which fell down in actual and sustained operation because too light, or too slow, or inaccurate, or lacking in rigidity.

Bawden Lathes have tremendous strength, complete rigidity and are positively accurate. They are business-like in appearance and fulfil every promise.

We ask you to communicate with us if at all interested. You'll be repaid.

Send for Specifications of our Heavy Duty Lathe.

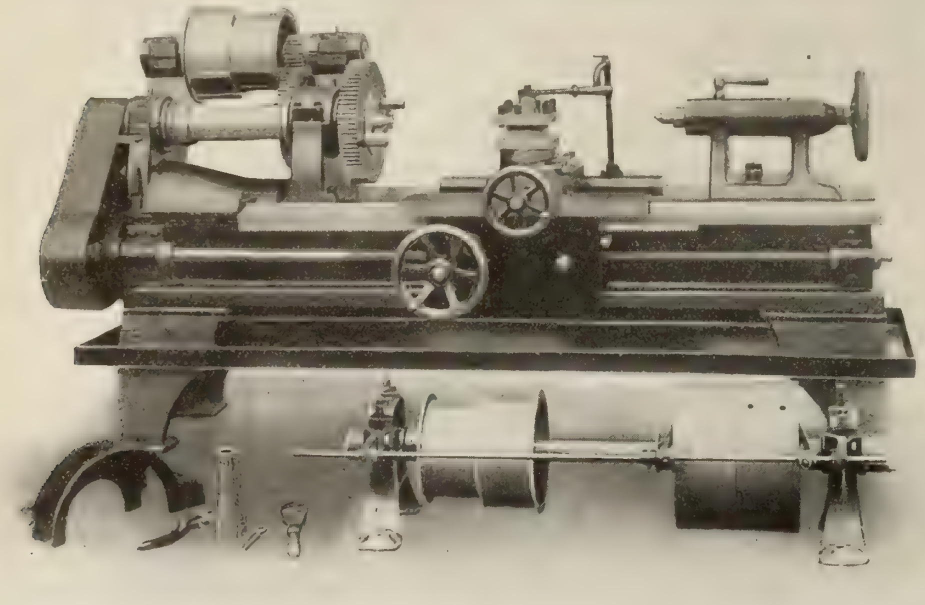
Note.—We manufacture a full line of gauges for all sizes of British, French and Russian Shells and Component parts.



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

The Yeates Heavy-Duty Shell Lathe

A Heavy-duty Machine Tool that stands the strain of the shell plant of to-day. A lathe that is built for service and durability—the kind reputations are founded upon.



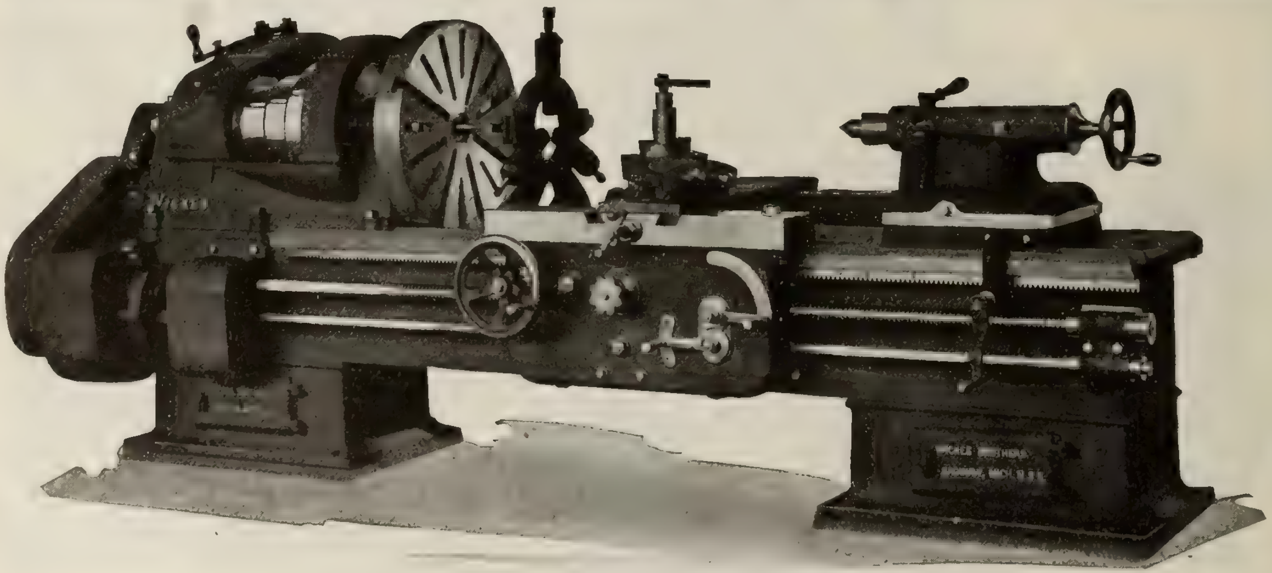
This lathe is equipped with turret tool-post and screw feed. It is made in two sizes. Small size, or 22" swing lathe will take 3.25 and 4.5 shells, and large size, or 26" swing will take shells from 6" to 10". These may be made with heavy turrets as ordered.

Prompt Delivery on Small Lathes.

Yeates Machinery

London, Ontario, Canada

Wickes Heavy Duty Engine Lathe



The Wickes 26" Heavy Duty Lathe.

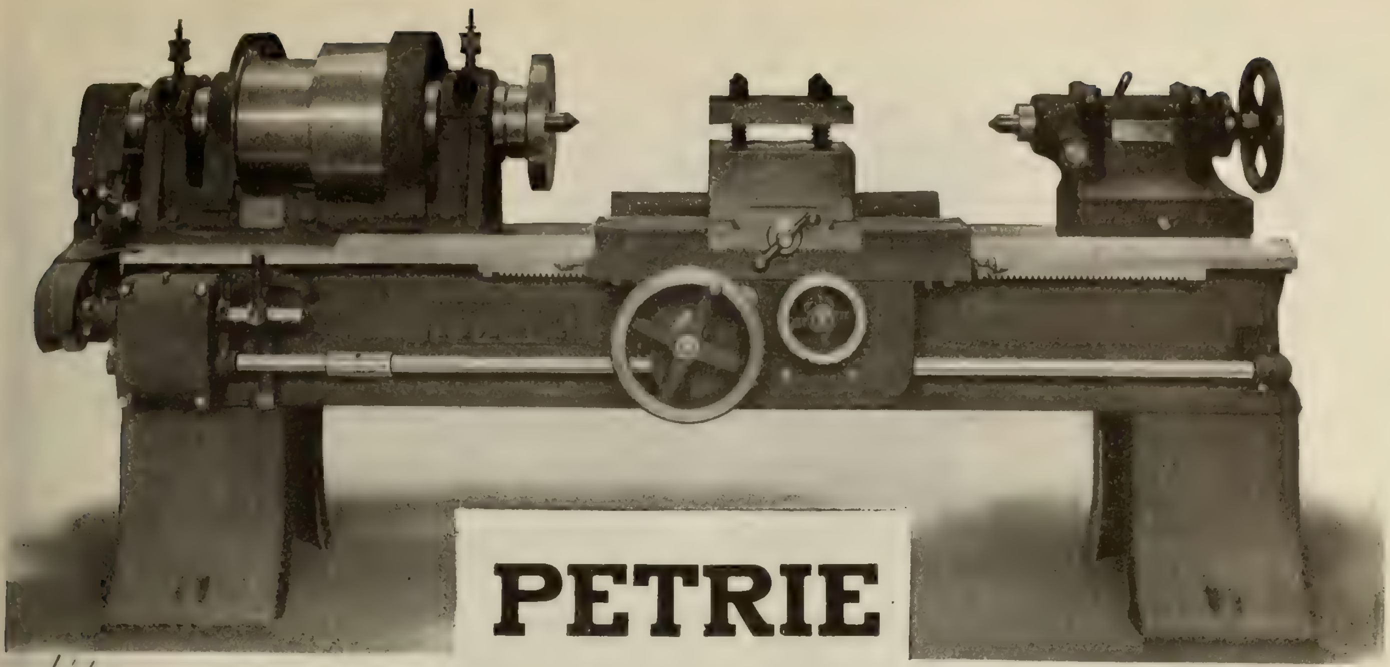
Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.

This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.

Let us tell you about this lathe and our 20", 32", also our 17" Rapid Production Lathe for Automobile and other work.

We can make prompt shipment.

WICKES BROTHERS **Saginaw, Michigan**



PETRIE

20-inch Heavy Duty Manufacturing Lathe

DESIGNED AND BUILT ESPECIALLY FOR MACHINING HIGH EXPLOSIVE AND SHRAPNEL SHELLS UP TO AND INCLUDING 8-INCH. USED AND ENDORSED BY SOME OF THE LARGEST AND MOST SUCCESSFUL SHELL MANUFACTURERS.

DESCRIPTION

HEADSTOCK All Headstock journals are provided with well lubricated, renewable bronze bearings.

Alternate heat treated steel and bronze washers take the end thrust and a simple adjustment is provided to take up wear.

All gears are covered with neat and substantial cast iron guards that may be quickly removed when desired.

BED The Bed is of deep construction and width to give the greatest rigidity under heavy cuts.

The sheats are made extremely massive and the bed walls extra thick, providing the necessary mass of metal to absorb the vibration and shocks incident to heavy turning at high speeds.

Heavy box girths tie the front and rear walls of the bed together at close intervals.

Improved type wide angle V on front shear to take thrust of cutting tool.

The rear bearing of carriage on bed is flat instead of V-shaped.

At the rear of the bed planed pads are provided for attaching Taper and Forming Attachments.

CARRIAGE The bridge is very wide and extraordinarily deep; it will not spring under the heaviest cuts.

The carriage is gibbed to the bed at the rear on the outside and will not lift under any conditions.

APRON The apron is of heavy double plate type affording a support or bearing to both ends of all shafts.

Apron is tongued and grooved to the carriage, also bolted and dowelled.

The feed friction has a greatly increased diameter and will pull the heaviest feeds and cuts without slipping.

For engaging the friction a hand wheel several inches in diameter is provided and seats the friction firmly with very small effort on the part of the operator.

All studs in apron revolve and simple but adequate oiling facilities are provided.

FEEDS Positive Gear drive through headstock spindle steel gears in gear box, three rates of feed are provided for through sliding key type. Feeds per revolution of spindle being ⅛ in., 1-16 in. and 1-32 in.

All gears in the feed train are fully guarded.

TAILSTOCK The tailstock is a massive casting, rigidly braced internally, and is provided with a long nose, making it unnecessary to extend the tailstock spindle for ordinary work.

It is clamped to the bed by four large locking bolts operated at the top of the barrel.

A simple binder locks the tailstock spindle in correct alignment, this clamp is located at the extreme front end where it grips the spindle with the utmost rigidity and absolutely does away with distortion of any kind.

The screw is unusually large to resist any buckling tendency.

Suitable screws are provided for setting over for Taper Work.

EQUIPMENT—Unless otherwise specified Lathes are furnished with 8 ft. bed, one driving plate, hand cross feed, heavy **duty plain rest, necessary wrenches, and two speed tight and loose countershaft.**

Forming attachment, turret tool post, hand or power feed bed turret, oil pan, pump, and connections can be furnished as extras when desired.

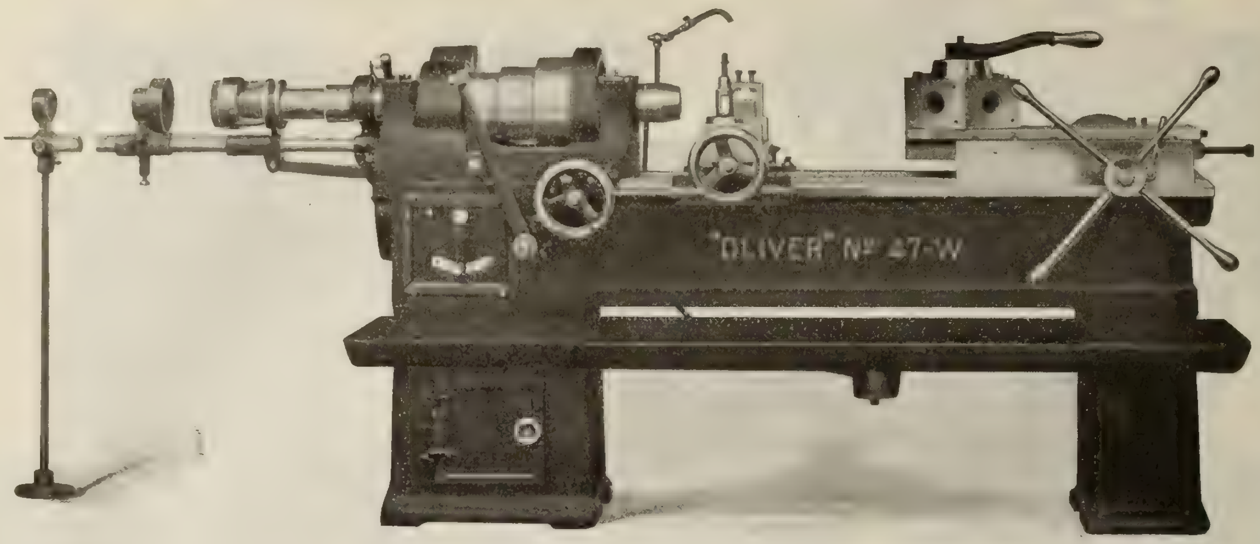
DIMENSIONS

Swing over bed	20 in.	Width of Tool Slide	12 in.
Swing over carriage	11 in.	Diameter of Headstock Cones	11 in. and 14 in.
Length of Bed Standard	8 ft.	Belt Width	6 in.
Distance between centres 8 ft. bed	40 in.	Number of Feed Changes	3
Width of bed overall	19½ in.	Feeds per Revolutions of spindle	⅛ in., 1-16 in., 1-32 in.
Height from floor to centres	40 in.	Speed of Countershaft	110 R.P.M.
Dimensions of front spindle bearing	4 15-16 in. x 6¾ in.	Size of Tight and Loose Pulleys	16 in. x 6¼ in.
Dimensions of rear spindle bearing	4 in. x 5½ in.	Ratio of Back Gearing	6.7 to 1
Diameter Nose of spindle	4 in.	Face of Back Gears	2¾ in. and 2¼ in.
Hole through spindle	1 5-16 in.	Length of Carriage Bearing	30 in.
Diameter Tailstock spindle	2⅜ in.	Width of Carriage Bridge	12 in.
Travel of Tailstock spindle	6 in.	Number of Spindle Speeds with Two-Speed Countershaft	8
Morse Taper- Centres	No. 5	Weight Approximately, 8 ft. Bed	5,200 lbs.

A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.



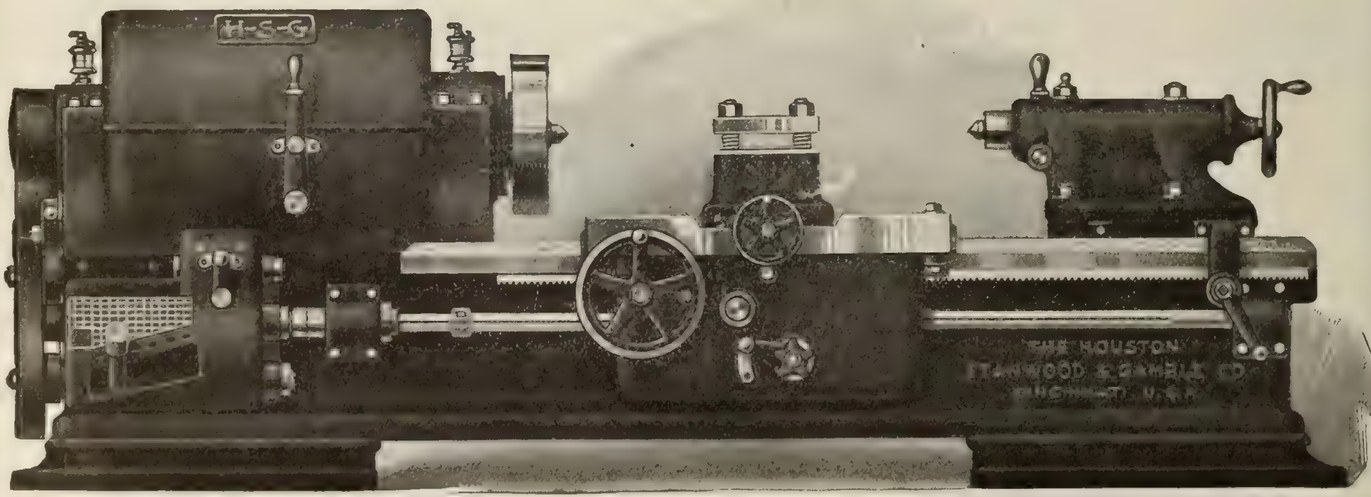
"OLIVER" NO. 47-W HEAVY DUTY SCREW MACHINE 2¼"—SWING 16".

A HEAVY TOOL FOR HEAVY WORK—A MODERN MACHINE—OLIVER QUALITY—

PROMPT DELIVERIES.

WRITE FOR FULL INFORMATION.

OLIVER MACHINERY COMPANY, Grand Rapids, Mich.



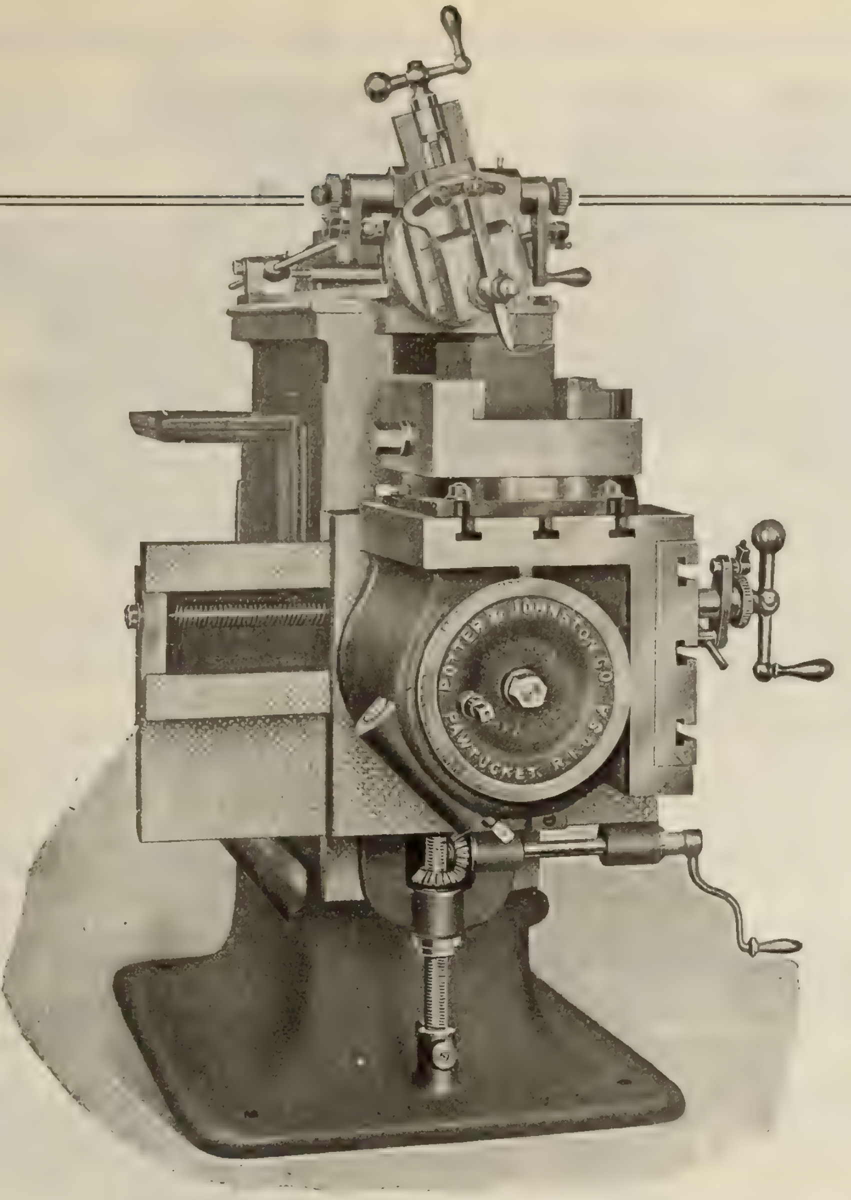
H-S-G TRADE MARK single-pulley, high-powered, all-geared engine lathe built in three sizes, 28", 30" and 36" swing.

This is a heavy duty lathe. For instance, the 30" swing lathe has 7" face drive pulley, 8" x 10" front spindle bearing and other parts of correspondingly liberal dimensions. The net weight with 13 ft. long bed is 18,500 pounds. The design and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

CINCINNATI, U.S.A.

Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto



Potter & Johnston 15-inch Universal Shaping Machine

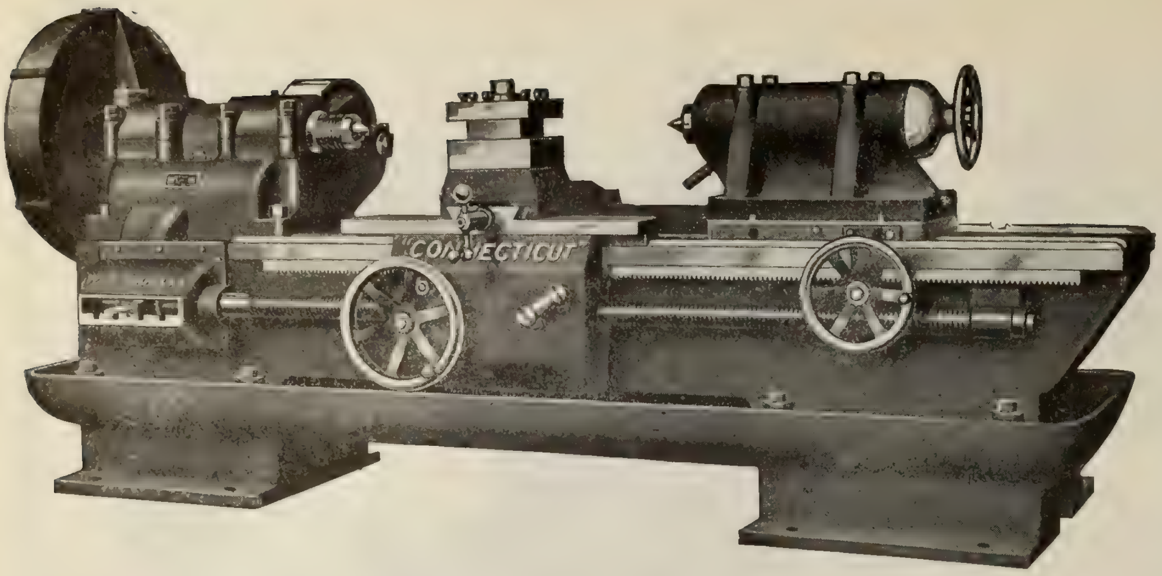
Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** **Pawtucket, R.I.**

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA



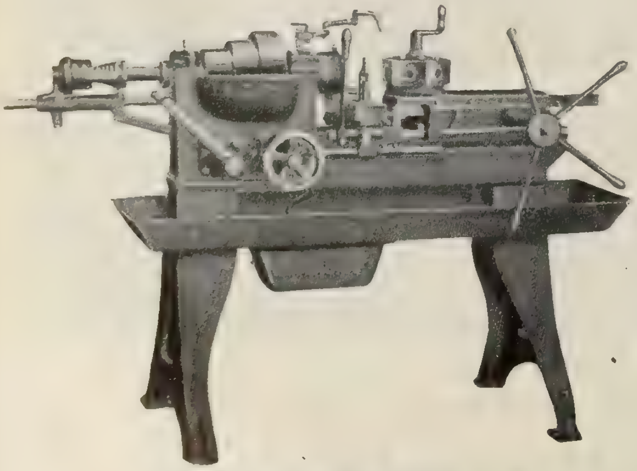
Connecticut High-Duty THE LATHE OF MAXIMUM PRODUCTION

BUILT for the purpose of doing one job at the highest speed. Adapted to unskilled labor yet of the greatest accuracy, rigidity and power. This means maximum production.

Full Details on Request

W. & B. DOUGLAS
MIDDLETOWN - CONN., U.S.A.

The "Steno"
1" x 7" TURRET HAND SCREW MACHINE



IMMEDIATE DELIVERY
Increased production enables us to offer a limited number of these exceptionally well built machines for immediate delivery.

THE STENOTYPE COMPANY
INDIANAPOLIS, INDIANA, U. S. A.

Makers of the "STENO" Duplex Surface Grinder and "STENO" Milling Cutters, Reamers, Fixtures, Jigs and Gauges.

Motor Driven Speed Lathe

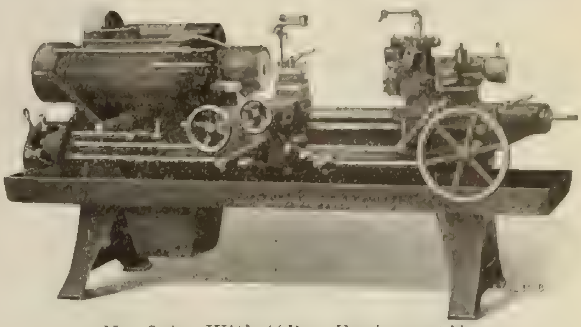
This style of motor drive employs a constant speed motor mounted on a plate having an extension arm to support a bearing for the outer end of the motor shaft. The motor plate is fitted to a slide on a shelf which is securely fastened to the back of the lathe bed. The motor plate is moved by means of a screw which tightens or loosens the belt. A four-step cone pulley on the motor shaft is belted to a four-step cone pulley on the spindle. This gives the same speed variation as when a countershaft is used, and by means of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is crossed-braced and all clamping levers are above the ways.

J. G. BLOUNT CO. - Everett, Mass., U.S.A.

Two Cuts at One Time

The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the



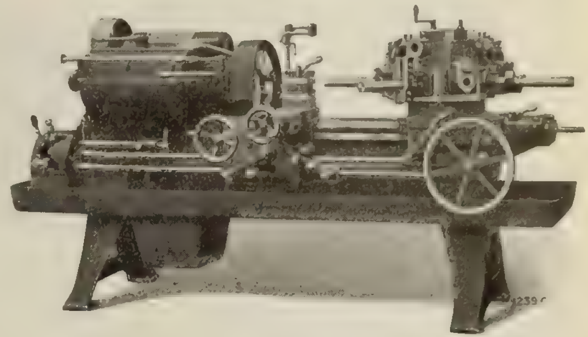
No. 2-A—With "Bar Equipment"

Universal Hollow-Hexagon Turret Lathes

Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



No. 2-A—With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal

---

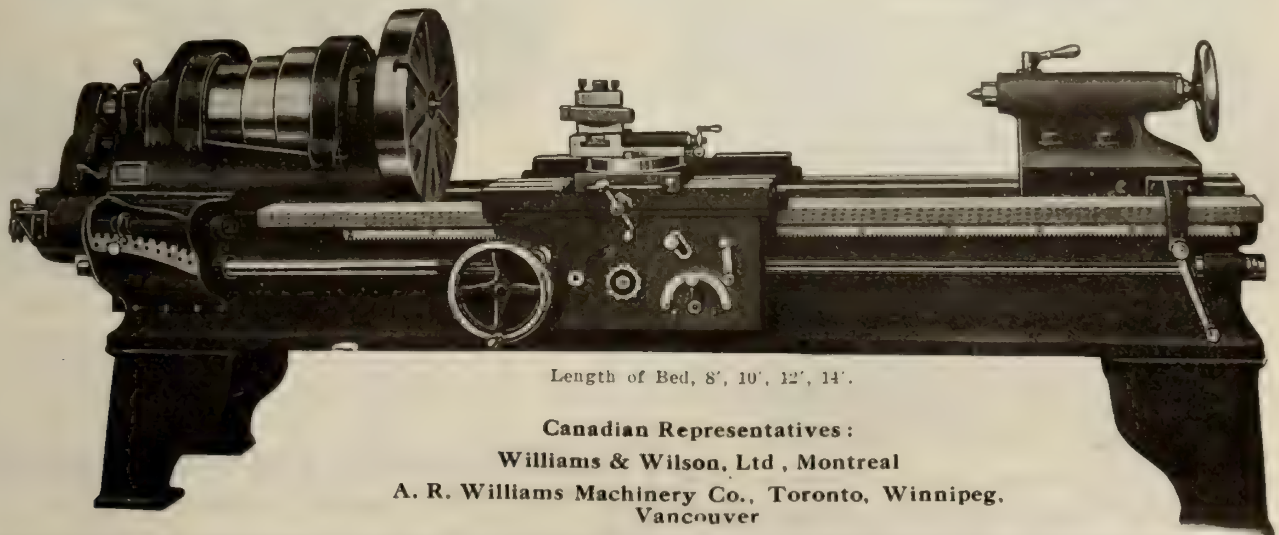
Davenport 22-Inch Lathe — For Extra Heavy Service

These lathes are built exceptionally rigid and heavy. No feature has been omitted, to secure great strength and power. The bed, the headstock, the tailstock, the carriage—every detail has been designed and constructed with a view to driving the heaviest cut that any tool will stand up against. At present we can make quick deliveries on this machine.

Built with ordinary change gears unless otherwise specified.

Write at once for Bulletin. It gives full details of construction.

DAVENPORT LOCOMOTIVE WORKS
DAVENPORT, IOWA



Length of Bed, 8', 10', 12', 14'.

Canadian Representatives:
Williams & Wilson, Ltd., Montreal
A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver

NOSING DIES

of

CHILLED CAST IRON

FOR

4.5", 5" and 6" H.E. Shells

We have one in use now that has nosed over 21,000 shells and is still doing business.

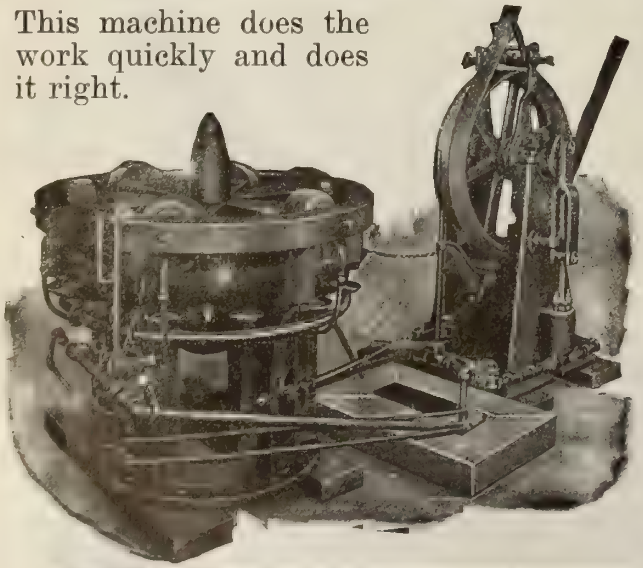
CHEAP AND EFFICIENT

Write or wire for particulars.

Marsh & Henthorn, Ltd.
Belleville, Ontario

Hydraulic Banding Machine
For compressing bands on shrapnel shells and other projectiles

This machine does the work quickly and does it right.



In writing for information or quotation please advise width and thickness of bands and diameter of shells to be handled.

Machines for our Canadian Customers are built in Hamilton, Ont.

We also manufacture machines for setting wagon and carriage tires, cold.

Please address all communications to our Rochester Office

THE WEST TIRE SETTER COMPANY
ROCHESTER, NEW YORK, U.S.A.

PRESSES FOR SHELLS

Hydraulic Presses for
NOSING, BANDING
and FORGING

Hydraulic Pumps and Accumulators.

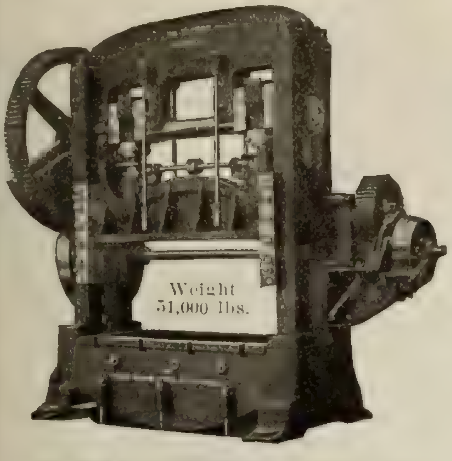
Hydraulic Presses for all purposes.

WRITE FOR FULL DETAILS NOW.

William R. Perrin, Limited
TORONTO, ONTARIO

"TOLEDO"

Greatly increased efficiency results when the construction of a press is specially adapted to meet particular requirements.



No. 95E for blanking and forming parts for auto hoods, drip pans, fenders and similar work

We have spent half a century developing "Toledo" Double Crank Presses until there is one adapted to every requirement of sheet metal and drop forging work.

Heavy, rigid construction reduces maintenance cost.

Perfection of design and improvement of details insure their answering every demand of the future as well as giving you ABSOLUTE CONTROL of present business.

The Toledo Machine & Tool Co.
Toledo, Ohio, U.S.A.

THE STANDARD
FOR 58 YEARS

The Bliss Straight Side Press with Cut-Back Frame. Built in a large number of sizes.

BLISS

Power Presses

When you buy a press, keep this one fact in mind; you are buying for now and for the future.

Machinery is the last thing on which to try to save money.

No press can be too good, too strong, or too serviceable for you.

BUY BLISS PRESSES

and make an investment that will pay dividends in money saved on power consumption, repairs, and by increased efficiency.

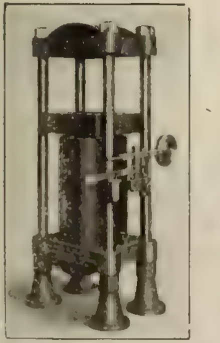
Bliss Presses assure you absolutely steady, reliable service.

We build a "Bliss" for every sheet metal working requirement.

Let us know your needs.

WRITE US AT ONCE
Talk to Us About Presses for Any and Every Purpose

E. W. Bliss Co., 20 Adams Street
Brooklyn, N.Y., U.S.A.
Chicago Office: 622 West Washington Boulevard
Detroit Office: Dime Bank Building



Elmes Hydraulic Press No. 676
With ¾-in. Automatic Lever Operating Valve No. 677-A

This press is of steel and semi-steel construction, and the stands which support the press are threaded at the ends to receive the steel columns and have holes for fastening to the floor. The platen is guided by the columns.

The operating valve is attached to the cylinder, and is designed with a weight to be set for the pressure desired, and releases automatically. To start the ram up, the lever is pushed down; upon the ram reaching the desired pressure, the lever automatically releases (acting as a safety valve as well), causing the ram to descend. Valve body is made of bronze, and other parts are made of tool steel and machine steel. If desired a hydraulic gauge can be attached to show the various pressures, although with this valve it is not necessary.

Write for our Hydraulic Machinery Catalogue.

Charles F. Elmes Engineering Works 217 N. Morgan St.
Chicago, U.S.A.

Over 50 years' experience building hydraulic machinery.

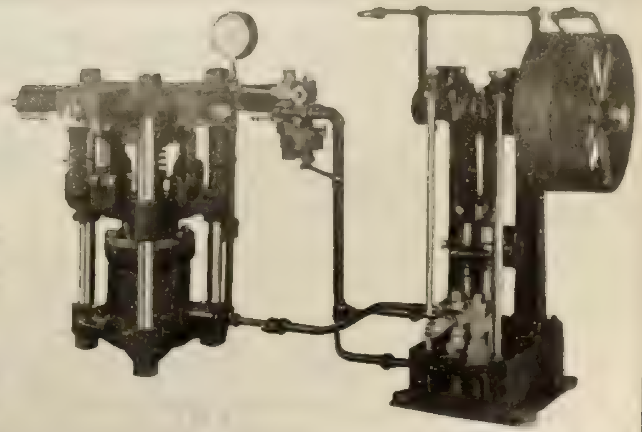
A very rapid worker—

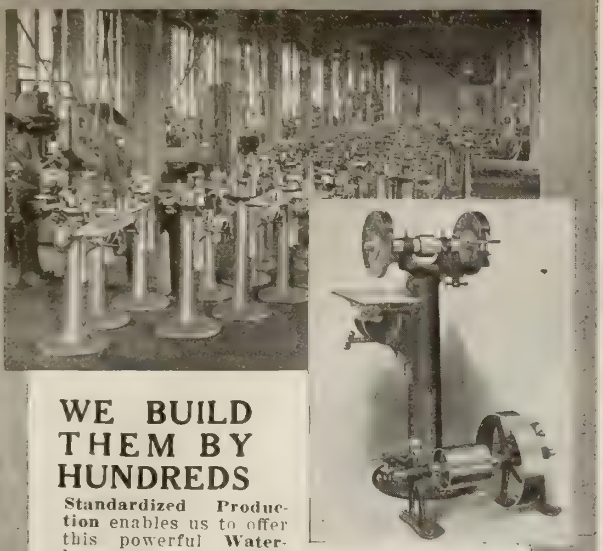
In fact the operation of this press is so rapid that it is impossible for human operators to handle the work to and from as quickly as it completes its operations. It is impossible to utilize its full capacity.

"Metalwood" Horizontal Banding Press for Shells from 3 to 5 in.

Press is combination of Hydraulic and toggle with means of adjustment both for amount of pressure applied and stroke. Has six concentric dies coming to a common centre forming a complete circle when closed to required diameter of band.
All working parts are fully enclosed, at the same time easily accessible for changing of dies. Toggles are arranged with adjustment so that pressure delivered on dies can be varied to suit the pressure or pressures applied on hydraulic cylinder. 2,500 lb. approximate pressure required, developing 120 tons on 9" ram.

Metalwood Manufacturing Co.
Leib and Wight Sts., DETROIT, MICH.





WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only

$60

Complete

The Blake & Johnson Co., Waterbury, Conn.

For Rapid Production and Accurate Work

USE THE

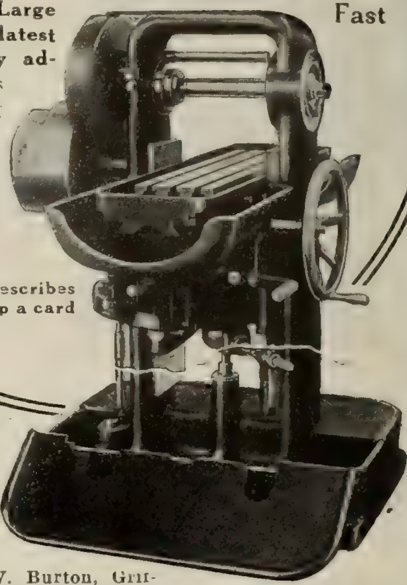
"BRIGGS"

The Briggs Miller handles work no other machine of its size can touch. It is a manufacturing machine. On account of its rigid construction it will produce accurate work when running at a high rate of speed and feed.

The Base Tank and Large Gear Pump is the latest addition to its many advantages. Tank holds 20 gallons of cutting lubricant.

Pump never requires priming and will deliver ten gallons per minute to the cutters, keeping them cool when run at very high speed.

Our booklet describes fully. Drop a card for it.



Gooley & Edlund Inc.
Cortland, N.Y., U.S.A

Foreign Agents: Allied Machinery Company of America, France, Belgium, Italy, Switzerland, Russia, Scandinavia, C. W. Burton, Griffiths & Co., London, Manchester and Glasgow, Barandiaran, Metivier, Gazeau & Cia, San Sebastian, Spain.

The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN.

"CRAWFORD SECTIONAL" OVENS

Heated with our Enclosed Flame Gas Burners, or Electricity

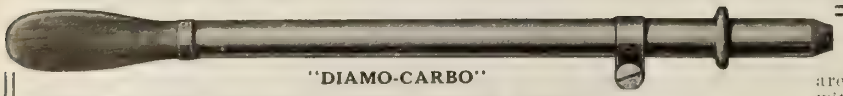
FOR BAKING JAPANS AND OTHER FINISHES ON METAL.

Ovens carried in stock and built to meet requirements of manufacturers.

Builders of All-Steel Oven Trucks with Roller Bearings.

Canadian Representatives: The A. R. WILLIAMS MACHINERY COMPANY, Ltd.

ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER



"DIAMO-CARBO"

You can make your dull or coated grinding wheels like new in efficiency by dressing them with

DESMOND-STEPHAN GRINDING WHEEL DRESSERS

and you will eliminate delayed production and lost time, due to the loss of their cutting properties.

Insist upon having your dealer supply you with one of our tools for trial. If he cannot, write us, and we will send any of them on approval.

The Canadian Desmond-Stephan Mfg. Company
HAMILTON, ONTARIO

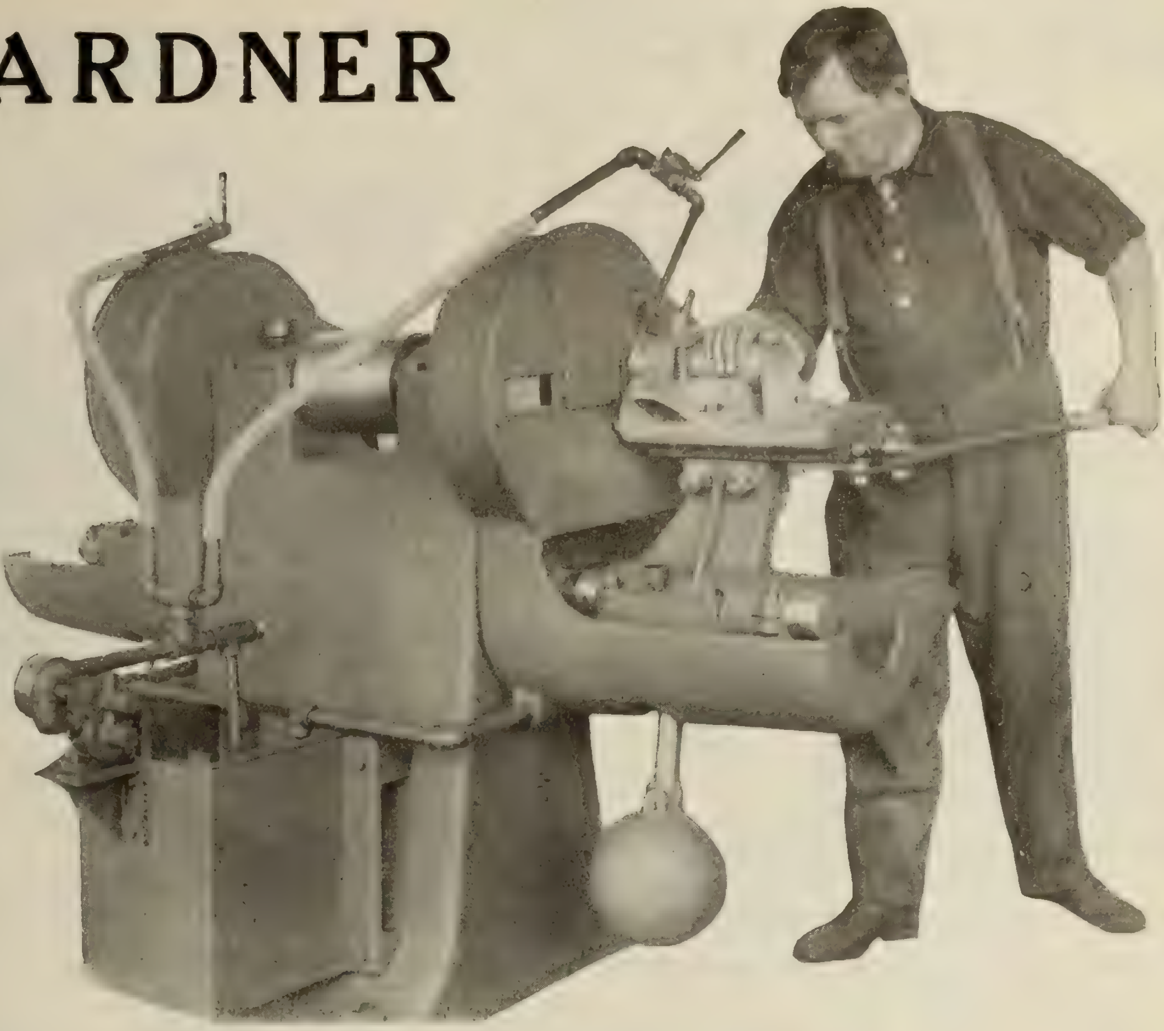
Our **"Diamo-Carbo"** Dressers are the economical substitute for the Black Diamond Dressers. They are so low-priced that each grinding stand may be provided with its own dresser.

Our **"Sherman-Huntington"** Dressers are for use on large and coarse wheels upon which the Diamond cannot be used. It is the most satisfactory Dresser ever designed.

"SHERMAN-HUNTINGTON"

Alfred Herbert, Ltd., Coventry, Agents for Great Britain.

GARDNER GRINDERS



For Grinding Ends of Shells

We have developed a Special Grinding Machine for removing the hub or centre projection from the ends of shells. This grinder is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates.
We build as well a much heavier and more Powerful Grinder to be used for these same operations on 6″ Shells.

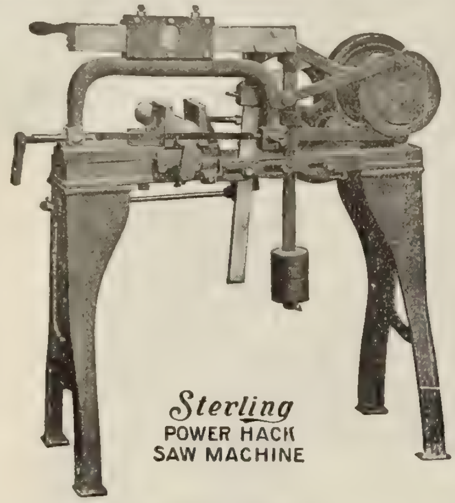
FEATURES

- **High-Grade Babbitt Bearings and Lever Feed.**
- **Rapid clamping of Shell into "V" fixture.**
- **Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.**
- **Can be equipped and operated at both ends for double output.**
- **Output, according to size of projection to be removed, from 40 to 100 per hour.**
- **Equipment includes two 16″ Perfection chucks, two 16″ abrasive ring wheels, two semi-universal lever feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments.**
- **Weight, 4,500 lbs.**

For further particulars write

The Gardner Machine Company, Beloit, Wis., U.S.A.

"STERLING"
HACK SAWS



MANUFACTURED BY
DIAMOND SAW & STAMPING WORKS
BUFFALO, N.Y., U.S.A

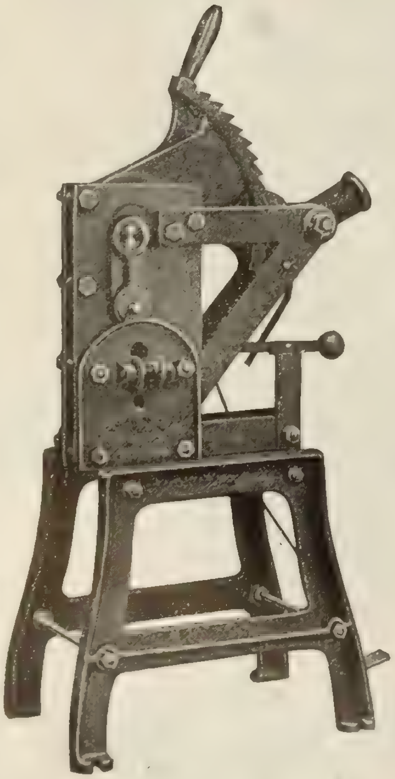
ACCURACY

Just now you may be ordering in smaller quantities, but you want quick deliveries and full value — every Screw and Nut a good one. We can supply your demands by shipping **"GALT"** products from stock — the quality is assured.

Specialists in Cap and Set Screws.

THE
GALT MACHINE SCREW CO., LIMITED
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company, Limited, 49 Common St., Montreal, Que.



Contractors Bar Cutter No. 10

Armor Plate Construction

Equal to a cast-iron machine of twice the strength.

Cuts round, twisted and Johnson bars up to 1⅛ inches for reinforced concrete work.

We make a complete line of hand and power punches and shears, portable and stationary forges and drills.

Send for new Punch and Shear Catalog.

Canadian Blower & Forge Co., Ltd.
KITCHENER, ONTARIO

St. John Montreal Toronto Winnipeg Vancouver

Shell-Steel Cutting Time
on the PEERLESS High Speed Heavy Duty Metal Cutting Saw

Owing to the toughness of this material it was selected for cutting time, and under extreme feed the actual time on cutting 5 in. round is 7¼ min. Regular stock blade was used, 12 x ¾, 18 gauge, 10 pitch.

A machine that will stand up for such heavy duty work must be properly designed and rigidly constructed, and to stand the wear and tear the right grade of material and workmanship must be embodied, and that is just what you will find in the PEERLESS High Speed.

As a real time saver in operating and adjusting, it is in a class by itself. For an example, more than six cuts per minute can easily be made on a ½ in. round cold rolled steel bar. This covers the time in starting and stopping on each cut. The PEERLESS not only saves time, but also increases the production.

Again we say, the actual time saved in operating and adjusting the PEERLESS High Speed is a big item that is well worth investigating.

Again we suggest, before considering any other cutting-off equipment, write us for a complete description.

PEERLESS MACHINE COMPANY
1607 Racine Street RACINE, WISCONSIN

MORE SPEED LESS BLADES

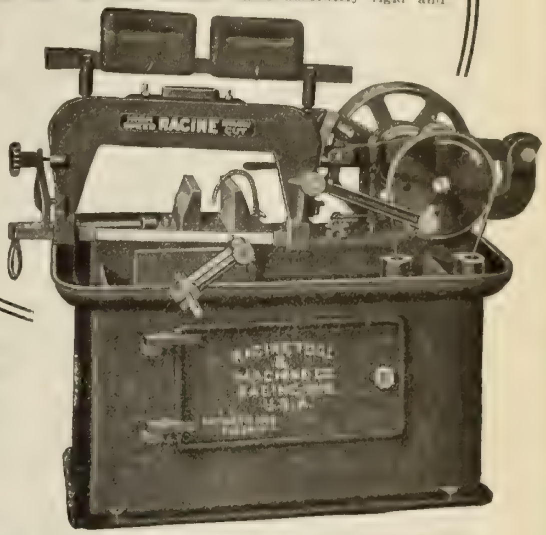
One Canadian Steel Company uses 120

RACINE METAL CUTTERS

and has saved $11,019.50. Particulars on request.

These machines are popular everywhere because they work fast and are easy on the blades—because springing is absolutely prevented by the mechanically correct design and construction.

The heavy, rigid saw frame guide of the Racine is made of the best grade of semi-steel and will hold the saw frame absolutely rigid and work at all times, insuring a straight cut with the least possible waste of material.



There are other Racine features well worth investigation — the **Positive Automatic Lifting Device, the Combination Vise, the Cooling System, etc.** May we tell you about them and about our unusual trial offer?

RACINE TOOL & MACHINE COMPANY
15 Melbourne Avenue, Racine Wis., U.S.A.

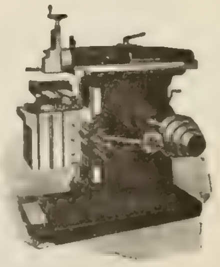
Don't Crowd Your Large Machines

You cannot manufacture small parts economically on a large machine. Steptoe Small Power Feed Millers and Hand Millers are especially adapted for that kind of work, a stiff, heavy tool that can be quickly handled and crowded to the limit. That is the machine to buy for small parts.

If your Planers are crowded take the small jobs and put them on a Steptoe Shaper and you will do them quicker and you will have less money invested in equipment.

STEPTOE SHAPERS "Just a Little Better."

CIRCULAR ON REQUEST.



John Steptoe Co., CUMMINSVILLE
CINCINNATI, OHIO, U.S.A.

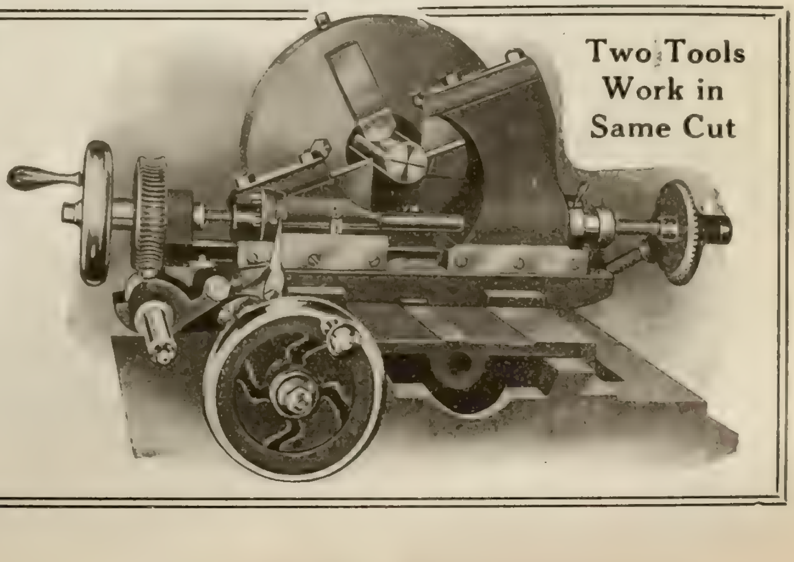
Double-Quick Cutting-Off

THE HURLBUT-ROGERS CUTTING-OFF AND CENTERING MACHINE has the advantage of two cutting tools.

Each tool is rigidly supported in a stationary block at an angle which permits a strong shearing cut.

WITH THIS MACHINE PRODUCTION CAN BE NEARLY DOUBLED, and the utmost accuracy maintained under the hardest of work.

Read full details. Write for catalogue.



Two Tools Work in Same Cut

Hurlbut-Rogers Machinery Company
South Sudbury, Mass., U. S. A.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow, Newcastle-on-Tyne. H. W. Petrie, Toronto, Canada.

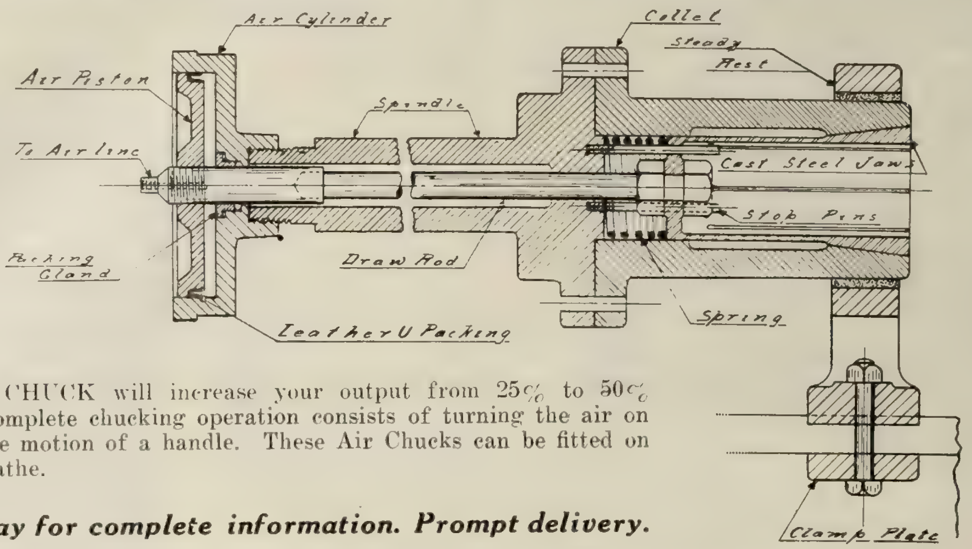
Get Out Your Watch and Time Your Chucking

With most screw chucks you have to use brute force or the hammer to tighten, and even then your shell is not always rigid.

H.E.W. AIR COLLET CHUCK IS RIGID

Saves Time

Saves Money



H.E.W. AIR CHUCK will increase your output from 25% to 50% because the complete chucking operation consists of turning the air on and off, by the motion of a handle. These Air Chucks can be fitted on almost any Lathe.

Write to-day for complete information. Prompt delivery.

HYDE ENGINEERING WORKS

P.O. BOX 1164 **27 William St., MONTREAL**

More Production — Greater Accuracy — Less Globe Breakage — Happier Men

That sums up the argument on this lamp bracket. Three frictional universal joints that can't wear out and are adjustable for any desired tension give the reason.

Just a slight push or pull puts the light where you want it, when you want it.

Any workman will do more and better work if his light is always in just the right place and under instant control.

The Searchlight Bracket

will pay for itself many times over in one season. The period of short days is approaching. Many shops are working night and day the whole year through. The cost is trifling compared with results. Only $1.50 each, with big discount, according to quantity.

Write now for samples and let us show you how your whole factory could be equipped at a big saving to you. Any quantity sent on 30 days' trial to any responsible concern. You can't possibly lose, and **You Might Win!**

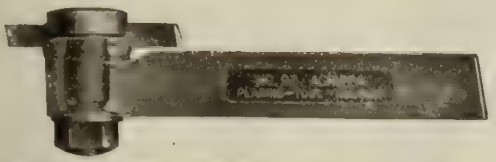
The McCrosky Reamer Company

Meadville, Pa., U.S.A.

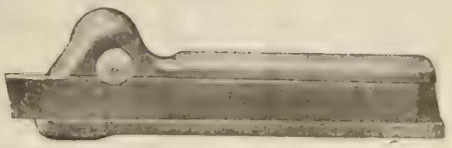
Export Agent;
Benjamin Whittaker, 21 State St., New York

Williams' "AGRIPPA" Tool Holders

"THE HOLDERS THAT HOLD"

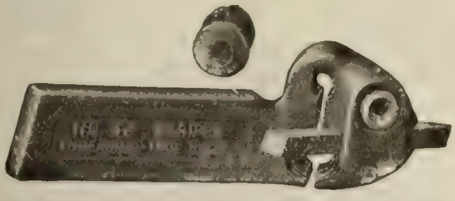


The Planing Tool with thirty-six angles of adjustment may be used on shapers or for heavy turning on lathes.



A tool that performs both cutting off and side work by the mere substitution of suitable cutters tells its own story of economy

Their P.P.I.E. Grand Prize was only an incident. The satisfaction they are giving is what counts.



The Threading Tool with lockable spring head will do roughing, finishing and threading at one setting in the tool post.

NO. 81 AGRIPPA
BORING-TOOL HOLDER

The Boring Tool takes any size or shape of bar and requires no bushings. Its sleeve bar permits either straight or angular adjustment of cutter.

Western Office and Warehouse
40 So. Clinton Street,
Chicago, Ill.

J. H. WILLIAMS & CO.
45 RICHARDS STREET BROOKLYN, N.Y. CITY
THE WRENCH PEOPLE

Secure "Agrippas" from your dealer with the assurance that WE guarantee them.

MURCHEY TAPS AND DIES

Very extensively used on 6-inch, 8-inch and 9.2-inch shells

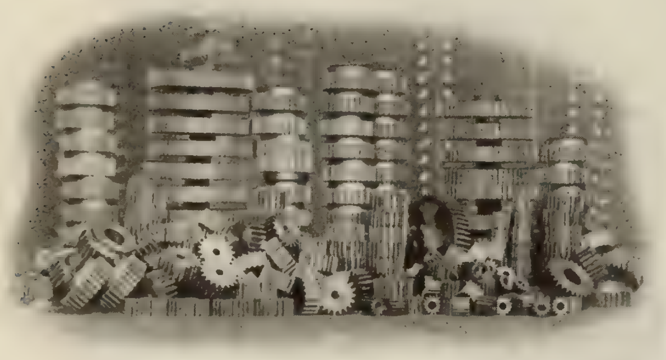
MAKERS ARE finding that Murchey Collapsing Taps and Automatic Self-Opening Dies are paying propositions on this kind of work. We can tap any size hole from 1 inch to 12 inches. All chasers used on shell work absolutely guaranteed to be made of the highest grade of high-speed steel. Get the benefit of our experience and the experience of some of the biggest shell manufacturers in the country. Let us tell you about the savings. Send blueprints. Write to-day for catalog.

Murchey Machine & Tool Company
DETROIT 75 PORTER STREET MICHIGAN

The Coats Machine Tool Company, Caxton House, Westminster, London, S.W., England, Glasgow, Newcastle-on Tyne, and Fenwick, Freres & Company, 15 Rue Fenelon, Paris, France.

CUT GEARS

CUT GEARS



QUANTITY PRODUCTION OR SINGLE GEARS WILL RECEIVE THE BEST OF ATTENTION

Write us for quotations

Hamilton Gear & Machine Co.

COR. CONCORD & VAN HORNE

TORONTO

The CLIPPER Belt Lacer

Makes Belt Lacing easy, quick and durable.

Can be carried to the broken or stretched belt, set on the floor or a box and the lacing done in **THREE MINUTES** without removing belt from shaft.

Laces any width or thickness. Each hook will stand a pulling strain of 60 lbs., equal to 400 lbs. per inch belt.

Over 33,000 now in use.

THE CLIPPER GOES TO YOU FOR A FREE TRIAL MERELY FOR THE ASKING.

For sale by all leading supply houses in Canada.

Clipper Belt Lacer Co.

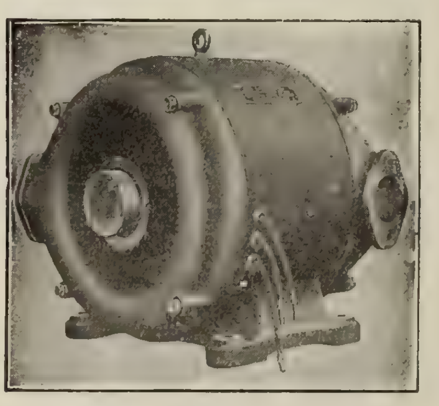
1 Front Ave., Grand Rapids, Mich.

The Lancashire Dynamo & Motor Company, of Canada, Limited

107-109 Duke Street, TORONTO

ELECTRICAL MACHINERY for all Purposes.

ELLIOTT BROS'. { INSTRUMENTS
RECORDING GAUGES



PIPE VENTILATED A C MOTOR

FOR VERY DIRTY PLACES

BOWSER

Oil Filtering and Circulating Systems

and

Unit Oil Filtering Outfits

The Standard of Quality, Efficiency and Service for Power Plants with Steam Engines, Gas Engines, Diesel Engines, Steam Turbines, Air and Ammonia Compressors.

Adaptable to heavy bearings and special machinery.

A system for every requirement.

S. F. Bowser & Company, Inc.
Toronto, Ontario
Engineers and Manufacturers of Oil Storage Systems
Offices in All Centres—Representatives Everywhere

BOWSER

ONE MAN can do as much trucking with this

ELEVATING TRUCK

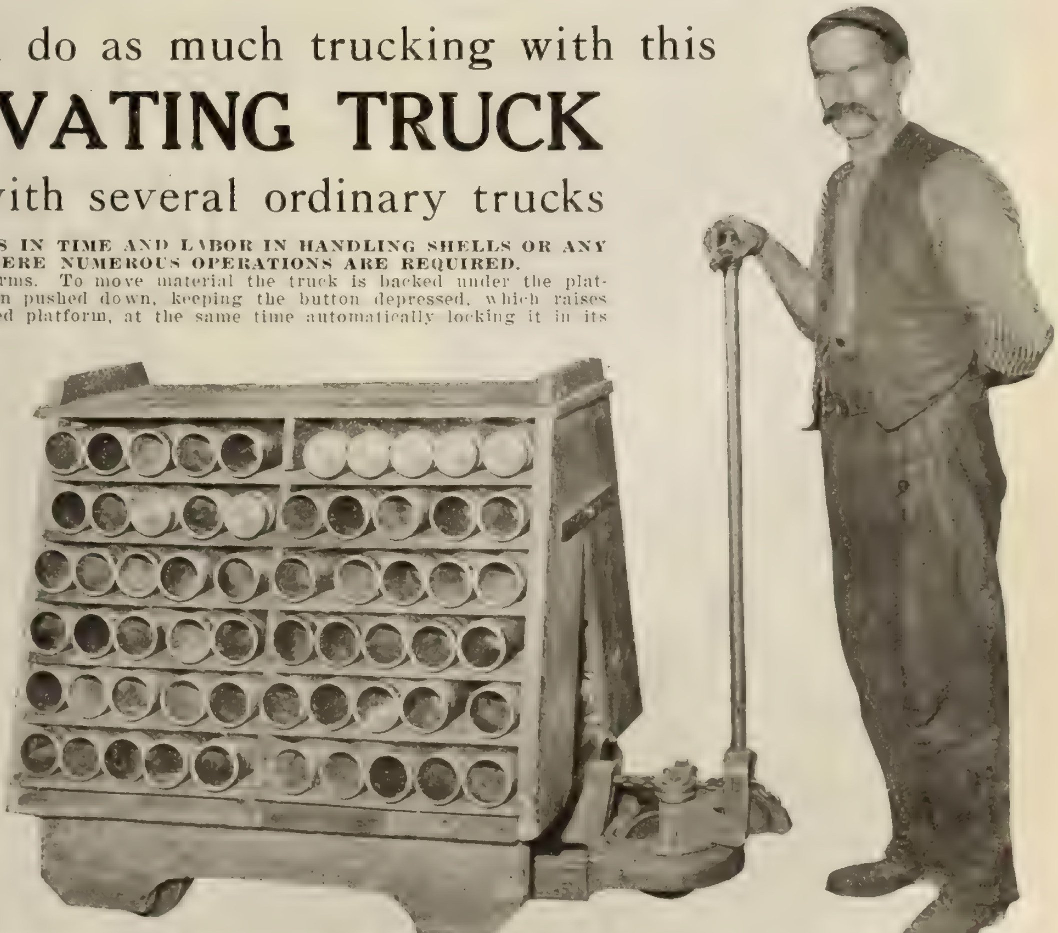
as several men with several ordinary trucks

IT EFFECTS ENORMOUS SAVINGS IN TIME AND LABOR IN HANDLING SHELLS OR ANY OTHER FACTORY PRODUCT WHERE NUMEROUS OPERATIONS ARE REQUIRED.
All material is stacked on the platforms. To move material the truck is backed under the platform; the handle of the truck is then pushed down, keeping the button depressed, which raises the truck bed and with it the loaded platform, at the same time automatically locking it in its raised position. When hauled to the desired position the button is pressed and the handle is raised, lowering the platform to the floor. The truck is then drawn from underneath and is ready to move another platform. **Raising and lowering of the Truck can be operated with one hand only.**

can be raised or lowered at any angle.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises and Presses, with attachments for pressing in** band—fixtures especially adapted for the manufacture of 18-pr. Shrapnel Shells.

We shall be pleased to submit prices and give any particulars required.



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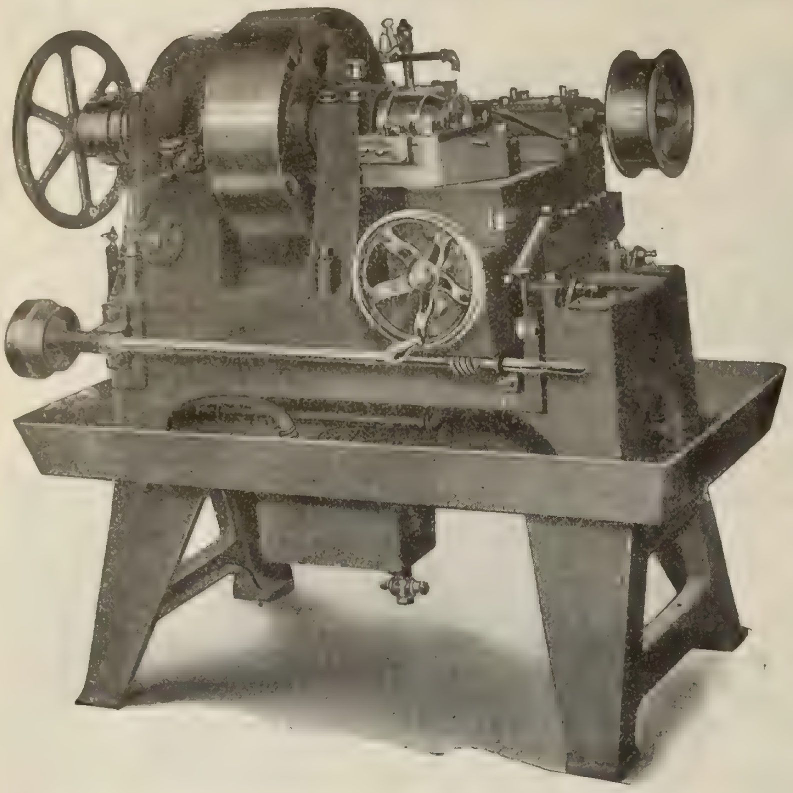

For Turning, Facing and Milling the thread on Gas Check Plugs for 6-inch High Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells. Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield

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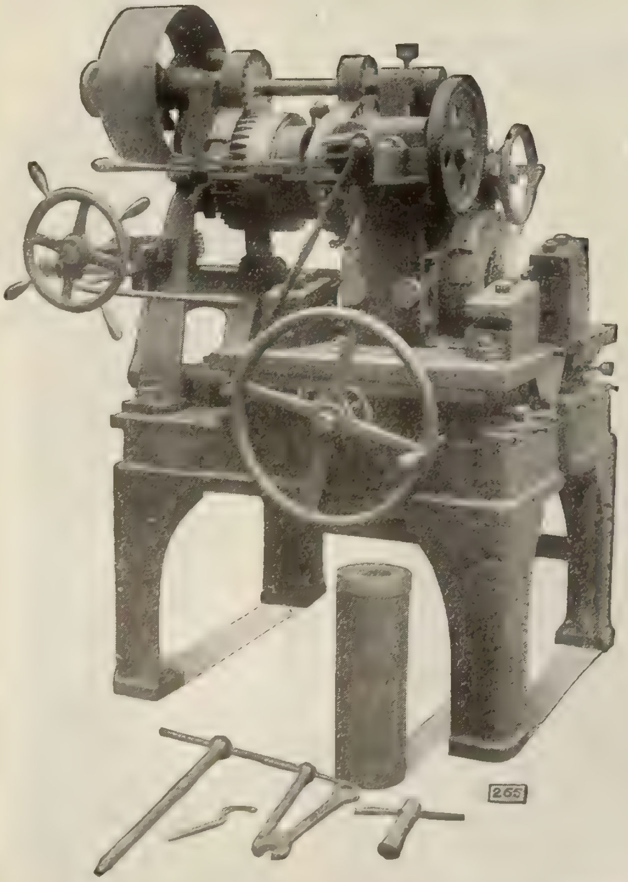

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Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

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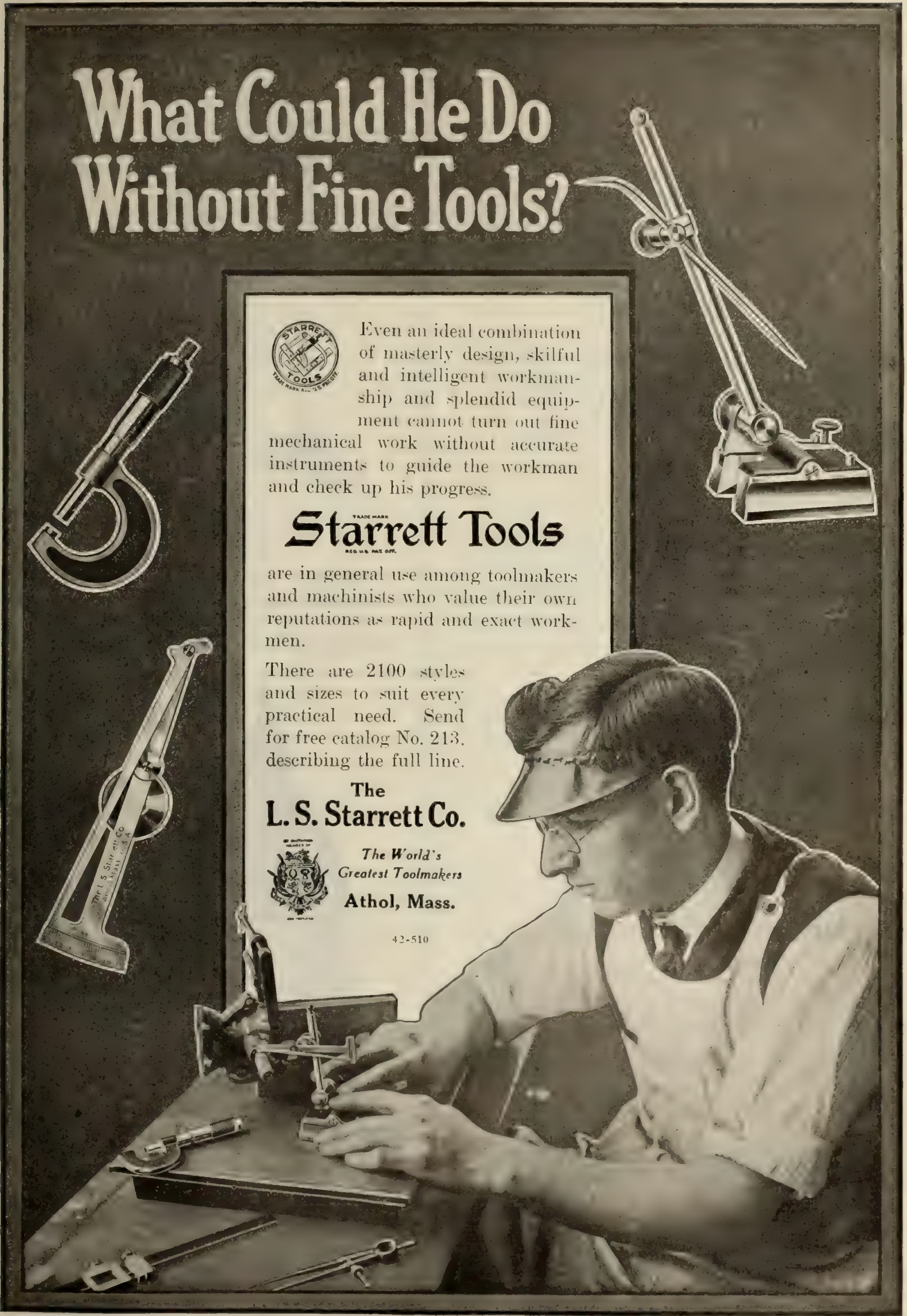

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They are nicely balanced.

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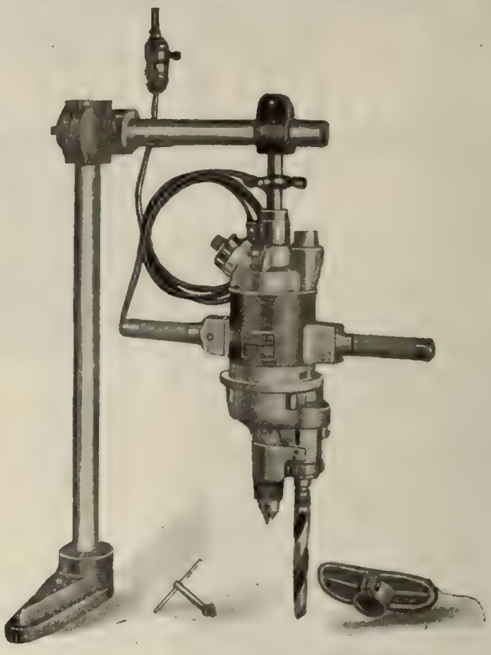

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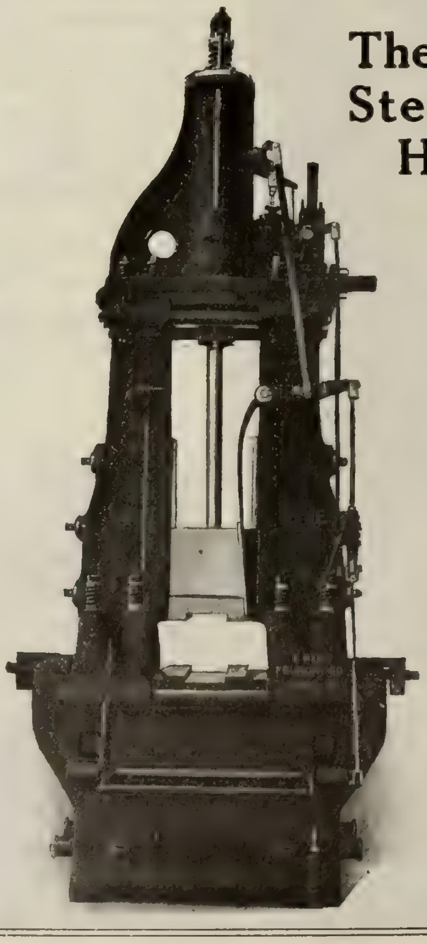

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A list will be supplied upon request.

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Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

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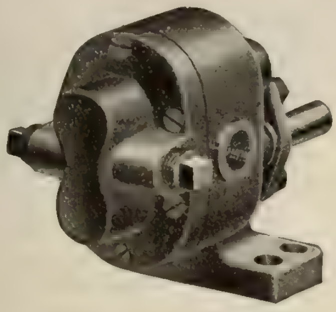

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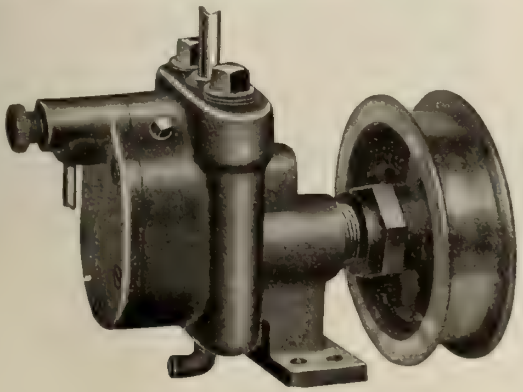
PERFECT SERVICE

THE Roper Types include the simple one-way pump, the economical Type 2, one-way pump with integral relief valve and by-pass, and the self-priming, low-cost reversing pump. The choice depends on the buyer and to some extent on the requirements of the service desired.

Roper pumps are made in five sizes, suitable for use on any machine. Their action is the acme of simplicity, consisting of two accurately cut steel gears, running in a tight chamber. They cannot get out of order.

Type 1. One Way, is for use on machines in which the cutting tools operate constantly in one direction. **Type 2. One Way** is for use where delivery is cut off or varied. **Type 1. Reversing** are self-reversing and self-priming.



Type 1. Reversing

Our pumps cost less to buy and less to instal since they eliminate the usual separate relief vaive and piping.

Send for fuller details.

C. F. ROPER & CO.
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To the Shell Manufacturer:

Use

Economic Shell Washer

If you wish to wash your shells quickly and cheaply; it will remove all grease, oil, lead, etc., and makes the shells easy to lacquer.

Made in Canada by

Canadian Economic Lubricant Company, Limited, Montreal

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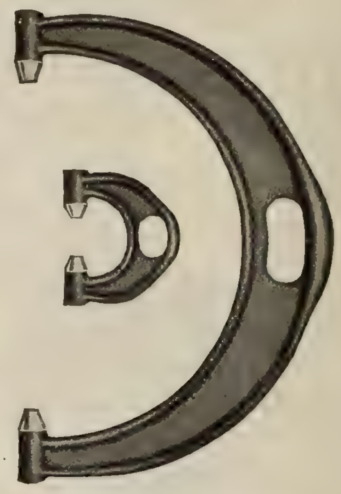
A snap gauge for calipering all outside diameters, with absolute accuracy.

Can be furnished suitable for waving, grooving, rough or finish turning—all sizes of shells, from 9.2" down.

Note the improvement on this gauge for holding.

In ordering, specify diameter and part to be calipered.

Immediate shipment can be made from stock.



Note the hole for handling when using.

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The Foundry & Machine Co., Limited
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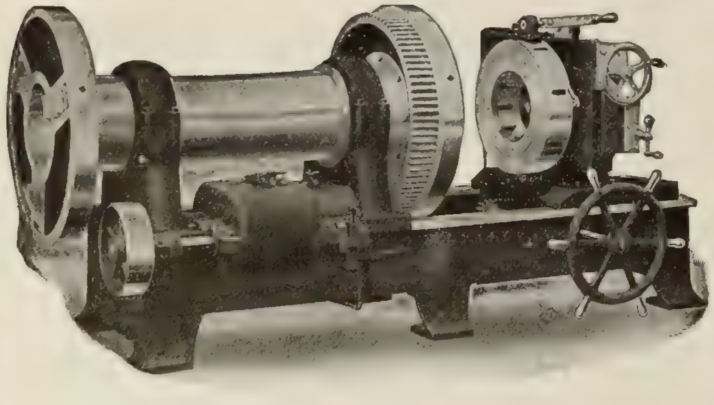

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It will "stand up" under the most strenuous service—it's made that way. It will give a long and useful life—it's made that way too.

It is being used all over the country in businesses of widely differing character, and making good in all of them.

The rate of depreciation is low—due to its substantial make-up. Our years of manufacturing experience has been centred on pipe machines, and we claim to know something about the use and the abuse a pipe machine receives, and build accordingly.

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Threading Machines

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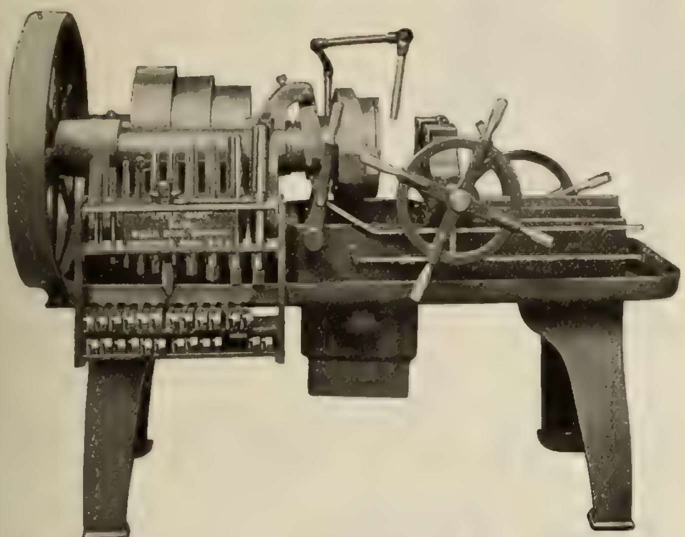

threading machines are free from time-consuming complications. Any shop employee can set them up in a few minutes. They are very easily operated. Any length of thread can be cut with the power machines, as they are fitted with hollow spindles.

The Little Giant line includes a complete range from the power machines with Automatic Opening Die Heads to the small bench machines with Solid Die Heads.

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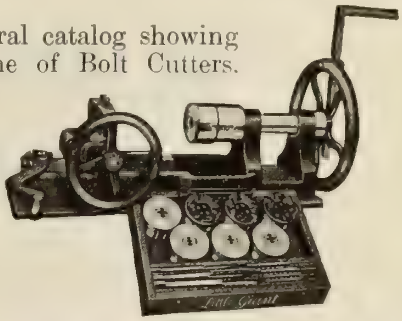

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Grinding Tapered Bodies of Connecting Rods

One of the largest gas engine and pump manufacturers in the middle west grinds tapered bodies of connecting rods to get good finish on these parts. It is putting in extra work not necessary for accuracy, therefore big production is required.

The photograph shows the machine grinding one of these rods, the tapered body of which is 30 inches long. The shaft is a drop forging, the finished small diameter is 1⅝ in., and the large diameter 1⅞ in. From 0.020 in. to 0.030 in. is removed—enough to clean up all lathe tool marks—the rod coming to the grinding machine after a roughing lathe cut only has been taken.

The wheel used is a Norton Alundum, 24 x 2 x 5 in., grain 24, grade M, running at a periphery velocity of 6,000 ft. per minute.

Canadian Agents
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40,000 Oneida Steel Split Pulleys in One Order

This Judgment a Guide for Pulley Users

A single order from one house—placed by the Remington Arms-Union Metallic Cartridge Company.

Oneida Steel Split Pulleys were selected because of absolute reliability, efficiency in transmitting the most power with the least waste through bearing friction loss (and hence economy.)

Because Remington had large contracts to fill (as well as place) and because it was extremely urgent that nothing in plant equipment be allowed to interrupt intense production, all proposed equipment was obvously very thoroughly studied, tested and tried, before specified. With a big order like this, it was exceedingly important to be sure of securing that which would prove the most efficient and the most economical in operation.

What does this mean to YOU?

Efficient transmission of power and economy in power-costs mean as much to you in your plant, as they do to Remington.

When you order Oneida Steel Pulleys, your orders are not only filled promptly, but you also know you are getting the most that money can buy in transmission equipment.

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The Manufacture of Russian 3 in. High Explosive Shells

Staff Article

In the methods described herewith, simplification of operations has been carried to the logical extreme, accompanied by a generous disregard for close limits where these are not necessitated by later operations; strict accuracy in the fundamental portions of the work, however, is closely maintained—these two features combining to produce successful results.

SOME time ago, considerable interest was aroused in munitions circles by the action of several firms in this country in declining the manufacture of Russian high explosive shells. The principle obstacle was stated to be the tapered bore called for in this design of shell, and in view of the probable difficulties which would be encountered in performing such an operation, the practical certainty of reduced output, and the opportunity for over-anxious inspectors to split hairs, the disposition of most makers to decline contracts was not altogether unnatural.

Fortunately for all concerned, the matter was finally settled by adopting a parallel bore and the production of shells for our "Ally of the Steppes" is now being accomplished in a manner which is at once creditable to our manufacturers and gratifying to our friends. Many of our readers are thoroughly familiar with the manufacture of the British 3-in. H. E. shell, and although the output of that particular shell has practically ceased, interest in the production of the corresponding Russian shell will be none the less keen on that account.

Principal Features

The factory in which this work is being done has been engaged in producing these shells for several months, and it is to the credit of the staff that while the methods as a whole have reached a high degree of perfection, opportunities for further improvement are at present being turned to account.

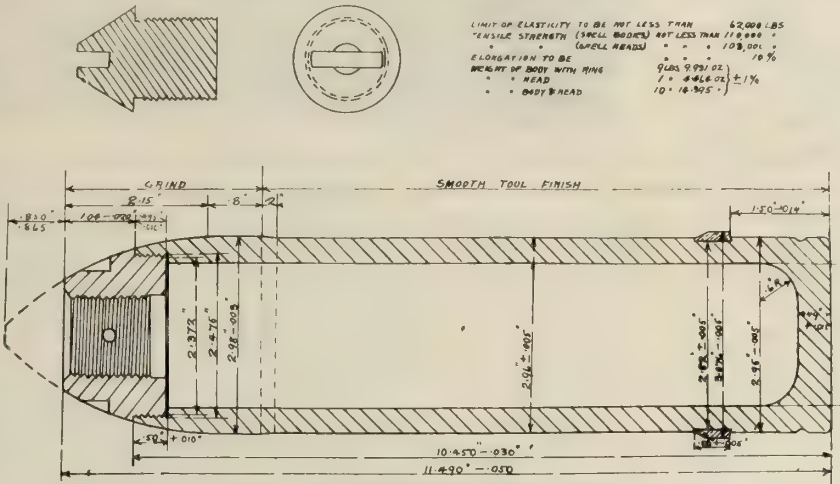
LIMIT OF ELASTICITY TO BE NOT LESS THAN 62,000 LBS
TENSILE STRENGTH (SHELL BODIES) NOT LESS THAN 110,000 "
" " (SHELL HEADS) " " " 103,000 "
ELONGATION TO BE " " " 10 %
WEIGHT OF BODY WITH RING 9 LBS 9.931 OZ
" " HEAD 1 " 4.464 OZ
" " BODY & HEAD 10 " 14.395 "
±1%
GRIND
SMOOTH TOOL FINISH
8.15"
.8"
.2"
.850"
.865
1.04-.020"
1.50"-.014"
2.372"
2.476"
2.98"-.003
2.96"±.005
2.96"-.005
2.1"+.03
.6R
.50"+.010"
10.450"-.030"
11.490"-.050

FIG. 2. 3-INCH RUSSIAN H.E. SHELL.

An outstanding feature of the work is the simplicity of the tooling equipment. Of almost as great interest is the heat treating department and the methods in use there. In both of these matters there is considerable variation from familiar British practice. For instance, these shells are forged hollow instead of being drilled from the solid, no inserted base plate or gas check is used, and a special heat treatment given to insure not only the specified physical requirements as to strength, but also to impart a particular characteristic fracture to the metal when the shell explodes.

The compelled shell, ready for final inspection, is shown in Fig. 2, and the forging as received and also rough machined, is shown in Fig. 5. It will be noticed that there is a considerable thickness of metal in the base of the forging which in conjunction with careful forging methods, insures a high degree of soundness to the base, the amount of metal to be machined off be-

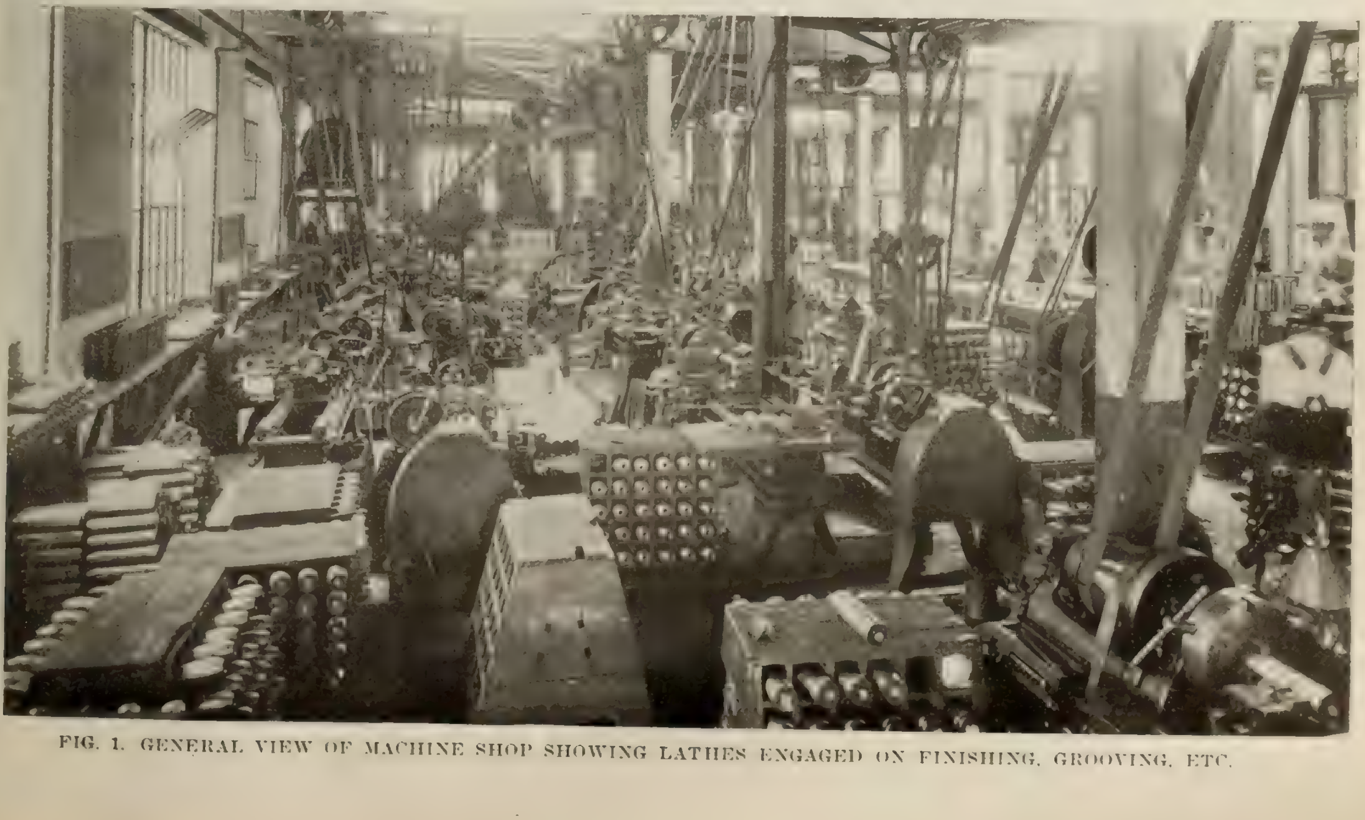

FIG. 1. GENERAL VIEW OF MACHINE SHOP SHOWING LATHES ENGAGED ON FINISHING, GROOVING, ETC.

ing more than ample to remove any surface imperfections.

Base of Operations

As is the practice in most shell shops, the operations are arranged so that all prime cuts originate from the bore of the shell. Thus the forging is first of all placed on a plain taper arbor in a speed lathe and a centre-hole drilled in the base by a centre drill in the tail stock spindle. The arbor is hollow, so that the operator can slacken off the shell with a bar from the back end. No stoppage of the machine is necessary, as the pressure from the drill will cause the forging to grip the arbor sufficiently to do the work. Actual time from floor to floor for this operation averages 31 seconds. The cutting-off of the open end is done in three Davis cutting-off machines, with double tools. Interest attaches to this work through the use of a self-tightening chuck devised by the staff, particulars of which, along with other interesting devices, may be the subject of future reference.

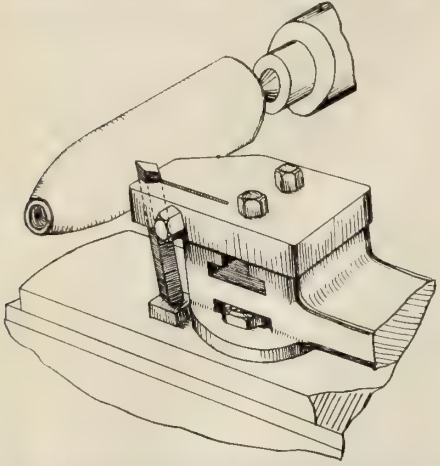

FIG. 4. TOOL HOLDER USING SQUARE BITS ON END.

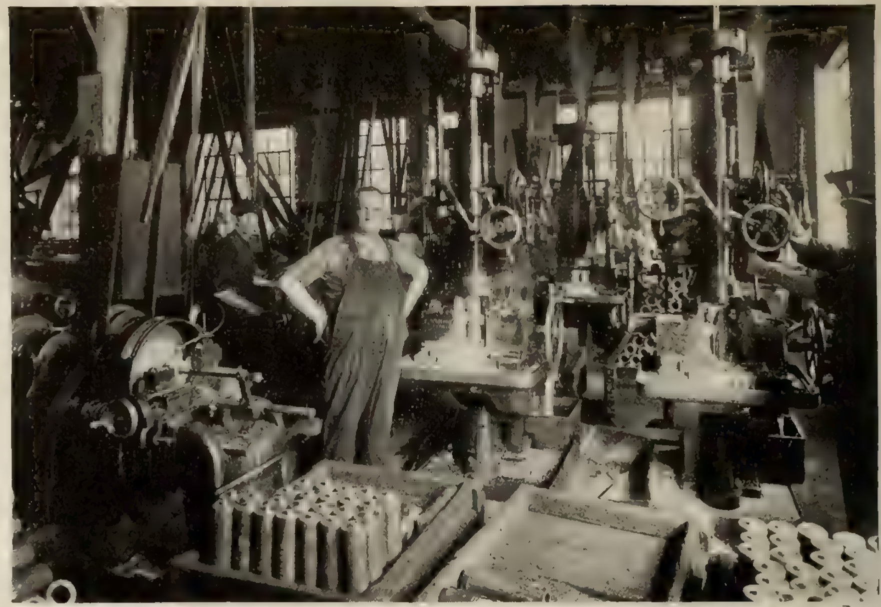

FIG. 3. CUTTING OFF MOUTH, AND ROUGH MACHINING BASE OF SHELL IN VERTICAL DRILLING MACHINES.

Features of Roughing Work.

In facing the base down to roughing thickness, no attempt at accuracy is made, the principal requirement being to get the metal off quickly. Power for cutting and power for holding are both very necessary and are obtained in this case from heavy duty vertical drills of Colburn make, a battery of four being installed for this work; see Fig 3. The tooling equipment is very simple, two flat cutters being fastened in the end of a plain cutter bar held in the drill spindle. The shell is supported internally on a rod which insures a uniform thickness of base when the drill spindle is fed down to the stop. A massive vise of rugged construction grips the shell between two vee-shoped jaws which centre it approximately in line with the spindle. As long as the centre hole has sufficient metal around it the operation is satisfactorily accomplished. Ample lubrication is supplied to the cutters, enabling cutting to be done at the limit of power supplied.

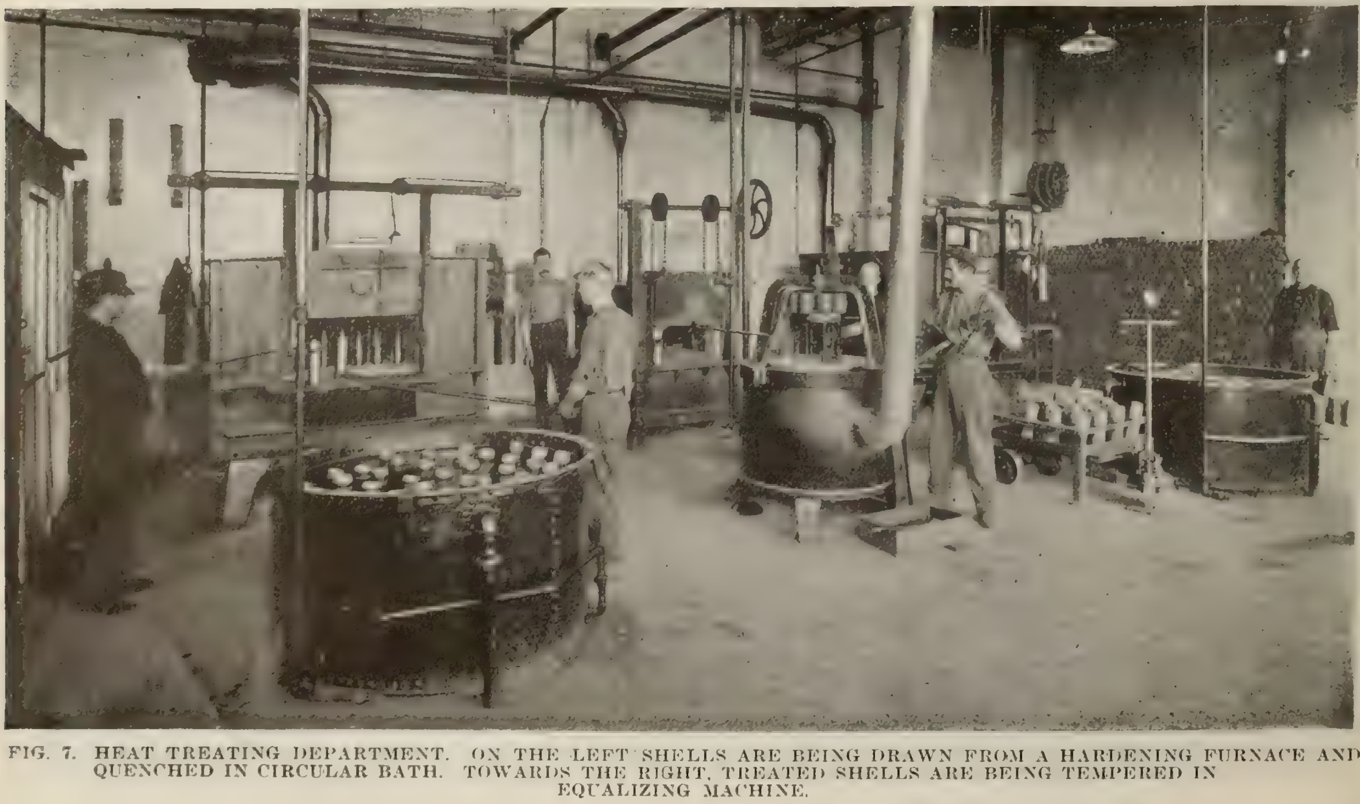

FIG. 7. HEAT TREATING DEPARTMENT. ON THE LEFT SHELLS ARE BEING DRAWN FROM A HARDENING FURNACE AND QUENCHED IN CIRCULAR BATH. TOWARDS THE RIGHT, TREATED SHELLS ARE BEING TEMPERED IN EQUALIZING MACHINE.

In rough turning, which is now performed, the shells are driven by the mouth, which is carried on an automatic expanding driver, while the base is carried by the tail centre. Lathes of the plainest possible design are employed, including two Bawden 16-in. lathes. 1 Niles and 1 McGregor-Gourlay. The driver is of simple construction, being of the eccentric fluted type with rollers instead of rectangular dogs, as shown in sketch, Fig. 6. These rollers work very satisfactorily and allow the shell to be removed by hand quite easily.

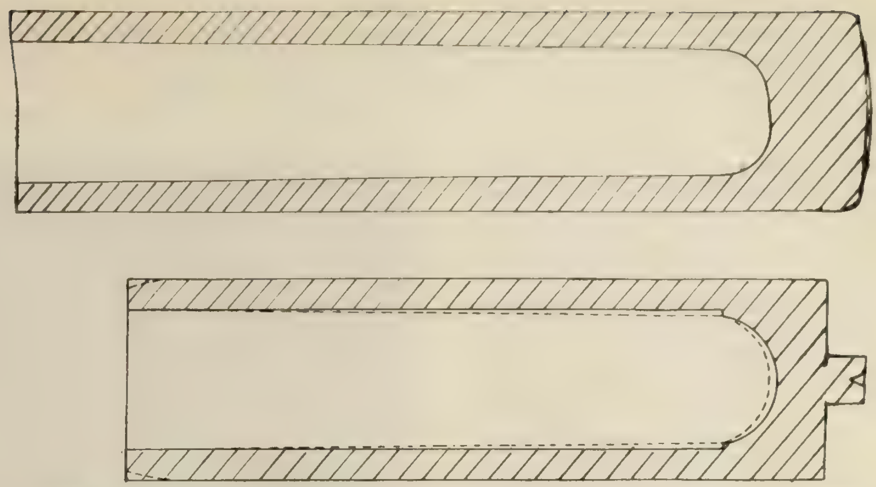
FIG. 5. UPPER, ROUGH FORGING BEFORE MACHINING. LOWER, FORGING AFTER ROUGH MACHINING.

Economizing Tool Steel

The problem of using high speed steel economically is satisfactorily solved by the type of tool holder used on these and other lathes in the machine shop. Fig. 4 is a sketch of this device, from which it will be seen that the strain of the cut is transmitted through packing directly onto slide rest, and as the tool is ground away, increased packing enables it to be used up to a very small amount. A cutting speed of from 40 to 60 feet per minute is maintained, according to the available pully ratios. At this speed and with a feed of 1-16 in. per rev., the average time from floor to floor is approximately 3 minutes per shell.

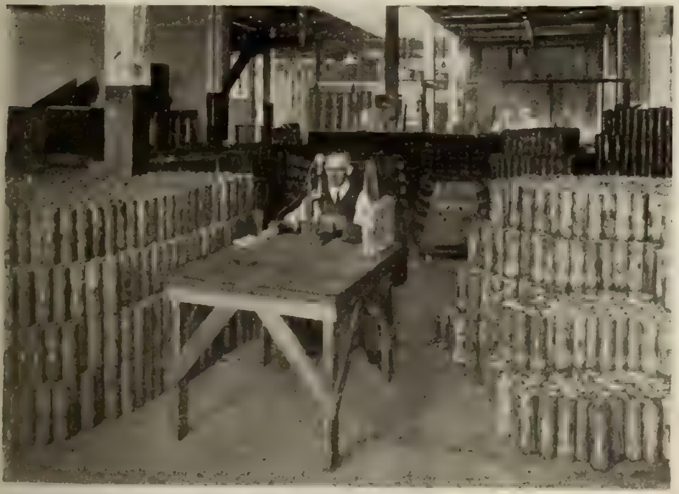
FIG. 8. TESTING TREATED SHELLS INDIVIDUALLY WITH THE SCLEROSCOPE.

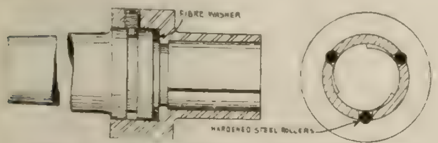

FIG. 6. THREE-ROLL DRIVER FOR ROUGH TURNING SHELLS.

The interior of the shell is now rough bored, which brings the shape to the outline shown in Fig. 5. As in the case of previous roughing operations, the limits are liberal enough to allow maximum feeds and speeds without particular care as to extreme accuracy. An ordinary spade cutter on the end of a bar, and supplied with lubricant through tubes in the bar is the only tool used. The time for the complete operation, including handling, is 21 seconds, but much of this showing is due to the design of chuck. A chuck of the type referred to is shown in Fig. 11, only in the case of the boring operation, a hinged pawl is mounted on the back of the rest so that when the job is finished, the pawl automatically engages as the spindle is reversed, thus backing off the collet sleeve. When, starting, the shell is simply inserted in the chuck against a stop at the inner end, and the lathe started up, whereupon the chuck tightens itself immediately, any further tightening necessary being caused by the cutters when brought into action. The machine used is a Lodge & Shipley lathe, having a turret carriage and a special fixed cross slide, which carries the tool for forming the nose.

Heat Treating Process

As mentioned at the beginning of this article, heat treating is a necessary part of the work on this shell. The actual physical requirements are indicated in Fig. 2, and these may be attained by any desired treatment approved of by the authorities. What is not specified is the type of fracture most desired in action. As fragments of the shell possess death-dealing ability, as well as the

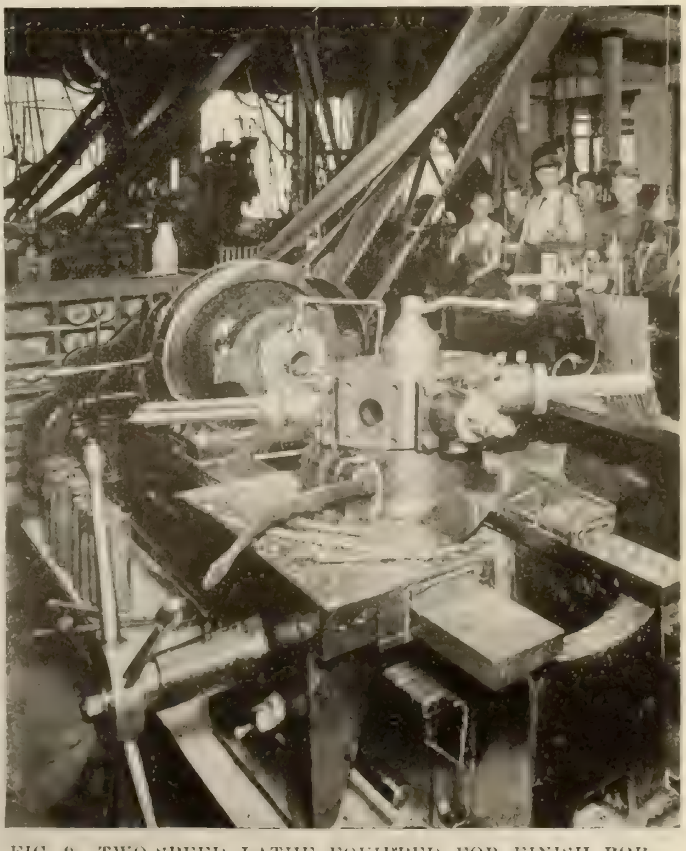
FIG. 9. TWO-SPEED LATHE EQUIPPED FOR FINISH BORING THE INTERIOR AND COUNTERBORING NOSE BEFORE THREADING.

charge of explosive, any treatment which will intensify the damage done by the fragments enhances the efficiency of the shell accordingly.

As the result of careful trials and exhaustive investigation, coupled with a suitable grade of steel, it has been found possible to impart what might be termed a high degree of ultimate brittleness to the metal while still retaining in ample degree, all the required physical properties, the result being that a maximum number of fragments are scattered when explosion takes place.

The actual operations involved in the treatment are very simple in themselves, and with the type of equipment in use, have yielded absolutely perfect results, not a single test shell having failed to yield the desired results either in laboratory tests or under actual firing conditions.

Equipment

The heating equipment consists of two hardening furnaces, one tempering furnace, one equalizing machine, with the necessary quenching baths, pyrometers, etc. The photograph, Fig. 7, shows the entire equipment, the two large hardening furnaces at either side being specially designed and built to the firm's requirements. They are of the five-burner, oil-fired type, the burners being so arranged that an absolutely even temperature is obtainable throughout the combustion chamber. In front of either furnace is a circular quenching tank with a constant flow of cooling water, and provided with racks which allow each shell to be maintained in a vertical position, with about 1½ in. projecting above the water level. Each heat consists of 35 shells which are brought to a temperature slightly over 1,500 deg. Fahr., in about half an hour, which, after allowing for drawing and filling, gives an average capacity of about 50 shells per furnace per hour.

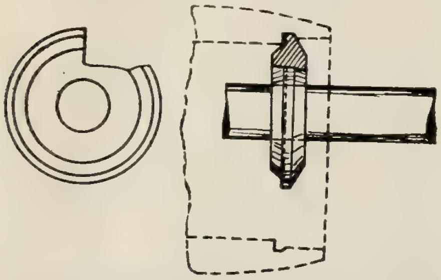

FIG. 10. CUTTER USED FOR RECESSING NOSE BEFORE THREADING.

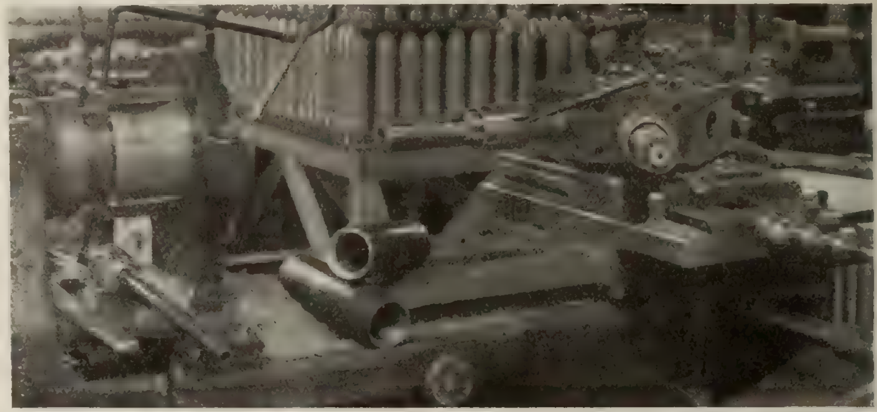

FIG. 11. THREADING THE NOSE OF SHELL WITH COLLAPSIBLE TAPS FITTED WITH SPECIAL PILOT BUSHINGS. NOTE OUTER SUPPORT FOR CHUCK ON LEFT.

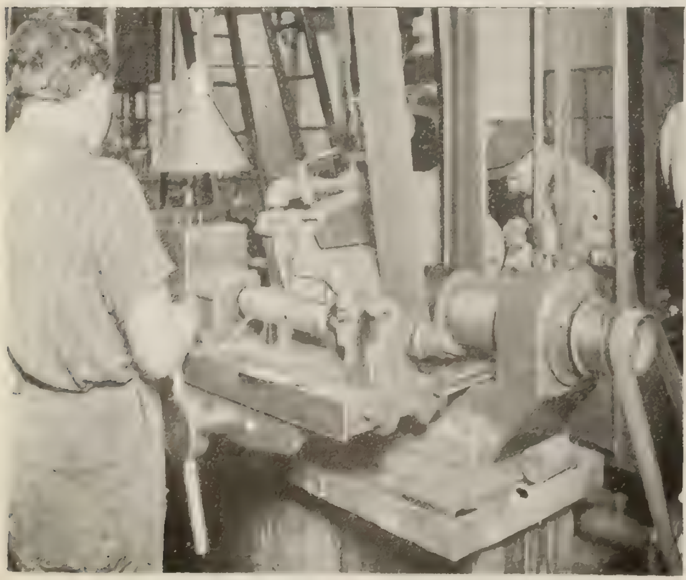

FIG. 13. GRINDING THE BOURLETTE AFTER FINAL TURNING OF THE BODY.

Equalizing the Treated Shell

The object of leaving the nose above water is to keep it fairly soft, so that no trouble will arise in threading the nose afterwards. In order to insure a perfectly even degree of hardness throughout the shell, they are now placed in a single-burner Mecol furnace and brought up to about 900 degs. Fahr. when they are withdrawn singly and immersed in the lead bath of the equalizing machine. This device, shown in the centre of the picture, consists of a lead bath surmounted by a framework which supports a revolving disc carrying six spindles. The spindles are arranged to lift up clear of the lead so that a shell may be placed underneath and partially immersed in the lead. The disc is now revolved and the shell under the spindle removed and a fresh one put in place. The upper ends of the spindles are fitted with small planetary pinions meshing with a central gear so that as the disc and the shells travel around the lead pot, each shell is revolved eight times, thus receiving an evenness of temperature not otherwise obtainable.

Testing Results

The tempered shells are now allowed to cool naturally and for this purpose they are placed in special metal racks adapted for use with elevating trucks of the Chapman ball-bearing type, after which a careful test is made on each individual shell with a scleroscope. For this purpose two spots are cleaned up on opposite sides of the shell, and all shells reading from 47 to 52 are passed as satisfactory. Owing to the methods employed, the difference between opposite sides seldom exceeds 2 points, thus testifying to the efficiency of the heat treatment.

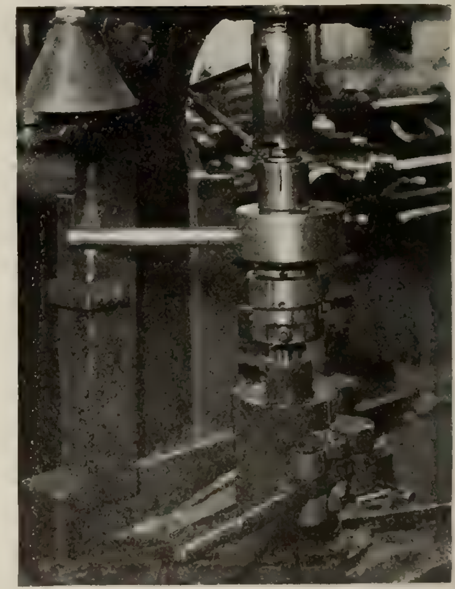

FIG. 12. FINAL SIZING OF THREAD WITH ADJUSTABLE TAP DRIVING BY SELF-REVERSING TAP HOLDER.

Finishing the Bore

The shells are now ready to receive the balance of machining operations, next in order being the finishing of the bore and counterboring the nose to receive the thread. Uniformity of tooling and output was secured by installing a battery of six Bullard turret lathes, one of which is illustrated in Fig. 9. These machines are of specialized design, having the simplest form of carriage, ways, and feed mechanism, and possess but two speeds, the slowest one being brought into use when bottoming the bore and other similar limit work. The chuck is of the self-tightening type previously referred to, the steady rest which is fastened to the ways being seen in the illustration.

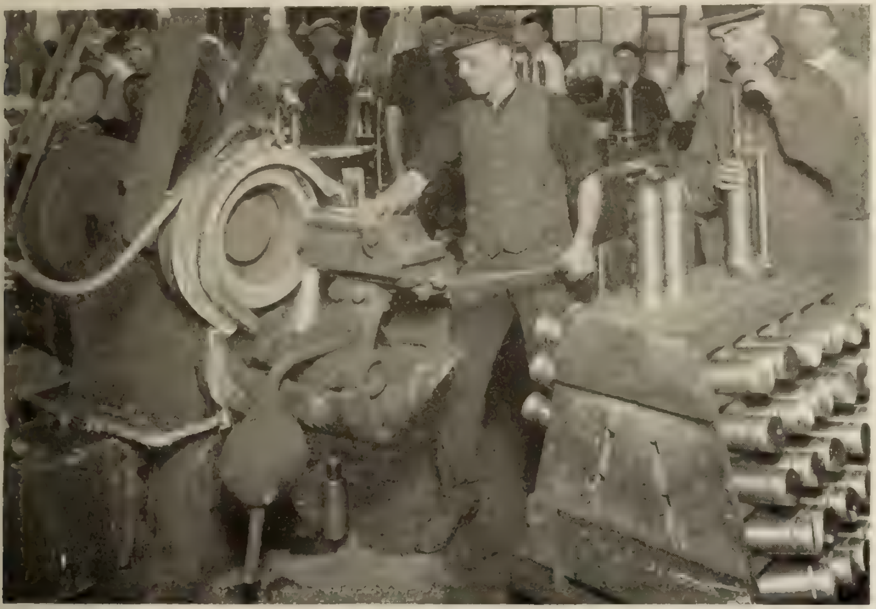

FIG. 14. FINISHING THE BASE ON A RING WHEEL GRINDER AFTER MACHINING OFF THE CENTRE.

Three tools are used on this operation—1st, a roughing cutter, which brings the bore close up to size; 2nd, a single point cutter on a short bar, which counterbores the nose; 3rd, a finishing cutter of similar form to the rougher, for final sizing and bottoming. By referring to the illustration a collar will be observed on each bar next the supporting bracket on the turret faces. By means of a set screw on each side of the collar, two small cutters of square tool steel are held in position, which face off the open end to the required length. A period of five minutes provides ample time for the work, most of the time being spent on the finish boring.

Minor Operations

Before proceeding to tap the nose, two minor operations are performed, viz., cleaning out the centre for use in final turning, and recessing the bottom of the counterbore to clear tap. At present the former is done in a simple speed lathe fitted with an arbor having two sets of expanding dogs. The arbor is operated by a handwheel working on a threaded part next the lathe spindle, the hub of the wheel engaging with projections from an internal rod which is thus caused to move lengthwise and expand the dogs by means of tapered portions on the rod.

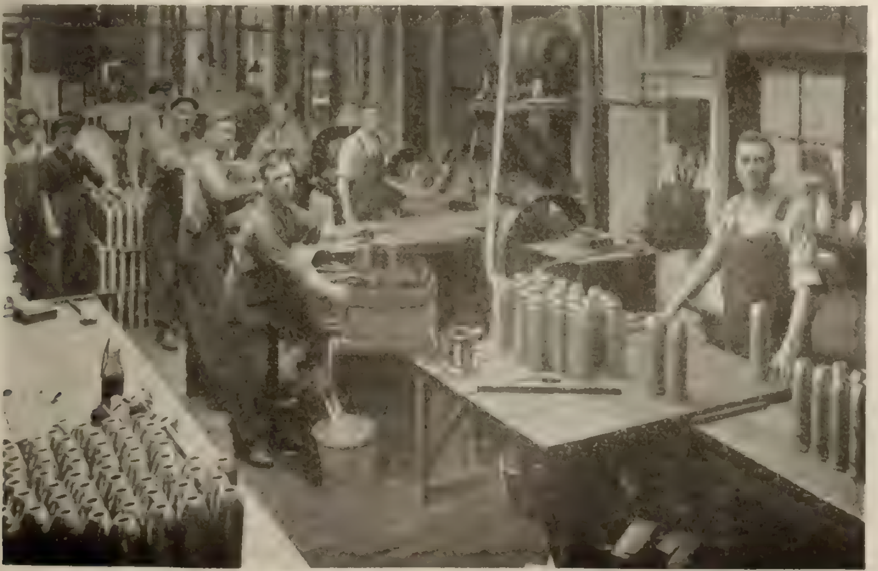

FIG. 16. BANDING DEPARTMENT, WHERE COPPER BANDS ARE ASSEMBLED, PRESSED AND MACHINED.

Recessing is done on a small engine lathe in which a cutter of the section shown in Fig. 10 is carried on a short bar. The profile of the cutter is arranged to make a square face on the bottom side of the groove, and an angular face on the other, also, when fed in to the proper depth the edge of the square face is champered, thus removing the rag and preventing any interference with gauging work during inspection.

Tapping the Nose

The production of perfect threads on tough heat-treated steel is not an operation which can be rushed like rough turning and other preliminary work, and a record of one shell in less than a minute from each machine over a period of days at a time speaks well for the thoroughness of the method, the efficiency of the equipment, and the care of the operator.

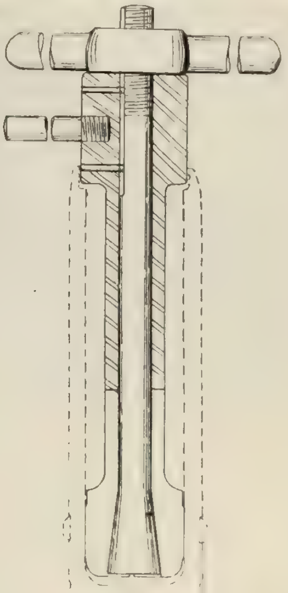

FIG. 15. EXPANDING PLUG FOR SUPPORTING SHELL WALLS WHILE BANDING.

Two Davis turret lathes are employed and each machine is equipped with two Victor expanding taps. The method of using the taps calls for more than passing notice in view of the excellent showing made. Photograph, Fig. 11, shows the taps fitted with special pilot bushings. The first or roughing tap which faces the reader has a revolving bushing mounted on the end of the tap. When the second tap is brought into action for finishing, an extra long bushing is inserted in the shell, so that the maximum possible support is given to the pilot bar on the tap, thus insuring a concentric thread. The illustration shows this bushing on the tap as it is withdrawn from the shell. The actual time for complete operation, including handling, is 57 seconds, while final sizing is done by an adjustable tap with similar pilot bushing, the latter operation being done in a Colburn drill fitted with an Errington friction drive reversing tapper. The shell is held in a split vice, with cam-lever tightening device, the whole arrangement being shown in Fig. 12.

Body Turning

The sockets, or nose-pieces, are now assembled. Every care is taken to secure perfect fitting joints, and adjustment by filing is occasionally done so as to insure the joint being imperceptible after machining. A preliminary cut is now taken over the body and profile with the shell driven by a threaded arbor, and support by a centre in the tailstock. Owing to the increased hardness of the metal, it is not possible to work at the previous speeds, about 25 feet per minute being the average on this work, which allows of a complete cut being taken in 3½ minutes. Ordinary engine lathes are in use with suitable profiling attachments. The final turning is now done on another group of lathes similarly equipped, which machine the shell so that it has a peculiar increase in diameter at the front end known as bourlette, or forward land, as it is sometimes termed. The body of the shell may have a smooth tool finish, but the bourlette and the nose must have a smooth finish, preferably by grinding.

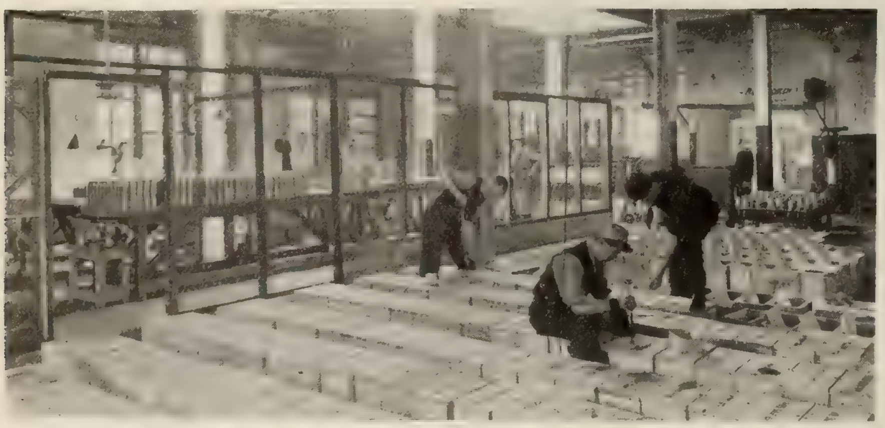

FIG. 17 CLOSING AND SEALING LIDS OF SHIPPING BOXES AFTER GOVERNMENT INSPECTION.

Final Machining Operations

Grooving, undercutting and knurling are next performed on two groups of engine lathes, the knurling being in the form of horizontal lines across the bottom of the groove. The bourlette is next ground on a Symington grinder shown in Fig. 13. Simplicity and rigidity are features of this tool, which, with the use of suitable driving devices enables the complete operation to be done in 49 seconds. The nose of the shell is centred by a cup, and driven by a pin engaging one of the wrench holes, shown in Fig. 2, while the base centre is supported by the tailstock.

The centre is next faced off, the radius formed, and the base accurately squared up. The latter operation is done on a Gardner disc grinder, the time occupied being a matter of seconds according to the amount of grinding required. The shell is slipped over an arbor hinged to bracket mounted on the work table. With the work table drawn back from the wheel, the arbor and the shell are tilted over to a horizontal position, resting in a vee-block which holds the shell perpendicular to the face of the grinding wheel. A slight horizontal pressure by the operator's left hand, combined with a vertical motion, causes the shell to oscillate across the face of the grinding wheel, while, with his right hand, the operator revolves the shell slowly thus securing a smooth, flat, and square base, ready to receive the various markings before being banded.

Banding Operations

The various operations connected with banding are conveniently grouped together and a view of this department is shown in Fig. 16. In order to prevent any permanent reduction of diameter due to the pressure of the banding press, a supporting plug is inserted in the shell after removing the socket. This plug is collapsible after the manner of a spring collet and is expanded tightly against the wall back of the band; see Fig. 15 Banding equipment of the West Tire Setter type is employed, a three-throw belt-driven pump supplying oil at the necessary pressure. Immediately after banding, the sockets are replaced with oil on the joint, and the shells passed over to the band-turning machines, which are of Jencks type, fitted with a special chuck made in the shop tool room. This chuck is self-tightening and has a hand wheel with considerable shake, which is used for slacking-off. Thus it is only necessary to place a shell in the chuck, throw in the friction drive on the spindle pulley and start cutting, a fair average time per band being 20 seconds, including handling.

Inspection and Shipping

After final shop inspection the shells pass through the hands of Russian Government officials, being finally oiled and fitted with steel shipping plugs. The shipping boxes hold six shells each, are of dovetailed construction, and lids fastened by six heavy wood screws. The two centre screws on each side are sunk well beneath the surface, forming a cavity which is filled up with a special sealing wax. An electric soldering iron is used for this work, the view in Fig. 17 showing these final operations, while in the immediate background can be seen the Government inspection department, from which oversight of shipping operations can be conveniently maintained.

* * *

NO TRADING WITH ENEMY

TRADE figures for the calendar year ended with June 30th, contain $48,215 worth of "imports from Germany," as against $2,293,837 for the preceding twelve months. As it is forbidden to trade with the enemy, these figures are of interest. Inquiry at the Customs Department elicits the information that a large proportion of these imports are excise warehouse entries, and consist of tobacco, cigars and beers which were in warehouses before the war, and have only recently been entered for consumption. A few other items, including toys, manufactures of jute, jewelry, carboids, etc., were purchased before the war and delayed in transit in some neutral country. No goods are reaching Canada from Germany direct at the present time.

Heavy exports of nickel from Canada to the United States are explained by the fact that every ounce of nickel mined in Canada is refined in New Jersey. In the year ended June 30, Canada exported $6,180,998 worth of nickel to the United States, while only $1,689,012 worth went to Great Britain. There is an increase in nickel exports of nearly $2,500,000 over the previous fiscal year.

* * *

IRON ORE EXPORTS FROM NEWFOUNDLAND

IRON ORE exports from Newfoundland for the fiscal year 1914-15 were 511,990 tons, of which 17,500 tons went to the United States, 382,260 tons to Canada, 41,300 tons to Holland, and 69,930 tons to the United Kingdom. For the fiscal year 1913-14 the total exports were twice as much, or 1,245,797 tons. The United States received 170.590 tons of this total; Canada, 785,245 tons; Holland, 122,332 tons; Germany, 51,790 tons, and the United Kingdom, 115.840 tons.

Manufacturing and Power Equipment of a Shingle Mill

By A. F. Menzies

Despite the fact that our readers are more or less familiar with the appearance of and the many purposes for which shingles find a ready market, few, beyond the districts in Eastern and Western Canada where they are produced in enormous quantities, may be said to be informed as to plant and equipment requirements for their manufacture. The accompanying article sheds considerable light on these features and incidentally gives prominence to an extensive and valuable Canadian industry capable of still further development.

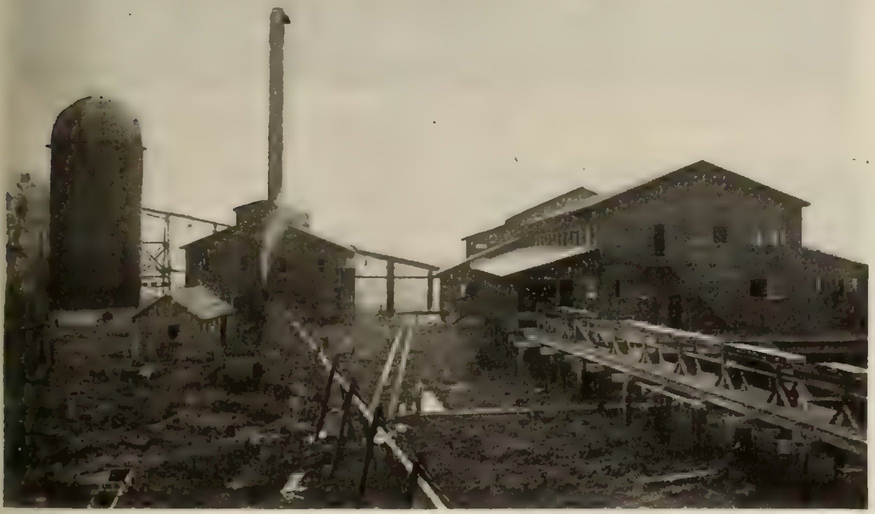

FIG. 1. GENERAL VIEW OF PLANT FROM TOP OF DRY KILNS.

THE Shull shingle mill, situated on the north arm of the Fraser River in the municipality of Burnaby, is reputed to be the largest of its kind in existence. The site occupied is approximately 12 acres. The entire mill is devoted exclusively to the sawing of cedar shingles, which are shipped via the British Columbia Electric Railway, a spur track from that company's line between New Westminster and Eburne, running alongside the shipping shed. Connection is available at New Westminster for transfer to several transcontinental railways. Being on the river bank, water transportation is available for the delivery of logs and shingle bolts to the mill.

The mill itself was designed by Mr. Lastig, of the Sumner Iron Works, Everett, Wash., which concern supplied a large portion of the machinery installed. Construction was carried out by the owners and was under the supervision of F. W. Talmadge. The total cost was in the neighborhood of $150,000, and the twenty shingle machines now installed are giving an output of 600,000 shingles per day of 10 hours. Space has been left on the manufacturing floor for four more machines which will bring the capacity up to 720,000 per day. Fig. 1 gives a comprehensive view of the plant as a whole, the dry kilns excepted, the photo being taken from the top of them.

A mill of this size naturally requires a power plant of considerable capacity In this case the designer should be complimented on providing a generous supply, which is not always done. All lumbering operations are attended with considerable waste of timber, sawdust being also produced in great quantities; the latter is almost always used as fuel under the boilers. Steam is supplied by four 72 in. by 18 ft. return tubular boilers, which are allowed a working pressure of 160 lbs. per sq. in. They are located in a semi-fireproof wood boiler house, situated about 39 feet from the mill building. The boilers are in brick settings with "Dutch Ovens," and the fuel is fed automatically to the fire holes by chutes from the conveyor, which brings it from the mill.

Fig. 2 is a photo of the stokehold and shows the chutes which lead to the fire holes. The platform, beyond the "Dutch Ovens," consists of steel plates carried on 6 in. I beams, spaced 30 in. centres The smoke boxes of the boilers are connected by a breeching to the 6 ft. by 100 ft. steel stack, the top 20 feet of the latter having a spark arrester screen. The boilers, uptake and stack were constructed and supplied by the Vulcan Iron Works, New Westminster. A large bin, 12 ft. by 54 ft., is provided at the back of the stokehold for storing a supply of waste timber for use at nights and at other times when the mill is not running and no sawdust is being produced.

Boiler Feed Arrangements

Feed water from the Fraser River is stored in a 40,000-gallon settling tank, located outside the boiler house, and is drawn from the tank by a $7\frac{1}{2}$—5—6-in. Worthington duplex boiler feed pump. The feed is delivered to the boilers through a Reilly multicoil feed water heater, supplied by the Canadian Griscom-Russell Co. The heater is located in the exhaust line from the main engines and delivers the water at about 220 de-

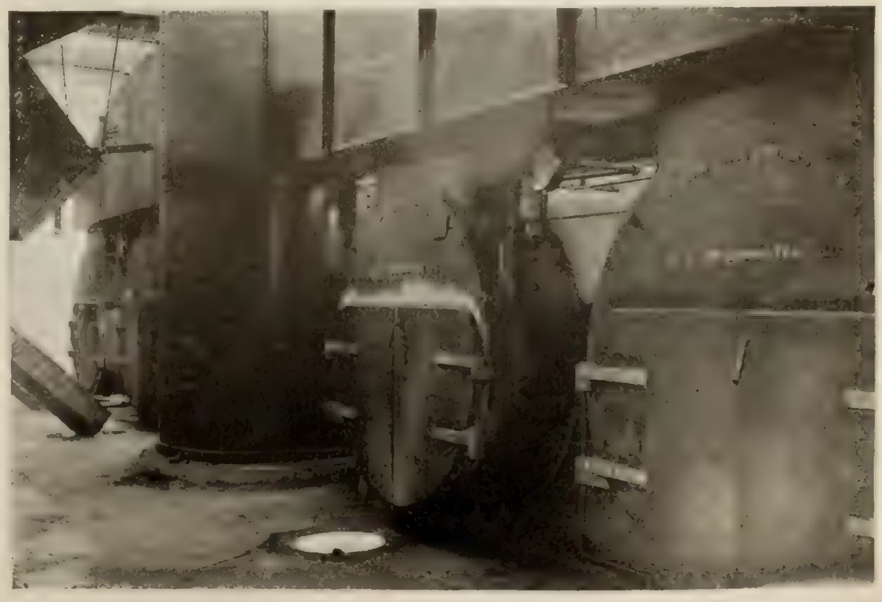

FIG. 2. STOKEHOLD OF POWER PLANT.

grees F. The feed regulating valves are provided with extension spindles, to enable them to be operated from the front of the boilers. A 2 in. Penberthy injector is provided as a stand-by for boiler feeding purposes.

Steam Piping

A 12 in. by 38 ft. steam header runs the length of the boiler room, and is connected to each boiler so that any one may be cut out without affecting the remainder. The header is constructed of extra heavy pipe and fittings, and was designed and built by the chief engineer of the plant. The main steam line, 9 inches in diameter, is taken from one end of the 12 in. header, and is provided with an extra heavy swivel expansion length, constructed by the Vancouver Engineering Works, Vancouver. Two 3½ in. steam lines are taken from the header—one to the dry kilns and the other to the underwriters' fire pump. The former line is about 350 feet long, and can be seen, supported on wooden "A" frames, in the foreground in Fig. 1. All the steam pipes are covered with asbesto-cel pipe covering, supplied and put on by the Vancouver branch of the Canadian H. W. Johns-Manville Co. Where exposed to the weather, the pipe insulation is protected by an additional waterproof cover. Crane Co. valves and fittings have been used exclusively in the pipe work, the Crane "Navy" valve being in evidence in all important places.

Engines and Generators

The mill drive is provided by two 18 in. by 20 in. twin horizontal, balanced valve engines, of Sumner Iron Works make. These prime movers turn up 190 r.p.m., and develop 440 horse-power each. They are provided with "Gardner" throttling governors, and sight-feed lubricators are fitted on all important bearings. The engines are set side by side, but facing opposite directions. Fig. 3 shows one of the engines, with part of the flywheel of the other showing on the extreme left. The engine foundations are of concrete, poured round closely spaced piling. The ground in the locality is of alluvial formation and bedrock too far down to reach, therefore, piling was the only method available, and the concrete monolith was given a very wide base to increase the bearing surface. The engines are each fitted with a double arm band wheel, 8 ft. in diameter, and of suitable width for the 30 in. driving belts.

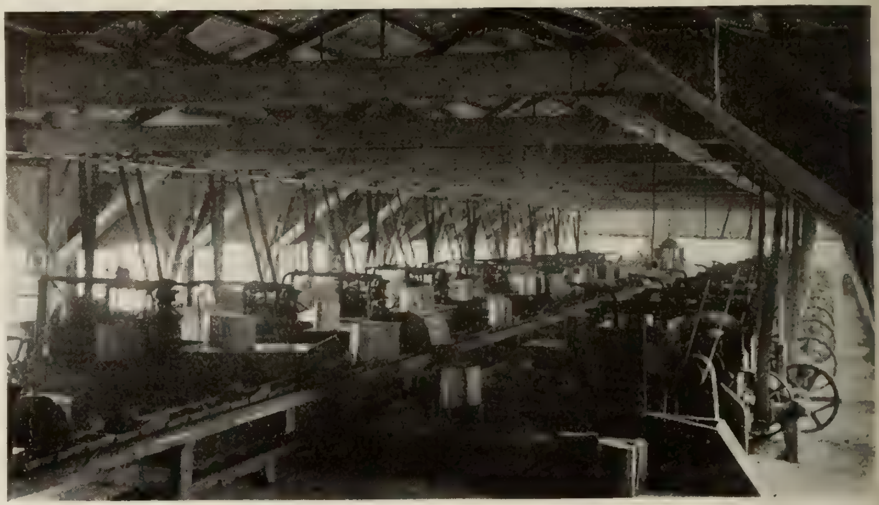

FIG. 4. SHOWING THE TWENTY SHINGLE MACHINES.

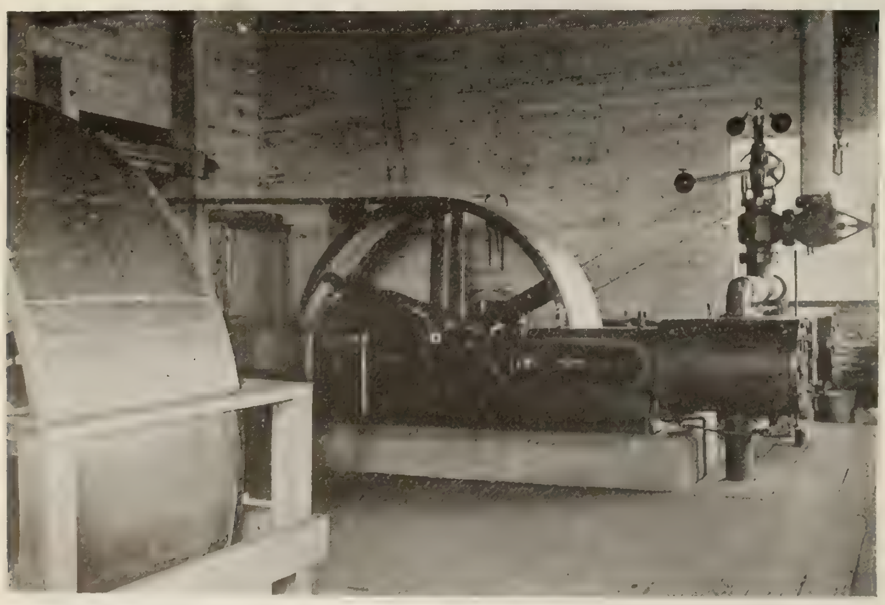

FIG. 3. ONE OF THE TWIN 18 IN. X 20 IN. MAIN DRIVING ENGINES.

A separate electric generating system is provided for lighting the plant. The generator is a 15 kw. machine, built by the Three Rivers Electric Co., Mich., and direct coupled to a twin single acting enclosed steam engine running at 500 r.p.m. The engine was supplied by the U. S. Rapid Fire Gun & Powder Co. of Derby, Conn. The generator is compounded for 110 volts at no load, and 115 volts at full load.

Fire Protection

Fire protection is provided for by a 16—9—12 in. duplex Underwriter fire pump, built by the Canada Foundry Co., Toronto. This pump is kept running constantly to ensure a certain supply of water at the various hydrants located at suitable places in the mill buildings and at strategic points on the mill site. The 10 in. suction pipe from the fire pump is led into the river, the lower portion being on a float, which keeps it off the river bottom, and which rises and falls with the tide. The movement of the pipe is procured by a ball and socket joint. The 8 in. discharge is placed underground, risers being provided at the hydrants. Besides fire duty, this pump is utilized to keep the settling tank supplied with feed water for the boilers, and also to supply the shingle saw water jets.

Driving Belts

The driving belts in the mill were supplied and installed by the Western Oil & Supply Co. of Vancouver. Some of the principal items under this heading are:—Two main drives, 30 in. by 2-ply "Amphibia" leather belt, one 110 feet and the other 61 feet long; 506 lineal feet of 10 in. by 5-ply balata belt on miscellaneous drives; 793 feet of 8 in. by 5-ply on drives to the shingle machines; 1,144 feet of 5 in. by 4-ply on the drives from the shingle saw arbors to the countershafts, and from the latter to the jointer saw arbors. These latter show prominently in Fig. 4. The leather belting was made by Sadler & Haworth, Montreal, and the balata by Jas. Dawson & Sons, Lincoln, England. Practically all the belting is made endless, being taken up automatically by weighted tightener pulleys.

Mill Equipment

The mill proper occupies a two-floor building, 200 feet wide by 72 feet long, the upper storey, occupied by the shingle machines being 40 feet wide. The building is of heavy timber construction, and is carried on a pile foundation. The end of the mill nearest the river has three haulways extending down into the water, two of the haulways being equipped with 9 in. by 1¼ in. chain, with flight attachments, and used for hauling up the cedar logs. The other haulway is used for shingle bolts, of which a considerable quantity are used. The log haulways lead to two 84 in. swing cut-off saws, which cut the logs into 16 in. or 18 in. lengths, depending on the size of shingles being made. After being cut off, the discs of timber are split into pieces of suitable size on two power-feed bolters. The timber is then known as "shingle blocks." To remove all sapwood and other defects, two knee bolters are used. These machines consist of a circular saw and a table on rollers, the latter having a projecting arm, which is held between the knees of the operator, hence the name. The shingle block is manipulated by hand and the table moved up to the saw by a motion of the knees.

When the blocks have been properly prepared by the knee bolter they are dumped into a conveyor, which takes them up to the machine floor. The conveyor travels the full length of the floor and the blocks are taken off and stacked on tables beside the shingle sawyers. Fig. 4 shows the machine floor, with the block conveyor running down the centre, and the ten shingle machines on each side. The shingle machines are all of Sumner Iron Works design and construction, and are equipped with their latest set equipment, which has a graining attachment to enable, if required, shingles to be taken off the block, butts up or down, instead of alternately up and down. This attachment is a great timber saver, as by its use the sawyer can keep a knot in the tip of the shingle, where it does no harm. As fast as the shingles are sawn from the block the edges are trimmed on the jointer saw and thrown down a chute to the packers.

The shingle packers are situated in the wings of the lower floor. The shingles are packed by hand into the machines, and, when a full bundle has been packed, are drawn down tight by means of a lever, which is held in a catch until the bands, consisting of two strips of wood and two strips of galvanized iron, are nailed on. The bundles are then removed and placed on conveyors, which take them to the dry kilns. The open-air portion of these conveyors can be seen in Fig. 1, where several bundles of shingles are shown en route.

Heating and Drying

The output of the mill is dried in four dry kilns, each 120 feet long by 21 feet wide. Each kiln has three tracks of light rails running clear through it. and extending beyond at each end. At the entrance end the bundles of shingles are piled on trucks in such a way as to permit a free circulation of air among them. The trucks are run into the kilns, where they remain about ten days, gradually working down to the lower end as those ahead of them are removed. The heating of the kilns is provided for by 10,000 feet of 1¼ in. pipe in each, in which steam is circulated. The steam is admitted to a header, located a short distance from the "wet" or entrance end. From the header the 1¼ in. pipes run to a similar header at the other end. Provision is made for the expansion and contraction of the piping, under a variation of temperature, and also for inequalities in length, by having, on the end of each run of pipe, an 1¼ in. by ⅜ in. elbow, the connection to the header being made by a ⅜ in. nipple threaded right and left-hand, and about 2 ft. long. The heating pipes are laid on a slight grade, and all condensation runs to the outlet header, from which it is trapped by four "Stoney" steam traps. The dry kilns were put in by the North Coast Dry Kiln Co., and the doors are of their special design. The temperature of the dry kilns is kept as nearly as possible between 185 and 195 degrees F., and is separately recorded for each kiln by a Bristol recording thermometer, having seven-day recording charts.

FIG. 5. SAW REPAIR AND FILING ROOM.

At the lower end of the kilns a large loading shed is provided, in which is a transfer track and car. By this latter means the loaded dry kilns trucks, on removal from the kilns, can be transferred to any loading berth desired. Two steam shingle presses, by Webb & Gifford, of New Westminster, are used in the loading shed to press the shingles in the bundles up tight. Naturally the trip through the kilns dries them out, and although the bands were tight on the bundles when packed, they are quite loose when removed from the kilns. After being pressed up, the bundles are run into waiting cars on gravity conveyors.

Shafting and Conveyors

To return to the mill building, the centre 40 feet of the lower floor contains the two main line shafts, each of which is driven by its own engine. The shafts are 5 inches in diameter where the power is received, being reduced in size as it is taken off. They extend the full length of the building. Between the shafts there are three conveyors, two for sawdust and one for spalt. These conveyors receive the sawdust and spalt through chutes from the shingle machines which are directly above on the upper floor, and discharge into two others running at right angles, one of which takes the sawdust to the stokehold and the other takes the spalt to the burner. Fig. 1 shows these conveyors running on an up-grade from the mill to their destinations. The spalt conveyor runs through the bin at the back of the stokehold and a supply of spalt is maintained in the bin by setting a tripper to throw the blocks off.

The burner, shown on the left in Fig. 1, is of steel with a brick lining; it is 28 feet in diameter and 80 feet high, with a spark arresting dome, 20 feet high on top. The burner is on a concrete foundation, and is kept busy all the time the mill is running, consuming the refuse.

The Saw Feature

The business end of the mill, the saws, were all supplied by the Vancouver branch of the Henry Diston & Sons Co. The outfit comprises: Sixty 40 in. shingle saws; forty 38 in. jointer saws for use on the shingle machines, there being three shingle and two jointer saws provided for each machine; four 86 in. inserted tooth cut-off saws; three 66 in. inserted tooth splitter saws; two 56 in.

inserted tooth cut-off saws, and three 52 in. knee bolter saws.

To do good work, saws must be kept in first-class shape. Their upkeep is attended to in a filing room on the same floor as the machines. A convenient system of getting the saws into the filing room is utilized. A series of pigeon holes opening into the filing room, and also into the machine room, are built into the dividing wall. A dull saw can be placed in its proper pigeon hole from the machine side, and withdrawn by the filer into the filing room when he is ready to attend to it. Similarly, a sharp saw is put in from the filing room side and withdrawn from the machine side. The filing room was equipped by the Henry Disston Co., and is supplied with two No. 55 and one No. 35 Covel automatic saw gummers. These machines are shown in Fig. 5. A large automatic saw gummer is located on the log floor and is used for sharpening the 86 in. cut-off saws, an overhead traveller being provided to bring the saws to the gummer and return them. Power for the filing room is preferably independent of the main engines. In this case a small vertical engine, manufactured by F. X. Bertrand, St. Hyacinthe, Que., and supplied by the Canadian Fairbanks Co., is installed.

The plant is operated under the supervision of Superintendent T. O'Connell; the steam end being in charge of F. G. Phillips, chief engineer, assisted by J. Anderson, second engineer.

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CONTINENTAL SHIPBUILDING AND SHIPPING DEVELOPMENT

SHIPBUILDING and shipping continue to experience real boom days in all the neutral countries of Europe and shipyards are being constructed in many hitherto practically unknown locations. A review of the present state of affairs is published in *Engineering* which states that old shipyards are being extended and new ones formed, shipping companies are being started almost every day, old concerns increase their capital, vessels keep changing hands at fabulous prices, and harbor extensions to accommodate this new traffic are the order of the day.

In Holland, throughout Scandinavia, and in other countries, shipbuilding yards are provided with work for years to come, and new concerns are being started under the best possible auspices. At Kallundborg, in Denmark, a new shipbuilding company has just been formed. The corporation is filling up a portion of the fjord and letting the area for building purposes to the new company for a period of 50 years, and a floating dock will also be constructed. A large new local shipping concern, started for running sailing vessels, has decided to have six steamers, of 2,000 tons each, built at the new yard, and in their fleet six large sailing vessels are to have motors installed. Not the least interesting feature in the present feverish movement is the revival of the sailing ship. But many authorities are extremely sceptical as to the future of the sailing vessel and discourage its renaissance.

Sweden

Swedish shipping concerns and Swedish yards are equally well employed. The largest steamer so far built in Sweden has just been launched at the Gota yard, Gothenburg. It is the Skagern, with a capacity of 8,000 tons, ordered by the Swedish Transatlantic Steamer Company, and intended for Australian trade. The keel was laid on January 5, 1916, and the boat is expected to be ready about November. A Swedish consular report urges the desirability of cultivating the Australian traffic, since the United States and Japan are doing their best to develop their direct connections with Australia. Another Swedish shipping company which is greatly extending its fleet is that of the Nords German, which has six motor vessels in course of construction in Copenhagen, each of 6,450 tons, and three motor vessels in Gothenburg, each of 9,200 tons. The new vessels are intended to increase the company's traffic to Brazil, La Plata and on the Pacific Coast. Sweden has, on the whole, shown much enterprise and initiative of late years in extending her overseas shipping, and the value of her exports overseas, to Asia, Africa and America, rose from 13,570,670 kr. ($3,800,000) in 1905, to 44,692.275 kr. ($12,500,000) in 1913. The Swedish Government is also assisting shipping by loans and other ways, and is contemplating serious endeavors for keeping the North Swedish ports open beyond the usual time when ice stops the traffic. A number of ice breakers are being built for that purpose, and an expenditure of 25,000,000 kr. is considered necessary in order to keep shipping going for an extra month beyond the usual time.

Harbor Activity

Larne new harbor works and extensions are going on or approaching their realization in all three northern kingdoms. The plan for the Malmo free harbor has now been finally drawn up, and is calculated to entail an expenditure of 9,360,000 kr. ($2,610,000). The area for the free harbor is situated to the northeast of the present harbor, and the entrance is to be through the present inlet, 80 m. broad, by way of the eastern channel, both of which are to be deepened to 9.25 m. (30 ft. 4 in.). The basins of the new harbor are to have the same depth, and will comprise an outer harbor, 80-200 m. broad and about 400 m. long, and a basin east of the former, 100 m. broad and 500 m. long. The water area will be 33 acres and the land area 83 acres, the length of quay being 1,860 m. (6,200 ft.). All the quays are to be built of concrete, faced with granite. There will be one stationary 25-ton crane, and seventeen 5-ton movable cranes.

In Norway, the question of a free port is also to the fore, and of late Stavanger has come into prominence as the most favorable position, with convenient access from the sea, entailing very little loss of time. Further, Stavanger is at no great distance from the large English coal mining districts, and it is conveniently located for transit, both to other Norwegian ports and to Archangel and the Baltic. Norway's largest dry dock is at present being constructed at Stavanger, and additional railway facilities will establish connection between Stavanger and Christiania

Russia

Russia, in spite of the war, is exerting herself in no small degree to meet the after-war competition in shipping. Russian yards, both on the Baltic and the Black Sea, have been considerably extended during the war, in addition to which a large new shipyard is being constructed on the Murman coast. The Russian steamer companies, however, have not confined themselves to the home yards in the matter of new ships, having placed orders both with Swedish and Norwegian yards, in the same way as vessels are being built for Russian account in Japan, both at the Osaka yard and the Kavasaki yard.

Holland has no doubt materially improved her merchant navy during the war by selling old vessels and building new in their place, at the same time as the Dutch yards have built a number of vessels for foreign account. As in other countries, an improvement of harbor and canal facilities has followed in the wake of the shipping boom. The course from the Hook of Holland to Rotterdam is to be or is being enlarged. There will be constructed a third Ymuiden lock, and the waterway from Ymuiden to Amsterdam will be widened and deepened so that the biggest steamers may get as far as Amsterdam.

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READER'S QUERY

By F. L. L.

IS there a simple method whereby without the use of a slide rule, it is possible to find the value of x and y in the equation:

$$A = B \times x \times y$$

The values of A and B are known and the ratio of x to y is as 3½ is to 2¼?

Machine Shop Equipment, Methods and Processes*

By E. R. Norris**

Since recent events have demonstrated so strikingly the reliance which must be placed by a nation on its engineering industry as a factor in modern warfare, the subject of the above title assumes a place of importance not previously awarded it by people in general. While not dealing specifically with munitions or other similar product, the application of the principles and information contained therein may be done with profit in all brænches of engineering

MANY important developments in machine shop equipment and practice have occurred recently, and while it is possible to collect and review only a few of these in the space allotted to this article, the few examples presented may be considered as fairly representative of the progress, and may, in a measure, indicate present trend of development.

It is about fourteen years since Messrs Taylor and White discovered the special treatment which gave the world high-speed steel, and while it was early predicted that the use of this steel would revolutionize machine tool equipment and method of manufacture, it naturally took some time for machine tool builders and users to fully realize the changes which had to be made in equipment and methods, in order that the demands of the new steel might be met in an efficient manner. The greatly increased feeds speeds and depths of cut, which were possible by the use of the new steel made it necessary for the builders of machine tools to redesign their tools along heavier lines, with greater pulling power, and later to equip the machines with quick changing and automatic or semi-automatic attachments to facilitate the handling between cuts.

High-Speed Steel Introduced Gradually

The large manufacturers had to be particularly careful in adopting high-speed steel when it was first introduced, its equipment not being suitable for its economical use; also, having a large stock of carbon and mushet steel tools, it was reasoned, and rightly so, that the change to high-speed steel must be made gradually. The new steels also made it possible for the machine operators to increase their productive capacity without an equivalent effort on their part, and it naturally followed that time and money values on work had to be adjusted to meet the new condition. Shops working under the premium plan of payment, or similar systems having a sliding scale of pay depending on the time taken to perform work, were in a position to adopt the new steel in many cases before values were adjusted to meet the new conditions. Under piece work or similar systems of payment, however, it was absolutely necessary to promptly adjust the price paid, in line with the savings in time made with the new steel, and there is no doubt that this fact, in a great many cases, retarded considerably the general adoption of the steel. During the period between 1898 and 1900, Messrs. Taylor and White discovered and developed the process of treating tools made from chromium-tungsten steels; and while shortly after this time it was generally known that steel of this kind heated nearly to the melting point would do considerably more work, comparatively few took full advantage of the steel until Mr. Taylor's paper "On the Art of Cutting Metals" was published in 1906. This paper created a profound and world wide interest in steel; and while the paper dealt only with the results obtained with forged cutting-edged tools of lathe and planer types, its value was well known, and the new steel was rapidly substituted for the steels which were being used for drills, milling-machine cutters and other kinds of cutting-edged tools.

Before entering into a detailed discussion of these matters it may be well to state for convenience the subject matter has been arranged in four groups, which will be taken in the following order:

Special alloy steels and Stellite
Machining with edge tools
Grinding
Electric driving for machine tools.

Special Alloy Steels

The composition of special alloy steels their treatment, application effect on machine shop practice.

Shortly after the publication of the paper, "On the Art of Cutting Metals," many steel manufacturers became highly interested in the subject, and, as a result, many varieties of the tungsten-chomium steels were rapidly placed upon the market by both home and foreign producers. The so-called "air hardening" steel, introduced by Robert Mushet about the year 1870, contained the essential elements of a high-speed tool steel, and required only the special treatment discovered by Messrs. Taylor and White to improve the high speed cutting qualities. Considerable development was necessary, however, before the high cutting speeds and durability, which are common to-day, were rendered possible. The annexed table indicates some of the changes which have been made in the chemical composition of high-speed steel up to the present date:

	Tungsten	Chromium	Carbon	Manganese	Silicon	Phosphorus	Sulphur	Molybdenum	Vanadium	Cobalt	Nickel	Copper
Mushet (Air hardening) ..	5.441	0.398	2.150	1.578	1.044							
Midvale (Date 1895)	7.723	1.830	1.113	0.180	0.246	0.023	0.008					
Recent make.........	16.28	4.26	0.63	0.10	0.141	0.008	0.018	0.55	0.26	3.7	Tr.	Tr.

While this research and development finally benefited the user, he was at first involved in considerable expense in efforts to select, from the many brands available, the best steels to use for different purposes. The following investigation is typical of the tests which were carried out by users at about that time.

Many Steels Tested

Twenty different brands of tool steel—ranging in price from $0.38 to $1.00 per pound ($0.84 to $2.205 per kilogram)—were selected and tested in order to determine which kinds would be the most efficient for the work in hand. From each brand of steel, tools were forged, hardened and ground under the direction of a specialist. The heat treatment was carried out in accordance with the steel manufacturers' instructions, and standard cutting angles and shapes were closely adhered to. The tools were first tested on axle-steel shafts, containing approximately 0.45 per cent. carbon, at a cutting speed of 103 feet (or 31.39 meters) per minute, the feed being 1-40 of an inch (0.634mm) and the average depth of cut 5-32 of an inch (3.97 mm).

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*A paper presented at the International Engineering Congress at San Francisco, 1915.

**Director of Manufacturing Operations, Westinghouse Electric & Mfg. Co., East Pittsburgh.

A stream of cutting compound was directed on the tool. It is interesting to note the wide variation in the amount of work done by the different kinds of steel. Fig. 1 shows that the tool giving the best performance removed 570 cubic inches (9336 cu. cm.) of metal for each grinding, whereas the tool at the bottom of the list removed only 38 cubic inches (622 cubic cm) of metal per grinding. Three tools were made from each kind of steel, and the best result from each set of tools was recorded in the chart.

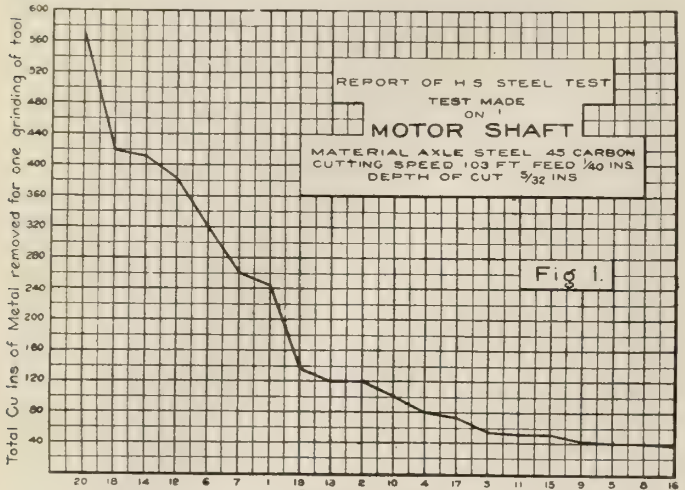


FIG. 1.

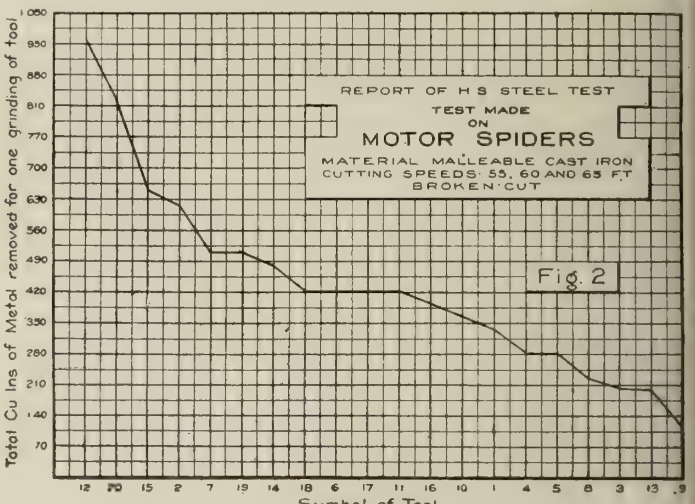


FIG. 2.

A second test was made on malleable cast iron spiders, which, having four ribs each, provided an intermittent or broken cut, thus giving the tools a more severe test than would have occurred had the cut been continuous. A cutting speed of 55 feet per minute (16.73 metres per minute) was used on the first four spiders; this was increased to 60 feet (18.29 metres) per minute on the next four spiders, and a speed of 65 feet per minute (19.81 metres per minute) was maintained on all subsequent spiders until the tool was ready for regrinding. In all cases, 1-12 inch (2.12 mm). feed was used, and the average depth of cut was 7-32 inches (5.56 mm). Fig. 2 shows the amount of metal removed for each grinding of the various tools; the symbols shown on the curves were for purposes of identification of the steels used.

Reducing Initial Cost of Tools.

Superior grades of high-speed steel, though of high efficiency from a cutting standpoint, are often rejected on account of the high cost of the investment. Tool holders reduce this investment to some extent, however, but their use is somewhat limited owing to the fact that in many places a solid tool can be manipulated to greater advantage.

From time to time, various tests have been made on butt-welded tools and on tools formed by welding tips of high-speed steel to low grade carbon steel shanks. The electrical welding process as applied to work of this kind is quite successful. A very important consideration, however, is the one of relative cost of solid and welded tools. To illustrate this point, consider a ¾ in by 1½ in. (19.04 by 38.1 mm.) round-nosed lathe tool made, first, as a solid high-speed tool; secondly, from low grade carbon steel shank with two inches of high-speed steel butt-welded on same; thirdly, from carbon steel shank with small high-speed steel tipwelded on. Reference to annexed table will show the first costs of solid, butt-welded and welded tip tools to be $2.74, $1.08 and $0.80 respectively, the figures being based on high-speed steel at $0.60 per pound ($1.32 per kilogram).

Solid Tool ¾ x 1* x 12 in. long (19.05 by 38.1 x 304.8 mm)—

Cost of first tool	$2.74
Six additional reforgings and hardenings	1.20
69 additional grindings	5.17
Total cost during life of tool	9.11
Salvage	1.07
Net cost	$8.04

Butt-Welded Tool—¾ x 1½ x 8½ in. Carbon Steel (19.05 x 38.1 x 216 mm) 3 Pcs. ¾ x 1½ x 2 in. (19.05 x 38.1 x 50.8 mm) H.S.S.

Cost of first tool	$1.08
Two additional pcs. of high-speed steel.	.80
Preparing for and welding (2 welds)	.46
Six additional reforgings and hardenings	1.20
69 additional grindings	5.17
Total cost during life of tool	8.71
Salvage	.04
Net cost	$8.67

Welded Tip Tool—

Cost of first tool	$ .80
Six high-speed steel tips	2.04
Preparing for and welding (6 welds)	1.20
69 additional grindings	5.17
Total cost during life of tool	9.21
Salvage	.04
Net cost	$9.17

Thus the initial outlay for the solid tool is considerably greater than that for the welded tip tool. The cost of up-keep must be considered, however, and further reference to the table, which is based on 70 grindings as being the life of each tool, shows that the final costs of the solid tool, the butt-welded tool and the welded tip tools are $ 8.04, $8.67 and $9.17 respectively. It may appear, at first sight, that the allowance for salvage on the solid tool is high, but when it is considered that scrap ends are forged down and used for smaller tools or the teeth of milling cutters, it will be seen that the depreciation is very small.

First Applications of the New Steels

The substitution of high-speed steel for carbon steel and mushet steel naturally took place first in those cases where tools were comparatively simple in construction—as in lathe and planner tools—and while the increased output, due to greater cutting speeds and feeds, was truly remarkable, there was a still more remarkable increase in the output from the drills and milling machines, after these latter had been equipped with the new steel tools. This, no doubt, was due in a measure to the fact that in the case of the lathe and planer, the transition was frequently made from mushet steel, with its cutting speed of approximately 30 feet (9.14 metres) per minute to high-speed steel of perhaps 60 feet (18.28 metres) per minute cutting speed; whereas, in the case of the drill and the miller, the change was made, in the majority of cases, from slow-speed steel tools directly to the new high-speed steel tools.

High-speed steels are now commonly used in modern machine shops for turning, boring, planing, shaping, milling, drilling and punching, the most noteworthy exceptions to this rule being found in shops where the product consists chiefly of articles made from the softer metals or their alloys, in which cases the carbon steels are often preferred. There are many purposes, however, for which carbon steel tools are used and will continue to be used in all shops. High-speed steels are also being used with success in the manufacture of slotting dies. There are at least two reasons why the use of high-speed steel for this purpose has been somewhat delayed, the first being that the speed of a punch or shear press is usually determined by the speed at which work can be fed; the second being due to the risk in hardening expensive dies. The following record of tests made with dies of carbon steel and high-speed steel is interesting.

Record of Tests.

The work selected was the punching of notches in sheet steel of 0.0172 inch (0.436-mm.) thickness. This was done on an automatic notching machine, which runs at the rate of 300 notches per minute—the maximum speed at which the work could be indexed with accuracy. Carbon and high-speed steels were run at the same speeds, and it was found that carbon steel dies required grinding oftener than the high-speed steel dies in the ratio of 2.4 to 1 The curves given in Fig. 3 show the number of notches punched for each grinding of the die. It can be seen that at the end of the tenth grinding the die made from the high-speed steel had punched 1,239,000 notches, whereas the carbon steel die had punched 506,000 notches.

The use of high-speed steel dies increases the production somewhat, as they do not require grinding so often as carbon steel dies. The greatest saving, however, is to be found in the cost of the dies themselves. From data collected from tests similar to the above, it has been found that the relative costs of carbon steel dies and high-speed dies, for a given production, are approximately as two is to one. The loss due to hardening is very small, being slightly under one per cent.

Heat Treatment of Tools

The heat treatment of the new steels has remained fundamentally the same since they were introduced. Modifications have been made in the apparatus used for the heat treatment of tools. Electrically heated oil baths provide a handy means of drawing the temper. Lead baths are also used, with thermocouples and galvanometer for temperature control. The galvanometer has four contracts—one for each thermicouple and one for the off position. The accuracy of each electric pyrometer is checked occasionally with a standard instrument, which is kept for that purpose. Heat treatment records are conveniently kept in a card index.

When a new brand of steel is introduced, the determination of its critical temperature is usually necessary. This is conveniently carried out by means of a small electric furnace, in conjunction with a thermo-couple and galvanometer. Small pieces of steel under test are clamped to the side of the thermo-couple and inserted in the furnace. The temperature of the furnace is raised slowly, and simultaneous readings of time and temperature are taken, from which the critical temperature curve of the steel is plotted.

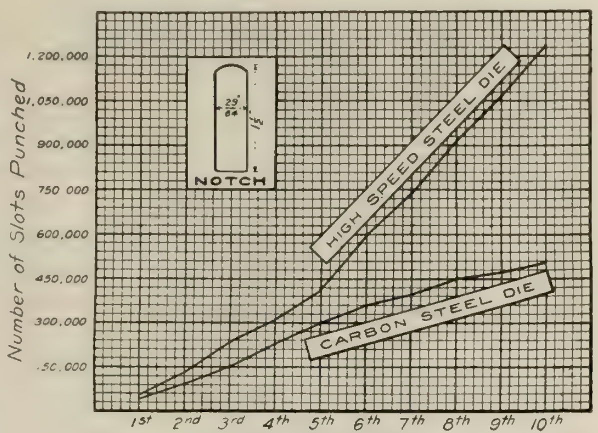


FIG. 3.

Stellite.

A substance placed upon the market under the name of Stellite is claiming considerable attention as a high-speed cutting material. Stellite is not a steel. A recent analysis of a sample gave the following chemical composition:

Cobalt	52.03%
Chromium	29.36%
Tungsten	12.71%
Iron	5.35%
Nickel	0.45%
Manganese	0.24%
Silicon	0.09%
Molybdenum	Trace

Stellitte cannot be forged, rolled or machined, is extremely brittle and tools made from it must be well supported close to their cutting edges. It is supplied by the makers in short cast bars of such sections as may be ground to form tools of simple outline and construction; hence its uses are at present somewhat limited.

Stellite tips may be brazed or electrically welded to shanks of carbon steel, and when so treated, may be used until repeated grindings render the stellic very thin. These tools continued to cut well until their tips were reduced in thickness, by repeated grindings. Tool holders which support their tools close up to the cutting edges are, therefore, especially suitable for stellite.

Under favorable circumstances, cutting speeds may be greatly increased by the substitution of stellite for high-speed steel. Many cases are on record where cutting speeds on machinery steel have been quadrupled. The following instances may be of interest. Thin cast iron frames, which were very hard on account of their being somewhat chilled, were successfully faced at a cutting speed of 300 feet (91.44 metres) per minute by the use of stellite, whereas the speed for high-speed steel was 45 feet (13.72 metres) per minute. In this case, there was also a decided reduction in the time spent on grinding tools, the stellite tool finishing nine pieces for each grinding as against one piece finished for each grinding of the high-speed steel tool. On an axle-steel shaft of 0.45 carbon the cutting speed was increased from 100 feet (30.48 metres) per minute to 305 feet (93 metres) per minute, when stellite was substituted for the usual high-speed tool. Sandy brass castings have also been machined with considerable success by the use of stellite tools—the cutting speeds being doubled. At present, stellite does not give good results where the cutting is irregular or broken, but where a continuous cut of uniform depth, with small feed, can be used, it will frequently be found that a high rate of cutting, together with a uniform size may be maintained.

* * *

COAL IN THE FEDERATED MALAY STATES

COAL, a recent discovery, is now one of the commercial products of the Federated Malay States. It is being mined in Selangor, not far from Kuala Lumpur, by the Malayan Collieries, Limited. Though work on an extensive scale was not begun till September last, 11,523 tons of coal were raised in 1915, and it is stated by Mr. W. Eyre Kenny, Senior Warden of Mines, that this coal, where used in suitable plant, will exercise an important influence on mining and other costs, and it is hoped will tend to reduce the consumption of firewood. Among other consumers, two large mines have taken the coal into use, a considerable saving in working expenses having resulted, and a contract has been entered into for part supply of the Federated Malay States Railways. The power plant at the mine comprises two Babcock and Wilcox boilers fitted with stepped grates, supplying steam to the steam winding plant and to a steam electric power station. Two inclined shafts have been sunk to a distance (on an incline) of 846 ft. and 800 ft. respectively, together with a ventilating shaft and airways, supplied by an electrically-driven fan. Experiments in briquetting are in progress, under the supervision of Prof. Bone, in England.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

SCREW CUTTING ENGINE LATHE WITH GAP BED.

THE lathe which is shown in the accompanying illustration is designed to meet the demand for a small screw-cutting engine lathe with gap, capable of doing all of the light work ordinarily performed on larger and more expensive machines. It is built by the Perfect Machine Co., Galt, Ont., in two sizes—12 in. and 14 in. with a 6 ft. bed. Convenience of design and accuracy of workmanship have been so combined as to render this tool particularly useful for machine shops, garages, experimental work, trade schools and opticians, etc.

Six spindle speeds are provided on the headstock, which has a three-step cone pulley with back gears, and is designed to afford maximum rigidity. The spindle is made from a high carbon steel forging, is finished by grinding, and has a $\frac{7}{8}$-in. hole through its length. Split bronze bushings allow of wear being taken up on both bearings, while end thrust is taken by a threaded collar. Reverse gear for screw cutting is also located on the headstock.

Careful attention has been given to the lead screw, which is of high carbon steel and accurately cut. It is splined for feeding on ordinary work through a friction feed so that the threads are only in use when cutting screws.

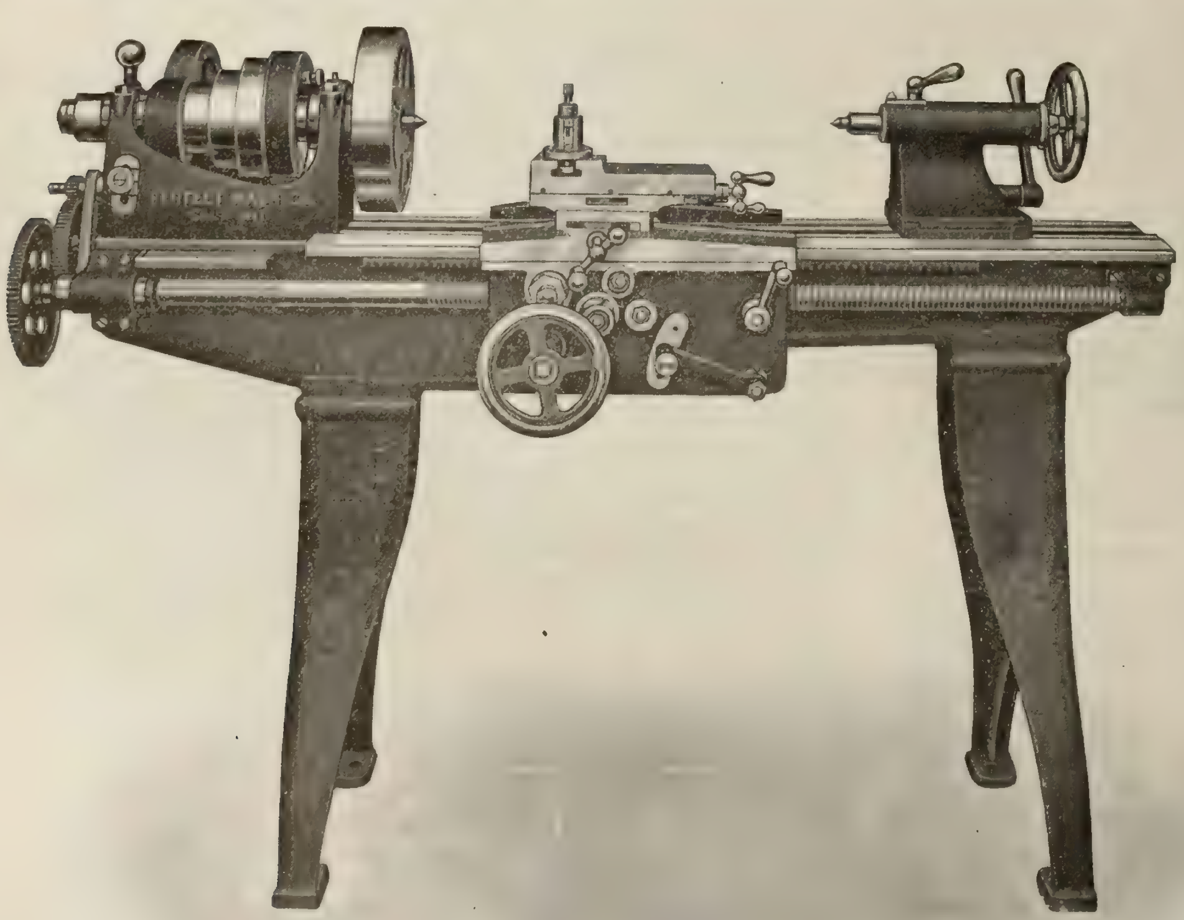
By means of an interlocking safety device, it is impossible to engage either the longitudinal or cross feed friction mechanism, while the half nuts for screw cutting are engaged. Both friction feeds are engaged by turning knobs and the crank hand of the cross-feed does not revolve while the power feed is on. Feed reverse in either direction is also provided.

The compound rest is graduated for angular settings, while the tailstock is quickly locked or released by the single movement of a lever. Equipment includes a plain faceplate, centre, and follower rest, steady head, set of change gears, wrenches, etc. The principal dimensions of the two lathes are respectively, for 12 in. and 14 in. size—swing-over carriage, $8\frac{7}{8}$ in. and $10\frac{7}{8}$ in.; swing-in gap, $17\frac{1}{2}$ in. and $19\frac{1}{2}$ in.; width of gap, 5 in.; width of same in front of faceplate, 5 in.; front spindle bearing, $1\frac{7}{8}$ in. by $2\frac{1}{2}$ in.; rear spindle bearing, $1\frac{1}{2}$ in. by $2\frac{3}{8}$ in.; dia. of lead-screw, $1\frac{1}{8}$ in.; width of cone steps, $1\frac{1}{2}$ in.; weight with countershaft, 800 lbs. and 850 lbs.

DUPLEX SURFACE GRINDER

SIMPLICITY of design, consistent with the purpose of the machine has been the chief aim in producing the Duplex Surface Grinder, illustrated herewith. It has been developed through more than two years' use in the tool room and production departments of the Stenotype Co., Indianapolis, and is now regularly produced by them.

The design is that of a simple hand-



SCREW CUTTING ENGINE LATHE WITH GAP BED.

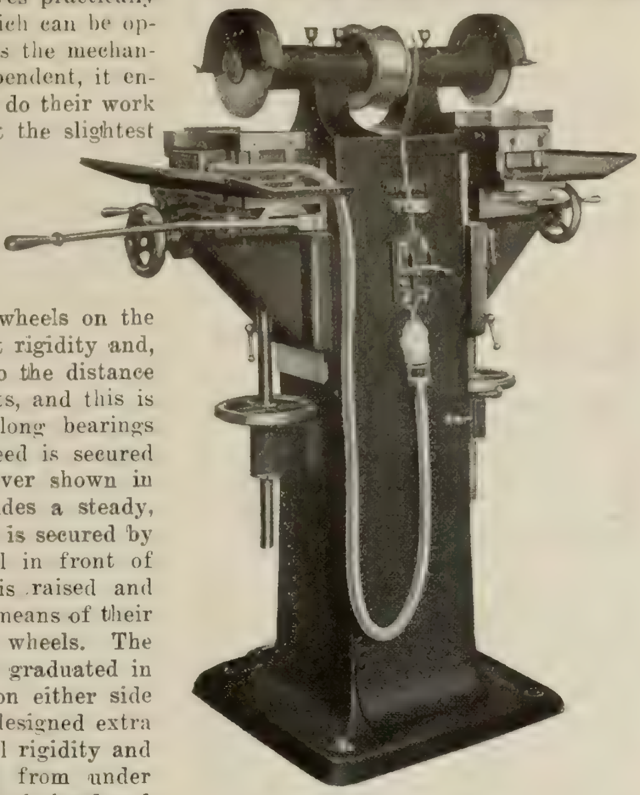
operated surface grinder, with a table on each side of the column, and an emery wheel for each table on opposite ends of the spindle. Each table is fitted with magnetic chuck, each chuck having its own switch. This gives practically two machines, each of which can be operated independently. As the mechanism of each table is independent, it enables the two operators to do their work at the same time, without the slightest interference with each other.

Either table can be elevated and fed entirely without interference from the other. Having the two wheels on the same spindle secures great rigidity and, therefore, accuracy, due to the distance apart of the bearing points, and this is further assisted by the long bearings used. The longitudinal feed is secured by means of the hand lever shown in the illustration and provides a steady, easy feed. The cross-feed is secured by means of the small wheel in front of each table. Each table is raised and lowered independently by means of their respective elevating hand wheels. The elevating hand wheels are graduated in thousandths. The knees on either side supporting the tables are designed extra strong, thus giving unusual rigidity and preventing any springing from under the table. The long spindle is hardened and ground and is supported on two 6-in. Non-Gran High Speed Bronze bearings. The spindle is carefully fitted to hand scraped bearings to insure a true running wheel without the slightest vibration.

Great accuracy with this machine is possible because of the large bearing surfaces, heavy supports and the very careful workmanship throughout. The time of setting up an automatic machine is saved and at the same time no sacrifice is made in accuracy. There is a distinct gain in speed in addition to the elimination of setting up, in that the operator can feed his work exactly according to his judgment, without having to stop it to change adjustments.

The machine comes equipped regularly with two standard magnetic chucks of the greatest efficiency that can be procured; also two emery wheels and the countershaft. The magnetizing switch is also included without extra charge. Wheels suitable for this grinder can be obtained from any of the grinding wheel makers. Note that the wheel guard may be removed and any other wheel within the limits of the machine can be used.

Leading dimensions are.—Vertical movement of table, 8 in.; working surface, 5¼ in. by 12 in.; max. distance, spindle to table, 13 in.; working surface of magnetic chuck, 4½ in. by 10 in.; emery wheels up to 7 in. dia. by ½ in. wide; floor space, 20 in. by 48 in.; net weight, 520 lbs.



DUPLEX SURFACE GRINDER

* * *

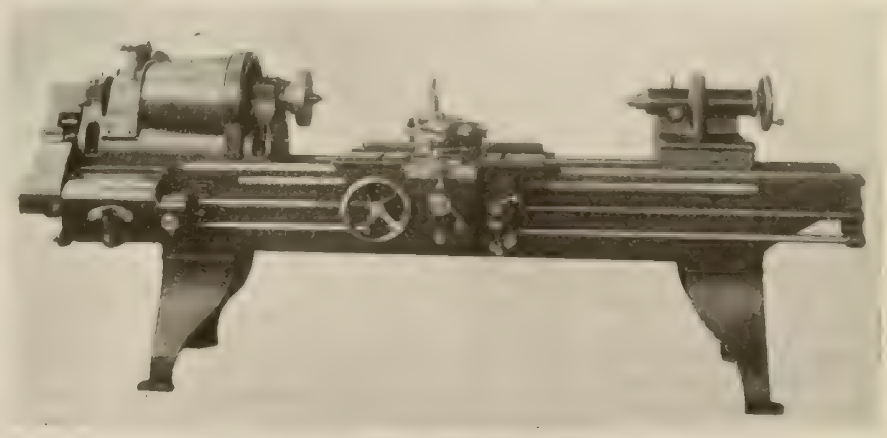
22 IN. ENGINE LATHE.

THE accompanying illustration cut represents a 22 in. lathe the design of which is along the same lines as the 16 in. and 18 in. size already built by the makers. It is built either in the single or double back gear head and with quick change or semi-quick change feed.

The front spindle bearing is 3¾ in. in diameter by 6 in. long. Hole through spindle is 2 in. Diameter of cone pulley steps on the double back gear are 11½ in., 12¾ in. and 4¼ in. wide. The carriage is unusually heavy with wide bridge and the length of it is 33½ in.

Apron is of double wall construction with all steel gears. Both cross and longitudinal feed operated by one lever through expanding ring frictions. Headstock is of massive construction and has two large drop ribs running the full length. Compound rest is clamped by one bolt by means of a steel dove-tail clamping ring.

Actual swing over bed 23⅛ in. swing over carriage 15½ in. This machine weights about 4,500 lbs. and is built by the Morris Machine Tool Co., Cincinnati, O.



22-IN. ENGINE LATHE.

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PAPER FROM KAING GRASS

IT IS announced that the conversion of the Kaing grass of Burma into pulp, and subsequently into paper, can be accomplished in a simple and economical manner. It is expected that arrangements will soon be completed for the collection of the grass, its conversion into pulp, and its shipment in this form to papermakers in the United Kingdom. The yield of unbleached pulp is 39 per cent., calculated on the air-dry grass, compared with about 43 per cent. of unbleached pulp obtained.

* * *

AN encouraging sign of British trade alertness in foreign markets is the action of a number of manufacturers in cooperating in the production of catalogues printed in English, French and Spanish. The catalogues, which are to be sent to importers in all parts of the world, are cloth bound, and are so arranged that any article or any manufacturer can be easily found. The general classifications of textiles, hardware, drugs, construction, materials, etc., are subdivided, and importers are asked to mark on application blanks the special lines in which they are interested, when volumes containing these sections will be forwarded. The cost of publishing these catalogues is estimated at £50,000, and in addition to this the English exporters offer to pay freight and duty on them in the distribution to prospective customers.

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

MACHINISTS' INSTRUCTION COURSE.—VI.

THE lathe is the backbone of the machine shop; without accurate lathe work no modern machine shop can be run. It is capable of a larger variety of operations than any other machine in the shop, and it requires considerable care and skill to become a good lathe hand.

Lathe Work

It has been found that many operations can be more economically performed on a lathe which is specially adapted for some specific purpose, so that we have a number of lathes that are really special types in their own line, such as axle lathes, wheel lathes, turrets, etc. We will take for our consideration the operation of a tool room, engine or general purpose lathe, as any man that can operate a lathe on general work will have no difficulty in operating a special machine, the main principles being the same.

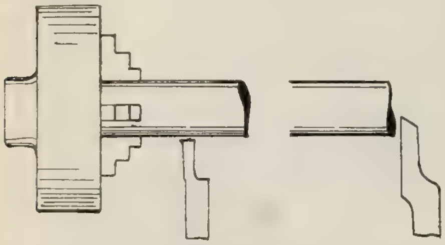

FIG. 29.

Consider first the turning of a plain round bar, and deal with conditions as we find them; there is a world of difference between actual conditions as you find them in some shops, and what you read about in text books. This bar might have been cast in the foundry, cut off with the shop saw, or as it often happens, the saw was busy with another job, so the blacksmith just nicked it round with a chisel and broke it off, leaving a nasty ragged end. The first thing to do is to face, or cut off the bar to the proper length. If the bar has a ragged end, don't waste time finding centre with compass or jenny-legs. Put the bar in the chuck , passing the bar through the hollow spindle of the lathe, and leave just enough sticking out of the chuck to face or cut off. (Fig. 29).

Cutting Off

If the lathe spindle should not be hollow, or if the bar should be too long, you will need to support one end with a steady bead. If there is sufficient length to cut off use a cutting-off or parting tool, but if there is not more length to cut off than the width of the cutting-off tool, use a knife tool. Don't use a cutting-off tool any longer than is necessary, the length should slightly exceed half the diameter of the bar to be cut, the width from 3-16 in. to $\frac{1}{4}$ in. After facing the end, the most convenient tool for centering is a combined dull and countersink to fit the tailstock, which is then fed into the bar with the tailstock spindle. A very useful tool is a centering tool; it is made of a standard size tool steel used in the lathe, hammered out like a flat drill, and used in the lathe tool post like any other drill. It is indispensable for truing up the centre of an old shaft. The centering drill of tool should be at an angle of 60 deg., to suit the angle of the lathe centres. (Fig. 30).

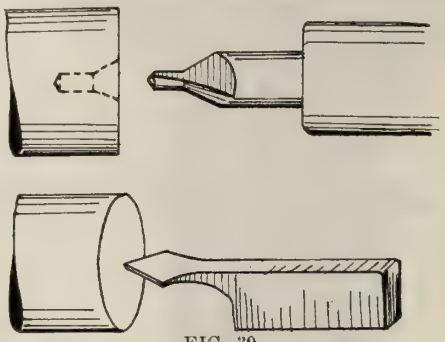

FIG. 30.

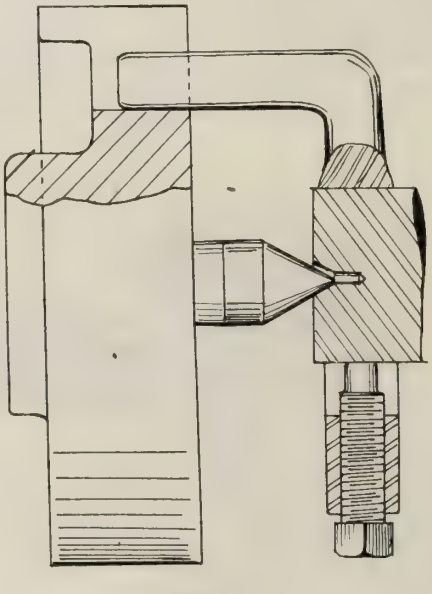

FIG. 31.

Proper Centres Essential

It is important to have round, smooth, centres at the correct angles, as it is impossible to do good lathe work with bad centres. If the centre is not made with a combination drill and countersink, a small hole should be drilled into the bar, as shown, to ensure that the centre will not ride on the point when the centre hole wears a little.

After centering, we are ready to begin turning. Put a lathe dog on one end, and lubricate the centre hole at the other end. The tailstock must be set to the proper position for holding the work between the centres; don't wind out the tailstock spindle any further than is necessary, and have the pressure on the spindle such that the work can be turned by hand, but not loose enough to have any end play, or fall down by the the weight of the dog. Be sure that the tail of the dog is quite free in the slots of the faceplate or driving plate. A common mistake for beginners is to have the tail of the dog held up in such a manner as to hold the work away from the live centre, Fig. 31, thus causing the work to run untrue. The writer considers that the proper way to drive a round bar is with a dog with a straight tail, driven by a pin bolted in one of the slots or holes of the face plate. This gives a direct drive and avoids all possibilities of twisting or jamming of the tail in the slot.

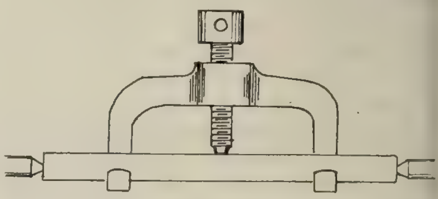

FIG. 32.

Truing the Bar

The next thing is to see that the bar is running true. It may be true at the ends, but bent in the middle more than the amount of stock to be turned off. If there is no special straightening machine, and it is seldom there is, it can be straightened between the centres of the lathe either by the use of a jim-crow, Fig. 32, or with a bar or lever, unless the job is a heavy one, when it might be necessary to take it to the blacksmith shop. Straightening a shaft cold in the lathe stretches the metal and sets up a kind of internal strain in the metal, so that it will very seldom remain true after being cleaned up with one cut; never try to finish a job with one cut that has been straightened in the lathe. If there is an old lathe that can be used for straightening, so much the better, as straightening between the centres is bad for the lathe and should be avoided if possible.

In using the jim crow, revolve the work round in the lathe and hold a piece

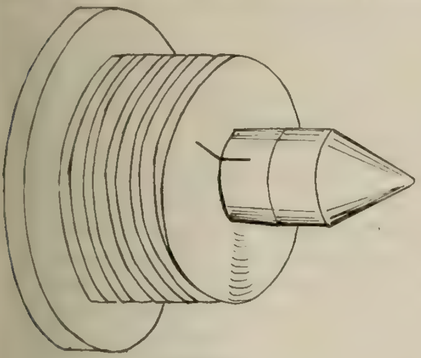

FIG. 33.

of chalk against it to find the high spots. Put the high spot or bent part at the top, right under the screw of the jim crow, and tighten up the screw until you judge you have taken out the bend. Test the bar by revolving it round again, and repeat the operation until you have the work true enough to turn up. The work can also be straightened by putting a bar or lever under the work in such a way that when the bar or lever is pushed down the work is sprung up, only in this case the marked or bent part must be down. After a few trials it will be found to run nearly true. If the bar is too stiff to be straightened by simply springing it with a bar, give it a few sharp blows with a hand hammer on the top of the shaft while holding it up with the bar. The hammering should be light or the bar will be found to be bent the opposite way.

If the job has been straightened between the centres, examine the lathe centres before starting a cut, putting the lathe on top speed to see if the live centre is true. If the live centre is slightly out of truth, although a piece of work turned out on it might be straight and true, or a number of different sizes were turned, they might all be true with each other, they would not be true with

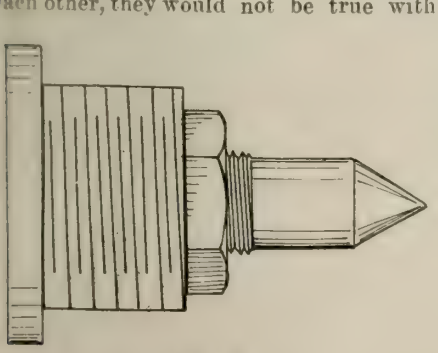

FIG. 34.

the centre hole in the shaft. If, however, the dog was loosed off and clamped again in a fresh place, or the piece was turned end for end, it would not run true, so that it is very necessary to have a true live centre, especially when work passes from one lathe to another before being finished.

Hardening of Centres

The dead centre should always be hardened. The live centre may or may not be hardened, according to circumstances. If a live centre is turned, hardened, and then put back into its place, the chances are that it will not run true, owing to unequal expansion and contraction in the operation of hardening and tempering. To use hardened live centres they ought to be ground in their place by a special grinding attachment for that purpose. On the other hand, while a soft lathe centre can easily be turned up and trued, it can easily be bent or bruised and made untrue.

If you are working in a shop that has grinding attachments for the lathe, by all means harden the live centre, but if not, better leave them soft or have the temper drawn just enough to turn. Even though the centre is ground perfectly true, it will be found that after removing it and putting it back it may not run true. This is due to the fact that the centre hole in the spindle is not always absolutely true; therefore, when turning the centre always make an identification mark on it and on lathe spindle to enable you to put them back in the same place. (Fig. 33).

All kinds of devices have been used for removing the lathe centre, leaving squares, or flats, on the centre, hammer and chisel, pipe wrenches, etc. One of the best methods is to thread the centre with a fine thread and fit on a nut, which also acts as a good support for rough or uneven turning. (Fig. 34).

MANUFACTURE OF ELECTRICAL APPARATUS IN INDIA

THE present war is making India more dependent upon herself for the production of material that has hitherto been imported from Europe and elsewhere. As far as engineering material is concerned, she has been able to produce both the quality and quantity required in whatever she has taken up. and *Indian Engineering* now asks, Why should not she extend her field and introduce the manufacture of such electrical goods as are at present only imported? According to our *Indian* contemporary, most, if not all, of the raw material required for the manufacture of electrical plant and machinery is procurable in the country; this being the case, why, it is asked, is it not utilized in the country instead of being exported for manufacture in some other country, and again imported in the shape of the finished article for use in India? The main reason for this seems to be the question of finance, no firms being prepared to lay out a large sum on the opening up of a new industry in a foreign country the success of which is not assured.. The demand for electrical plant and machinery in India has increased enormously during the past few years, and there is no doubt that this demand is going to increase steadily for several years to come.

RUSSIAN PLATINUM

ACCORDING to a Consular report the outlook for platinum mining in the Urals, as judged by recent events, would seem to foreshadow an even smaller production this year than in 1915. Recent mobilizations in the platinum mining districts, which have hitherto not been called upon, have greatly curtailed the output from hand washing. Austrian prison labor and Chinese labor, although largely utilized in other industries, have not been adopted in the platinum industry. The production from the larger companies by means of dredging is likely to be similarly affected by this scarcity of labor. The future as regards prices is largely dependent on the quantities the Government allow to be exported, as the Russian internal consumption is not sufficient to influence prices either one way or the other.

MOLYBDENITE

THE great demand for molybdenite has had the effect of producing a much-increased output from many of the mines now operating in Queensland, and numbers of prospectors have been induced to examine areas of country where indications of the mineral appear in the outcrops of lode formations, but no phenomenal developments have taken place as a result of these operations. The principle molybdenite lodes are at Wolfram, in the Chillagoe field, other important deposits occurring at Bamford, in the same district. Official records show common occurrences of the mineral in small quantities in quartz lodes on many fields throughout Queensland.

* * *

PEOPLE are very apt to dismiss what they do not understand very easily as theoretical, and therefore useless; that is a very easy way out of a difficulty, as it saves the bother of learning. But it is a fatal mistake to carry that attitude too far, because theory which stands for systematic knowledge can not safely be dismissed as merely academic. If the facts established in the laboratory do not work out in practice, it must be that some factor is not understood.

* * *

The Canada Copper Co.'s productio for eight months at the Greenwood, B.C. smelter, was 3,455,578 lbs. copper, 3,555 ozs. gold, and 33,096 ozs. silver.

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CURRENT VIEWS OF CAPITAL AND LABOR

THE annual meeting of the British Association for the Advancement of Science was held at Newcastle in the beginning of September, and by a curious coincidence the Trade Union Congress at Birmingham was held at the same time. The proceedings of the latter body have been fully reported by the delegates from the various countries and the various addresses delivered at the former body are now available. In common with every public body of prominence the attention of members was directed by many of the speakers to the vast social and economic changes brought about by the conflict.

No man will question the truth of the position as defined by the Lord Mayor at Birmingham when he said the aim of the working classes was that it should be worth while to live in the country they had done so much to preserve. Just how to reconcile the probable refusal of the Trade Unions regarding an ultimate lowering of wages and at the same time return to old days of restricted output and high costs is a matter which will not lose in importance as the time draws near for adjustment.

The hopes of Canada to attain a high place in world commerce are worthy of all fulfillments and the absence of such a vital factor as restricted output, with its train of trouble, disagreement, and economic loss, is one feature of our outlook for which we as a nation should feel thankful. Even now, when women have entered this field, the result of their efforts has not been to show the work of our men to disadvantage. To the average Canadian employee it seems almost impossible that refined women should continue indefinitely to produce two or three times as much work as an able-bodied man was previously allowed to do by trade union rules.

With all desire to maintain the trade supremacy of the Empire in general, and Britain in particular, it is impossible for a person accustomed to Canadian conditions to see how a body of presumably intelligent men could deliberately lie down on the job to such an extent.

The answer to the whole situation seems to be a lack of confidence, and in the mutual sacrifices which have been and may still have to be made by both capital and labor, may rest that future freedom from internal strife, without which present sacrifices will have been in vain. It may, in fact, be that the appearance of the gentler sex on the industrial horizon has served a dual purpose, that of diligent example to labor, and that of generous recognition to capital. Recognition, not limited to a scant nod in the factory and ignoring in the street, not the feeling that when the man's pay is made up for the week the employer need have no further interest in his welfare,—recognition such as that is to a great extent responsible for the present attitude of labor. The new recognition has been brought about by the women themselves, whose presence has resulted in the provision of kitchens, canteens, rest-rooms, laundries, etc., in connection with many establishments, while in the shop itself increased attention to labor-saving appliances, lighting, inspection of product, tool room service and supervision of effort generally, have all contributed their share to the present results, so much so that a reversal to former conditions of latent antagonism seems almost unbelievable.

After viewing the standpoint of the Congress it is interesting to observe the criticisms of capital which were made by various speakers at the Association. Prominent among these was Mr. Gerald Stoney, F.R.S., who presided over the Engineering Section, and in the course of his address discussed some of the problems which face the engineering trade of Britain, and in lesser degree Canada. As an engineering manufacturer of wide experience Mr. Stoney was qualified to comment on the handicap under which our industries suffered from the reluctance of firms to utilize highly educated labor or to adopt scientific methods.

With direct reference to Newcastle district, the speaker asked how many engineering firms had a skilled chemist on their staff, and what percentage of these pay him a decent salary? How many heads of firms have sufficient chemical knowledge to appreciate the work, and utilize the services of such a man, because unless there is an appreciation of the work done by him, his services are useless and he becomes discouraged, generally finding himself up against the blank stone wall of passive tolerance, if not of active prejudice. And yet chemical problems are continually cropping up in engineering work. Perhaps the most significant statement was that Leipzig University alone has an annual income from the German Government of $500,000 against a total British grant to all universities of about $225,000.

Equally discouraging was the support given to the National Physical Laboratory which receives a grant of $35,000, as against $350,000 enjoyed by its German equivalent, and $700,000 which is granted to the Bureau of Standards at Washington. With regard to private investigation, Sir Charles Parsons is quoted as saying that a man or firm in the face of financial difficulties cannot carry on research work. The minimum spent on research work should be at least 1 per cent. of the turnover and the amount it is advisable to spend is 3 per cent. Unless a firm makes good profits it cannot keep up-to-date and will sooner or later go to the wall.

The foregoing concluding sentence is one reason why any attempt by labor to enforce a retrograde act on capital will meet with the opposition of men striving for life. It is known that labor has deliberately restrained effort, it is known that with a reasonable effort and mutual trust labor may earn much more and yield more, it is known that without increased and continued yield labor as typified by trade unions will be as a millstone on the neck of capital, the question of the hour, therefore, is mutual trust and events seem to be working surely if slowly to such a desired consummation.

INDUSTRIAL NOTABILITIES

THOMAS FINDLEY, Vice-President and Assistant General Manager Massey-Harris Co., Toronto; President, Deyo Macey Engine Co., Binghampton, N.Y.; Director, Johnston Harvester Co., Batavia, N.Y.; Vice-President Toronto Housing Co.

Mr. Findley was born in York County, Ont., on December 16, 1870, being the son of Thomas and Agnes (Thompson) Findley. He was educated in the public school at Sutton West, Ont., and began his business career as a telegraph operator and postal clerk in the same town in 1886. In 1890 he joined the Massey-Harris Co., as a telegraph operator, remaining with the firm until the present time. His advancement has been steady and continuous. He became Chief Accountant in 1895; Assistant to President in 1902; Assistant General Manager 1907; Director 1909 and Vice-President 1912, which position he holds at the present time.

THOMAS FINDLEY.

Mr. Findley is a member of the Canadian Manufacturers' Association. He was Chairman of the Legislative Committee 1912-1914, and is a member of the Executive Council. He is an active member of the Presbyterian Church, being a member of the General Board of Finance.

Mr. Findley married Phoebe Constance Smith, daughter of Samuel Smith, of Kingston, Ont., on April 24, 1894, and has two sons and one daughter.

He is a member of the Lambton Golf and Country Club, and St. Andrews' Society. His recreations are golf and motoring, and he lives at 88 Admiral Road, Toronto, Ont.

—Photo. Courtesy British and Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$19 95
Lake Superior, charcoal, Chicago	19 75
Michigan Charcoal, iron	28 00
Ferro nickel pig iron (Soo)	25 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton, No. 1	$26 00	$24 00
Hamilton, No. 2	26 00	24 00
Victoria, No. 1	27 00	25 00
Victoria, No. 2X	26 00	24 00
Victoria, No. 2 plain	26 00	24 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.25
Steel bars, base Toronto	3.40
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.50
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.25
Bars, 2 in. and up	3.75
Structural shapes	3.25
Plates	3.75

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs. C.L.	Per 100 lbs. L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$31 00
Electrolytic copper	31 00	31 00
Castings, copper	30 00	30 00
Tin	44 00	47 00
Spelter	13 00	14 00
Lead	9 00	9 00
Antimony	15 00	18 00
Aluminum	70 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4 75	$4 50
Heads	5 00	4 75
Tank plates, 3-16 in.	5 25	4 75

WROUGHT IRON PIPE

Prices in effect Sept. 12, 1916.

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3.50	$ 5 00
¼ in. and ⅜ in.	3 18	5 31
½ in.	4 08	5 65
¾ in.	4 95	7 07
1 in.	7 31	10 46
1¼ in.	9 89	14 15
1½ in.	11 83	16 91
2 in.	15 91	22 76
2½ in.	25 16	35 98
3 in.	32 90	47 05
3½ in.	39 56	56 50
4 in.	46 87	67 04

Lapweld

2 in.	$17 76	$24 24
2½ in	26 33	36 56
3 in.	34 43	47 81
3½ in.	41 40	57 50
4 in.	49 05	68 13
4½ in.	59 69	83 19
5 in.	69 56	96 94
6 in.	90 24	125 80
7 in.	121 40	165 40
8 in. x 25 lbs. per ft.	127 50	173 80
8 in. x 25 lbs. per ft.	146 90	200 20
9 in.	176 00	239 40
10 in. x 32 lbs. per ft.	163 20	322 40
10 in. x 40 lbs. per ft.	210 10	286 30

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	16 75	$18 50
Copper, crucible	19 75	22 50
Copper, heavy	19 75	22 00
Copper wire	19 75	22 00
No. 1 machine compos'n	15 25	17 00
No. 1 compos'n turnings	13 25	14 00
New brass clippings	13 75	15 00
No. 1 brass turnings	12 25	12 00
Heavy melting steel	9 50	10 00
Boiler plate	12 00	10 50
Axles, steel	15 75	15 00
Axles, wrought iron	19 00	19 00
Tires. steel	12 00	11 00
Rails	13 75	13 00
Shafting	16 75	16 00
Malleable scrap	10 25	11 00
Pipe, wrought iron	10 25	9 00
Stove plate	10 25	10 50
Heavy lead	6 00	7 00
Tea lead	5 00	5 25
Scrap zinc	7 50	7 75
Aluminum	35 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	45
Stove bolts	62½
Plate washers	25
Machine bolts, and less	35
Machine bolts, 7-16 and over	25
Blank bolts	30
Bolt ends	25
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts, hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets	37½
Boiler rivets, base ¾-in. and larger	$5.25
Structural rivets, as above	5.15
Wood screws, flat, bright	77½
Wood screws, O. & R., bright	72½
Wood screws, flat, brass	45
Wood screws, O. & R., brass	42½
Wood screws, flat, bronze	37½
Wood screws, O. & R., bronze	35

MILLED PRODUCTS

	Per Cent.
Set screws	45
Sq. & Hex. Head Cap Screws	40
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Fin. & semi-fin., up to 1 in.	40
Fin. & semi-fin., over 1 in.	35
Studs	25
Taper pins	50
Coupling bolts	net
Planer head bolts, without fillet	net
Planer head bolts, with fillet	add 10
Planer head bolt nuts, up to 1 in.	40
Planer head bolt nuts, over 1 in.	35
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30 & 10
Thumb screws	30
Thumb nuts	75
Patch bolts	add 30 & 10
Cold pressed nuts to 1½ in.	add $3.50
Cold pressed nuts over 1½ in.	add $6.00

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$45 00
Open-hearth billets, Pittsburgh	45 00
O. H. sheet bars, Pittsburgh	45 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3.85	$3.80
Cut nails	3 40	3 40
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs.		$3 90

MISCELLANEOUS

Solder, guaranteed	0.29½
Solder, strictly	0.27½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	030½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	0.83
Linseed oil, boiled, single bbls.	0.86
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	7.50
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.12
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes	35
S.S. drills, 1/16 in. and larger	50
Standard drills to 1½ in.	50
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	20
3-fluted drills over 1½ in.	10
Bit stock	50
Ratchet drills	20
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	25
Sockets	30
Sleeves	40
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	5 25	4 80
Canada plates, dull, 52 sheets	4 75	4 75
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 25	6 20
Premier, 10¾ oz.	6 50	6 45

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch.	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65-10
Kearney & Foot, Arcade	65-10
J. Barton Smith, Eagle	65-10
McClelland, Globe	65-10
Black Diamond	65
Delta Files	60-10
Nicholson	65-10
Globe	65-10
Vulcan	....
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$20 00	.....
1¼ in.	23 00	.....
1½ in.	26 00	22 50
1¾ in.	26 00	18 00
2 in.	27 00	17 50
2¼ in.	29 50	.....
2½ in.	32 50	23 00
3 in.	44 00	27 00
3¼ in.	.....	30 50
3½ in.	50 00	32 00
4 in.	57 00	40 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.39 to .40
Tin	.50 to .53
Zinc	.18 to .21

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.10
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Que., Oct. 9, 1916.—Industrial activity continues to indicate the heavy demand for all classes of manufactured products. The steel situation is still the outstanding feature, further advances pending. In addition to productive activity, commercial interests are reporting increased business and revenue, which is a very encouraging factor. The present situation is seriously affected by the pronounced shortage of materials, and little relief is expected for some time.

Pig Iron

The pig iron situation is reflected in the additional advance on pig iron in the Pittsburg district, $1.50 per ton being added to Bessemer and 50 cents to basic pig. Quotations are now $24.95 and $20.45 respectively. Foundry grades in the same district have been advanced another $1 per ton.

Steel

On top of the recent advances on many lines of steel and the evident scarcity of material, the prospect is for still further advances. The mills are unable to cope with the excessive demands and deliveries are being extended. Unless something can be done to increase production, the shortage may become more acute although everything possible is being done to keep the steel plants operating at capacity. In addition to the heavy requirements for munition steel, the consumption for domestic purposes has increased considerably. The demand for sheet bars and billets has quieted down a little, but the demand for steel rails is increasing. Renewed demand for plates is a feature of the market, owing to the heavy requirements, for steel cars; delivery in many cases being scheduled for the last quarter of next year. The tendency is for higher prices in sheets, due to the active demand for black, blue annealed and also galvanized material. The Pittsburg quotation on black sheets has been advanced $3 per ton, and galvanized sheets $1, prices being now $3.25 and $4.40 per 100 pounds respectively. No developments have yet taken place regarding the expected advance on wire and kindred products, but an early move is anticipated. The demand is very heavy and it is impossible to satisfy to the full extent consumers' requirements. The local situation has not yet been affected by price changes.

Metals

The market is comparatively quiet at present with tin developing increased activity. Copper continues strong but quiet. Spelter is firmer and prices stronger but not very active. Lead is steady. Antimony shows signs of improvement, prices becoming stronger.

Copper.—The situation is unchanged and the market continues quiet but firm. The present strong position of copper will likely be maintained throughout the winter months, as producers are assured of capacity business for a long period, and are apparently well satisfied to let the outside market adjust prices; which under present conditions will only be affected by resale metal. The London market is stronger on all grades electro being quoted at £141. The New York market is firm with quotations on prime lake steady at 28½c electrolytic strong, being quoted at 28¾c and castings at 27½c. The local situation is strong and firm at unchanged prices.

Tin.—The outlook for tin is showing signs of improvement, and indications point to early activity. No heavy buying is yet taking place, as the general market appears doubtful as to the actual strength that the situation is developing, believing that conditions are largely the result of higher prices abroad. However, an undertone of anxiety seems to prevail among the trade that may result in a buying movement at any time. Holders of metal are not forcing sales, and further advances are foreshadowed by market conditions. Dealers here are quoting 44c on a strong and steady market, which represents an advance of ½ cent per pound .

Spelter.—While no definite reason can be discovered as to the cause of the present condition of spelter, the market is undoubtedly stronger. While consumers do not appear willing to pay the figure that dealers are asking at present, the fact that sales are being made at advanced prices would indicate that early developments may be expected. In some respects consumers are well covered for immediate requirements but many are uncertain as to what is to follow. It is true that galvanizers have been showing increased interest in spelter, but not sufficient to warrant any radical change in the market. However, it is not anticipated that price advances will be very marked, although the situation may develop a stronger tendency. The dealers here are quoting the unchanged price of 13c per pound, on a quiet market.

Lead.—The quiet tone of the market has not affected price quotations, and both the leading interests and independents are holding firm. The basis of prices remains steady at 7c New York, with some outside producers asking slightly higher figures. The London market is a little easier. Dealers here are quoting 9c per pound.

Antimony.—An undertone of strength appears to be developing in the antimony market and higher prices are probable. The local market is quiet and unchanged at 15c per pound.

Aluminum.—The market is firm and strong with quotations at 70c per pound.

Machine Tools and Supplies.

The machine tool activity is somewhat handicapped owing to the apparent shortage of labor; and the delivery on certain tools is causing purchasers some inconvenience. Shell shops are also suffering from lack of help, which is effecting the demand for equipment. The feature of the situation continues to be the demand for heavy duty lathes. With the increasing interest taking place in foreign products exhibits, it is expected that further activity may develop in domestic requirements for machine tools.

Scrap

Following the advance of last week. Quotations have held pretty firm on an active market. Dealers report good business in all lines.

Toronto, Oct. 10.—The steady advance in prices of practically all metal goods has again become a question of considerable importance in machinery circles. New high levels are being reached in steel and iron products which is reflected in all lines of machinery. Cost of production is also higher on account of increase in prices of materials and also higher wages. Signs are wanting of any relief in the situation and indications point to still further advances. High prices however, under prevailing conditions are not so important as deliveries. In the case of steel, the mills are getting behind all the time on delivery and specifications have to be prepared months ahead of the time when the steel is required. As regards machine tools the situation is not so acute although on milling machines and grinders, ten months is often required before shipment can be made.

Steel

The prospect of higher prices of steel products has caused an increased demand as consumers are anxious to cover for their requirements, fearing further advances. That steel prices will advance is inevitable owing to the increasing demand which is heavier than the steel companies can take care of. Furthermore, deliveries are getting more backward and the situation in the steel trade is getting tighter. The total output of steel for this year has been estimated at 1,500,000 tons as compared with 1,350,000 tons in 1913, the previous high record. Notwithstanding this big increase in output, the prevailing shortage of steel will continue for the rest of this year and for a considerable part of 1917 unless anything unforseen happens. One prominent steel company is turning out steel billets at the rate of 15,000 tons a month, more than twice the amount produced in a year ago. There is no improvement in the situation as regards steel rails. It is reported that U.S. mills have turned down an enquiry from Canada for 22,000 tons of rails as the rail making mills for this and next year have been booked to capacity. Under the circumstances it looks as if the proposed removal of the tariff on rails would not relieve the situation. So much steel is required for munitions that the Canadian rail mills cannot accept orders for rails. No price changes on steel products except on pipe have been announced during the week but further advances on bars, plates and tubes are looked for in the near future. The shortage of steel is evidenced by an enquiry for 30,000 tons of billets from a U.S. firm for delivery during the first half of 1917, CANADIAN MACHINERY understands that no Canadian mill can take the business.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

The market for black sheets continues very firm and the situation unchanged. Sheet bars are still being quoted at $45. per ton Pittsburgh, but this price is practically nominal and an advance is looked for as the mills are sold up for several months ahead. An advance of 10 cents per 100 lbs., has been made on "Premier" galvanized sheets owing to the continued high price of black sheets and firmer spelter market.

A shortage of labor in the United States is making it difficult to increase production and with the demand for steel continually increasing, deliveries are consequently getting further behind. A feature of the market is an exceptionally heavy demand for plates. It is understood that the U.S. Steel Corporation plate mills are sold to full capacity during 1917. The scarcity of unfinished steel is getting more acute and unusual methods are being resorted to in order to produce additional tonnages. Steel bars have advanced and are now quoted at 2.75c Pittsburgh.

Pig Iron

The pig iron market continues very firm and the general situation unchanged. Production is steadily increasing the greater part being used in steel making although the demand for foundry grades is showing some improvement. Quotations on Canadian pig iron are unchanged in the meantime but an advance is looked for. Gray forge has again advanced and is now quoted at $19.95 Pittsburgh.

Scrap

Although the market for old materials has recently developed considerable firmness there has been no price changes during the week. The situation continues satisfactory and business is keeping up well. Higher prices on scrap copper, brass and zinc are expected in the near future.

Machine Tools

The demand for machine tools continues steady being, as for some months past, almost entirely for equipment for munitions plants. The output of shells has not yet reached the desired volume but steps are being taken to improve the situation by increasing the available supply of labor. An increase in activity in the machine shops will help to improve business in the machine tool trade.

Supplies

Prices of practically all machine shop supplies composed of steel or brass continue to advance and deliveries are getting more backward. The advances this week include bright, brass and bronze wood screws, milled products, carborundum goods and wire rope. Brass globe valves are down being listed at 27 per cent. instead of 25 per cent. formerly. The linseed oil market is considerably stronger and prices have advanced. An advance has been made in twist drills owing to the increased cost of steel and labor.

Metals

The situation in the metal markets has recently shown considerable improvement and prices are generally firmer. Copper continues to hold the lead in point of interest and the market is still very strong. It is intimated by some copper authorities that the order recently placed by the Allies ran in excess of 500,000,000 pounds and not 448,000,000 pounds as previously stated. Lead, spelter and antimony are stronger at unchanged quotations but a sharp advance has been made in tin owing to the fear that shipments may be interfered with by submarines which have recently been active along the New England coast.

Copper.—The market continues very strong without any change in the situation. Producers report that the demand is less urgent. Domestic consumers are now pretty well covered for the first half of next year and the Allies have covered for their requirements for several months which indicates that there will be less activity in the market until another buying movement develops. Copper producers are increasing their output all the time but they have been unable to keep up with the demand, it is probable therefore when new buying does develop, higher prices for copper will result. Local quotations are firm and unchanged at 31 cents for electrolytic and lake, and 30 cents per pound for castings copper.

Tin.—Good business is being done for future delivery, especially for the first quarter of next year. It is also reported that some large users are sounding the market on tin for delivery in the second quarter of 1917. The recent submarine activity off the New England coast has created some scare in the tin market and prices have advanced 3 cents per pound. Local price 47 cents per pound.

Spelter.—The situation in the spelter market has improved and indications point to higher prices. There has been a good demand recently from speculative interests and the market is more active. Local quotations in the meantime are unchanged on 14 cents per pound.

Lead.—The market is quiet but very firm, the Trust price of 7c New York is well maintained. A fair demand is reported and most dealers have very little October lead available. It is reported from New York that the Canadian Government is expected to come into the market very soon. The recent enquiries put out by Canada failed to develop into business as the buyers thought the prices were too high. Local price 9c per pound.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

J. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia.

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Ploschad 9, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

Antimony.—The market is stronger due to increased demand required for munitions. Local quotation unchanged at 18 cents per pound.

Aluminum. — A good demand for aluminum is reported and the market is firm at 68 cents per pound.

Solders.—Prices of solders have advanced on account of the sharp advance in tin and also because of the high cost of lead. Guaranteed as quoted at 29½c and strictly at 27½c per pound.

◆

HIGHER RAILWAY EARNINGS

AGGREGATE gross earnings of the three big Canadian railroads for September make a good showing, although the total falls below those of both July and August, and the increase is the smallest in a percentage way so far this year.

It was pointed out some time ago that it was in September a year ago that earnings began to rise sharply for a long and severe descent, and that comparative figures, in the best of circumstances, could not be expected to make the spectacular showing of the preceding twelve months. Added to this as a factor in the actual returns and their possibilities of continued expansion is the smaller grain crop that is to be handled this autumn.

It is well to note at this stage of the railroad year, however, that if some subsequent contraction is to be faced, the results of the first quarter have been extremely favorable. As compared with the three months of July, August and September, a year ago, the three big systems have rolled up this year an increase of no less than $17,686,333, or about 40 per cent. gain.

Per Cent. Gains

As to the comparative showing for September and the gain of 19.1, as compared with gains of 50 per cent. in the midsummer months, it may be noted that last year gross earnings increased about $3,500,000, or 26 per cent. from July to September as a result of the record-breaking grain movement. This year September has fallen a little short of the July record. Against the sharp upward movement from summer to autumn last year, there has been a slight downward movement this year.

Grand Trunk figures are a feature of the September record, the average daily earnings being the best the company has reported this year. There was one day less in the month, however, and August figures were actually a little higher than September.

September returns, as reported in the weekly statement, follow:

Road.	Sept., 1916.	Increase.	P.C.
C. P. R. ..	$11,846,000	$1,851,000	18.5
G. T. R. ..	5,636,826	1,032,293	22.4
C. N. R. ..	3,187,900	430,900	15.6
Total ..	$20,670,726	$3,314,193	19.1

Aggregate gross earnings of the three systems by months so far this year, and the increase over 1915, follow:—

Month.	Earnings.	Increase.	P.C.
January ..	$14,724,216	$3,966,003	36.9
February .	14,667,915	3,237,879	28.3
March	17,344,243	3,371,539	27.4
April	18,077,805	4,959,127	37.8
May	19,959,336	7,224,934	56.7
June	19,840,173	6,659,139	50.5
July	20,956,091	7,040,445	50.6
August ...	22,315,176	7,331,695	49.5
Sept.	20,670,726	3,314,193	19.1

EXHIBITION OF ENEMY SAMPLES

THE Exhibition of Enemy Goods opened in Montreal a few days ago, represents the concrete realization of the British Government's plans to assist British and Dominion manufacturers in capturing German trade. The exhibit is in charge of H. Kershaw, representative of the British Board of Trade. The 8,000 German and Austrian-made articles in the exhibit were bought in the open markets of the world—70 in all, to be correct. Wherever possible, each article has the wholesale and retail price, place of purchase, and other details affixed. The department is also prepared to give information as to where buyers for any article exist.

Textiles First, Hardware Second

The greatest number of inquiries so far has been for textile lines, and second for tools and general hardware. The quality of most of the latter is poor, and in the words of one visiting manufacturer, "Sheffield would not turn out such stuff." The fact remains, however, that there is a sale for such articles and the Germans built up an enormous trade in just such goods that other nations had not considered worth while. Thus, one knife shown consisted of a sheet iron blade riveted once into a split wooden handle, which in turn was painted in bright colors. This article was meant for use in the African hinterland, and illustrates the German method of giving people what they want and not what the manufacturer thinks they ought to want. Shoes sold in Trinidad had soles of pressed paper, which were glued to the uppers. Samples of some goods, such as textiles, are frequently given to inquiring visitors for a more detailed examination at their factories.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL
Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE
Valparaiso, British Consul General.

COLOMBIA
Bagota, British Consul General.

ECUADOR
Quito, British Consul General.

EGYPT
Alexandria, British Consul General.

FRANCE
Havre, British Consul General.
Marseilles, British Consul General.

INDIA
Calcutta, Director General of Commercial Intelligence.

ITALY
Genoa, British Consul General.
Milan, British Consul.

MEXICO
Mexico, British Consul General.

NETHERLANDS
Amsterdam, British Consul.

PANAMA
Colon, British Consul.
Panama, British Vice-Consul.

PERU
Lima, British Vice-Consul.

PORTUGAL
Lisbon, British Consul.

RUSSIA
Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN
Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN
Stockholm, British Consul.

SWITZERLAND
Geneva, British Consul.

URUGUAY
Monte Video, British Vice-Consul.

VENEZUELA
Caracas, British Vice-Consul.

Lesson of Exhibit

The lesson of the exhibit, as indicated by the remarks of a great variety of visiting manufacturers, jobbers, wholesalers, etc., is, "We must systematize." We wish particularly to focus attention on the industries that can be taken up after the war. The increased debt of Canada, her future pension payroll, and similar charges, all demand an increase in revenue. This appears to be the logical method of getting it.

Getting Together

In Britain the object of the exhibition is primarily to induce manufacturers to take up new lines; to indicate to them probable markets for their present product, and to put them in touch with importing agents in overseas countries or export merchants in England. Exporters have visited the exhibit for the purpose of getting in touch with manufacturers for the founding of new markets, and vice versa. It brings buyers and sellers in touch with one another. The same condition prevails here.

The articles shown are of great variety, and include the following classes of goods:—Textiles, soft and hard haberdashery, fancy and leather goods, glassware and crockery, hardware, enamel goods, aluminum ware, etc.; tools, cutlery and electro goods, and numerous miscellaneous lines. The exhibition will be held in Toronto.

CANADA'S REVENUE INCREASE.

A REVENUE of well over $200,000,000 is in prospect for the present fiscal year, according to an estimate made public recently, by Sir Thomas White. This will enable the Dominion Government to apply $50,000,000 or more against the principal outlay on war account.

The official returns for the first half of the fiscal year, that is to say, up to September 30, are now available and make, in the opinion of the Minister of Finance, a showing satisfactory beyond the highest expectations of the budget. The revenue of the Dominion from all sources has reached a total of $103,000,000, or $30,000,000 in excess of that for the first half of last year. The total expenditure, which includes an increase of interest of $4,500,000 upon war borrowings, is about the same as last year, the higher interest charges being offset by reductions effected in public works and railways and canals expenditures. It now seems certain that the total revenue for the year will amount to at least $210,000,000 or possibly $220,000,000.

Trade and Bank Deposits.

Equally satisfactory with the revenue returns are those showing the total trade and bank deposits of the Dominion. For the first five months (ended August 31) of the present fiscal year, the total trade of Canada (imports and exports) aggregated $791,000,000, as compared with $399,000,000 for the same period of last year. The total bank deposits in Canadian chartered banks at the end of August aggregated $1,250,000 as compared with less than $1,000,000,000 at the end of August, 1914, and a little over $1,000,000,000 at the end of August, 1915. The increase for the past year has thus been $250,000,000.

The Minister of Finance, while regarding the figures as gratifying as showing the soundness of the country's trade and its general prosperity still emphasizes the need for national saving on a greater scale in order that the constantly increasing expenditures of the war may be met as largely as possible from Canada's own resources. He is of the opinion that if those not immediately engaged in the war would put forth their maximum of effort in the way of production of all kinds of agricultural and other commodities which now command such high prices and if at the same time the public would save as much money as possible the Dominion, notwithstanding the great increase which must take place in the national debt for our war expenditure, would as a community be stronger, commercially, financially, and industrially after the war is over than before it commenced and be able to easily tide over any period of dislocation or reconstruction which may follow in its wake. The true policy at the present time as stated by the Minister is one of individual and public economy resulting in greatly increased savings. In order that the public may be able to readily invest these savings in the national securities, which are the highest class of all and yield unprecedentedly attractive rates, the Finance Department, now that the war loan has been successfully floated will in the near future make public a plan which will have for its object the promotion of greater saving among those of limited means who may be willing to save and securely invest part of their earnings and income both as a wise personal provision against the future and as a patriotic effort assisting the prosecution of the war. It is also probable that a plan will be devised whereby the investing public will be given an opportunity of temporarily investing funds in Dominion treasury debenture stock pending new war loan issues in which they may be waiting to participate. This will save for the purposes of the Dominion and Imperial Governments funds which now find their way into foreign securities. Any securities issued for the purposes specified will be of such term, character and issue price as not to conflict with those of the first and second domestic war loan.

BIG NICKEL DEPOSITS IN NEW CALEDONIA

AFTER a four months' stay in New Caledonia, Tasmania, New Zealand, and Australia, gathering information as to the nickel resources of that part of the world, Dr. W. G. Miller, Provincial Geologist, and Thomas Sutherland, Inspector of Mines, have returned to Toronto. The two officials left Toronto in May and the most important work of their stay abroad was the survey made of the nickel resources of New Caledonia, the only serious rival in the world for the Sudbury nickel deposits. While Dr. Miller will not make his report until next meeting of the Nickel Commission, of which he is a member, it is understood that he found the New Caledonia deposits to be vastly larger than has been generally thought. While considerable development is being carried on there by the French, great ore-bearing areas have not been touched. Even here the International Nickel Company is in evidence, some very valuable deposits in New Caledonia being owned by the company and held as a reserve.

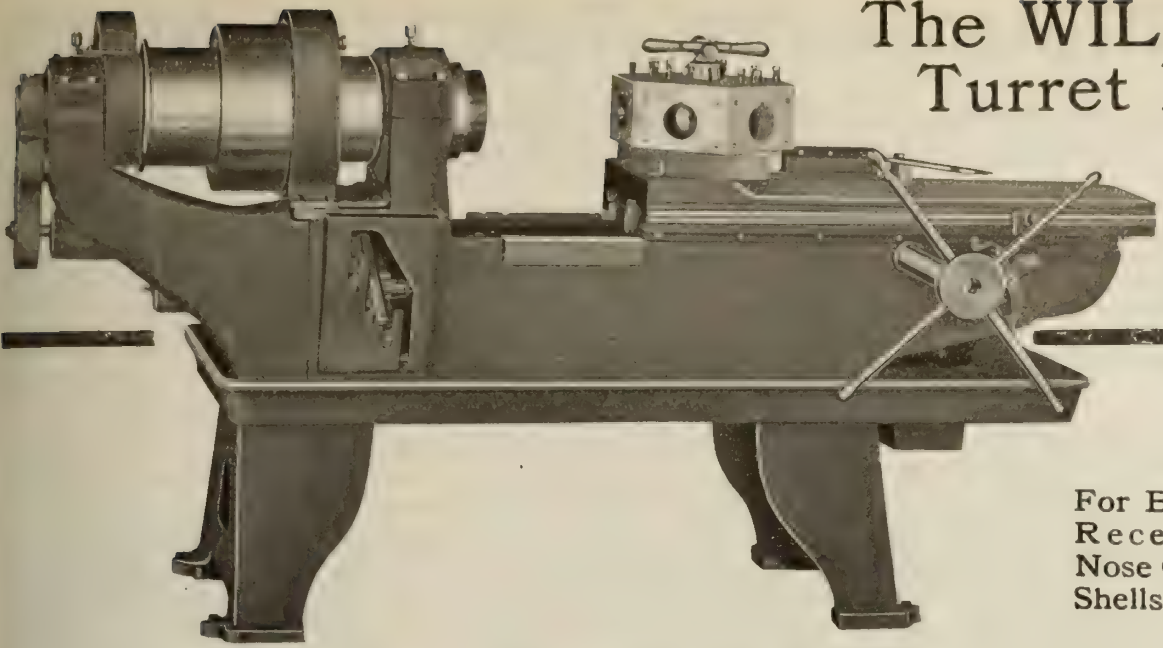
TRADING WITH ENEMY PROHIBITED IN ITALY

A PROCLAMATION has been issued prohibiting Italian citizens from trading with persons, institutions, or companies established in enemy territory, or territory occupied by the enemies of Italy, or the allies of enemy States; and with subjects of the above-mentioned States, wherever they may reside; third, with persons, commercial firms, or companies whose names appear on a special list. By a further decree all commercial enterprises existing in the kingdom whose managers or chief shareholders are subjects of States enemies of Italy, or allies of enemy States, are placed under the control of the Government for their eventual liquidation.

GLASGOW TRADE FAIR

ALL the preliminaries for the British Industries Fair, to be held in Glasgow in February, are now complete. The Fair is to be on similar lines to that held at Leipzig, and is to have for its primary object the extension of Empire trade after the war. All branches of home industry are to be represented, and as the Fair is to be under the official wing of the Glasgow Corporation, success is already secured.

The WILLIAMS Turret Lathe



Prompt Delivery

For Boring, Base Recessing and Nose Operation on Shells up to 6 in.

SPECIAL FEATURES

2-Step Cone for 6" Belt.
Hole in spindle bored large enough to take 6" shell.
Extra large spindle bearings.
Can be equipped with 3-jaw Universal or Air Chuck.
Long and Heavy Turret Slide, well gibbed.
Extra Large Turret ensures rigidity under heavy cuts.
Powerful indexing arrangement with automatic trip.
Four instantaneous Feeds.
Weight about 7,000 lbs.
No Friction devices are used. Countershaft is equipped with Tight and Loose Pulleys.
Write for full description and prices.

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The A.R. WILLIAMS Machinery Co., Limited

Toronto,
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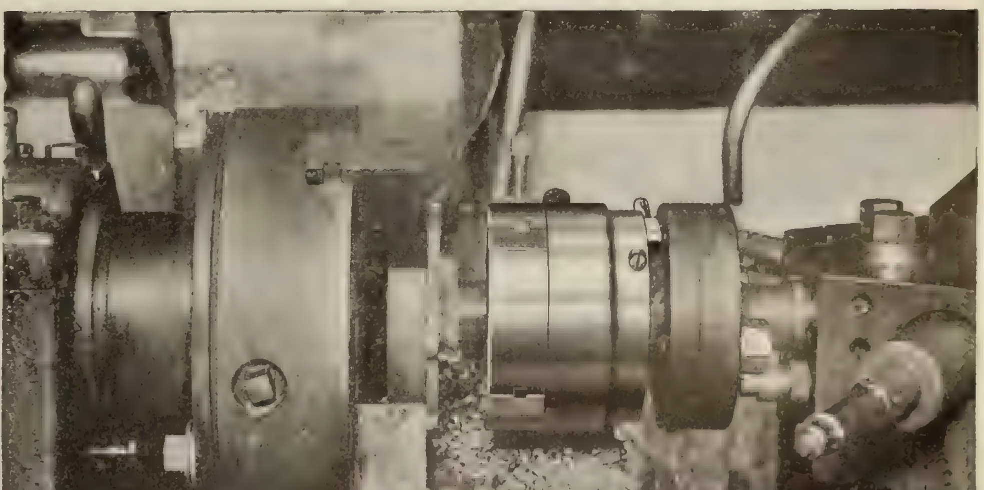
The limits on this job are very close, but a Geometric Self-opening Die Head finishes the threads so that they pass rigid inspection.



The part is a manganese bronze pump body, made by the Superior Machine & Engineering Co., on a Warner & Swasey Screw Machine.

Have you a Geometric on your Screw Machine or Turret Lathe? Send us your specifications and get our quotation.

THE GEOMETRIC TOOL CO., New Haven, Conn., U.S.A.

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INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Renfrew, Ont.—Fire on Oct. 4, destroyed Limbleau & Son's foundry and machine shop, doing several thousand dollars' damage. No insurance was carried.

Sherbrooke, Que.—The Iron & Metal Supply Co., of Montreal, may locate a plant here, if satisfactory arrangements can be made with the City Council with regard to power, rates, etc.

Windsor, Ont.—Engineering plans for preliminary construction of the steel plant at Ojibway are nearing completion, although it is unlikely any actual building of mills will be started before next spring.

Vancouver, B.C.—If satisfactory arrangements can be made with the city, the Vancouver Shipyards, an old-established firm on Coal Harbor, proposes to extend its plant and construct steel steamers.

Kitchener, Ont.—The Canadian Buffalo Forge Co. started work last Thursday on additions that will double their capacity. The improvements will cost over $100,000. It is expected to have the building completed by December 1st. The new building will be 150 ft. by 100 ft.

Winnipeg, Man.—The Greater Winnipeg Water District Commissioners will call for tenders for the construction of an addition to the engine shed at Deacon, at an estimated cost of $4,000, and for the erection of a small engine shed at the eastern terminus, at a cost of $1,200. Chairman, R. D. Waugh.

B. C. Copper Co.—General Manager Oscar Lachmund, of the B. C. Copper Co., states that company is installing a plant to raise water from Similkameen River to furnish power for mine equipment and experimental mill. New main tunnel now in 1,000 feet level, has crosscut one end of ore body, and drift is now being run.

Kingston, Ont.—The smelter and mine belonging to the North American Smelter Co., has passed into the hands of a New York syndicate on a lease with option to purchase. Repairs have already been begun on the smelter and it is hoped to have it in active operation by December 1. The company which has taken over the property has been incorporated and will probably be known as the Kingston Smelting Co. Alexander McKinnon is the engineer in charge.

Galt, Ont.—A contract has been let to P. H. Secord and Sons, of Brantford, for a large addition to the north works of the Goldie and McCullouch Co. The building is to be 60 by 144 feet of fireproof construction, and will cost $15,000. The work is almost completed on the new $20,000 power house at the south works of the same company.

Galt, Ont.—A permit has been taken out for an addition to the plant of the Wells Bros. of Canada, manufacturers of taps and dies, on Front street. The addition will be 30 by 40 feet, of two storeys and constructed of brick. The estimated cost of the new building is $2,000. Thomas and Hancock have the contract for the addition.

St. John, N.B.—The first unit of the T. MacAvity & Son new plant at St. John, N.B., is now completed, and operations are under way looking to the output of a small order of 8-inch shells. As soon as the latter are finished, additional equipment, now being installed, will, with that already in service, start on a large contract for the machining of 9.2-inch shells.

Galt, Ont.—The decision of the Dodge Metal Hose Co., of Canada, Ltd., to erect a $50,000 plant here assures another new industry for Galt. The company is organized under Dominion charter, with an authorized capital of $150,000. The company will manufacture malleable iron hose to replace rubber hose used to couple air line between railway cars, and also has Canadian patents on five other articles. Land has been purchased on Beverly Street, and plans are being prepared for a modern factory by John Evans, architect. James R. Cameron, of Toronto, is to be works manager.

Electrical

Petrolea, Ont.—Hydro light and power from the Petrolea sub-station was turned on the Wyoming system on October 4.

St. Thomas, Ont.—The Hydro-Electric line from the Kent sub-station to Sarnia, which will supply that town and district with hydro service, has been completed.

Fort William, Ont.—A by-law has been passed releasing to the Slate River Local Telephone Co., the rights for the telephones in the township owned and operated by the city. The company intends to spend $1,500 extending lines throughout the district.

Municipal

Sarnia, Ont.—The City Council will investigate the cost of installing an incinerator plant.

Richmond Hill, Ont.—A by-law will be submitted to the ratepayers in January which will enable the municipality to instal a modern water system.

Guelph, Ont.—Engineer F. McArthur has made a report recommending an expenditure of $75,000 on waterworks improvements.

Port Arthur, Ont.—A by-law to grant certain concessions to Aimwell G. McIntyre, who proposes to build a chemical pulp mill in Port Arthur, will be voted on by the ratepayers on October 23.

Fort William, Ont.—The City Council have decided to have plans drawn for a subway on Yonge street at an estimated cost of $250,000.

Redcliffe, Alta.—The Town Council are considering the question of installing a steam or gas engine and pump in the municipal power plant. Extensions may also be made to the water main system.

Township of Hibbert, Ont.—A by-law will be submitted to the ratepayers on October 16 to raise $5,000 to provide for the cost of a plant to distribute electric power to be supplied by the Hydro-Electric Power Commission for the police village of Dublin. James Gordon, township clerk.

Toronto, Ont.—The York Township Council have made satisfactory arrangements with the Hydro Commission's engineers with regard to the supply of light for the township. The council have accepted the engineer's report, authorizing the construction of water mains on Eglinton avenue, Runnymede and Weston roads.

General Industrial

Montreal, Que.—The Smardon Shoe Co. will build a factory here.

Fort William, Ont.—The Canada Starch Co. have commenced work on an extension to their factory here.

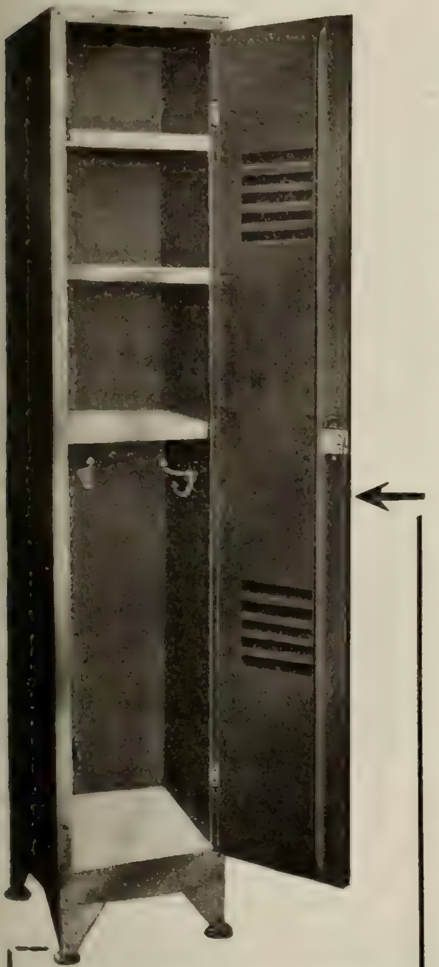
Calgary, Alta.—The Calgary Silver Plating Works has been organized here.

Acton, Ont.—The Reliance Shoe Co. will build a factory here if the proposed by-law is passed.

Lindsay, Ont.—Flavelle's, Ltd., produce plant was badly damaged by fire on Oct. 5. The power plant was damaged, but not destroyed.

Montreal, Que.—Work will begin soon on the foundations of the factory addition for the United Shoe Machinery Co., at Maisonneuve.

Toronto, Ont.—The Canadian National Carbon Co. will build a factory here.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Eastern Representative: H. E. O. Bull
184 Mance St. Montreal, P. Q.

The John V. Grey Construction Co., Toronto, are the contractors.

Vancouver, B.C.—The Colonial Pulp and Paper Mills, Ltd., in which Geo. F. Whalen, Vancouver, is interested, are going ahead with the erection of a large plant at Quatsina Sound, B.C. The first unit will have a capacity of 60 tons of sulphite fibre per day.

New Incorporations

Hamilton Brass Ltd., Hamilton, has been incorporated with a capital of $40,000.

W. E. Clark, Ltd., Toronto, Ont., has been incorporated with a capital of $40,000, by W. E. Clark, J. F. Coughlin and F. P. O'Hearn, to manufacture brass, steel, iron and metal products.

National Bronze, Iron & Engineering Works, Ltd., has been incorporated with $750,000, by L. A. David, J. S. Lamarre and E. C. Baker, to carry on the business of mechanical and electrical engineers.

John MacGregor Ltd., has been incorporated at Ottawa with capital of $100,000 to carry on business as contractors and engineers at Fort William, Ont. Incorporators are F. G. Bush, G. R. Drennan and A. G. Yeoman all of Montreal.

Graphite Products Ltd., has been incorporated at Ottawa with a capital of $500,000 to purchase and develop graphite mines. Head office is at Montreal and the incorporators are L. A. David, S. R. H. Bush and J. S. Lamarre, of Montreal.

The Canadian Lamp & Stamping Co., has been incorporated at Ottawa with a capital of $100,000 to manufacture steel and other metal products at Ford, Ont. Incorporators are George E. Edmunds, William T. Jones and Lawrence H. Bedford all of Detroit, Mich.

Contracts Awarded

Toronto.—The Chapman Valve Mfg. Co., Toronto office, have been awarded a contract for a 36-in., gate check valve by the Board of Control.

The American Water Softener Co., Philadelphia, Pa., have been awarded a contract for a mechanical filtration plant by the Town Council of New Toronto, Ont.

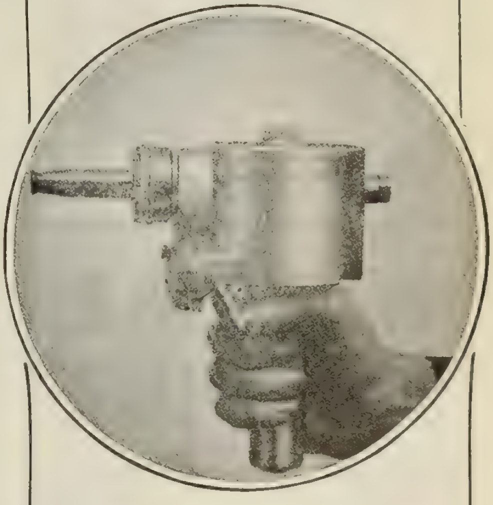
Toronto, Ont.—The Peter Lyall Co., who are building the new Union Station, have awarded the contract for reinforced concrete fireproofing to the Crescent Concrete Co. of Toronto. The contract amounts to over $100,000.

Galt, Ont.—The general contract for the erection of a factory addition for the Galt Paper Box Co. has been let to Thomas & Hancock. Approximate cost, $4,000.

Transcona, Man. — The contract for the construction of the new 1,000,000 bushel transfer grain elevator has been let by the Department of Railways, Ottawa, to Fegles Bellows & Co., of Fort William. Estimated cost, $500,000.

Winnipeg. — A contract for street lighting equipment has been awarded

The Metals Coating Co. of Canada, Ltd.
Versailles Building, 90 James St.
MONTREAL, CANADA


A machine gun making its ammunition from Reeled Wire, and coating objects by bombarding with minute plastic particles of metal. The **Schoop method** of Metallic deposition, any object and any size coated with a positive adhesive and homogeneous coating with any metal for any desired thickness.

Solves one of the greatest problems heretofore confronting the structural engineer, because it produces on iron or steel a permanent coating not susceptible to corrosion.

Carbons can be coated with copper, etc.

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We are manufacturers of stamped parts for other manufacturers.

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We can finish steel stamping in Nickel Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS
372 Pape Avenue, Toronto, Can.

by the Board of Control to the Canadian General Electric Co., for $3,560. The contract for lamps is to be divided between the same company and the Canadian Westinghouse Co.

Wood-Working

Harriston, Ont. — The Harriston Casket Co's. plant which was recently destroyed by fire will be rebuilt.

Arrowhead, B.C.—A shingle mill is being erected here by Ralph Simpsin. The building will be two storeys, 32 x 60, and three machines are to be installed.

Petrolea, Ont. — Fire on Oct. 8. destroyed two storage buildings of the Petrolea Wagon Co., doing damage to the extent of $20,000 which is covered by insurance.

New Westminster, B.C.—The Dominion Cedar & Shingle Co., in which the contracting firm of Marsh, Hutton, Powers Co,. are interested, have leased a site just east of Lulu Island bridge, New Westminster, and are proceeding with the erection of a modern plant.

Refrigeration

Winnipeg, Man.—The plant which the Manitoba Cold Storage Co. propose building, here, will cost approximately $100,000.

Vancouver, B.C.—B. J. Rogers has had his private yacht equipped with a ½-ton refrigerating plant, furnished by the Armstrong Machinery Co., Spokane, Wash.

Barons, Alta.—W. D. Annabell has had his general store equipped with a 1-ton refrigerating plant, supplied by the Armstrong Machinery Co., Spokane, Wash.

Chemands, B.C.—The Victoria Lumber & Mfg. Co., has had its commissary equipped with a 4-ton refrigerating plant, furnished by the Armstrong Machinery Co., Spokane, Wash.

Marine

Montreal, Que.—It is understood that the Canadian Vickers Co. has contracted for the construction of two 7,000-ton steamers. It is further understood that the company will go right ahead with building freighters in a general way.

London, Ont.—The Dominion Government has awarded the contract for the construction of a new cement pier to

MALLEABLE GREY IRON **CASTINGS** ALUMINUM & BRASS

OUR CASTINGS GIVE A MAXIMUM OF GOOD SERVICE BECAUSE THEY ARE MADE AND TREATED ESPECIALLY FOR THE WORK REQUIRED.

MADE IN ALL SIZES.

Castings made on moulding machines are accurate and true to pattern.

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MORTON MANUFACTURING CO.
PORTABLE PLANERS
DRAW CUT SHAPERS
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FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
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are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

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THE WALLACE BARNES COMPANY
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Man'f'rs of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire

HAVE YOU
read pages 70 to 77? Turn to them now and see for yourself whether or not they are of interest.
Canadian Machinery
Classified Advertising Section

protect the west side of Port Stanley harbor, and work is to be undertaken by the contractors at once. The cost will be in excess of $100,000 and the work will occupy many months.

— —

Trade Gossip

British Columbia produced a record amount of copper in 1915, being over 5,000,000 pounds greater than the next highest year, 1912. The total production was almost 57,000,000 lbs.

The Herbert Morris Crane & Hoist Co., Toronto, have been awarded a contract for a 5-ton hand operated travelling overhead crane by the Board of Control, Toronto.

The Canadian Boomer & Boschart Co., Montreal have received orders for hydraulic pumps, presses balers and accumulators from the Ha Ha Bay Sulphite Co., and the Ouiatchouan Falls Paper Co.

Measures Taken to Protect Shipping.—Measures, which it is expected will be sufficient to protect Canadian shipping and vessels in the Canadian Atlantic service, are being taken by the Admiralty in co-operation with the Canadian Government. No suggestion as to the nature of these measures is available or could be published.

Newfoundland has copper ores, some running from 4 to 30 per cent. copper, with which little was done until after the war broke out. The production in 1915 was about 15,000 tons, or which 12,150 tons, worth $151,372, went to the United States, and the remainder to England, as against about 2,000 tons as the 1914 output, valued at $15,000, and all taken by the United States.

Montreal, Que.—It is reported that rush orders have just been placed at Pittsburgh for steel to complete a new span in the Quebec bridge to replace that which recently fell into the St. Lawrence River. The Dominion Bridge Co. has placed a contract with the American Bridge Co. to fabricate the new span and the Carnegie Steel Co. will roll 5,000 tons of steel shapes and beams at its Homestead plant.

Canadian Dollar on Paris Exchange.—The Canadian dollar is now being quoted on the Paris Exchange. This has been done by the French Minister of Finance and the brokers' syndicate, at the request of Canadian exporters, many of whom have representatives now in Paris. The occurrence of wide fluctuations in the exchange markets makes this move of interest to Canadian export firms.

Marine Insurance Rates Advanced.—Marine insurance rates from American

Steel Shell Forgings or Billets of any size or weight will move any distance or about curves upon our specially constructed Gravity Carriers and Incline or Horizontal power devices. No labor required.

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Engineers, Manufacturers and Erectors of Steel Structures such as

Bridges, Buildings, Tanks, Penstocks, Smoke Flues, Stacks, Coal Bins, Refuse Burners, Air Receivers and other **Miscellaneous Steel Plate and Structural Steel Work.**

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This tool is used in shops where parts are keyseated by thousands. It is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. Shops large and small can use the tool, and it is readily attached to a drilling machine for which it is designed. The tool keyseats in places where Keyseating Machine, Planer and Shaper can't reach. The right tool to use for keyseating interchangeable parts. There is no limit to the variety of work possible to be keyseated.

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2270-2272 Spring Grove Avenue, Cincinnati, Ohio, U.S.A.

Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria.

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Use them for Prestige.

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1. Puro Sanitary Drinking Fountains will give you a *better* water supply *cheaper*.
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Are not these reasons enough? Then why hesitate longer?
PURO equipment is not expensive—the first cost is *low* and the up-keep *nothing*.
Easily attached; positively fool-proof.
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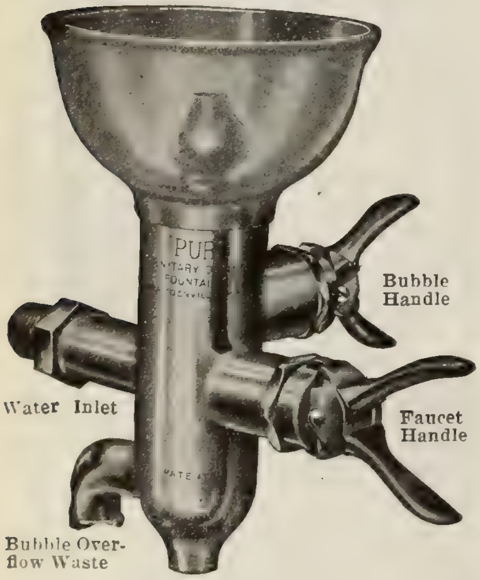

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to English ports on Monday jumped from 1 to 5 per cent. in consequence of the German submarine operations. Rates to Havre and Bordeaux were increased from five-eighths to three-quarters of one per cent. to five per cent. Some brokers were asking for trans-Atlantic insurance as high as 10 per cent., and others refused to quote rates at all.

C.N.R. Terminals.—Sir Donald D. Mann, vice-president of the C. N. R., stated recently that excavations at the Dorchester street terminal site at Montreal will be begun in November, and in about four weeks' time tenders will be asked for the construction of the Lagauchetiere street station, as the plans will then be ready. The construction will be chiefly of concrete, and it is expected that regular trains will be running through the tunnel by the 1st of May.

Railway Commission Returns East.—Sir Henry Drayton and A. H. Smith, of the commission which is to report on the railway situation in Canada, have returned to Ottawa from a trip through the West and an inspection of various Western lines. The journey was part of a general examination as to location, physical condition and operation. A similar examination was made by Mr. Smith in the East some weeks ago. A more thorough and detailed examination is being made by the commission's engineering staff. The commission will report before the close of the next session of Parliament.

Trade Affected by Shipping Shortage.—W. J Egan, Canadian Trade Sommissioner in South Africa, reports Canada's exports to South Africa for the first six months of the year are about $22,000 less than the same period in 1915. He says it is due to lack of shipping. He points out that the United States has in the same period increased its trade with South Africa over that of 1915 by about $5,000,000. He adds the apparently just complaint in view of Canadian difficulties to secure shipping that nearly all this American trade was carried by British-owned vessels.

The Dominions Royal Commission will sit at Montreal from October 27 to 31, both days inclusive. The Board of Trade has granted the use of its council chamber for the sessions, which will be held there each morning and afternoon. During their stay evidence regarding immigration, railways, steamship services, ocean insurance, bills of lading, statistics, Empire development, telegraphs and cables, control of ocean rates, freights and bills of lading, the Panama Canal, Empire trade marks, asbestos resources, commercial laws, forests, harbors, irrigation and water powers, minerals, circulation of American publica-

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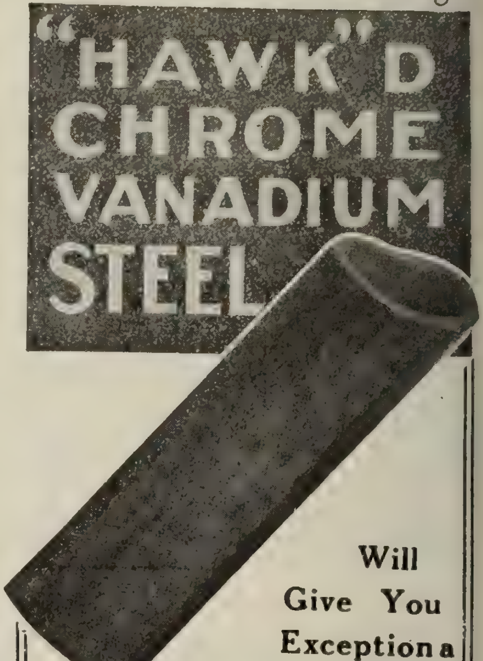

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WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

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It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

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tions in Canada, trade commissioners' services, and other subjects, will be taken by the commission.

Personal

Col. Thomas Cantley, president of the Nova Scotia Steel & Coal Co., purposes sailing for England about October 15th.

Redmond Quain, a director of the Ottawa Electric Railway Co. and Ottawa Car Co., died at Ottawa on October 5, aged 56.

Capt. F. R. Newman, late manager of the Canadian Fairbanks-Morse Co.'s sales office in Toronto, has been wounded in France.

W. G. Ross, chairman of the Montreal Harbor Commissioners, has been elected president of the American Association of Port Authorities.

J. E. Ryan, formerly with the Rudel Belnap Co., has been appointed sales manager for Montreal Machineries and Supplies, Ltd., Montreal.

George W. Cook, general foreman of the Pere Marquette shops at St. Thomas, Ont., has resigned. Mr. Cook had been with the company since 1904.

Sir Alfred Bateman, K.C.M.G., has arrived at Quebec on the steamer Scandinavian, en route for Ottawa, to join the Dominion Royal Commission.

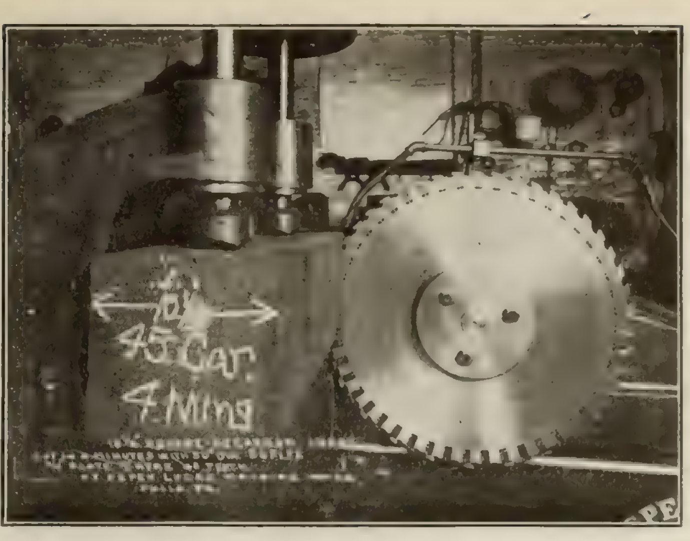
J. Howard Jackson, head of Jackson & Co., civil engineers, died on October 7. He was born in England in 1847, and went to New Zealand in the early sixties. He came to Brantford in 1912 to join his son in the engineering business.

John Power, who for 33 years was superintendent of the Montreal Gas Works, passed away in that city on October 4, at the age of 81. Mr. Power was an Irishman by birth, and came to Canada in 1860. He retired as superintendent of the gas works in 1895.

Erastus Long, president of the E. Long Mfg. Co., Ltd., Orillia, Ont., died on Oct. 4, aged 48. Mr. Long was one of the most prominent and public spirited citizens of Orillia. He has been chairman of the Orillia Water, Light and Power Commission since its inception four years ago.

Railways—Bridges

Montreal, Que.—Plans will be prepared for widening the subway under the G.T.R. on Wellington street, and also three other subways. The City Council have appropriated $18,600 to cover the cost of plans. Chief Engineer Mercier has charge of the work.



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Let us demonstrate what a saving can be made by installing a
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HUNTER SAW & MACHINE CO., Pittsburgh, Pa., U.S.A.

We are qualified Tool, Die, Jig, Gauge and Fixture Makers.
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Forgings Cranks, Connecting-Rods, Valves and any other special work.
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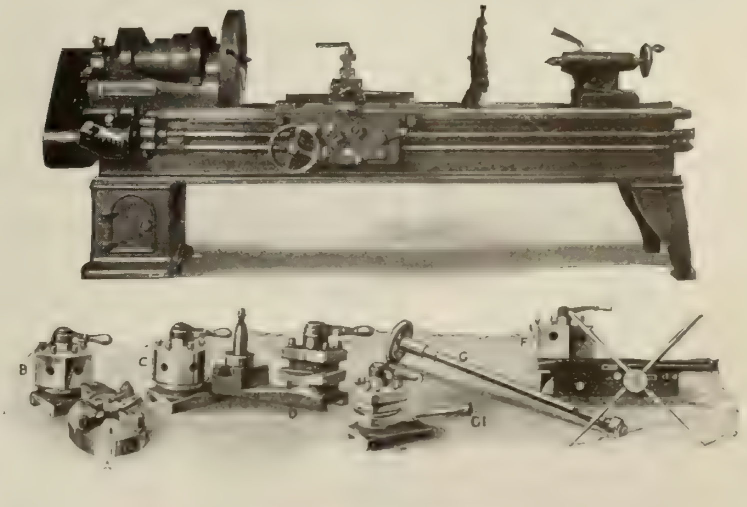


Sizes 16x6, 18x8, 20x10
Edgar Bloxham, Inc.
Grand Central Terminal Building NEW YORK, N.Y., U.S.A.
Prices lower than any other lathe of same specifications because of volume of manufacture and fixed low percentage of profit over actual cost of production.

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Display rates on application.

FOR SALE

16 H.P. IDEAL GAS ENGINE — ALSO quantity of pulleys. Chipman & Millman, Brantford, Ont. (16)

6½ H.P. WESTINGHOUSE AND 1 3 H.P. Toronto & Hamilton Electric Co. 60-cycle motors, in first-class order. Geo. H. Lees & Co., Hamilton. (17)

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 227, Canadian Machinery. (15)

FOR SALE—2 2" MURCHEY COLLAPSIBLE taps for nosing shells; 1 No. 6 2" collapsible tap; maker, The Manufacturers' Equipment Co. McGregor & McIntyre, Toronto, Ont. (14)

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

BRASS RODS, 1¼, 1½, 1¾ UP TO TEN FT. Brass tubings, 2⅜ o.d., with ¼ wall; all lengths to ten feet. Louis Lovitz, 186 Markham St., Toronto. Telephone College 3711. (17)

FOR SALE—ONE 2 H.P., 60-CYCLE CHAPman & Walker motor, single phase, 110 volts, or will exchange for a 2 H.P., 25 cycle motor, 550 volts, three-phase. Address The R. S. Bickle Company, Woodstock, Ont. (14)

For Sale Cheap

1—Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.

1—12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 3 tons capacity; complete, less the Hoist.

1—Brantford (Gas) Bake Oven and 4 Racks.

1—Linderman 2-Spindle Boring Machine.

1—26" Drill, London Machine Tool Company.

1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

11—New 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.

30—Used 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.

M. BEATTY & SONS
Limited
Welland, Ont.

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5 32" wall. No reasonable offer refused. Box 226 Canadian Machinery. (15)

BUSINESS FOR SALE — MACHINE SHOP with a good, steady run of work and always busy. A good opening for a young man to get into business. Owner has other interests. Box 224, Canadian Machinery. (12)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

FOR SALE.—ONE BROWN-BOGGS MARKing Machine, suitable for 6" Mark XVI. or Mark III. English Shells. Only object in selling is that other methods of marking have been adopted. Price on application. Taylor-Forbes Co., Ltd., Guelph. (14)

ONE REED TURRET LATHE, 8' BED, swing 28"; 4 2" holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 226, Canadian Machinery. (16)

FOR SALE—ONE 16" x 8' HENDEY LATHE, with taper attachment, $1,100.00; one 22" x 10' Blaisdell lathe, with taper attachment, $1,300.00; one 24" Gould & Eberhardt shaper, $800.00. The above machines are in first-class condition. For particulars apply Box 221, Canadian Machinery.

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

WE HAVE FOR SALE THE FOLLOWING equipment: Complete nickel and copper plating plant, including direct connected dynamo and motor; one second operation cast iron plug machine, and two first operation cast iron plug machines manufactured by the Brown Engineering Corporation; 2 16-inch turret lathes; 1 38-inch engine lathe, 20-foot bed. The above outfit will be sold en bloc or separate. Apply direct to Foundry & Machine Co., Ltd., Montreal. (12)

FOR SALE—McDOUGALL ENGINE LATHE, 20" swing, 10' bed; never been used. Baker Keyseater No. 2, good as new. Boring Mill, 2 bars, will bore up to 30" dia. Boston Forge Blower, 27", good condition. Cresent Swing Cut-off Saw, almost new. 7½ H.P. Westinghouse D.C. Motor, in good order. Gurney Platform Scale, 2,000 lb., 16" wheels. Mandrills, Couplings, Hangers, Post Boxes, Pulleys, Belting, Cap Screws, Bolts, etc. Special prices on above, write for particulars. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (14)

GAP LATHE — LONDON TOOL CO. — swings 41" in the gap, 26" over shears, 20 ft. bed, rod and screw feed, compound rest, steady rest, countershaft, 2 face plates, 4-jaw chuck, weight about 10,000 lbs. This tool has been very little used, and is in excellent condition. Bargain for quick sale. Winnipeg Machinery Exchange, Sutherland & Gladstone Sts., Winnipeg, Man. (17)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

WANTED

Burned out Tungsten Lamps, late type, drawn wire, 25, 40, 60 and 100 Watts, 110 and 115 volts.

DOMINION TUNGSTEN LAMP FACTORY
ST. CATHARINES, ONTARIO

SITUATIONS WANTED

TOOL MAKER IN CHARGE DESIRES change. Competent to take charge of machine shop or tool room. Good references. Box 225, Canadian Machinery. (17)

SUPERINTENDENT—FIRST-CLASS PRACtical mechanical man is open for an engagement as works manager or superintendent. Can give best of reference as to character and ability to handle help and produce results. Box 227, Canadian Machinery.

ARE YOU LOOKING FOR A SUPERINtendent? There's money in making shells, if you know how. If you don't, let me make them for you, any size. I'm open for a contract with any concern that is looking for a live wire production Superintendent. Address Box 230, Canadian Machinery. (13)

WANTED

WANTED — 250-VOLT D.C. GENERATOR — 75 to 150 k.w., direct connected to steam engine; must be in good condition. Write to The Kaufman Rubber Co., Berlin, Ont. (13)

WANTED TO MANUFACTURE A FEW lines of metal products, sheet metal preferred. We have complete equipment for high-class work. Give complete description and rating in first letter. Apply Box 221, Canadian Machinery. (17)

WANTED—12" BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Aplly Box 218, Canadian Machinery.

FOREMAN FOR LARGE WINNIPEG MAchine shop — must be aggressive and mechanic with good practical experience in jobbing, stock and transmission work. When applying, state age, experience and salary expected. Applications treated confidentially. Box 229, Canadian Machinery. (16)

SUPERINTENDENT FOR 4.5 SHELL FACtory all equipped and tooled for 400 to 500 shells per day. Shipping since May. Must have ability to thoroughly organize, and be capable of producing maximum results in short time, and have previous shell experience. To the right man we will pay a liberal salary and bonus. State fully (in confidence) past experience, present record and salary expected. Box 228, Canadian Machinery. (14)

MOTORS

We have for Immediate Delivery:

No.	H.P.	Phase	Cycle	Volt	R.P.M.	
1	100	3	25	550	750	new
1	40	2	25	550	750	new
2	40	3	25	550	750	used
1	20	3	25	550	750	new
2	15	3	25	550	1400	new
2	10	3	25	550	750	new
2	10	3	25	550	1400	new
2	7½	3	25	550	1400	new
3	5	3	25	550	750	new
3	5	3	25	550	1400	new

We also have a number of 40 and 50 H.P. Motors, 25 cycle, 3 phase, for early delivery, about Nov. 15th.

Also one 10-ton 40-ft. span 3 motor Direct Current Crane.

The A. R. **WILLIAMS** MACHINERY CO., LIMITED
64-66 FRONT STREET WEST, TORONTO

WANTED

Seamless Steel Tubing in any Quantity. Cash Paid.

Apply Box 233, Canadian Machinery

Long Distance is Calling!

Telegrams and Long Distance Telephone Messages are not uncommon among the replies to ads in our Classified Advertising Section.

FAIRBANKS-MORSE New and Used Machinery

In Stock at Toronto

1—⅞" 4-spindle National Acme Automatic; used.
2—No. 3 1" Foster Hand Screw Machines.
4—No. 4 1½" Smurr & Kamen Turret Lathes.
1—10" x 5' Seneca Falls Lathe; used.
2—18" x 8' Springfield Lathes; new.
5—20" x 9', 19 16" x 7', 3 16" x 9' Fairbanks-Morse Lathes; new.
2—No. 1 Racine Hacksaws; new.
1—No. 304A Oster Pipe Machine; new.
1—20" x 8' Hendey Lathe; used.
1—Gisholt 16" Special Lathe, type C, 6½ bore.
1—Walcott 20" x 8' Engine Lathe.
5—Barnes 18" x 8' Engine Lathes; new.
7—Potter & Johnson No. 6A Automatics; used.

In Stock at Montreal

3—Gisholt 16" Turret Lathes; new.
2—Gisholt 25" Turret Lathes; new.
Waving and Grooving Machines, 6" shells; new.
1—Hendey 16" Lathe; used.
2—American 16" x 6' Tool Room Lathes; new.
1—Rivett Precision Lathe; used.
1—Brown & Sharpe No. 1½ Universal Mill; used. used.
1—Valley City No. 1½ Universal Mill; used.
2—Ford Smith 20" Wet Tool Grinders; new.
1—Wilmarth & Morman Drill Grinder; new.
3—[illegible]" Back-geared Drills; new.
1—25" Sliding Head Drill; new.
1—Banfield Plug Miller, 6" shells; new.

This is only a partial list of our stock of Machine Tools.

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

PETRIE'S WEEKLY LIST

Of New and Used Machine Tools in Stock for Immediate Delivery

Turret Lathes and Screw Machines

3½" Gridley Automatic
40" x 16' Conradson, heavy duty
40" x 12' New Haven
26" x 8' Davis
24" x 8' Lodge & Shipley
21" x 10' LeBlonde, D.B.G.
20" x 10' American
17" x 6' Garvin
16" x 6' Pratt & Whitney
16" x 5' Windsor, wire feed
15" x 5½' Fox, American
2" x 24" Jones & Lamson flat turret
No. 22½ Garvin, wire feed
No. 2 Garvin, wire feed
8" x 31" Brown & Sharpe

Engine Lathes

42" x 20' Fifield
36" x 16' Putnam
30" x 10½' Pond
26" x 40" x 20' London Gap
26" x 14' Hamilton, D.B.G. (4)
26" x 14' Gleason, D.B.G. (2)
24" x 13' New Haven
24" x 10' LeBlonde
24" x 10' Peerless
24" x 10' Lodge & Shipley, patent head
22" x 12' American, all-geared head
21" x 8' Back-geared single purpose (4)
20" x 12' Lodge & Shipley, patent head (2)
20" x 10' Reed
20" x 8' Walcott, D.B.G. (2)
20" x 8' Hercules, heavy duty
20" x 8' American
20" x 8' Ames
20" x 7' Fay & Scott
19" x 8' LeBlonde, D.B.G.
18" x 10' MacGregor-Gourlay
18" x 8' Walcott, D.B.G. (2)
18" x 8' New Haven
18" x 6' Barker (2)
18" x 6' New Haven
16" x 10' MacGregor-Gourlay, D.B.G
16" x 6' Prentice (2)
16" x 6' Porter
14" x 6' American

Upright Drills

24" Bickford, shaft-driven (2)
24" London, back-geared, sliding head
24" Kerkhoff, back-geared, sliding head
22" Barnes, back geared, sliding head
20" Bertram, power feed
No. 10A Baush, 16 spindle
16" Avey, high speed, 4-spindle, sensitive
16" Canedy-Otto
15" Barnes
14" Excelsior
14" Garvin, 4-spindle
10" Barnes, friction
60" Bertram Semi-universal Radial
48" Gang, plain radial, tapping attachment
36" New Century, plain radial
32" Canedy-Otto wall radial

Iron Planers

30" x 30" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
24" x 24" x 6½' Dundas
24" x 24" x 6' Gray
20" x 20" x 5' Bertram

Milling Machines

No. 5 Becker-Brainard, plain
No. 3 Cincinnati Universal
No. 12 Brown & Sharpe plain
No. 1½ Brown & Sharpe Universal
Louden Universal
24" Bertram, plain
Holden-Morgan Thread Miller

Presses

No. 12 Geared Rhodes, roller feed
No. 5 Waterbury, inclinable
No. 3 Michigan Inclinable
No. 190 Brown-Boggs inclinable

Miscellaneous

24" Gould & Eberhardt, B.G. Shapers (2)
No. 10 Racine Hack Saws (2)
No. 1 Racine Hack Saws (5)
Nos. 3 and 4 Robertson Hack Saws
Lo-Swing Lathes (2)
32" x 9' Special Facing and Tapping Machine
40" Binsse Horizontal Boring Mill
12" x 66" Landis plain grinder
12" x 42" Landis plain grinder
No. 2 Diamond Universal Grinder
No. 14 Besly Grinder
No. 60 Heald Cylinder Grinder
No. 2 Garvin Automatic Tapping Machine
No. 1 Garvin Automatic Tapping Machine
No. 2 Cochrane-Bly Filing Machine
¼" Shuster Riveters (3)
9½' Bertram Bending Rolls
15" London Punch and Shear
30 ton Lucas Forcing Press.

Prices, Descriptions and Full Particulars on Request.

H. W. PETRIE, LTD.

Front St. W., - - Toronto, Ont.

List of

Second-Hand Machinery

on hand for immediate delivery, subject to prior sale

1 No. 2 Brown & Sharpe Vertical Chucking and Boring Machine; excellent condition.

1 No. 4 Quint Vertical Turret Drilling and Chucking Machine; excellent condition.

1 24″ x 24″ x 7′ Lodge & Davis Planer, fitted with full electric equipment and in good condition.

1—4¼″ Belt-driven Gridley Automatic; excellent condition.

2—4¼″ Motor-driven Gridley Automatics; excellent condition.

1 26″ x 48″ x 10′ J. J. McCabe Lathe; good condition.

1—No. 12 16-spindle Pratt & Whitney Multiple Drill, ½″ capacity in steel, ⅝″ capacity in cast iron; excellent condition.

1 Foster Ring Turret; good condition.

1 22″ x 22″ x 4′ Whitcomb Planer.

1—18″ Warner & Swasey Plain Head Turret Lathe.

1—14″ Flather Engine Lathe, rod and screw feed, plain rest, slip change gears.

1—14″ Pratt & Whitney Engine Lathe, screw feed, plain rest, slip change gears.

1—No. 15 Toledo Punch, 18″ throat.

1—No. 12 Badger Punch and Shear.

1—30″ Collier Circular Shear.

1—16″ Steptoe - McFarland Lathe.

1—12″ Shepard Gap Lathe.

1—No. 2 Mitts & Merrill Keyseater.

1—No. 2 10″ Massillon Punch; new.

2—20″ Barnes Drills.

1—¼″ Shuster Riveter.

2—Marvel Hack Saws.

1—14″ Fox Drill.

1—24″ Ohio Shaper.

1—14″ Steptoe Shaper.

1—Shinn Metal Band Saw.

C. E. Fales Machinery Co.
Kerr Building, Detroit, Mich.

FOR SALE
New Stock Motors

We have following motors, Canadian General Electric Co. make, in Canadian stock for immediate delivery:

1—I-S-10-900-K-550 Volt Motor No. 17328, Rotor 15367, less base and pulley.

1—NR 1612 A-2 Compensator, No. 40117, 10 H.P., V. 60 cycle, 3-phase, 550 volts.

1—K.T. 8-5-900 C 550 V. Motor, No. 18959, rotor 16674, less base with pulley 8 x 5.

2—M.T.C. 5200 5 H.P. 900-500 Volt 60 cycle A.C. 3phase induction Motor No. 159816, with controller and Cat. 74789 C.R. 198 rheostat.

2—S-A-I-18-2-½ Ds Solenoid Brakes mounted on above motors.

1—M.T.C. 5200, 5 H.P., 900-500 volt, 60 cycle, A.C., induction motor No. 672456, with controller and Cat. 74789 C.R. 198 rheostat.

1—M.T.C., 5200, 5 H.P., 900-500 60 cycle, A.C., induction motor No. 670340, with controller and Cat. 74789 C.R. 198 rheostat.

If interested, address The Dominion Foundry Supply Co., Ltd., Montreal, P.Q., or Toronto, Ont., or write direct to

Whiting Foundry Equipment Company
HARVEY, ILL., U.S.A.

FOR SALE

Two 70-Gallon Hydraulic Pumps for 1,500 lb. Pressure.

One 90-H.P. General Electric Co. Motor, 3-Phase, 60-cycle, 200-Volt, $700.

Two Sheldons, No. 3, Cast Iron Fans.

These machines can be seen and inspected at

National Steel Car Co., Limited
HAMILTON, CANADA
(18)

WANTED!

Any amount Brass Tubing, Sheets and Rods

Bought for Cash

Apply Box 232
CANADIAN MACHINERY

Canadian Agents Wanted

Agents wanted to represent a well-known British line of

Chain Belting, Chain Gearing, Etc.

Apply Box 222
CANADIAN MACHINERY

YOU'LL FIND WHAT YOU WANT

In the Classified Advertising Section of Canadian Machinery. Watch it each week for all kinds of new and used machinery.

YOU MAY WANT WHAT YOU FIND.

FOR SALE

ENGINE LATHES, 14" x 6" Reed heavy Duty; oil pan bed; no back gears; belt feed.

THREAD MILLING MACHINES, Lees-Bradner.

MARKING MACHINE, No. 3 Dwight-State; work-holder, dies and die-holder.

DRILL PRESSES, Barnes 22" self-oiling, heavy duty; all geared; capacity ½" to 2" high speed drill. Vanadium steel spindles and gears.

All in good condition. Immediate delivery. (15)

INDUSTRIAL WORKS, Bay City, Mich.

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

Machine Tools For Sale

In stock for immediate delivery:

LATHES.

2—20 x 10 Hamilton (new).
1—16-24 x 8 Sebastian Gap Lathe.
1—13 x 6 Barnes.
1—9" Porter Cable Mfg. Lathe (new).
1—16 x 6 Canedy-Otto (new).
2—16 x 6 Style A Hamilton (new).

BENCH LATHES.

A variety of new and used bench lathes with collets.

BENCH MILLER.

1—B. C. Ames (new).

PROFILER.

1—No. 14 Garvin.

HAND MILLING MACHINES.

1—No. 2 Garvin (new).
1—No. 1 Standard (new).

SLAB MILLER.

1—16 x 48 Bement Slab Miller.

COLD SAW.

1—9-inch Lea Simplex with saw grinder (new).

DRILL PRESSES.

1—4-spindle Barr.
1—3-spindle Avey.

SHAPERS.

1—16" G. & E. B. G.

SCREW MACHINES.

2—No. 2 B. & O. (new).
1—1-inch Pierce (new).
2—1½-inch B. & O. (new).
1—No. 2½ Garvin (new).
1—No. 4 Foster.

MILLING MACHINE.

1—No. 1 Van Norman Plain (like new).

DISC GRINDERS.

2—No. 6 x 20" Ring Diamond Disc Grinder, with compound table micrometer adjustment.
2—No. 6 x 14" Ring Diamond Grinder with table, same as above.

GRINDERS.

2—No. 1 Cutter and Reamer Grinders (new).

STRONG & HERY
225 STATE ST., ROCHESTER, N.Y.

A SNAP

For Sale—Boiler Repair and Sheet Iron Works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars.

Box 213, Canadian Machinery

MACHINE TOOLS

LATHES.

1—68 x 20 Fifield, face plate drive, triple geared.
1—30 x 27 Reed, heavy type, with taper attachment.
1—18 x 36 x 10 Niles Extension Bed Lathe.
1—22 x 14 Engine Lathe, C.R., H.S.
1—28 x 15 Engine Lathe, C.R., H.S.
1—20" LeBlond Heavy Duty, with turret.
1—18 x 8 Jones & Lamson Engine Lathe.
2—16 x 6 Barnes Engine Lathes.
1—16 x 8 Cincinnati Engine Lathe.
1—16 x 6 Walcott Engine Lathe.
1—16 x 6 Reed Engine Lathe.
1—16 x 8 Porter Engine Lathe.
1—14 x 5 Lodge & Shipley Engine Lathe.

MILLING MACHINES.

1—No. 1½ B. & S. Universal with vertical attachment.
1—No. 3½ Fox, Plain.
1—No. 3 Chicago Hand Miller.
2—No. 12 P. & W. L.T. Millers.
4—No. 13 P. & W. L.T. Millers.
1—No. 3-H. B. & B. Vertical Miller.
1—Warner & Swasey Profiler.

GRINDERS.

1—No. 1 B. & S. Universal, with all attachments.
1—No. 1 Landis Universal.
2—12 x 36 Landis, plain, geared head.
1—No. 5 Springfield Oscillating Surface Grinder.
1—No. 2 Gardner Disc Grinder.
1—No. 34 Gardner Double Spindle Disc Grinder.
3—Webster Perks Heavy Grinders.

PLANERS.

1—Pond, 62" (widened pattern type), 9' bed.
1—36 x 26 x 10 Industrial Planer, 1 rail head and 1 side head.
1—34 x 10' Badger, S.H.

TURRET LATHES.

1—No. 6 Foster Friction Geared Hand Screw Machine.
1—No. 4 W. & S. Friction Geared Hand Screw Machine.
1—No. 4 Smurr & Kaven Friction Geared Hand Screw Machine.
1—14" B. & O. Chucking Machine.
1—No. 5 Pearson Hand Screw Machine.
1—1 x 8 Pierce Hand Screw Machine (new).
1—2" Cleveland Automatic Screw Machine (model A).
2—2" Cleveland Jigger Feed Screw Machines.
1—⅝" Cleveland Automatic Screw Machine (model A).

AIR COMPRESSORS.

Steam.

1—12 x 12 x 12¼ x 12 Ingersoll-Rand, Class M.F.I.
1—16 x 18 x 12 D. A. Union S.L. 2 S. Air Compressor.

Belt.

3—10 x 10 Bury Hor., Belt-Driven (182 C.F.).
1—10 x 10 Curtis Vertical, D.C., with base (160 C.F.).
1—8 x 8 Ingersoll Sergent Horizontal (100 C.F.).
1—8 x 8 Chicago Pneumatic Horizontal (110 C.F.).
1—10 x 6 Bury Horizontal.

DRILLS AND SLOTTERS.

1—24" Niles Geared Slotter.
1—28" Prentiss, B.G., P.F., W. & L.F.
2—20" Rockford, B.G., P.F., W. & L.F.
3—20" Buffalo (new), W. & L.F.
1—17-Spindle Moline.
1—5-Spindle Barnes.

PUNCH PRESSES.

1—No. 64 Toledo, S.S., B.G.
1—No. 95 Consolidated Press.
2—Briscoe S.S., 7" stroke.
2—1200-lb. B. & S. Roll Board Hammers.
1—800-lb. B. & S. Roll Board Hammer.

We carry a large line of Boilers, Pumps, Engines, Motors, Generators, etc.

Riverside Machinery Depot
Detroit, Mich.

TRADE DOMINION MACHINERY CO. TORONTO MARK

Our Motto Protects You

Every Tool Will Stand Investigation

LATHES.

1—24 x 14 London Engine Lathe.
1—20 x 10 London Engine Lathe.
1—20 x 10 Rahn, double back-gear.
1—20 x 10 Lodge & Shipley, quick-change gear and double back-gear.
1—18 x 10 American Engine Lathe, quick-change gear.
1—15 x 8 Carroll-Jamieson Engine.
1—15 x 6 Bertram Engine Lathe.
1—14" x 6' Hendey-Norton type Tool Room Lathe; new.

SHAPERS.

1—24" Cincinnati.
1—18" Barker.
1—15" Sumacher.
1—20" Ohio Machine Tool Co.; new.

DRILLS.

1—24" Barnes, sliding head.
1—10" Davis, back-geared.
1—14" Henry & Wright.
1—14" Avey.
1—14" 3-spindle Henry & Wright.
1—14" Reed.

MISCELLANEOUS.

1—No. 4 Pangborne Sand Blast.
1—10 x 10 Curtis Air Compressor with idler and box ready for motor.
1—6" Curtis & Curtis Pipe Machine with full set of new dies.
1—9.2 Cut-off Machine.
2—Dominion Tool-room Grinders. Delivery 30 days.

We have several new electric motors, sizes ranging from 3 to 12 horse-power, at bargain prices.

We are manufacturing High-grade Machines for waving, base turning, and cut-off machine for 6" and 9.2 shells.

Get particulars of our 9.2 Copper Band Milling Machine. We can save you money.

DOMINION MACHINERY CO.
TORONTO, ONTARIO, CANADA
Office 110 Church Street
Factory 14 Darling Avenue

---

3 Replies Waiting For Box 221

Please Call at Once

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue - Toronto

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

Rebuilt Machine Tools

New York's Greatest Stock

One of the largest foreign machinery houses, to whom we have shipped during the past eighteen months, machine tools amounting to over $150,000.00, write us under date of September 16th, stating:

> **"We have been very much satisfied with your machines and will always be happy to send you orders for new and rebuilt machines."**

We have since received a cable order from them for a number of machines.

Among other machines in stock, we mention:

PLANERS

44" x 44" x 16' Niles, one head; fitted for three heads
44" x 42" x 17' Betts, two heads
42" x 42" x 13' Sellers, two heads
42" x 42" x 10' New Haven
36" x 36" x 18' Niles, two heads
36" x 36" x 12' Chandler; heavy duty; weight 35,000 lbs.
30" x 30" x 12' Detrick & Harvey open side, three heads
24" x 24" x 4' Wright
18" x 18" x 36" Wheeler

SHAPERS

30" Morton Draw Cut
24" Steptoe
22" Steptoe
20" Steptoe
20" Gould & Eberhardt
16" Juengst

BORING MILLS

10' Betts Vertical, two heads
6' Betts Vertical, two heads
5' 6" Betts Vertical, two heads
Newton Horizontal, 2 spindles, 5" diameter bars, motor driven
Binsse Horizontal, 3¼" bar
36" Niles Vertical, two heads

GRINDERS

12" x 72" Norton Plain Cylindrical
Four No. 1½ Landis Internal
No. 1 Brown & Sharpe Internal
Springfield Surface, working surface of table 17" x 50"
Falkanau Surface Grinder
Two No. 1 Cincinnati Universal Cutter & Tool Grinders
No. 3 Brown & Sharpe Universal Cutter & Reamer Grinder
No. 2 Garvin Cutter & Reamer Grinder

We have photographs of many of these machines.

New York Machinery Exchange

Offices: 50 Church St., NEW YORK

MACHINE SHOPS AND WAREHOUSES:
222-234 Culver Avenue **63-83 Pollock Avenue**
JERSEY CITY

Baird's Machine Tool List

Every machine listed can be seen in our warehouses

LATHES

1—15 in. x 6 ft. South Bend Engine Lathe.
1—15 in. x 6 ft. Rockford Plain Engine Lathe.
1—18 in. x 10 ft. Draper Plain Heavy Duty Engine Lathe.
1—32 in. x 12 ft. Shepard Lathe, Quick-change, light pattern.
1—17 in. x 7 ft. Street Semi-quick-change Lathe.
1—20 in. x 12 ft. New Haven Lathe and Counter-shaft, face plates, chucks, follow and steady rests, plain change gears.
1—20 in. x 12 ft. Bradford Lathe, plain change gears, complete with chuck.

SCREW MACHINES AND TURRET LATHES

1—No. 53 Acme Automatic (new).
1—¾ in. Cleveland Automatic.
1—3¼ in. Gridley Automatic.
1—2¼ in. capacity Modern Flat Turret Lathe with bar and chucking equipment.
2—No. 3 Screw Machines, complete with wire feed automatic chuck, hand feed to turret.
1—1 in. capacity Garvin Turret Lathe.
2—22 in. New Turret Lathes, heavy duty type.

SHAPERS

1—24 in. Cincinnati Back-geared Crank Shaper.
1—32 in. Walcott Shaper.

MILLERS AND GEAR CUTTERS

1—No. 2 Cincinnati Vertical Milling Machine (almost new).
2—Warner & Swasey Single Spindle Profilers.
1—Keyseating Miller, with long table.
1—No. 1 Farwell Automatic Gear Hobbing Machine.
1—Farwell Quick-change Hand Miller.
1—No. 2 Cincinnati Plain, All-geared Miller (new).
1—No. 1½ Cincinnati Universal Miller.
1—No. 2 Owen Universal Miller.

DRILL PRESSES

1—Foote-Burt 3-spindle Sensitive Drill.
1—13 in. Reed Sensitive Drill.
3—4-spindle Drill Presses.
1—Double Head Taylor & Fenn Sensitive Drill.
2—1-spindle High Speed Ball-Bearing Reed Drills.
1—36 in. American Sensitive Radial Drill.
1—36 in. Mueller Radial Drill, with tapping attachment, cone drive, swinging table.

ELECTRIC DRILLS

1—G.I.U.S. Electric Drill, capacity 1¼ in.
1—Thor Universal Electric Drill, capacity ¼ in., 110 volts.
1—Hisey Wolf Friction Motor Bench Drill, 110 volt., D.C.
1—Standard Type Electric Drill, 110 D.C., ⅜ in. capacity
1—⅜ Electric Drill, 110 volts, D.C.

PLANERS

1—17 in. x 17 in. x 20 in. Crank Planer, one head.
1—26 in. x 26 in. x 6 ft. Cincinnati Planer, one head.

GRINDERS

2—10 in. x 36 in. Landis Plain Self-contained Grinders.
1—No. 3 Landis Universal Grinder.
1—No. 2 Modern Universal Grinder.

W. J. BAIRD MACHINERY CO.

54-56 Jefferson Avenue **Detroit, Mich.**

Used Machinery for Immediate Delivery

BORING MILLS.

51" Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52" Niles Car Wheel Boring Mill.

DRILLS

22" Aurora, S.H., B.G., P.F.
24" Hamilton, B.G., P.F.
32" Hamilton, S.H., B.G., P.F.
32" Hoefer, S.H., B.G., P.F.
34" Barnes, S.H., B.G., P.F.
2½' Dreses Radial.
3½' Industrial Radial.
12 spindle Multiple.
No. 30 C Baush, 12 spindles.

GEAR CUTTERS

24" x 7" G. & E., for spur.
30" x 9" G. & E., spur and bevel.
36" Walcott, for spur.

GRINDERS

No. 5 Diamond Water Tool.
14" x 20" B. & S. Universal.
Gisholt Tool Grinder.

LATHES

12" x 5' Davis, C.R.
14" x 6' LeBlond, C.R., taper.
14" x 6' Porter, C.R.
14" x 6' Rockford, C.R.
14" x 6' Fairbanks, C.R., taper.
15" x 6' Goddard, C.R., taper.
16" x 6' Prentice, C.R.
16" x 6' Sebastian, C.R.
16" x 6' Walcott, C.R.
16" x 8' Lodge & Shipley Pat. Head, C.R., Q.C.G.
16" x 10' Greaves & Klusman, C.R .
17" x 10' Blaisdell, C.R.
18" x 6' Bradford, C.R. taper.
18" x 8' Lodge & Shipley, Pat. Head, C.R. taper.
18" x 8' Bradford, C.R. with turret.
18" x 12' Greaves & Klusman, C.R.
20" x 10' Flather, C.R.
21" x 12' New Haven, C.R.
24" x 16' Schumacher & Boye, C.R.
30" x 14' Reed, C.R.
32" x 16' Blaisdell, C.R.
36" x 12' American, C.R.
36" x 28' American, C.R.

MILLING MACHINES

No. 12 B. & S., plain.
No. 2 Cincinnati, plain.
No. 3 Brown & Sharpe, plain.
No. 4 LeBlond, plain.
No. 13 P. & W., Lincoln.
No. 4 Becker Vertical.

PLANERS

Morton Portable.
22" x 22" x 6' Gray, one head.
24" x 24" x 6' Cincinnati, one head.
30" x 30" x 12' Cincinnati, two heads.
36" x 36" x 12' Powell, one head, arranged for two.
36" x 36" x 12' Cincinnati, two heads.
36" x 36" x 16' Sellers, one head.
39" x 39" x 12' New Haven, one head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.

SCREW MACHINES

No. 1 Chicago Automatic.
1 3/16" Hartford Automatic.
2" Cleveland Automatic.
2¾" Cleveland Automatic.
1" B. & S. Plain.
16" P. & W. Plain.

PRESSES

No. 30 A. Perkins, O.B., Inc.
No. 6 N. American Can. S.S.
No. 174 Consolidated Double Crank.
No. 25 Toledo, O.B., Inc., Cam Drawing.

MISCELLANEOUS

24" Gisholt Turrett Lathe, capacity 6¼".
Allan 2-spindle drill press (new).
Allan 4-spindle drill press (new).
No. 2 Baker Keyseater.
Whitton Centering Machine.
1½" Acme Bolt Cutter.

Write for our stock list.

The H. A. Stocker Machinery Company, 566-572 W. Randolph St.,
CHICAGO, ILL.

MACHINE TOOLS NEW AND REBUILT

The World is Our Field
SIMMONS
ALBANY N.Y. U.S.A.
har
MACHINERY

SPECIAL AMERICAN LATHE.
1—24 x 24 x 6 High Duty American Planer, Adams Vertical Attachment. Same as new $1050
9—22" Swing x 8' Bed American Q.C.G. D.B.G. four-sided Turret Tool Post, complete, used 3 months..... 1060

MILLERS.
1—No 284 Bement Lincoln Miller, perfect condition 250
2—No. 7 Becker Brainard Lincoln Millers, perfect, each 475
1 No. 24 Oesterline Heavy Plain Miller.. 1070
1 No. 3 Kempsmith Plain Miller, Sept. delivery 1450

SHAPERS.
1 12" Juengst Crank Shaper, excelient condition 275
1 24" Gould & Eberhardt Shaper, perfect condition 650
1 16" Smith & Mills Crank Shaper perfect condition 450

BORING MILLS.
4 60" Niles Vertical Boring Mills, excellent condition, each 2650
5 60" Sellers Vertical Boring Mills, excellent condition, each 2650

GRINDERS.
1—Standard No 6 Universal Tool and Cutter Grinder 400
1—10 x 36 Landis Plain Self Contained Grinder 1600

LATHES.
1—14 x 6 Seneca Falls; Pan Bed, CR; hollow sipndle; complete 425
2—No. 5½ Sloan-Chase Bench Lathes, CR, 3 step cone, set collets in 16th, each... 300
1—28" swing x 10' bed Ames, PCF, chuck, complete .....$ 300
1—18" swing x 8' bed Porter Lathe, CR, PCF, chuck 375
1—30" swing x 9' bed New Haven, Turret Tool Post, chuck taper attachment, complete 460
1—22" swing x 10' bed Niles, CS, PCF, 5 step cone, 3" bed, HS, complete... 775
1—40" swing x 14' bed, Harris Lathe, CR, PCF, SS, complete with chuck..... 800
1—20" swing x 8' bed LeBlonde, CR, PCF, 5 step cone, 2½" belt, hollow spindle, complete 875
1—66" inch swing x 16' bed Pond, CR, PCF, HS, 4½" hollow spindle, 5" belt, complete 2000

PLANERS.
1—24 x 24 x 6 Gray Planer, excellent condition 675
1—30 x 30 x 16 Bement Extra Heavy, perfect condition 750
1—30 x 30 x 7 Flather High Duty Planer, perfect condition 850
1—30 x 30 x 8 Pond Extra Heavy Type, perfect condition 1200

DRILLS.
1—4' Fosdick Plain Radial; single pulley drive; same as new 1150
1—24" Sliding Head Prentiss Back Geared Drill 150

MISCELLANEOUS.
1—No. 68-N Bliss Press, double acting, good as new 550
1—48 x 12 Gould-Eberhardt Gear Cutter, all attachments, perfect condition..... 700

Simmons Machine Company, Inc.

903 Singer Building,
New York City

989 Broadway,
Albany, N.Y.

If any advertisement interests you, tear it out now and place with letters to be answered.

FOR SALE

GRINDING MACHINES
1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16" x 66" Landis Crank Shaft Grinder (18 months old).
2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES
58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13" Gisholt Semi-Automatic (12 mos. old).
20 21" Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES
1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES
1 8-spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.
2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS
1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES
38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES
2 Noble & Westbrook No. 1 (new).

PROFILERS
1 No. 3H Becker (new).

PLANERS
1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 40" x 40" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS
1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES
1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES
1 12" Jackson (new).

KEY SEATERS
1 No. 1 Catlin (new).

SCREW MACHINES
1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅝" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2" x 24" Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼" capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES
1 No. 3 La Pointe (nearly new).

BOLT CUTTERS
1 2" Landis Double Head (nearly new).

BORING AND TURNING MACHINES
1 4' Bickford Boring & Turning Mill (nearly new).
1 20" swing 4-Spindle Moline Vertical Boring Machine with 18" x 36" table.

BULLDOZERS
1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES
1 Large Filing and Sawing Machine with 12" stroke.

PUNCHES AND SHEARS
1 No. 3 Walsh Punch Press.
1 Moser 1½" stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8" throat capacity ¼" x ¼".
1 27½" throat lever punch ½" capacity 1¼" stroke.
1 Thompson Bevel Shear ½" capacity.

PIPE MACHINES
1 6" Saunders.

SHAPERS
1 14" Hendey Geared Friction.
1 20" Hendey Geared Friction.

TAPPING MACHINES
1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2" collapsible taps (new).

THREAD ROLLING MACHINES
1 Waterbury Farrell ⅜" capacity (nearly new).

THREADING MACHINES
5 Special Threading Machines for threading 3" steel shells (nearly new).

SPOT WELDERS
1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

Write us what you want new or second-hand.

32 North Clinton Street, Chicago
W. F. Davis Machine Tool Co.
403 Singer Building, New York City

High-Grade
MACHINE TOOLS

The list below is a small portion of our present stock. Write for complete lists.

36" x 20' Fitchburgh lathes.
12- 26" 48" x 14' new style McCabe double spindle heavy pattern new lathes.
2—26" 48" x 18' new style McCabe double spindle heavy pattern new lathes.
20" x 8' Prentice, H. S., C. R., T.A.
3-19" x 8' Sidney new lathes, swing, 21".
2-19" x 8' Sidney new lathes, quick change, swing 21".
2-17" x 8' Sidney new lathes, quick change, swing 19".
2-18" x 10' Rahn Mayer, H.S., C.R.
18" x 10' Cincinnati, H.S., C.R.
18" x 8' 6" Rahn Mayer H.S., C.R.
9-17" x 8' National, quick change, new.
14" x 10' Prentice, taper attachment.
2-13" x 7½' Carroll, Jamieson, new.
40" swing, 3¾" H.S. Conradson Semi-Automatic turret.
1" x 8" New Pierce screw machine.
4- ¼" Hartford Automatic screw machine with slotting attachment.
⅜" Pratt & Whitney screw machine.
36" Baker Bros. tapping and boring drill.
36" Currie & Snyder sliding head drill.
No. 3½ Fox Miller, vertical attachment, index head.
No. 210 Heald wet ring grinder.
12" x 66" Landis universal grinder.
20" Cincinnati B.G. Shaper.
20" Steptoe new S. G. Shaper.
24" American B. G. shaper.
18" x 18" x 5' Pond planer.

FRANK TOOMEY, INC.
127-131 North Third St., PHILADELPHIA, PA., U.S.A.

Immediate Delivery
NEW STEAM ENGINES

Two 5 x 6 Vertical steam engines, 8 horse	$105.00	each
Two 6 x 6 Vertical steam engines, 10 horse	125.00	"
One 7 x 8 Vertical steam engine, 15 horse	175.00	
One 8 x 8 Vertical steam engine, 20 horse	200.00	
Two 4 x 6 Horizontal steam engines, 6 horse, with base	100.00	"
One 5 x 6 Horizontal steam engine, 8 horse, with base	125.00	
Five 6 x 6 Horizontal steam engines, 10 horse, with base	135.00	"
Five 6 stroke engines, with base, 10-15 H.P.	150.00	"
Two 6 x 6 Automatic, with base, 12-20 H.P.	250.00	"
Two 7 x 6 Automatics, with base, 15-25 H.P.	275.00	"
One 8 x 8 Automatic, with base, 20-42 H.P.	500.00	
One 10 x 10 Automatic, with base, 39-82 H.P.	700.00	
One 11 x 10 Automatic, with base, 47-85 H.P.	725.00	

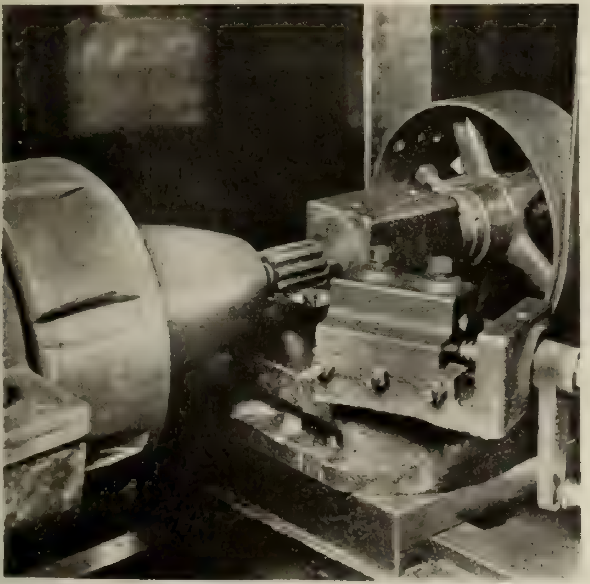
YOUNG, CORLEY & DOLAN, Inc.
115 Broadway, NEW YORK CITY
Telephone: Rector 7866
(tf)

4.5 Mark VII Plant For Sale

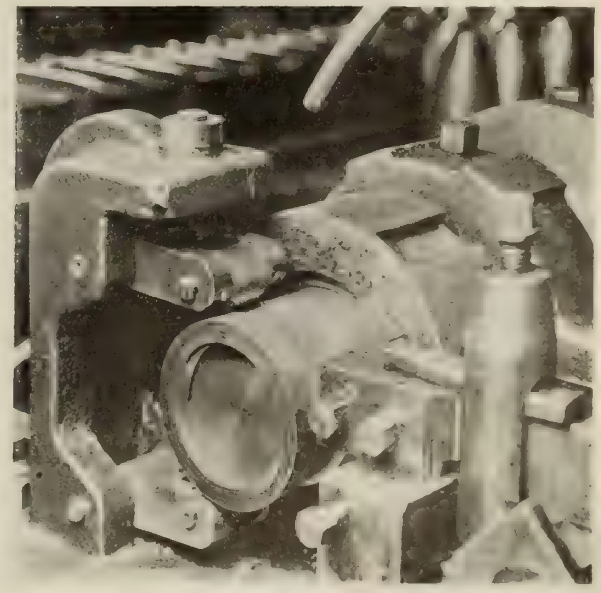
Immediate Delivery

The following machines have been changed from the mark V shell to the mark VII. We will dispose of these machines with their tooling. Every machine has been examined and put into first-class shape.

3—30" American Turret Lathes, Triple Geared; 36" turret base; will take both 3" and 4" boring bars; extension heads on turrets; special small turret or cross-slide with six 1½" holes; 20" 3 jaw Universal steel chucks; Power Feed and Power Reverse. All tooled, boring bars, pot chuck, etc., each	$1300
1—22" x 10' Pond Engine Lathe; back geared and screw feed. All tooled for outside profile operation on Mark VII. shell	$525
1—22" x 10' London Single Drive Engine Lathe; quick change gear box with screw and rod feed. All tooled for outside profile operation on Mark VII. shell	$700
1—24" x 10' Lodge & Barker Back Geared Engine Lathe; screw feed. All tooled for outside profile operation on Mark VII. shell	$500
2—24" Morse Turret Lathes; with 3-jaw Universal chuck; 16" base turret having six 3" holes. All tooled, with pot chuck, for hogging-out base of Mark VII. shell, each	$800
1—Jenckes Band Turning Machine; collet chuck. This machine has band-turned about 15,000 shells. All tooled for Mark VII. shells	$900
1—24" x 12 Bertram Engine Lathe, all tooled with special milling fixture for threading the base recess of Mark VII. shell	$900
2—24" Morse Special Turret Lathes; carriage feed; all tooled with pot chuck and forming tool for finish base recess of Mark VII. shell, each	$900
1—4.5 Brown-Boggs Marking Machine, latest model. New	$200
1—Special Painting Machine, with 110 volt alternating current motor	$50
30—4.5 Shell Platforms with tops holding 50 shells each	$4
1—150-ton Hydraulic Nosing Outfit, consisting of 1 Triple Action Pump (Perrin); 1 Accumulator (Perrin); 1 Nosing Press (Perrin), with Mark VII. die complete; 1 Chapman Banding Attachment for Press	$1075
1—Roelofson Band Turning Lathe, suitable for undercutting, grooving, or similar operations. This machine has a collet chuck	$450



The only correct time to perform the seating operation is to do it in the same fixture with the milling operation. This fixture will fit any engine lathes, and costs only $120.00. The angle of seating can never vary.



Most of the British Shells may now be knurled. This fixture is quick in operation and most accurate. The cost is only $100.00, and it can be used as an attachment to almost any lathe.

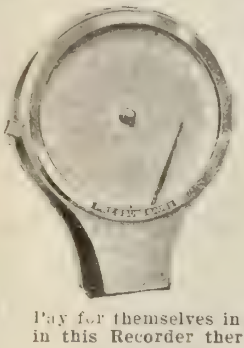
We have all gauges for both Mark V and Mark VII Shells, consisting of plug, length, outside diameter, form, thread and seating gauges.

Our Nosing Die Outfit is the best for the Mark VII shell. Leading manufacturers, such as P. L. Robertson Co., Milton; Wilford & Co., Lindsay; Manitoba Engines, Ltd., Brandon; Canadian Westinghouse, Hamilton; Vancouver Engineering Works; Vulcan Iron Works; Otis Fenson Elevator, etc., are using our dies.

Toronto Type Foundry Company, Limited

50 Coleman Avenue, TORONTO, ONT.

Hints to Buyers



Every Steam Boiler

Should Have a Recording Gauge

Write for a copy of our new catalog No. I—1001, and learn how you can secure continuous night and day records of your steam pressure.

TRADE MARK
BRISTOL'S
REG. U. S. PAT. OFFICE.

Recording Gauges

Pay for themselves in service. One user said, "Since we put in this Recorder there have been days when it earned for us more than its cost."

THE BRISTOL CO., WATERBURY, CONN.

Branch Offices:
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Allen Safety Set Screws

Made by a patent process which increases the strength of the metal over 30%.

All sizes from ¼″ to 1″ carried in stock by Williams & Wilson, Montreal, Canada.

THE ALLEN MFG. CO.

Hartford, Conn., U.S.A., and 173 Princess St., Manchester, England

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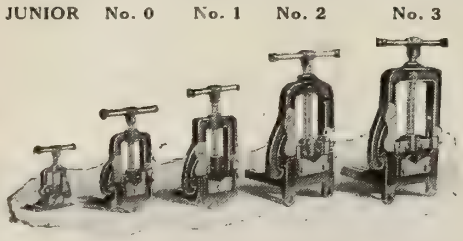

ARMSTRONG MALLEABLE IRON HINGED PIPE VISES

WITH HARDENED STEEL JAWS

Manufactured By

THE ARMSTRONG MFG. CO.

328 KNOWLTON ST., BRIDGEPORT, CONN., U.S.A.
NEW YORK, U.S.A., 248 CANAL ST.

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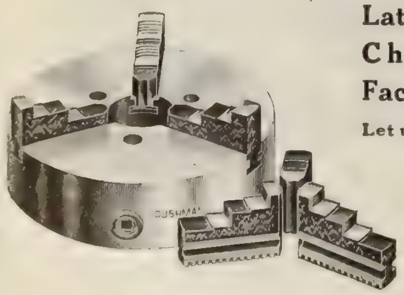
Cushman Chucks



Lathe Chucks, Drill Chucks, Portable Face Plate Jaws.

Let us send you our catalog.

The Cushman Chuck Co.

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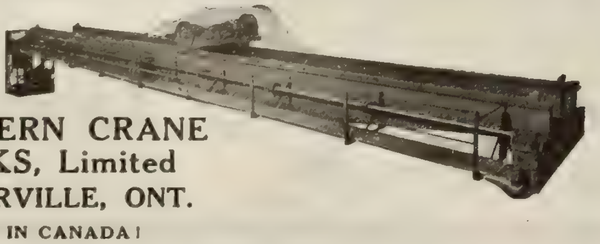

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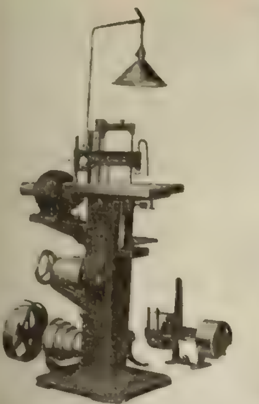

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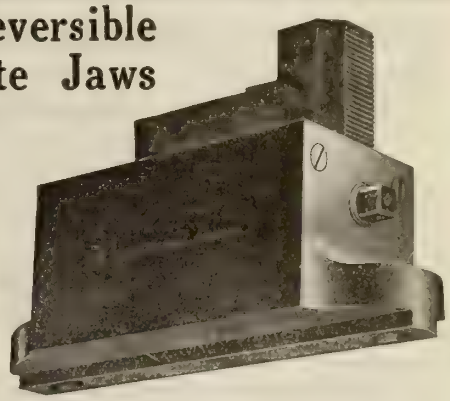

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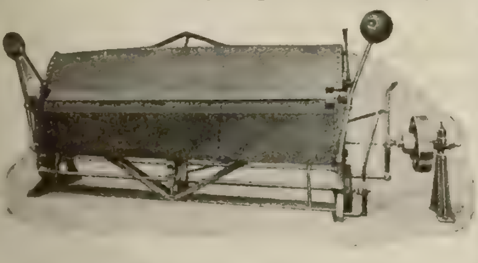

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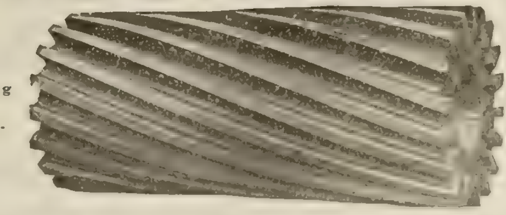

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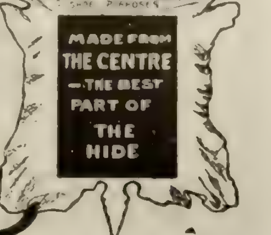
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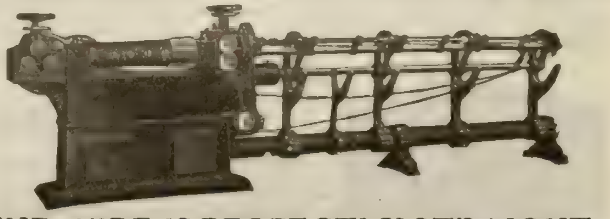

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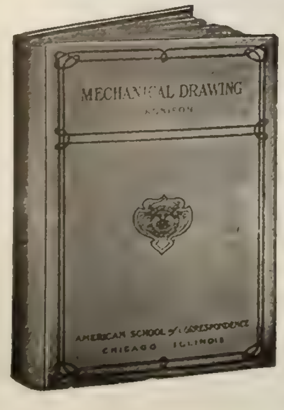

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Cleveland Twist Drill Co., Cleveland.
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Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, GOLIATH AND PNEUMATIC

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Garvin Machine Co., New York.
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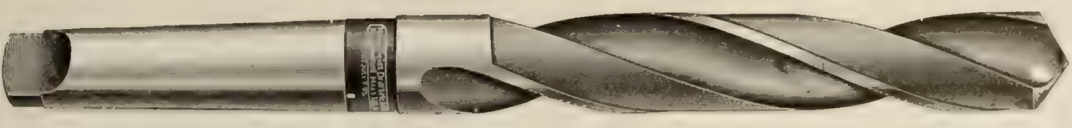

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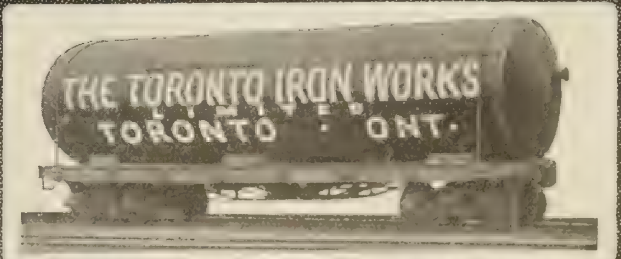

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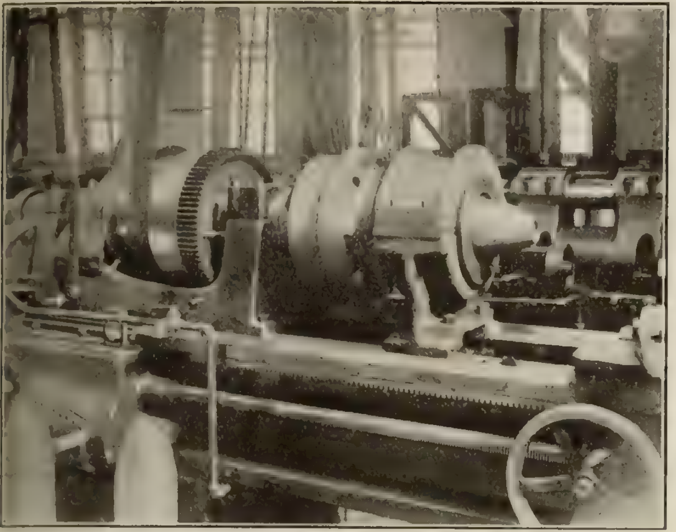

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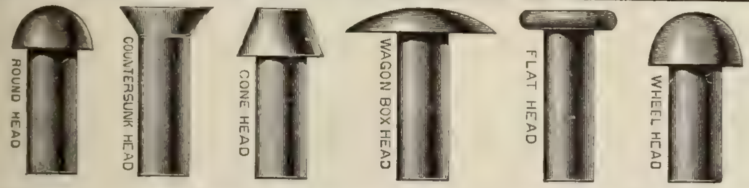

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Stenotype Co., Indianapolis, Ind.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GEAR BLANKS
Brown Engineering Corp., Toronto, Ont.
Can. Steel Foundries, Ltd., Montreal, Que.
Lyman Tube & Supply Co., Montreal, Que.
Webber Bros. Mach. Co., Toronto, Ont.

GEAR-CUTTING MACHINERY
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Hamilton Gear & Machine Co., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
The Smart-Turner Machine Co., Hamilton.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.

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Bridgeford Mach. Tool Works, Rochester, N.Y.

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Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.

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Gardner, Robt. & Son, Montreal.
Grant Gear Works, Boston, Mass.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.

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H. W. Petrie, Toronto.
Wickes Brothers, Saginaw, Mich.
A. R. Williams Machy Co., Toronto.

GRAIN FOR POLISHING
Norton Co., Worcester, Mass.

GRAPHITE
Aikenhead Hardware Co., Toronto, Ont.

GRAVITY CARRIERS
Can. Matthews Gravity Carrier Co., Toronto, Ont.

GREASES (SEE LUBRICANTS)

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Foss & Hill Machy. Co., Montreal.

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Canada Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Dominion Machy. Co., Toronto, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Gray Mfg. & Machine Co., Toronto.
Niles-Bement-Pond Co., New York.
Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.

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Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Pratt & Whitney Co., Dundas, Ont.

GRINDERS, DIE CHASER
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

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Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
United States Electric Tool Co., Cincinnati, O.

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Foss & Hill Machy Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Greenfield Machine Co., Greenfield, Mass.
Modern Tool Co., Erie, Pa.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
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Independent Pneumatic Tool Co., Chicago, Ill.

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Dominion Machy. Co., Toronto, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Greenfield Machine Co., Greenfield, Mass.
Norton Co., Worcester, Mass.
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H. W. Petrie, Toronto.
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Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
Niles-Bement-Pond Co., New York.
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H. W. Petrie, Toronto.
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Carborundum Co., Niagara Falls.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Norton Co., Worcester, Mass.
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Dennis Wire & Iron Works, London, Canada.
Ford-Smith Mach. Co., Hamilton, Ont.
New Britain Mach. Co., New Britain, Conn.

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Boker & Co., H., Montreal, Que.
Diamond Saw & Stamping Works, Buffalo, N.Y.
Foss & Hill Machy. Co., Montreal.
H. W. Petrie, Ltd., Montreal.
Racine Tool & Machine Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
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HACK SAW MACHINERY
Peerless Machine Co., Racine, Wis.

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Canadian Billings & Spencer, Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
High Speed Hammer Co., Rochester, N.Y.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.

HAMMERS, HELVE POWER
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West Tire Setter Co., Rochester, N.Y.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.

HAMMERS, MARKING
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Whitman & Barnes Mfg. Co., St. Catharines, Ont.

HAMMERS, STEAM
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Erie Foundry Co., Erie, Pa.
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Dodge Mfg. Co., Toronto, Ont.
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H. W. Petrie, Toronto.
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HINGES
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Can. Matthews Gravity Carrier Co., Toronto, Ont.
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Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
H. W. Petrie, Ltd., Montreal.
Whiting Foundry Equipment Co., Harvey, Ill.

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Ford Chain Block & Mfg., Philadelphia, Pa.
Jenckes Mach. Co., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

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Northern Crane Works, Walkerville, Ont.

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Matthews, Jas. H. & Co., Pittsburg, Pa.

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Toronto Iron Works, Ltd., Toronto, Ont.

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L. S. Starrett Co., Athol, Mass.

INDEX CENTRES
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Garvin Machine Co., New York.

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Norton, A. O. Coaticook, Que.
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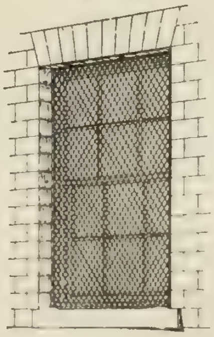

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Garvin Machine Co., New York.
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National Machy. Co., Tiffin, O.
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MACLEAN'S MAGAZINE

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Other Good Things in the October MacLean's

Is Permanent Peace Possible?—by Stephen Leacock (in the role of a professor of political economy). Frequently Leacock doffs the mantle of the humorist, and dons his academic gown and speaks with an earnest seriousness—as a student, teacher and deep thinker. In this article, Is Permanent Peace Possible? he writes to make men and women think.

The Presidential Situation in the U.S.A.—by Agnes C. Laut. Miss Laut says that the German-Americans will support Wilson rather than Hughes, and gives her reasons. This is quite a contrary view to that commonly held, for we all know that the Hyphenates were "sore" on Wilson a few months ago. What has changed them? Miss Laut tells.

The Man from Athabasca by Robert W. Service. Another "At the Front" poem by this Kipling of Canada. The stirring tale in verse of an old Athabasca trapper who left the hunting grounds of the Far West to do his bit in France and Flanders. A fine thing, this poem, admirably illustrated.

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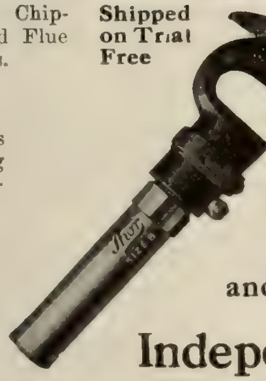

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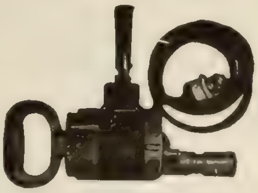

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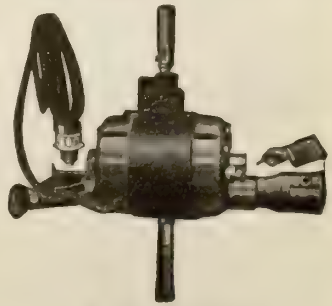

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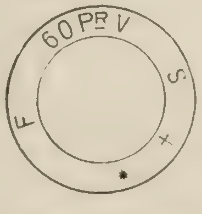

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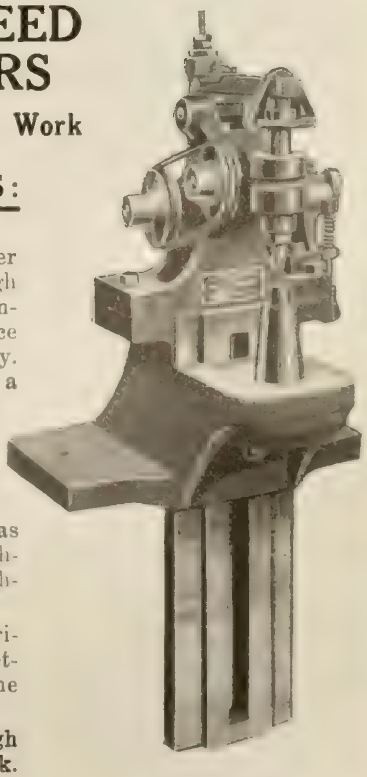

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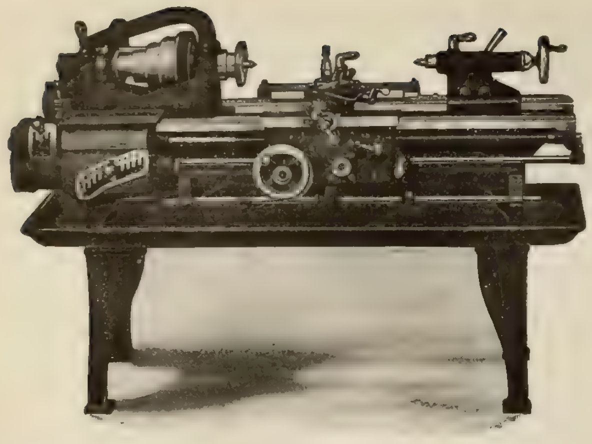

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The Service

Capacity and Convenience

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The "**Hendey**" is accurate in the highest degree and **suited for the efficient use of watch tool chucks, stop chucks, relieving attachments, etc.**

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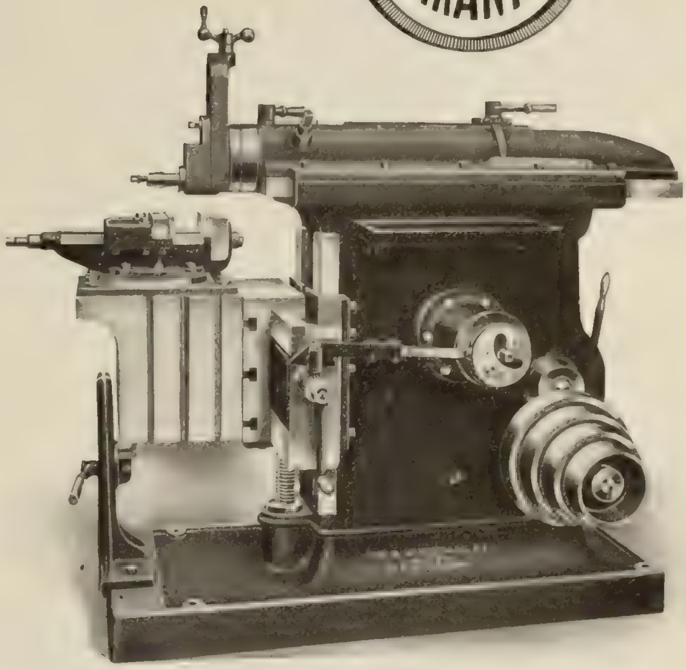

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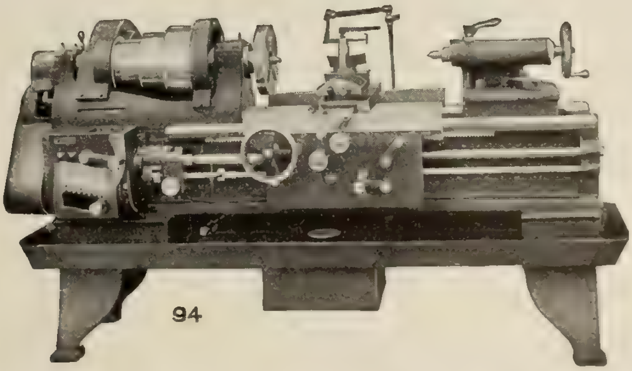

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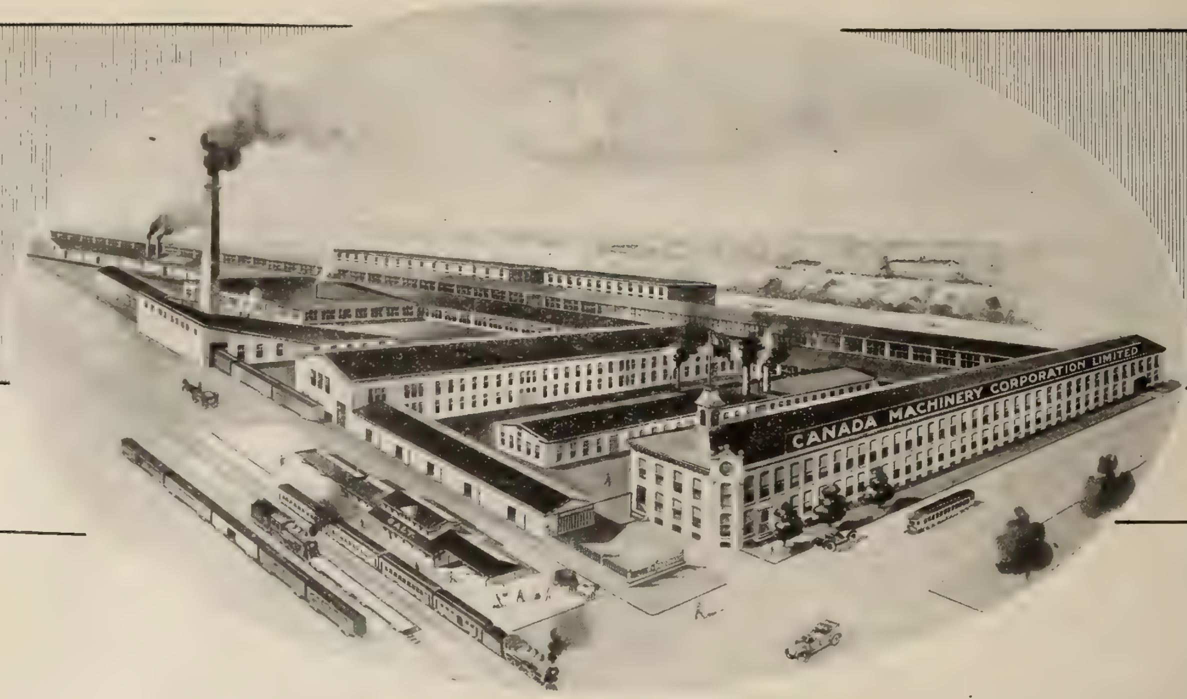

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BUILDERS OF MACHINE TOOLS AND WOODWORKING MACHINERY

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CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XVI—No. 16 Publication Office: Toronto, October 19, 1916 Subscription Price $3.00 per Year

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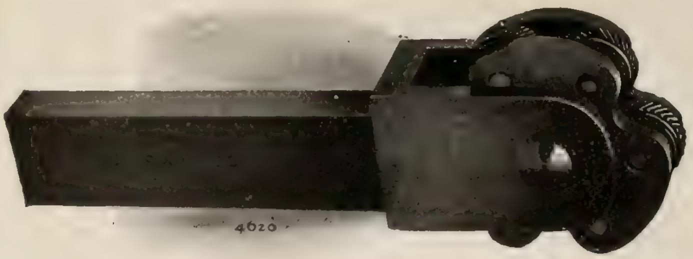
High Speed Steel

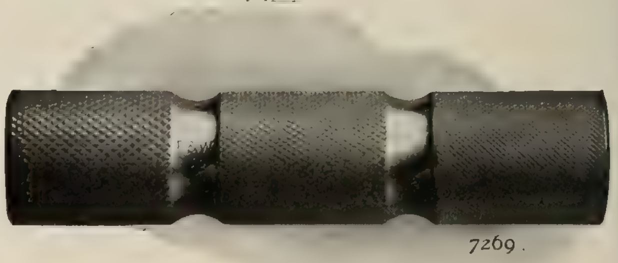
Don't Waste Time Changing Knurls

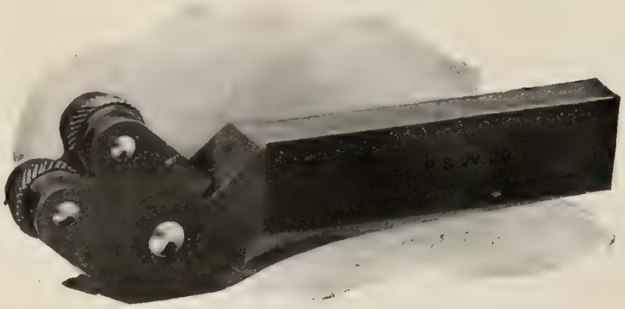
and don't be bothered with three holders when one will do.



Use the P. & W. "Three-in-One" Lathe Knurling Tool

Carries three pairs of knurls, making it three distinct knurling tools in one.





Coarse, Medium and Fine

The three pitches of knurls which we carry in stock are all combined in this one tool.

Uses same knurls as regular Lathe Knurling Tool shown opposite.

Same Holder for Chasers and Single Point Cutters

and the change can be made in a jiffy on the

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1. Threads can be cut very close to a shoulder.
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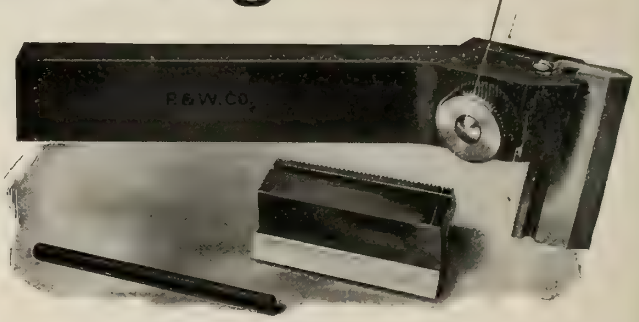

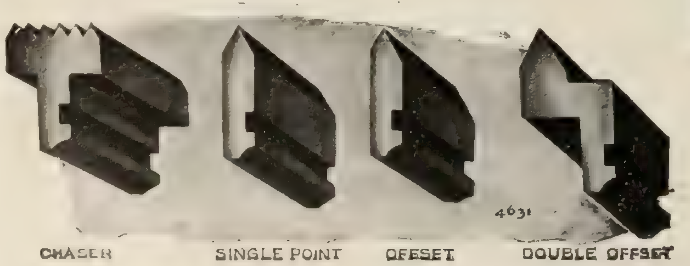

3. Combines economy with all features essential in a threading and forming tool.
4. Cutters have 15° clearance which experience has taught gives the longest wear in various metals.

Place a trial order with our nearest store.

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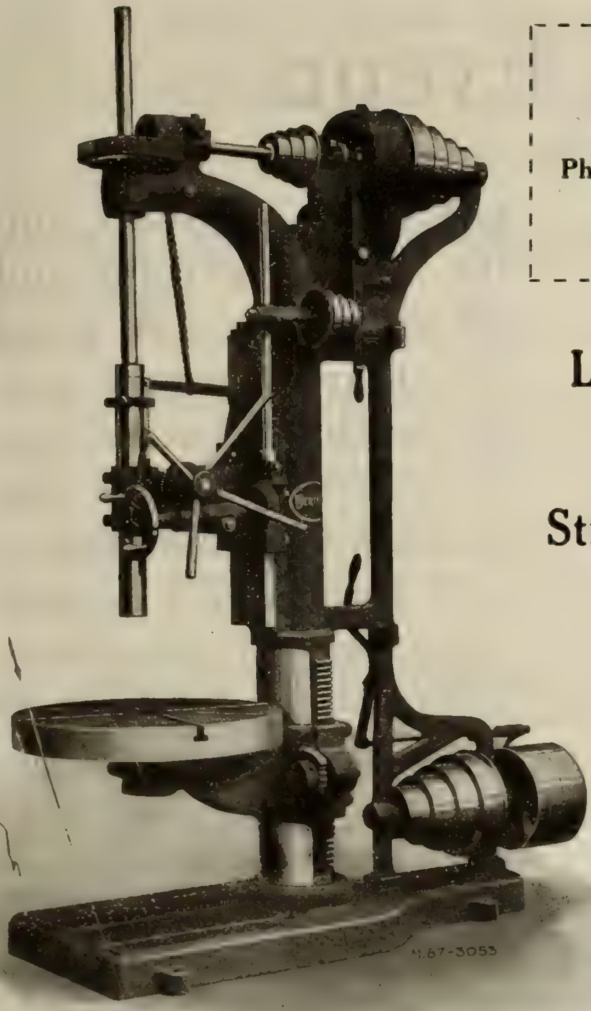

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The Publisher's Page

TORONTO October 19, 1916

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Forms on our Export Number close Oct. 26th.

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CANADIAN MACHINERY
and Manufacturing News
143-153 University Avenue, Toronto

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Courtesy in Business

* * *

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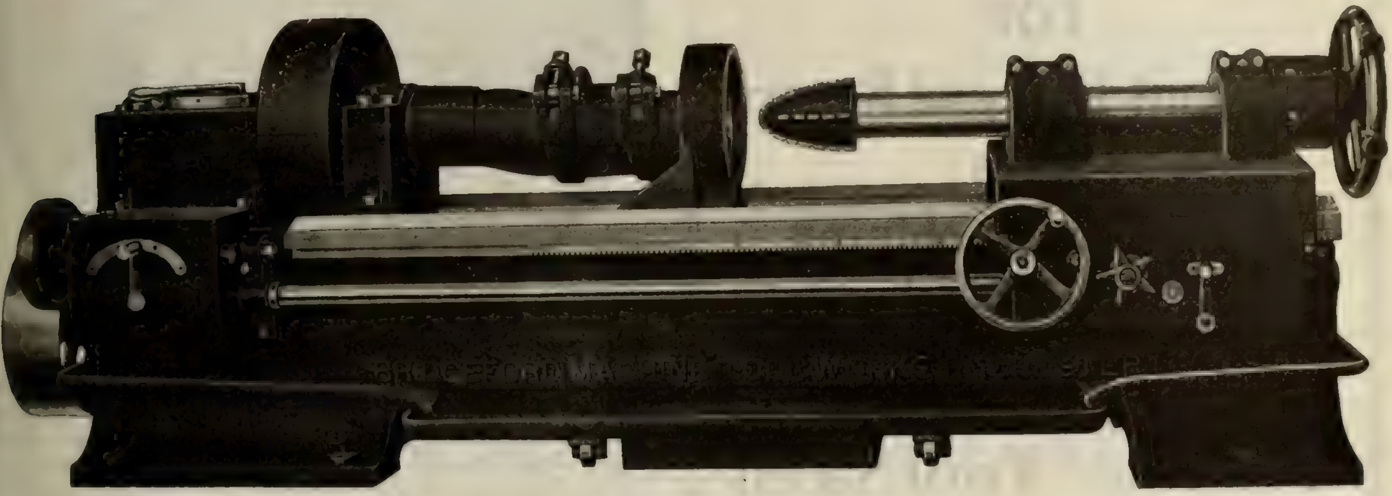

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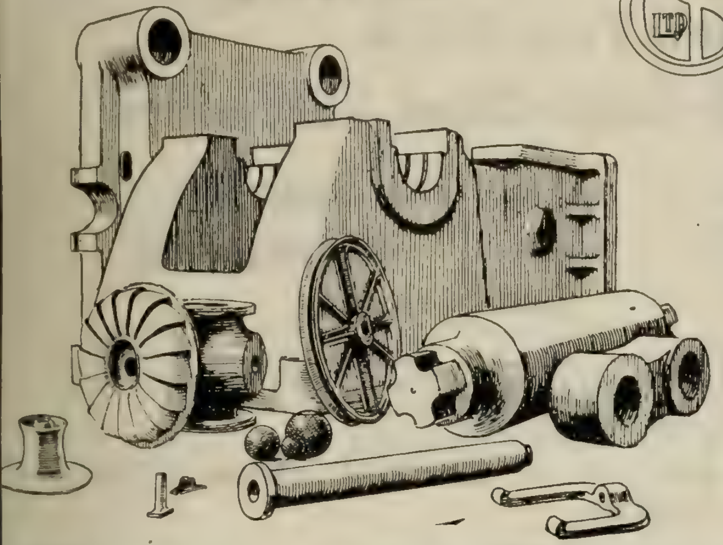

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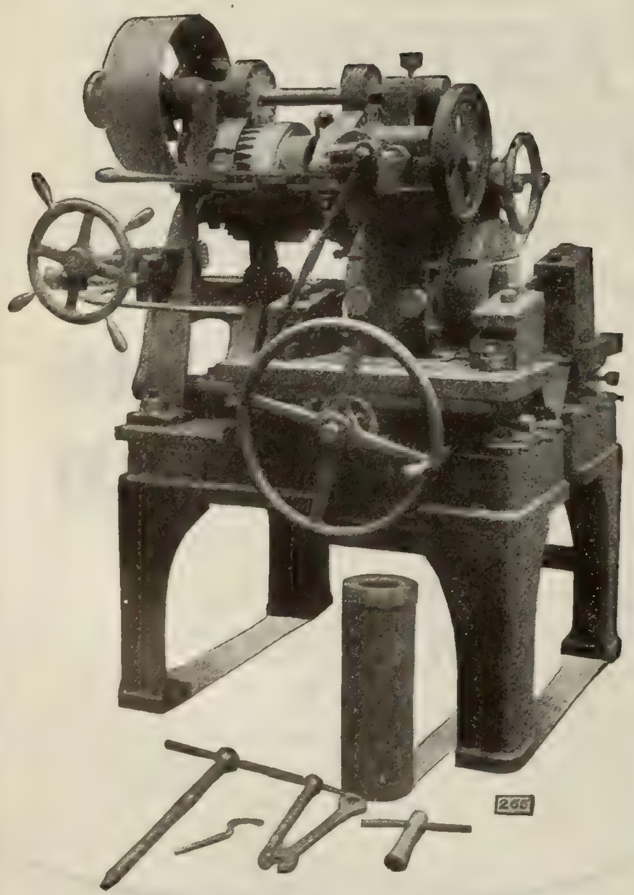

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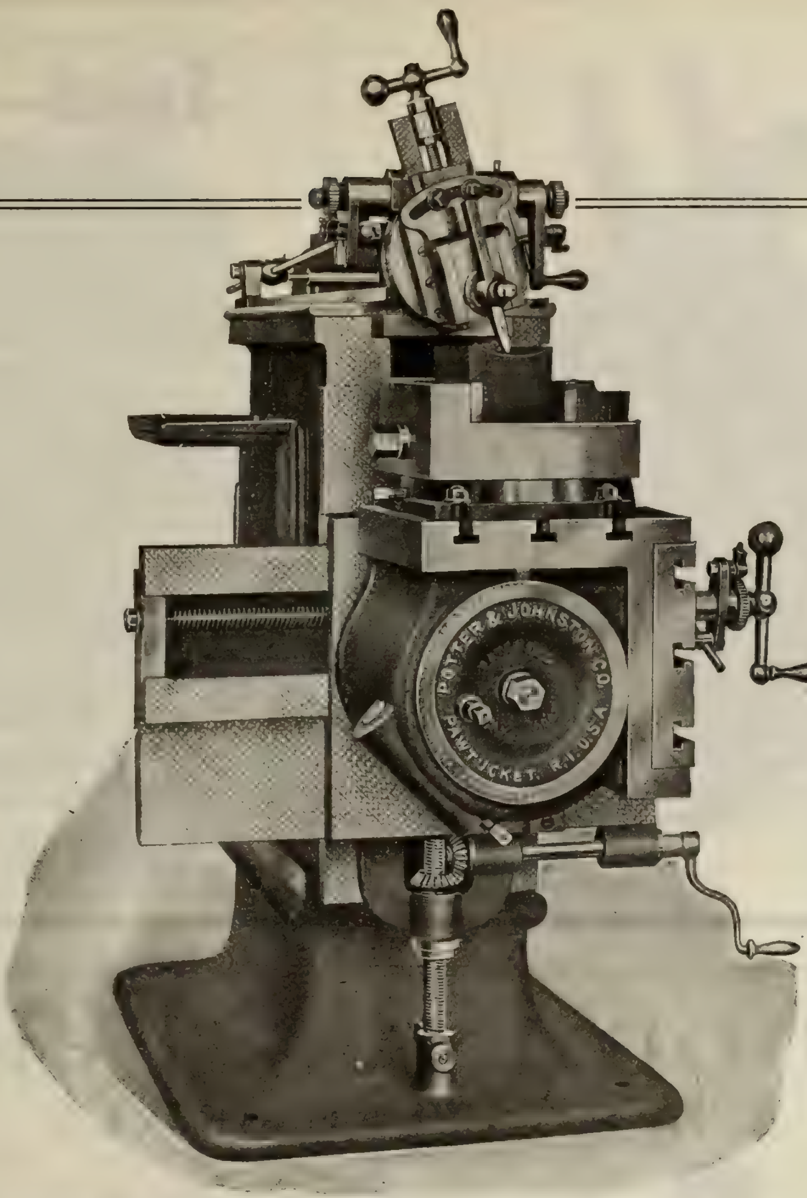
Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal



Potter & Johnston 15-inch Universal Shaping Machine

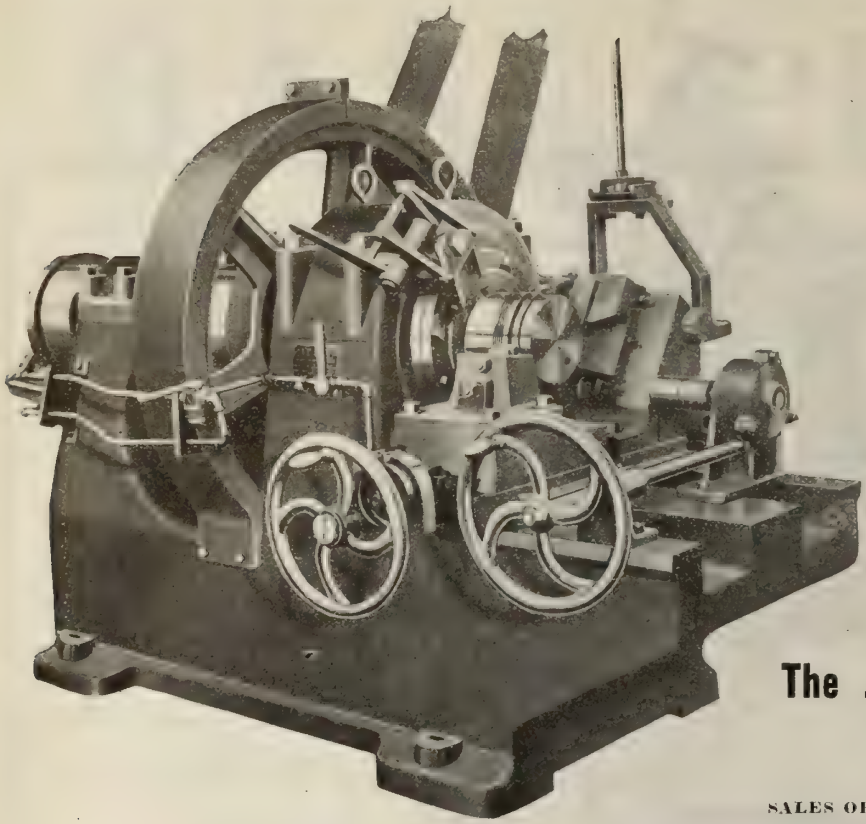
Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA



Speed—Accuracy

—The two most important factors in shell-making. The former is desirable, the latter absolutely necessary. Both are assured by the use of *Jenckes Single Purpose Lathes for Shell Work.*

Illustration shows the latest addition to this famous line—a Banding Lathe for 8" shells. Note the liberal proportions, the general appearance of sturdiness. They mean an extra measure of long and efficient service.

These machines are also manufactured for 18 pdr., 4.5", 5", 6", 8", 9.2" and 12" shells; are tooled when required for the mm. sizes corresponding to Russian and French ammunition.

The Jenckes Machine Co., Limited

WORKS: **Sherbrooke, Que.**
St. Catharines, Ont.

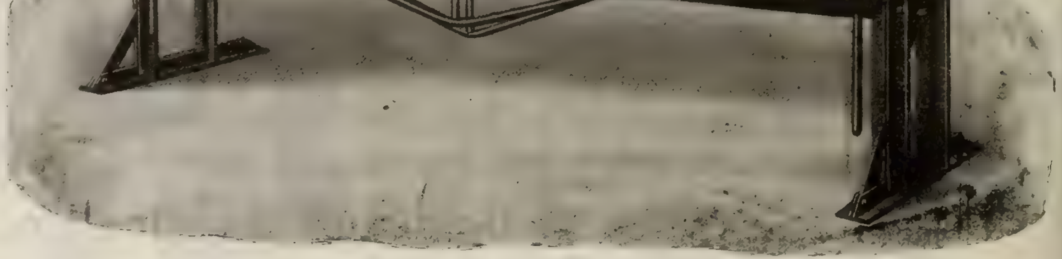
SALES OFFICES: 727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver.

A GOOD INVESTMENT

A "B.B." STEEL BRAKE

FOR a Cheap Brake the "B.B." Steel Plate Machine is the best investment you can make. It is especially designed for rapid forming of sheets, and is suitable for a large variety of work, such as can be accomplished on an ordinary Cornice Brake. We can furnish these Brakes for bending all sizes and gauges of metal.

Write for Catalogue if Interested.

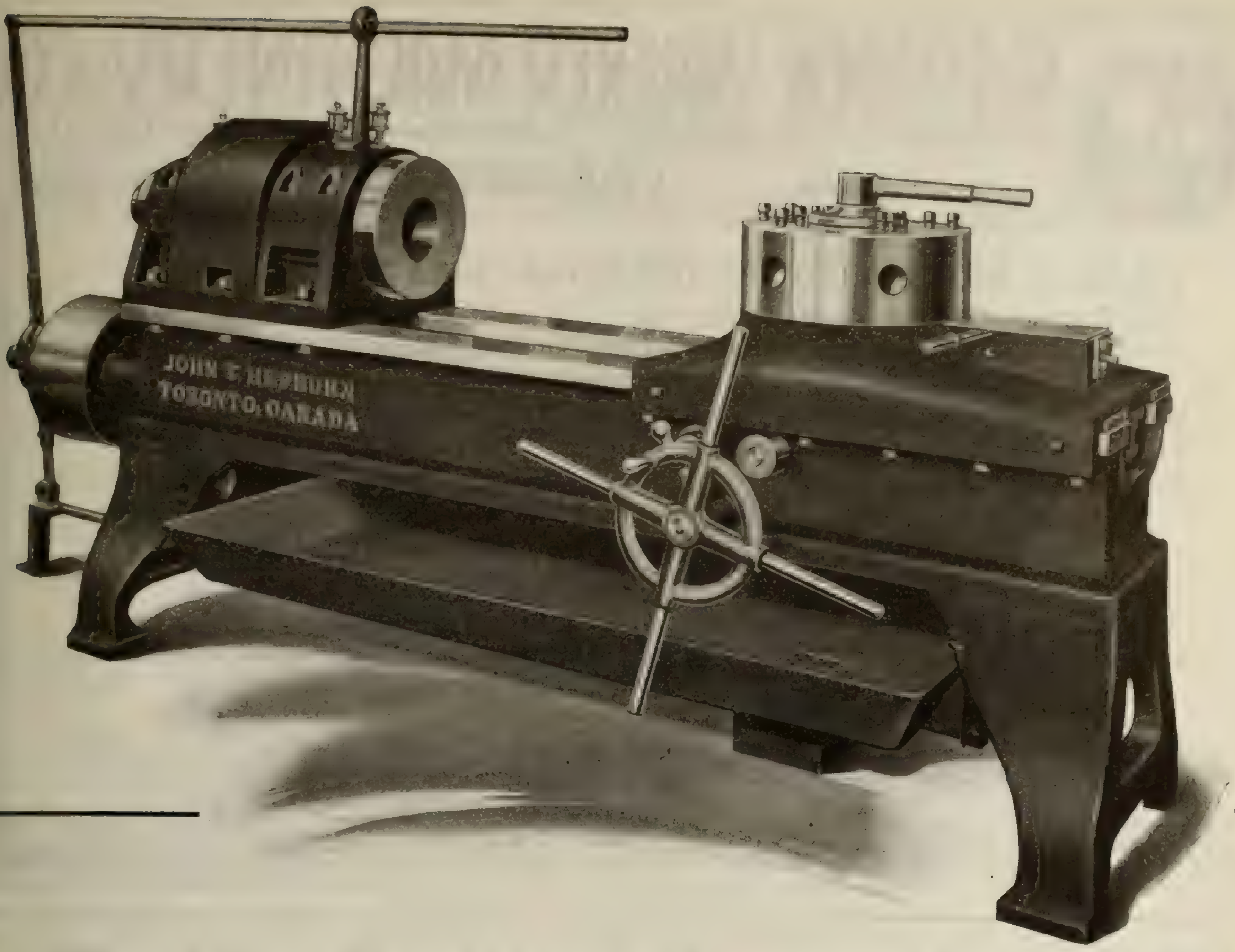


"ALWAYS, EVERYWHERE, SPECIFY 'B.B.' QUALITY."

The Brown-Boggs Co., Limited, Hamilton, Canada

Tinsmiths' Tools, Sheet Metal Working Machinery, Dies, etc.

Western Representatives: MESSRS. BISSETT & WEBB, LIMITED, WINNIPEG AND EDMONTON



The Six Standards

SPEED
ACCURACY
POWER

STRENGTH
SIMPLICITY
DESIGN

Measure every heavy duty shell Lathe by these Six Tests. Get the factory records.

The HEPBURN HEAVY DUTY SHELL LATHE

courts comparison. It knows where it stands in Competitive tests. It has sold and still sells on its **efficiency.**

It is important that you have a lathe that does maximum service. Shell business is not to last forever, and it pays to get the best to do the most.

We can make prompt delivery. Communicate with us.

We manufacture Turning and Turret Lathes up to 9.2".

John T. Hepburn, Limited
18 to 60 Van Horne Street
TORONTO, CANADA

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO.
LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

WE HAVE AT TORONTO FOR IMMEDIATE DELIVERY:—

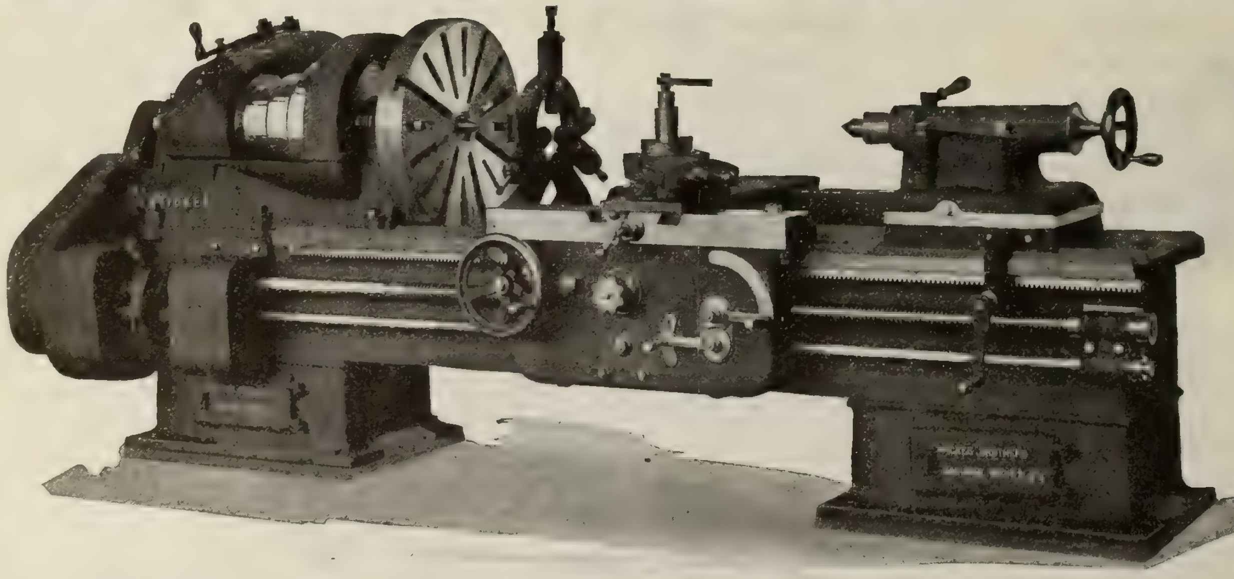
New **Davis 6" Cutting-off Machines,** fully equipped, size of hole in spindle 6⅞".
New **Giddings & Lewis** 18" x 8' Heavy Duty Engine Lathes, 3- step Cone, Double Back Gears, regular equipment.
New Heavy Duty Lathes for turning 8" and 9.2" Shells.
Thor pneumatic hammers and drills.
Appleton Grinder—Challenge No. 1—slightly used.

Special 16,000 lb. 40" Boring Lathes for 6" Projectiles.
Immediate Delivery—Special Price—Write for Cuts, etc.
Good Delivery now on Lodge & Shipley 24" Lathes.
Ask for information about machines for any operation on 3", 4.5", 5", 6", 8" or 9.2" Projectiles.—Our Experience is at Your Service—

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds

Wickes Heavy Duty Engine Lathe



The Wickes 26" Heavy Duty Lathe.

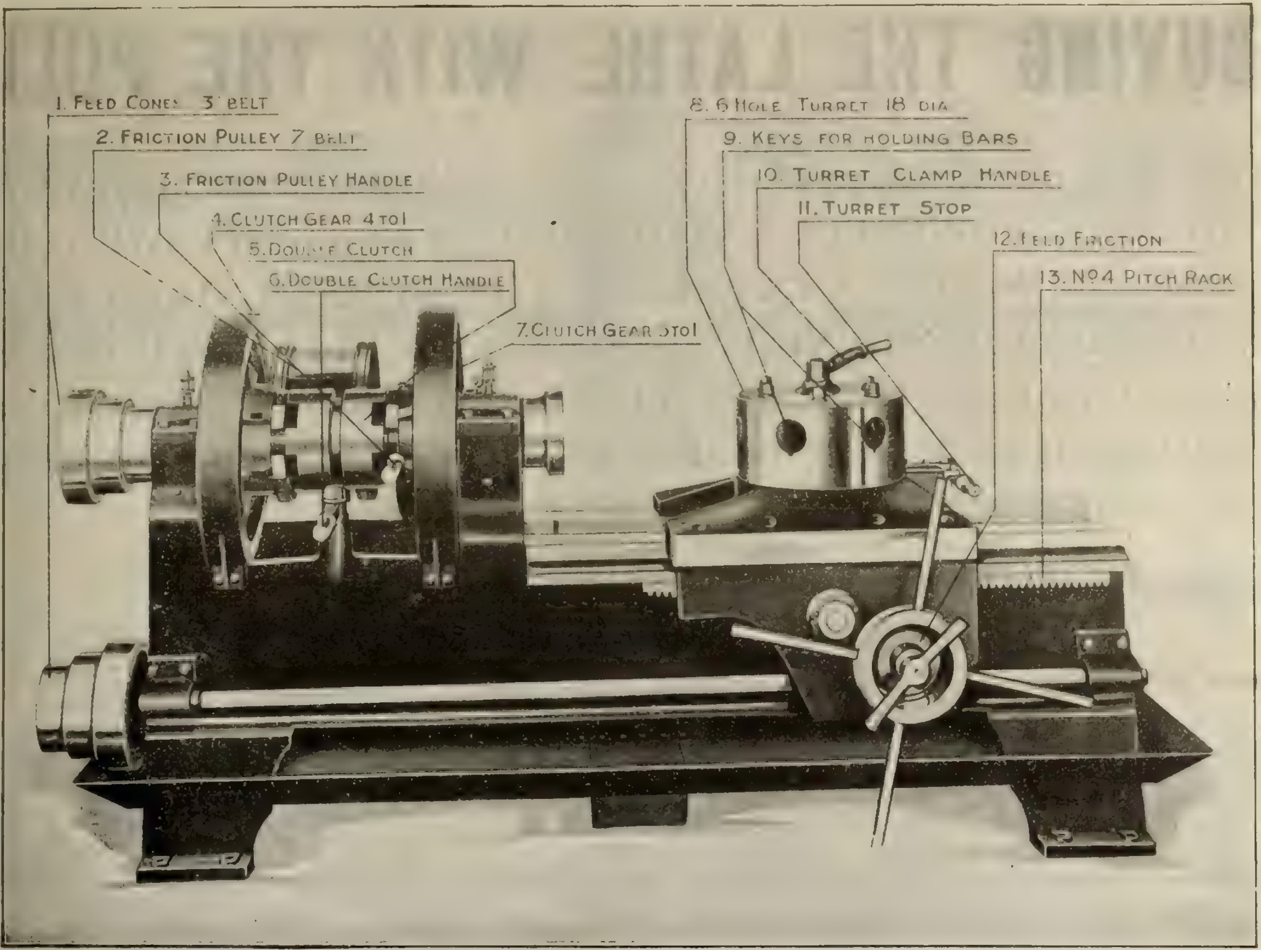
Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.

This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.

Let us tell you about this lathe and our 20", 32", also our 17" Rapid Production Lathe for Automobile and other work.

We can make prompt shipment.

WICKES BROTHERS Saginaw, Michigan


1. FEED CONES 3" BELT
2. FRICTION PULLEY 7" BELT
3. FRICTION PULLEY HANDLE
4. CLUTCH GEAR 4 TO 1
5. DOUBLE CLUTCH
6. DOUBLE CLUTCH HANDLE
7. CLUTCH GEAR 5 TO 1
8. 6 HOLE TURRET 18 DIA
9. KEYS FOR HOLDING BARS
10. TURRET CLAMP HANDLE
11. TURRET STOP
12. FEED FRICTION
13. Nº 4 PITCH RACK

SPECIAL SHELL LATHE

For boring and turning shells from 9.2 down. Above cut shows bed turret for boring operations. We have them in stock for both boring and turning.

Among other good features, note the following:—

No. 1—3" belt on feed.
'' 2—7" belt and 75 H.P. friction.
'' 8—18" turret.
'' 9—Keys for boring bars.
'' 12—External Feed friction.
'' 13—Four-pitch rack.
Note ratio of gearing.

Note Sheet Steel Oil Pan.
No countershaft required.
Bronze bearings throughout.
Sight feed oilers.
Hardened and ground thrust collars.
An overplus of strength throughout.
Workmanship guaranteed.

This lathe will give you satisfaction.

Immediate Shipment From Stock
(Subject to Prior Sale)

The Foundry & Machine Co., Limited
1167 Carriere Road
Montreal, Canada

BUYING THE LATHE WITH THE PULL

Gives you a machine that is recognized to-day among machinists as ONE OF THE MOST POWERFUL LATHES BUILT. AN EXTRA SWING OF OVER 2½ INCHES. A LATHE THAT IS AS NEAR FOOLPROOF AS POSSIBLE, COMBINING ACCURACY WITH EFFICIENCY. SIMPLE IN CONSTRUCTION YET ECONOMICAL. NO LARGE REPAIR BILLS ON A CNISCO. EASILY OPERATED, REQUIRING NO SKILLED MECHANIC.

There are OTHER reasons why you SHOULD BUY CISCOS.

Sold in Canada
by
WILLIAMS

Made in Cincinnati U.S.A.
by
THE CINCINNATI IRON AND STEEL CO.
14", 16", 18", 24" Lathes

NOSING DIES

of

CHILLED CAST IRON

FOR

4.5", 5" and 6" H.E. Shells

We have one in use now that has nosed over 21,000 shells and is still doing business.

CHEAP AND EFFICIENT

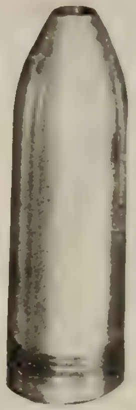
Write or wire for particulars.

Marsh & Henthorn, Ltd.

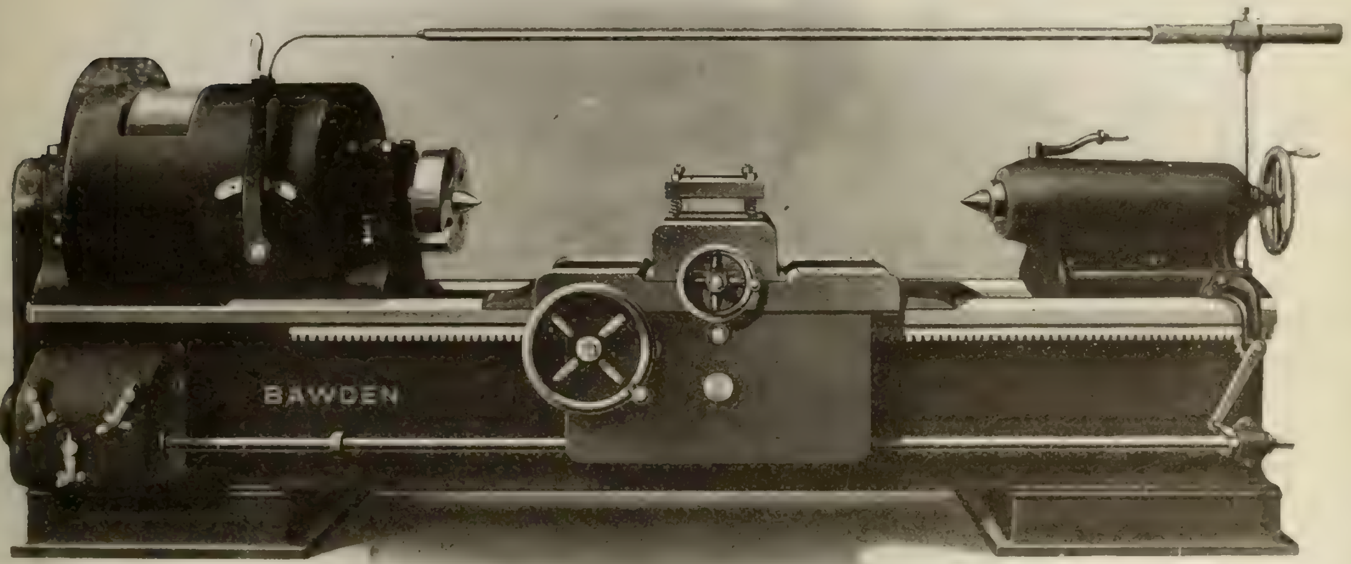
Belleville, Ontario

BAWDEN

Heavy Duty Shell Lathe



A Bawden Heavy Duty Shell Lathe restores its cost.



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

A Lathe may be an expense—always; or it may save its cost. A Bawden Lathe, in comparison with many Lathes, wipes out its own invoice cost.

The Bawden Lathe for making shells has a rigidity, accuracy, speed and durability under operation that put it in a class by itself. It does its work **right** and **fast**, and so saves time, saves waste, saves temper—all of which have a real money value.

Let us put you in direct communication with Bawden Lathe users. If they like it, they'll say so. If they condemn it, they will not hesitate to give the Bawden kicks and curses.

Send for specifications.

NOTE: We manufacture a full line of Guages for all sizes of British, French and Russian Shells and component parts.

The Bawden Machine Co., Limited

TORONTO, CANADA

Working Day and Night?

If so, it will be decidedly to your advantage to install

"Chicago" Automatic Screw Machines

They are not only equal to day and night service, but will economically turn out any screw machine product in minimum time.

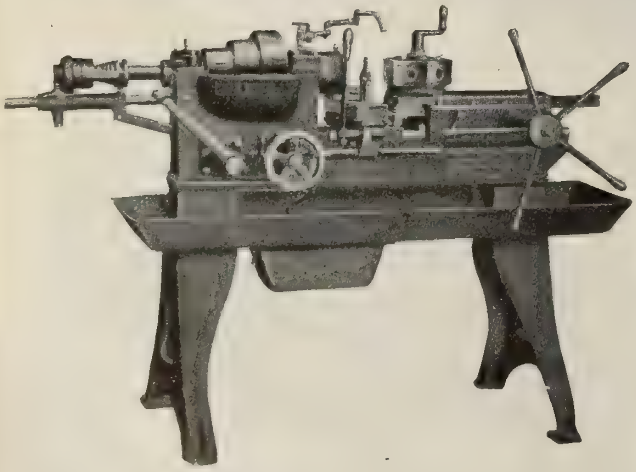
Drop a card now for specifications.

READY FOR OPERATION IN YOUR PLANT IN LESS THAN SIX WEEKS from the time your order reaches us.

The John MacNab Machinery Co., 90 West Street NEW YORK.

European Representative: John MacNab, Hyde, England.

The "Steno"
1" x 7" TURRET HAND SCREW MACHINE



IMMEDIATE DELIVERY

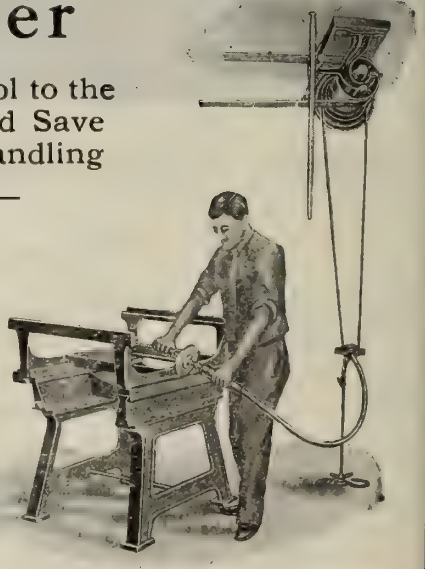
Increased production enables us to offer a limited number of these exceptionally well built machines for immediate delivery.

THE STENOTYPE COMPANY
INDIANAPOLIS, INDIANA, U. S. A.

Makers of the "STENO" Duplex Surface Grinder and "STENO" Milling Cutters, Reamers, Fixtures, Jigs and Gauges.

Portable Emery Grinder

Take the tool to the Work and Save Heavy Handling



We are inventors of the

Flexible Shaft

For all Purposes.

The oldest and largest manufacturers in the world.

CAN FURNISH MOTOR DRIVEN WHEN DESIRED

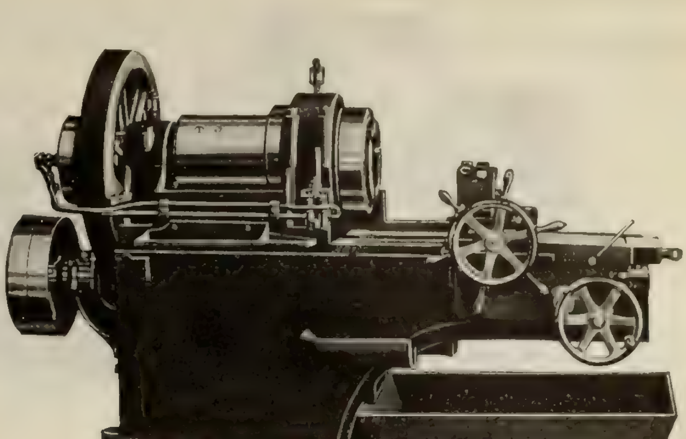
Write Us for Catalogue and Prices.

STOW MFG. CO. BINGHAMTON NEW YORK

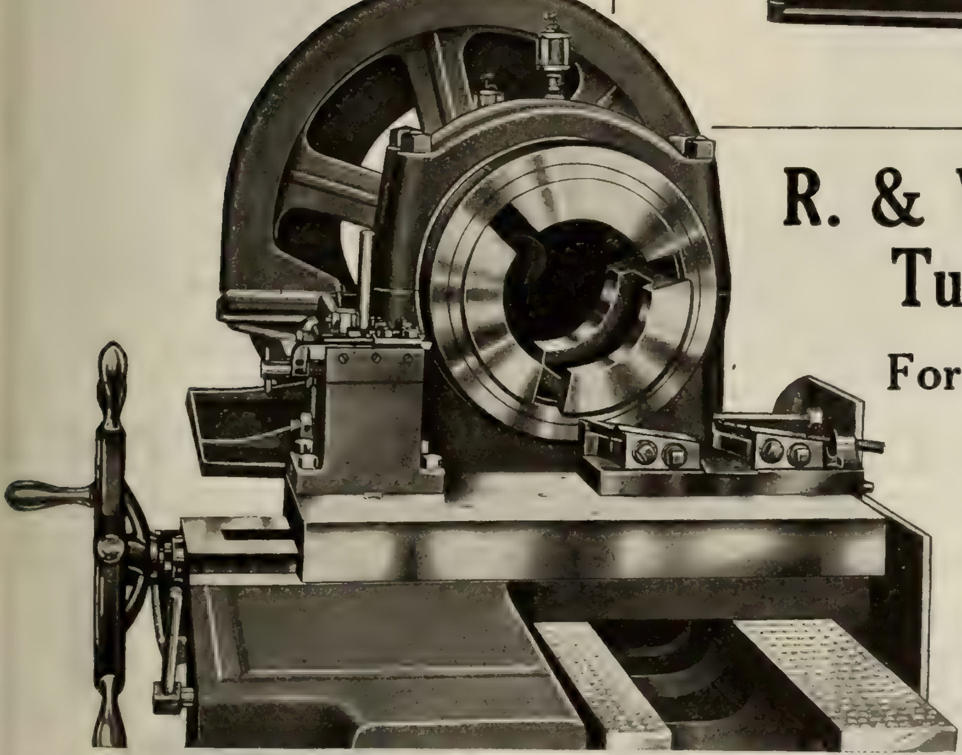
Established 1875

Oldest Portable Tool Manufacturers in America.

General European Agents—Selson Engineering Co., Ltd.
85 Queen Victoria St., LONDON, ENG.



SIDE VIEW



R. & V. Copper Band Turning Lathe

For 6", 8" and 9.2" Shells

Illustration gives view of carriage showing the tool slide with forming tools and trimmer; also chucking collet for holding shell.

WE have brought out a line of Special Single Purpose Lathes for the manufacture of High Explosive Shells, specializing on

Cutting-Off Lathes
Outside Roughing Lathes
Outside Finishing Lathes
Inside Boring Lathes (Roughing and Finishing)
Thread Millers
Turret Lathes for Counterboring
Waving and Undercutting Lathes
Copper Band Turning Lathes
Facing End and to Weight Lathes

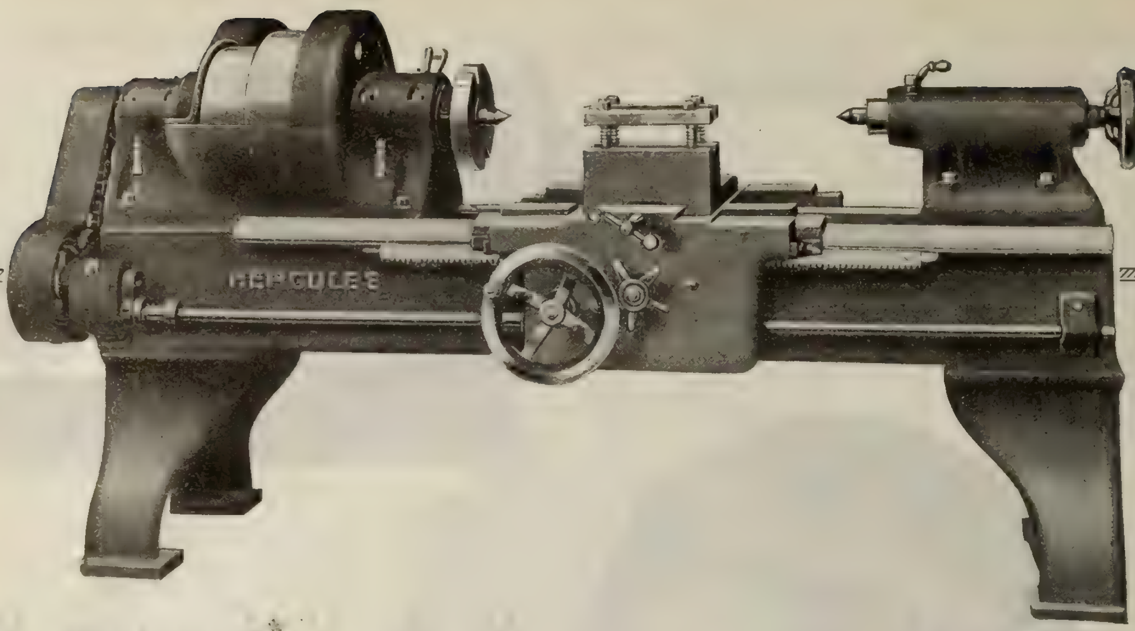
They are all of exceptionally heavy construction and simple design to meet the severe service and special requirements of the Munition manufacturers.

These machines are making records equalled by few, and are already favorably known.

If you are a manufacturer of, or contemplate making shells, write us for estimates and deliveries.

The Root & Vandervoort Engineering Company

EAST MOLINE, ILLINOIS, U.S.A.

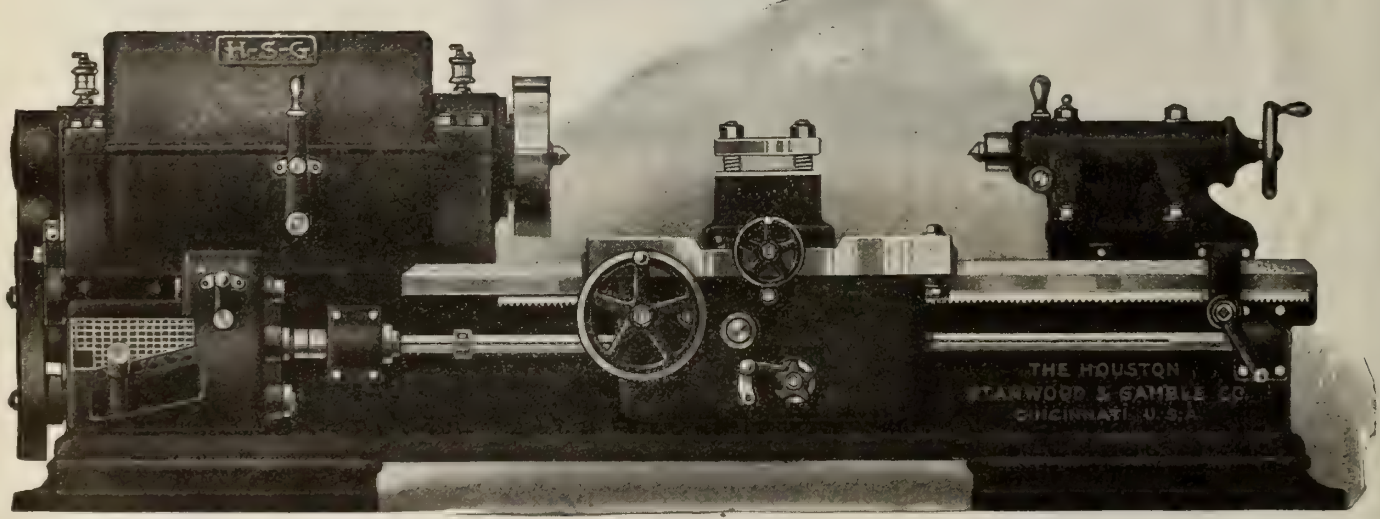


There's Nothing Fancy About the "Hercules," but—

when it comes to turning—well, just watch it. When you have a tough job of straight or taper turning the very absence of frills and special attachments is a decided advantage. That's the idea behind a "Hercules"—a lathe that can handle work requiring sheer strength and power. Its extreme simplicity avoids confusion in operation and facilitates quick handling. When you realize that the majority of lathe work is plain turning, there are possibilities in the "Hercules" well worth considering. Early deliveries. Write us now.

Investigate our Turret Screw Machines

Himoff Machine Co., 128 Mott St., New York City



H-S-G TRADE MARK single-pulley, high-powered, all-geared engine lathe built in three sizes, 28", 30" and 36" swing.

This is a heavy duty lathe. For instance, the 30" swing lathe has 7" face drive pulley, 8" x 10" front spindle bearing and other parts of correspondingly liberal dimensions. The net weight with 13 ft. long bed is 18,500 pounds. The design and workmanship are excellent.

The Houston, Stanwood & Gamble Co.

CINCINNATI, U.S.A.

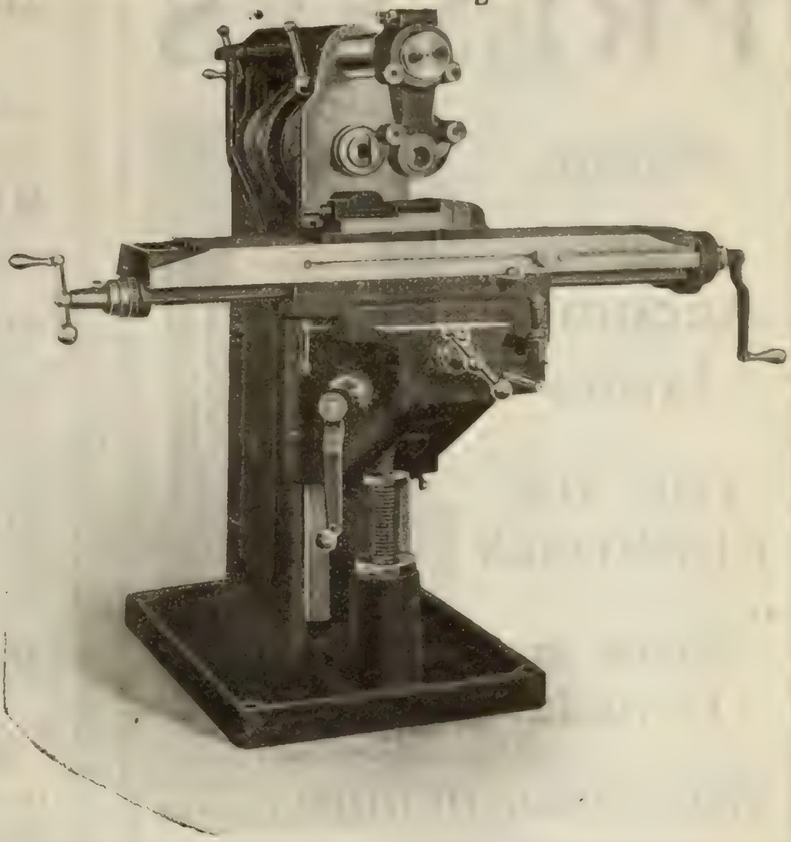
Represented by Rudel-Belnap Co., Ltd., of Montreal and Toronto

The Ford-Smith Machine Company

Ford-Smith

27" x 19" x 7½"

Milling Machines



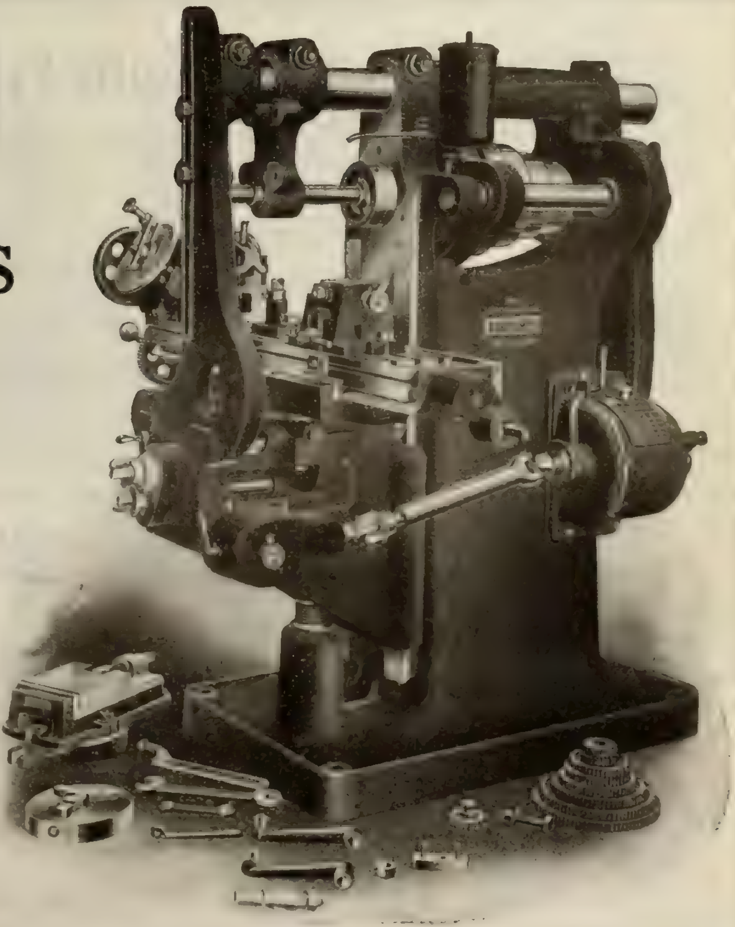
We can make interesting deliveries on these machines, either through our regular dealers or direct from our plant.

Our Catalog illustrates various features exclusive with Ford-Smith Millers and will be gladly forwarded on request.

THE FORD-SMITH MACHINE COMPANY, LIMITED
Hamilton Canada

KEMPSMITH

UNIVERSAL MILLING MACHINES



Every Kempsmith Milling Machine of whatever size, is provided with a slotted spindle nose for positive drive of arbor and for positive drive of face milling cutter in either direction.

Every machine is equipped with our patented keyed overhanging arm which insures positive alignment of arbor and boring bar and also prevents the cutter being pounded out of line under cut.

Kempsmith machines are heavy, with weight well distributed and their accuracy is guaranteed within very close limits.

Send for Illustrated Catalogue.

Kempsmith Manufacturing Co.
MILWAUKEE, U. S. A.

Agents:—Foss & Hill Machinery Co., Montreal
General Supply Company, Toronto and Ottawa
Western Supply and Equipment Co., Calgary

PRESSES

Pumps
and
Accumu-
lators

**FOR ALL
PURPOSES**

Made in
Canada

NOSING PRESS

WILLIAM R. PERRIN, Limited
TORONTO

Three Machines In One

No tool in your shop is more efficient than this

METALWOOD

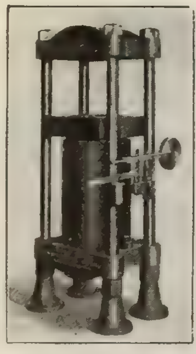
Combination Forcing, Broaching and Straightening Press.

It is one of the handiest of shop tools for all work such as pressing in bushings, broaching, and the straightening of small shapes. Auxiliary tables and fixtures not shown in illustration. Once installed, a multitude of special uses for the machine keep suggesting themselves and its speed makes it a **great producer.**

Metalwood

Mfg. Co.

Leib & Wight Sts.,
DETROIT, MICH.



Elmes Hydraulic Press No. 676

With ¾-in. Automatic Lever Operating Valve No. 677-A

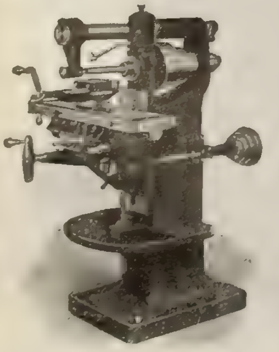
This press is of steel and semi-steel construction, and the stands which support the press are threaded at the ends to receive the steel columns and have holes for fastening to the floor. The platen is guided by the columns.

The operating valve is attached to the cylinder, and is designed with a weight to be set for the pressure desired, and releases automatically. To start the ram up, the lever is pushed down; upon the ram reaching the desired pressure, the lever automatically releases (acting as a safety valve as well), causing the ram to descend. Valve body is made of bronze, and other parts are made of tool steel and machine steel. If desired a hydraulic gauge can be attached to show the various pressures, although with this valve it is not necessary.

Write for our Hydraulic Machinery Catalogue.

Charles F. Elmes Engineering Works 217 N. Morgan St. Chicago, U.S.A.

Over 50 years' experience building hydraulic machinery.



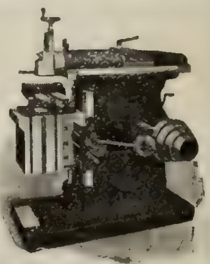
Cut Your Shop Costs

Nobody would think of putting 16-inch lathe work on a 30-inch lathe, then why leave small parts on a large Milling Machine?

A steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

That same principle applied to your small planer work will cut the cost of planer work.

A Steptoe Shaper will do the work faster because it can be handled quicker.



The John Steptoe Company, CUMMINSVILLE CINCINNATI, OHIO, U.S.A.

Shell-Steel Cutting Time on the PEERLESS High Speed Heavy Duty Metal Cutting Saw

Owing to the toughness of this material it was selected for cutting time, and under extreme feed the actual time on cutting 5 in. round is 7¼ min. Regular stock blade was used, 12 x ¾, 18 gauge, 10 pitch.

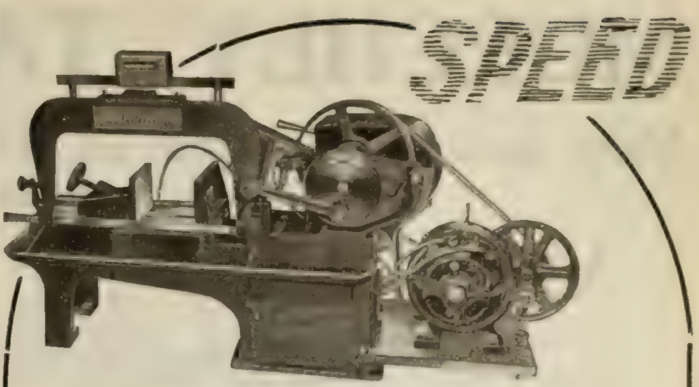
A machine that will stand up for such heavy duty work must be properly designed and rigidly constructed, and to stand the wear and tear the right grade of material and workmanship must be embodied, and that is just what you will find in the PEERLESS High Speed.

As a real time saver in operating and adjusting, it is in a class by itself. For an example, more than six cuts per minute can easily be made on a ½ in. round cold rolled steel bar. This covers the time in starting and stopping on each cut. The PEERLESS not only saves time, but also increases the production.

Again we say, the actual time saved in operating and adjusting the PEERLESS High Speed is a big item that is well worth investigating.

Again we suggest, before considering any other cutting-off equipment, write us for a complete description.

PEERLESS MACHINE COMPANY
1607 Racine Street RACINE, WISCONSIN



and a clean, straight cut

If you're interested in speed and accuracy you'll be interested in the

Racine Metal Cutter

It goes through angle irons, channels, I-beams, die blocks, pipe, tubing, heavy bars, etc., in a way that wins the enthusiastic endorsement of all users. It is in use in many Canadian shops. One Canadian Steel Company purchased 120 Racine Metal Cutters and has effected a saving of $11,019.50, full particulars of which will be given interested parties.

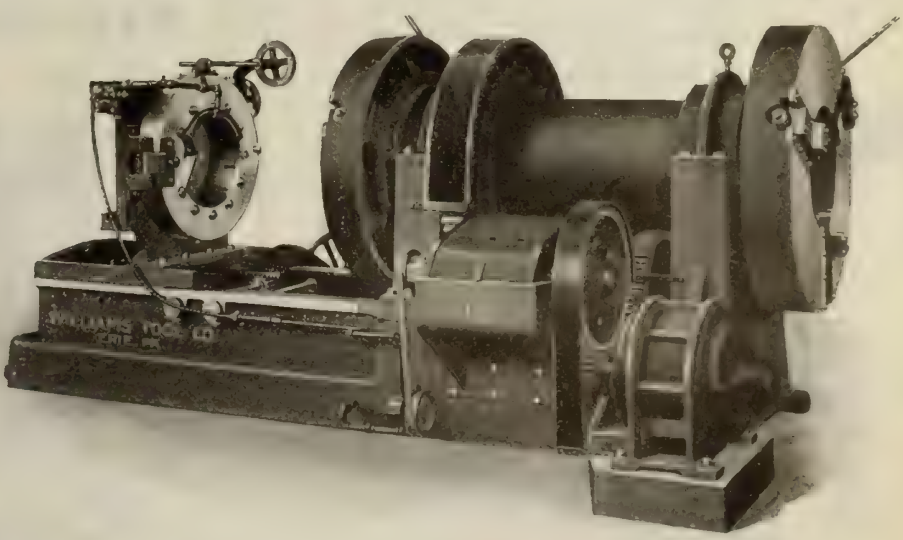
Write for list of Canadian users, and specifications.

Racine Tool & Machine Co.

15 Melbourne Ave., Racine, Wisconsin, U.S.A.

WILLIAMS PIPE MACHINES

Received Highest Award at Panama Exposition



The Following Letter Explains Why:

Williams Tool Co., Erie, Pa.: Rochester, N.Y., 12-3-14.

Gentlemen:—We are so pleased with our No. 3 Pipe Machine, and it is doing such splendid work for us at a minimum of expense that we are now considering the advisability of displacing two smaller machines for one of your No. 1½ or No. 2 motor drive.

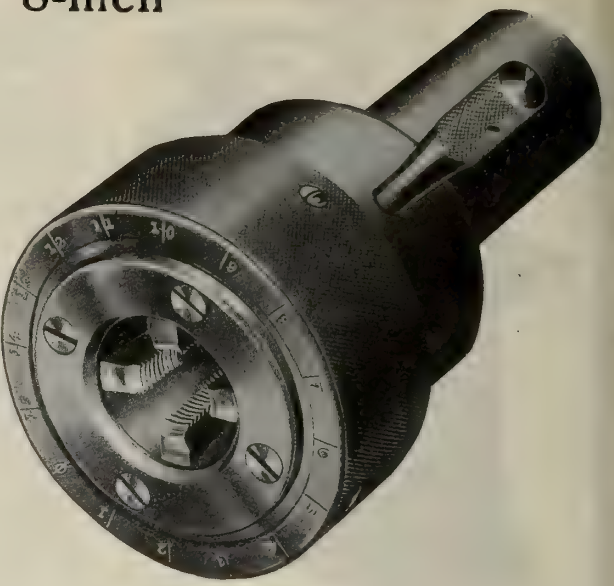
The machines which we would displace, if we make a change, are belt drive, are (names of two of the oldest and best known machines on the market) equipped with nipple holders, extra dies, etc. Both of these machines are still in fairly good condition. On what basis could we make an exchange with you?

Yours very truly, SAMUEL SLOAN & CO.

WILLIAMS TOOL CO. - - - ERIE, PA.

MURCHEY TAPS AND DIES

Very extensively used on 6-inch, 8-inch and 9.2-inch shells



MAKERS ARE finding that Murchey Collapsing Taps and Automatic Self-Opening Dies are paying propositions on this kind of work. We can tap any size hole from 1 inch to 12 inches. All chasers used on shell work absolutely guaranteed to be made of the highest grade of high-speed steel. Get the benefit of our experience and the experience of some of the biggest shell manufacturers in the country. Let us tell you about the savings. Send blueprints. Write to-day for catalog.

Murchey Machine & Tool Company
DETROIT 75 PORTER STREET MICHIGAN

The Coats Machine Tool Company, Caxton House, Westminster, London, S.W., England, Glasgow, Newcastle-on-Tyne, and Fenwick, Freres & Company, 15 Rue Fenelon, Paris, France.

THE ROCKFORD

You can drive high speed drills up to 2½" diameter

with the new box-column type

Heavy Duty "Rockford" Drilling Machine

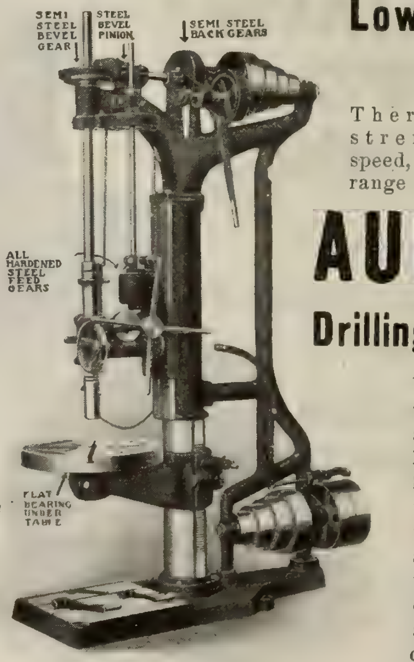
This Rockford machine tool meets the most exacting requirements.

It is **STRONG, RIGID, ACCURATE AND FAST,** with individual features. Built in three styles.

ROCKFORD DRILLING MACHINE CO.
ROCKFORD, ILL., U. S. A.

Rockford Machines Cut Costs.

Production of Rare Quality at Lowest Labor Costs



There is unusual strength, accuracy, speed, convenience and range in

AURORA

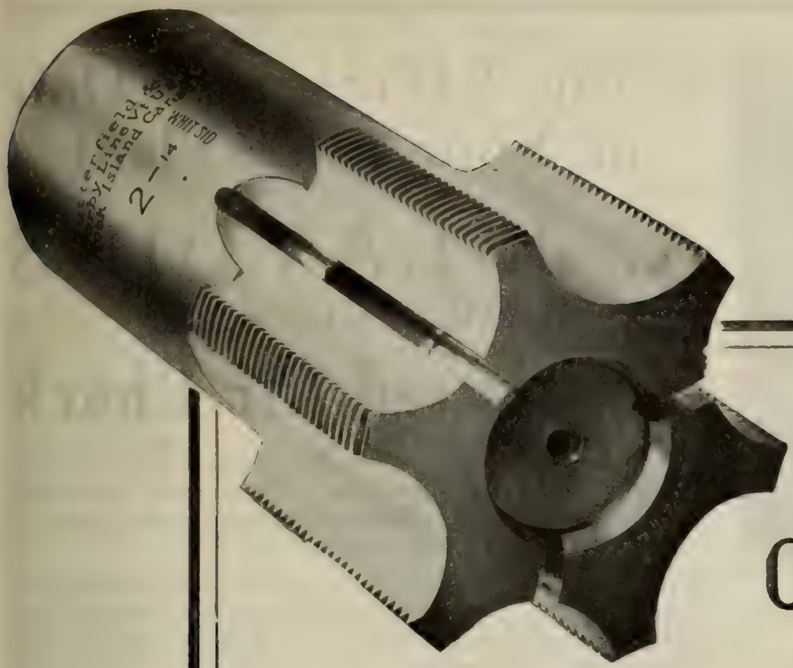
Drilling Machines

You can use them to great advantage on **HIGH EXPLOSIVE SHELLS** or any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

Drop a line for full particulars and specifications.

Stationary Head Sizes 20"—21"
Sliding Head Sizes 22"—44"

The Aurora Tool Works, Aurora, Indiana


Butterfield & Co
Derby Line, Vt
Rock Island, Canada
WHIT. STD
2-14

ON TIME!

These Butterfield High-Power Tools will help you get out your rush work on time. They are built to stand up under the heavy strain of exceptional production. Look at them! See their strength! Their compact, rigid design. We have developed this line of Taps especially for shrapnel and shell work.

The name "Butterfield" on your taps, dies and reamers is a guarantee of quality—a mark of superiority. We build into every one the experience of thirty-five years devoted to the manufacture of high-grade tools.

That is what makes Butterfield quality. We have a new catalog. Let us send you a copy.

Butterfield & Co., Inc.
Rock Island
QUEBEC

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Office:
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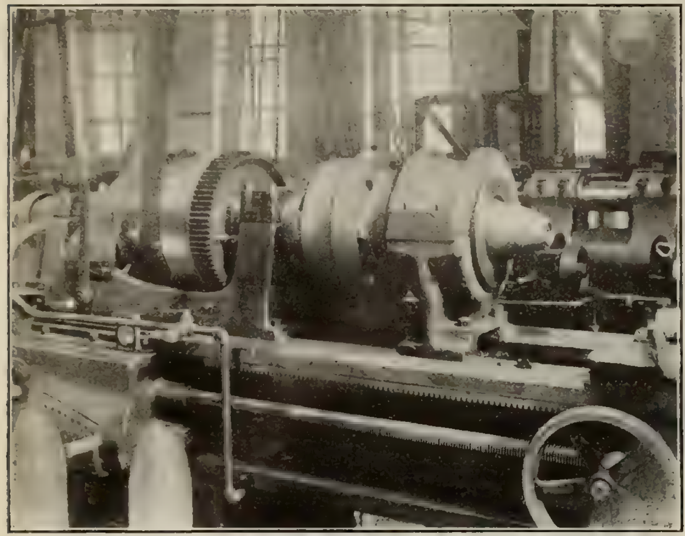

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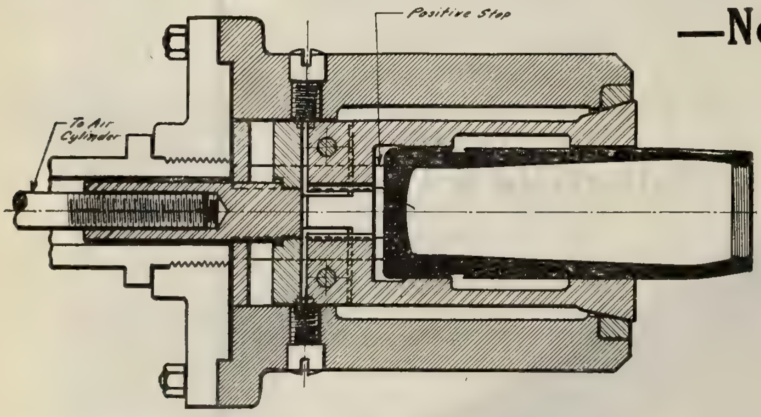

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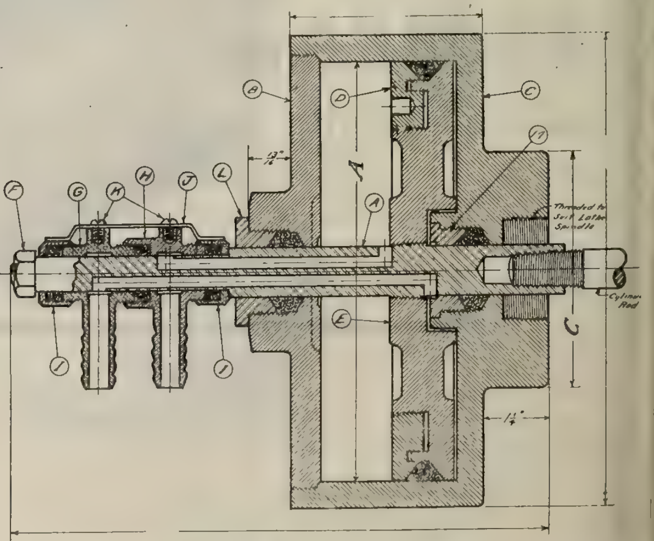

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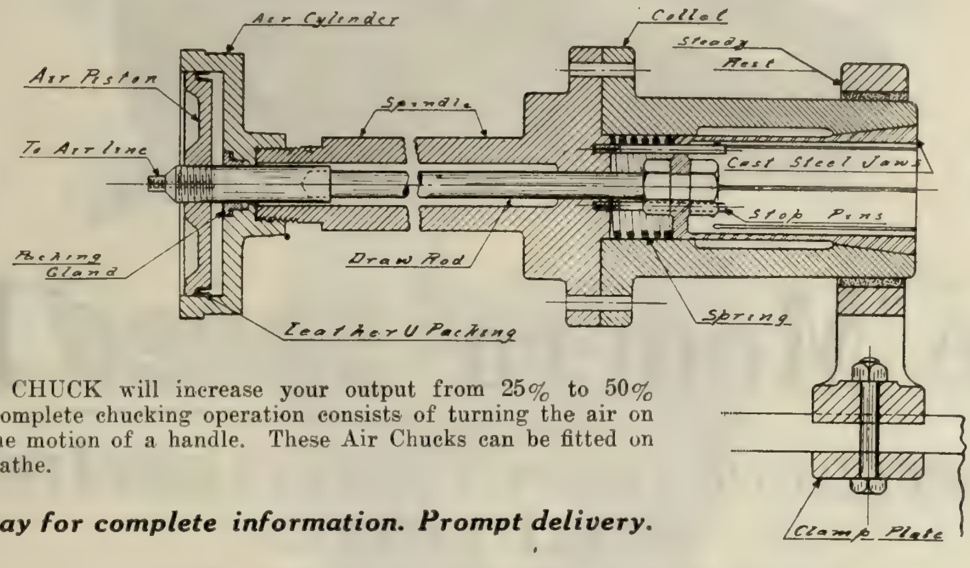

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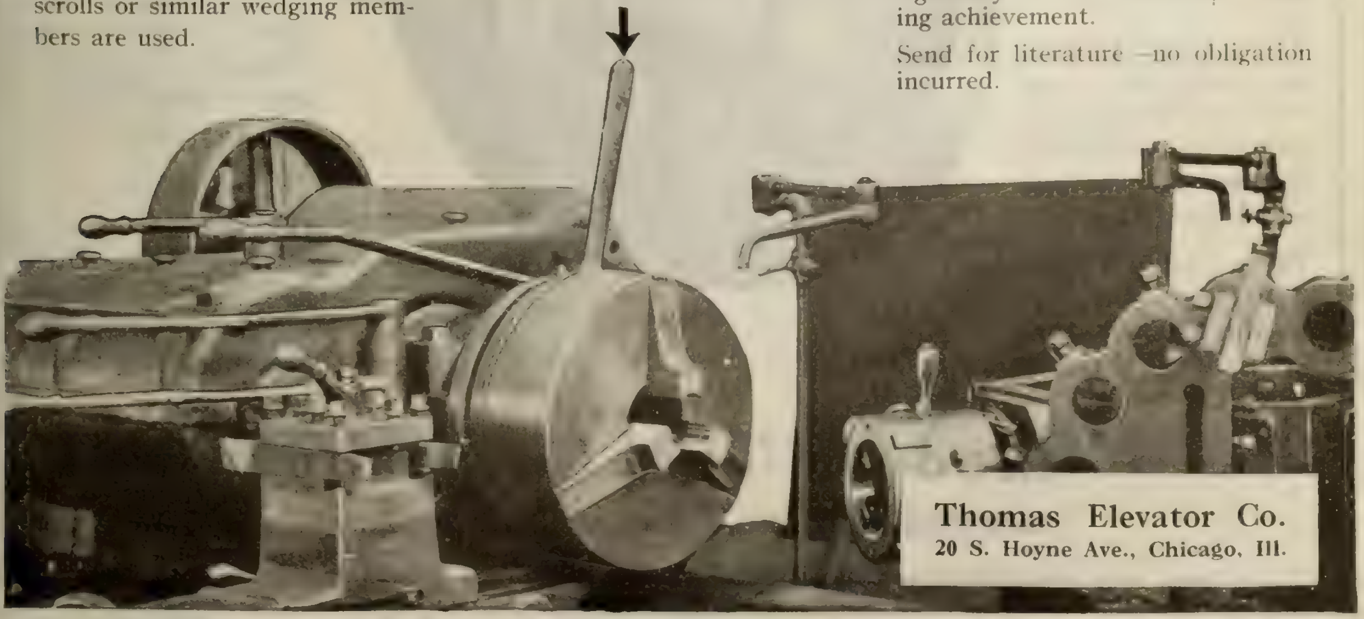

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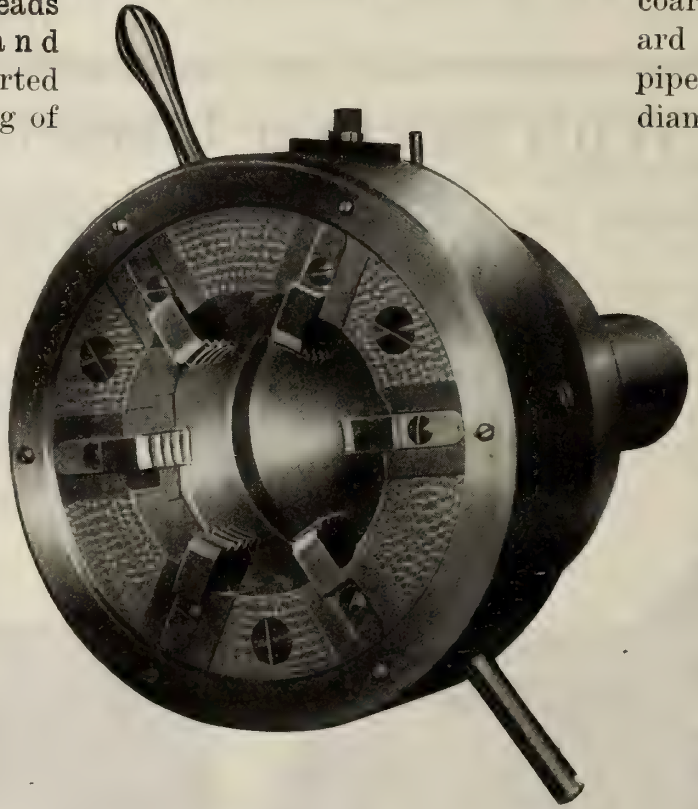

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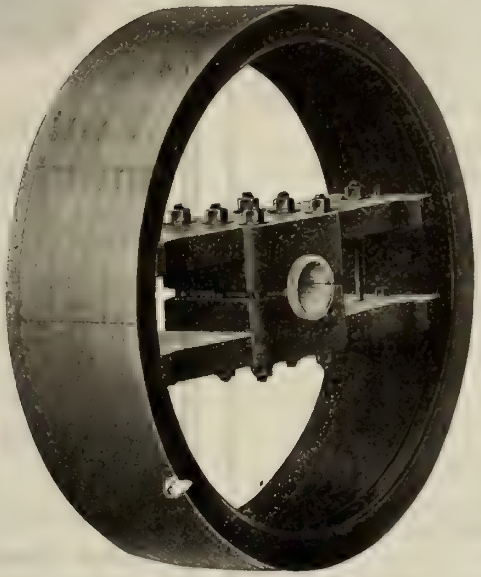

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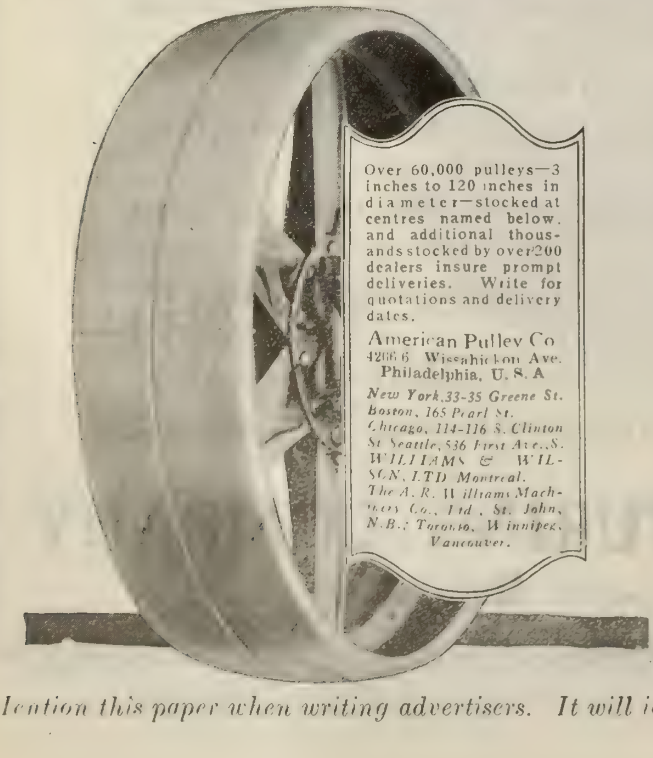

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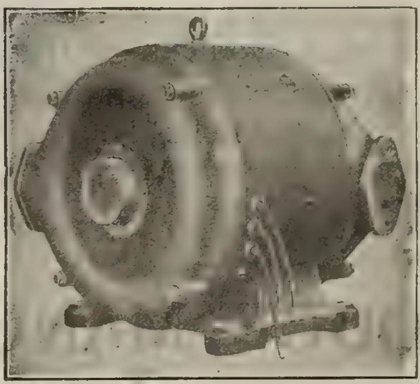

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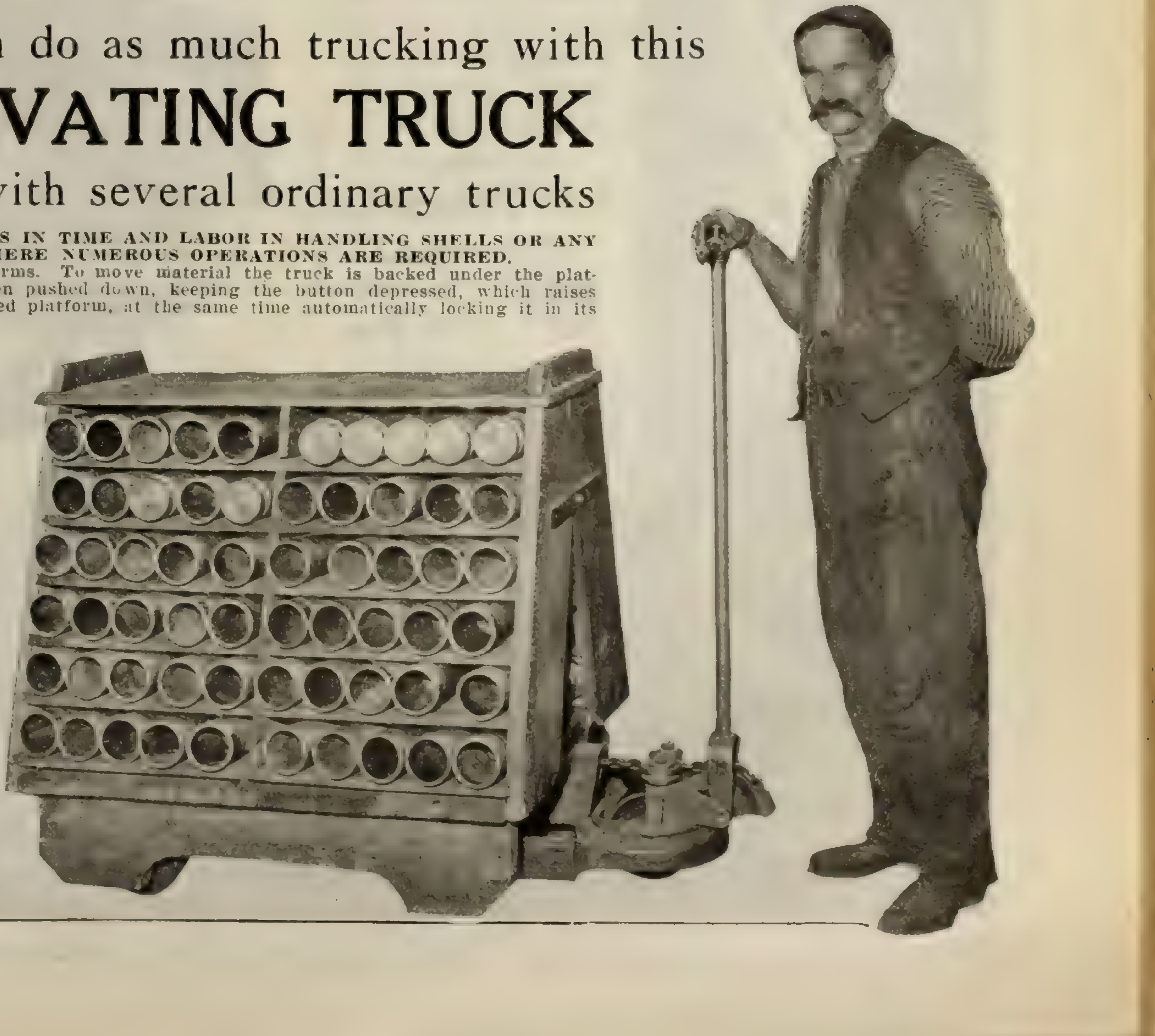

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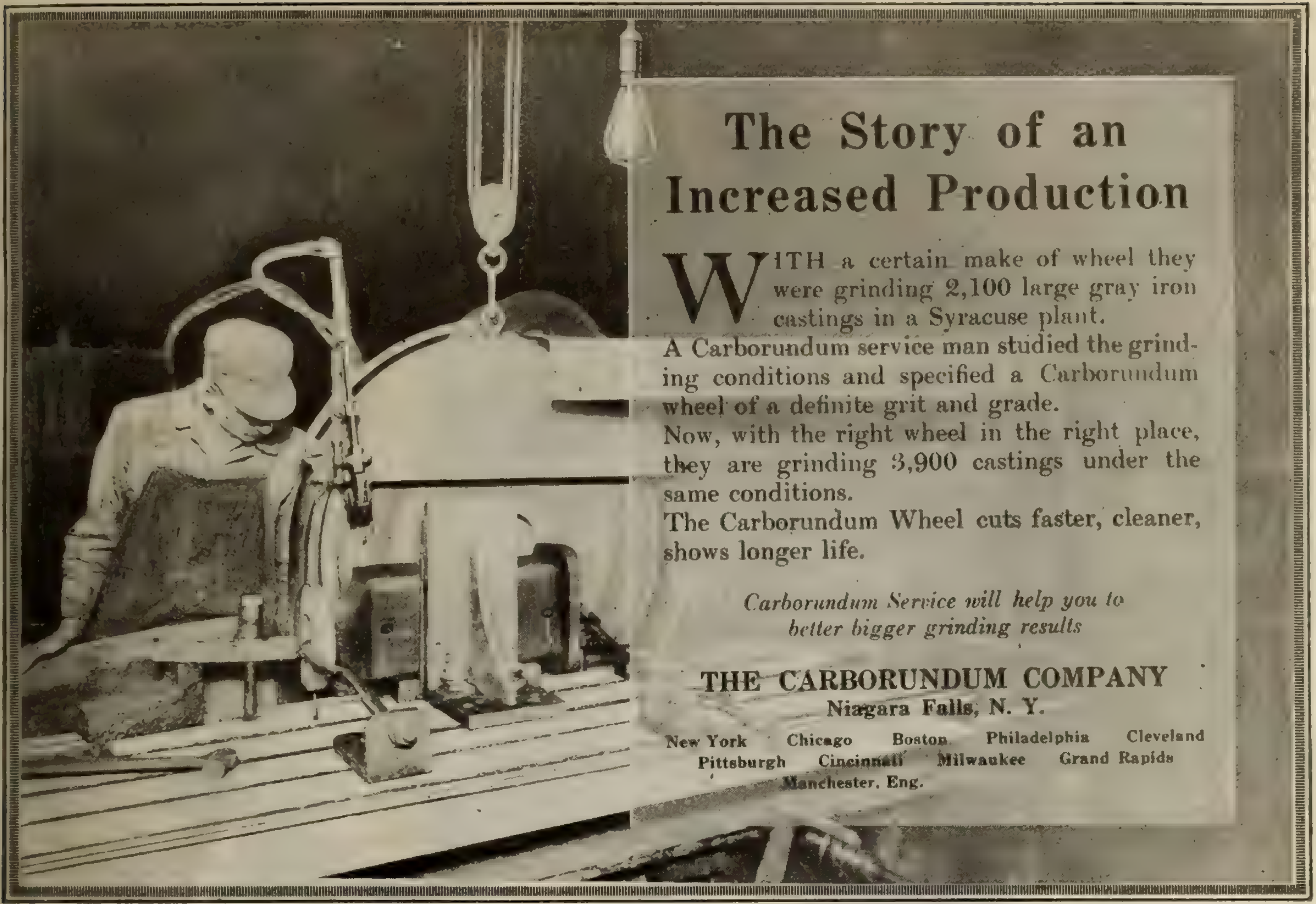

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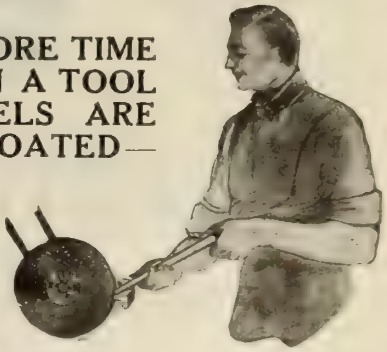

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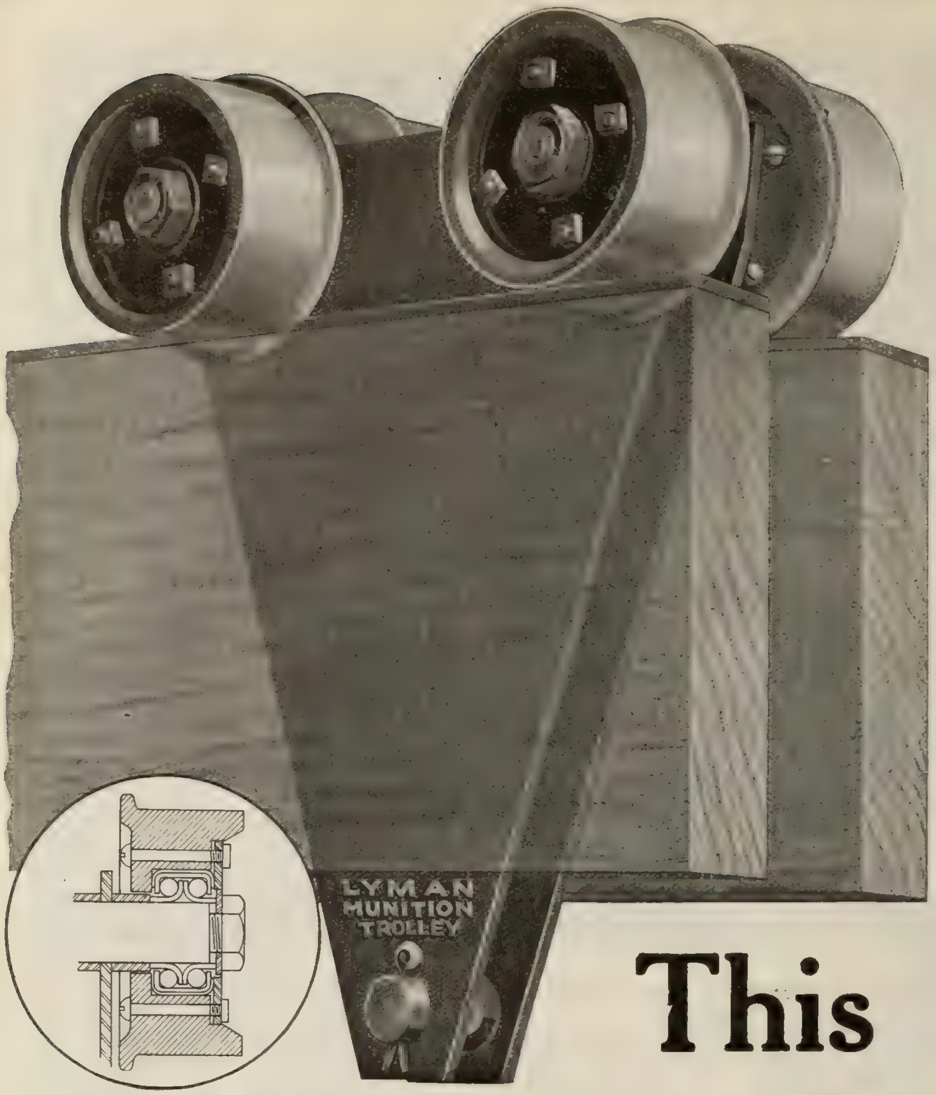

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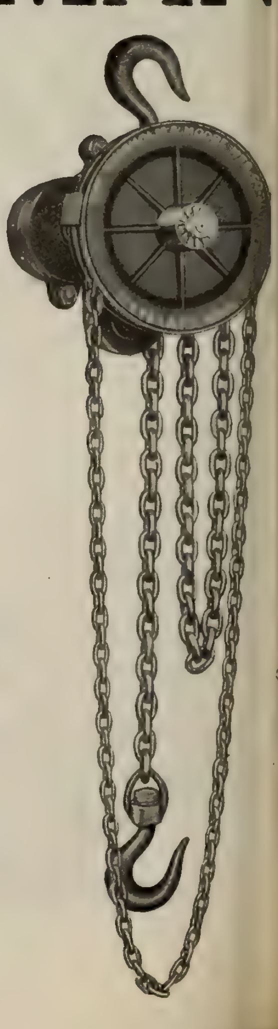

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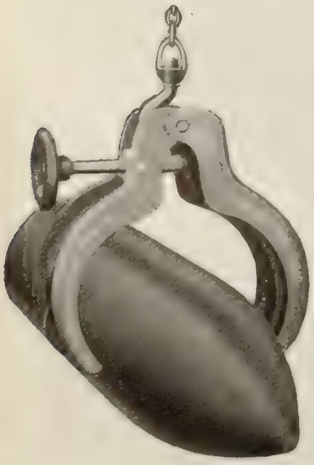

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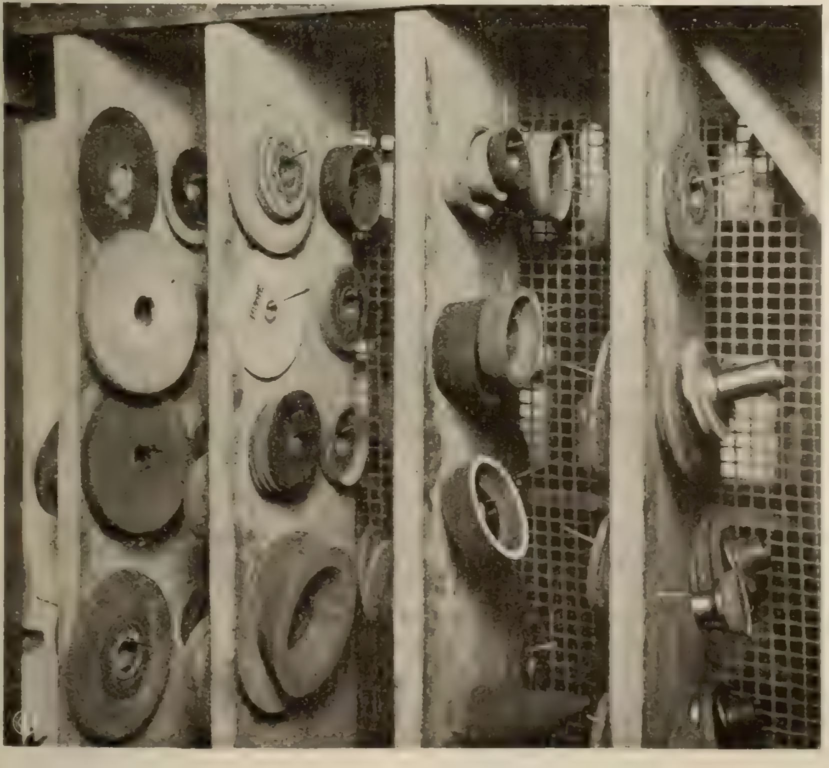

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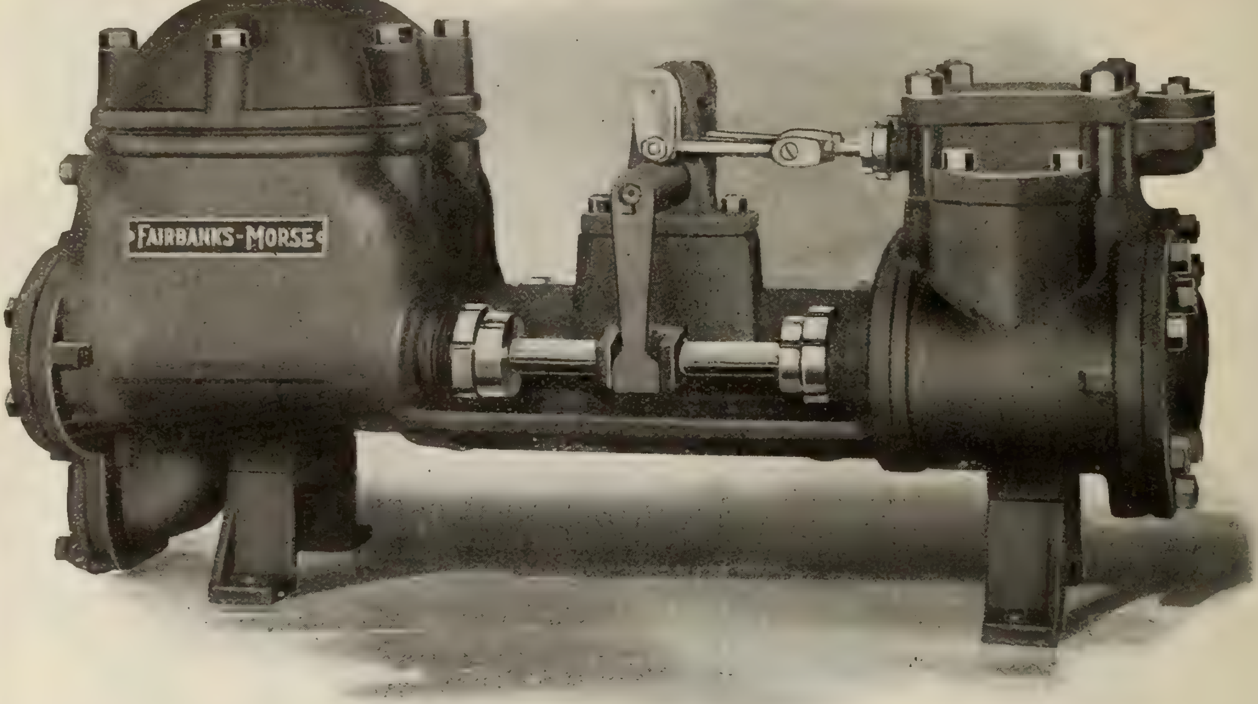

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CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

Factors Contributing to Maintenance of Press Work Efficiency

Staff Article

The attainment of maximum efficiency, in any line of manufacturing effort, can only be accomplished through the systematic study of operative and constructional details, resulting in the elimination of undesirable features and replacing them with methods and appliances adapted in detail to the particular case, but which in principle can be applied to any given case. Factors controlling the adaptabiliy of tools to a number of different machines are treated from the standpoint of actual shop conditions in the following article.

WITHOUT going deeply into the details of die construction, there are a few features in connection with the general design of sheet metal tools that are often overlooked when the tool-maker starts to work upon the die. While the operation of many press tools requires machines of special design and lift of ram, it is only those of ordinary make and lift that are here referred to. In press rooms where a large variety of work is handled, it is often necessary to use a certain tool in a number of different presses, owing to the one previously used being occupied on another operation. Under these conditions it is essential that the various tools be placed in the different presses, with the minimum amount of ram and bolster plate adjustment.

Height of Punch and Die.

With few exceptions work corresponding in character is performed in the same or similar presses, and for this reason it is advisable that the die can be used in any of the presses. To do this satisfactorily, the height (h) Fig. 1, when the crank is at its lower extremity, should be greater than the height (h) Fig. 2, contained between the top of the punch and the lower surface of the die, when these are in a finished position. Therefore, one of the chief factors to be taken into account when designing a punch press die, is due consideration in regard to this overall height; otherwise it may be found from the base of the die, or the top of the punch, after the tool is completed; often destroying the stability of the die, and consequently its efficiency. Sometimes it is found that after being in operation for some time, a die will not go in a certain press, owing to insufficient ram adjustment, even when the pitman is screwed to its shortest possible length. To operate the tool in this particular press, metal is removed as above stated, and unless great care is exercised in doing this, the accuracy of the die may be destroyed. For example, if stock is cut from the upper surface of the punch block, a condition as shown at B, Fig. 10 may result; where the recut face is not square with the punch shank, and consequently does not bear firmly against the face of the ram.

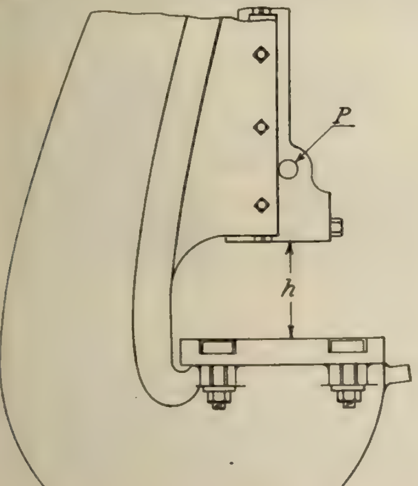


FIG. 1.

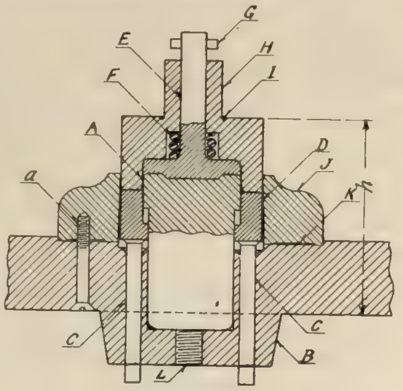


FIG. 2.

Location of Clamping Holes

Next to the consideration of uniform height of dies (as far as possible), for the rapid setting of press tools, is the maintenance of standard dimensions for the relative position of the clamping holes in the various tools used on the different presses.

Wherever possible, all bolsters and die beds (especially the latter), should be made from standard patterns and in as few sizes as the nature of the work will permit; the upper portion of the die being constructed to suit the work required. Frequently when a pattern for a die bed has been constructed, and after the various sections have been placed in position to suit the operation, lugs have been added for clamping, without consideration to distance of location with the result that the position of the holes for the clamping bolts will often come close up to a shoulder, or on the very edge of the casting. Upon placing this same die in one of the other presses, it may be necessary to either drill new holes or extend those already drilled, so that the bolts will enter. In many cases this is due to the die setter failing to re-adjust the bolster plate to conform with the new die. However the chief cause of this objectionable feature is generally a lack of system in locating clamping holes.

It is true that occasions will arise when set rules cannot be strictly adhered to, but, under ordinary conditions, the clamping holes in the die should be on the same centre-line as the punch shank, as indicated in Fig. 3; and where four holes are used they should be

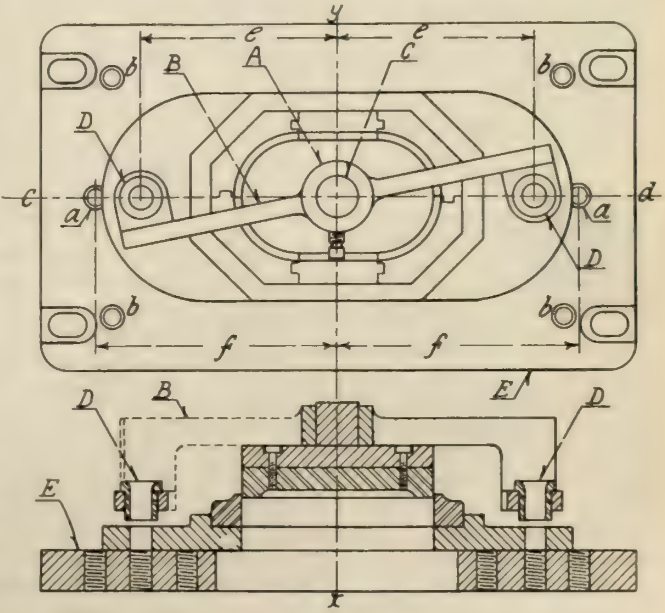


FIG. 3.

located as shown at b,b,b,b; or if preferred, on the two centre lines cd and xy.

Using a Clamping Jig.

For the convenience of locating these holes in the dies, and maintaining a high degree of accuracy, a jig similar to that shown in Fig. 3 will prove very serviceable. This device is applicable to the various sizes and styles of die beds, one being required for each of the several sizes. As the distance l on either side of the punch shank is equal, it is obvious that the die can be reversed and still retain its relative position. By using a short piece of round stock in the ram, the jig can be adapted for laying off the corresponding holes in the bolster plate this latter being located in a central position. Where frequent changes of dies are necessary, this systematic method of locating holes will be found of inestimable value.

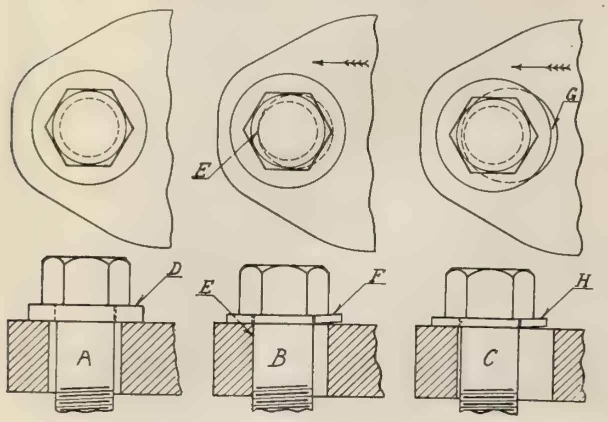


FIG. 4.

Clamping in Position

The efficiency and life of a die depends largely on the care that is given to the holding facilities. In addition to bolting the die firmly to the bolster, it is essential that every precaution be taken to guard against the possible creeping of the die, with the continual jar of the working. To avoid time and expense, of the penny wise and pound foolish sort, some tool makers allow dies to go to the press room that have not been machined on the upper surface of the clamping portion. Under no conditions can it be expected that the rough surface will be parallel to that resting on the bolster plate, therefore it is reasonable to expect that there is the tendency, be it ever so small, of the die creeping from its initial position.

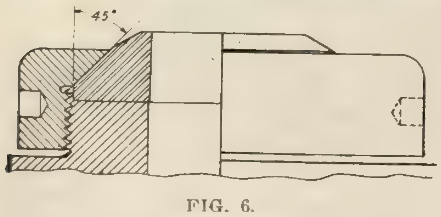


FIG. 6.

When washers are used beneath the head of the bolt, they should be of substantial thickness, as shown at D, Fig. 4, and the nearer the bolt is to the centre of the hole, the better will be the results. If, as shown at B, Fig. 4, the bolt comes in such a position that it bears against the side of the hole, as at E, the pounding of the punch may cause the die to shift in the direction indicated by the arrow. This action would be increased by the use of too small, or too thin a washer, as the clamping pressure at F must be less than that on the opposite side. When this condition takes place, it is common practice in some shops to drill the hole out larger, as shown at C, and while the bolt is freed from direct contact with the side of the hole, the possibility of the die shifting has not been materially reduced, unless a much larger and thicker washer is used.

Use Heavy Clamps

It is often required to secure a die by means of a clamp, instead of a bolt passing directly through the body of the die.

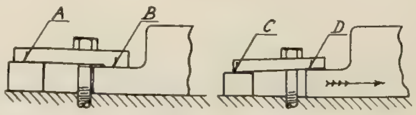


FIG. 5.

In such cases, the clamp should be heavy enough to withstand the pressure without bending, and should be placed in a horizontal position, as shown to the left of Fig. 5; the block A being the proper thickness for the desired purpose. The bolt should be close to the work, but not touch it, and the bearing at B should be wide, and parallel with the lower surface of the die. A condition as shown at the right should always be avoided, as the tendency of the die to creep in the direction of the arrow must be very obvious.

Die Construction

The design of a die would naturally be that best adapted for its particular purpose, but in order to briefly describe the component parts of the ordinary blanking and drawing die, and also the plain blanking die, the sketches Figs. 2 and 6 are shown. To provide a long bearing for the center post A, the die has a boss B on the base; this portion also furnished ample support for the push pins C, C, which are sometimes subjected to considerable compression owing to the action of the rubber that supplies the pressure required for the drawing operation. The draw ring D rests upon the push pins C, and should be thick enough to stand the strain of the draw without bending. If this ring is too weak, or the number of push pins is insufficient, the additional pressure directly over the pins may cause "lugs" to form on the finished product. The retaining shoulder on the inner diameter of the ring should allow the upper or draw surface to come just above the cutting edge of the die. The top of the post A should be slightly below the cutting edge of the die, as this permits the flat stock to be held firmly between the punch and the draw ring while being cut, the drawing operation being performed as the punch proceeds downwards. The knockout E, which also forms the upper impression in the sheet metal cap, ejects the latter on the upward stroke, by means of the spring F, the pin G preventing the knockout from coming out of its position. To insure a good bearing of the punch H upon the face of the ram, it is a good plan to cut a small groove at the base of the shank, as shown at I.

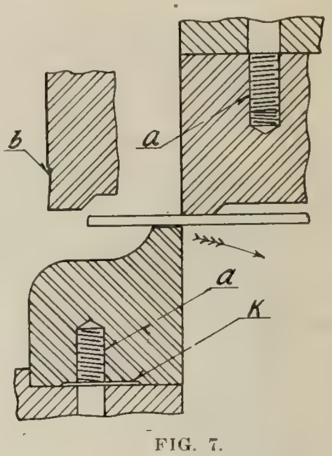


FIG. 7.

When turning the cutting ring J, it is advisable to cut a shallow recess in the base, to reduce the grinding necessary, and also add to the holding qualities.

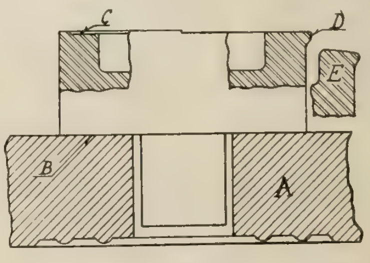


FIG. 8.

The steel ring should be hardened and ground before the cast iron bed is checked to receive it, as the shrinkage due to hardening, and subsequent grinding would mean a loose fit, if the parts were fitted earlier.

Holding Circular Dies

In the construction of some circular

cutting dies, it is common practice to hold the cutting ring to its seat by means of a nut, fitted to a threaded portion of the die bed below the steel die, as shown in Fig. 6; the clamping portion being machined at an angle of 45 degrees, the most suitable angle for the purpose. By this method it is possible to remove the cutting ring for regrinding without removing the die from the press.

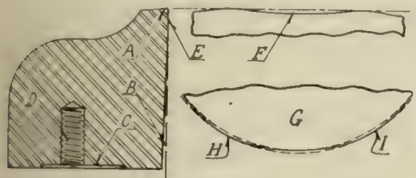


FIG. 9.

When securing the steels of sectional dies in position it is important that the bearing on the base should be perfectly flat, to avoid any possibility of rocking motion, which is often more pronounced in this type of die. In addition to having a good firm bearing it is also frequently advisable to locate the clamping screws (a) (a) Fig. 7 a little more than half the distance back from the cutting edge. When the pressure required to cut the stock comes upon the die, there is a tendency for the cutting edge to move inwards, as shown by the arrow, therefore the leverage from the cutting edge to the clamping screw should be as great as circumstances will permit. An exaggerated condition of the punch after a series of blanks have been cut is shown at (b) and will demonstrate the action of the die, when in operation.

Upsetting and Repairing Dies

A feature of press work that requires careful attention is the repairs which are necessary to maintain the tools in good working condition. Individual cases must be treated according to their own particular needs, and the repair man will require to use his best judgment, as each occasion may demand. A few of the elementary factors are here cited. Probably the most common call on the tool room is the refitting of a worn die. Where soft punches are used it is customary to upset and re-turn them. To do this satisfactorily, a solid block should be provided, with a hole in the centre large enough to receive the punch shank freely as shown in Fig. 8. A large worn out die is often most useful for this purpose, one that will give a good solid bearing to the back of the punch block. Before upsetting the punch, it is advisable to cut a shallow recess in the face as shown at C, Fig. 8. This permits the upsetting to be accomplished more easily, the result being as shown at D. If the face is not first cut away the shape, after upsetting, would be similar to that at E.

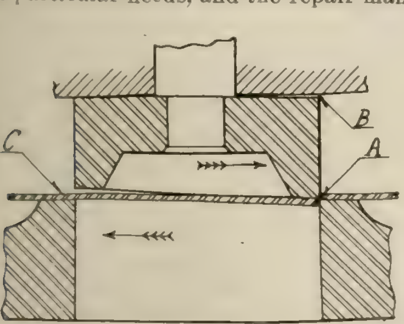


FIG. 10.

Grinding the Shear

In grinding and regrinding the shear on the face of cutting dies, the general practice is to allow about the thickness of stock, as indicated at F, Fig. 9. In addition to the shear, a slight rake, as at A is also given. If the clearance B is excessive, and extends right up to the cutting edge, any undue shear would result in an uneven blank as shown at G; the inner dotted circle representing that cut by the high points, and the outer dotted circle that cut by the bottom of the shear, the heavy line being the true outline of the blank. To offset this, a portion of the inner surface at E is ground to give very little clearance.

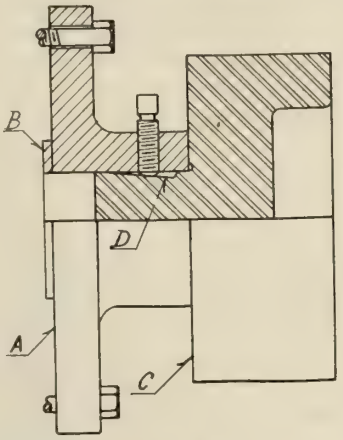


FIG. 11.

Unnecessary repairs are often occasioned by a condition similar to that shown in Fig. 10, where one side of a die is in action in advance of the opposite side. This causes the punch and die to be forced in the direction of the arrows, and this action is more pronounced as the cutting edges, become dull, the punch will gradually be sheared at the point A.

Turning Punches.

When turning a punch to fit the die, it is usually held in a chuck that is secured to the face plate of the lathe as shown in Fig. 11. Where the chuck is exclusively used for central work, some tool makers prefer to have a shallow boss B on the back that fits into a recess cut in the face plate. Before starting work on the punch, care should be taken that the face C runs perfectly true, to insure accurate alignment when placed in the press. This may be aided by filing a tapered portion D on the shank, so that the pressure of the screw will drain the punch firmly against the face of the chuck.

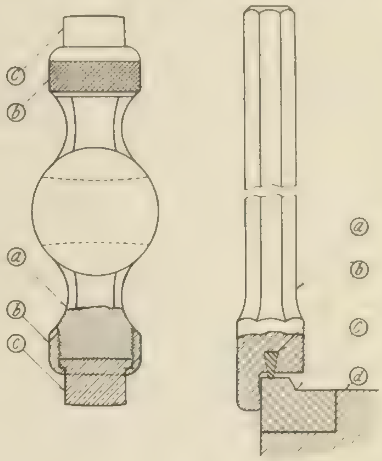


FIG. 12.

For the repairing of dies, two very useful tools are shown in Fig. 12; that on the left being a special soft headed hammer for use on finished parts. The pieces (c) can be made of leather or any kind of soft metal and held in position by the nut (b). The tool to the right is used for upsetting punches without striking the cutting edge. By making the shank (a) extra long punches can be upset while in the press.

* * *

MORE CANADIAN MUNITION ORDERS

MUNITION orders placed in Canada since the outbreak of the war amount to $550,000,000. An order for munitions to the value of $60,000,000 has just been received and contracts to that amount are to be placed. Since the first of the year orders have been placed amounting in value to $185,000,000.

These figures were made public on Oct. 11 by the Imperial Munitions Board. During the months of July and August the output from Canadian industries was interrupted by reason of the difficulty experienced in procuring the necessary steel and forgings. The board is now pleased to state that, due to the efforts put forth by manufacturers, the output on most contracts is more satisfactory and increasing in volume each week.

The quantity of shrapnel shells now produced each week, complete with cartridge cases, fuses, primers and propellant charge, has reached almost 250,000, and the board has been authorized within the past week to place continuation orders for this size of shell into 1917. Large orders were placed during last spring and summer on the larger sizes of shells, especially 8 in. and 9.2 in. This involved complete new installation of machinery and equipment. Many of these plants have now commenced operating, and the output of larger-sized shells is increasing each week, and will continue to increase until about January 1st, when the maximum output of the plants should be reached. The position in Canada in regard to steel, the basis of all munition work, is now such that no interruptions in output will likely take place, as the immense tonnage required for all classes of shells has been arranged well ahead. The fuse plant built by the board in placing new business will be to keep all plants now producing munitions fully employed, and where increased production is required on any particular class of work to extend the operations of plants which are already equipped and producing.

BIG INCREASE IN DOMINION REVENUES

HEAVY increases in revenue receipts, evidences of the steadily mounting cost of the war and the total of the net debt, together with a slight decrease in domestic expenditures, are reflected in the Dominion financial statement issued recently. This statement gives the figures for the month of September and for the first half of the current fiscal year.

During the six months revenues have increased by over thirty millions as compared with the corresponding period of last year. Expenditures on consolidated account have increased by three and a half millions, while those on capital account have decreased by five and a half millions. During the six months Canada spent sixty millions more for war than she did during the corresponding period last year, while her expenditure for the month of September is just double what it was in September, 1915. At present the war is costing the Dominion just about a million a day. Since September, 1915, the net debt has been increased by nearly $200,000,000. At the end of last month it stood at $680,275,444, as against $484,841,633 on September 31, 1915. The increase in the debt for the month alone was over twenty millions as compared with August.

Nation's Revenue

The total revenue for the six months is $103,589,680, an increase of $30,346,166 over the corresponding period last year. Customs receipts are responsible for twenty millions of the increase. Excise for two million; post office for $800,000; railway receipts for five millions, and miscellaneous for over a million.

For the month of September revenue receipts increased by six and a quarter millions as compared with September, 1915. Customs are responsible for three and a half millions of this increase, excise for half a million; post offices for $450,000, and railway receipts for three-quarters of a million. On consolidated fund account (ordinary expenditure) there was spent during the six months $49,757,711, as against $46,271,622 for the corresponding period last year, or an increase of three and a half millions. This increase is nearly all accounted for during the month of September, and may be due to extra interest charges on the debt.

Over Two Millions Saved

On capital account (public works, etc.) a total of eleven millions was spent during the six months, as against sixteen and three-quarter millions for the corresponding period last year, or a saving of five and three-quarter millions. The net saving on domestic expenditure, during the six months, has, therefore, been about two and a quarter millions. During the six months, $104,538,895 was spent on war, as against only $44,427,893 for the corresponding period of 1915, or an increase of $60,111,002. For the month of September alone, a total of $28,228,176 was spent on war, which is fourteen millions more, or just double what was spent in September, 1915.

Figures showing the funded debt of the Dominion indicate the changed character of Canada's financing superinduced by the war. Of this funded debt over $75,000,000 is payable in New York. On September 30, 1915, Canada had nothing payable in New York. On Sept. 30, 1915, Canada had only $757,960 of a funded debt payable in the Dominion. To-day she has a total of $118,645,070. Her funded debt payable in London totals to-day 470 millions, as against 362 millions in September, 1915.

SHIPBUILDING ON PACIFIC COAST

FROM Prince Rupert on the north to San Diego on the south come reports of shipbuilding activity, and the hum of industry is heard in all the shipbuilding yards of the Pacific Coast, where, it has been estimated, that steel and wooden ships are under contract or construction of a value of $75,000,000. There is every reason to believe that this encouraging condition will continue for a long time to come.

In the Pacific North-west, steel and wooden ships are being constructed, for contracts are in hand for their construction, reaching a total cost of $30,000,000. This estimate includes the work reported from yards in British Columbia, Puget Sound, Grays Harbor and the Columbia River, and is certainly a splendid showing for the shipbuilding of the Pacific North-west as well as foreshadowing a healthy and most encouraging revival in this most important industry. The preponderance of the tonnage being built is foreign, Norway leading with most of the steel steamships, although two of this class are being built for the Atlantic coastwise trade. The wooden ships are mostly for American owners, although the Government of British Columbia by offering a subsidy is greatly stimulating the industry so that it is forging ahead and may soon take the lead for this class of ships.

RATES TO BE PAID CANADIAN SEAMEN

AN Order-in-Council has been passed providing regulations for the enlistment of men "in the Royal Naval Canadian Volunteer Reserve" for overseas service in the Royal Navy. The men enlisting will be enrolled for the period of the war. Ordinary and able seamen will receive $1.10 per day; leading seamen, $1.20; petty officers, $1.40, and the chief petty officers, $1.90.

Men subsequently transferred to stoker ratings will be paid 10 cents per diem more than the pay of their equivalent seamen ratings. Wives and approved dependents of men enrolling will be paid from the date of enrollment separation allowance on the following scale: Wives and approved dependents of ordinary seamen, able seamen, leading seamen and equivalent ratings, $20 a month; petty officers and chief petty officers and equivalent ratings, $25 per month.

B. C. SHIPYARDS BUSY

WORK in the British Columbia shipyards is going ahead at full speed. At the Victoria plant of the Cameron-Genoa Mills Shipbuilders, the operation of lining up the third keel for the schooner to be known as the Esquimalt has been completed. Each of the vessels will cost when completed about $130,000, so it is estimated, but from one cause and another the actual cost will likely be in the neighborhood of $150,000. They measure over all 225 feet, with a beam of 42 feet. Each will have a hold of 19 feet, will be schooner rigged with five masts, together with modern equipment for handling loads. The auxiliary power equipment will consist of oil-burning engines of the Bolinder type, which are being imported from Sweden. Three sets are already delivered, and it is expected that more will be on hand in time for the completion of other vessels on schedule time.

The Cameron-Genoa Mills Shipbuilders, Ltd., has to date invested about $50,000 in new plant and material. The Wallace Shipyards, Ltd., who are also building several ships of the above type, have invested about $35,000 in their enterprise.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data and Ideas Evolved from Actual Practical Application and Experience

METHODS OF MEASUREMENT FOR EXPERT MECHANICS

By F. Scriber.

WITHOUT method a goodly tool may be a poor makeshift—is sound logic for a tool-maker or inspector when taking measurements to insure accuracy. It takes good machines to do good work and it takes good tools to know when the work is correct, but it takes sound reasoning to be sure one is not getting fooled in the measurements as taken. A tool-maker should plan his work and set up his machine with an eye to accuracy first and last, always allowing production to be the effect of interchangeable accuracy, and never permitting speed to induce a questionable set-up.

Principal Aids to Accuracy

The measuring methods here illustrated are reviews of set-ups which it is hoped will be suggestive and are the kind of examples which conduce toward certainty in the finished product, the three tools shown in Fig. 1 being three of the big aids used to attain this end, and are, namely, Vernier Caliper, Vernier Height Gauge and Surface Gauge.

It is not always advisable to take measurements on a piece of work in the same manner as the dimensions are given on the drawing, and, in fact, unless the drafting department is in the habit of considering how a piece will be meassured it is often desirable to deviate to some extent in actual practice. In Fig. 2, at the top is shown a fixture with all dimension reading from the bottom of the fixture, and this is to the hole, all other important dimensions being given from this hole down. As the actual distance from the bottom of fixture to the holes and finished seats is not important, but rather the relation of the holes and seats to each other, the better way of dimensioning is as shown in the lower view. In either case the fixture may be set upon a surface plate and measurements taken from one seat to another or to a plug in the hole.

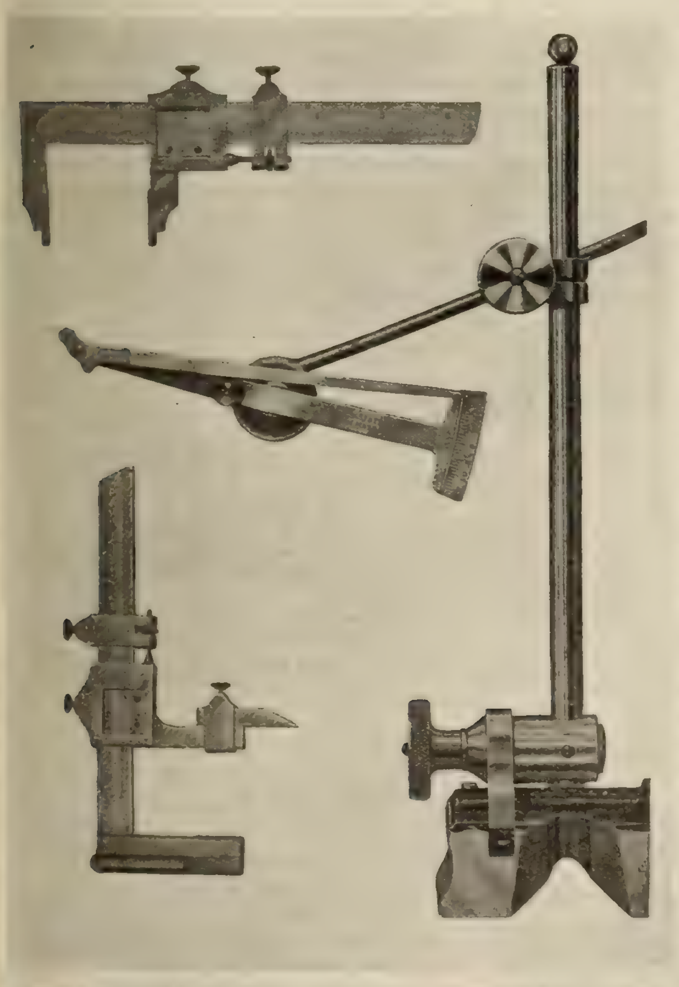
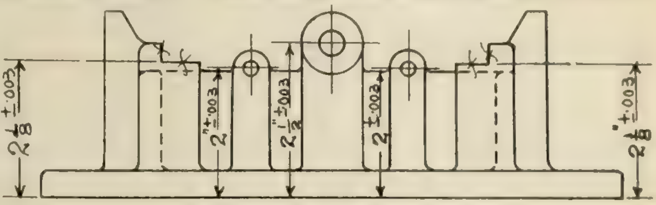
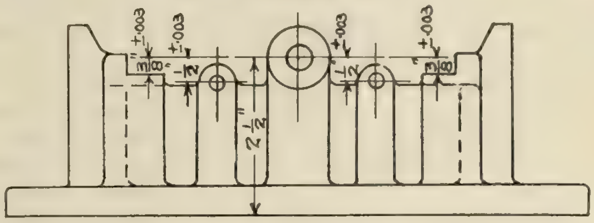


FIG. 1. THREE OF THE PRINCIPAL INSTRUMENTS USED IN MEASURING DIMENSIONS OF MACHINE WORK.



FIXTURE WITH DIMENSIONS GIVEN FROM BOTTOM

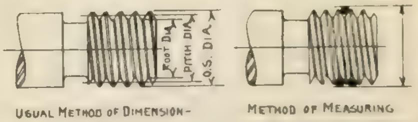


A MORE SATISFACTORY WAY OF DIMENSIONING THE ABOVE FIXTURE.

FIG. 2. TWO METHODS OF GIVING DIMENSIONS ON DRAWINGS.

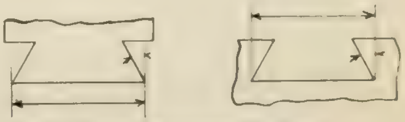
Overlapping of Limits

A glance at the limits given on the dimensions in these two views brings up a very interesting point which might easily be overlooked. It will be noticed that the limits in both cases are plus or minus .003 in., but where the dimensions are given as in the lower view, this means just what it says, plus or minus .003 in., while if the dimensions are measured as given in the view at top of illustration, the limit of accuracy allowed is actually .006 in., as in measuring to one place the reading might be 2½+.003 or 2.503 in., while in measuring to the other surface the reading might be 2⅛—.003 or 2.122 in.; therefore, 2.503—2.122=.381 in. as compared to 2½—2⅛=.375 in., and subtracting one from the other .381—.375=.006 in. Thus, it follows that dimensions given as shown in the upper view must be held to one-half the limit allowed on dimensions

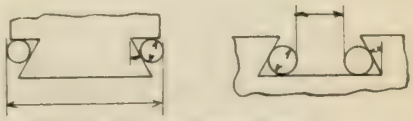


USUAL METHOD OF DIMENSIONING THREAD

METHOD OF MEASURING THREAD BY WIRE SYSTEM



COMMON METHOD OF DIMENSIONING DOVETAILS



MEASURING DOVETAILS BY THE USE OF PLUGS

FIG. 3. TWO APPLICATIONS OF COMMON PLUG OR WIRE MEASUREMENTS.

as given in the lower view to obtain the same relative accuracy, and, incidental, the closer the limit the longer the time required for doing the work, and thus it will be noted there is a distinct advantage in giving dimensions as shown in the lower view.

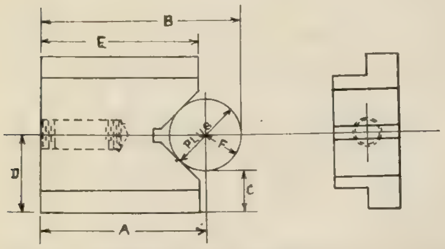


FIG. 4. METHOD OF MEASURING A VEE BLOCK, USING A PLUG FOR ACCURACY.

Calipering over plugs, buttons, wires and balls is the ideal way of measuring a great many classes of work which have angular surfaces. In this class are included the wire system of measuring screw threads on the pitch line and the measurement of dovetail slides, both of these methods being shown by Fig. 3, where the ordinary methods of giving dimensions for these parts are shown, and also the method of calipering with plugs or wires.

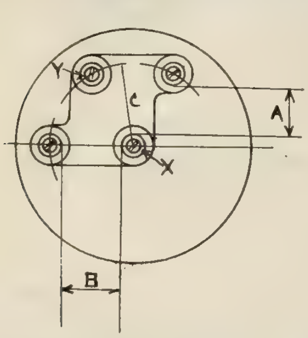


FIG. 5. LOCATING HOLES BY THE BUTTON METHOD.

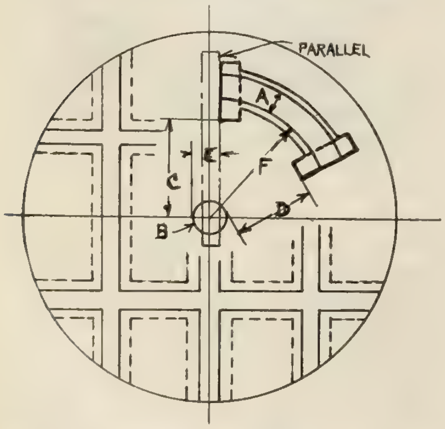


FIG. 6. METHOD OF LOCATING WORK RADIALLY FOR MACHINING ON BORING MILL.

Plugs and Trigonometry

It is sometimes difficult for a beginner to take measurements by the plug system unless the work is dimensioned in that manner, inasmuch as a knowledge of trigonometry is necessary to change a dimension given across points, to a dimension suitable for plug measuring, but the extra work is well worth the trouble when the resultant accuracy is desired, or when the parts can not be fitted, and reference to the principles involved for these calculations can be had by consulting any up-to-date machinist handbook.

The dimensions necessary for accurately measuring a vee are shown by Fig. 4, where a plug is used, as it is impossible to measure accurately to sharp corners with a scale. In this case the plug is equal to the size of work which rests in the vee; A is the distance from seat which vee rests against to centre of work; B is this distance plus half the diameter of the plug, and the other dimension C is obtained in the same manner by subtracting F from D, while E is the length of block.

Laying out holes by the use of buttons is illustrated by Fig. 5, and the manner of accomplishing this is obvious, as all holes are measured in a horizontal or vertical plane A and B from a central hole, while the radius of the buttons X and Y must be subtracted from the dimension C for measuring between the buttons, this method being preferable to radial and angular measurements for accurate work.

Fig. 6 illustrates an example in setting up a boring mill for cutting the slot A after the other portions were finished, using a plug B in the centre of the face plate and calipering at C, D and E to locate the work while the radius is measured across F, it being necessary when locating the work to hold a parallel bar, as shown by the dot and dash lines to permit of calipering at right angles to the various surfaces over to the plug.

Progressive Height Measurement

A micrometer depth gauge clamped to a straight edge for use in measuring depths where the opening across top of hole is too wide to support the beam of the depth gauge is shown by Fig. 7, while a height gauge of the vernier type, as shown in Fig. 1, can frequently be used to good advantage for measuring such work as is illustrated at the left of Fig. 8. On this piece of work it is desired to measure the thickness of each projection X, and this is accomplished by squaring up the work in the vise A in right-hand view, when, by setting the vise on a surface plate B, the distance C is measured, which is followed by measuring the distance D, and likewise all of the other distances from surface plate, when by deducting one from the other the thickness of each projection is obtained. Care should be taken not to disturb the part in the vise until all the desired measurements are made to obtain correct readings in rotation.

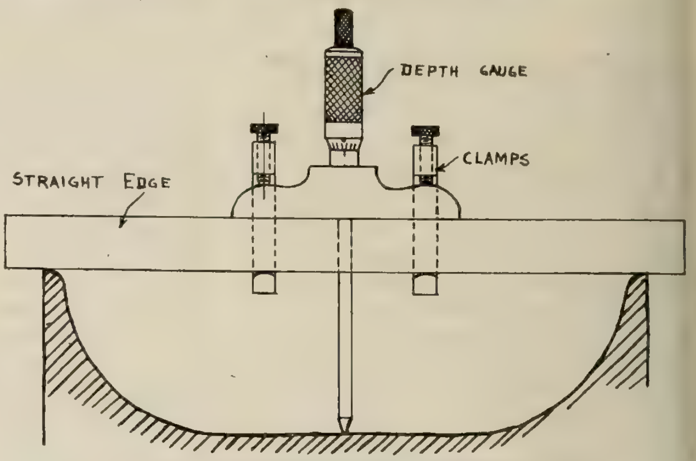


FIG. 7. EXAMPLE OF MEASURING DEPTHS HAVING A WIDE OPENING.

Suitable calipers not being available with which to measure the pulley shown in Fig. 9, the diameter was computed by use of the set-up shown. This consisted of placing the work on a milling machine table held between two angle irons A, with an arbor B in the hole of the pulley, when by measuring across C, multiplying this by two and adding the diameter of the arbor, the size of pulley is accurately obtained.

As an incidental feature of measuring, accuracy is often the result of keeping close watch of the method of setting up the work when machining, for, as any first-class mechanic knows, it is

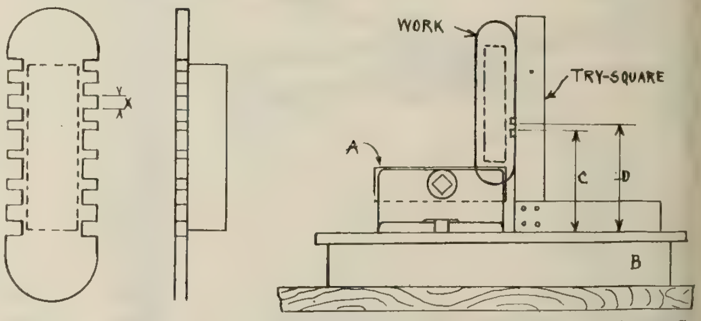


FIG. 8. LEFT: WORK TO BE MEASURED. RIGHT: SHOWING USE OF TRY SQUARE AND HEIGHT GAUGE FOR MEASURING WORK.

harder to plane or mill a piece square by machining the sides haphazard than by keeping the end of the work always at the same hand of the operator and locating in succession against the side last machined. For this reason when machining work which is to be square it is advisable to have a point contact for pinching the rough side of the work similar in principle to that shown by Fig. 10, which shows the four cuts in the order made, as indicated by the finish marks and a piece of round stock between the sliding vise jaw and the work. This principle of squaring from the proper surfaces should be borne in mind when locating all classes of work for machining or measuring.

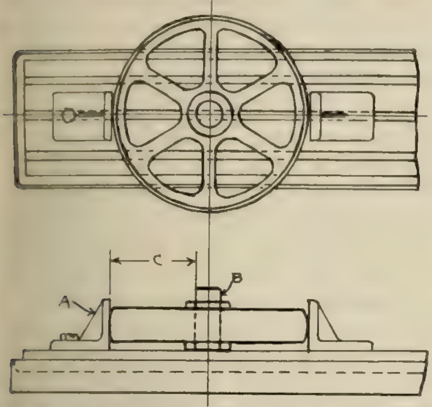


FIG. 9. A METHOD USED FOR MEASURING A LARGE PULLEY.

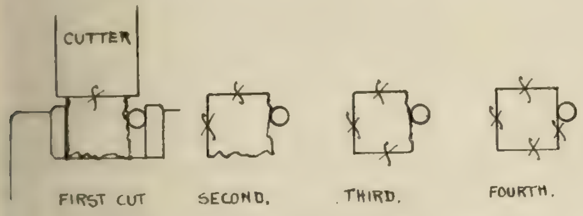
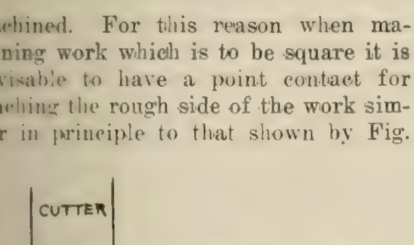
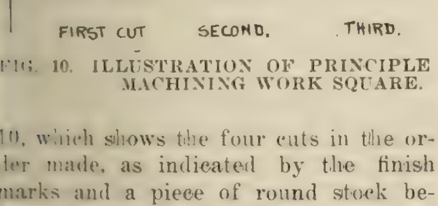


FIG. 10. ILLUSTRATION OF PRINCIPLE INVOLVED IN MACHINING WORK SQUARE.



DISC WHICH IS COUNTERBORED



METHOD OF DIMENSIONING DISC

FIG. 11. TWO VIEWS OF WORK WHICH IS SET UP AS SHOWN IN FIG. 12.

Milling cutters are often located in relation to the work by means of set blocks, but the mere fact that set blocks are provided for this purpose is no guarantee that the work produced from a set block measurement will be accurate, and the work produced should, therefore, be measured to be sure it is correct. Reasons for this are obvious, as a milling cutter out of truth will not cut correctly, and likewise when setting straddle milling cutters on the arbor, allowance must be made for ''tightening the nut'' when the cutters are located by means of a set block, as the tightening of the nut forces the cutters closer together and makes them cut small, thus 1.000 in. test with set block may be .995 in. on the part machined.

The Use of Construction Holes

Several examples in the use of construction holes to facilitate the measurement of angles are shown by the following sketches, this often being the most convenient way to obtain an accurate angular measurement. Fig. 11, upper view, shows a round disc with two counterbored cuts A and B in it. The difficulty of measuring these counterbored cuts is at once apparent, but by putting in a construction hole A, lower view, Fig. 11, with a pin in it, the work may be set up, as shown in Fig. 12, and counterbored. The measurements may be taken as given at B and C, Figs. 11 and 12, using a height gauge to get the difference in height from the table of machine, and as the construction pin is located from face of disc D the work will be correct. The dimensions for locating the other counterbore are E and F, Fig. 11, while the angles are G and H. To locate the work at the proper angle for counterboring, a plug J may be used, which is set to the dimensions K and L, which are figured by trigonometry to give the desired angle, as will be explained later. It will be noted on this example that the dimensions are given to centres, although in actual practice the radius of the construction pins must be subtracted from the centre distance, and the measurements taken between the pins or buttons.

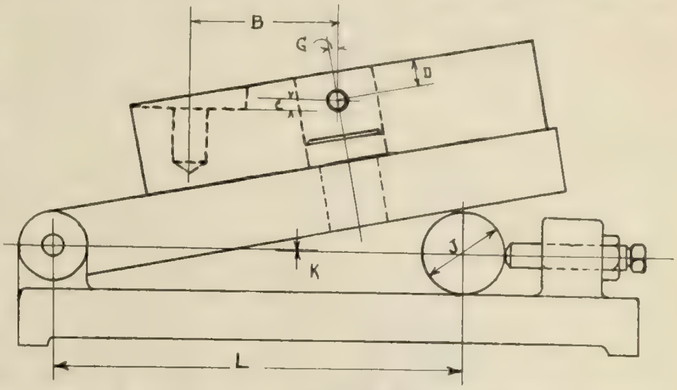


FIG. 12. METHOD OF SETTING UP THE WORK SHOWN IN FIG. 11.

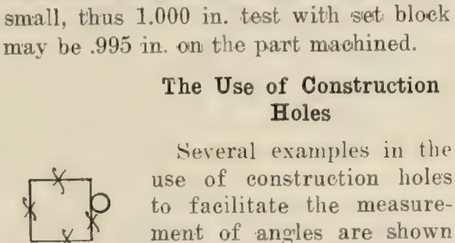


FIG. 13. EXAMPLE OF MEASURING ANGULAR SURFACE AND LOCATING PIN "A."

Illustration Fig. 13 shows an accurate method of locating the pin A from the seat B, and also shows the method of measuring the seat B from the bottom and the angular surface from the seat by the use of a construction hole, this being a typical milling fixture construction measurement. In this instance the seat B is first machined to dimensions C, D and E, following which the construction hole F is located to the dimensions G and H, from which it is a simple matter to measure the angular surface from the construction hole using angle and dimension J, which likewise the hole for pin A is measured using dimension K and angle.

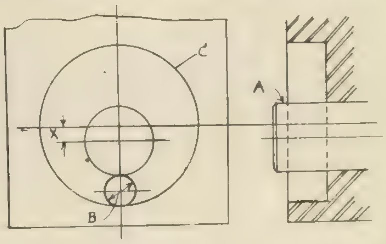


FIG. 14. MEASURING AN ECCENTRIC HOLE WITH PLUG.

Ascertaining Eccentricity

A simple way of measuring an eccentric hole in relation to a concentric hole is illustrated by Fig. 14. In this set-up an arbor A is placed in the small hole and the eccentric hole is calipered to get the exact diameter, when by trying test plugs B between the arbor and the hole the amount of eccentricity can be calculated by adding half the diameter of the arbor A to the plug B and subtracting this from half the diameter of the eccentric hole C, the result equaling X.

MISFITS IN SCREW THREADS

IN a paper on "The Standardization of Screw Threads," presented before the American Railway Master Mechanics' Association, F. O. Wells stated that in searching for the principal reasons of misfits in screw threads it had been found that non-interchangeability was due less to inaccuracy in the screw-cutting tools themselves than to the unreliable methods employed in taking and transferring measurements, and also to the total disregard of proper tolerances for both male and female threads.

In theory, screw-cutting tools should reproduce their own threads; in practice they did not always do so. The principal point to be brought forward was that it was not the tools that had to interchange, but the work done by them. It was generally agreed among tap and die and screw manufacturers that the screw was the basis from which all formulas and calculations should be derived. The usual custom was to tap a hole and fit the screw to the tapped hole, and in the process of making a screw, if the lead of the tap was not normal which had been used to tap the hole, the operator kept cutting down the screw to fit the hole, and consequently got it greatly under size of the tapped hole.

It was a fact that the vast majority of taps broke in use and that very few wore out. Some authorities put the total breakage at 90 per cent. of all the taps used. This breakage was due largely to the fact that the holes to be tapped were not either drilled or reamed to a large enough size. For ordinary work, three-quarter depth of thread was good practice. A nut having only one-half depth of thread would break the bolt before it would strip the threads. The outside diameter had little or nothing to do with the fit for a screw thread as long as the screw was made basic, or smaller, and the tap over basic. If this condition existed, when put into use the metal in the top of such threads flowed and made a fit depending upon the tolerances; the closer the tolerances, the tighter the fit. Pitch diameter and lead were two factors of equal and reciprocal importance.

Tests showed that long, curly chips from taps required less power, and there was consequently less breakage than from taps which made fine, granulated chips. This statement was equally true of dies. To obtain these curly chips it had been found necessary to give these taps and dies a certain amount of positive rake, this rake depending upon the material to be cut. To make the tolerance of screw threads within well-defined limits for railroad work would tend to prevent the nuts and screws from working loose, and no doubt help to decrease the number of accidents that could be prevented by some forethought and care. These limits must be very carefully worked out, because on screw threads subject to jar, if the fit were too loose, the parts would quickly come apart, while if the fit were too tight the strain set up by the tight fit, together with the jar, would soon carry the part beyond its breaking strength, and so cause a rupture.

◆

DON'TS FOR LATHE HANDS.

By R. M.

DON'T have a lot of things lying on the saddle.

DON'T use the saddle of the lathe for an anvil.

DON'T leave the chuck wrench in the chuck—something might happen.

DON'T use metal belt fasteners where belts are to be shifted by hand.

DON'T start a new machine unless you are familiar with the mechanism.

DON'T let your lathe centers go too long without redressing. The proper angle is 60 degrees.

DON'T permit the center lubrication to become full of grit. Keep it clean and under cover.

DON'T be continually using belt dressing to increase the driving power. Look elsewhere for the trouble.

DON'T forget that an occasional drop of oil on the tool post screw will increase the holding power on the tool.

DON'T try to pull cuttings from about the work with the hands while the work is in motion. Use a bar or stick.

DON'T slack off the gib screws unless the slide is too tight. The trouble is often too much dirt and insufficient lubrication.

DON'T have any excess overhang on the cutting tools. The closer the working point is to the center of support, the better the results.

DON'T allow grease and dirt to accumulate on the sides of the cone pulleys. The belt will have a tendency to climb to the next step.

DON'T place a center or drill socket in the lathe spindles unless you are sure they are both free from dirt and other objectionable features.

DON'T put too much oil on the feed screws that are open to the cuttings from the work. Excess of lubrication in this respect may prove as expensive as too little.

DON'T forget that heat will be generated when turning small shafts, causing the work to elongate. The tail stock center may require to be gradually released to avoid distortion in the the shaft.

◆

CANADA'S TRADE FOR PAST YEAR

DETAILED figures of exports and imports for the twelve months ended with last June, as published by the Trade and Commerce Department, shows some interesting developments of trade conditions during the two years of war.

Exports to Britain have nearly trebled while imports from Great Britain hav fallen off by over 25 per cent. For th twelve months ended June last, Canada' exports to Britain totalled $557,909,00 as compared with $209,609,000 for th twelve months ended June, 1914. Imports from Great Britain were $90,275 000, as compared with $121,461,000 tw years ago. Canada's favorable balanc of trade with the mother country for th twelve months ending last June wa $476,647,000.

Trade with the United States show an increase of nearly $74,000,000 in imports and of $117,865,000 in exports during the two years. Imports increase from $363,117,000 in 1914 to $442,088,00 in 1916. Exports increased from $182, 575,000 to $300,440,000. The balance o trade for the twelve months ended wit June last was in favor of the Unite States by $141,648,000.

Canada is now buying $74,000,00 worth of goods a year more from th United States and $31,000,000 worth o goods less from Great Britain than wa the case two years ago.

The rise in the price of foodstuffs meats, etc., is explained to some exten by the fact that Canada found it necessary to import during the twelve month ended with last June, provisions costin $15,561,000, breadstuffs costing $10,938, 000 and vegetables costing $2,549,000, total of $30,000,000 worth, on all o which the consumer had to pay a substantial duty.

The increase in the importation o provisions for the twelve months wa nearly $10,000,000 as compared with th preceding twelve months.

On the other hand, exports of cattle increased from $8,702,000 to $12,505,000 o breadstuffs from $123,851,000 to $304, 388,000 and of provisions from $49,388, 000 to $73,210,000. Exports of cheese fo the twelve months ended with last Jun totalled $27,731,000, a $6,000,000 increase, and of bacon and hams, $31,082, 000 a $14,000,000 increase.

The growth of temperance is probabl reflected in the increased consumption o tea and coffee. For the twelve month ended with June, Canada bought tea t the value of $8,557,000 and coffee to th value of $2,033,000. There are increase of $1,133,000 in tea and $379,000 i coffee as compared with the precedin twelve months.

On the other hand, the importation o spirits and wines decreased from $4, 563,000 in 1915 to $3,992,000 in 1916.

The percentage of duty collected o taxable imports has increased from 2 per cent. in 1914 to 34 per cent. at th present time.

The Development of Irregular Sheet Metal Pipe Connections

Staff Article

The problems dealt with in this article are typical examples encountered in actual practice, which, while not of very frequent occurrence, may be of considerable importance when met with. They possess considerable divergence from ordinary symmetrical forms and a study of the methods employed will enable their application to be successfully carried out in similar cases.

A SHEET metal problem, involving some interesting projections and developments, is illustrated and described in the accompanying article. In Fig. 1 are shown four views of the piece required—(a) front elevation; (b) side elevation from the left; (c) side elevation from the right; and (d) top view. The diameter of the lower vertical section F is to be 2 feet, and also the branch A; the branch B is 18 in. in diameter, the centre line of both branches making an angle of 45 degrees with the centre line xy, and intersecting in a common point, as shown at O.

Drawing the Front Elevation

To draw the several views in Fig. 1, first erect the vertical line xy and the base line ab. From the point 4, mark off the distance 4, 0, equal to 2 feet, and from the point 0 draw the centre lines of the branch pipes at an angle of 45 degrees. At a distance of 4 feet from the base line draw the horizontal line $1\ 1^1$, showing the top of the transition piece D; also a line 6 inches higher upon which the extreme points of the branch sections A and B lie. On either side and parallel to the centre line of each branch draw the lines $1, 1^1$ and $7, 7^1$ at a distance equal to the radii of the pipes. Draw the lines 1, 7 at right angle to the centre lines, and in such a position that the point 1 falls on the extreme top line. Then from the point 4 describe the semicircles into six equal parts, projecting the points parallel to their respective centre lines, and dividing the sections A, B and F as shown. Lay off the line $4^1\ 7^1$ in A so that the two angles (i) and (i) are equal, also the line $1^1\ 7^1$ in F, so that the angles (j) and (j) are equal. This makes the piece C a portion of a round pipe with a diameter equal to that of A and F.

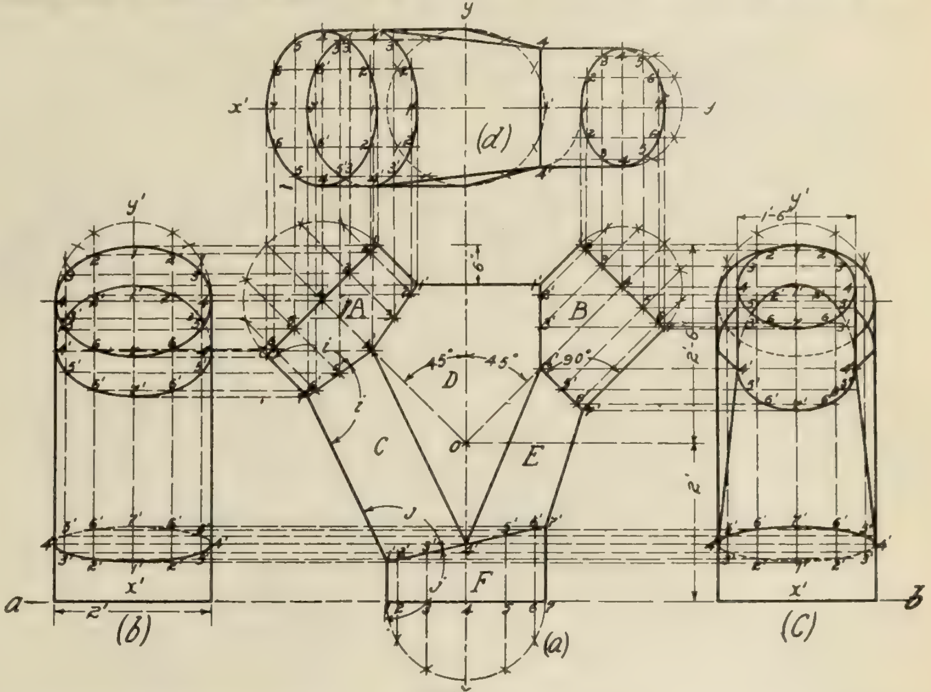


FIG. 1.

From the point 1^1 at B, drop a vertical line, cutting the centre line 0, 4 at 4, and from this point draw a line at right angle to the centre line. Connect the points $4^1\ 4^1$ and $7^1\ 7^1$, thus forming the piece E.

Top and Side Elevations

The two side elevations, and also the top view, can be obtained by the ordinary method of projection, care being taken to have similar points in the various views numbered alike. On the centre lines of both side views at a convenient point describe semicircles equal to the diameter of the corresponding pipes, and divide each into a certain number of equal parts, generally twelve divisions to a circle. The vertical projections for the side elevations are obtained from these circles, and the horizontal intersections are obtained from corresponding divisions on the front elevation. The top view is obtained in a similar manner, the horizontal projections being obtained from the construction circles, and the vertical intersections obtained from corresponding points on the front elevation; the ellipses representing the several openings and joints being drawn through the various intersections.

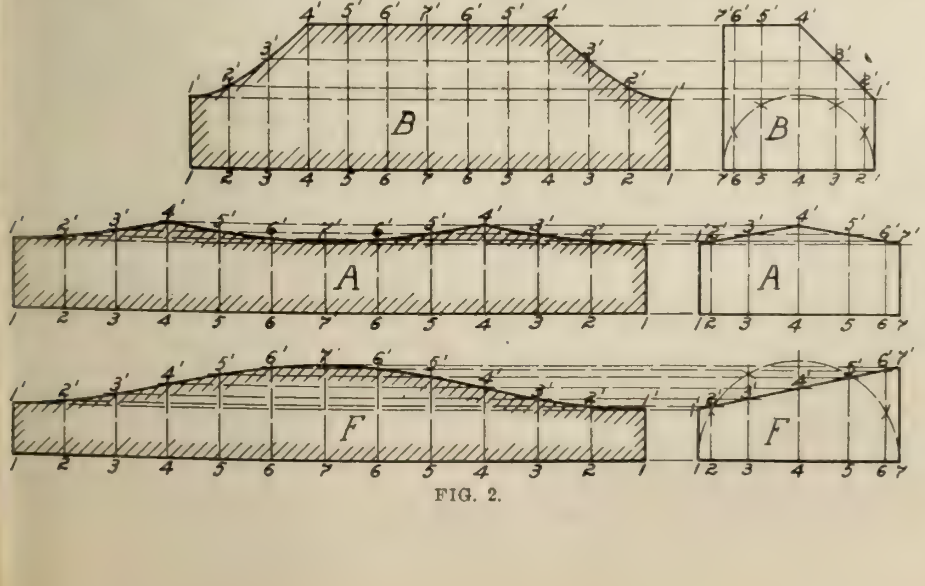


FIG. 2.

Developing Cylindrical Sections

The developments of the three cylindrical pieces, A, B and F, are shown in Fig. 2. The elevation of the three pieces are shown on the right. A semicircle is described on the base line and divided into six equal divisions; the projection of these points cutting the base and angular faces in the points shown. On the base line of the development twelve divisions are marked off, each equal to one-twelfth of the circumference of the pipe, and numbered with the corresponding points in the elevation, the line 1, 1^1 representing the seam in each piece. Vertical lines are erected from each division on the base line, the intersection for the irregular curve being obtained from the horizontal projection of the corresponding points in the elevation. In developing these surfaces, no allowance has been made for seams—sufficient metal must, at these points equal in length to the lines 3, 3^1—4, 4^1—5, 5^1, etc., in the semicircles at either end of the pipe connections. The length of the lines 2, 3^1—3^1 4^1, etc., in (h) will be the true length of corresponding lines in the elevation. As each half of the pattern is symmetrical, it can be developed on either side of a centre line.

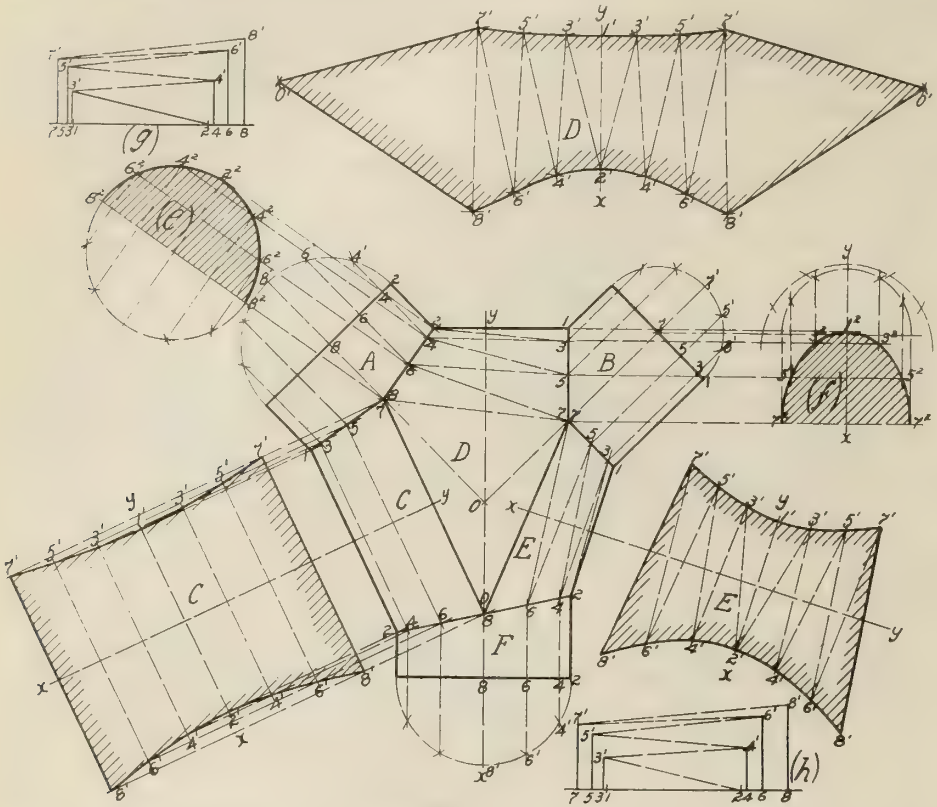


FIG. 3.

therefore be added where necessary, depending upon the style of joint used.

Transition Development

The development of the three transition pieces, C, D and E, is shown in Fig. 3. The piece C is developed similarly to those shown in Fig. 2. The centre line xy is drawn at right angle to the line 1, 2 in the elevation, and on this line six equal divisions are marked off, each equal to one-twelfth of the circumference of a 2-foot pipe. From these points on the centre line xy perpendicular lines are drawn, and the intersections of these lines with projections from the section C in the elevation are the points on the irregular curve.

The developed shape of the transition piece E is shown to the right of the elevation. To obtain the true length of the various radial and diagonal lines the triangulation method is used. The line 1, 2 being on the centre line of the side view, is, therefore, the true length in the front elevation, so with this as a basis we can proceed to obtain the true lengths of the other construction lines. On the base line at (h) lay off the various lengths, 1, 2—2, 3—3, 4, etc., as shown on E in the elevation, and erect perpendiculars

At right angle to the centre line xy erect the line 1^1 2^1, equal in length to the line 1, 2 in the elevation. With 2^1 as centre and 2, 3^1 in (h) as radius, describe an arc that intersects at 3^1 with one drawn from the point 1^1, with a radius equal to one-twelfth of the circumference of an 18-inch circle. Then with 3^1 as centre and 3^1 4^1 in (h) as radius describe an arc that intersects at 4^1 with one drawn from the point 2^1, having a radius equal to the distance 6^1 7^1 on the curved line in F, Fig. 2. The development of E can be completed by following the method just described, noting carefully the corresponding figures and lines; the length of the line 8^1 8^1 in E will be of the same length as the curved line in F, as contained between the points 4^1 4^1.

The development of the transition piece D is shown at the top of Fig. 3, and is derived similar to that of E. The end portions that connect the two branch pieces, A and B, are divided by projecting lines from the semicircles as shown, the points 1, 2, 3, etc., forming the extremities of the radial and diagonal construction lines. The true shape of the ends are shown at (e) and (f), obtained in like manner to that described in Fig. 1. The true length of the construction lines in the elevation are shown by the cross lines in (g) Fig. 3, and are obtained the same way as in (h). On the centre line xy of the pattern D lay off the distance 1^1 2^1 equal to the line 1, 2 in elevation, and with 2^1 as centre and the length 2, 3^1 in (g) as radius, describe an arc that will intersect one drawn from the point 1^1, having the length 1^2 3^2 in (f) as radius. Then with 3^1 as centre and 3^1 4^1 in (g) as radius, describe an arc that will cut another arc drawn from the point 2^1, having the length 2^2 4^2 in (e) as radius. Proceed in this manner until the line 7^1 8^1 has been obtained, taking care that the curved line 7^1 7^1 in the pattern is the same length as that in (f) and the line 8^1 8^1 the same as the curved line in (e). Now with 8^1 as centre and the distance 7, 8^1 in (c) as radius, describe an arc at the apex 0^1, and from the point 7^1, with the line 7^1 8^1 in (h) as radius, describe an arc cutting the other at the point 0^1. Then lines drawn from the point 0^1 at either end to the points 7^1 and 8^1 will complete the development of the transition piece D.

* * *

GRINDING LATHE AND PLANER TOOLS.

THE desirability of having the grinding of tools done by one man is being more widely recognized, but it is not always feasible to have it done. After having read Fred W. Taylor's truly remarkable treatise "On the Art of Cutting Metals," and having had several interesting interviews with modern mechanics, a writer in Grits and Grinds states that at least two things made a strong impression on his mind in connection with the grinding of high-speed lathe and planer tools:

a. They are ground successfully both by the free hand method and by automatic tool grinding machines.

b. It is common practice to grind both wet and dry.

Taking up first hand vs. machine method—the machine method of grinding is safer and more satisfactory except in instances where there are real mechanics who possess both mechanical horse sense and skill.

The advantages of hand grinding are It gives the operator a little better opportunity to regulate the angle or rake to suit the work. Since he must grind the tool many times each day he should be able, if a good, observing mechanic, to improve the cutting edge with each grinding. This remark was recently made by a man who is interested in keeping up the efficiency of the shop "There is just about one man in ten who grind tools in this shop who can grind a lathe tool better by hand than a machine will grind it and it is mighty poor policy to let any green man grind by hand."

The parties whose interests are on the side of the automatic tool grinding machine have good arguments why machines should be used exclusively. Saving of workmen's time, saving of time lathes and planers would stand idle while tools are being ground, the correct grinding angles, life of the tool, quality of work, increased production and a smaller investment in high speed steels are some of the talking points.

Wet vs. Dry.

Whether to grind high-speed steel wet or dry is still being debated, and it is being ground successfully by both methods—take your choice. The most approved practice, in so far as the writer can learn, is to grind wet whenever practicable. Reference to the printed instructions issued by four of the principal high speed steel makers disclosed the fact that two of them instruct the users of their product to "grind on a wet wheel" and two to "grind on a dry wheel."

When grinding wet a copious stream of water must flow at low velocity directly on the nose of the tool. It should be ample to take up the heat as fast as it is generated. A little water is far worse than no water at all as it is the direct cause, many times, of surface cracks and checking. When grinding wet do not grind too forcibly as the water is thus temporarily kept away from the surface being ground, and when the tool is released the cold water strikes the hot surface causing it to check and surface crack.

It is not unusual to find tool grinding machines in use that are not properly provided with a sufficient water supply and there are cases, too, where the workmen grind without turning on the flow of water full force because it is somewhat disagreeable to grind a small tool by hand under these conditions. Both are costly; high-speed steel is too expensive to be thus damaged.

The advocates of dry grinding contend that "high-speed cannot be damaged by dry grinding" and that the green man will have less trouble by the dry method. The superintendent of a shop where both wet and dry methods are used for lathe and planer tools, remarked: "There is one advantage in grinding dry, particularly short tools—the grinder can't force the grinding too hard: if he does he'll burn his fingers."

There is a temptation when grinding dry to plunge the hot tool in a bucket of water to cool it off. This is considered by many poor practice.

Lip and Clearance Angles of Tools

Taylor says:

"For standard shop tools to be ground by a trained grinder or an automatic grinding machine a clearance angle of six degrees should be used for all classes of roughing work."

"In shops in which each machinist grinds his own tools a clearance angle of from 9 degrees to 12 degrees should be used, because in nine cases out of ten the workmen grind the clearance and lip angles of their tools without any gauges, merely by loking at the tool and guessing at the proper angles. Much less harm will be done by grinding clearance angles considerably larger than six degrees than by getting them considerably smaller."

"Tools for cutting cast iron and the harder steels, beginning with a low limit of hardness, of about carbon 0.45 per cent. should be ground with a clearance angle of six degrees, back slope eight degrees, and side slope 14 degrees, giving a lip angle of 68 degrees."

"For cutting steel softer than carbon 0.45 per cent. clearance angle six degrees, back slope of eight degrees, side slope of 22 degrees, giving a lip angle of 61 degrees."

"Chilled Iron—a lip angle of from 86 degrees to 90 degrees should be used."

"Steel as hard or harder than tire steel; clearance angle six degrees, back slope five degrees, side slope nine degrees, lip angle 74 degrees."

"Extremely soft steels, carbon 0.10 per cent. to 0.15 per cent. use tools with lip angles sharper than 61 degrees."

"Tools ground with lip angle of about 54 degrees cut softer qualities of steel and also cast iron, with the least pressure of the chip upon the tool."

Tools for Special Holders.

Many shops are now equipped with special tool holders which permit the use of small bits of high-speed steel instead of solid forged tools. The grinding of these tools for special holders is a somewhat different proposition from the grinding of solid forged tools due to the fact that the holder socket may be inclined at an angle to the lathe centres. It is necessary when such is the case to add the desired amount of clearance to the fixed angle of the holder socket. For example, if six degrees of clearance is wanted for the tool when at work and the holder socket is inclined at an angle of say 16 degrees the tools should be ground at an angle of 22 degrees. This is a point frequently overlooked, except when the tool grinding machine is provided with a special holder for grinding them or when the bits are ground in the holders.

Lathe Chips.

The lathe man is usually interested in the shape of lathe chips he is getting. He considers a long, stringy ribbon chip a dangerous kind because it is likely to wind up around the work and to swing around and slap him in the face. A common trick of the old-time mechanic, in order to guard aganst the dangerous chip, is to grind a little groove across the top of the tool a short distance back from the cutting edge—say about ⅛in. to ¼in.. The groove should not be too deep. This has a tendency to break up the chip in short pieces or roll it in a coil which is easily taken care of. The kind of chip referred to above is more likely to be found when working soft and tough steels. Hard, brittle steels break more easily. Cast iron does not give trouble in this respect as the material does not hold together

Some Good Points to Remember.

The surface of the tool should never be allowed to fit closely against the surface of the grinding wheel for any great length of time. Keep moving or wobbling the tool about while grinding.

Practical machinists who grind their tools incline towards too little rather than too much side slope. Steep side slope is avoided for reasons of economy.

It is economical to have on hand a sufficient supply of tools that the dull tools may be laid aside to be ground in lots or batches. It is also probably economical for even the small shop by such a system to use an automatic tool grinding machine.

There is greater economy in the automatic tool grinding machine where standard shapes for all tools have been adopted.

It is a common practice among workmen to use the side of a grinding wheel to finish grind. It should always be kept in mind that the side of a straight wheel was never intended to be ground on and the man who uses the side is not observing the "safety first" rules. There may be some cases where even a slightly concaved edge on the tool would be objectionable, but it is doubtful if there is enough concavity when the average size grinding wheel is used to make any difference in the action of the tool. Should it be so, the remedy is to grind on the rim of a cup or cylinder wheel.

Should special men be delegated to do all the grinding of cutting tools and be provided with suitable templates and gauges

"Yes," a superintendent replied, "but we don't do it here, and I don't think there are many shops where the plan is entirely practical. We have five or six lathe and planer departments and no one of them is large enough to support an automatic grinding machine. They are too far apart for a common grinding department. That would be an ideal plan if the conditions were ideal, but they're usually not."

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

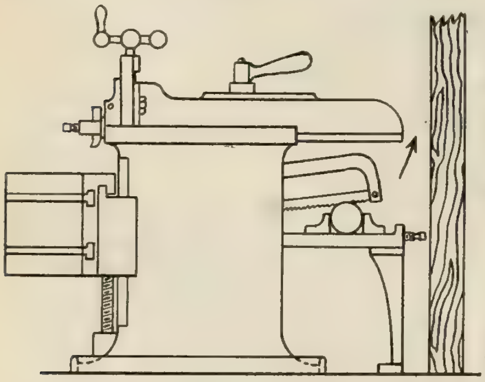
"SAFETY FIRST"—LOCATING MACHINE TOOLS

by R. Hamilton

THERE is an old saying that "Prevention is better than cure." This proverb is not only true in the physical sense of its meaning, but it can also be applied to good purpose in the routine of every-day work.

Twofold Influence

Among the various developments due to efforts to provide better protection for all classes of workmen, the placing of machinery is one of increasing importance, not only in direct relation to the men as individuals, but in its influence on the results obtained through other precautions whether practical, such as protective apparatus and devices, or moral, consisting of instructions, warnings, etc. When equipping a new shop for the manufacture of a certain product, the layout of the machine tools can be so arranged as to obtain the highest possible efficiency, both in production and economy, but, when it is necessary to install additional machinery in a shop already equipped, it often becomes a problem just where to locate the extra tools.



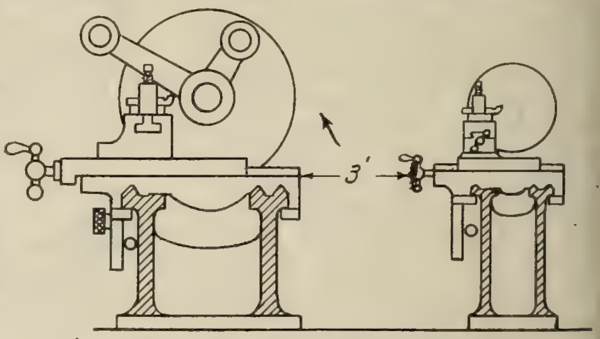
SHAPER TOO CLOSE TO WALL.

The proper placing of machine tools, especially when the equipment is being added to, is very essential not only with regard to its productive efficiency, but also as regards the safety of the employees, operating the various tools.

A Common Cause

One of the great sources of accidents in metal working shops, is the frequent over-crowded condition of the plant; not only in the quantity of the heavier tools, but in the general condition of the space between the machines, and the main aisles of the shop, in which an unnecessary amount of material is often allowed to accumulate.

The free movement of the workmen in the discharge of their duties, should be one of the chief considerations of the executive, as the efficiency of a plant depends largely upon the elimination of unproductive action on the part of the employees.



LATHES TOO CLOSE TOGETHER.

Dangerous Thoughtlessness

Many machines are located in such a position that the precautions required in their operation result in considerable loss of time, and occasionally in injury to the workmen. While in a shop some time ago the writer noticed a power hack saw placed alongside of a 16 in. shaper, the ram of which travelled back to the wall, when on the full length of stroke. To place a short bar in the hack saw vise, it was necessary for an operator to crowd in at the rear of the shaper to support the end of the bar. While no accidents have actually happened, there has been several narrow escapes of heads and arms being crushed, owing to the shaper hand starting up his machine while a bar was being placed in the saw.

Gap Lathe Location

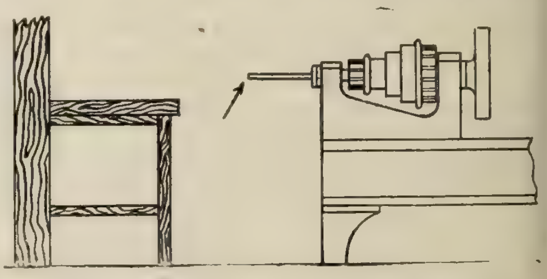
The location of a gap lathe is connection with the safety of workmen, other than the operator—should be given careful consideration, as the possibilities of accident are often overlooked. Plenty of room should be provided, both at the front and rear of the machine, and a suitable guard placed, if necessary, to prevent passing workmen coming within the danger zone. In some plants the use of a gap lathe is seldom required, and when used is mostly for circular work; but when this tool is operating on odd-shaped pieces, such as bell cranks, connecting rods, etc., the possibilities of accident from projecting portions is often very great.

Some time ago in a certain shop known to the writer a job was being performed in a large gap lathe, which necessitated an arm of the work extending for a foot out from the rim of the face plate. The rear of the gap lathe was located about three feet from the working side of a small engine lathe. While the workman on the smaller machine was taking a step backward, to remove a piece of work from his lathe, the large lathe was suddenly started, the swinging piece striking the workman a violent blow upon the arm, that resulted in a lay off for several days. Another objectionable feature in connection with these two machines was that the operator on the smaller one had to stop his work and stand to one side while heavy work was being hoisted into the larger lathe.

Obstructing Thoroughfares

Another common cause of accident is the placing of hollow spindle lathes and turret machines, in such a position that the work often extends partly, or entirely, across an aisle or section of a shop where there is considerable traffic. If it is a general practice to operate on long bars, the workmen get the habit of using another passage, but if only occasionally used, the chances are that a workman may receive injury before he can be warned.

Over a year ago an accident occurred in a certain shop, where his coat was torn from the back of one of the workmen. A bar was extending part way across a passage that was much used when one of them—a new man—in passing the end of the lathe, came in contact with the revolving bar, and before he could retreat, the end became twisted in his clothing with the result above



STOCK PROJECTING OVER PASSAGEWAY.

Many other cases might be cited where more or less injury and near accidents have resulted from machines being located in positions that have necessitated the workmen taking risks which would otherwise have been avoided if proper consideration had been given to the placing of machine tools. If, after a machine has been placed in a certain position, it is found that an additional hazard has developed, the danger should be immediately minimised, if not entirely eliminated by the provision of such guards as it is possible to install.

* * *

MACHINISTS' INSTRUCTION COURSE—VII.

IN order to turn a parallel bar between the lathe centers it is necessary for the lathe centers to be in line with each other and with the line of movement of the tool rest. To test this, use a bar about 2 ft. long with a small portion at each end turned to the same size or slightly less in the middle for clearance, set the tool to just touch one end of the bar, then run the carriage along to the other end and if the tool does not touch at the other end move the tailstock whichever way it needs to go, until the tool exactly touches either end of the bar. If the end of the tailstock is not already marked make a reference mark with a fine chisel, so that it can be put back to the same place if you need to move it at any time.

If you have no test bar or no time or opportunity to make one, try out the centers by using the job in hand. Turn a small portion at each end to the same size, then, instead of undercutting the middle for clearance, set the tool to touch the turned portion at the live center end, take the job out of the centers, or if it is a light job turn back the tailstock center enough to allow you to run the carriage to the other end against the centers and test as before. If the job is too heavy to conveniently take out of the lathe, note the graduations on the cross feed screw or make a reference mark on same anl see that the tool just touches each end of the turned portion when the reference mark on cross feed screw is the same. Another result of the centers not being in line can be seen by facing the end of the work between the centers, when, by placing a straight edge across the end, it would be found that the end would be concave or convex, according to which way the tailstock needed to be moved, as the centers have to be exactly at right angles to the cross slide to produce a flat surface.

Selecting a Tool

Volumes have been written about the theory of cutting tools, but to specify the exact size and shape of all the different lathe tools is outside the scope of these articles. The shape of the tool depends entirely upon the nature of the job and the kind of metal to be cut. Generally speaking, the softer the me to be cut the sharper the tool, while with hard metal there is less clearance. If it is a light spongy job, the tool ought to have a comparatively narrow nose with lots of side clearance so that the cuttings will slide off with the least-possible resistance. Cast iron can be cut with a broader nosed tool than wrought iron or steel, because the chips break off more readily and thus relieve the tool, allowing a broader nose and rougher feed.

Height of Tool

It is important to have the tool at the right height, so in oraer to insure this make a mark on the tailstock spindle exactly the height of the lathe center, put a parting or cutting off tool in the tool post and adjust it to the exact height of the lathe centers. Now slightly press it against the tail stock spindle and run the carriage along making a permanent mark on the tailstock spindle about 2 inches long, Fig. 30. This will be found very convenient especially when setting the tool for taper work as will be shown later.

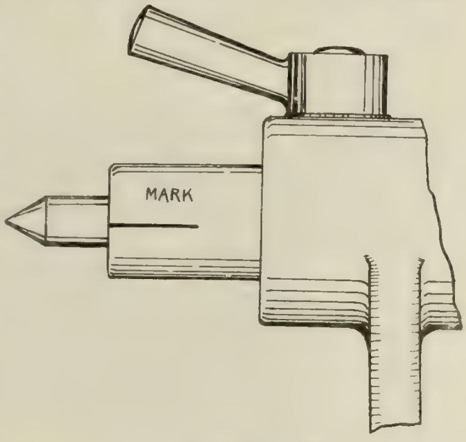


FIG. 30.

Set the tool a little above the center; by using the reference mark on the tail stock spindle, you will know exactly the height of the tool in relation to the lathe centers. The larger the diameter of the work the higher you can set the tool above the lathe centers with advantage. Avoid setting the tool below the center, because if there is any lost motion in the screw or slackness in the slide, the tendency is to pull the tool into the work, when without warning, the job will climb over the top of the tool and jump out of the centers. Fasten the tool in the tool post as close to the cutting edge as possible and keep it quite clear of the work while doing so.

The First Cut

Making the first cut is entirely a matter of judgment. Try the calipers on it as soon as you can but be careful not to take too much off at the first trial as there are no lathe putting-on tools. After adjusting the cut to the right size start the feed and let it run half way up the bar, then remove the work, run the tool back to the starting point, replace the work in the reverse position, and let the same cut run over the part that has not been turned. The work will now be the same size at both ends and the cut will meet in the center. If the live center should not run perfectly true, it will be least noticeable where the cuts meet in the middle of the bar.

If it is necessary to take a number of cuts and a very accurate job is wanted, it is best to reverse the work at every cut so that the centers will wear even. Before clamping the dog on to a finished surface, place a piece of sheet brass about the size of a postage stamp under the set screw to save marking the surface.

Always grind the tool before taking the finishing cut. Finishing tools, as a rule, will stand a little more rake on top than roughing tools. Take the finishing cuts with a fine feed and at as high a speed as the tool will stand up to, considering the diameter and length of the job being done.

Measuring With Calipers

A good lathe hand can with care detect a difference of .001 inch with an ordinary pair of spring calipers. They should be held lightly between the thumb and fingers of the right hand, while the thumb and forefinger of the left hand hold one of the caliper points stationary on the piece to be calipered. Gently swing the other point across the work, and move it in and out until you find the place where the point has the least travel. This is the smallest diameter that can be found, anl is at right angles to the axis of the shaft. When, this point is determined, let the calipers pass over with a very slight pressure; some prefer to let the calipers pass over without touching, noting very carefully the amount of side play or travel of the calipers at the smallest part and then have the same conditions exactly on the plug or piece that they are measuring from . This is probably the most accurate way, but it requires some experience as it depends more upon judgment than sense of touch.

Turning to Gauges

If the shaft has to be turned to fit a ring gauge it must of necessity be a few thousandths less than the ring gauge, depending upon the diameter, as a ring gauge of 3 in. diam. for instance will not pass over a 3 in. plug although sometimes plug and ring gauges are made to pass over each other especially home made ones.

When using plug and ring gauges remember that the kind of fit that the ring and plug gauge make with each other is exactly reversed in the work. If the plug and ring gauge will not go together, the work made to them must. If the ring and plug will pass over each other the work may not, as it would depend on whether the work was a closer fit than the plug and ring gauges are to each other. These conditions apply when the hole in the work is made to fit the plug, and the shaft turned to fit the ring, so that if plug and ring gauges were being made for parts that were wanted to be a forced or driving fit, it would be necessary to make the gauges so many thousandths slack.

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MANUAL POWER

By A. L. Haas.

WHEN labor is extremely cheap, as in most Asiatic countries, ordinary sources of power and labor-saving devices of the West are from this cause relatively dear and the more primitive human muscle continues in use as the chief source of energy.

At home a metal turning lathe seems inseparable from overhead shafting. In India, China and elsewhere, native labor being abundant and cheap, lathes up to 10-in. centres of modern type, with flared heads, are propelled by treadle. Occasionally the treadmill device of a heavy flywheel separately mounted and operated by four to eight men is used. Recently an engine lathe so fitted came under the writer's notice, 9 in. centres, 10 ft. bed, destined for the Far East.

In the absence of other motive power, or by reason of economy, such method of propulsion of a modern tool, while quaint, may be desirable. Where labor is cheap, time of small consequence with depth of cut, feed and speed proportioned to muscle rather than conditioned by scientific practice, more work of this character is done than is generally realized in more civilized places.

For repair purposes, as apart from manufacture, the gear to accomplish the desired end is of greater moment than any attempt to utilize high speed steel to its ultimate capacity.

It seems likely that at least 30 per cent. of the regular type engine lathes are used for isolated repair plants, and not for manufacture at all. Only on this supposition can the yearly demand and output be explained in normal times.

A Primitive Lathe

The most primitive type of lathe with which the writer is acquainted, possibly its original form, survives in parts of the Nearer East termed the Levant. Among the trophies brought home by the tourist to Egypt are articles made up of a multiplicity of small pieces of turned wood.

The operator whose limited kit, including his "lathe" is carried on his person, squats in some convenient corner. He thrusts two pieces of wood, having metal centres, into the ground at his feet. A bow with a loose string is his motive power, and with a supply of material he is ready for a start. The bow is placed one turn round the work between the centres. A chisel held between the toes for rest forms the cutting tool. The bow is moved ceaselessly backwards and forwards with the left hand, the right and the toes (which never having been shod are very flexible) manipulate the chisel. The device is at least as old as the traditional potter's wheel, and antedates the pole spring lathe common enough a century ago. Quite complex shapes, necessarily small, are made with great dexterity and speed.

A Modern Tinker

A man known to the writer has contrived to effect a living by various devices in many primitive lands. One experience of his concerns his life in Paraguay thirty years ago.

In some unexplained manner he found a derelict lathe for sale at a nominal figure in a coast town; it was 6 in. screw-cutting, with reasonably full kit, and is yet in existence, as he brought it home subsequently. To it he added a portable forge and some miscellaneous gear. Hiring a wagon and horse, he set out in the manner of the country tinker, immortalized by Bunyan seeking work.

The wagon journeyed by devious ways from racienda to hacienda, and the jobs he managed to accomplish were many. He quoted a price for any work or repair within his capacity, until he left the gear at the ranch in good shape, travelling on again in quest of work and adventure. Sometimes he stayed a week, sometimes a month; very rarely was he refused work. In fact, he makes out that he had a sort of royal progress from place to place. There was no dearth of labor miners' skill, and the treadle of the lathe was never propelled by his own foot. Subject to any scruples he had, his prices were never subjected to question. and the need for his services was evident. Agricultural machines laid aside for some defect he was able to put into commission again. The facilities for purchasing new machines were abundant. opportunity for skilled repairs absent. Hence my enterprising friend obtained a warm welcome and achieved a modest competence by the supply of a veritable lack in a sparsely settled community.

The future of the travelling workshop and a record of its adventures would make an entertaining volume if these were adequately rendered into print.

Price Depends on Place

Skill of the right sort at the right place, where this is isolated, commands a ready welcome and high pay. In Brazil only a couple of years ago an erector of aerial ropeways was paid £50 to travel free of cost a matter of 100 miles to lay up an 80-ft. splice in another ropeway. It was just the exercise of unusual skill in an isolated spot, the fee was paid, as it was cheaper than to bring a man from the coast to do the job.

Another instance of manual labor or power occurs in places of detention and punishment, in prisons where work is done neither for pay nor affection, but as forced exercise.

In a large institution of the kind it is difficult in Asiatic countries to devise tasks of a utilitarian character. To instal power in view of the overplus of labor would be superfluous. So that corn is ground and water pumped by the application of human muscle.

The favorite device for water supply is a three-throw well pump actuated by a capstan. Such a device may utilize up to 50 men for a couple of hours per day.

Curing a Defect

In connection with a large capstan of the kind for 48 men, the designer who had experience with much smaller capstans provided 10 feet bars, 16 in number. He provided the bars of a size in his judgment sufficient, and these could not be increased in size without a larger head. With only two men at the end of a bar it both sagged and bent considerably, in spite of its initial upward rake. The amount of safe deflection possible at the end of a well-supported ash pole, 10 feet long, must be seen to be believed. The capstan erected for test proved unsatisfactory for this reason.

To remedy the defect in the cheapest manner, the bars were trussed as follows.—A piece of flanged C.I. pipe was bolted flange down on capstan head. This had $\frac{7}{8}$-in. holes in the same radial position as the bars at the upper end of the short pipe; $\frac{3}{4}$-inch rods, double nutted at the pipe end, were led to clips at mid-section of the capstan bars. These clips were connected bar to bar radially by $\frac{3}{4}$-inch double-eye links.

The completed job was quite sightly, the entire capstan now moving like a cart wheel with projecting spokes.

It may be added that the bars (as is usual in such case) were bolted in capstan head. Accidents resulting in serious injury having been known owing to accidental unshipping of a bar while under way. The permanence afforded by the trussing was in this wise not detrimental to the finished job.

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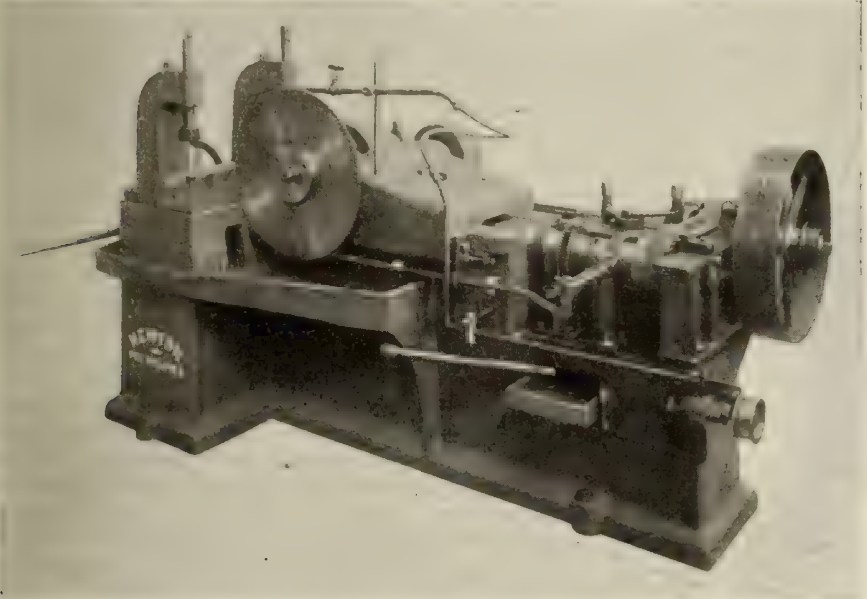
Ottawa, Ont.—The Haynes Motor Co. may establish a plant here at a cost of approximately $40,000.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

SMALL COLD METAL SAWING MACHINE

THE cold metal sawing machine illustrated herewith has been designed to meet the demand for a machine to handle solid bars in individual sizes up to $5\frac{1}{2}$ in. dia., and smaller stock that can be grouped into an equivalent section. Ordinarily it is equipped with a 20 in. dia. high speed steel blade of either the solid or inserted teeth type to enable the maximum capacity of the machine to be maintained. Every possible precaution has been taken to prevent the occurrence of chatter.



GEAR FEED 20 IN. COLD METAL SAWING MACHINE.

The machine is of the spindle driven type with spindle revolving in capped bearings and driven by spur gears through worm and worm wheel, the worm wheel being of solid bronze, and the worm fitted with roller thrust bearings. A very essential feature is the front bearing for the feed screw, which insures its operating tension.

The saddle has underlocking gibs cast solid with vertical and horizontal adjustments made by taper shoes and fast power return for the saddle is provided in addition to a gear box giving changes without removal of gears. The saddle is also fitted with trips to stop the feed at any pre-determined point, and safety stops are provided for each of the extreme positions of travel.

Generous oil pans, cast solid with the base, are also provided, and the lubricant is located in the rear inside the base. Pump, piping and attachments are supplied to deliver the lubricant to the point of cutting.

A departure from accepted practice in the design is the inclusion of a gear feed, experience having demonstrated that a friction feed that is powerful enough to advance the blade will cause as many breaks, if any, as gear feed. The machine illustrated has been successfully demonstrated to cut off 6 in. .50 carbon stock in three minutes, or at a feed of 2 in. per minute, the equipment when fitted with high speed blades being guaranteed to cut in its average capacity a feed of 1 in. per minute.

This machine is a recent product of the Newton Machine Tool Works, Inc., Philadelphia, Pa.

* * *

1 IN. x 7 IN. TURRET HAND SCREW MACHINE

THE 1 in. by 7 in. turret hand screw machine shown in the accompanying illustration, is now being placed on the market by the Stenotype Co., Indianapolis, after being successfully tried out in the hands of several purchasers.

As shown in the illustration, this machine is fitted with a plain three-step cone of large diameter and face, giving great power for all spindle speeds. It will be noticed also that a guard is provided for the cone in the form of a well entirely covering the lower half of the cone. This also serves to tie the front and rear bearings rigidly together and thus assist in maintaining the rigidity of the spindle.

The headstock is cast solid with the bed, eliminating the possibility of the spindle working out of alignment. The cut-off is large and well proportioned, with broad, well gibbed bearings, insuring firmness of the tools under heavy cuts. The hand wheel for adjusting the position of the cut-off is provided with a large diameter dial with adjustable clips, so that the different shoulder lengths can be accurately duplicated. The turret slide and saddle unit is provided with a supplementary base and taper gibs for vertical and horizontal adjustment.

The slide is operated by turnstile and rack and pinion, and the turret is automatically indexed by the backward movement of the slide. It is held firmly in its seat by a large steel stud upon which it revolves. This stud is tapered and provides adjustment for taking up wear and is so bored that long stock can pass through the turret, thus permitting the use of short, stiff tools. The lock bolt is of large diameter and is a special grade alloy steel, hardened, ground and lapped. It operates vertically, locking into hardened and ground steel turret bushings, and is provided with a taper end working into a taper hole in the bushings so that the turret is locked firmly in position. This locking position is at the front end of the slide, almost directly under the tool. The holes in the solid hexagon turret are $1\frac{1}{4}$ in. diameter with binder bushings for holding straight shank tools, and each face of the turret has four $\frac{3}{8}$ in. tapped holes for bolting tools direct to the turret.

The tool holes in the turret are bored in the machine itself after assembling, to insure that the holes line up with the spindle. Six stops are provided, one for each face of the turret, and when set they operate automatically for each position of the turret. They are threaded for their full length and each one is provided with a binder for clamping it into position when set.

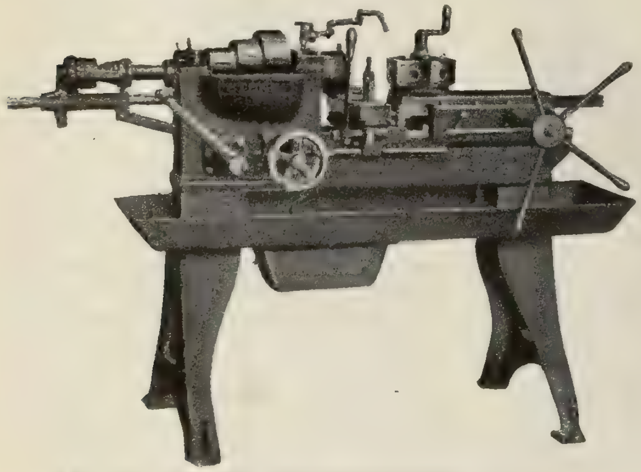
The spindle is a high carbon steel forging, carefully ground to size. Bearings are die cast from a special composition of high grade babbitt. All bearings are carefully scraped by hand for fit and to insure correct alignment of spindle. They are of very liberal dimensions to enable them to stand up under the most severe duty. Sight feed oilers are provided for lubricating spindle bearings. The spindle nose is of large diameter, threaded and provided with pilot end and is so constructed that the overhang for either bar chuck or casting chuck is reduced to a minimum. Adjusting collars with hardened and ground thrust washers are provided for taking up end thrust.

The automatic chuck and bar feed, operated by the long lever at the left of the machine, grips the bar instantly and releases it completely. One movement by the operator serves to open the chuck and feed the bar without stopping the machine. A stepped wedge, operating the fingers automatically, compensates for slightly varying diameter of stock. Collets can be changed quickly by unscrewing collet hood. Collets and collet hood are hardened and then ground, to insure great accuracy. Chucks or fixtures for extra size pieces can readily be attached to spindle nose in place of collet hood.

The oil pan is of pressed steel, avoiding entirely the possibility of breakage. The oil reservoir is of cast iron bolted to the pan and is provided with a strainer to prevent chips from entering. The screw plug in the bottom of the pan provides for draining oil and for the removal of sediment. The oil pump is driven by a separate belt directly from a pulley on countershaft and operates equally well in either direction. It delivers an ample supply of oil, distributed by means of an adjustable pipe. A partition in the reservoir prevents the possibility of sediment entering the pump.

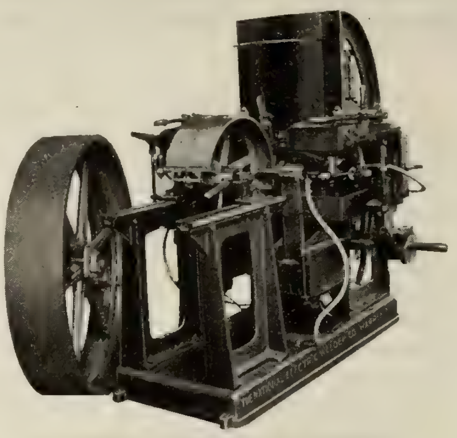
All parts are made from jigs and fixtures and are carefully inspected and gauged before assembling, thus insuring interchangeability, and giving a machine which can be relied upon to do close, accurate work.

The principal dimensions of this machine are: Bar stock capacity through automatic chuck, 1 in.; swing over bed, 13½ in.; swing over cut-off, 6 in.; cut-off travel, cross, 5½in.; longitudinal, 9 in.; holes in turret, 1¼ in. dia.; hole in spindle 1 9-32 in.; width of belt, 2¾ in.; net weight, 1,375 lbs.


1 IN. BY 7 IN. TURRET HAND SCREW MACHINE.

NOVEL ELECTRIC WELDER

THE electrical welding of pulley fillers to the rims is now being done in a specially built machine which automatically performs the necessary operations on circular work ranging from 12 in. to 60 in. dia. The accompanying illustration shows the machine along with a sample pulley welded by it.


ELECTRIC WELDER FOR STEEL PULLEYS.

Two complete and separate welding equipments are provided, one on each side of the centre of the pulley, and each makes 60 welds per minute with a motor drive and automatic switch. The welding mechanisms move away from each other to give a clearance of 12 in. between the welding points, which are water-cooled, and will operate within a space of 2½ in. radially from the centre of the arbor.

Feeding and stopping are automatic, the feed device being adjustable from ½-in. between welds up to 3 in. or more as desired. The stops automatically trip off and stop the machine when it reaches the separation strip on the pulley.

In addition to its large range of automatic operation, the machine is notable for the small number of moving parts and simplicity of construction. The floor space required is 50 in. by 66 in., and weight is approximately 3,500 lbs. The machine is built by the National Electric Co., Warren, O.

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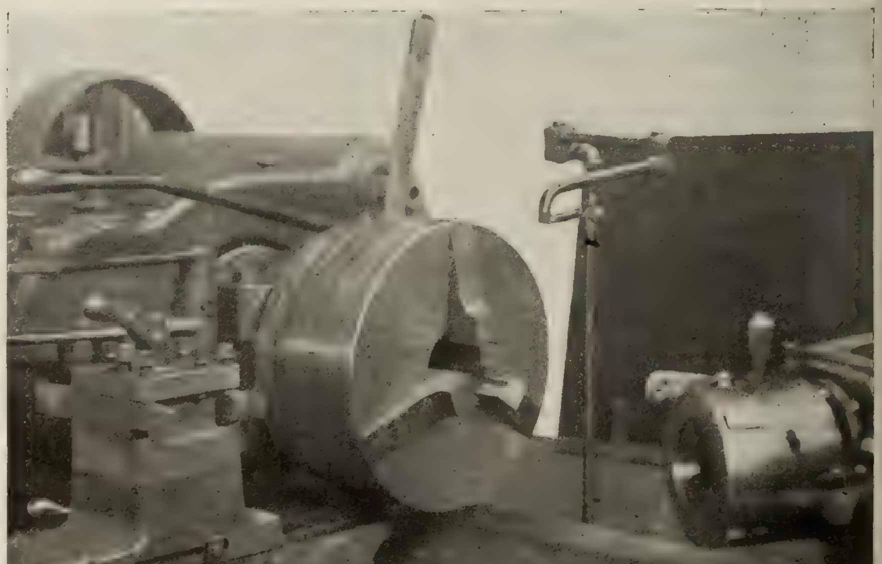
WRENCHLESS CHUCK

THE accompanying cut illustrates a new development of the Barker Wrenchless Chuck, which is made by the Thomas Elevator Co., Chicago. The principal feature of this chuck is the rapidity with which the work can be handled, thus effecting a considerable saving of time in chucking operations.

The operating mechanism is in the form of a planetary-gear arrangement all enclosed within a casing, which is carried and held central on the hub of the chuck, and is kept from rotating by means of a U bar that straddles the headstock or any convenient projection fixed solid with the machine. The slot in the casing exposes the outside diameter of the movable internal gear to which the hand lever is fastened. The hand lever movement is imparted from the internal gear through suitable pinions to the cam which in turn actuates the jaws The same action takes place while the chuck is in motion as well as when at rest.


WRENCHLESS CHUCK FITTED TO TURRET LATHE.

Since the position of the hand lever is determined entirely by the position of the bar, it is possible to change the angle of the lever merely by fastening the bar around in another position. In most cases, and especially for those turret lathes where the carriage passes the headstock and the front of the machine is taken up with control levers, the chuck is furnished with the bar fastened so as to throw in the lever about a vertical position. This, however, is entirely optional, and can be furnished in any other position that may be specified.

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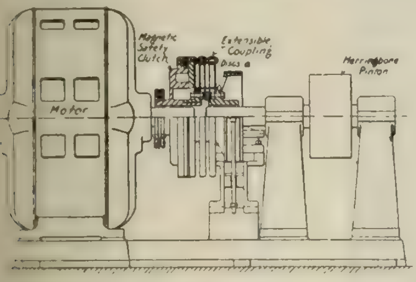
EXTENSIBLE COUPLING FOR MILL DRIVES.

THE Cutler-Hammer Clutch Co., Milwaukee, Wis., has developed a new type of coupling for use with mill drives, particularly where herringbone gears are used. The extensibility of the coupling is independent of the amount of torque transmitted and is the same at no load as when full power is being transmitted. A certain amount of flexibility is also present in the clutch and this too is not affected by the amount of torque transmitted. The coupling was designed for use with a set of rubber calendar rolls but, it is pointed out, is capable of a number of other applications where an extensible coupling is desired. In designing this coupling three factors had to be taken into consideration. The coupling must transmit the necessary power between the motor and the herringbone driving pinion and at the same time leave the latter free to align itself with the gear with which it meshes and also not transmit any end thrust caused by the lateral motion of the driving shaft to the pinion.



EXTENSIBLE COUPLING FOR MILL DRIVES.

The construction of the coupling is simple, consisting of a number of thin disks bolted together to form the disks of the coupling. The use of thin disks was decided upon as the deflection of a thin circular plate under a given load varies inversely as the cube of the thickness. While the torque transmitted by the single disk ⅜ in. thick is the same as that transmitted by three ⅛-in. disks, the flexibility of the latter combination is nine times that of the former. In this coupling, which is 32 in. in diameter, it is stated that the correctness of this theory has been satisfactorily demonstrated, the force necessary to cause a deflection of almost 1 in. being much less than the end sliding friction in the bearings.

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ELECTRODE PLANT FOR SHEFFIELD

THE recent installation of a number of electric furnaces in Sheffield has led to an increased demand for electrodes, which prior to the war were bought principally in the United States, although a small number were obtained from the continent. The entire supply at present comes from the United States, but according to a consular report, steps have been taken by home firms to manufacture their own supply.

A plant is being erected by the Electrode Co. of Sheffield, which has been organized with a capital of over $200,000 for the manufacture of carbon electrodes. The promoters of this company and the majority holders of the stock are four large Sheffield firms, which have installed or have in course of installation 23 electric furnaces, with a total capacity of 90½ tons. The new company will have an output of from 3,000 to 5,000 tons of carbon electrodes per annum, which will furnish the promoters with an adequate supply of electrodes for their own furnaces, although any surplus manufactured will undoubtedly be put on the market.

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CANADIAN PATENTS

THE following is a list of Canadian patents recently issued through the agency of Messrs. Ridout & Maybee, 59 Yonge Street, Toronto, from whom further particulars may be obtained:—Gutta Percha & Rubber Co., tires; John R. Churchill, chassis for motor vehicles; Esther Murray, wheels for motorcycles and other vehicles; John F. Goodwin, gas water heater; R. B. Thomas and W. R. Davies, the manufacture of tin and terne plates; Herbert E. T. Haultain, apparatus for separating ores by flotation; Robert MacGilchrist, septic tank syphon; John G. Robinson, steam superheater for locomotive boilers; Gutta Percha & Rubber, flat water pail; Thomas Rigby & Nils Testrup, utilization of peat; Franklin Camfield, waggon wrench; Harry G. Akers, process of producing barium and strontium oxides; Michal Migasnick, plow; John G. Robinson, apparatus for use on locomotive or like engines fitted with steam superheaters; The Williams, Greene & Rome Co., dress shirt; James H. Lumbers, intrenching tool; Georgetown Foundry and Machinery Co., knitting machine; Albert H. Power, register for hot air heating apparatus.

TRADE INQUIRIES FROM GREAT BRITAIN

THE following inquiries relating to Canadian trade have been received by the Department of Trade and Commerce, Ottawa:

935. Wire Nails.—A Leeds firm, using annually about 500 tons of wire nails, wishes to hear from shippers of this commodity.

939. Electrical Plant and Accessories.—An Edinburgh firm is desirous of receiving quotations from Canadian manufacturers.

950. Mining and Railway Supplies.—A Johannesburg firm of thirty years' standing are prepared to take up Canadian agency in rails, all kinds, and supplies, railroad cars and coaches, locomotives, creosoted sleepers, mining machinery of every kind and supplies. Immediate correspondence is requested, as this firm is in a position to secure immediately very large orders.

990. Wolfram Ore, Molybdenite and Ferro Chrome.—A Sheffield firm of steel manufacturers makes inquiry as to Canadian producers of the above.

991. Wire Nails.—A Leeds firm is in the market for twenty tons of wire nails.

992. Engineers' Tools, Chucks, etc.—A Leeds firm of ironmongers desires to hear from Canadian manufacturers of engineers' and joiners' tools, and especially 4-inch, 6-inch and 8-inch self-centring chucks.

994. Tungsten, Molybdenum, Vanadium and Cobalt.—A Sheffield firm of steel manufacturers makes inquiry for Canadian producers of the above in the refined state.

995. Steel Billets and Blooms.—A Sheffield firm wishes to receive quotations from Canadian firms in a position to export the above.

1014. Mining Equipment.—A firm of importers of mining equipment in Cape Town, South Africa, having close connections with many of the South African mining companies, ask tenders from Canadian manufacturers for the following supplies: (a) For a gold mining company, machine-cut gears, cast steel, spur and pinion; quote weights and prices. (b) For a coal company, 300 steel trucks and 325 sets of wheels; one hundred tons 16-pound section rails with 3-inch centre holes for fish plates for 150 tons of rails and sufficient bolts for 200 tons; two tons of dog spikes for fastening rails to wooden sleepers. (c) A mine roller, 20 inches by 5 inches; the number of rollers and bearings required, 300. Blue prints have been forwarded to the Commercial Intelligence Branch, Department of Trade and Commerce, Ottawa.

1034. Siemen's Steel Billets.—A Sheffield firm, who are regular buyers of Siemen's steel billets, wishes to hear from Canadian exporters.

The MacLean Publishing Company
LIMITED
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JOHN BAYNE MACLEAN - - - - - - - - President
H. T. HUNTER - - - - - - - - - Vice President
H. V. TYRRELL - - - - - - - General Manager

PUBLISHERS OF

CANADIAN MACHINERY
MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

PETER BAIN, M.E., Editor. B. G. NEWTON, Manager.
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COAL SCARCITY IN CANADA

THE scarcity of certain varieties of coal continues to be a matter of first importance, not only in regard to the supplies available for shipping, but relative to the requirements of manufacturing establishments as well. That there will be no coal in the country by March 15, 1917, is the forecast of one official. The Dominion Coal Co. reported some time ago that it was bunkering large supplies of coal for use on Government transports in anticipation of an acute famine on the St. Lawrence route, and recent developments in widely separated quarters continue to emphasize the seriousness of the situation in its every aspect.

In Eastern Canada, manufacturing and power plant institutions are very largely dependent for the supply of bituminous coal for steam raising and other purposes on the output of the mines in Cape Breton, and while at first sight the lack of available "bottoms" which is generally known to exist contributes in part to the decreased and decreasing receipts by consumers, other influences have been and are at work, the effects of which are still more far-reaching. In a word, production has been declining each month during the present year; shortage of men is the sole reason for the falling production, and enlistment for overseas service may be accepted as the sole reason for the labor shortage. During the year 1915, from January 1, until September 30, the output of the Dominion Coal Co. collieries at Cape Breton showed a steady increase from 287,000 tons in the former month to 452,000 tons in the latter month, or a grand total for the nine months of that year of 3,666,000 tons. In January of the present year the output amounted to 407,000, this total being maintained very approximately up until the end of March. In April the output fell to 378,000 tons rallying slightly in May to 383,000 tons since when there has been a steady decrease, the figures for September being around 345,000 tons. Should the rate of decrease continue, and there is little hope of its being arrested, the output for this year will show a falling off of probably three-quarters of a million tons.

In conversation with a gentleman in close touch with coal production elsewhere as well as here in Canada, we learn that instead of a decreased output being allowed to materialize abroad, special efforts have been put forth to intensify production, the various Governments concerned realizing as Canada's has not, that coal and especially bituminous coal is the basic munition in the war in which we are engaged. As if, however, ill-directed enlistment had not been sufficiently effective to restrict production, we understand that some 1,800 men left the Maritime Provinces in August to harvest in the West, the half of whom were taken from the mines and munition plants of Nova Scotia. A majority, if not all of those men were carried all or part of the way West on our Government Railroad, and of course at a low and attractive rate. Taken in conjunction with the lack of regulation of enlistments, it is plainly evident that the importance of coal for our manufacturing and power plant requirements is still unrealized by responsible Government.

RAILROAD PUBLICITY

A WEEK ago at the monthly meeting of the Canadian Railway Club, Montreal, the subject of Railroad Publicity was discussed in a paper by Walter Thompson, of the Grand Trunk Railway System Press Bureau. In common with most of us, Mr. Thompson believes that railroad "baiting" is on the wane—everywhere we might add; in any case so far as Canadian railways are concerned it has not to our knowledge, or from observation, at any time assumed ugly proportions and been over-menacing in attitude. Railroad "baiting," however, and wherever practised, has of course nothing to commend it, and in the ultimate analysis is usually barren of result; nevertheless, whether extreme or moderate of display, it may be averred that railroad executives in the past stuck too tenaciously to their "perch" of silence and indifference.

The establishment of publicity bureaux and the gradual development of the work and scope of these has broken down the wall of public prejudice against railroad administration and operation, while that offspring of the publicity department—the Employees Magazine, has contributed a full measure to the success achieved. No auxiliary of railroading, or for that matter, of any other business enterprise whose activities call for great plants and great numbers of employees, makes bid for the like quality and quantity results as regards co-operative service. Everything that transpires is departmentally allocated a place in the editorial columns each month, and as a result the individual interest becomes merged in that of the institution as a whole. It may not be assuming too much to observe that, in addition to the inside benefits which have been procured by keeping executives and employees in close touch by means of the Magazine, the latter in the hands of the employees has borne a large part in breaking down and removing almost entirely preexistent public prejudice, particularly in the sphere of railroading.

In the course of the paper, reference was made to the reticence of executives regarding the work of the "road," and the opinion was expressed that a desirable publicity would be of considerable inherent value. To quote the author, "you may create a publicity department with all the literary and journalistic genius of the age, but if it has not the full co-operation of all officers of the road; if they are not keenly interested in its activities, and willing to render it ready support, it will fail to do good work. Keep the publicity end of the road in view every day for ways in which it may assist your department and the service as a whole." That there is room for a keener interest in and still more ready support to even the best organized and directed railroad publicity departments by executives individually and collectively, goes without saying, for here as in every other sphere of industrial and commercial enterprise, the need is a daily development and growth.

INDUSTRIAL NOTABILITIES

CHARLES GORDON McGHIE, manager and secretary, Welland Vale Co., manufacturers of hand agricultural implements, special forgings and edge tools, St. Catharines, Ont.; director, Canadian Crocker-Wheeler Co.; vice-president, Metal Drawing Co.; vice-president, Wallingford Mfg. Co., Wallingford, Vt.; president, Bedford Mfg. Co., Bedford, Que., also interested in many other Companies, was born at St. Catharines, Feb. 16, 1868, son of the late William and Christina (Gillespie) McGhie, of Scottish ancestry. He was educated in Public Schools and Collegiate, St. Catharines, and began his business career as office boy with Whitman & Barnes, St. Catharines. During the period from 1881-88 he was successively clerk and bookkeeper; traveling salesman, 1888-1890; traveling salesman, Welland Vale, 1890-1895; traveling salesman, Whitman & Barnes, 1895-1900; special representative to Australia for Welland Vale Mfg. Co., 1900-1901; Eastern representative for the Welland Vale Co., and president of the Bedford Company, Montreal, 1901-1904; bought out the J. H. Wethey Co., St. Catharines, 1904-1905; has been secretary and office manager, Welland Vale Co. since 1905.

CHARLES GORDON McGHIE.

Mr. McGhie has been a member of Water Commission, St. Catharines, for the past eight years, and was largely instrumental in building a larger water-main service, thereby greatly increasing water supply. He devoted much of his time and effort to building up the export trade of the Welland Vale Co., which is considerably larger now than the home trade; one of the organizers of the Metal Drawing Co., munition manufacturers in St. Catharines. As an industrial worker for St. Catharines he has succeeded in locating different industries there. He is a member of finance committee of the Patriotic Fund, and takes an active interest in patriotic work.

Mr. McGhie married Harriet Junkin, daughter of Alexander Junkin, Nov. 12, 1890; the family consisting of two sons and one daughter. His clubs are: St. Catharines; Niagara (New York); Albany (Toronto); his society, A.F.&A.M.; his recreations, golf, lawn bowling, motoring. In politics he is conservative, and in religion, Anglican. His residence is 151 Ontario St., St. Catharines, Ont.

—Photo, Courtesy International Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh		$20 45
Lake Superior, charcoal, Chicago		20 75
Michigan Charcoal, iron		28 00
Ferro nickel pig iron (Soo)		25 00
	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton	$26 00	$25 50
Victoria No. 1	27 00	26 00
Victoria, No. 2	26 00	25 50

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.35
Steel bars, base, Toronto	3.50
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.50
Small shapes	3.75
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.25
Bars, 2 in. and up	3.75
Structural shapes	3.25
Plates	3.75

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$31 00
Electrolytic copper	31 00	31 00
Castings, copper	30 00	30 00
Tin	44 50	46 00
Spelter	13 00	14 00
Lead	9 00	9 00
Antimony	15 00	18 00
Aluminum	70 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4 75	$4 50
Heads	5 00	4 75
Tank plates, 3-16 in.	5 25	4 75

WROUGHT IRON PIPE

Prices in effect Oct. 2, 1916.

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3.50	$ 5 00
¼ in. and ⅜ in.	3 18	5 31
½ in.	4 08	5 65
¾ in.	4 95	7 07
1 in.	7 31	10 46
1¼ in.	9 89	14 15
1½ in.	11 83	16 91
2 in.	15 91	22 76
2½ in.	25 16	35 98
3 in.	32 90	47 05
3½ in.	39 56	56 50
4 in.	46 87	67 04

Lapweld

2 in.	$17 76	$24 24
2½ in	26 33	36 56
3 in.	34 43	47 81
3½ in.	41 40	57 50
4 in.	49 05	68 13
4½ in.	59 69	83 19
5 in.	69 56	96 94
6 in.	90 24	125 80
7 in.	121 40	165 40
8 in. x 25 lbs. per ft.	127 50	173 80
8 in. x 25 lbs. per ft.	146 90	200 20
9 in.	176 00	239 40
10 in. x 32 lbs. per ft.	163 20	222 40
10 in. x 40 lbs. per ft.	210 10	286 30

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$16 75	$19 50
Copper, crucible	19 75	22 50
Copper, heavy	19 75	22 00
Copper wire	19 75	22 00
No. 1 machine compos'n	15 25	17 00
No. 1 compos'n turnings	13 25	14 00
New brass clippings	13 75	15 00
No. 1 brass turnings	12 25	12 00
Heavy melting steel	9 50	10 00
Boiler plate	12 00	10 50
Axles, steel	15 75	15 00
Axles, wrought iron	19 00	19 00
Tires, steel	12 00	11 00
Rails	13 75	13 00
Shafting	16 75	16 00
Malleable scrap	10 25	11 00
Pipe, wrought iron	10 25	9 00
Stove plate	10 25	10 50
Heavy lead	6 00	7 00
Tea lead	5 00	5 25
Scrap zinc	7 50	7 75
Aluminum	35 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cen
Coach and lag screws	45
Stove bolts	60
Plate washers	25
Machine bolts, ⅜ and less	30
Machine bolts, 7-16 and over	25
Blank bolts	30
Bolt ends	25
Machine screws, flat head, iron	66 &
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in. $3.75 per lb.	o
Nuts, hex., over 1 in. $2.00 per lb.	o
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	35
Boiler rivets, base ¾-in. and larger	$5.2
Structural rivets, as above	5.1
Wood screws, flat, bright	77½
Wood screws, O. & R., bright	72½
Wood screws, flat, brass	45
Wood screws, O. & R., brass	42½
Wood screws, flat, bronze	37½
Wood screws, O. & R., bronze	35

MILLED PRODUCTS

	Per Cen
Set screws	45
Sq. & Hex. Head Cap Screws	40
Sq. Head Set Screws	55
Rd. & Fil. Head Cap Screws	25
Flat & But. Head Cap Screws	net
Fin. & semi-fin., up to 1 in.	40
Fin. & semi-fin., over 1 in.	35
Studs	25
Taper pins	50
Coupling bolts	net
Planer head bolts, without fillet	net
Planer head bolts, with fillet	add 10
Planer head bolt nuts, up to 1 in.	40
Planer head bolt nuts, over 1 in.	35
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30 & 10
Thumb screws	30
Thumb nuts	75
Patch bolts	add 30 & 1
Cold pressed nuts to 1½ in.	add $3.5
Cold pressed nuts over 1½ in.	add $6.0

BILLETS

	Per gross to
Bessemer billets, Pittsburgh	$45 0
Open-hearth billets, Pittsburgh	45 0
O. H. sheet bars, Pittsburgh	45 0
Forging billets, Pittsburgh	69 0
Wire rods, Pittsburgh	55 0

NAILS AND SPIKES

Standard steel wire nails, base	$3.85	$3.80
Cut nails	3 70	3 70
Miscellaneous wire nails	65%	
Pressed spikes, ⅝ diam., 100 lbs	$4 10	

MISCELLANEOUS

Solder, guaranteed	0.29½
Solder, strictly	0.27½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	030½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	1.00
Linseed oil, boiled, single bbls.	1.03
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	8 00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.12
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes	35
S.S. drills, 1/16 in. and larger	50
Standard drills to 1½ in.	50
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	20
3-fluted drills over 1½ in.	10
Bit stock	50
Ratchet drills	20
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	25
Sockets	30
Sleeves	40
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	5 25	4 90
Canada plates, dull, 52 sheets	4 75	4 75
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 35	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 25	6 20
Premier, 10¾ oz.	6 50	6 45

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65.5
Kearney & Foot, Arcade	65.5
J. Barton Smith, Eagle	65.5
McClelland, Globe	65.5
Black Diamond	65.5
Delta Files	65.5
Nicholson	55.
Globe	65.5
Vulcan	65.5
Disston	....

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$20 00	.....
1¼ in.	23 00	.....
1½ in.	26 00	25 50
1¾ in.	26 00	21 00
2 in.	27 00	20 50
2¼ in.	29 50	.....
2½ in.	32 50	26 00
3 in.	44 00	30 00
3¼ in.	.....	35 50
3½ in.	50 00	35 00
4 in.	57 00	43 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.	
Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel *	.48 to .52
Cobalt	1.75 to 2.00
Copper	.39 to .40
Tin	.50 to .53
Zinc	.18 to .21

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.10
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Que., Oct. 16, 1916.—The industrial situation has apparently reached another stage in its history as indicated by the further price increases on many lines of steel and metal products. To say that the summit will soon be reached, only adds another to the prophecies that have been advanced at various periods in the past, only to be exploded by subsequent developments. That the apex has however been reached in some directions is shown in the slackening off of certain enterprises involving the use of steel for domestic purposes until lower prices prevail. The higher prices may as a consequence place additional facilities at the disposal of shell steel producers.

Pig Iron

The market in pig iron has taken on additional strength, this being indicated by a general advance of from 25 cents to $1 per ton. While no change has been made in local circles, an advance here is expected.

Steel

No cessation appears evident in the upward movement of steel and steel products. The continued advances that mark the trend of the ever increasing volume of business may result in the curtailment in certain lines of domestic activity, until a lower level is again reached. That the present conditions will prevail for some time is not only probable, but it is more than likely that further advances will feature the market in the near future. Railroads and structural engineers are demanding increased tonnage. The volume of business being placed by railroads for steel rails is very large, but, owing to the condition of the mills, delivery on some of the orders run into 1918. In many respects the situation in plates is under greater tension than at any previous period. Added to the call from railroads and shipbuilders, the export demand is of such a volume as to cause uneasiness in these circles, and to some extent a partial famine is anticipated. While no general advance is reported, it is believed that offers have been made involving premiums on current quotations. The sheet situation has experienced another adjustment in prices, and as was expected, is an advance on previous quotations. Black and blue annealed sheets, Pittsburg, have been advanced $5 per ton the former being quoted at $3.50 and the latter at $3.35 per hundred pounds. The price on galvanized sheets is now $4.50 Pittsburg, being an advance of $2 per ton. An additional $1 per ton has been placed on the Pittsburg quotation for iron bars, the current price ranging from $2.70 to $2.75 per hundred pounds. Recent demand has been quite heavy. The consumption of wire and wire products is still very large, and a revision of prices is expected shortly. Steel hoops have been affected by the recent advance, the quotation of $3.25 Pittsburg, representing an advance of $5 per ton. Wrought iron pipe, and also boiler tubes are still in good demand. Furnace coke for immediate delivery is now $4.50 per ton, an advance of 50 cents per ton.

Metals

The general situation in metals is comparatively unchanged. Copper is very firm with prospect of further heavy buying. Tin is becoming easier after the scare of last week. Spelter continues dull, and lead is quiet but firm. Antimony and aluminum are a little stronger.

Copper.—In comparison with recent developments, the copper market is quiet, although considerable interest is still being shown and some good inquiries are reported. The consumption of this metal is very heavy at the present time, both for domestic and war purposes. Copper is being used in such enormous quantities just now, that the fear is prevalent that the production will be insufficient to cover the future requirements of the trade. If consumers should be confronted with a situation of this nature, it is more than possible that higher prices would prevail. However, both smelters and refiners are steadily increasing their facilities, in order to cope with the abnormal demand, and unless exceptional pressure is placed upon the producers, the situation will not likely develop any serious features. The recently placed order for the Allied Governments for about 250,000 tons of copper, is reported to be insufficient for intended requirements, and it is possible that further tonnage will be booked shortly. The London market is strong having advanced £3 on spot and £2 on futures. The local situation continues steady with prices very firm, lake and electrolytic 31c and castings 30c per pound.

Tin.—Developments of submarine activities during the earlier part of last week was the cause of a sharp advance in tin, which followed in the wake of a highly excited market. However, like many a previous scare, the uneasiness was only temporary, the situation having become easier and quotations gradually resuming their former level. While heavy sales are not reported, it is believed that considerable business is being done in a quiet way, more especially for early futures. Local dealers were not much affected by the recent activities, quotations being firm and slightly stronger, this week's quotation showing an advance of ½c, the price being 44½ cents per pound.

Spelter.—It is apparently impossible to break the dullness of the spelter situation. The stronger tendency that seemed to be developing, has been replaced by a contrary tone that reflects itself in lower prices. The actual condition of the market is difficult to determine, as the larger interests are not actively in the market, and present quotations are based on visible activities. The dullness is partly accounted for by the large volume of high grade scrap on the market, which the brass mills are absorbing. The London situation has shown a little improvement and prices have advanced from £2 on spot to £2½ on futures, but the New York market has declined ⅛ cent, the current quotation being the nominal price of 10c per pound. Dealers here report a quiet market, with an undertone of weakness, but prices are steady at 13c per pound.

Lead.—Nothing has developed to change the general tone of the market, firm price quotations being maintained. Production is still equal to consumption, but the market activity is not pronounced, and neither producers or consumers are showing much interest in the situation. Under these circumstances, prices are well maintained; the Trust quotation being 7c, and the independents asking from 7 to 7⅛c. The London market is firm and higher, while the local market is steady with quotations unchanged at 9c per pound.

Antimony.—Owing to the activity in bonded metal, the market in antimony has taken on a little strength, resulting in advances on listed quotations. Local dealers are quoting last week's price of 15c per pound.

Aluminum.—New York reports an advance of 4c per pound on No. 1 Virgin, following increased market activity. The situation here is firm with prices unchanged at 70c per pound.

Machine Tools and Supplies

While the demand for machine tools continues steady, the requirements are not such as they would be were more labor available. Manufacturers are experiencing some difficulty in keeping the machines now installed in operation, and until more help is available the calls for additional equipment will probably decrease. However, the volume of business is still satisfactory and inquiries for domestic purposes promises well for the future. Supplies of all kinds are in good demand; deliveries in some cases being extended to the discomfiture of the consumer.

Scrap

The situation as regards old materials is following the lead of steel, quotations for scrap materials showing advances on the American market which will likely be reflected here shortly. At present dealers are asking last week's prices.

Toronto, Ont., Oct. 17.—Although shell plants are still many months behind on deliveries, considerable improvement is looked for in the future, as the Imperial Munitions Board announced recently that the supply of steel and forgings was more satisfactory and no interruptions in output are likely to take place on this account. A number of new plants are now ready to turn out the larger shells. The new order for munitions to the value of $60,000,000 will stimulate the industry and incidentally brings the total of orders placed this year up to $185,000,000.

The principal feature in the industrial world as it affects the machinery and steel trades is the steady advance in prices of raw materials. At the present time there appears to be no limit to the upward movement in prices. The scarcity of steel is becoming a serious matter, and the situation is becoming more acute as time passes. Consumers are confronted with a difficult problem, having to wait at least twelve months for delivery, which is a serious handicap to business.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL
Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE
Valparaiso, British Consul General.

COLOMBIA
Bagota, British Consul General.

ECUADOR
Quito, British Consul General.

EGYPT
Alexandria, British Consul General.

FRANCE
Havre, British Consul General.
Marseilles, British Consul General.

INDIA
Calcutta, Director General of Commercial Intelligence.

ITALY
Genoa, British Consul General.
Milan, British Consul.

MEXICO
Mexico, British Consul General.

NETHERLANDS
Amsterdam, British Consul.

PANAMA
Colon, British Consul.
Panama, British Vice-Consul.

PERU
Lima, British Vice-Consul.

PORTUGAL
Lisbon, British Consul.

RUSSIA
Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN
Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN
Stockholm, British Consul.

SWITZERLAND
Geneva, British Consul.

URUGUAY
Monte Video, British Vice-Consul.

VENEZUELA
Caracas, British Vice-Consul.

particularly to those using steel in the manufacture of their product.

Steel

The situation in the steel market is getting tighter and the upward movement in prices continues without any sign of a reaction. The steel market was never stronger and deliveries never so backward, the first quarter of 1918 being named in some cases as the best delivery that can be made. In fact, buying of bars, plates and shapes, and steel products generally, for delivery in 1918, is the outstanding feature of the steel situation. During the week prices on steel bars were withdrawn by some mills, being followed later by an advance of 10c on both iron and steel bars. Iron bars are now quoted at $3.35, and steel bars at $3.50 per 100 lbs. Cut nails have advanced 30c, and are now quoted at $3.75 per 100 lbs. base, while pressed steel spikes are higher at $4.10 per 100 lbs. base. The expected advance on boiler tubes has materialized; lapwelded tubes, however, only are affected. The advance is equal to $3 per 100 feet, and is due to the big demand for tubes and the sold-up condition of the mills. Several of the largest are not taking orders for delivery before the second and third quarters of 1917. The situation in plates is getting tighter, and a famine exists in the primary market. Not only is the export demand heavy, but there is also an enormous demand from shipbuilders for plates. An advance in prices of plates is looked for in the near future.

The high-speed tool steel situation shows little or no improvement, as the increase in output is offset by the increased demand. A few months ago the market was easier, but recently has become considerably firmer. The importations from England are insignificant owing to the big demand in Great Britain from munition plants, and also from France and Russia. The demand is so pressing that high-speed steel scrap is carefully collected for remelting to minimize loss as much as possible. While the production of tungsten has considerably increased, available supplies are quickly absorbed by the steel makers. A fair amount of high-speed tool steel is coming in from the States, but not in sufficient quantities to meet the increasing demand.

The sheet market is very firm, following the higher prices recently announced by the American Sheet & Tin Plate Co. at Pittsburgh. The new prices are $2 per ton higher on galvanized sheets and $5 a ton higher on blue annealed and black. The new prices are as follows:—Blue annealed, $3.25; black, $3.40; and galvanized, $4.50. These prices are for Bessemer, open-hearth being $2 a ton higher. Local prices are consequently very firm, and will likely advance in sympathy with the United States market.

The United States Steel Corporation statement for September showed a decrease of 137,733 net tons in unfilled orders on its books, the total orders amounting to 9,522,584 tons. This does not mean that the demand for steel has slackened, as practically all the mills in the United States have been declining large volumes of new business during recent months. It has been stated that the U. S. Steel Corporation has enough business on its books to guarantee steady operation for the next eight months even if it fails to book another ton. The demand for steel in the United States is more pronounced than a month ago, and the market is very strong, with prices advancing. The shortage in supply of sheet bars and billets is getting more acute and prices are higher. Export business is still heavy, but the domestic demand has assumed considerable proportions, particularly as regards rails and plates, the demand for the latter being very heavy. There is a great scarcity of billets and sheet bars, and prices are very firm, with an upward tendency. Steel bars are being quoted at 2.75c, plates 4c, and shapes 2.75c Pittsburgh; delivery at mill convenience.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Pig Iron

The continued strength in the pig iron market in the U. S. is reflected locally, and prices on domestic pig irons have advanced $1.50 per ton. The advance is somewhat belated, and is due principally to higher prices in the States. The sharp advances in the pig iron market in the States are taken to indicate that Lake Superior iron ore prices next year will be higher. Coke also is advancing. Hamilton and Victoria brands are now quoted at $25.50 per ton. Gray forge, Pittsburgh, has advanced again, and is now quoted at $20.45 per ton. Lake Superior charcoal iron is also higher at $20.75 per ton, Chicago. Bessemer is now $23.95, and basic, valley furnace, $20 per ton.

Scrap

With the exception of wrought and cast iron scrap, the market is strong and prices firm. The situation as regards steel turnings has improved, as the Dominion Government has given permission for limited quantities to be exported. Hitherto this material has been accumulating, there being practically no market for it in Canada, as sufficient steel scrap, such as heavy melting, has been available, and is preferred by the mills. The only important change in prices to note is an advance of 1c per pound in light copper.

Machine Tools

The statement issued by the Imperial Munitions Board that the difficulty of obtaining forgings has been overcome will improve the situation in the machine tool business. Increased activity may also be expected following the placing of contracts covered by the new order for munitions to the value of $60,000,000. This, it is believed, will be principally for shells of large calibre.

Supplies

Prices of machine shop supplies continue to advance, due to the steady increase in cost of raw materials, particularly iron, steel and brass. Wood pulleys have advanced 10 per cent., the discount which was 50 per cent. being now 40 and 10 per cent. All lathe and drill chuck lists have been cancelled pending the announcement of higher prices. A new and standard list is being prepared covering all lines of chucks which will be subject to standard discounts. A new discount of 35 per cent. has been issued on black rivets and burrs. Stove bolts now carry a discount of 60 per cent.; machine bolts, ⅜ in. and less, 30 per cent.; machine bolts, 7-16 in. and larger, 20 per cent. A new discount of 65 and 5 per cent. has been announced on practically all makes of files except Nicholson, which is unchanged at 55 per cent. Linseed oil is stronger, and quotations are higher at $1 for raw, and $1.03 for boiled oil. Turpentine is weaker, but unchanged at 71c per gallon.

Metals

A quieter tone characterizes the metal markets this week, but prices have been well maintained, with the exception of tin, which has declined, the market having recovered from the excitement caused by the recent submarine activity. The copper market is still very strong, and is in an excellent position, with quotations unchanged. Lead and spelter are quieter, but antimony is firmer on better demand. Business locally continues good, and the outlook generally is favorable.

Copper.—The strength in copper continues undiminished, producers reporting that while the volume of business is gradually tapering off, fair orders are still being taken from domestic consumers. The Italian Government has come into the market for about one million pounds of copper. Owing to the enormous demand for copper, there is some fear of a shortage, and higher prices may yet be recorded. Local quotations are firm and unchanged at 31c per pound.

Tin.—The submarine scare having quickly subsided, the tin market recovered, although it is still irregular on prompt metal. The market, however, is firm and higher on futures. Tin has declined 1c locally, and is quoted at 46c per pound.

Spelter.—The market is dull, with little business passing. There is considerable uncertainty in the market, and the large interests are waiting until the situation clears before coming into the market. Local price is 14c per pound.

Lead.—Business is quiet in the lead market, as neither buyers nor sellers are showing much inclination to do business. The Trust is maintaining the price of lead at 7c, New York. Local price, 9c per pound.

Antimony.—Quotations are nominal and unchanged, although the market is firmer and demand heavier. Local quotation is 18c per pound.

Aluminum.—The market is more active, but quotations are unchanged at 68c per pound.

◆

U. S. COPPER EXPORTS

IN view of the large orders for copper placed in the United States by the Allies during the past few days, the following figures showing the exports for eight months ending August 31st last, in tons of 2,240 pounds, are significant:

	1916.	1915.
United Kingdom	51,738	57,015
France	105,398	62,592
Germany	......	......
Holland	1,912	798
Belgium	......	......
Austria	......	......
Italy	31,143	27,916
Denmark	1,904	1,550
Norway and Sweden	8,101	11,586
Russia	12,283	8,651
China and Japan ...	71	81
Sundries	2,654	1,597
Total	215,199	171,786

TRADE OPPORTUNITIES IN THE WEST INDIES

JAMES E. DOBBS, who as a representative of the Canada India League, spent ten weeks in the British West Indies and in Trinidad in particular, has returned to Toronto firmly convinced that there are vast opportunities for the development of Canadian trade in the West Indies. There is there, Mr. Dobbs declares, a prevailing opinion that almost all sorts of Canadian products can find a ready market if advertised and sold by competent representatives who would see that the goods were prepared and packed to suit tropical conditions. The Canada India League is interested in bringing about a closer bond of sympathy among the colonies of the Empire and eliminating any social, religious or racial prejudices which might exist, and Mr. Dobbs spent considerable time in Trinidad, where men from the East Indies form one-third of the population, in studying the social, commercial and domestic life of the men from the East Indies.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALASIA

J. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

L. D. Wilgress, Omsk, Siberia .

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya Ploschad 9, Petrograd.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, Fruit Trade Commissioner, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND SWEDEN

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England. Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Rainy River, Ont.—Blackmore Bros. will build a machine shop to cost about $15,000.

Merrickville, Ont.—The Percival Plow & Stove Co. plant was destroyed by fire recently.

Toronto, Ont.—The Hamilton Gear & Machine Co. will build an extension to their plant to cost about $5,000.

Renfrew, Ont.—Imbleau & Sons propose building a foundry and machine shop, which will cost about $3,000.

Alton, Ont.—The Alton Foundry Co. is in the market for 3-phase, 60-cycle, 220-volt motors of 5, 10, 15 and 25 h.p.

Glenora, Ont.—J. C. Wilson & Co. have purchased a site for a new machine shop, which will be of brick construction. The building will cost approximately $15,000. Some new machine tools and shop equipment will be required.

Merritt, B.C.—Over 175 tons of fabricated steel are required for the new addition to the leaching building of the Consolidated Co. electrolytic zinc plant at Trail. The new building is 165 x 200 feet, and the work of erection is well under way.

Steveston, B.C.—The rolling mills in the old Dominion Safe Works, at Bridgeport, which were burned to the ground about a month ago, have been opened again in a temporary way, but arrangements are under way for the re-building of the structure.

Amherstburg, Ont. — A Canadian branch of the Solvay Process Co. of Syracuse, N.Y., is about to be established at Amherstburg. The plant, it is said, will be erected near the Limestone quarries, Anderson Township, to supply all Canadian territory in soda ash. Reports from Syracuse state that an issue of $300,000 of stock has been made to provide funds for building and equipping the new plant.

Hamilton, Ont.—The Hamilton Steel Wheel Co. has purchased a site, and will erect a plant, costing $200,000, for making steel wheels, which product was formerly furnished by Germany and the United States. This industry will give employment to about two hundred men, and will turn out about seventy-five tons of steel wheels per day. C. W. Sherman, of the Dominion Steel Foundry Co., will be managing director of the new concern.

Ottawa, Ont.—The aeroplane factory to be established in Canada, probably in Toronto, will cost, it is reported, approximately a million dollars, and will be equipped to turn out six machines per week. These machines, as stated previously, will be purchased by the Imperial Government. The supervision of all matters connected with the establishment of the factory will probably be entrusted to C. S. Wilcox, of Hamilton, chairman of the Steel Company of Canada.

Vancouver, B.C.—The P. G. E. R. is about to commence erection of machine shops, store buildings, scales, etc., at Squamish. The new construction is to be strictly modern, and will cost approximately $100,000. At East Lillooet also, 120 miles above Squamish, and selected as the railway divisional point, immediate construction of round-house and divisional headquarters buildings will be commenced, this work to cost $50,000. A. H. Sperry is general manager of the railway company.

Electrical

Dublin Township, Ont.—The Township Council will shortly submit a by-law to authorize the installation of a hydro system.

Woburn, Ont.—A petition, signed by over 400 ratepayers, has been presented to the Township Council asking for the installation of the hydro-electric system. The petition has been referred to the Hydro-Electric Commission for approval.

General Industrial

Montreal, Que.—The Thomas Davidson Mfg. Co. will build an extension to their factory here.

Montreal, Que.—Fire at the Gagnon Co. boot and shoe factory recently did damage to the extent of $200,000.

Quebec, Ont. — Arrangements have been made whereby the Dominion Fibre Co. of Doon, whose premises there were burned out about two months ago, will locate in Guelph, taking over the old Grundy stove foundry near Grow's Bridge.

Steveston, B.C.—R. D. Rorison interviewed the council recently, asking for free water and exemption from taxation for an industry which will employ a large number of men and occupy at least 400 acres of land. No action was taken by the council, but it is expected that more definite proposals will be made in a few days.

Victoria, B.C.—The re-establishment on a much larger scale of the industry formerly carried on by the Sidney Cannery will shortly be undertaken by the Sidney Cannery Co., a new concern which has been incorporated to take over the business. Messrs. Charles F. Gooderich and H. E. Sims, of Port Angeles, men prominent in the cannery industry on this coast, and who will invest a considerable amount of capital in the new concern, are the prime movers in the scheme. The company is capitalized at $40,000. They contemplate adding extensively to the plant at Sidney, and will install modern machinery.

Trade Gossip

The Berlin Rubber Mfg. Co., have changed the name of the concern to that of the Kitchener Rubber Mfg. Co.

Fernie, B.C.—The Rambler-Cariboo Mining Co. has contracted with a United States refining concern to take over 800 to 1,000 tons of zinc now held for treatment at that mine.

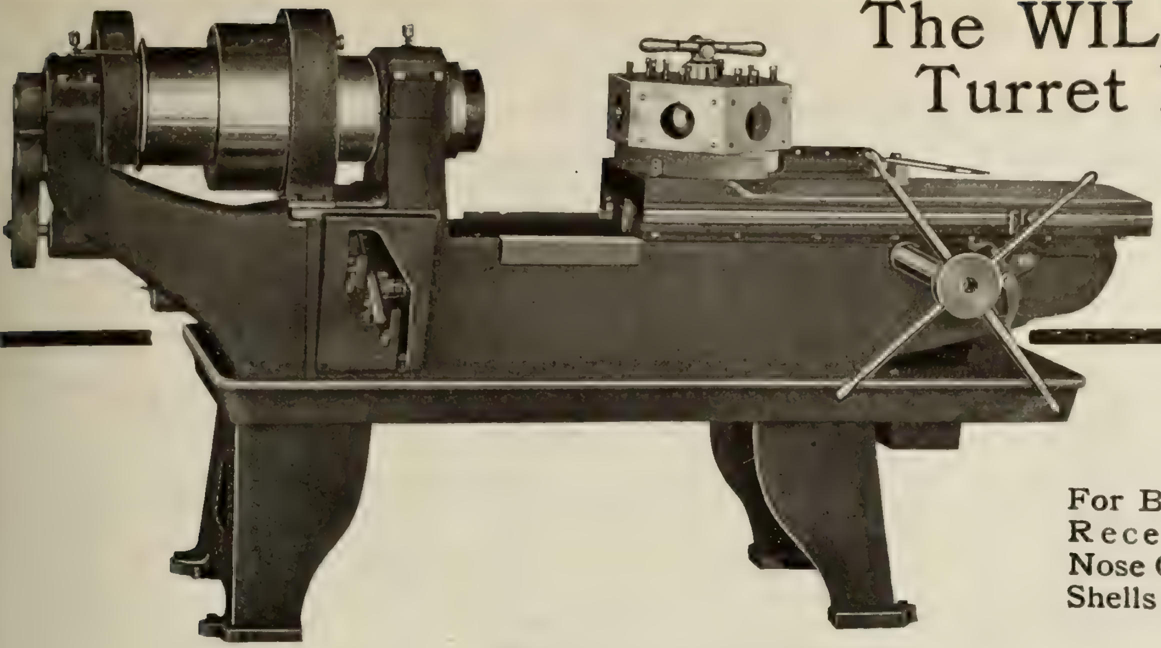
Kingston, Ont.—The feldspar industry is booming in Frontenac. Four comcompanies are now exporting the mineral and a fifth company will shortly be at work. The total value of the feldspar exported from Frontenac will be over $100,000, or twice as much as last year.

The Boss Lock Nut Co., have recently been incorporated in Canada to manufacture lock nuts for railway, constructional and industrial use. T. W. Coleman formerly manager of the Grip Nut Co., is now manager of the new concern with offices at 901 Eastern Townships Bank Bldg., Montreal.

The Canadian Fairbanks-Morse Co., have opened a branch sales office at Windsor, Ont., in order to take care of their increasing business in Western Ontario. J. N. Charles will be in charge of the office.

British Import Prohibitions.—A proclamation of October 3 provides that the

The WILLIAMS Turret Lathe



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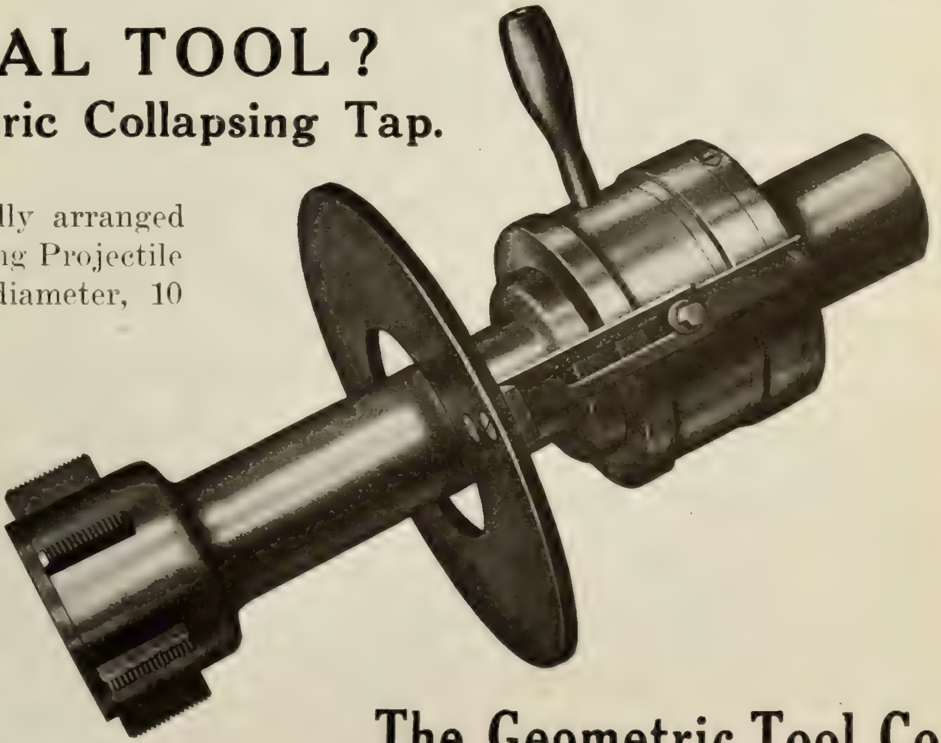

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following articles will be treated as absolute contraband in addition to those set out in royal proclamations:—Insulating materials, raw and manufactured; fatty acids; cadmium, cadmium alloys, and cadmium ore; albumen, aluminum powder, bone, horn, ivory, and celluloid.

Increase in Building Ships.—An announcement from London states that a substantial increase in merchant shipping under construction for the three months ending October 1 is reported by Lloyds. The report shows that on Oct. 1 there were 469 vessels building, representing a total of 1,789,054 tons. This represents about 249,000 tons more than the amount under construction at the end of the previous quarter, and 253,000 tons more than that building a year ago.

To Capture Russian Trade.—A. Melville Dollar, of the Dollar Steamship Line, with offices in Vancouver, B.C., is of the opinion that that city should take similar steps along the line that Seattle is doing to capture the Russian trade. Seattle has formed a $2,000,000 corporation to go after this trade, and Mr. Dollar is of the opinion that the best way for Vancouver to go after this trade is to form a corporation also. Vancouver has as good a chance of getting the trade as Seattle, he says.

The Tungsten Market.—The tungsten market is more active in the U.S. Large sales of concentrates for next year's delivery have been made at about $17 per unit for 60 per cent. ore. At least 200 tons of ferrotungsten has also been sold, part of it for foreign consumption, England being the principal purchaser. The price paid was $2.60 to $2.75 per lb., New York, of contained tungsten. An incident connected with England's purchase is that one lot was taken from an American producer whose name appears on the British supplementary black list.

The British Columbia Copper Co., of Greenwood, B.C., will discontinue the shipment of copper across the border after the 1st of November, the Consolidated Mining & Smelting Co. having contracted to handle the entire copper product of that company. This latter company have just completed an electrolytic plant which will have a capacity of from five to ten tons of the red metal daily, and their facilities for handling zinc concentrates will soon enable them to take care of the larger part of the product of the zinc mines of the Kootenay-Boundary district.

Marine Motors in China.—While there are at present perhaps not more than a dozen marine motors in the vicinity of Amoy, this should become a good market for marine motors and sundry supplies, as the Chinese are becoming more and more acquainted with the use of motors and the great advantage derived through them. At present practically all of the local traffic is carried by sailing boats, which is both slow and expensive. If the benefits of marine motors were properly displayed, say by a demonstration agent, and a local agency opened, good results would undoubtedly follow.

B. C. Producing Copper.—The electrolytic copper refinery at Trail, B.C., which has now been in operation for a few weeks, will shortly begin the shipment of electrolytic copper. The melting building—where the copper sheets as taken from the tanks are melted into shipping shape—is now completed, and the reverberatory furnace in which the melting will be done is almost ready. After that the plant will begin turning out and shipping pure copper at the rate of some five tons daily—the first product of its kind in Canada. The capacity of the plant, according to Superintendent John F. Miller, who also has charge of the electrolytic lead refinery, is ten tons daily.

Britain First in Coal.—Germany even in war time is producing considerably more iron and steel than the United Kingdom, and the territories she has seized are no doubt being used to augment her supplies. The following is a comparative table:—

Pig Iron:	1913	1915.
United Kingdom	10,479,000	8,793,000
Germany	19,291,000	11,789,000
Steel:		
United Kingdom	7,663,000	8,550,000
Germany	18,958,000	13,258,000

In coal, Britain continues to hold the first place in Europe by a long lead, though the production in 1915—253,179,000 tons—showed a substantial drop from the 1913 figure—287,411,000 tons.

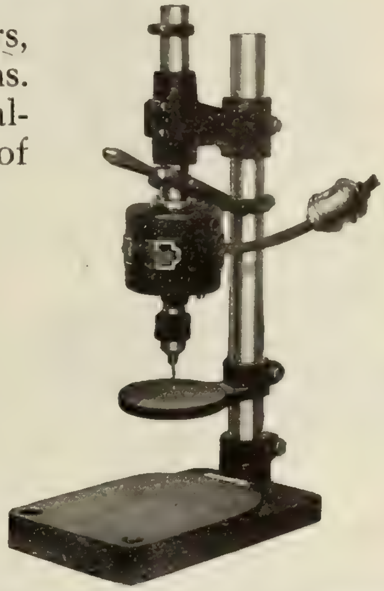
Exemption of Gold Mining Machinery.—A Russian Imperial Decree has been issued exempting from duty for a period of ten years the following machinery and apparatus for use in gold mining:—Dredges and excavators and parts thereof; apparatus for grinding gold-bearing ore or for the chemical extraction of gold from ore and prospecting apparatus, together with parts thereof. The latter are entitled to free admission, whether or not imported at the same time as the principal article. The measure is retroactive, providing that all duties collected on such machinery and apparatus since January 1, 1916, shall be refunded. This concession is a restoration of an exemption which was in effect prior to January, 1909.

B. C. Mineral Exports.—The total exports of copper from the Fernie district during the first nine months of this year amounted to 4,741,861 pounds, valued at $1,320,468. Gold, for the last quarter, made a total export of 7,094 ounces, valued at $171,329. The value of silver exports for the same time was $52,664; zinc to the value of $160,074; and lead valued at $1,042, were sent over the line. Timber products to the value of $97,692 were exported. Included in the timber products was 1,178,400 feet of white pine lumber, sent to a large match manufacturing concern in the United States for use in the manufacture of matches. Coal and coke to the value of $305,455 go to make up the total.

Newcastle, N.B.—A deal is reported to be near completion between the Partington Pulp & Paper Co. in New Brunswick and leading capitalists in Maine. It is said that more than one million dollars capital will be put into the proposition. Included amongst the capitalists who are interested is Hugh Chisholm, of Portland, Me., who is intimately connected with the International Pulp & Paper Co. The property under consideration is said to include mills at St. John, Marysville and Blackville, and timber limits on the Nashwaak and other streams. It is not at all improbable that a larger pulp mill will be built at Blackville. N. M. Jones, of St. John, is manager of the Partington Pulp & Paper Co.

U. S. Exports to Russia.—United States exports to Russia, via Vladivostok, January 1 to April 1, 1916, aggregated $31,497,280, according to the report recently of the American-Russian Chamber of Commerce at 60 Broadway, which obtained the data from the Russian-American Chamber of Commerce at Moscow. A wide variety of merchandise is included in these exports. Iron and steel and similar products aggregated approximately $8,000,000; other metal products, $3,000,000; machinery, $7,655,000; transportation supplies, $5,574,000; textiles, including raw cotton amounting to $4,365,000, and cloth and other woollen fabrics, to the amount of $1,280,000, reached a total of $5,726,000; chemicals, drugs and dyestuffs, $452,000; and leather, $982,000.

Minerals in Newfoundland.—The Government geologist estimates the iron ore deposits in Newfoundland at 3,635,500,000 tons. On Belle Isle, Conception Bay, alone, the estimated deposit of this ore is put at 35,000,000 tons, and more. The total ore mined and exported since the beginning of operations in 1895 to date is estimated at 15,000,000 tons, all of which, prior to the war, went to the United States, United Kingdom, Canada, the Netherlands, and Germany. Since the outbreak of the war none has gone to Germany, and but little to the United States, the United Kingdom, and the Netherlands. Canada has taken the major portion, much of which is being utilized for munition purposes.



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Specifications :

Height—18 inches.
Weight—17 lbs.
Stroke—2 inches.
Drills to center of a six-inch piece.
Drilling capacity:
Steel, 0 to 3-32".
Brass, Aluminum and soft alloys, 0 to 13-64".

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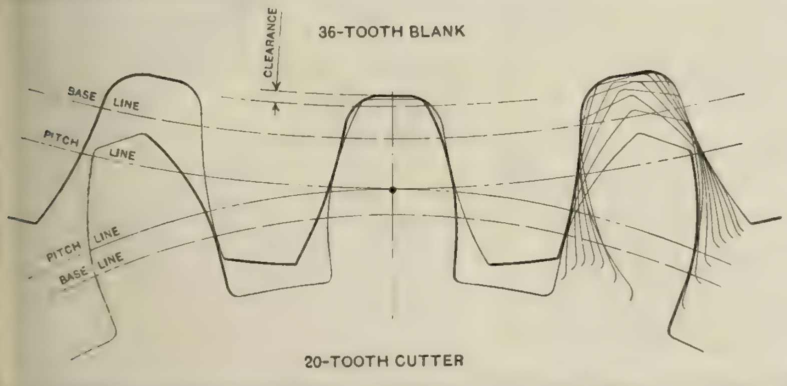

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Catalogs on Request

Municipal

Kingsville, Ont.—The Town Council propose having improvements made to the waterworks system.

Scarborough Township.—The Township will petition the city to extend its water main service throughout the district as the need arises.

New Westminster, B.C.—Negotiations are still under way between the City Council and John R. Duncan regarding a site for an extension to the Vulcan Ironworks.

Hamilton, Ont.—Plans will be prepared for waterworks buildings and equipment, including a high-duty triple expansion steam unit and steam turbine, to cost $300,000. E. R. Gray, city engineer.

Port Hope, Ont.—The town carried the Port Hope Sanitary Mfg. Co. by-law on October 10 by a vote of 343 for and 8 against. The by-law provides exemption of taxes. The company will pay the town $650 rent per year for the land.

New Incorporations

The Exolon Co. of Thorold, Ont., makers of abrasive materials have been granted a supplementary license to carry on business in the Province of Ontario with a capital not to exceed $275,000.

The White Co., has been incorporated at Ottawa with a capital of $40,000 to manufacture motor cars and trucks with head office at Toronto. Incorporators are W. M. Cox, H. A. Harrison and W. J. Beattie all of Toronto.

The James McKay Co., of Pittsburgh, Pa., manufacturers of chains and forgings have been granted a license to do business in the Province of Ontario with a capital not to exceed $40,000. Franklin W. Wegenast, of Toronto, is the company's attorney .

The Tillsonburg Foundry & Machine Co., has been incorporated at Toronto, with a capital of $25,000 to carry on business as foundrymen, machinists, etc., at Tillsonburg, Ont. Incorporators are Lydney E. Dykeman, David J. Downs and F. James Bushell all of Tillsonburg.

Pressed Metals, Ltd., has been incorporated at Ottawa with a capital of $60,000 to carry on business as engineers, foundrymen and machinists, etc., with head office at Toronto. Incorporators, J. W. Leighton, O. J. P. Crick and Y. H. Chewett all of Toronto.

Canadian Molybdenite, Ltd., has been incorporated at Toronto, with a capital of $100,000, to acquire and develop mines and properties. Head office is at Toronto, and the provisional directors are: Franklin M. McDowell, George R. Sproat and Charles H. Kemp, all of Toronto.

Personal

Henry Clark, Canadian manager for Head, Wrightson & Co., of Stockton-on-Tees, England, bridge and mining machinery manufacturers, is in England on a business trip.

Will H. Baltzell has been appointed chief engineer of the Canadian Steel Corporation, Ltd., with offices at Ojibway, Ont. This is the Canadian branch of the United States Steel Corporation.

Capt. Robert Fraser, marine superintendent of the Montreal Transportation Co., Kingston, Ont., has severed his connection with the company. Capt. Fraser will take up his residence in California.

W. P. Kellett, of the Dominion Steel Products Co., of Brantford, Ont., formerly engineer for the Grand Valley and L. E. & N. Railway, has been appointed to the board who are to make a valuation of Canadian Railways.

A. S. Clarson, C.E., the newly appointed city engineer of Verdun, Que., has been for the past five years, principally engaged as engineer of the electrical commission of the City of Montreal. He was born in England and before coming to Canada was engaged in several important engineering works.

O. R. Sweeny, of Valparaiso, Chile, who is well known in ocean shipping circles, being the General Manager of the Compania Sud-Americans de Vapores, which operates a fleet of steamers along the west coast of South America, from the Panama Canal to Patagonian ports, is visiting Toronto. Mr. Sweeny is touring the United States and Canada, accompanied by his wife. From here he goes to Montreal, Ottawa and Quebec, and then to the Pacific coast.

Contracts Awarded

London, Ont.—Contracts have been let by the McClary Mfg. Co. for the erection of a galvanizing plant.

Copper Cliff, Ont.—The Canadian Copper Co. have awarded a contract to the Ridgeway Dynamo & Motor Co., of Ridgeway, Pa., for a motor-driven compressor.

Montreal, Que.—The Board of Control have awarded a contract to T. O. Sullivan for the construction of a bridge and headgates over the aqueduct canal at Lasalle Road. The work will cost $209,221.

Vancouver, B.C.—Macdonald, Nettleton & Bruce, of Vancouver, have been awarded the contract for the construction of the C. N. R. freight sheds, their tender being approximately $125,000. It is expected that the buildings will be completed about the beginning of next March.

Tenders

Toronto, Ont.—Tenders, addressed to W. C. Wilkinson, secretary-treasurer of the Board of Education, for the Technical School, will be received until Oct. 23, for two complete chassis, one new and one used; engine with four cylinders; electric starter.

Lyall, Man.—Tenders will be received up till October 23 for the supply of transformers, meters, pole line construction, and electrical equipment. Plans and specifications are available at the office of the engineer of the Public Utilities Commission, 300 Tribune Building, Winnipeg.

Hawkesbury, Ont.—The Town Council is calling tenders for one electrically-driven turbine pump of 1,000,000 gal. per day capacity, direct connected to a 100-h.p. motor; one pump of 750,000 gal. per day capacity, with 75-h.p. motor, and for one pump of 500,000 gal. per day capacity, with 50-h.p. motor. M. Gareau is town clerk.

Ottawa, Ont.—Tenders, addressed to J. W. Pugsley, secretary of the Department of Railways and Canals, Ottawa, Ont., will be received up to November 15 for the construction of a reinforced concrete elevator with a capacity of 500,000 bushels. Plans, specifications and blank form of contract may be seen at the office of the following:—Chief engineer, Department of Railways and Canals, Ottawa; railways, Moncton, N.B.; general superintendent, Winnipeg, Man.; resident engineer, Fort William, Ont.; John S. Metcalf Co., engineers, Montreal, Que. Contractors who wish to obtain plans and specifications temporarily for their own use may obtain same on depositing a certified bank cheque for $100.

Toronto, Ont.—Tenders will be received by Frank Barber, engineer of the Township of York, up to October 30, for the supply and delivery of the following material:—Tender A-1—for supply and delivery of approximately 20,500 ft. of 24 in. cast iron pipe; A-2—for the supply and delivery of cast iron pipe (12 in. and smaller sizes); B-1—for supply and delivery of 24 in. special castings; B-2—for supply and delivery of special

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In Light and Air and sanitary Working Conditions.
In clean, fresh drinking water for everybody.
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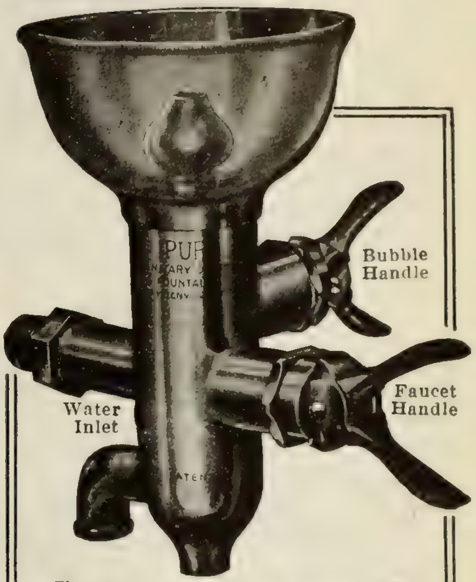

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An ugly statement, isn't it? But true, absolutely.

When a man comes to work in your factory he puts his health in your keeping.

Are you willing to take chances on such a trust?

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Apply the "Safety First" Principles to your water supply; don't deny your men a clean, fresh drink of water.

Conserve their health and they will improve your profits; make yourself as worthy of the name of "employer."

Install the Gold Medal winner Puro in your plant, office and shop alike.

The only Sanitary Drinking Fountain that is safe, sanitary, simple, automatic in control and easily attached.

Let us tell you just what it will cost you to

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HAVE YOU

read pages 70 to 76? Turn to them now and see for yourself whether or not they are of interest.

Canadian Machinery
Classified Advertising Section

castings, 12 in. and smaller sizes; C-1—for supply and delivery of 24 in. valves; C-2—for supply and delivery of 12 in. and 6 in. valves; C-3—for supply and delivery of air valves; D—for supply and delivery of hydrants; F—for supply and delivery of tops, covers and plugs. Plans and specifications may be obtained at the office of Frank Barber, engineer, Toronto.

Wood-Working

Port Hammond, B.C.—An extension of the Hartnell Lumber Co.'s plant, which will practically double its output, is under way. One new dry kiln has already been erected, and another will be started shortly. A new boiler is being installed.

Building Notes

Toronto, Ont.—A permit hat been issued by the city architect to J. O'Neill for an addition to the laundry building at 2 River Street, to cost $3,500.

Toronto, Ont.—A building permit has been issued to the Canada Metal Co. for the construction of a factory extension on Fraser Avenue, to cost $20,000. Work on the foundation has already started.

Marine

Ottawa, Ont.—The Canadian-built icebreaker, sold some time ago to the Russian Government, will be given a trial run at Murray Bay on the 23rd of this month. Representatives of the Russian Government are now supervising the completion of the vessel. The icebreaker was intended for the Canadian Government service and was accordingly christened the "J. D. Hazen," in honor of the Minister of Marine and Fisheries. Her new owners naturally prefer a Slavonic appellation, and she has been renamed his Imperial Russian Majesty's ship Mikula Selianinovitch.

Catalogues

Sand Blast.—A leaflet illustrating and describing a sand blast machine by the Gray Manufacturing and Machine Co., Toronto.

McGregor Swinburne, Ltd., Glasgow, Scotland, have mailed a series of bulletins dealing with an interesting line of chucks which are illustrated and described fully. Among these are included the "Crawford" direct drive drill chuck and slide rest chuck, full particulars of each covering the principal features being given. Other specialties dealt with include the "Glasgow" drill and "Gyro" loose ratchet head.

Tobin Bronze is the title of a 36-page booklet issued by the American Brass Co., Ansonia, Conn., dealing with Tobin bronze and its application. Its physical properties are described and the results of several tests given followed by tables giving approximate weights of rods and sheets. The booklet also contains a number of testimonials from firms who have used this material for various purposes.

Electric Portable Tools.—The Stow Mfg. Co., Binghampton, N.Y., have issued three bulletins: No. 100, containing 20 pages, illustrating and describing electric motors; No. 101, 28 pages, on portable electric drills, grinders, motor driven screw drivers, and other electric tools; No. 102, 60 pages, illustrating the "Stow" flexible shaft, with its many applications. These bulletins are very complete and give detailed information covering the full line of "Stow" portable tools. Copies of these bulletins may be had on application.

A Model Foundry, is the title of a catalogue, No. 124, issued by the Whiting Foundry Equipment Co., Harvey, Ill., giving in a general way the methods followed by the company during its long experience in designing, equipping, and conducting initial operation of foundry plants for making all kinds of castings. A large number of half-tones show the different types of foundry equipment installed, including some typical crane installations and interior views of steel casting and foundry plants. A partial list of foundry plants equipped by the company in the United States and Canada is included.

The Lagonda Manufacturing Co., Springfield, Ohio, are distributing their 16-page booklet, published every year or so as a general reminder and concise catalogue of all the specialties in the "Lagonda" line. The booklet which is entitled "Lagonda" Boiler Room Specialties, illustrates and describes the different types of "Lagonda" tube cleaners and other specialties, one page being devoted to each. The large catalogues are referred to for more detailed information. The booklet will be gladly sent upon request to any engineer who is interested enough to write for it.

The McAlear Mfg. Co., Chicago, Ill., have issued a reference book on the McAlear system of vacuum and vapor heating, which deals with the subject in a comprehensive manner. In addition to a full description of the system, the book contains complete particulars of the various parts and their construction, method of operation and directions for installing. The illustrations include details of the traps and pumps and also several diagrams showing various systems and applications. Copies of this book may be obtained from Arthur L. Leitch, Kent Bldg., Toronto.

The Dearborn Chemical Co., Chicago, Ill., have issued a very attractive and well gotten up booklet entitled "Walter" which deals with the "Dearborn" treatment of boiler feed water. The subject is discussed under the following heads:—Corrosion, incrustation and foaming, the cause and effect in each case being dealt with in a scientific, yet practical manner. Particulars are given of the principal scale—forming solids and the reason why they are harmful, while the subject of electrolysis is also discussed. The illustrations show excellent exterior and interior views of the company's factory and offices, while the covers have a very artistic and attractive appearance. Copies of the booklet may also be obtained from the company's branch factory at Toronto.

Burd Piston Ring Directory for 1916 has been published by the Burd High Compression Ring Co., Rockford, Ill. This publication is a directory of piston ring sizes, which includes a tabulation of the piston ring requirements of practically every automobile of any import manufactured in the United States during the past ten years, besides information of like character covering the requirements of aeronautical, marine, stationary, and other types of internal combustion engines. The book is an invaluable source of information for garage men and those engaged in the repair of gasoline engines, and contains data on proper fitting and installation of piston rings, regardless of by whom manufactured. Stock sizes are indicated by an asterisk, which follows the telegraphic code word for every size listed. An additional telegraph code is provided, affording means of communication between the customer and the factory. This directory, while being more exhaustive than any other treatise of its kind ever attempted, is distributed among the garage trade free of charge.

Book Review

"Fundamentals of a Cost System for Manufacturers" is the title of a bulletin issued by the Federal Trade Commission, Washington, D.C. This bulletin has been prepared with a view to aiding the campaign of education by explaining what a cost system is, how it operates, the results obtained, and the benefits to be derived from its operation. This bulletin shows briefly the importance of accurate manufacturing costs and the fundamental principles underlying them. Copies may be obtained from the United States Government printing office. Washington, D.C.

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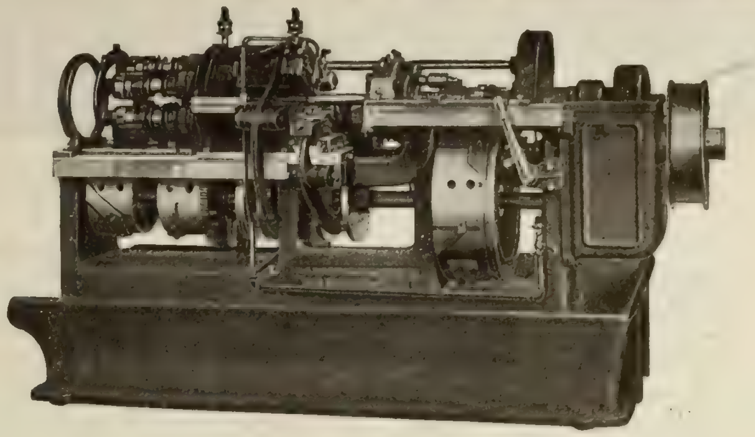

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6½ H.P. WESTINGHOUSE AND 1/3 H.P. Toronto & Hamilton Electric Co. 60-cycle motors, in first-class order. Geo. H. Lees & Co., Hamilton. (17)

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 227, Canadian Machinery. (15)

FOR SALE — HOT SAW AND MILLING machine. Ajax. New; never used. Address Canadian Warren Axe & Tool Co., St. Catharines, Ont.

FOR SALE—45 H.P. GAS PRODUCER AND engine, complete. Good condition. For particulars write Canadian Warren Axe & Tool Co., Ltd., St. Catharines, Ont.

BRASS RODS, 1¼, 1½, 1¾ UP TO TEN FT. Brass tubings, 2⅝ o.d., with ¼ wall; all lengths to ten feet. Louis Lovitz, 186 Markham St., Toronto. Telephone College 5711. (17)

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

FOR SALE—ONE 2 H.P., 60-CYCLE CHAPman & Walker motor, single phase, 110 volts, or will exchange for a 2 H.P., 25 cycle motor, 550 volts, three-phase. Address The R. S. Bickle Company, Woodstock, Ont. (14)

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- 1—Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.
- 1—12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 3 tons capacity; complete, less the Hoist.
- 1—Brantford (Gas) Bake Oven and 4 Racks.
- 1—Linderman 2-Spindle Boring Machine.
- 1—26" Drill, London Machine Tool Company.
- 1—Bowser 40 Gal. Varnish or Oil Pump and Tank.
- 11—New 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.
- 30—Used 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.

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FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 226 Canadian Machinery. (15)

BUSINESS FOR SALE — MACHINE SHOP with a good, steady run of work and always busy. A good opening for a young man to get into business. Owner has other interests. Box 224, Canadian Machinery. (13)

1-2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

FOR SALE.—ONE BROWN-BOGGS MARKing Machine, suitable for 6" Mark XVI. or Mark III. English Shells. Only object in selling is that other methods of marking have been adopted. Price on application. Taylor-Forbes Co., Ltd., Guelph. (14)

ONE REED TURRET LATHE, 8' BED, swing 28"; 4 2" holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 226, Canadian Machinery. (16)

FOR SALE—ONE 16" x 8' HENDEY LATHE, with taper attachment, $1,100.00; one 22" x 10' Blaisdell lathe, with taper attachment, $1,200.00; one 24" Gould & Eberhardt shaper, $800.00. The above machines are in first-class condition. For particulars apply Box 221, Canadian Machinery.

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

GAP LATHE — LONDON TOOL CO. — swings 41" in the gap, 26" over shears, 20 ft. bed, rod and screw feed, compound rest, steady rest, countershaft, 2 face plates, 4-jaw chuck, weight about 10,000 lbs. This tool has been very little used, and is in excellent condition. Bargain for quick sale. Winnipeg Machinery Exchange, Sutherland & Gladstone Sts., Winnipeg, Man. (17)

WE HAVE FOR SALE THE FOLLOWING equipment: Complete nickel and copper plating plant, including direct connected dynamo and motor; one second operation cast iron plug machine, and two first operation cast iron plug machines manufactured by the Brown Engineering Corporation: 2 16-inch turret lathes; 1 38-inch engine lathe, 20-foot bed. The above outfit will be sold en bloc or separate. Apply direct to Foundry & Machine Co., Ltd., Montreal. (13)

FOR SALE—McDOUGALL ENGINE LATHE, 20" swing, 10' bed; never been used. Baker Keyseater No. 2, good as new. Boring Mill, 2 bars, will bore up to 30" dia. Boston Forge Blower, 27", good condition. Crescent Swing Cut-off Saw, almost new. 7½ H.P. Westinghouse D.C. Motor, in good order. Gurney Platform Scale, 2,000 lb., 16" wheels. Mandrills, Couplings, Hangers, Post Boxes, Pulleys, Belting, Cap Screws, Bolts, etc. Special prices on above, write for particulars. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (14)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

SITUATIONS WANTED

TOOL MAKER IN CHARGE DESIRES change. Competent to take charge of machine shop or tool room. Good references. Box 225, Canadian Machinery. (17)

SUPERINTENDENT—FIRST-CLASS PRACtical mechanical man is open for an engagement as works manager or superintendent. Can give best of reference as to character and ability to handle help and produce results Box 227, Canadian Machinery.

SITUATIONS VACANT

WANTED — EXPERIENCED STEEL works draftsman for Nova Scotia. Give full particulars, including salary, permanency. Apply Box 234, Canadian Machinery. (17)

FOREMAN FOR LARGE WINNIPEG MAchine shop — must be aggressive and mechanic with good practical experience in jobbing, stock and transmission work. When applying, state age, experience and salary expected. Applications treated confidentially. Box 229, Canadian Machinery. (16)

SUPERINTENDENT FOR 4.5 SHELL FACtory all equipped and tooled for 400 to 500 shells per day. Shipping since May. Must have ability to thoroughly organize, and be capable of producing maximum results in short time, and have previous shell experience. To the right man we will pay a liberal salary and bonus. State fully (in confidence) past experience, present record and salary expected. Box 228, Canadian Machinery. (14)

WANTED

WANTED TO MANUFACTURE A FEW lines of metal products, sheet metal preferred. We have complete equipment for high-class work. Give complete description and rating in first letter. Apply Box 221, Canadian Machinery. (17)

WANTED—12" BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Aplly Box 218, Canadian Machinery.

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

MOTORS

We have for Immediate Delivery:

No.	H.P.	Phase	Cycle	Volt	R.P.M.	
1	100	3	25	550	750	new
1	40	2	25	550	750	new
2	40	3	25	550	750	used
1	20	3	25	550	750	new
2	15	3	25	550	1400	new
2	10	3	25	550	750	new
2	10	3	25	550	1400	new
2	7½	3	25	550	1400	new
3	5	3	25	550	750	new
3	5	3	25	550	1400	new

We also have a number of 40 and 50 H.P. Motors, 25 cycle, 3 phase, for early delivery, about Nov. 15th.

Also one 10-ton 40-ft. span 3 motor Direct Current Crane.

The A. R. **WILLIAMS** MACHINERY CO., LIMITED
64-66 FRONT STREET WEST, TORONTO

GRINDERS

9—6x32 Norton Plain, one year old, fine condition.
7—10x24 Norton Wide Wheel, Single Purpose, one year old, fine condition.
1—10x20 Landis Universal, very good condition.
1—No. 2 Brown & Sharpe Universal Cutter Grinder, used one week.

E. B. STICKLEY, Goebel Building
DETROIT - MICH.

FAIRBANKS-MORSE
New and Used Machinery

In Stock at Toronto

1 -⅞" 4-spindle National Acme Automatic; used.
2—No. 3 1" Foster Hand Screw Machines.
4—No. 4 1½" Smurr & Kamen Turret Lathes.
1 10" x 5' Seneca Falls Lathe; used.
2- 18" x 8' Springfield Lathes; new.
5—20" x 9', 19 16" x 7', 3 16" x 9' Fairbanks-Morse Lathes; new.
2 No. 1 Racine Hacksaws; new.
1 No. 394A Oster Pipe Machine; new.
1 24" x 8' Henley Lathe; used.
1 Gisholt 16" Special Lathe, type C, 6½ bore.
1 Walcott 26" x 8' Engine Lathe.
5 Barnes 18" x 8' Engine Lathes; new.
7 Potter & Johnson No. 6A Automatics; used.

In Stock at Montreal

3—Gisholt 16" Turret Lathes; new.
2 Gisholt 25" Turret Lathes; new.
Waving and Grooving Machines, 6" shells; new.
1 Hendey 16" Lathe; used.
2—American 16" x 6' Tool Room Lathes; new.
1 Rivett Precision Lathe; used.
1 Brown & Sharpe No. 1½ Universal Mill; used. used.
1 Valley City No. 1½ Universal Mill; used.
2 Ford Smith 20" Wet Tool Grinders; new.
1 Wilmarth & Moorman Drill Grinder; new.
[illegible] Back-geared Drills; new.
1 [illegible] Sliding Head Drill; new.
1—Banfield Plug Miller, 6" shells; new.

This is only a partial list of our stock of Machine Tools.

CFM

The Canadian Fairbanks-Morse
Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

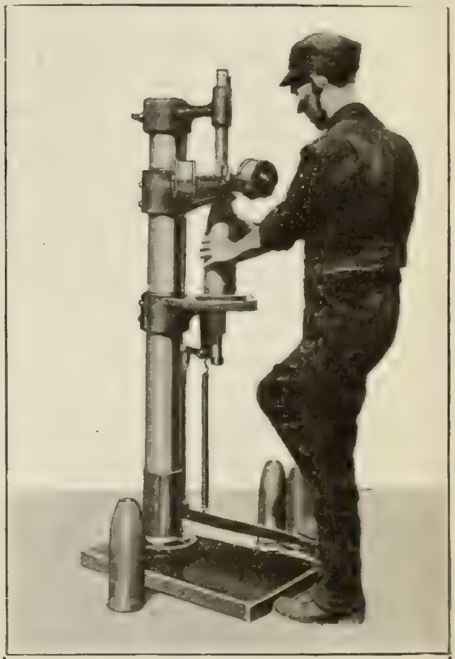
CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

MONARCH
Milling Machine
(Made in Canada)

For Milling the three slots in the nose of

Mark 7 Shells

Adjustable to take any size shell from 4.5 to 9.2 inclusive.



ONE MOVEMENT of foot lever clamps the shell and feeds the three cutters in to the right depth.

CAPACITY ON 4.5—6 to 8 shells per minute. Actual cutting time is simply — "zip" and the three slots are finished.

THE MACHINE is complete with High Speed Cutters and drive pulleys which should run at about 550 revolutions per minute. It can be driven by three 2-inch belts, either from overhead counter or line shaft. The clamping device does not interfere with copper band, and altogether it will be found to be a very satisfactory tool—CONVENIENT and ACCURATE.

For further particulars address

H. W. PETRIE, LTD.
FRONT STREET WEST, TORONTO
Sole Selling Agents for Canada

Practically New

114" x 22' Pond Lathe, quadruple geared, face plate drive.
38" x 24' New Haven Lathe.
36" x 15' New Haven Lathe.
34" x 16' Perkins Lathe.
30" x 28' Pond Lathe.
30" x 18' Gray Lathe.
28" x 16' Fifield Lathe.
26" x 12' Blaisdell Lathe.
24" x 24' Pond Lathe.
24" x 20' Morse Lathe.
Two—24" x 12' Johnson Lathes.
Two—24" x 10' Reed-Prentice Lathes.
24" x 10' Hendey Q.C.G. Lathe.
Three—24" x 8' American Lathes.
Two—22" x 10' Davis Q.C.G. Lathes.
18" x 10' Greaves-Klusman Q.C.G. Lathe.
18" x 8' Shellenbach Geared Head Lathe.
Two—16" x 6' LeBlond Lathes, geared head, single pulley drive, taper attachment.
32" Kerhoff B.G., S.H. Drill Press.
30" Bickford B.G., S.H. Drill Press.
28" Aurora B.G., S.H. Drill Press.
26" Fox Bros. B.G. Drill Press.
Six—24" Baker Bros. High-Speed Drill Presses.
12" x 72" Norton Plain Cylindrical Grinder.
10" x 30" Norton Plain Grinder (new).
Springfield Surface Grinder, table 17" x 50".
No. 2 Falkanau Plain Grinder.
Four—No. 1½ Landis Internal Grinders.
No. 1 Brown & Sharpe Internal Grinder.
No. 3 Brown & Sharpe Universal Cutter and Reamer Grinder.
Two—No. 1 Cincinnati Universal Cutter Grinders.
No. 2 Garvin Cutter and Reamer Grinder.
No. 2 Cincinnati Universal Milling Machine.
Ingersoll Slab Milling Machine, adjustable rail, three heads; weight 55,000 lbs.
Newton Duplex Slab Milling Machine, 10-ft. platen.
76" Newton Vertical Milling Machine, 48" rotary table.
Detrick & Harvey Milling, Drilling and Boring Machine.
Two—No. 1 Pratt & Whitney Plain Milling Machines.
No. 20 Kempsmith Plain Milling Machine.
No. 4 Garvin Profiler.
Two—No. 1 Garvin 2-spindle Profilers.
Sellers & Co. Double Angle Shear, capacity 8" x 8" x 1" angles.
Size "D" Long & Allstatter Bar Iron Shear; weight 30,000 lbs.
No. 3 Hilles & Jones S.E. Punch and Shear, 21" stroke.
Lennox Rotary Splitting Shear, split 16' plates.
Lennox Rotary Splitting Shear, split 12' plates.
D. F. Hainns D.E. Punch and Shear, 12" and 21" gaps.
Reade Combined Punch and Shear, 26" throat.
Bass D.E. Punch and Shear, 20" throats.
Bertsch Splitting Shear, 1½" stroke.

New York Machinery Exchange

Offices: 50 Church St., NEW YORK

MACHINE SHOPS AND WAREHOUSES:

222-234 Culver Avenue **63-83 Pollock Avenue**
JERSEY CITY

Immediate Delivery

NEW STEAM ENGINES

Two 5 x 6 Vertical steam engines, 8 horse	$105.00	each
Two 6 x 6 Vertical steam engines, 10 horse	125.00	"
One 7 x 8 Vertical steam engine, 15 horse	175.00	
One 8 x 8 Vertical steam engine, 20 horse	200.00	
Two 4 x 6 Horizontal steam engines, 6 horse, with base	100.00	"
One 5 x 6 Horizontal steam engine, 8 horse, with base	125.00	
Five 6 x 6 Horizontal steam engines, 10 horse, with base	135.00	"
Five 6 stroke engines, with base, 10-15 H.P.	150.00	"
Two 6 x 6 Automatic, with base, 12-20 H.P.	250.00	"
Two 7 x 6 Automatics, with base, 15-25 H.P.	275.00	"
One 8 x 8 Automatic, with base, 20-42 H.P.	500.00	
One 10 x 10 Automatic, with base, 39-82 H.P.	700.00	
One 11 x 10 Automatic, with base, 47-85 H.P.	725.00	

YOUNG, CORLEY & DOLAN, Inc.
115 Broadway, NEW YORK CITY
Telephone: Rector 7866

(tf)

They must be getting results--

or why would they continue to advertise each week? That's logic, isn't it? This is a *direct-result* department. Have you noticed that each week the same firms' lists appear? If you don't care to use large space, insert a "liner" ad.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto, Ont.

WANTED

Seamless Steel Tubing in any Quantity. Cash Paid.

Apply Box 233, Canadian Machinery

The man with money

In Canada, if you are a man with money, or called upon to advise others in regard to money matters, you will find it to your advantage to read a sanely edited, broadly informed and clear-visioned financial newspaper, such as "The Financial Post of Canada." The Financial Post is, beyond question, Canada's most authoritative newspaper serving investors and those concerned with the money market. The wide organization and many papers of The MacLean Publishing Co., together with the experience and ability of the Editors, make this pre-eminence possible.

THE
Financial Post
OF CANADA

The Canadian Newspaper for Investors

$3.00 PER YEAR

One advantage which subscribers have is the service of the Investor's Information Bureau of "The Post," where special information and advice are provided, without any fee, by personal letter. This service is very valuable to investors.

We suggest that you buy a copy of the current issue from your newsdealer, and make a careful examination of it. Ask your banker or broker about "The Post." Get independent opinions regarding it from the professional classes who handle money. Sample copy on request.

Published by

The MacLean Publishing Co., Ltd.
143-153 University Ave., Toronto, Canada

FOR SALE

Two 70-Gallon Hydraulic Pumps for 1,500 lb. Pressure.

One 90-H.P. General Electric Co. Motor, 3-Phase, 60-cycle, 200-Volt, $700.

Two Sheldons, No. 3, Cast Iron Fans.

These machines can be seen and inspected at

National Steel Car Co., Limited
HAMILTON, CANADA

(18)

WANTED!

Any amount Brass Tubing, Sheets and Rods

Bought for Cash

Apply Box 232

CANADIAN MACHINERY

MACHINE TOOLS

LATHES.

1 68 x 20 Fifield, face plate drive, triple geared.
1 30 x 27 Reed, heavy type, with taper attachment.
1 18 x 36 x 10 Niles Extension Bed Lathe.
1 22 x 14 Engine Lathe, C.R., H.S.
1 28 x 15 Engine Lathe, C.R., H.S.
1 20" LeBlond Heavy Duty, with turret.
1 18 x 8 Jones & Lamson Engine Lathe.
2 16 x 6 Barnes Engine Lathes.
1—16 x 8 Cincinnati Engine Lathe.
1—16 x 6 Walcott Engine Lathe.
1—16 x 6 Reed Engine Lathe.
1 -16 x 8 Porter Engine Lathe.
1- 14 x 5 Lodge & Shipley Engine Lathe.

MILLING MACHINES.

1- No. 1½ B. & S. Universal with vertical attachment.
1—No. 3½ Fox, Plain.
1—No. 3 Chicago Hand Miller.
2- No. 12 P. & W. L.T. Millers.
4—No. 13 P. & W. L.T. Millers.
1—No. 3-H. B. & B. Vertical Miller.
1—Warner & Swasey Profiler.

GRINDERS.

1—No. 1 B. & S. Universal, with all attachments.
1--No. 1 Landis Universal.
2—12 x 36 Landis, plain, geared head
1—No. 5 Springfield Oscillating Surface Grinder.
1—No. 2 Gardner Disc Grinder.
1—No. 34 Gardner Double Spindle Disc Grinder.
3—Webster Perks Heavy Grinders.

PLANERS.

1—Pond, 62" (widened pattern type), 9' bed.
1 36 x 36 x 10 Industrial Planer, 1 rail head and 1 side head.
1 34 x 10' Badger, S.H.

TURRET LATHES.

1 No. 6 Foster Friction Geared Hand Screw Machine.
1 No. 4 W. & S. Friction Geared Hand Screw Machine.
1- No. 4 Smurr & Kaven Friction Geared Hand Screw Machine.
1 -14" B. & O. Chucking Machine.
1 No. 5 Pearson Hand Screw Machine.
1—1 x 8 Pierce Hand Screw Machine (new).
1 2" Cleveland Automatic Screw Machine (model A).
2 2" Cleveland Jigger Feed Screw Machines.
1 ⅝" Cleveland Automatic Screw Machine (model A).

AIR COMPRESSORS.

Steam.

1- 12 x 12 x 12¼ x 12 Ingersoll-Rand, Class M.F.I.
1 -16 x 18 x 12 D. A. Union S.L. 2 S. Air Compressor.

Belt.

3 -10 x 10 Bury Hor., Belt-Driven (182 C.F.).
1- 10 x 10 Curtis Vertical, D.C., with base (160 C.F.).
1 8 x 8 Ingersoll Sergent Horizontal (100 C.F.).
1 - 8 x 8 Chicago Pneumatic Horizontal (110 C.F.).
1 10 x 6 Bury Horizontal.

DRILLS AND SLOTTERS.

1 24" Niles Geared Slotter.
1—28" Prentiss, B.G., P.F., W. & L.F.
2 20" Rockford, B.G., P.F., W. & L.F.
3—20" Buffalo (new), W. & L.F.
1—17-Spindle Moline.
1 5-Spindle Barnes.

PUNCH PRESSES.

1 No. 64 Toledo, S.S., B.G.
1—No. 95 Consolidated Press.
2—Briscoe S.S., 7" stroke.
2—1200-lb. B. & S. Roll Board Hammers.
1—800-lb. B. & S. Roll Board Hammer.

We carry a large line of Boilers, Pumps, Engines, Motors, Generators, etc.

Riverside Machinery Depot
Detroit, Mich.

A MAN

was wanted as Tool-room Foreman. He was found by a condensed ad. in

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto

FOR SALE

GRINDING MACHINES

1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16" x 66" Landis Crank Shaft Grinder (18 months old).
2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES

58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13" Gisholt Semi-Automatic (12 mos. old).
20 21" Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES

1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES

1 8-spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.
2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS

1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES

38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES

2 Noble & Westbrook No. 1 (new).

PROFILERS

1 No. 3H Becker (new).

PLANERS

1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 40" x 40" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS

1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES

1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES

1 12" Jackson (new).

KEY SEATERS

1 No. 1 Catlin (new).

SCREW MACHINES

1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅝" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2" x 24" Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼" capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES

1 No. 3 La Pointe (nearly new).

BOLT CUTTERS

1 2" Landis Double Head (nearly new).

BORING AND TURNING MACHINES

1 4' Bickford Boring & Turning Mill (nearly new).
1 20" swing 4-Spindle Moline Vertical Boring Machine with 18" x 36" table.

BULLDOZERS

1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES

1 Large Filing and Sawing Machine with 12" stroke.

PUNCHES AND SHEARS

1 No. 3 Walsh Punch Press.
1 Moser 1½" stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8" throat capacity ¼" x ¼".
1 27½" throat lever punch ½" capacity 1¼" stroke.
1 Thompson Bevel Shear ½" capacity.

PIPE MACHINES

1 6" Saunders.

SHAPERS

1 14" Hendey Geared Friction.
1 20" Hendey Geared Friction.

TAPPING MACHINES

1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2" collapsible taps (new).

THREAD ROLLING MACHINES

1 Waterbury Farrell ⅜" capacity (nearly new).

THREADING MACHINES

5 Special Threading Machines for threading 3" steel shells (nearly new).

SPOT WELDERS

1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

Write us what you want new or second-hand.

32 North Clinton Street, Chicago **W. F. Davis Machine Tool Co.** **403 Singer Building, New York City**

We have for Immediate Shipment

large stocks of different well-known manufacturers'

SMALL TOOLS

in standard sizes, including **CARBON AND HIGH TWIST DRILLS, REAMERS, MILLING CUTTERS, TOOL STEEL AND SPECIAL TOOLS, TAPS, DIES, SCREW PLATES.**

NEW AND SECOND - HAND MACHINERY.

THE CLEVELAND POWER TRANSMISSION CO.
CLEVELAND, OHIO

USED MACHINE TOOLS ALL KINDS

THE MOTCH AND MERRYWEATHER MACHINERY CO
CLEVELAND OHIO

EACH PIECE OVERHAULED GUARANTEED

Used Machinery for Immediate Delivery

BORING MILLS.

51" Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52" Niles Car Wheel Boring Mill.

DRILLS

22" Aurora, S.H., B.G., P.F.
24" Hamilton, B.G., P.F.
32" Hamilton, S.H., B.G., P.F.
32" Hoefer, S.H., B.G., P.F.
34" Barnes, S.H., B.G., P.F.
2½' Dreses Radial.
3½' Industrial Radial.
12 spindle Multiple.
No. 30 C Baush, 12 spindles.

GEAR CUTTERS

24" x 7" G. & E., for spur.
30" x 9" G. & E., spur and bevel.
36" Walcott, for spur.

GRINDERS

No. 5 Diamond Water Tool.
14" x 20" B. & S. Universal.
Gisholt Tool Grinder.

LATHES

12" x 5' Davis, C.R.
14" x 6' LeBlond, C.R., taper.
14" x 6' Porter, C.R.
14" x 6' Rockford, C.R.
14" x 6' Fairbanks, C.R., taper.
15" x 6' Goddard, C.R., taper.
16" x 6' Prentice, C.R.
16" x 6' Sebastian, C.R.
16" x 6' Walcott, C.R.
16" x 8' Lodge & Shipley Pat. Head, C.R., Q.C.G.
16" x 10' Greaves & Klusman, C.R.
17" x 10' Blaisdell, C.R.
18" x 6' Bradford, C.R. taper.
18" x 8' Lodge & Shipley, Pat. Head, C.R. taper.
18" x 8' Bradford, C.R. with turret.
18" x 12' Greaves & Klusman, C.R.
20" x 10' Flather, C.R.
21" x 12' New Haven, C.R.
24" x 16' Schumacher & Boye, C.R.
30" x 14' Reed, C.R.
32" x 16' Blaisdell, C.R.
36" x 12' American, C.R.
36" x 28' American, C.R.

MILLING MACHINES

No. 12 B. & S., plain.
No. 2 Cincinnati, plain.
No. 3 Brown & Sharpe, plain.
No. 4 LeBlond, plain.
No. 13 P. & W., Lincoln.
No. 4 Becker Vertical.

PLANERS

Morton Portable.
22" x 22" x 6' Gray, one head.
24" x 24" x 6' Cincinnati, one head.
30" x 30" x 12' Cincinnati, two heads.
36" x 36" x 12' Powell, one head, arranged for two.
36" x 36" x 12' Cincinnati, two heads.
36" x 36" x 16' Sellers, one head.
39" x 39" x 12' New Haven, one head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.

SCREW MACHINES

No. 1 Chicago Automatic.
1 3/16" Hartford Automatic.
2" Cleveland Automatic.
2¾" Cleveland Automatic.
1" B. & S. Plain.
16" P. & W. Plain.

PRESSES

No. 30 A. Perkins, O.B., Inc.
No. 6 N. American Can. S.S.
No. 174 Consolidated Double Crank.
No. 25 Toledo, O.B., Inc., Cam Drawing.

MISCELLANEOUS

24" Gisholt Turrett Lathe, capacity 6¼".
Allan 2-spindle drill press (new).
Allan 4-spindle drill press (new).
No. 2 Baker Keyseater.
Whitton Centering Machine.
1½" Acme Bolt Cutter.

Write for our stock list.

The H. A. Stocker Machinery Company, 566-572 W. Randolph St., CHICAGO, ILL.

MACHINE TOOLS NEW AND REBUILT

The World is Our Field
SIMMONS
ALBANY N.Y. U.S.A.
har
MACHINERY

SPECIAL AMERICAN LATHE.

1 24 x 24 x 6 High Duty American Planer. Adams Vertical Attachment. Same as new	$1050
9 22" Swing x 8' Bed American Q.C.G. D B G. four sided Turret Tool Post, complete, used 3 months	1050

MILLERS.

1—No. 284 Bement Lincoln Miller, perfect condition	250
2 No. 7 Becker Brainard Lincoln Millers, perfect, each	475
1 No. 24 Oesterline Heavy Plain Miller	1070
1 No. 3 Kempsmith Plain Miller. Sept. delivery	1450

SHAPERS.

1 [illegible] Juengst Crank Shaper, excellent condition	275
1 [illegible] Gould & Eberhardt Shaper, perfect condition	650
1 [illegible] Smith & Mills Crank Shaper perfect condition	450

BORING MILLS.

1 60" Niles Vertical Boring Mills, excellent condition, each	2650
5 60" Sellers Vertical Boring Mills, excellent condition, each	2650

GRINDERS.

1 Standard No. 6 Universal Tool and Cutter Grinder	400
1 10 x 36 Landis Plain Self Contained Grinder	1600

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1 14 x 6 Seneca Falls; Pan Bed, CR; hollow sipndle; complete	425
2—No. 5½ Sloan Chase Bench Lathes, CR, 3 step cone, set collets in 16th, each	300
1—28" swing x 10' bed Ames, PCF, chuck, complete	$ 300
1—18" swing x 8' bed Porter Lathe, CR, PCF, chuck	375
1—30" swing x 9' bed New Haven, Turret Tool Post, chuck taper attachment, complete	460
1—22" swing x 10' bed Niles, CS, FCF, 5 step cone, 3" bed, HS, complete	775
1—40" swing x 14' bed, Harris Lathe, CR, PCF, SS, complete with chuck	800
1—20" swing x 8' bed LeBlonde, CR, PCF, 5 step cone, 2½" belt, hollow spindle, complete	875
1—66" inch swing x 16' bed Pond, CR, PCF, HS, 4½" hollow spindle, 5" belt, complete	2000

PLANERS.

1 24 x 24 x 6 Gray Planer, excellent condition	675
1—30 x 30 x 16 Bement Extra Heavy, perfect condition	750
1—30 x 30 x 7 Flather High Duty Planer, perfect condition	850
1—30 x 30 x 8 Pond Extra Heavy Type, perfect condition	1200

DRILLS.

1—4' Fosdick Plain Radial; single pulley drive; same as new	1150
1—24" Sliding Head Prentiss Back Geared Drill	150

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1—No. 68 N Bliss Press, double acting, good as new	550
1—48 x 12 Gould-Eberhardt Gear Cutter, all attachments, perfect condition	[illegible]

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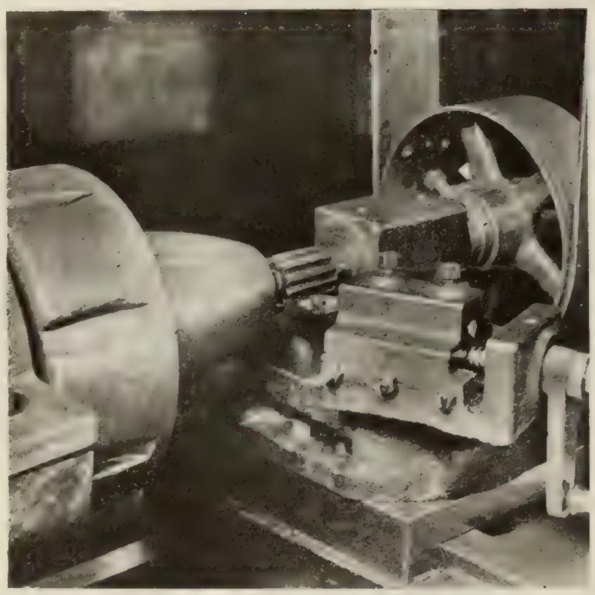
4.5 Mark VII Plant For Sale

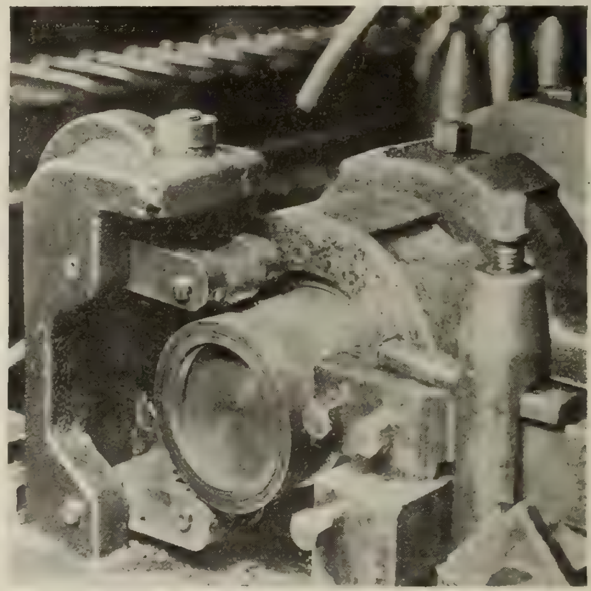
Immediate Delivery

The following machines have been changed from the mark V shell to the mark VII. We will dispose of these machines with their tooling. Every machine has been examined and put into first-class shape.

2—30" American Turret Lathes, Triple Geared; 36" turret base; will take both 3" and 4" boring bars; extension heads on turrets; special small turret or cross-slide with six 1½" holes; 20" 3 jaw Universal steel chucks; Power Feed and Power Reverse. All tooled, boring bars, pot chuck, etc., each	$1300
1—22" x 10' Pond Engine Lathe; back geared and screw feed. All tooled for outside profile operation on Mark VII. shell	$525
1—22" x 10' London Single Drive Engine Lathe; quick change gear box with screw and rod feed. All tooled for outside profile operation on Mark VII. shell	$700
1—24" x 10' Lodge & Barker Back Geared Engine Lathe; screw feed. All tooled for outside profile operation on Mark VII. shell	$500
2—24" Morse Turret Lathes; with 3-jaw Universal chuck; 16" base turret having six 3" holes. All tooled, with pot chuck, for hogging-out base of Mark VII. shell, each	$800
1—Jenckes Band Turning Machine; collet chuck. This machine has band-turned about 15,000 shells. All tooled for Mark VII. shells	$900
1—24" x 12 Bertram Engine Lathe, all tooled with special milling fixture for threading the base recess of Mark VII. shell	$900
1—24" Morse Special Turret Lathe; carriage feed; all tooled with pot chuck and forming tool for finish base recess of Mark VII. shell, each	$900
1—4.5 Brown-Boggs Marking Machine, latest model. New	$200
1—Special Painting Machine, with 110 volt alternating current motor	$50
1—150-ton Hydraulic Nosing Outfit, consisting of 1 Triple Action Pump (Perrin); 1 Accumulator (Perrin); 1 Nosing Press (Perrin), with Mark VII. die complete; 1 Chapman Banding Attachment for Press	$1075



The only correct time to perform the seating operation is to do it in the same fixture with the milling operation. This fixture will fit any engine lathes, and costs only $120.00, including milling, cutter and seating tool. The angle of seating can never vary.



Most of the British Shells may now be knurled. This fixture is quick in operation and most accurate. The cost is only $100.00, and it can be used as an attachment to almost any lathe.

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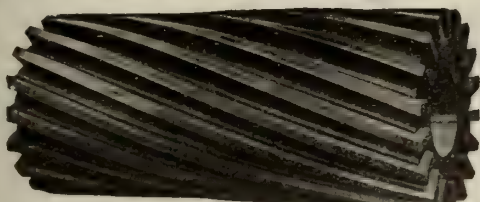

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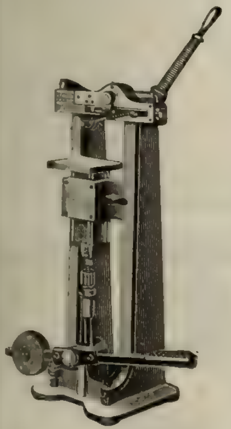

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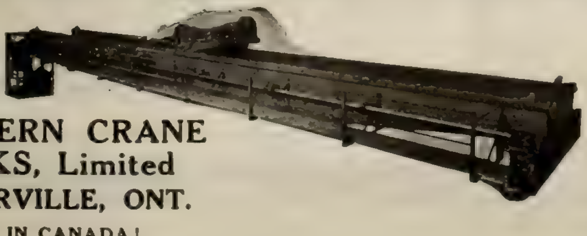

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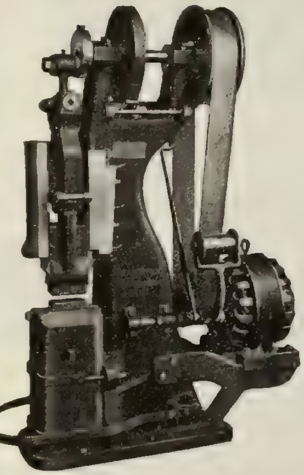

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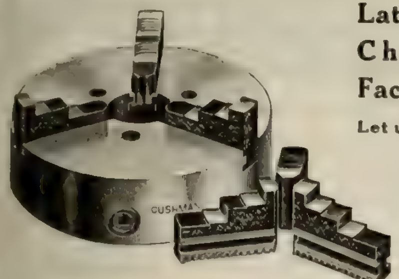

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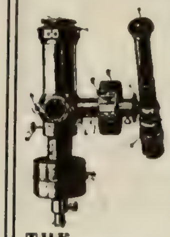

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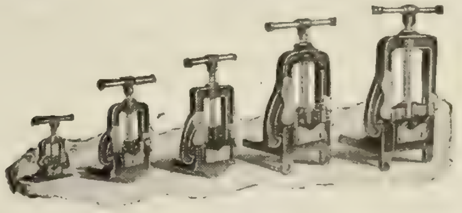

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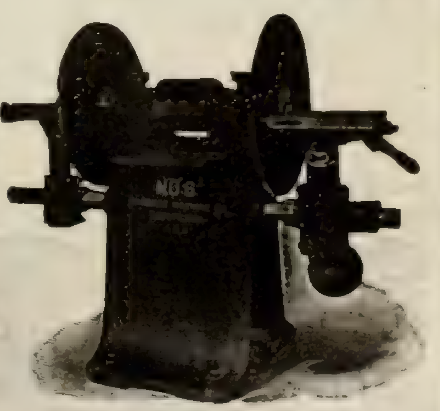

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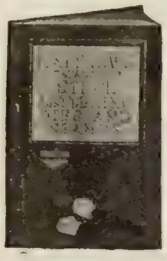

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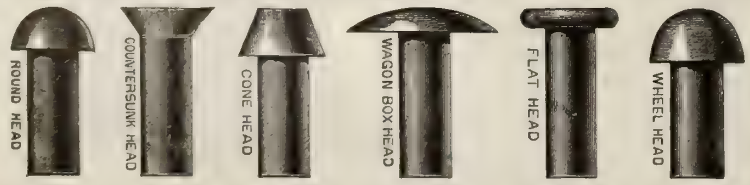

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Wickes Bros., Saginaw. Mich.

BOARTZ
Geo. A. Joyce Co., Ltd., New York, N.Y.

BOILERS
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Wickes Brothers, Saginaw, Mich.

BOILER MAKERS' SUPPLIES
Jno. F. Allen Co., New York.

BOLT CUTTERS AND NUT TAPERS
Aikenhead Hardware Co., Toronto, Ont.
Canada Machinery Corp., Galt, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
Galt Machine Screw Co., Galt, Ont.
London Bolt & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

BOLT AND NUT MACHINERY
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machinery Co., Toronto.

BOLT THREADING MACHINERY
Cook, Asa S., Co., Hartford, Conn.

BORING MACHINES, PNEUMATIC CYLINDER
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghampton, N.Y.

BORING MACHINES, UPRIGHT AND HORIZONTAL
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Dominion Machinery Co., Toronto.
Garlock-Walker Machy. Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Roelofson Machine & Tool Co., Toronto, Ont.
Stow Mfg. Co., Binghampton, N.Y.

BORING AND TURNING MILLS
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy Co., Montreal.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

BRACKETS, ADJUSTABLE ELECTRIC LIGHT
Darling Bros., Ltd., Montreal, Que.
McCrosky Reamer Co., Meadville, Pa.

BRAKES
Brown, Boggs & Co., Hamilton, Can.
Steel Bending Brake Works, Ltd., Chatham, Ont.

BRASS RODS
Brown's Copper & Brass Rolling Mills, New Toronto.

BRASS WORKING MACHINERY
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Warner & Swasey Co., Cleveland.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

BRIDGES, RAILWAY AND HIGHWAY
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke, Que.

BRONZE RODS AND SHEETS
Brown's Copper & Brass Rolling Mills, New Toronto.

BUBBLERS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

BUCKETS, CLAM SHELL, CRAB AND DUMP
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

BUCKETS, ELEVATING AND HOISTING
Banfield, Edwin J., Toronto.

BUFFING AND POLISHING MACHINERY
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Lachapelle, J. D., & Co., Montreal, Que.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.

BULLDOZERS
John Bertram & Sons Co., Dundas.
E. W. Bliss Co., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, O.

BURNERS, FUEL OIL AND NATURAL GAS.
Lachapelle, J. D., & Co., Montreal, Que.
Northern Crane Works, Ltd., Walkerville, Ont.
Oven Equipment & Mfg. Co., New Haven, Conn

BURRING REAMERS.
Wells Bros. Co. of Canada, Galt, Ont.

BURRS, IRON AND COPPER.
Parmenter & Bulloch Co., Gananoque.

BUTTERISERS.

Wells Brothers Co. of Canada, Galt, Ont.

CABLE, RUBBER-COVERED

Lachapelle, J. D., & Co., Montreal, Que.

CANNERS' MACHINERY.

Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.

CARS, INDUSTRIAL.

Can. Blower & Forge Co., Berlin, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER

Bawden Machine Co., Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Alexander Fleck, Ltd., Ottawa.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Ontario Specialties, Ltd., Ottawa, Can.
Tallman Brass & Metal Co., Hamilton.

CASTINGS, GRAY IRON.

Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Steel Foundries, Ltd., Montreal, Que.
Alexander Fleck, Ltd., Ottawa.
Gardner, Robt., & Son, Montreal.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound.
Plessisville Foundry Co., Plessisville, Que.

CASTINGS, STEEL CHROME AND MANGANESE STEEL.

Can. Steel Foundries, Ltd., Montreal, Que.
Dominion Steel Foundry Co., Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Wm. Kennedy & Sons, Ltd., Owen Sound.
Galt Malleable Iron Co., Galt.
Ontario Specialties, Ltd., Ottawa, Can.

CASTINGS, MALLEABLE.

Can. Steel Foundries, Ltd., Montreal, Que.
Galt Malleable Iron Co., Galt.

CASTINGS, NICKEL STEEL.

Hull Iron & Steel Foundries, Ltd., Hull, Quebec.

CEMENT, IRON.

Shelton Metallic Filler Co., Derby, O.

CEMENT MACHINERY.

Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son, Montreal.
H. W. Petrie, Toronto.

CENTRE REAMERS.

Wells Brothers Co., Greenfield, Mass.
John Bertram & Sons Co., Dundas.
Gardner, Robt., & Son, Montreal.
Hurlbut, Rogers Machy. Co., South Sudbury, Mass.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.

CHAIN BLOCKS.

Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Foss & Hill Machy. Co., Montreal.
Lyman Tube & Supply Co., Montreal, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

CHEMISTS.

Can. Inspection & Testing Lab., Montreal, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Toronto Testing Laboratory, Ltd., Toronto.

CHUCKS, AERO, AUTOMATIC.

Garvin Machine Co., New York.

CHUCKS, DRILL, LATHE AND UNIVERSAL.

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Can. Blower & Forge Co., Berlin, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Celtor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Cushman Chuck Co., Hartford, Conn.
Detroit Pneumatic Chuck Co., Detroit, Mich.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford.
Manufacturers Equipment Co., Chicago, Ill.
Milholland, W. K., Co., Indianapolis, Ind.
McCrosky Reamer Co., Meadville, Pa.
Modern Tool Co., Erie, Pa.
Montreal General Tool Co., Montreal, Que.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Skinner Chuck Co., New Britain, Conn.
Thomas Elevator Co., Chicago, Ill.
D. E. Whiton Machine Co., New London, Conn.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS.

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Aikenhead Hardware Co., Toronto, Ont.

CHUCKS, FRICTION AND TAP

Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, RING WHEEL.

Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKING MACHINES.

Garvin Machine Co., New York.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Turner Machine Co., Danbury, Conn.
Warner & Swasey Co., Cleveland, O.

CLUTCHES.

Positive Clutch & Pulley Works, Ltd., Toronto.

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Whiting Foundry Equipment Co., Harvey, Ill.

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Hanna & Co., M. A., Cleveland, O.
Zenith Steel & Coal Products, Montreal, Que.

COLLECTORS, PNEUMATIC.

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Sheldons, Limited, Galt.

COLLETS

Manufacturers' Equipment Co., Chicago, Ill.
McCrosky Reamer Co., Meadville, Pa.
Stone Tool & Supply Co., J. R., Detroit, Mich.

COMPRESSORS, AIR.

Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W Petrie, Toronto.
Smart-Turner Machine Co., The, Hamilton.
Wickes Brothers, Saginaw, Mich.

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Darling Bros., Ltd., Montreal, Que.

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Lachapelle, J. D., & Co., Montreal, Que.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

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Whiting Foundry Equipment Co., Harvey, Ill.

COPING MACHINES.

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John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

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Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.

COUNTERSHAFTS.

Baird Machine Co., Bridgeport, Conn.
Webber Bros. Mach. Co., Toronto, Ont.

COUPLINGS.

Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.

CRANES, LOCOMOTIVE.

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Northern Crane Works, Walkerville.

CRANES, GANTRY.

Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, GOLIATH AND PNEUMATIC

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Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, PORTABLE.

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Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

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Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRIMPS, LEATHER.

Graton & Knight Mfg. Co., Montreal.

CUPOLAS.

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Northern Crane Works, Walkerville.
H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

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Sheldon's, Ltd., Galt, Ont.

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Garvin Machine Co., New York.
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CUTTERS, FLUE.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING.

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Cleveland Twist Drill Co., Cleveland.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machinery Co., Montreal.
Garvin Machine Co., New York.
Morse Twist Drill and Machine Co., New Bedford
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Stenotype Co., Indianapolis, Ind.
Tabor Mfg. Co., Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.

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Racine Tool & Machine Co., Racine, Wis.

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Canadian Fairbanks-Morse Co., Ltd., Montreal.
Foss & Hill Machy. Co., Montreal.
Garlock-Machinery, Toronto.
Garvin Machine Co., New York.
Hurlbut, Rogers Machy. Co., South Sudbury, Mass.
John H. Hall & Sons, Brantford, Ont.
Wm. Kennedy & Sons, Owen Sound, Ont.
Peerless Machine Co., Racine, Wis.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Racine Tool & Machine Co., Racine, Wis.
Root & Van Dervoort Engr. Co., East Moline, Ill.
Tabor Mfg. Co., Philadelphia, Pa.

DAMPER REGULATORS.

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Darling Bros., Ltd., Montreal, Que.

DERRICKS

Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co., Montreal.

DIAMONDS, BLACK AND ROUGH

Geo. A. Joyce Co., Ltd., New York.

DIE BLOCKS

Hammond Steel & Forging Co., Syracuse, N.Y.

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Geo. A. Joyce Co., Ltd., New York.

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Matthews, Jas. H. & Co., Pittsburgh, Pa.

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Banfield, W. H., & Son, Toronto.
Butterfield & Co., Rock Island, Que.
Brown, Boggs & Co., Hamilton, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
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Pratt & Whitney Co., Dundas, Ont.
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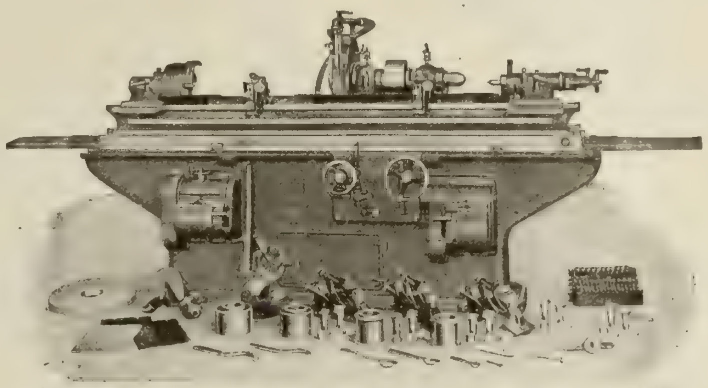

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Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machinery Co., Toronto.

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Modern Tool Co., Erie, Pa.

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Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rockford Driling Mach. Co., Rockford, Ill.

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John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Dominion Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Turner Machine Co., Danbury, Conn.

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Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.

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Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rockford Driling Mach. Co., Rockford, Ill.
A. R. Williams Machy. Co., Toronto.

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Keystone Mfg. Co., Buffalo, N.Y.

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W. F. & John Barnes Co., Rockford.
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Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
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Pratt & Whitney Co., Dundas, Ont.
United States Electrical Tool Co., Cincinnati.

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Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy. Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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Celfor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
L. S. Starrett Co., Athol, Mass.

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Cleveland Pneumatic Tool Co. of Canada, Toronto.

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Can. Blower & Forge Co., Kitchener, Ont.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Lachapelle, J. D., & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.
A. R. Williams Machy. Co., Toronto.

DRILLS, HIGH SPEED
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Power Transmission Co., Cleveland, O.
Cleveland Twist Drill Co., Cleveland.
Can. Fairbanks-Morse Co., Cleveland.
H. A. Drury Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Morse Twist Drill & Machine Co., New Bedford.
W. F. & John Barnes Co., Rockford, Ill.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, MULTIPLE SPINDLE
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.

DRILLS, PNEUMATIC
John F. Allen Co., New York.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York.

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Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago.
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
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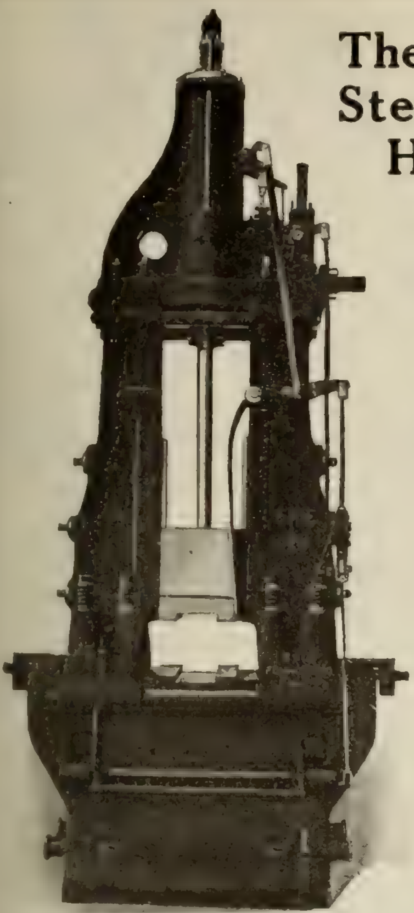

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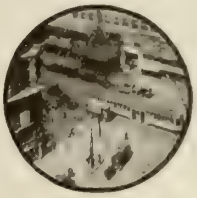

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H. F. GADSBY writes on "Conserving the Conservatives"—a political article that both Liberals and Conservatives will find good reading : : : Peter McArthur, farmer-author, begins a series of stories in the November Number with "The Witch of Atlas"—extremely good : : : Robert W. Service has another "At the Front" poem—"Fleurette," strong yet tender : : : H. M. Tandy, a Canadian writer of fine ability, has a story, "Straw-Stack Strategy"—fine! : : : Serial stories by Arthur Stringer and Arthur E. McFarlane.

CONTRIBUTORS:

Arthur Stringer
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Niles-Bement Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
Wickes Bros., Saginaw, Mich.
A. R. Williams Machy. Co., Toronto.

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Yeates Machinery, London, Ont.

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Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Jenckes Mach. Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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Can. Fairbanks-Morse Co., Montreal, Que.
Hepburn, John T., Ltd., Toronto.
Himoff Machine Co., Inc., New York, N.Y
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Roelofson Mach. & Tool Co., Toronto, Can.
Root & Van Dervoort Engr. Co., East Moline, Ill.

LATHES, SCREW CUTTING

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Cincinnati Iron & Steel Co., Cincinnati, O
Davenport Locomotive Works, Davenport, Iowa.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Gisholt Mach. Co., Madison, Wis.
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Niles-Bement-Bond Co., New York.
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Canada Machinery Corp., Galt, Ont.
Cincinnati Iron & Steel Co., Cincinnati, O
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Hepburn, John T., Ltd., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
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LOCOMOTIVES

Davenport Locomotive Works, Davenport, Iowa.

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Cataract Refining & Mfg. Co., Toronto.

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Roper, C. F., & Co., Hopedale, Mass.

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Foss & Hill Machy. Co., Montreal.
New York Machinery Exchange, New York.
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H. W. Petrie, Toronto.
Stocker, H. A., Machinery Co., Chicago, Ill.
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Hendey Machine Co., Torrington.
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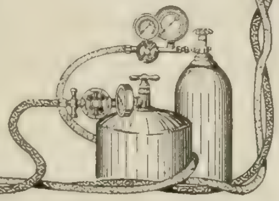

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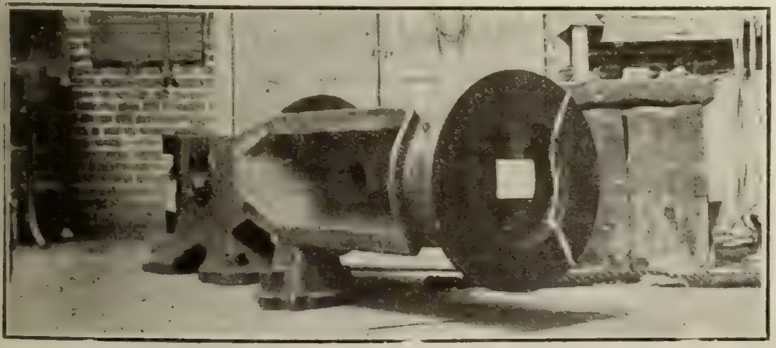

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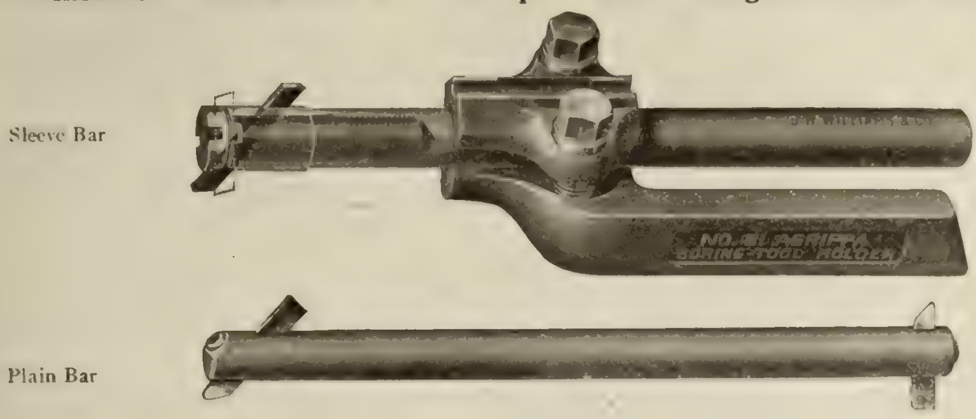

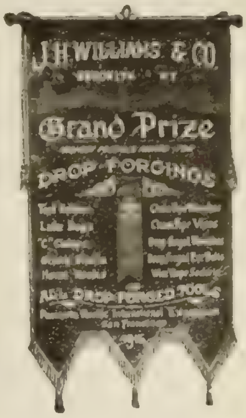

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AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XVI. TORONTO, OCTOBER 19, 1916 No. 16

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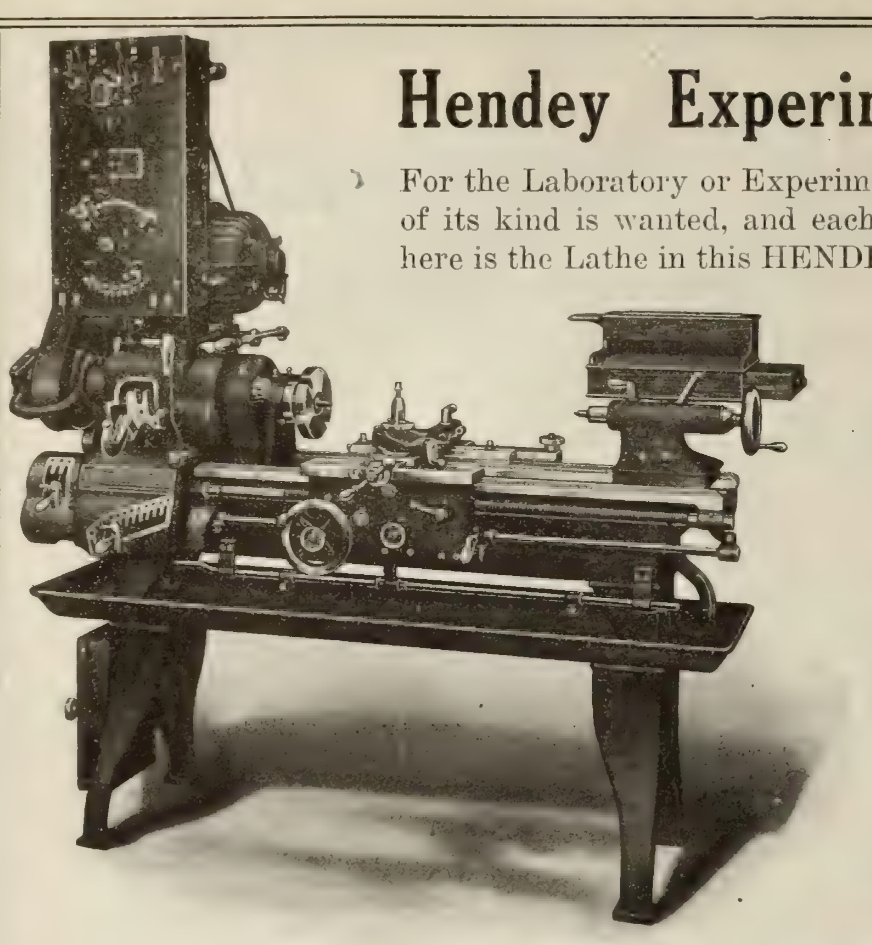

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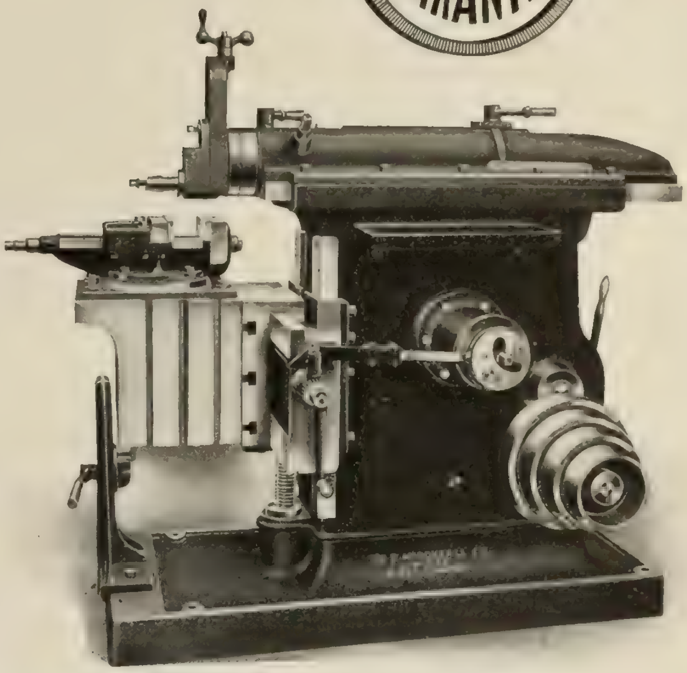

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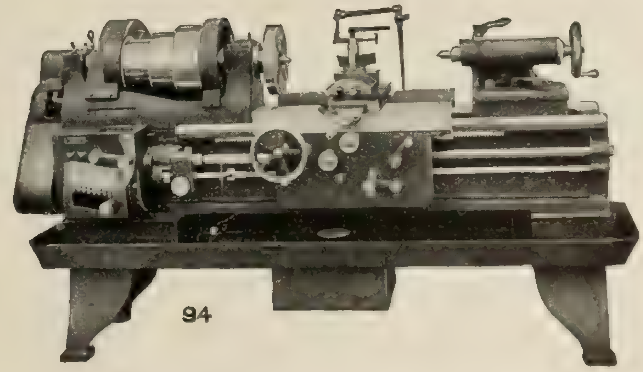

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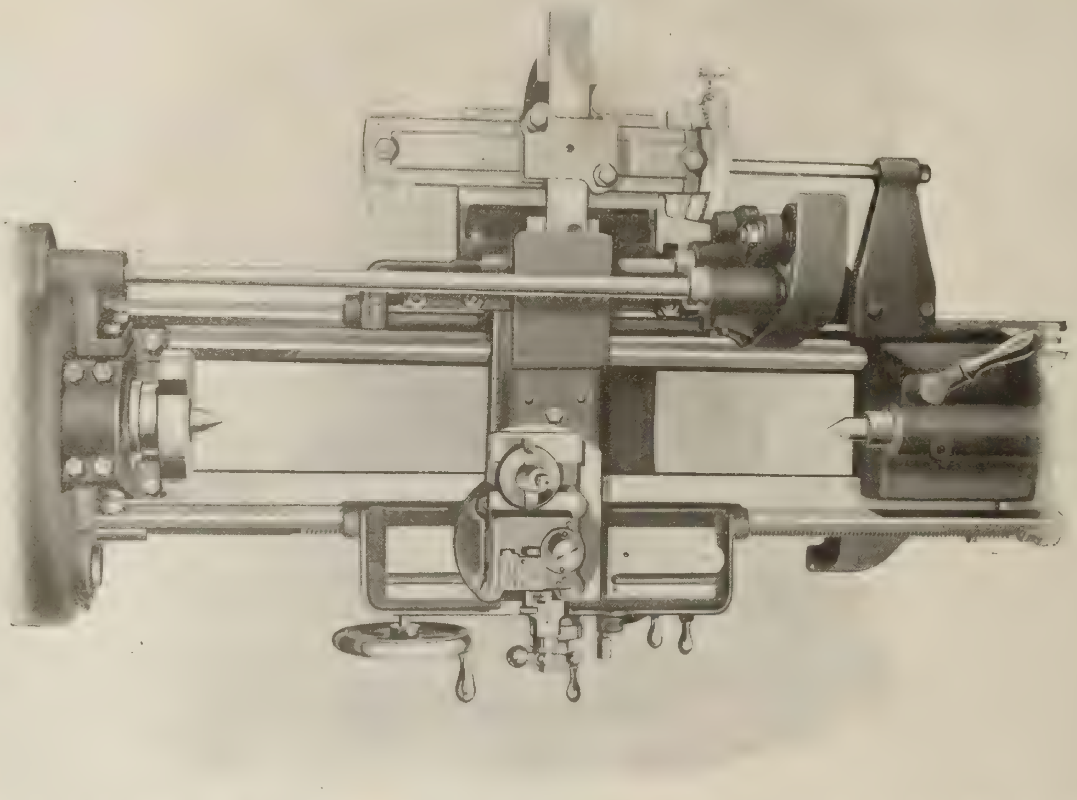

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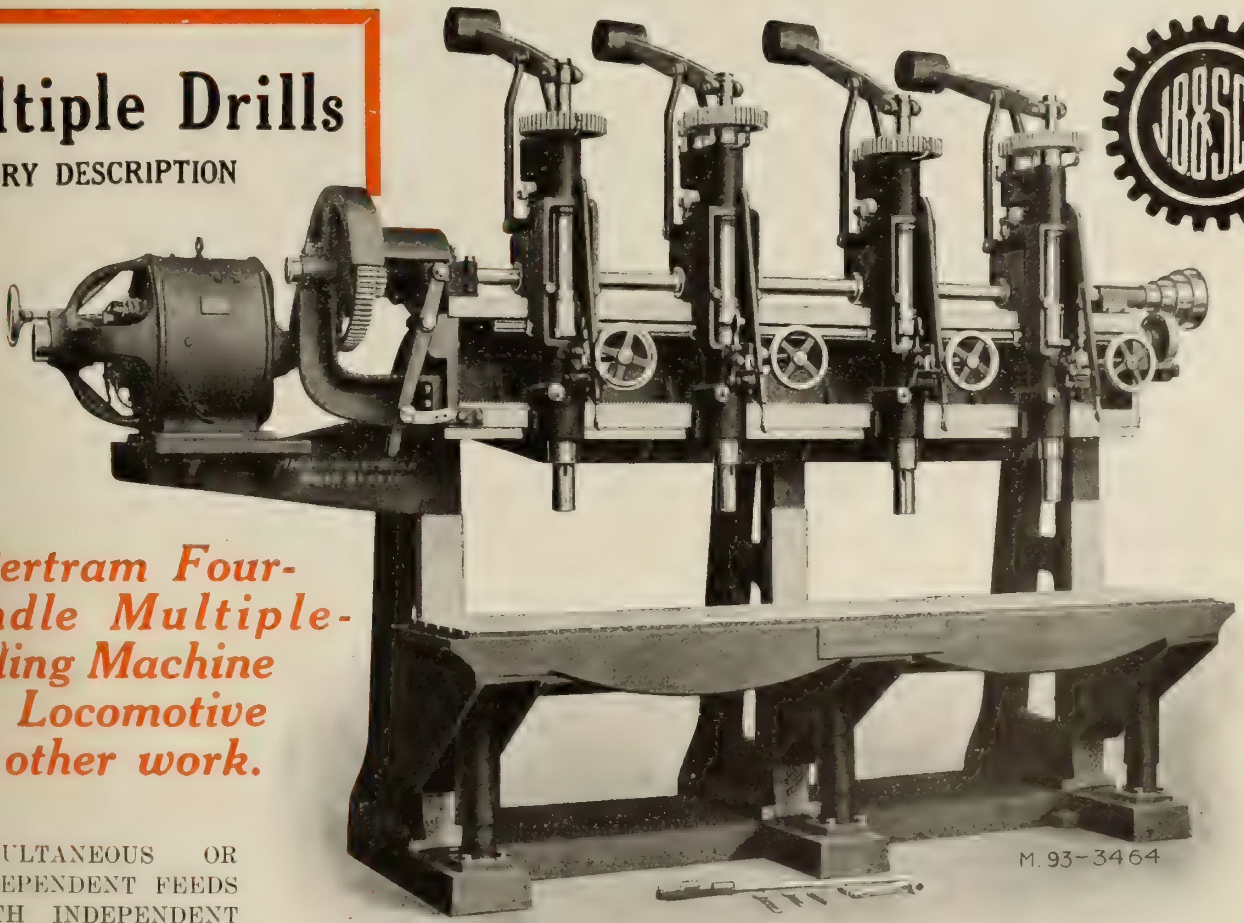

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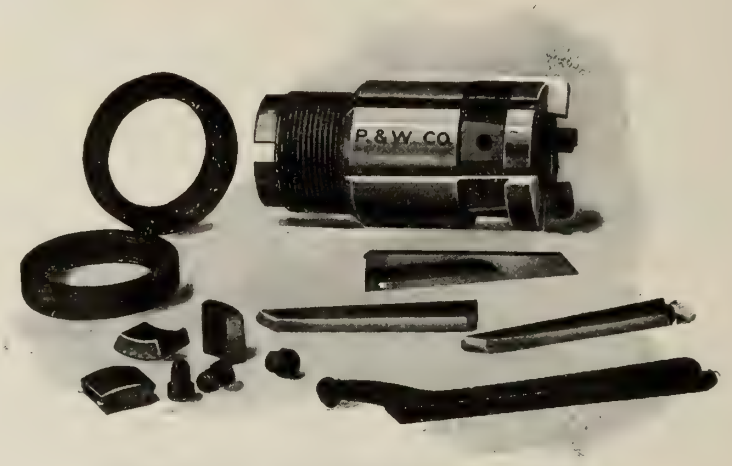

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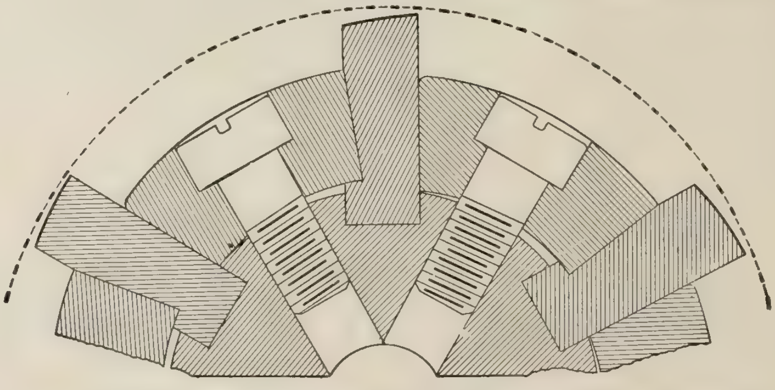

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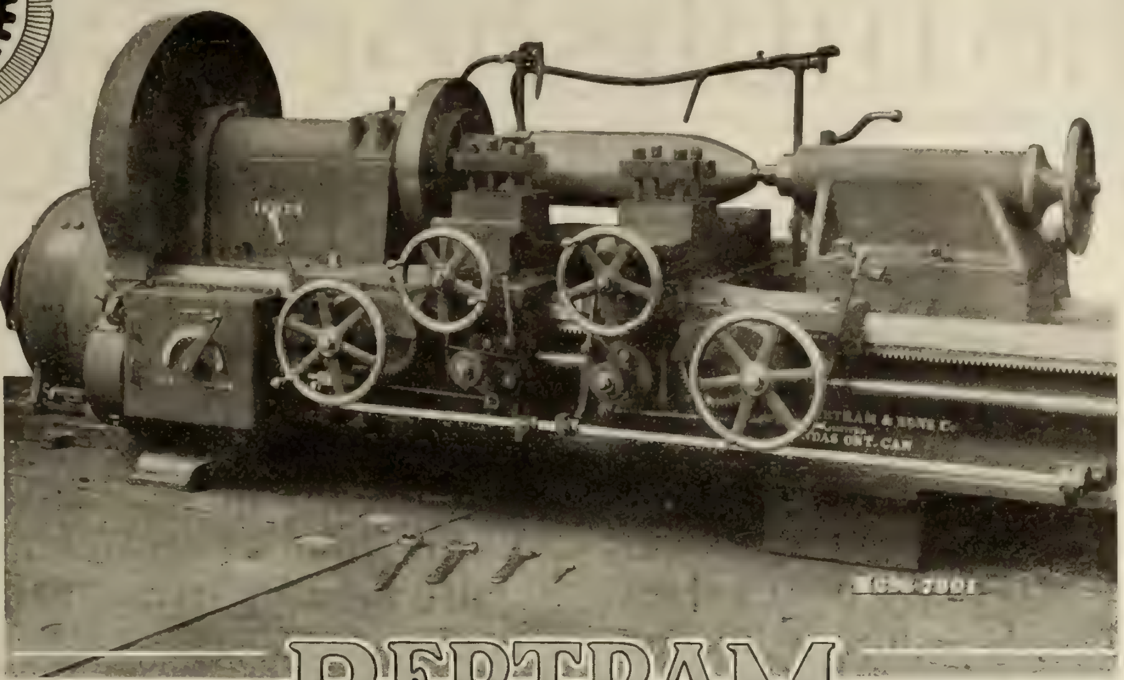

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The Publisher's Page

TORONTO October 26, 1916

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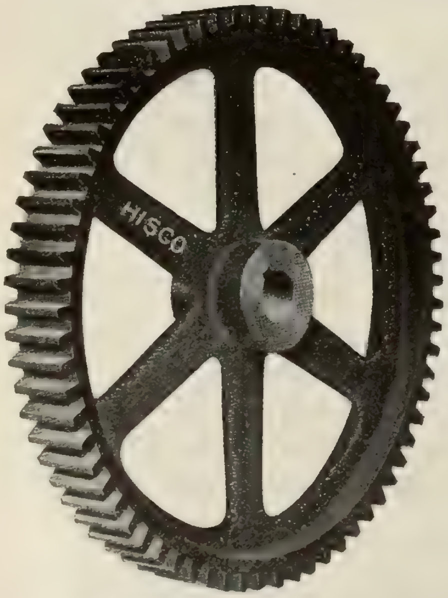

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Any size up to 18 feet in diameter, in either steel, semi-steel or grey iron. No patterns required.

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IF ITS CASTINGS WRITE TO US
ADAMANTINE MANGANESE STEEL

Also manufacturers of all parts pertaining to Cement Mill Machinery, Crushing, Mining and Dredging Plants in "Adamantine," Chrome, Manganese and Nickel Steel.

Let us figure on your requirements. Write

HULL IRON & STEEL FOUNDRIES, Limited
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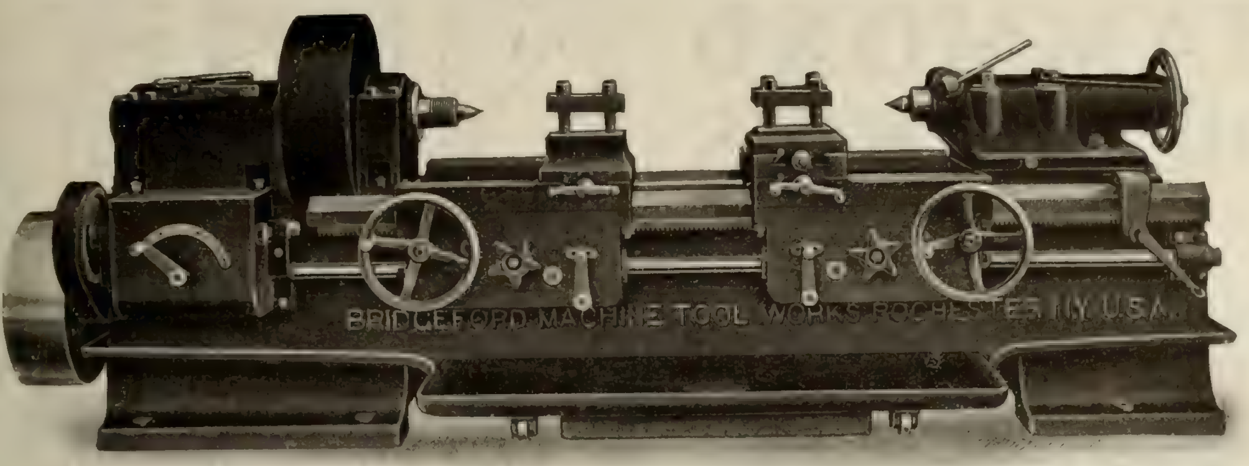


"BRIDGEFORD" 27-in. HEAVY DUTY LATHE

The Ideal Machine for Rough-Turning Shells

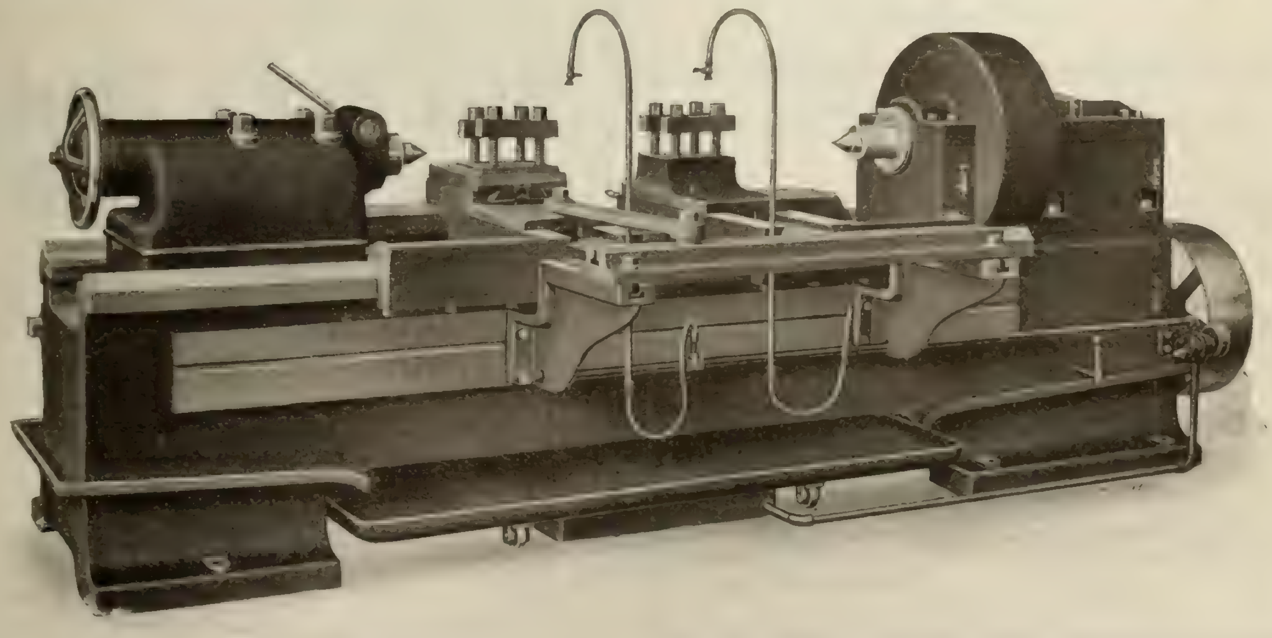
This is an especially heavy duty machine, and as shown in the engravings, is arranged for rough-turning 8", 9.2" or 12" shells. Power is transmitted through 8" driving belt, with three instantaneous speed changes through hardened steel gearing. Main driving gear 6½" face. Four instantaneous feed changes—all through cut steel gearing, running in oil. Leading shell manufacturers have from 70 to 120 of these machines in operation—giving remarkably satisfactory results.

Owing to greatly increased facilities, we can make early deliveries on Bridgeford lathes. Write us.

BRIDGEFORD MACHINE TOOL WORKS

HEAVY LATHE SPECIALISTS FOR 20 YEARS

237 MILL STREET **ROCHESTER, N.Y**



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FOR

Difficult Dies and Record Runs

Speed in Machining

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SPECIAL

Trimmer Tool Steels

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HAMMERED crucible cold trimmer Die Tool Steel means longer runs between grindings—less wasted time dragging down production.

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"Hammered from Ingot to Finished Bar"

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SHRAPNEL SHELLS

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Only Company in Canada producing steel ingots by the "HARMET" Liquid Process.

REASONS WHY THESE INGOTS ARE SUPERIOR TO THE ORDINARY KIND:

1. Prevention of cracks, due to shrinkage; of internal stresses and resulting cracks and fissures.
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4. Prevention of "Pipes" or interior cavities, and thus preservation of absolute solidity in the ingot.
5. Improvement in physical properties.
6. Reduction in waste of ingot.

WE CAN SUPPLY FORGINGS OF ALL SHAPES AND SIZES MADE OF ORDINARY OR "HARMET" FLUID COMPRESSED OPEN-HEARTH STEEL ON THE SHORTEST NOTICE.

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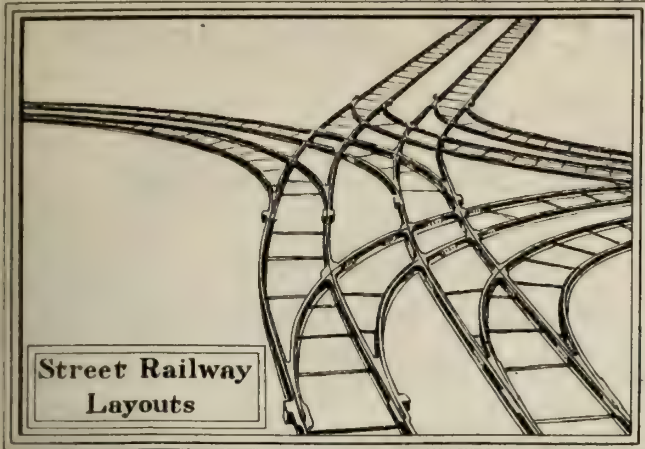

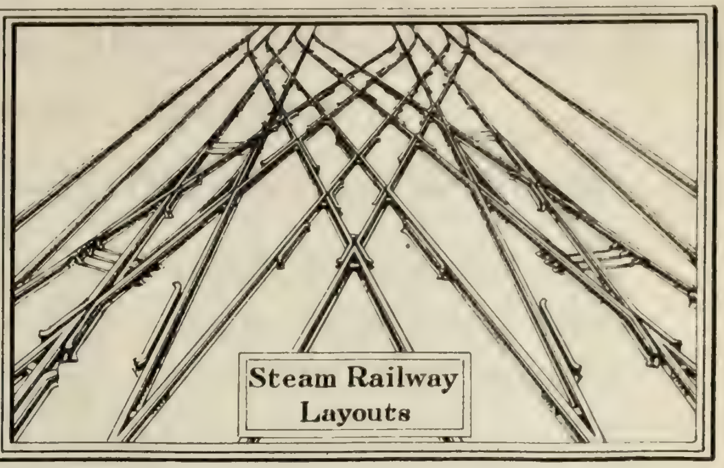

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Manufacturers of

SHELL FORGINGS

We have the Equipment and Experience and can execute orders for

Nose Sockets Base Plates Adapter Plates

For any size Shells. Can execute orders promptly.

SPECIAL FORGINGS—We can make any forging that can be made under Drop Hammers.
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Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX	Carbon Tool Steel
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Chrome Vanadium Steel	

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

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YOUNG, CORLEY AND DOLAN, Inc.

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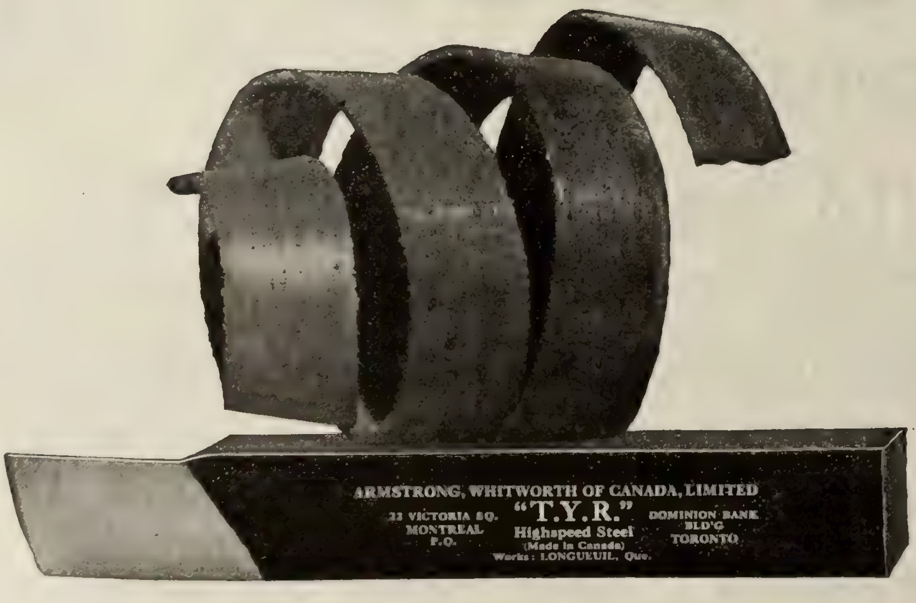
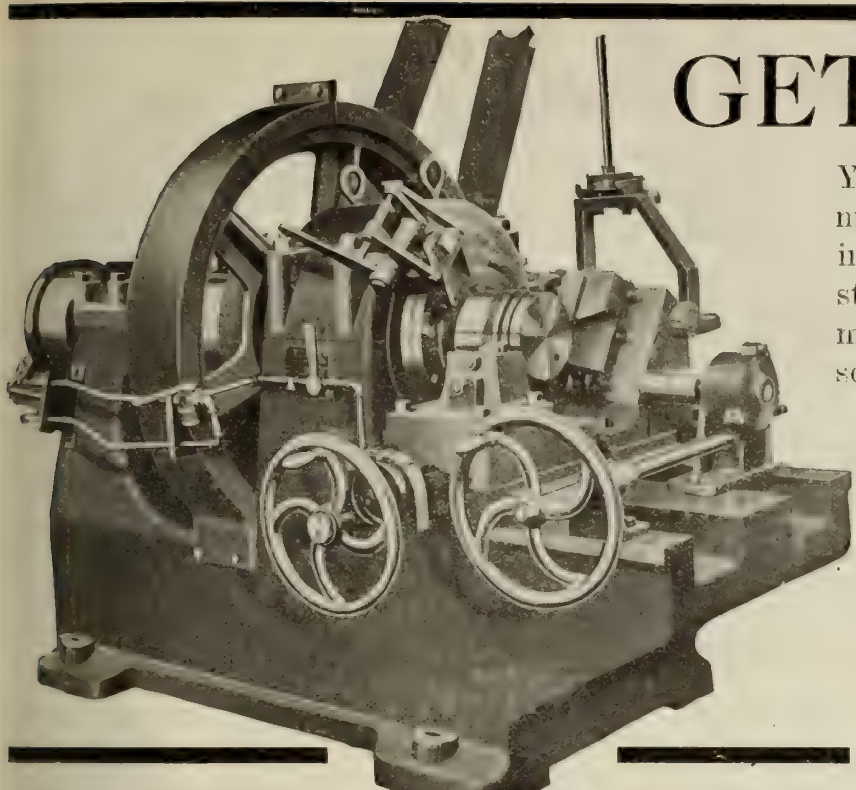

ARMSTRONG, WHITWORTH OF CANADA, LIMITED
22 VICTORIA SQ. MONTREAL P.Q.
"T.Y.R." Highspeed Steel (Made in Canada)
Works: LONGUEUIL, Que.
DOMINION BANK BLD'G TORONTO

Immediate shipment of all standard sizes and shell-turning sizes can be made from stock.

MADE IN CANADA



GET THE BEST

You must figure as close in the shell-making game as in any other line. Nothing but the best machines should be installed if efficiency of operation and maximum of production are to be secured.

The Jenckes Single Purpose Lathes for shell work have established themselves with shell makers as the best and most efficient machine tools yet designed for this class of work.

Illustration shows the latest of these—a Banding Lathe for 8" shells. Note the liberal proportions, the general appearance of sturdiness. They mean an extra measure of long and efficient service.

These machines are also manufactured for 18 pdr. 4.5", 5", 6", 8", 9.2", 12" and 14" shells; are tooled when required for the mm. sizes corresponding to Russian and French ammunition.

THE JENCKES MACHINE COMPANY, LIMITED

WORKS: Sherbrooke, Que.
St. Catharines, Ont.

SALES OFFICES:
727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

Red Cut Superior High Speed Steel

Quality First
THE BEST FOR MACHINING ALL HARD MATERIALS

Are your tools made of **Red Cut**?
Send for folder

VANADIUM-ALLOYS STEEL COMPANY
PITTSBURGH, PA.
Works at Latrobe, Pa.

EXTRA Die Steel

is produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

You get extra service from "EXTRA" DIE STEEL. A trial is convincing.

H.A. DRURY COMPANY LIMITED
STEEL
MONTREAL TORONTO NEW YORK

Manufactured By SANDERSON BROTHERS & NEWBOULD, Limited
SHEFFIELD, ENGLAND

STELLITE

HIGH SPEED TOOL METAL

MADE IN CANADA
STELLITE

NOT A STEEL

CONTAINS NO IRON

Run your machines faster and get larger production

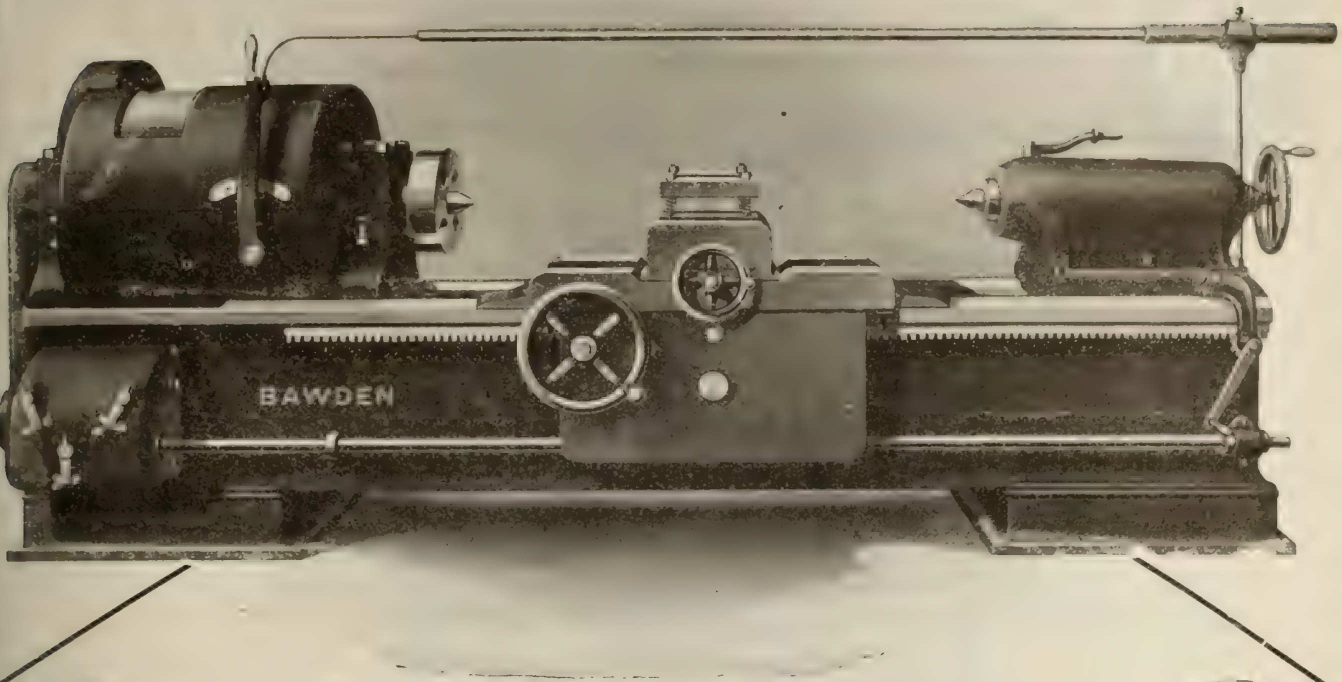
If your steel tools won't stand faster driving use "Stellite." It won't burn up no matter how fast the machines are driven, for it has no temper. Stellite cuts as well when red hot as when cold. It eliminates the necessity of cutting compound. Increases output 20 to 300 per cent, at no extra cost for equipment.

It is hard. It is tough; use according to directions and it will give you the most startling demonstration of turning you have ever seen.

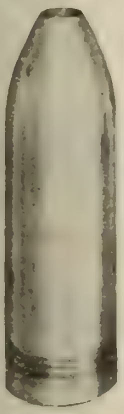
Made in Canada by
THE DELORO MINING AND REDUCTION CO., LIMITED
DELORO, ONTARIO

The Canadian B. K. Morton Co., Limited

SOLE SELLING AGENTS FOR CANADA AND NEWFOUNDLAND
49 Common St., MONTREAL, QUE. 86 Richmond St. East, TORONTO, ONT.



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.



BAWDEN

Heavy Duty Shell Lathes

They are perfect for heavy work. They stand up under the heaviest strain, being of tremendous strength and complete rigidity.

Being positively and permanently accurate, they discharge their duty with precision and speed. So they save material and time.

A Bawden Lathe will have a value after the war. Use it now for Shell-making, and in peace times for some specialty—for a Bawden is made to to last.

Investigate the **Bawden** and have it prove itself to you. We'll help you without hesitation or concealment to get the facts and records.

We've already done all this and so know that we're not taking chances.

Send for complete specifications of Lathe illustrations.

Note: We manufacture a full line of gauges for all sizes of British, French and Russian Shells and component parts.

The Bawden Machine Co., Limited
TORONTO, CANADA

GARLOCK-WALKER MACHINERY CO.
LIMITED

G&W MACHINERY

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

WE HAVE AT TORONTO FOR IMMEDIATE DELIVERY:—

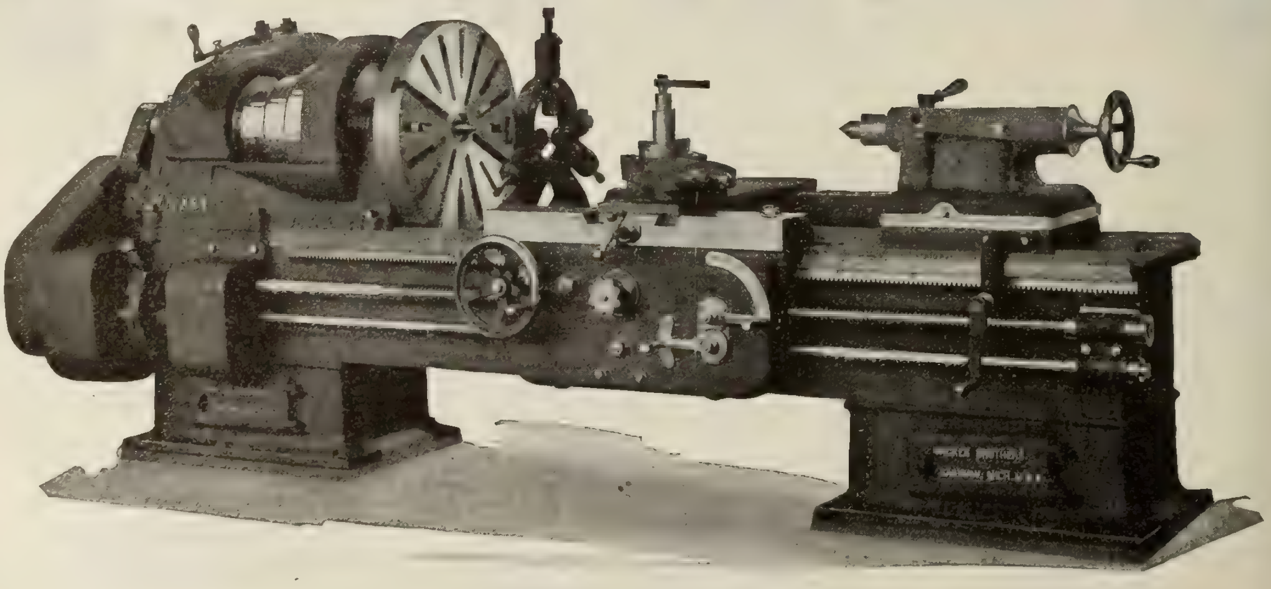
New **Davis 6″ Cutting-off Machines**, fully equipped, size of hole in spindle $6\frac{7}{8}$″.
New **Giddings & Lewis** 18″ x 8′ Heavy Duty Engine Lathes, 3- step Cone, Double Back Gears, regular equipment.
New Heavy Duty Lathes for turning 8″ and 9.2″ Shells.
Thor pneumatic hammers and drills.
Appleton Grinder—Challenge No. 1—slightly used.

Special 16,000 lb. 40″ Boring Lathes for 6″ Projectiles.
Immediate Delivery—Special Price—Write for Cuts, etc.
Good Delivery now on Lodge & Shipley 24″ Lathes.
Ask for information about machines for any operation on 3″, 4.5″, 5″, 6″, 8″ or 9.2″ Projectiles.—Our Experience is at Your Service—

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds

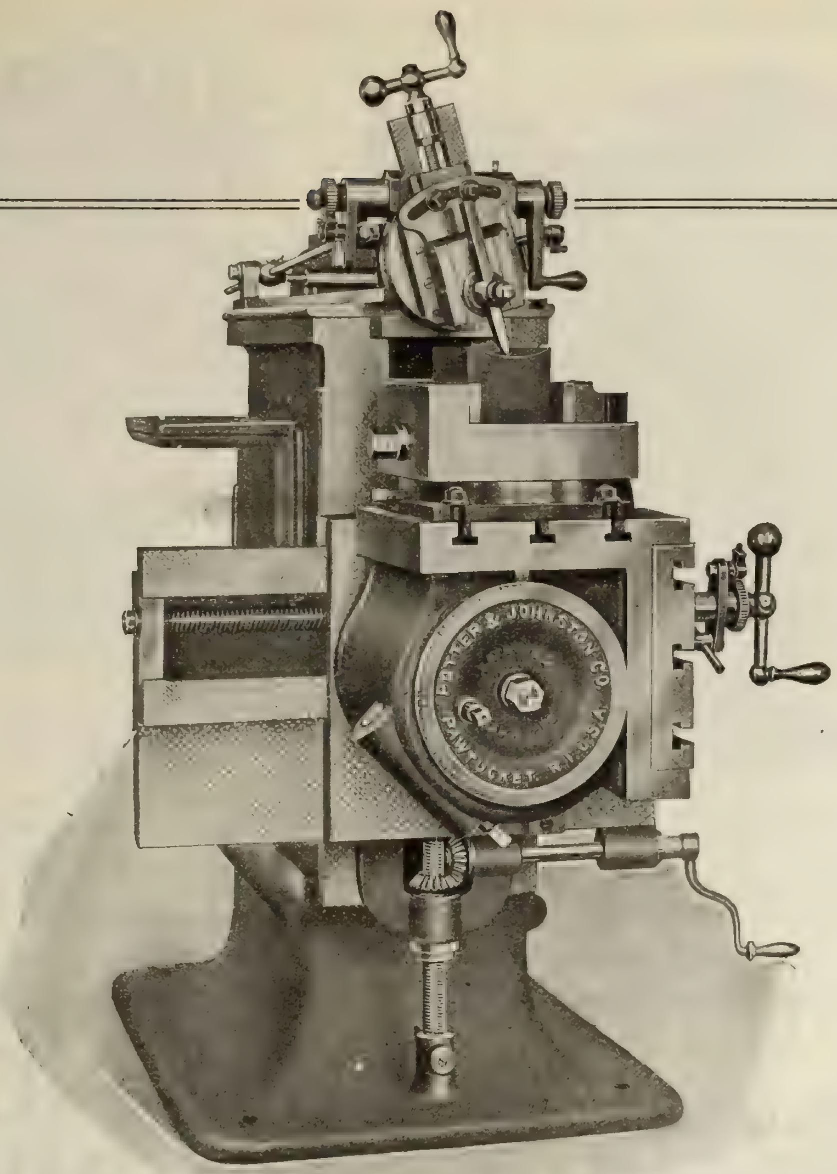
Wickes Heavy Duty Engine Lathe



The Wickes 26″ Heavy Duty Lathe.

Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.
This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.
Let us tell you about this lathe and our 20″, 32″, also our 17″ Rapid Production Lathe for Automobile and other work.
We can make prompt shipment.

WICKES BROTHERS **Saginaw, Michigan**



Potter & Johnston 15-inch Universal Shaping Machine

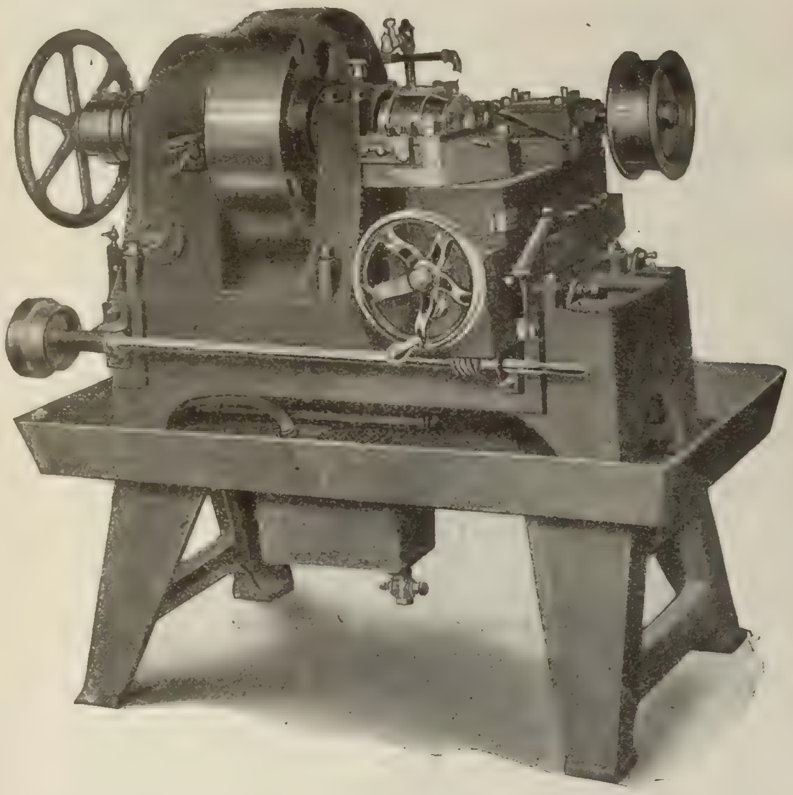
Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA



For Turning, Facing and Milling the thread on Gas Check Plugs for 6-inch High Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling. driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells, Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

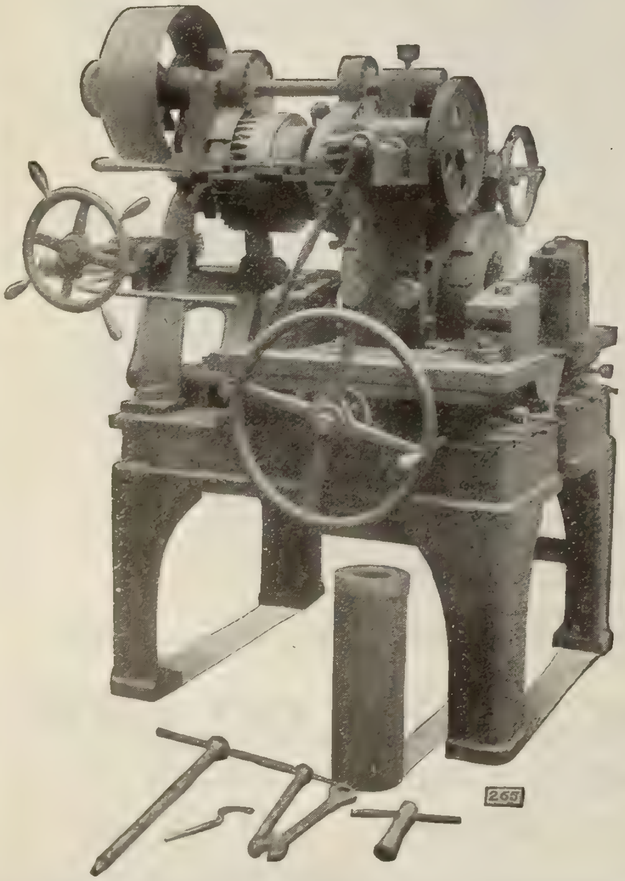
Write for prices and deliveries.

Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield

STAIR BUILDING, TORONTO, ONT.



CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

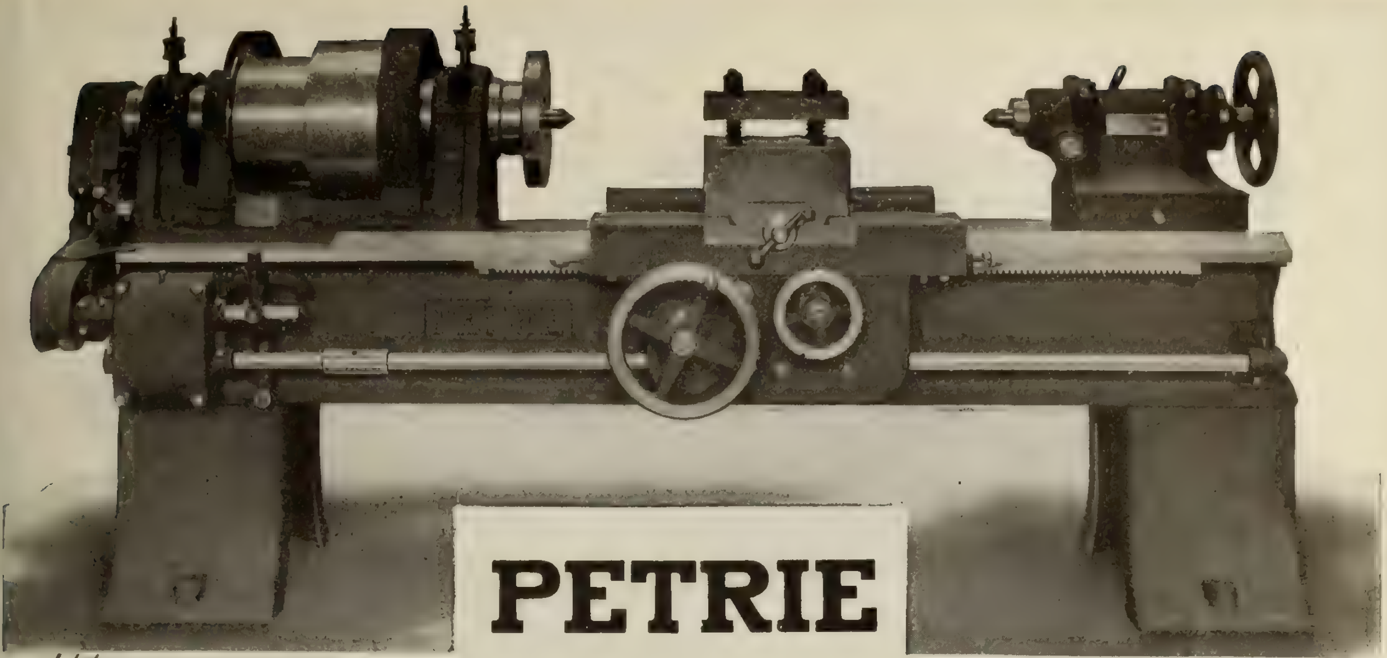
Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE

Wm. Kennedy & Sons
LIMITED

OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal



PETRIE

20-inch Heavy Duty Manufacturing Lathe

DESIGNED AND BUILT ESPECIALLY FOR MACHINING HIGH EXPLOSIVE AND SHRAPNEL SHELLS UP TO AND INCLUDING 8-INCH. USED AND ENDORSED BY SOME OF THE LARGEST AND MOST SUCCESSFUL SHELL MANUFACTURERS.

DESCRIPTION

HEADSTOCK—All Headstock journals are provided with well lubricated, renewable bronze bearings.

Alternate heat treated steel and bronze washers take the end thrust and a simple adjustment is provided to take up wear.

All gears are covered with neat and substantial cast iron guards that may be quickly removed when desired.

BED—The Bed is of deep construction and width to give the greatest rigidity under heavy cuts.

The shears are made extremely massive and the bed walls extra thick, providing the necessary mass of metal to absorb the vibration and shocks incident to heavy turning at high speeds.

Heavy box girths tie the front and rear walls of the bed together at close intervals.

Improved type wide angle V on front shear to take thrust of cutting tool.

The rear bearing of carriage on bed is flat instead of V-shaped.

At the rear of the bed planed pads are provided for attaching Taper and Forming Attachments.

CARRIAGE—The bridge is very wide and extraordinarily deep; it will not spring under the heaviest cuts.

The carriage is gibbed to the bed at the rear on the outside and will not lift under any conditions.

APRON—The apron is of heavy double plate type affording a support or bearing to both ends of all shafts.

Apron is tongued and grooved to the carriage, also bolted and dowelled.

The feed friction has a greatly increased diameter and will pull the heaviest feeds and cuts without slipping.

For engaging the friction a hand wheel several inches in diameter is provided and seats the friction firmly with very small effort on the part of the operator.

All studs in apron revolve and simple but adequate oiling facilities are provided.

FEEDS—Positive Gear drive through headstock spindle steel gears in gear box, three rates of feed are provided for through sliding key type. Feeds per revolution of spindle being ⅛ in., 1-16 in. and 1-32 in.

All gears in the feed train are fully guarded.

TAILSTOCK—The tailstock is a massive casting, rigidly braced internally, and is provided with a long nose, making it unnecessary to extend the tailstock spindle for ordinary work.

It is clamped to the bed by four large locking bolts operated at the top of the barrel.

A simple binder locks the tailstock spindle in correct alignment, this clamp is located at the extreme front end where it grips the spindle with the utmost rigidity and absolutely does away with distortion of any kind.

The screw is unusually large to resist any buckling tendency.

Suitable screws are provided for setting over for Taper Work.

EQUIPMENT—Unless otherwise specified Lathes are furnished with 8 ft. bed, one driving plate, hand cross feed, heavy duty plain rest, necessary wrenches, and two speed tight and loose countershaft.

Forming attachment, turret tool post, hand or power feed bed turret, oil pan, pump, and connections can be furnished as extras when desired.

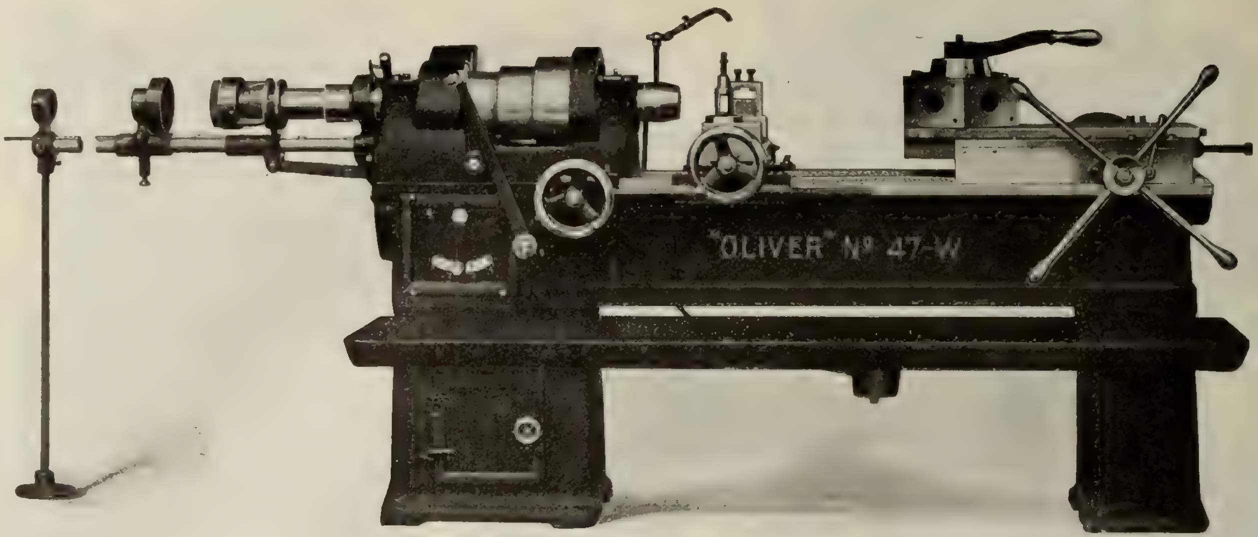
DIMENSIONS

Swing over bed	20 in.	Width of Tool Slide	12 in.
Swing over carriage	11 in.	Diameter of Headstock Cones	11 in. and 14 in.
Length of Bed Standard	8 ft.	Belt Width	6 in.
Distance between centres 8 ft. bed	40 in.	Number of Feed Changes	3
Width of bed overall	19½ in.	Feeds per Revolutions of spindle	⅛ in., 1-16 in., 1-32 in.
Height from floor to centres	40 in.	Speed of Countershaft	110 R.P.M.
Dimensions of front spindle bearing	4 15-16 in. x 6¾ in.	Size of Tight and Loose Pulleys	16 in. x 6¼ in.
Dimensions of rear spindle bearing	4 in. x 5½ in.	Ratio of Back Gearing	6.7 to 1
Diameter Nose of spindle	4 in.	Face of Back Gears	2¾ in. and 2¼ in
Hole through spindle	1 5-16 in.	Length of Carriage Bearing	30 in.
Diameter Tailstock spindle	3⅜ in.	Width of Carriage Bridge	12 in.
Travel of Tailstock spindle	6 in.	Number of Spindle Speeds with Two-Speed Countershaft	8
Morse Taper—Centres	No. 5	Weight Approximately, 8 ft. Bed	5,200 lbs.

A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.



"OLIVER" NO. 47-W HEAVY DUTY SCREW MACHINE 2¼"—SWING 16".

A HEAVY TOOL FOR HEAVY WORK—A MODERN MACHINE—OLIVER QUALITY—PROMPT DELIVERIES.

WRITE FOR FULL INFORMATION.

OLIVER MACHINERY COMPANY, Grand Rapids, Mich.

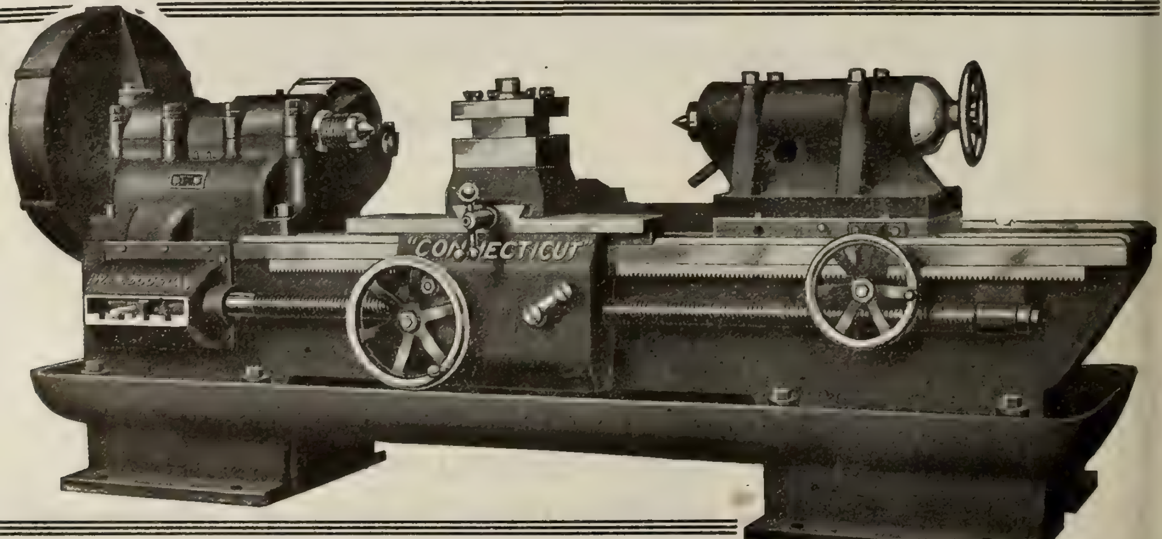
Machining High-Carbon Steel with a Connecticut

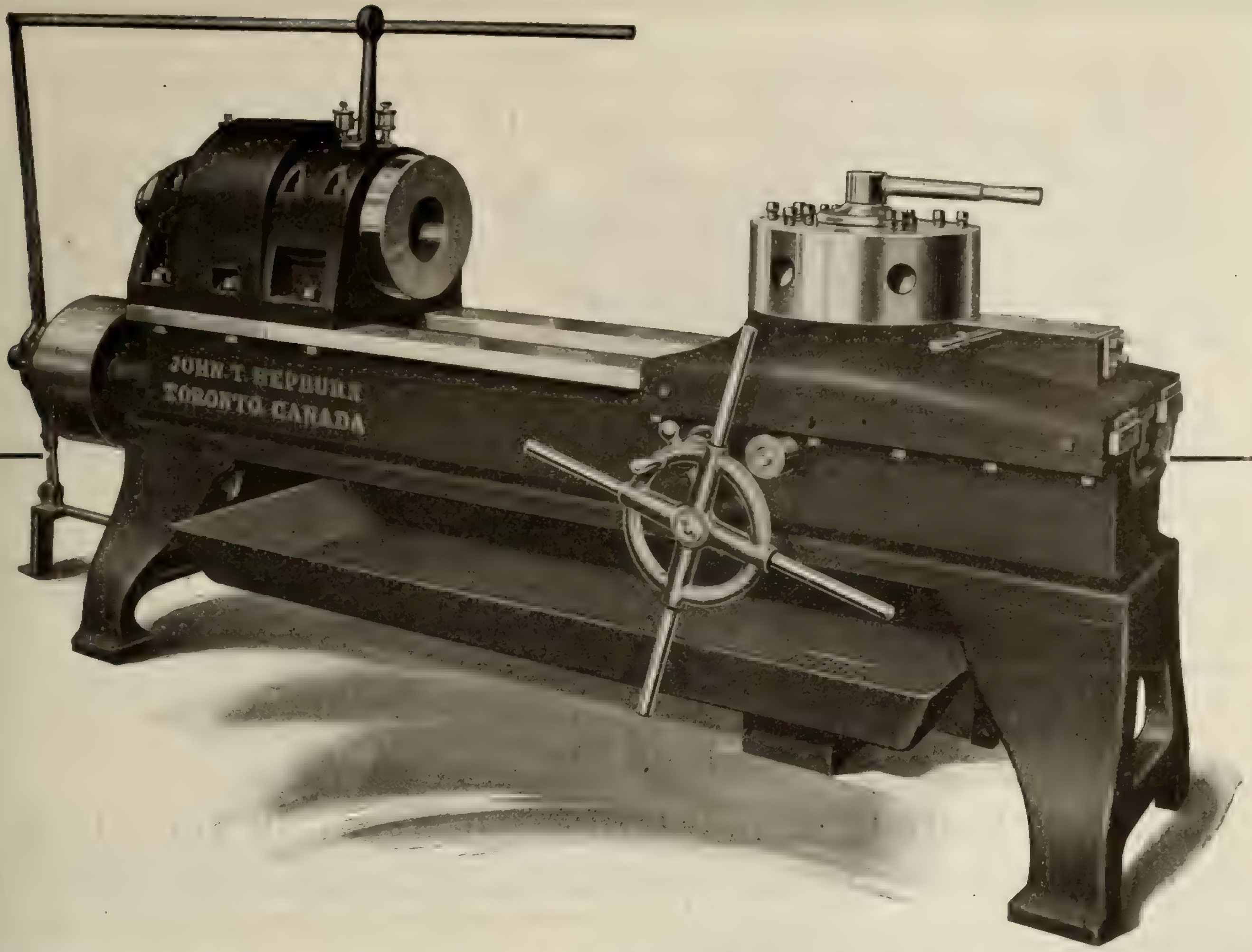
THE Connecticut Lathe illustrated below is for the machining of high-carbon steel at maximum speed—this lathe combines power, accuracy and rigidity in fullest measure.

The bed is cross ribbed with heavy box shaped girths 15 inches apart. All gears and pinions are of steel except the big gear, which is semi-steel with 4-inch face. The head stock, the tailstock—every detail from pulley to base—are built to the most liberal dimensions. The utmost power is built right into Connecticut Lathes.

Get the Details of this Machine

W. & B. DOUGLAS, *Middletown, Conn.*





The Name HEPBURN on a Lathe for Shells

You won't find Hepburn Lathes being scrapped to make way for better ones: but we can tell you of Heavy-Duty Shell Lathes that have been scrapped to make way for a "Hepburn."

The HEPBURN has five essentials in maximum measure –

Speed, Accuracy, Power, Strength, Simplicity

To these may be added two other characteristics—rigidity and design. Rigidity is included in the term "strength." However, we define it because it is a thing you must look for.

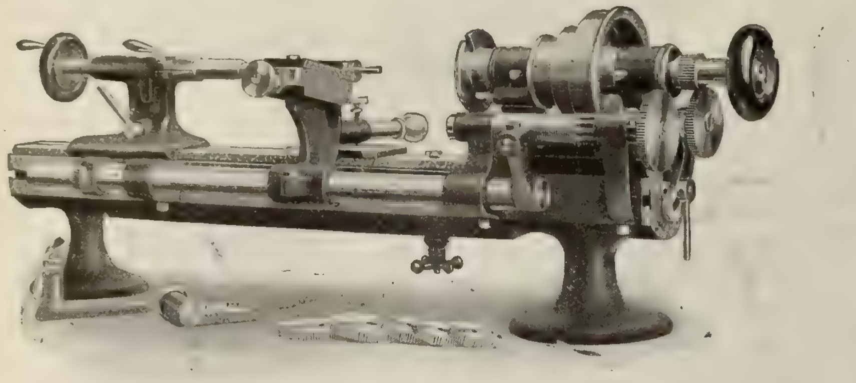
Hepburn Heavy-duty Shell Lathes are helping the Allies to win the war. They are enabling shell makers to make more and better shells in a day than can possibly be made when a second rate lathe is used.

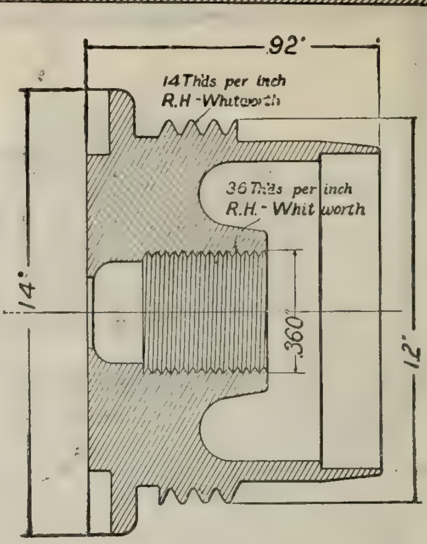
You may have been "Stung" when you bought your first lathes. If so—play safe—learn about the Hepburn.

N.B.—We can ship promptly. We make turning and turret lathes up to and including 9.2".

John T. Hepburn, Limited
18 to 60 Van Horne Street
TORONTO, CANADA

THE CATARACT BENCH LATHE
WITH CHASING ATTACHMENTS



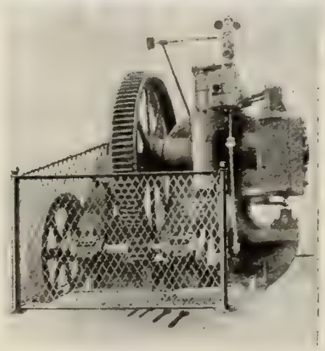


We have sold many of our lathes to Canadian concerns who are eminently satisfied with results. Will you be next?

For work requiring greatest accuracy and rapidity, THE HARDINGE CATARACT BENCH LATHE will not disappoint you. Machine equipped with Automatic Chuck Closer for rapid operation of chuck, and with chasing bar arranged with multiple point, chasing tool is producing from ten to twelve hundred 14-pitch Whitworth threads on primers in TEN HOURS. Prompt deliveries. Catalogue No. 15 is ready to mail TO YOU. You are invited to write for it to-day.

HARDINGE BROTHERS, Inc., 1770 Bertau Ave., CHICAGO, U.S.A.

QUALITY



"What Can a Man Say to the Widow"
whose husband has been killed in unguarded machinery? Before things happen, let us protect your danger spots. We want to estimate on your requirements.

DENNIS WIRE & IRON WORKS CO., LTD.
London, Canada

DENNIS-LONDON

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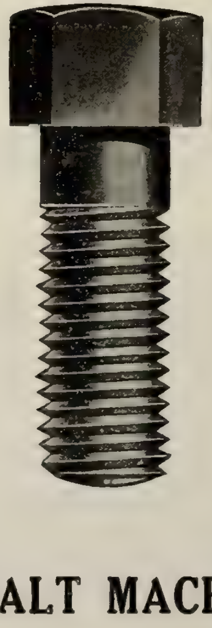
ACCURACY



The discriminating buyer is the one we like to meet—the one who insists on accurate product. He will eventually buy "GALT" Cap and Set Screws because they measure up to his standard.

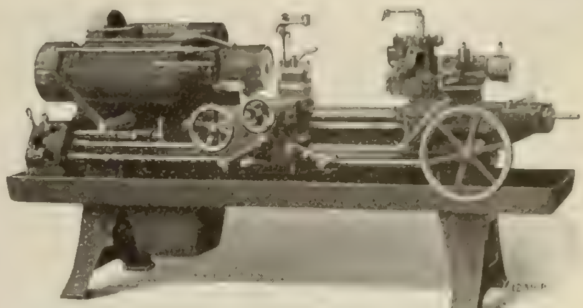
Your rush orders for S. F. Hex. nuts taken prompt care of. Better finished nuts—try a sample.

**THE
GALT MACHINE SCREW CO.,
LIMITED
GALT, ONTARIO**

Eastern Representatives: The Canadian B. K. Morton Company, Limited, 49 Common St., Montreal, Que.

Two Cuts at One Time

The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the



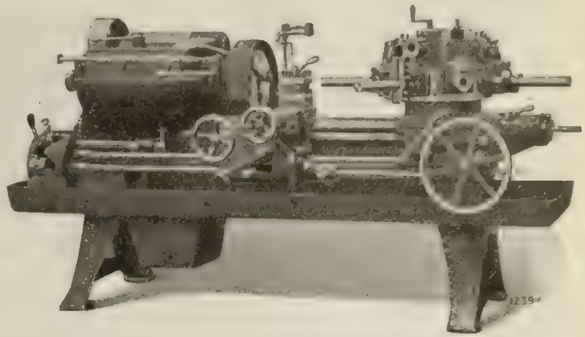
No. 2-A—With "Bar Equipment"

Universal Hollow-Hexagon Turret Lathes

Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



No. 2-A—With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal

---

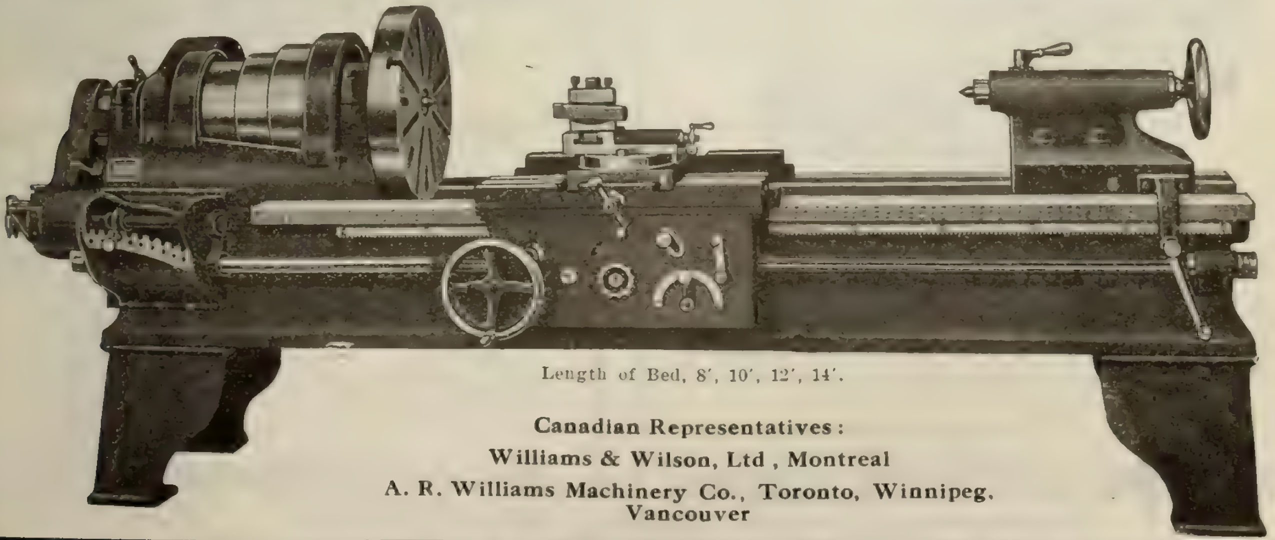
Davenport 22-Inch Lathe — For Extra Heavy Service

These lathes are built exceptionally rigid and heavy. No feature has been omitted, to secure great strength and power. The bed, the headstock, the tailstock, the carriage—every detail has been designed and constructed with a view to driving the heaviest cut that any tool will stand up against. At present we can make quick deliveries on this machine.

Built with ordinary change gears unless otherwise specified.

Write at once for Bulletin. It gives full details of construction.

DAVENPORT LOCOMOTIVE WORKS
DAVENPORT, IOWA



Length of Bed, 8', 10', 12', 14'.

Canadian Representatives:
Williams & Wilson, Ltd , Montreal
A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver

If any advertisement interests you, tear it out now and place with letters to be answered.

NOSING DIES

of

CHILLED CAST IRON

FOR

4.5", 5" and 6" H.E. Shells

We have one in use now that has nosed over 24,000 shells and is still doing business.

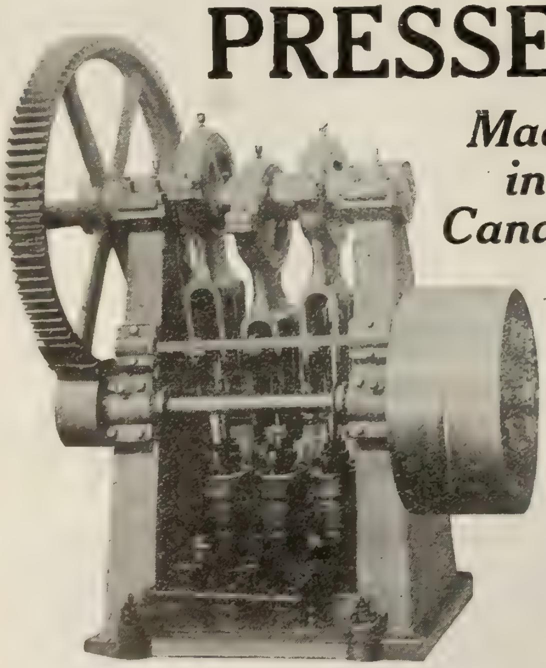
CHEAP AND EFFICIENT

Write or wire for particulars.

Marsh & Henthorn, Ltd.
Belleville, Ontario

PRESSES

Made in Canada

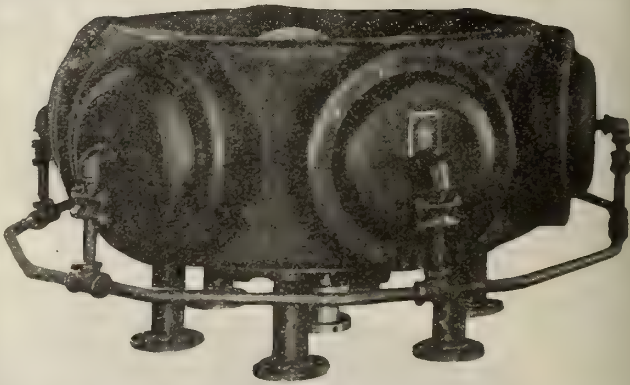


Hydraulic Presses, Pumps and Accumulators for all purposes.

WRITE FOR PRICES AND DELIVERIES

WILLIAM R. PERRIN, Limited
TORONTO, CANADA

For 6″ to 12″ Shells



"Metalwood" Banding Press

Has a remarkably sturdy construction. It stands up to the most severe service and constant use.

While the price of this press is somewhat higher than others on the market, customers who have used both unhesitatingly prefer our machine, even to the point of discarding other types.

Rams—6—Semi-steel 11″ diameter. Move of each ram ½″ or more if necessary. All rams returned by levers on plate with heavy Vanadium Steel Spring. Cylinder—Removable, of alloy steel.

Hydraulic inlet to cylinder 1¼ pipe. Distributing ring 2″.

All pipe, seamless steel tubing; all fittings, drop-forged steel. All parts under strain, alloy steel castings or forgings.

Dies 6, forged chrome nickel steel, hardened and removable. without disturbing any part of press by loosening 2 nuts.

Weight 9,500 lbs.

Can be operated either from accumulator or pump.

Metalwood Manufacturing Co.
Leib and Wight Sts., DETROIT, MICH.

HYDRAULIC MG MACHINERY

Equip Your Hydraulic Presses

With High-Pressure Hydraulic Valves—

If you are controlling the operation of your hydraulic presses with inefficient, low pressure hydraulic valves, you are working at a big disadvantage. Good work cannot be expected from your presses as long as you experience valve trouble. There is one way only to eliminate this trouble—the use of perfectly designed and well-built high pressure hydraulic valves. "Mount Gilead" Hydraulic Valves are such valves—let us tell you about them.

The Hydraulic Press Mfg. Co.

89 Lincoln Avenue
Mount Gilead - - - Ohio

Eastern Office: Room 1105-R, 39-41 Cortlandt St., New York City.

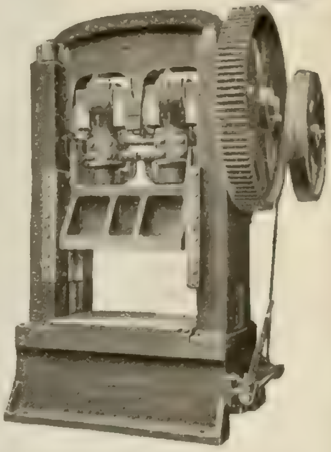
Canadian Agents: A. R. Williams Machinery Co., Ltd., Toronto, Ont.; Canadian Fairbanks-Morse Co., Montreal.

Four-Way Balanced Poppet Operating Valve.

Hydraulic Tee with Flanged Connections

We build a size that will successfully meet your requirements

BLISS



These presses are built with correct proportions for use in the manufacture of large sheet iron and steel goods.

The large diameter of shafts and the well-gibbed slides allow quantity production that proves very profitable.

BLISS DOUBLE CRANK PRESSES

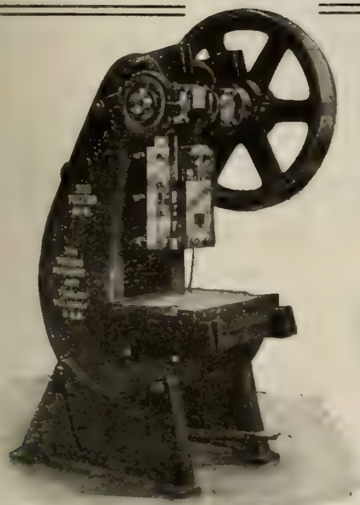
Adapted for the economical manufacture of vapor stoves, wrought iron ranges, agricultural implements, paneled ceilings, metal doors, window frames and sashes, metal furniture, shingles and all similar classes of goods.

150 different sizes and styles. Our Catalog 9-G will be sent to you on request.

Talk to us about Presses for any and every purpose.

E. W. Bliss Co., No. 20 Adams Street
Brooklyn, N.Y., U.S.A.

Chicago Office: 622 West Washington Boulevard
Detroit Office: Dime Bank Building



"TOLEDO"

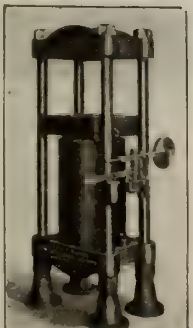
Open Back Inclinable Power Presses

Stand out as the foremost machine for all-around efficiency.

The increased bed area and die space—new form of knock-out in slide, hammer forged Pitman screw and crank shafts, new pattern inclining attachment, are but a few of the advantages.

Twenty sizes from 250 to 9,000 lbs. weight and adapted to nearly every kind of blank cutting, forming, perforating, drawing, shaping and combination die work.

The Toledo Machine & Tool Co., Toledo, Ohio



Elmes Hydraulic Press No. 676

With ¾-in. Automatic Lever Operating Valve No. 677-A

This press is of steel and semi-steel construction, and the stands which support the press are threaded at the ends to receive the steel columns and have holes for fastening to the floor. The platen is guided by the columns.

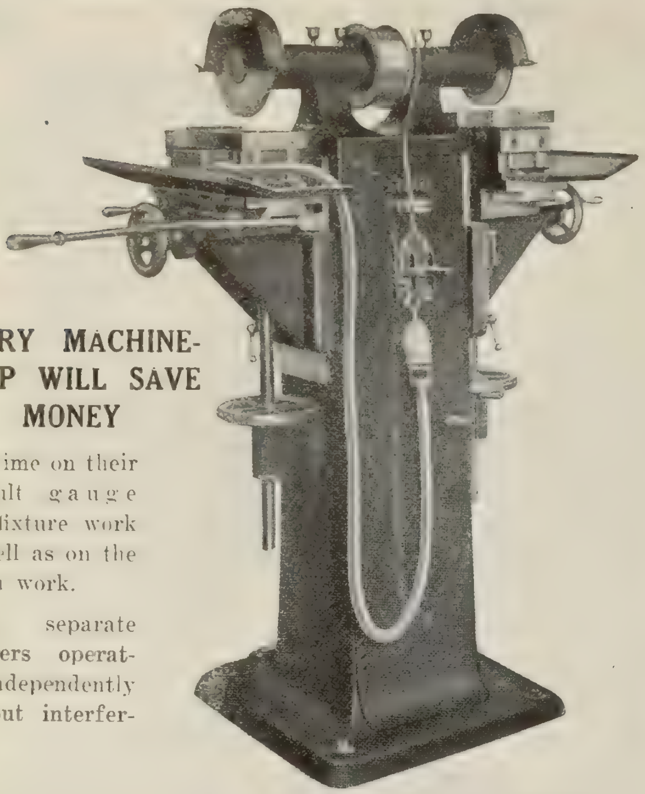
The operating valve is attached to the cylinder, and is designed with a weight to be set for the pressure desired, and releases automatically. To start the ram up, the lever is pushed down; upon the ram reaching the desired pressure, the lever automatically releases (acting as a safety valve as well), causing the ram to descend. Valve body is made of bronze, and other parts are made of tool steel and machine steel. If desired a hydraulic gauge can be attached to show the various pressures, although with this valve it is not necessary.

Write for our Hydraulic Machinery Catalogue.

Charles F. Elmes Engineering Works

217 N. Morgan St.
Chicago, U.S.A.

Over 50 years' experience building hydraulic machinery.



The "Steno" Duplex Surface Grinder

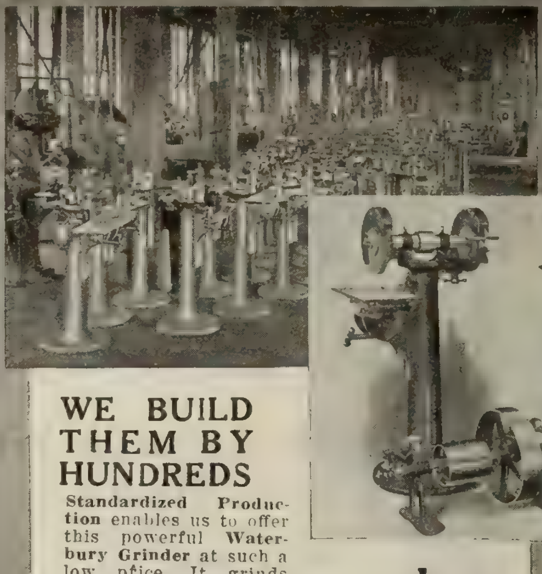
EVERY MACHINE-SHOP WILL SAVE MONEY

and time on their difficult gauge and fixture work as well as on the rough work.

Two separate grinders operating independently without interference.

THE STENOTYPE COMPANY, INDIANAPOLIS, INDIANA, U.S.A.

Manufacturers of the "STENO" Duplex Surface Grinder, the "STENO" 1" x 7" Turret Hand Screw Machine and "STENO" Milling Cutters, Reamer, Fixtures, Jigs and Gauges.

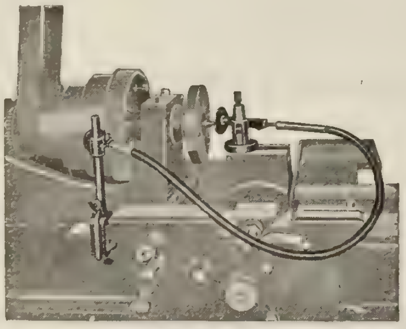


WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low pfice. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only $60 Complete

The Blake & Johnson Co., Waterbury, Conn



CENTER GRINDER

(Improved)

CHEAP! PRACTICAL! DURABLE!

The most popular tool of its kind on the market. Adjusted in a moment.

An occasional use will keep your Lathe centers in perfect order.

Stow Mfg. Co.

Binghamton, N.Y., U.S.A.

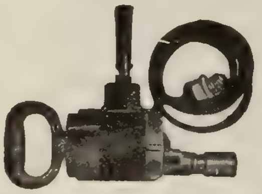
London, Eng., Stock, 85 Queen Victoria Street.
Oldest Portable Tool Manufacturers in America.

U. S. Electric Drills and Grinders

Save Time, Labor and Money

They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.



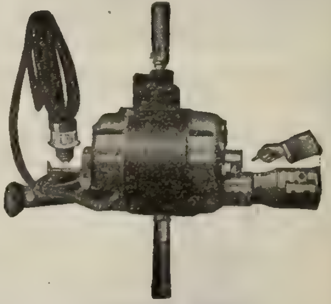
3 SIZES

3-16 inch, W.G.T. 6 lbs.
¼ inch, W.G.T. 9 lbs.
⅜ inch, W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



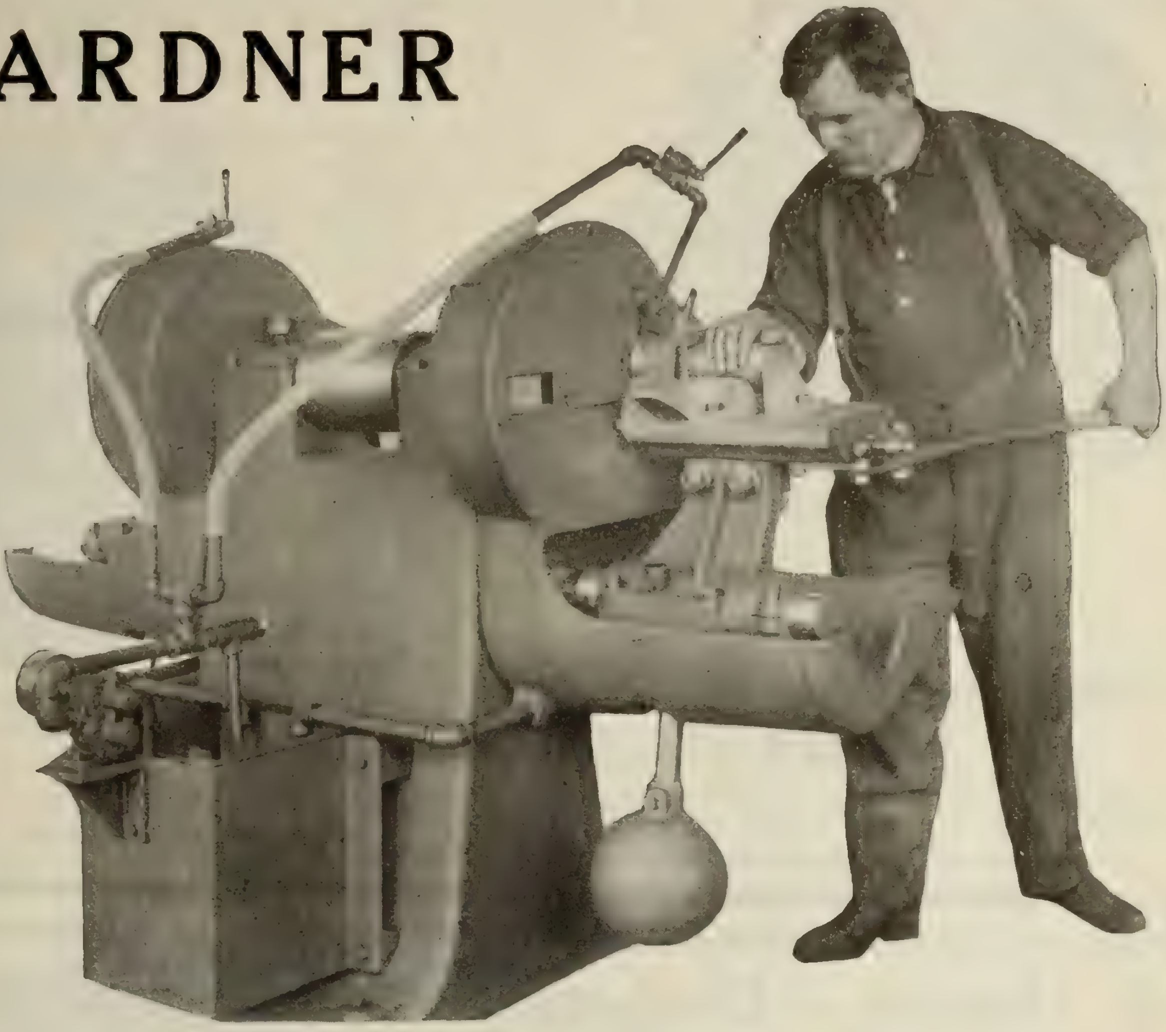
½ inch—2 SPEED.

Speed, 400-750 R.P.M.

For Sale By
The Canadian Fairbanks-Morse Co., Limited
Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver.

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO

GARDNER GRINDERS



For Grinding Ends of Shells

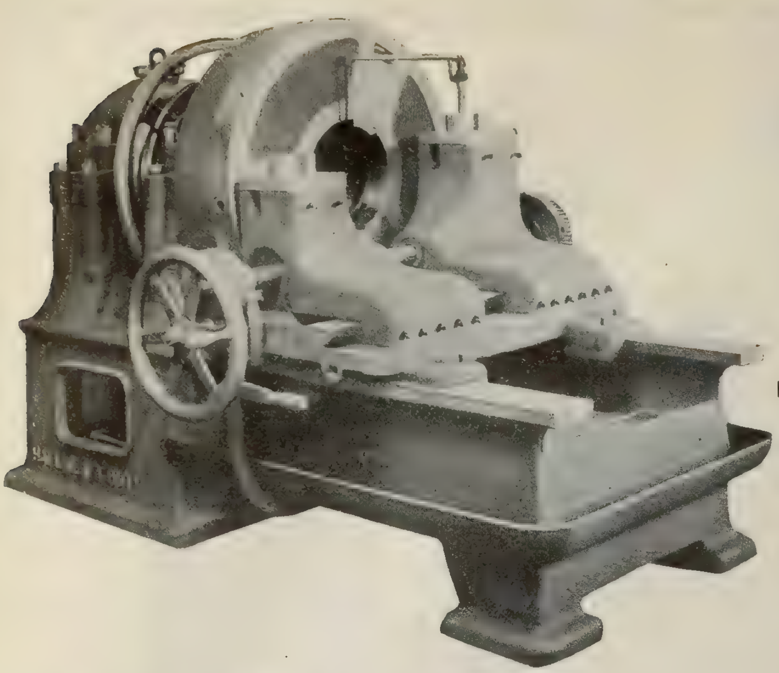
We have developed a Special Grinding Machine for removing the hub or centre projection from the ends of shells. This grinder is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates.
We build as well a much heavier and more Powerful Grinder to be used for these same operations on 6" Shells.

FEATURES

- **High-Grade Babbitt Bearings and Lever Feed.**
- **Rapid clamping of Shell into "V" fixture.**
- **Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.**
- **Can be equipped and operated at both ends for double output.**
- **Output, according to size of projection to be removed, from 40 to 100 per hour.**
- **Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments.**
- **Weight, 4,500 lbs.**

For further particulars write

The Gardner Machine Company, Beloit, Wis., U.S.A.



Cut illustrates our No. 12 cutting-off machine for cutting-off and facing 6", 8", 9.2", 10" or 12" shells.

The bed of the machine is of the box lathe type, with sufficient weight and strength to give great rigidity under the severest strain.

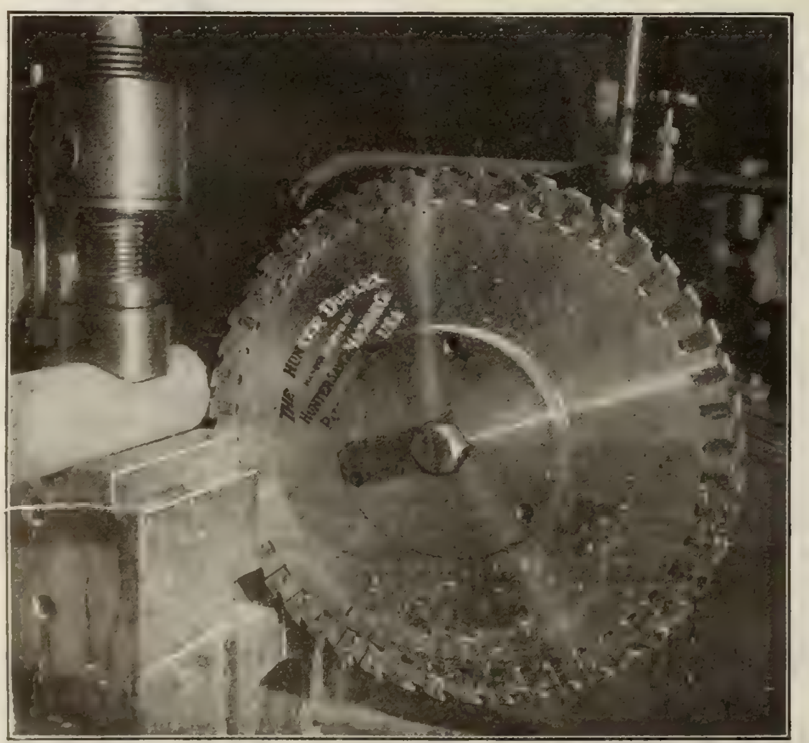
We manufacture a full and complete line of machinery used in the manufacture of shrapnel, 4.5, 60-Pr. and 10" shells.

Cutting-off machines range from 1½" to 12".
For cutting off the open ends.
For facing off the closed ends.
For facing off projecting ends of plugs.
For cutting off bar stock.
For cutting off ingots, any size.
Pipe lathes ¼" to 18".
Double and single head nipple cutters.
Roller pipe cutters.

Let us tell you the nearest point at which you can see some of our machines in operation.

John H. Hall & Sons
Limited
Brantford Canada
Manufacturers of Pipe Threading and Special Machinery

A Hunter "Duplex" on Shrapnel Stock



FAST GOING
on Newton Machine

Through 3½" round 60 Carbon, 70 Manganese Shrapnel Stock every

2 MINUTES

The secret of Hunter "Duplex" Saw speed is the method of holding the high speed teeth.

You can use this speed profitably—on shrapnel or any other stock.

Let us send full Particulars.

HUNTER SAW & MACHINE COMPANY, Pittsburg, Pa.

Shell-Steel Cutting Time

on the PEERLESS High Speed Heavy Duty Metal Cutting Saw

PEERLESS
PEERLESS
MACHINE CO
RACINE WIS USA

Owing to the toughness of this material it was selected for cutting time, and under extreme feed the actual time on cutting 5 in. round is 7¼ min. Regular stock blade was used, 12 x ¾, 18 gauge, 10 pitch.

A machine that will stand up for such heavy duty work must be properly designed and rigidly constructed, and to stand the wear and tear the right grade of material and workmanship must be embodied, and that is just what you will find in the PEERLESS High Speed.

As a real time saver in operating and adjusting, it is in a class by itself. For an example, more than six cuts per minute can easily be made on a ½ in. round cold rolled steel bar. This covers the time in starting and stopping on each cut. The PEERLESS not only saves time, but also increases the production.

Again we say, the actual time saved in operating and adjusting the PEERLESS High Speed is a big item that is well worth investigating.

Again we suggest, before considering any other cutting-off equipment, write us for a complete description.

PEERLESS MACHINE COMPANY
1607 Racine Street RACINE, WISCON

SPEED SPEED

This pile of 1-inch square steel bars was cut in nine hours with a

Racine Metal Cutter

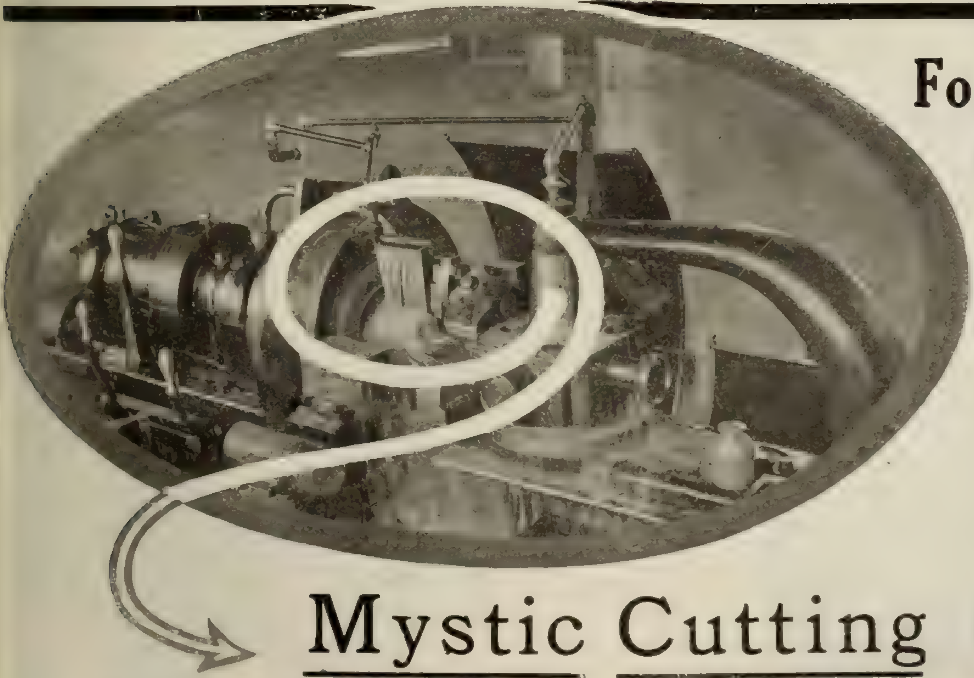
with ONE BLADE at a blade expense of six cents.

You will profit by learning all about the Racine features that make records like this possible.

Used extensively in Canadian plants. One Canadian Steel Company is using 120.

We'll gladly put you in touch with users and send full details.

RACINE TOOL & MACHINE COMPANY
15 Melbourne Ave., Racine, Wisconsin, U.S.A.



For cool and clean-cutting tools

Leading manufacturers use Mystic Cutting Compound on shell work in preference to oil. It means higher speeds, increased production and lower costs. Keeps work and tool cool and free from chips.

Mystic Cutting Compound

A free-flowing, unsaponified animal oil lubricant. Does not separate in solution, grow rancid or cause rust. It is non-combustible and contains nothing injurious to operator's hands.

Let us demonstrate **free of cost** what Mystic Compound can do for you.

Cataract Refining Company, Limited, Toronto, Ont.

The Only Grand Prize for TOOL HOLDERS

Awarded separately and independent of other lines exhibited at the

PANAMA-PACIFIC EXPOSITION

WAS WON BY

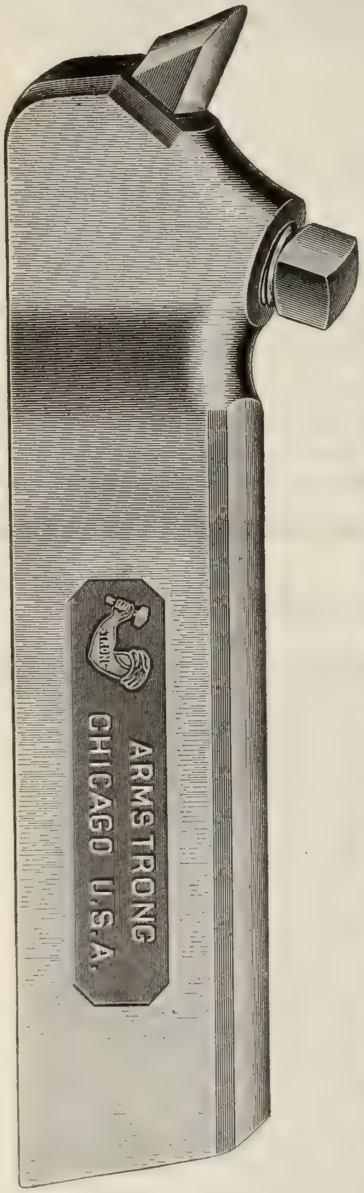
ARMSTRONG TOOL HOLDERS

HIGHEST AWARD

at 4 World's Expositions

Paris - - -	1900
St. Louis -	1904
Liege - - -	1905
San Francisco	1915

THEY ALWAYS MAKE GOOD


ARMSTRONG
CHICAGO U.S.A.

OFFICIAL
AWARD
RIBBON
PANAMA PACIFIC
INTERNATIONAL
EXPOSITION
SAN FRANCISCO
1915
PRESIDENT
DIRECTOR OF EXHIBITS
GRAND
PRIZE
DEPARTMENT OF
MACHINERY
CHIEF

They Are Saving Millions of Dollars in High Speed Steel

CATALOG FREE

Armstrong Bros. Tool Co.

"The Tool Holder People"

306 N. Francisco Ave., CHICAGO, U.S.A.

The Panama-Pacific MEDAL OF HONOR was also won by ARMSTRONG Drop Forged Wrenches, Ratchets, Clamps, Lathe Dogs, Etc.

SAWS FOR SHELLS

We have experimented on the

SPECIAL SHELL STEEL

and have produced a *HACK SAW BLADE* that will give unequalled service on this material in *HIGH - SPEED MACHINES.*

Possibly we could help you.

"VICTOR BLADE— CANADIAN-MADE."

Victor Saw Works, Ltd.

Hamilton, Ont., Canada

VICTOR HACK SAWS Get a Box and Try 'em

Preparedness—

THE watchword of the day. Start now and be ready for the big business that is coming.

SPECIAL machinery and equipment is our forte. We ask the opportunity of having our engineers solve your problems.

LYMBURNER, LIMITED

360 St. Paul St.

MONTREAL, CANADA

Two Cuts

Simultaneously

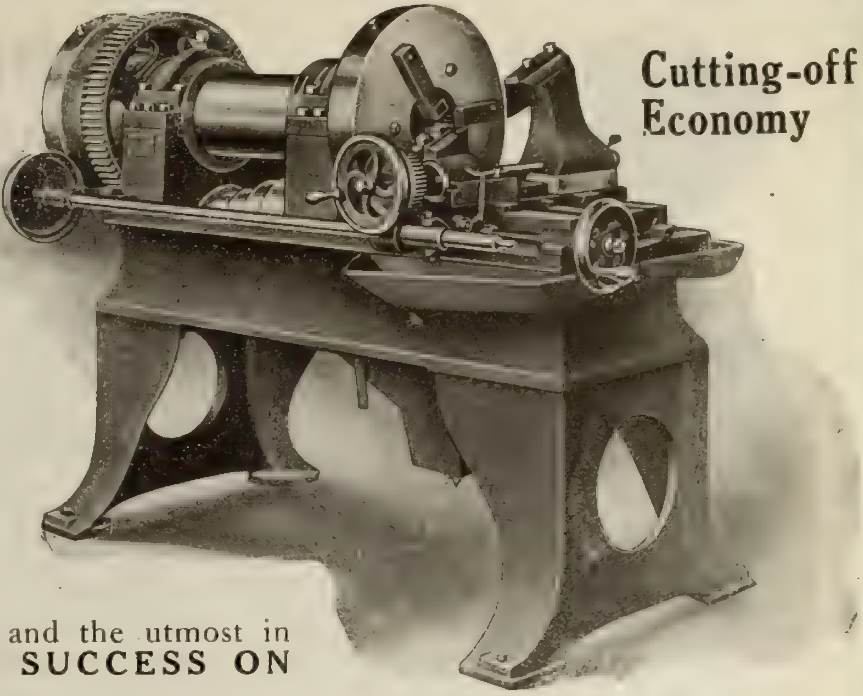
One up, the other down. This is what makes the **Hurlbut-Rogers Cutting-Off and Centering Machine** virtually double the output and reduce the cost per piece about one-half.

The Hurlbut-Rogers Machine gives you capacity of two machines at the expense and in the floor space of one machine.

We build them for hard work and the utmost in accuracy—and their **GREAT SUCCESS ON SHELLS** shows it.

Let us go into details.

Cutting-off Economy



5-inch Cone-Driven Machine

HURLBUT-ROGERS MACHINERY CO., South Sudbury, Mass.

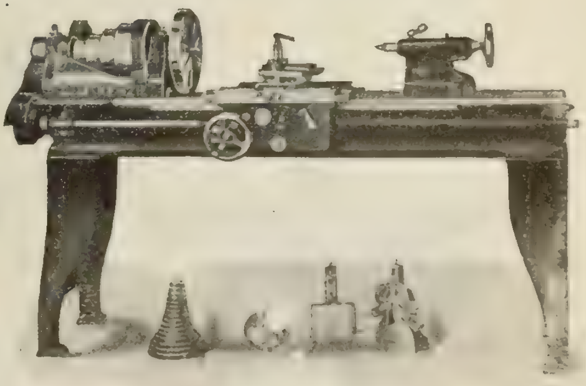
FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle-on-Tyne. H. W. PETRIE, TORONTO, CANADA.

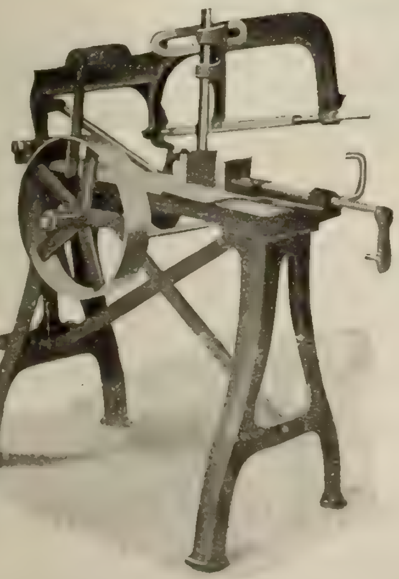
The "McKenzie" Engine Lathe

The Standard of Accuracy

Made from new patterns, of improved design, and constructed of the very best material by expert workmen. Every part is mechanically perfect and excellently finished. Its accuracy and durability mean a big saving of money to you.

Let us put full details before you. Write!





The Improved Power Hack Saw

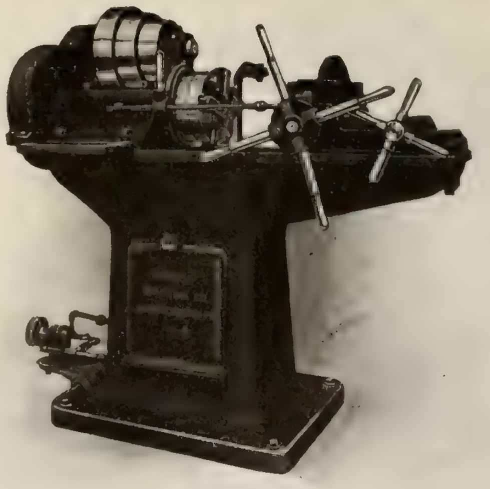
will cover its cost many times over with the money it saves through long, efficient service.

Saws bars 6 x 6 in., either round or square, and is so constructed as to require no attention after work is put in vise, and stops automatically when piece is cut off.

The improved Saw Guide is a Special Feature—it keeps the saw perfectly in line at all times.

The D. McKenzie Machinery Company
Guelph, Ontario

Not ONE Feature at a Sacrifice of Others.



That is why the Landis die is conceded to be the most efficient threading tool on the market.

Efficiency in thread cutting depends upon the quality of threads, the quantity and a low cost of upkeep.

The Landis chaser has a controllable rake or cutting angle which insures clean-cut, well-formed threads at all times.

The chaser is tangentially disposed to the stock, thereby reducing the friction to a minimum and permitting of the highest possible cutting speeds.

The chasers, when dull, are merely given a slight grinding at the cutting edge and advanced in the holders, eliminating the necessity of annealing, hobbing and retemperng.

There are other features which, added to the three stated above, produce a greater degree of accuracy and a higher production at a lower cost of die maintenance than is possible with any other threading tool.

Let us show you.

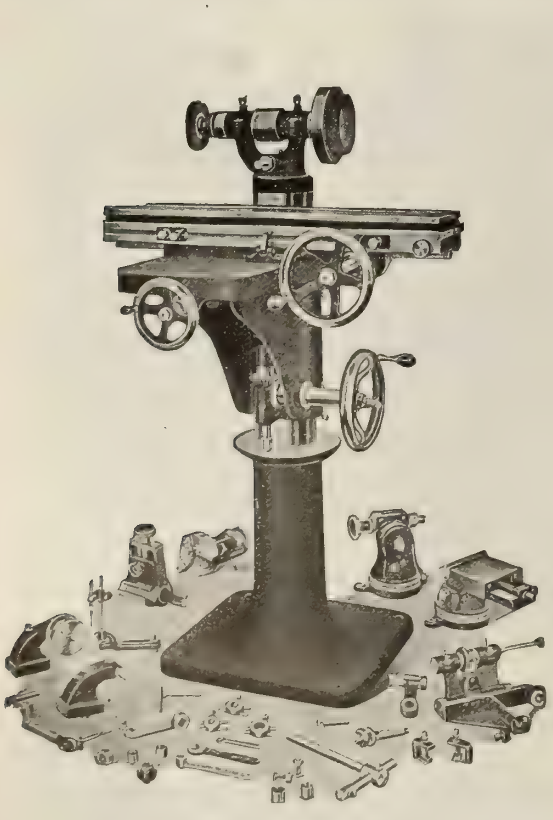
Catalogue No. 22.

LANDIS MACHINE COMPANY

WAYNESBORO, PA.

The *Greenfield*

For Special Work, Tools, Jigs, Etc.



This Universal Grinder is just the machine needed in many of the shops engaged in equipping for the manufacture of special lines. It is an all-around grinder and will handle about any kind of a job that comes within its range.

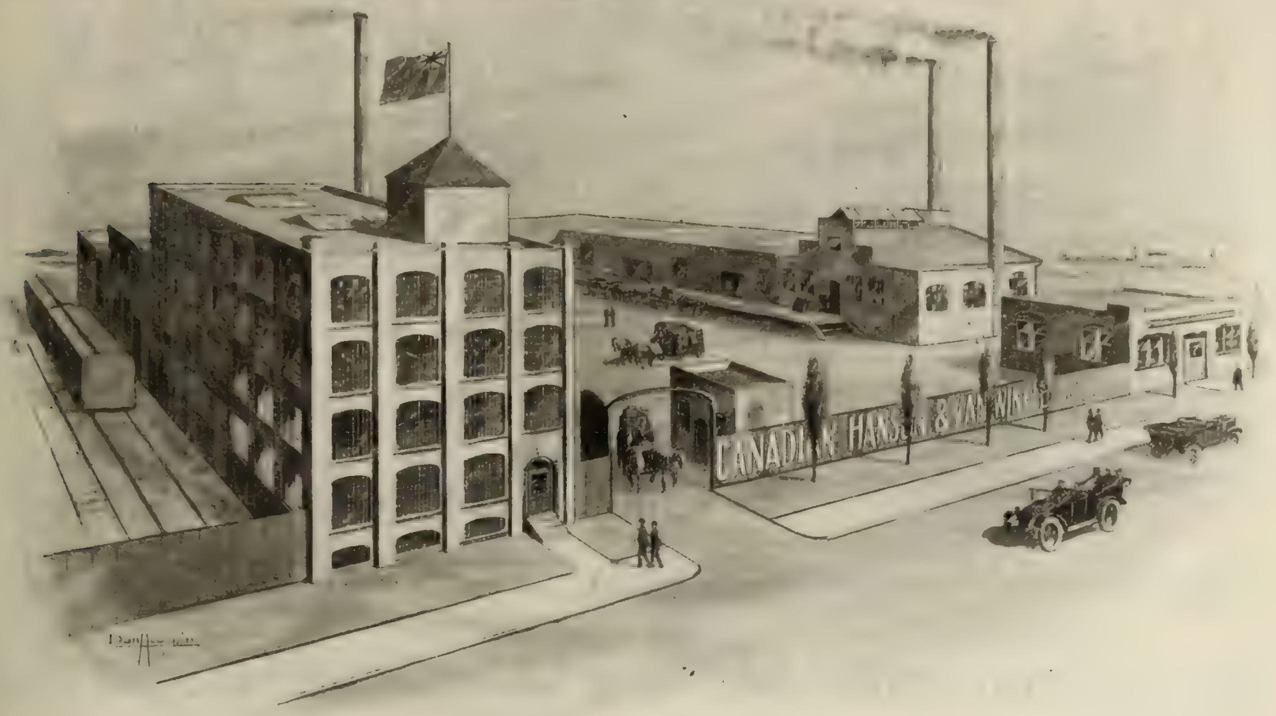
It has a stiffer, more rigidly supported table than any similar machine. It will turn out accurate, dependable work. Also, we believe we are perfectly correct in stating that we furnish this machine with a larger and more complete set of attachments than can be had for any grinder selling at anything like the same price.

How can we do it? Specialization and building in quantities.

Ask for Catalog No. 5, showing the machine in twenty-one different "set-ups" and explaining the purpose of each.

Greenfield Machine Company

Greenfield, Mass., U.S.A.



Manufacturing Plant of the
Canadian Hanson & Van Winkle Company, Ltd.

Electro-Plating, Polishing Materials of All Kinds

Having made large additions to our works, and installed the most up-to-date machinry procurable, we are in a better position than ever to give prompt attention to all orders.

ANODES:

NICKEL
BRASS
COPPER
BRONZE
COBALT
ZINC

Purity Guaranteed

COMPOSITION:

IDEAL
(WHITE FINISH)
TRIPOLI
CROCUS
ROUGE
EMERY CAKE

Everything for Polishing

Equipment

We make a specialty of installing Plating and Polishing Equipment. Consult us, and we will gladly work out your problems.

Chemicals

Acme Mineral Cleaner, Kostico, Galvanizing Salts, Capitol Nickel Salts, Copper Carbonates, Metal Cyanide, Pickelene.

Supplies

As all our supplies are now made in Canada, we are able to give you special materials to suit your particular class of work.

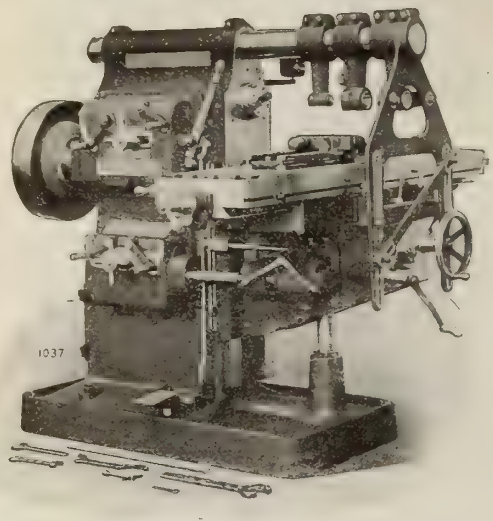
BUY GUARANTEED QUALITY SUPPLIES

Manufactured by

The Canadian Hanson & Van Winkle Company, Limited

15-25 Morrow Ave., West Toronto, Canada

Cincinnati High Power Millers



One of our 9 High Power Single Pulley Plain Millers. We also make 9 cone driven plain machines.

Unusual Spindle Power

Heat Treated Alloy Steel Gearing for the Spindle Drive

Flanged Spindle End which makes Face Milling Cutters Interchangeable in all sizes of Machines.

Handy and Easy to Operate

These are some of the reasons why you should use **Cincinnati High Power Millers**

ASK FOR CATALOG

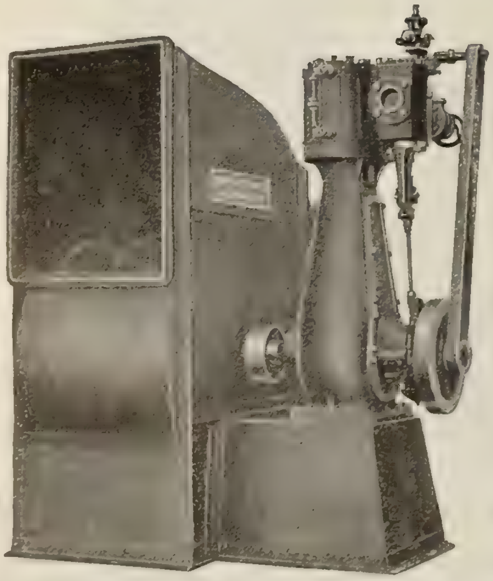
The Cincinnati Milling Machine Company
CINCINNATI, OHIO

Canadian Agents: H. W. Petrie, Ltd., Toronto, Ont.; H. W. Petrie of Montreal, Ltd., Montreal, Que.; Taylor Engineering Co., Ltd., Vancouver, B.C.

CONSTANT STEAM PRESSURE

We can tell you how to get it and keep it

CANADIAN MECHANICAL DRAFT APPARATUS



will make you independent of weather and temperature conditions and do away with chimney maintenance and repair expense.

Intensity of draft is proportional to fan speed, which is easily regulated by either manual or automatic control. Overload easily handled, and fuel bills reduced.

Uses 2% less of the total steam.

Let us tell you what we have accomplished and what we can do for you.

Write our Engineering Department 16.

CANADIAN BLOWER & FORGE CO.
Limited
KITCHENER, ONT.

St. John Montreal Toronto Winnipeg Vancouver

BEAVER BRAND

COPPER & BRASS BROWN'S QUALITY ROLLING MILLS

BRASS, BRONZE

You are assured the very best in quality and service plus moderate price when you buy from us.

It will be well worth your while to see for yourself by sending in a trial order.

Drop us a card for full information.

AND GILDING METAL IN SHEETS, ROLLS, PLATES AND RODS

SPECIAL MARINE BRONZE ROD
For Shafting and Bearings.

For Drilling and Free Turning, Order
BEAVER BRASS ROD.

Beaver Brand
"SPINNING BRASS."

Brown's Copper and Brass Rolling Mills
LIMITED

General Offices and Mills:
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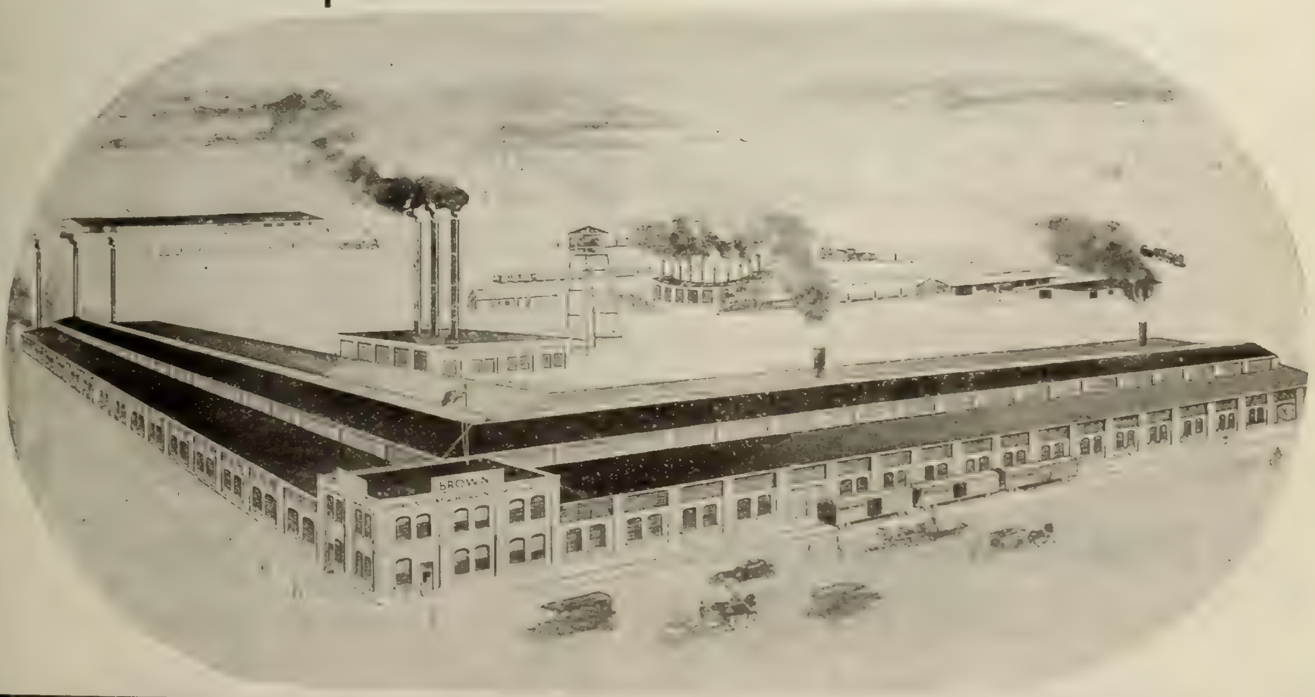

"W. & B." Drop FORGINGS

¶ We make a specialty of the highest grade Drop Forgings. Our exceptional capacity and equipment insure accurate forgings and prompt delivery.

The
Whitman & Barnes Manufacturing Co.
Established 1854
St. Catharines, Ontario

Send us Blue Prints on Special Forgings, three pounds and under in weight, and permit us to estimate on your requirements.

A New Thing in Shell Gauges

A snap gauge for calipering all outside diameters, with absolute accuracy.

Can be furnished suitable for waving, grooving, rough or finish turning—all sizes of shells, from 9.2" down.

Note the improvement on this gauge for holding.

In ordering, specify diameter and part to be calipered.

Immediate shipment can be made from stock.

The Foundry & Machine Co., Limited
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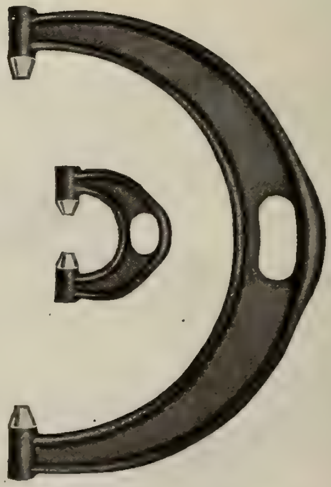

Note the hole for handling when using.

Save the Operators' Fingers

Drop-Forged Tools for the Machine Shop

Suitable Design
Dependable Construction
Sufficient Performance

Safety, strength and ultimate economy back up our guarantee.

Request Machinists' Tools Pamphlet for full details.

J. H. WILLIAMS & CO.
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THE WRENCH PEOPLE

Leading dealers supply all "VULCAN" and "AGRIPPA" tools.

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DROP-FORGINGS
ALL DROP-FORGED TOOLS
Panama Pacific International Exposition
San Francisco
1915
NO. 81 AGRIPPA BORING-TOOL HOLDER
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VULCAN

Motor Driven Speed Lathe

This style of motor drive employs a constant speed motor mounted on a plate having an extension arm to support a bearing for the outer end of the motor shaft. The motor plate is fitted to a slide on a shelf which is securely fastened to the back of the lathe bed. The motor plate is moved by means of a screw which tightens or loosens the belt. A four-step cone pulley on the motor shaft is belted to a four-step cone pulley on the spindle. This gives the same speed variation as when a countershaft is used, and by means of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is cross-braced and all clamping levers are above the ways.

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Brass, Phosphor Bronze, Copper and Aluminum CASTINGS

We have the largest Jobbing Brass Foundry in Canada.
Can make prompt delivery.

Tallman's reputation is in the goods.

Tallman Brass & Metal Co.
HAMILTON, ONT.
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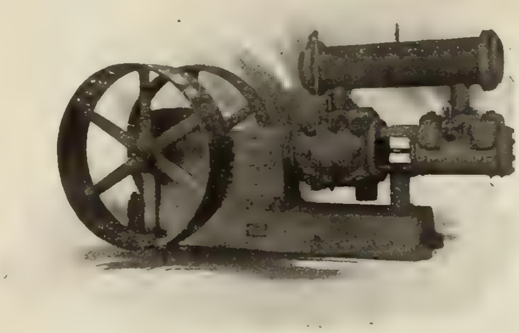
If any advertisement interests you, tear it out now and place with letters to be answered.

"Maximum Power at Minimum Cost"

COST OF ATTENDANCE



is a large item of expense with most air compressors.

INGERSOLL-RAND COMPRESSORS

are so completely automatic that practically all the attention they require is to start them and stop them.

With their extreme simplicity there is little likelihood of "trouble," and "splash" lubrication takes care of the oiling problem

Ask our nearest office for information.

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COMMERCIAL UNION BUILDING - MONTREAL, CANADA

SYDNEY TORONTO COBALT TIMMINS WINNIPEG NELSON VANCOUVER

Works: Sherbrooke, Que.

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"Keith" Fans will be found more economical and have a greater efficiency where conditions are unusually severe, because they possess advantages over other Fans used for the same purpose.

The "Keith" Fan is the one that will give you continued and unqualified satisfaction.

Our New Catalogue No. 55 has just come from the Press. Tell us where to address it and you will receive one by first mail.

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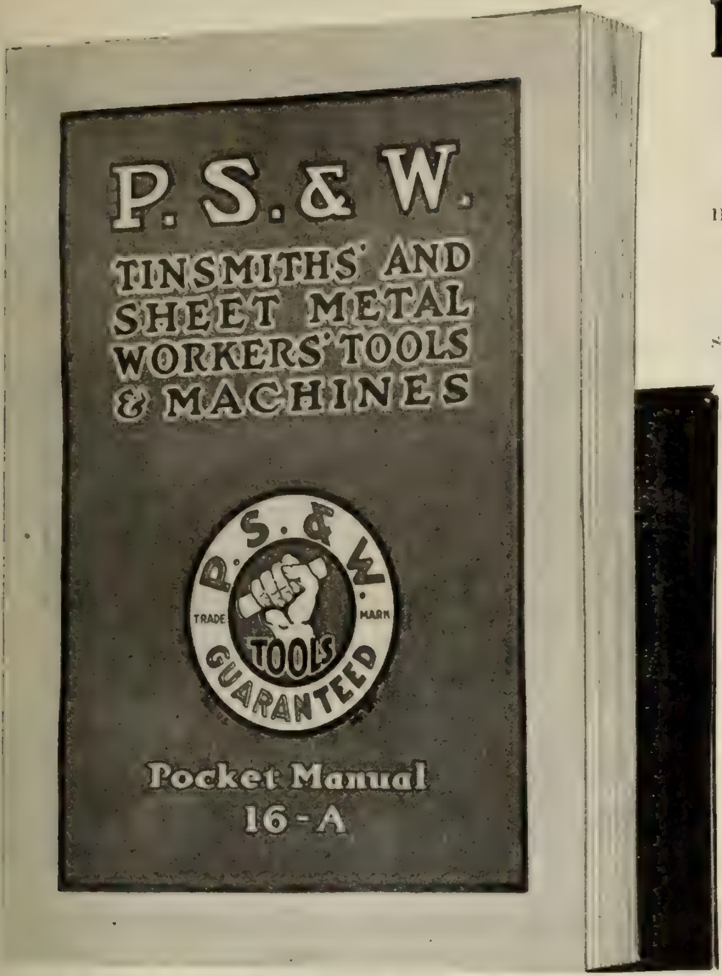

Put This Free Book in Your Pocket

Here's a book that every worker in tin and sheet-metal should have with him all the time.

It tells at a glance—

How to make all kinds of seams and joints.

How to increase the given diameter of tin and sheet iron.

The weight and thickness of every gauge of sheet iron, from 38 to 0000000 gauge, and of sheet zinc from 4 to 24 gauge.

The difference between wire gauges; weights and thicknesses of sheet copper; net weight per box of tin plates; diameters, circumferences and areas of circles and cylinders from a foot to 12 feet in diameter, and a lot of other mighty valuable information.

Most important of all, it shows every Pexto tool and machine for the metal worker, with a full description of each and an outline of the work it does and the way it does it.

All this information is compressed into a book that just fits the pocket. Write for it now. It's free.

PEXTO

The Peck, Stow & Wilcox Co.

Mfrs. Mechanics' Hand Tools, Tinsmiths and Sheet Metal Workers' Tools and Machines, Builders and General Hardware.

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*Address all correspondence to 205 West Center Street
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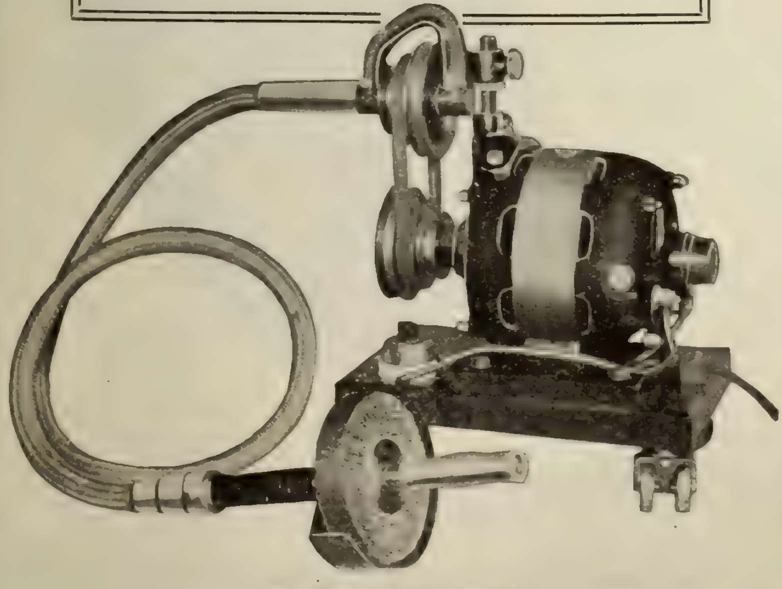

Type M-6 and M-7 Grinder

STRAND
FLEXIBLE SHAFT AND MACHINERY

Are remarkable in their efficiency and durability.

These electrical tools will give you a service that will pay their way. In other words, earn a good profit on the investment.

Our catalog contains information that will prove invaluable to you. Yours for the asking.

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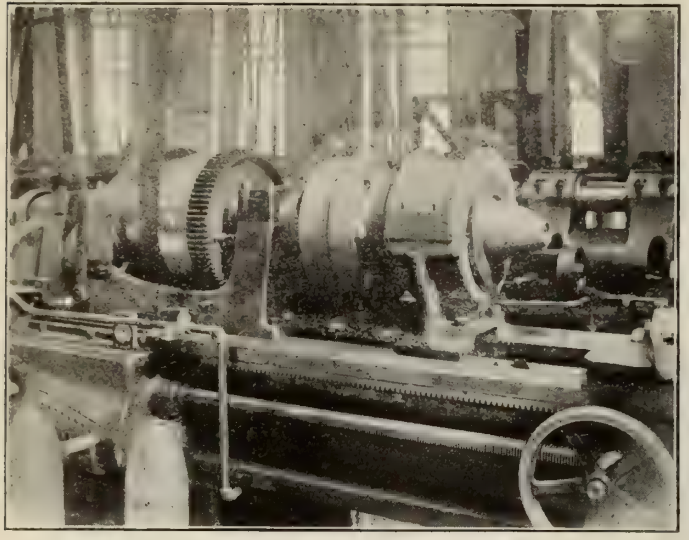


Cut shows Chuck on nosing operation. This is one of over two hundred in this Canadian plant.

This chuck is *built on the duplicate part system. It is simple, effective and fool-proof.*

It grips the shell in a predetermined position. The jaws will not slip on the shell. It has shell interior and exterior adjustable stops.

A trial on one of your lathes will convince you that this is THE Chuck for shell work.

A Big Efficiency Unit in Your Shell Plant

A. J. LAVOIE'S

LOW PRESSURE

Compressed Air Chuck

This chuck can be applied to any make of lathe, without alteration to the machine, and will increase production from 25% to 75%. It grips and releases the shell while in motion—no need to stop your machine.

It is a single unit combination attached to the face plate of lathe, supported by an additional heavy duty bearing, thus making a heavy duty lathe out of a light machine. A small lever operates the chuck. Will operate with a pressure of 60 lbs. per sq. in.

MANUFACTURED BY

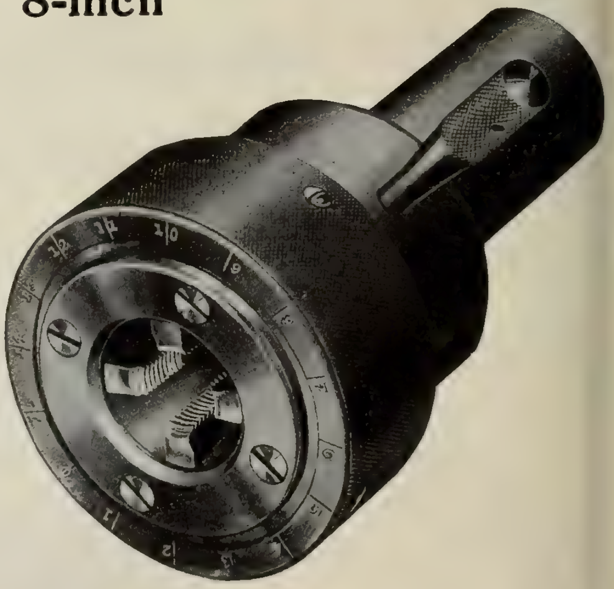
The Montreal General Tool Co.
673-5 Notre Dame Street, Maisonneuve, Montreal, P.Q.

Also manufacturers of shell tools, and special machine attachments of all kinds made to order.

MURCHEY TAPS AND DIES

Very extensively used on 6-inch, 8-inch and 9.2-inch shells

MAKERS ARE finding that Murchey Collapsing Taps and Automatic Self-Opening Dies are paying propositions on this kind of work. We can tap any size hole from 1 inch to 12 inches. All chasers used on shell work absolutely guaranteed to be made of the highest grade of high-speed steel. Get the benefit of our experience and the experience of some of the biggest shell manufacturers in the country. Let us tell you about the savings. Send blueprints. Write to-day for catalog.



Murchey Machine & Tool Company
DETROIT 75 PORTER STREET MICHIGAN

The Coats Machine Tool Company, Caxton House, Westminster, London, S.W., England, Glasgow, Newcastle-on-Tyne, and Fenwick, Freres & Company, 15 Rue Fenelon, Paris, France.

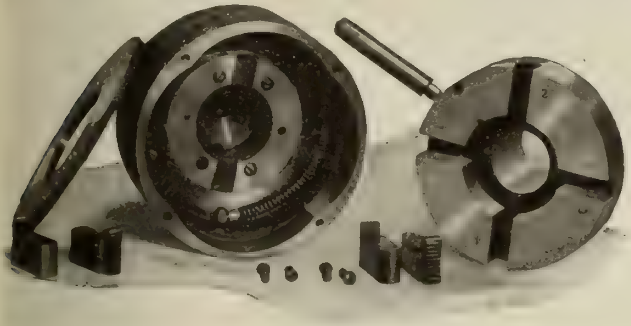
The "IDEAL" Die

for

Shrapnel

Quick, accurate work in threading Fuse Plugs for Shrapnel Shells is essential if you would make maximum profits. Your field is unlimited and your output governs your income. **Why not give the special type "C" Ideal Die a hard trial at this work and see if it will not boost production for you?**

Let the "IDEAL" cut the threads that bind you to low production. They will fit your machines. Circular on request.



"IDEAL" is a *different* die. The head revolves around a stationary cam, thereby utilizing the belt power or cutting strain as opening power. Chasers are supported directly back of cutting strain, which will remove any tendency to bell out and cause taper threads.

The Ideal Tool & Mfg. Company

BEAVER FALLS PA., U.S.A.

A. M. ELLICOTT CO., MONTREAL, QUEBEC

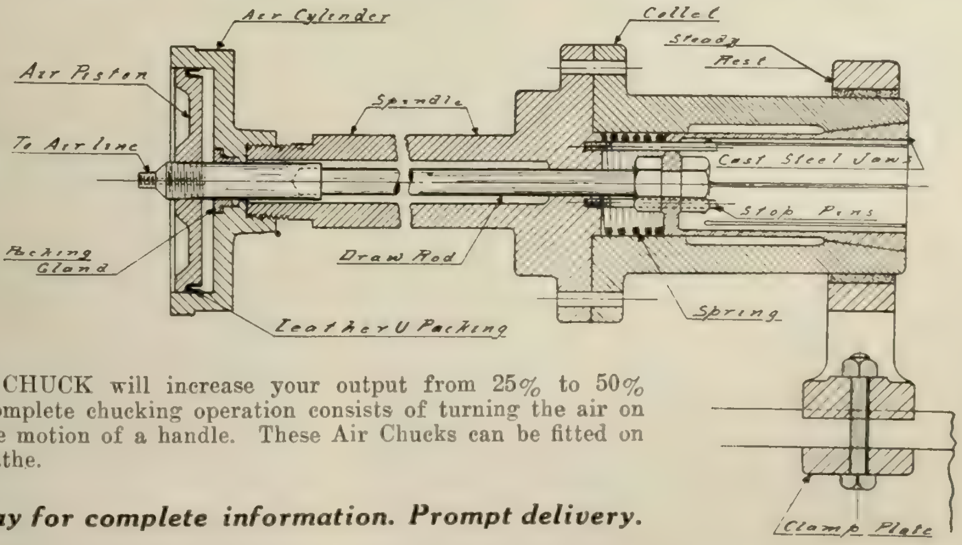
Distributors for Province of Quebec and Ottawa

Get Out Your Watch and Time Your Chucking

With most screw chucks you have to use brute force or the hammer to tighten, and even then your shell is not always rigid.

H.E.W. AIR COLLET CHUCK IS RIGID

Saves Time



Saves Money

H.E.W. AIR CHUCK will increase your output from 25% to 50% because the complete chucking operation consists of turning the air on and off, by the motion of a handle. These Air Chucks can be fitted on almost any Lathe.

Write to-day for complete information. Prompt delivery.

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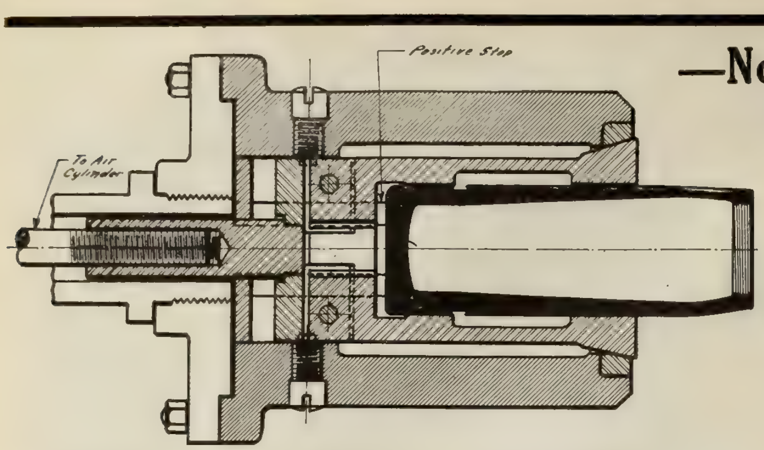
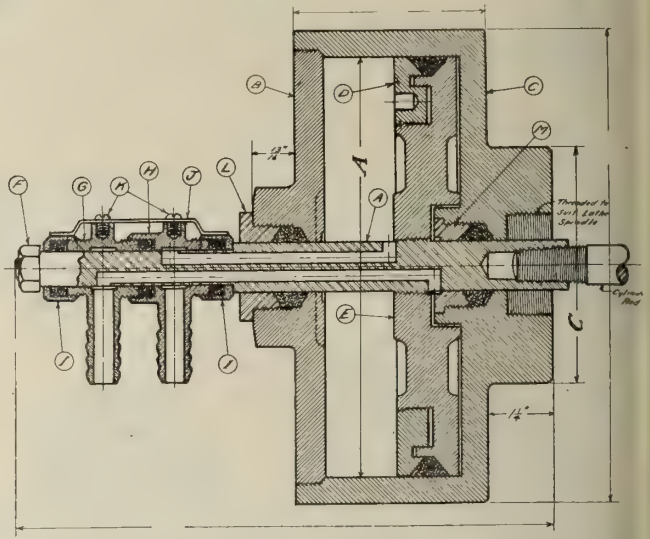


—No Time Consuming and Production Delaying Adjustments Here

M. E. C. Hinge Collet Chucks, operated by compressed air, are opened and closed in one-tenth the usual time. They hold the job in a positive rigid grip without the slightest need for adjustment; no wrench is required and the operator does not leave the front of the machine.



M. E. C. Air Cylinders
Embody every strong feature consistent with modern requirements. Construction of piston permits adjustment, preventing unnecessary loss of air.

No Manufacturer who is desirous of increasing production can afford to be without

M. E. C. TOOLS

We are anxious to have you demonstrate in your own plant just what M. E. C. Tools will accomplish for you.

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Foreign Agents: C. W. Burton Griffiths & Co., Ludgate Square, Ludgate Hill, London, England.
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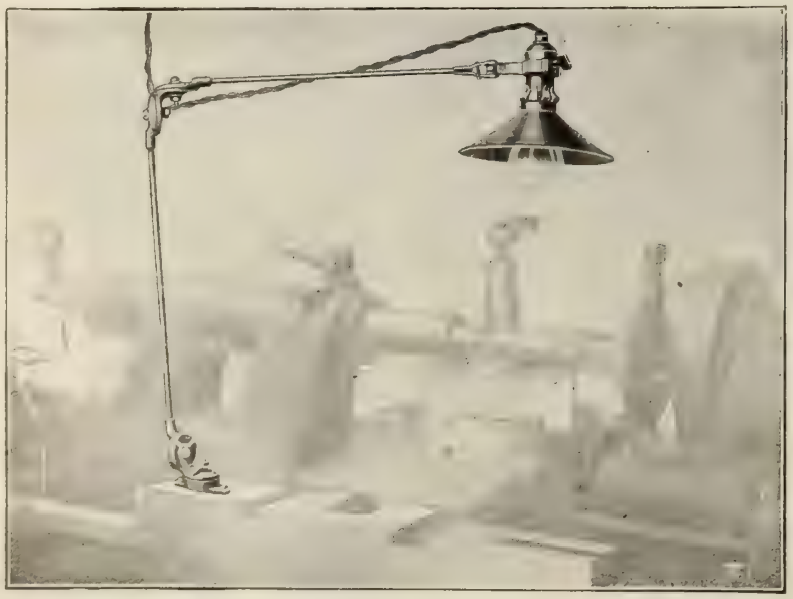
More Production — Greater Accuracy — Less Globe Breakage — Happier Men

That sums up the argument on this lamp bracket. Three frictional universal joints that can't wear out and are adjustable for any desired tension give the reason.
Just a slight push or pull puts the light where you want it, when you want it.
Any workman will do more and better work if his light is always in just the right place and under instant control.



The Searchlight Bracket

will pay for itself many times over in one season. The period of short days is approaching. Many shops are working night and day the whole year through. The cost is trifling compared with results. Only $1.50 each, with big discount, according to quantity.
Write now for samples and let us show you how your whole factory could be equipped at a big saving to you. Any quantity sent on 30 days' trial to any responsible concern. You can't possibly lose, and **You Might Win!**

The McCrosky Reamer Company
Meadville, Pa., U.S.A.
Export Agent;
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The Power House of Keokuk, on the Mississippi River, by Night.

The World's most important power plants employ

Silent Chains (MORSE, of Course)

Eleven 23 H.P. Oil Pump Drives (as illustrated below) are located in the Keokuk Power House. Seventy-two 24 H.P. drives are employed at Panama for operating the safety gate hoists. The largest chain drive in the world (5000 H.P.) drives a generator in a western power plant.

Your plant, no matter how large or small, can employ silent chain drives somewhere to good advantage—for driving pumps, governors, fans, blowers, exciters, compressors, etc., and, because of the exclusive "Rocker-Joint" construction, assuring longest chain life and greatest economy, we ask that the *make* of chain chosen be "MORSE," Of Course.

Morse Chain Co., Ithaca, N.Y.

Please send copies of your Latest Publications to the address given below. Also name preliminary proposition for a MORSE Silent Chain Drive as per the following specifications:

Maximum H.P. to be transmitted ....

Drive from .... to ....

R.P.M. of driver .... Of driven ....

Distance between shaft centres ....inches

Daily use desired of about .... hours

Name of individual ....

Company ....

Address ....

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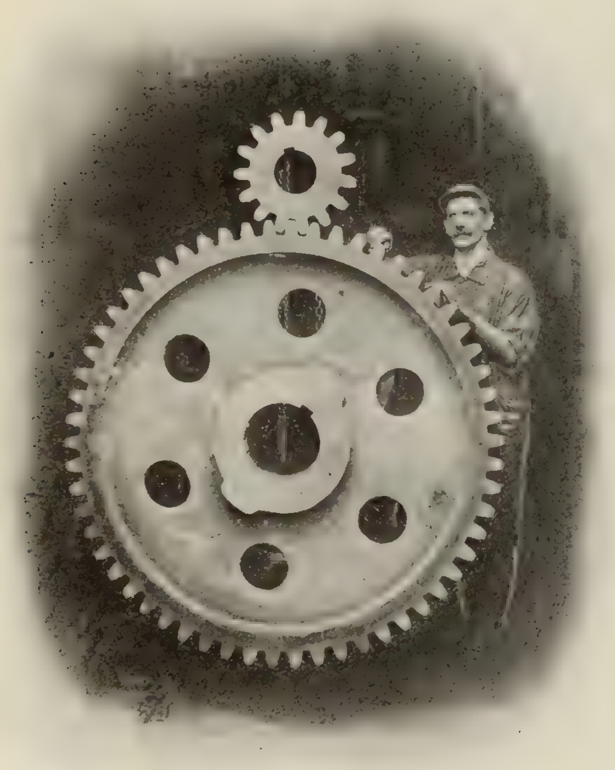
CUT GEARS

CUT GEARS



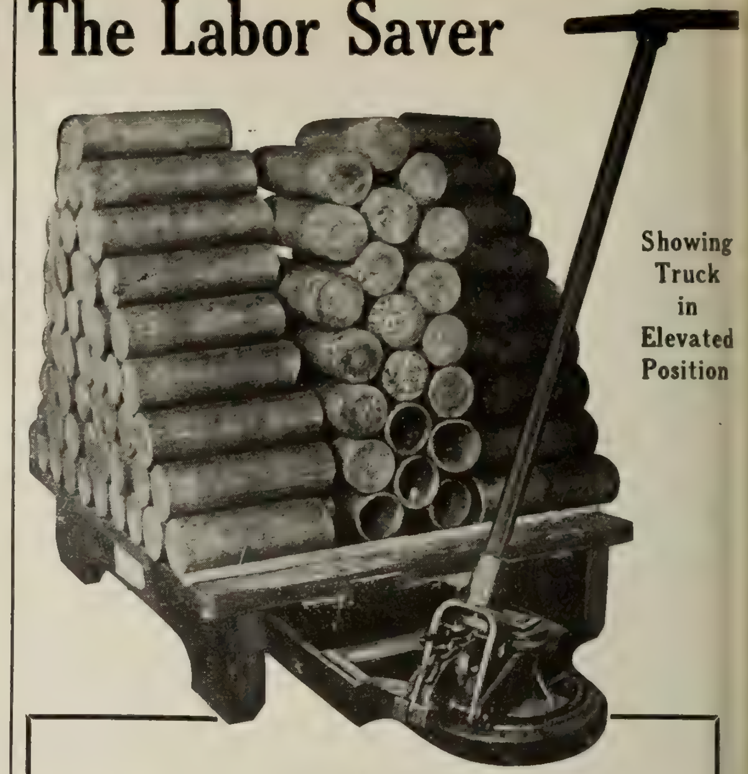
THESE HEAVY HIGH SPEED SPUR GEARS, FOR ESPECIALLY SEVERE REQUIREMENTS, WERE A RECENT RUSH ORDER.

Write Us for Quotations

Hamilton Gear & Machine Co.

COR. CONCORD & VAN HORNE **TORONTO**

The Labor Saver



Showing Truck in Elevated Position

THIS

ELEVATING TRUCK

greatly reduces cost of producing

SHELLS

or any factory product where numerous operations are required.

All material is stacked on the platforms. To move material the truck is backed under the platform; the handle of the truck is then pushed down, keeping the button depressed, which raises the truck bed, and with it the loaded platform, at the same time automatically locking it in its raised position.

When hauled to the desired position the button is pressed and the handle raised, lowering the platform to the floor. The truck is then drawn from underneath and is ready to move another platform.

Raising and lowering of the truck can be operated with one hand—can be raised or lowered at any angle. Specially designed ball-bearings throughout.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises and** PRESSES WITH ATTACHMENTS FOR PRESSING IN BAND — fixtures especially adapted for the manufacture of 18-pr. Shrapnel Shells.

You will profit by getting in touch with us now for prices and full information.

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LIMITED
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TRANSMISSION BALL BEARING CO., INC.
32 Wells Street, Buffalo. N.Y.

ARE YOU HAVING TROUBLE with the belting on your *Grinders?*

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ELEVATING
TRANSMITTING
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BELTING

ANACONDA BELTING
Is Heatproof

Is the belting you are using on Heavy Duty Drills and Lathes standing the severe conditions imposed upon it? ANACONDA BELTING will prove a profitable surprise to you under these conditions, if you are yet unacquainted with its merits.

Let us help you solve your belting troubles.

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SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the **COST** of your **CUTTING MIXTURE** BECAUSE

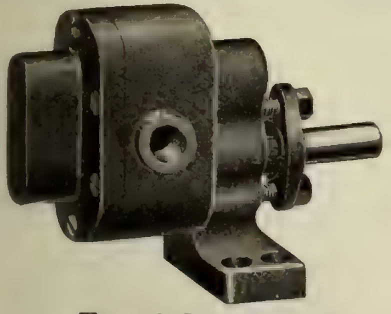
ONE GALLON of ECONOMIC WATER OIL will mix readily with **30 to 50** gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be **satisfactory**, but will produce very **ECONOMIC RESULTS.**

One TRIAL ORDER will prove our STATEMENT.

Made in Canada

Canadian Economic Lubricant Co.
LIMITED
1040-1042 Durocher St. MONTREAL

Positive in Action—Simple in Construction



Type 1 One Way

Type 2 One Way

ROPER
Circulating OIL PUMPS

Give a steady, non-pulsating stream delivered in proportion to the speed of the machine.

Type 1 One-way pump is especially designed for use on machines in which the cutting tools operate constantly in one direction, although by belting separately to the pump it may be used on a reversing machine.

In this form of pump a separate relief valve is used in the pipe line if it is desired to close the delivery pipe while the pump is running, or if the delivery is varied in quantity.

Where it is known that the delivery will be cut off or varied at times with the pump running, our **Type 2 One-way pump** provides the best as well as the cheapest way of accomplishing this result.

By using this form of pump, the piping is much simplified and the cost of installing is less while the appearance of the pump on the machine is much better.

It will pay you to investigate Roper oil pumps—they are saving money everywhere.

WRITE FOR FULL PARTICULARS.

C. F. ROPER & CO., HOPEDALE, MASS., U.S.A.

Looking for a safe and easy-running hoist?

Try the

Ford Tribloc

CHAIN HOIST

You may operate the Tribloc at any speed or at any angle, as the Patented Loop Hand Chain Guide prevents the "gagging" of the hand chain and insures a safe and easy-running hoist.

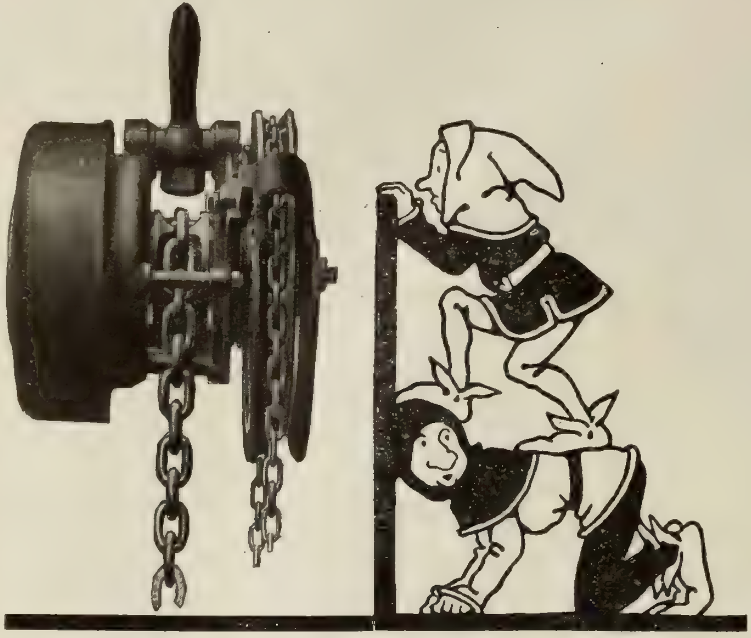
It is 3½ to 1 in its weakest part—the greatest factor of safety of any chain hoist built.

The Tribloc has planetary gearing, steel working parts and drop-forged chains and hooks. It has everything that will increase its efficiency and safety and is so good that we guarantee it for five years.

Our catalogue gives details and prices and illustrates other styles of hoists. Ask for a copy.

Ford of Philadelphia

Ford Chain Block & Mfg. Co. 139 Oxford St., Philadelphia, Pa.



—laces a 6-inch Belt in THREE minutes

CLIPPER Belt Lacer

Laces any width or thickness. You don't have to remove belt from shaft, as this small 19-lb. machine is carried to the belt and the work done on the floor.

Saves man-time, machine-time, and money, and you get a better joint.

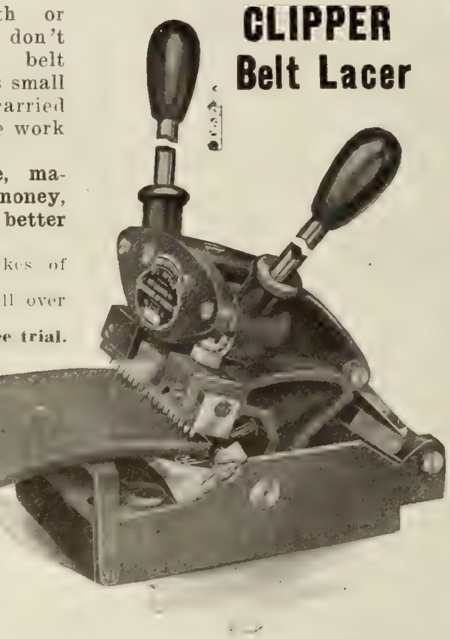
Adapted to all makes of belting.

33,000 now in use all over the world.

Sent on 30 days' free trial. Here's your opportunity to prove for yourself, on your own plant that the "Clipper" is the only belt lacer you can afford to use.

FOR SALE BY ALL LEADING SUPPLY HOUSES IN CANADA.

Clipper Belt Lacer Company
1 Front Ave., Grand Rapids, Mich.



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FERY RADIATION
PYROMETERS

Eliminate Guesswork from the Manufacture of All Products requiring extremely high Temperatures * * * *

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MAGNOLIA ANTIFRICTION METAL
MAGNOLIA ANTIFRICTION METAL

TRADE MARK

TRADE MARK

FOR PLANERS

WORCESTER LUMBER CO., CHASSELL, MICH.

Magnolia Metal Co., March 23rd, 1916.

Gentlemen:

In my twenty-five years' experience in saw, shingle and planing mills I have used all the principal brands of babbitt metals. After a great many severe tests, I find Magnolia Metal to be superior to all others for all general purposes.

I babbitted the cylinders of one of our planers eight years ago, and the machine has run on an average of more than ten hours per day since, at a speed of 4,000 R.P.M., and will probably run another year or more without rebabbitting.

Yours very truly,
FRED. GRAY.

PRACTICAL ENGINEER POCKET BOOK:

Over 600 pages. A valuable reference work imported from England and sold as an advertising medium at the low price of 40c. post paid.

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OFFICE AND FACTORY:
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HOYT METAL CO. TORONTO

Our Annual Sales run over $5,000,000

There is an enormous demand for our products because they are remarkable in their service and value.

"Hoyt Frost King" Babbitt

will surprise you by the way it takes care of high speed and stands up to heavy duty.

For all classes of stationary engines, traction rolling mills, planing mills, saw mills, pulp machinery, etc., it is without equal. A first-class all-round babbitt.

"ONCE USED, ALWAYS USED."

HOYT METAL COMPANY

FACTORY AND OFFICES
EASTERN AVE. and LEWIS ST., TORONTO, CANADA

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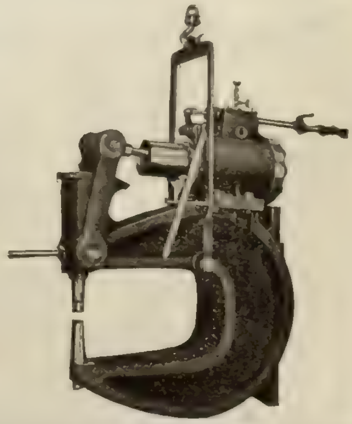
ALLEN Portable Pneumatic RIVETER

will give you the *Fastest* and *Tightest* Riveting at the Lowest Cost.

Special riveters designed to meet all requirements.

Send for Illustrated Catalogue.

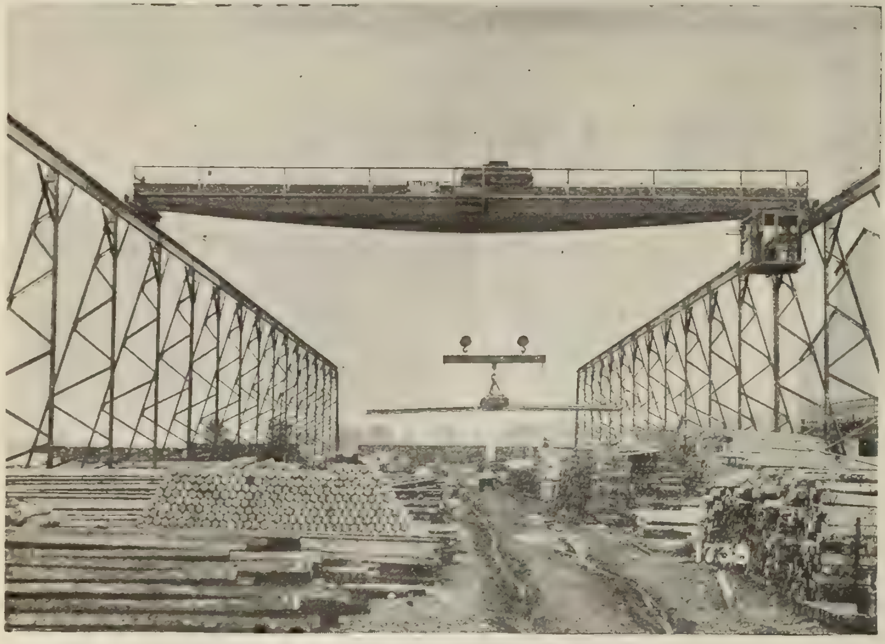


JOHN F. ALLEN COMPANY, (**Established 1872**)
370-372 Gerard Avenue, NEW YORK, U.S.A.

Liebers and W. U. Codes, "Riveter."

AGENTS—**Canadian Ingersoll-Rand Co., Ltd.,** Toronto, Ont.; Montreal, Que.; Winnipeg, Man.; Vancouver, B.C.; Sydney, N.S.; Cobalt, Ont.; Lethbridge, Alta.; Nelson, B.C.; So. Porcupine

A Crane in the Yard Saves Labor



7½-ton Whiting Traveling Yard Crane fitted with Cutler-Hammer magnet in plant of Ingalls-Shepard Forging Co., Harvey, Ill.

Reduces the laboring gang and effects more rapid and efficient handling of material in foundries, forge shops, steel mills, etc.

Fitted with a magnet such a crane is invaluable for handling bars, shapes, pig-iron, scrap, etc.

Many installations in U.S. and Canada.

Send for Catalogue No. 110.

COMPLETE FOUNDRY PLANTS Designed, Equipped and Put into Operation. CRANES OF ALL KINDS.

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB.

Electric Travelling Cranes

(Direct or Alternating Current)

Steam and Electric Derricks

(Stationary or Travelling)

Up-to-date design. Built for fast, continuous service.

ACCESSIBILITY—DURABILITY.

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MONTREAL

CUT GEARS

Theoretically Correct

RAWHIDE OR METAL

PROMPT SERVICE

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LIMITED
52 NAZARETH ST., MONTREAL, P. Q.

STARRETT TOOLS
TRADE MARK REG. U.S. PAT. OFF.
No 440
The L.S.Starrett Co Athol, Mass. U.S.A.

An Important Combination

The Man—the Machine—and the Tool

Even an expert workman is unable to accomplish much without good machines and accurate measuring instruments. Part of his skill lies in using the instruments to guide him in his work at the bench or with a machine tool. The country's ablest toolmakers and machinists rely for their fine measurements on

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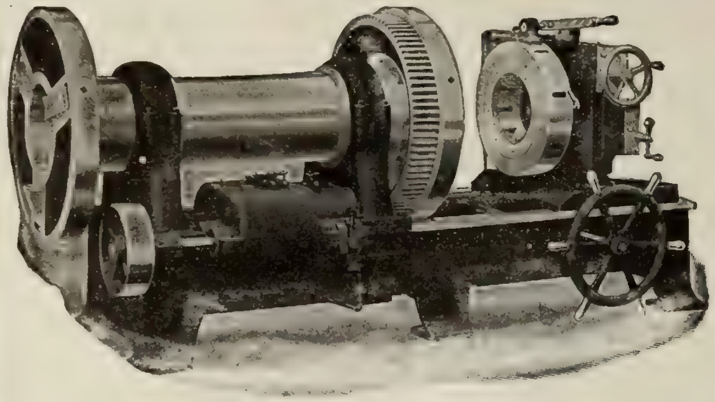

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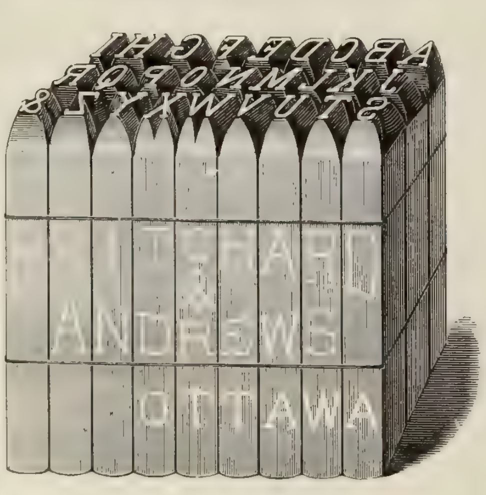

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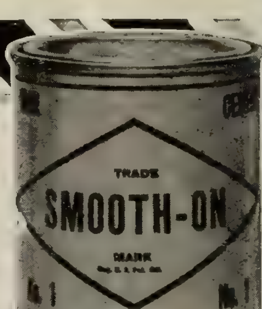

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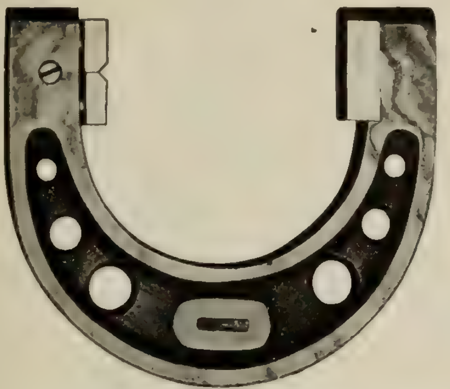

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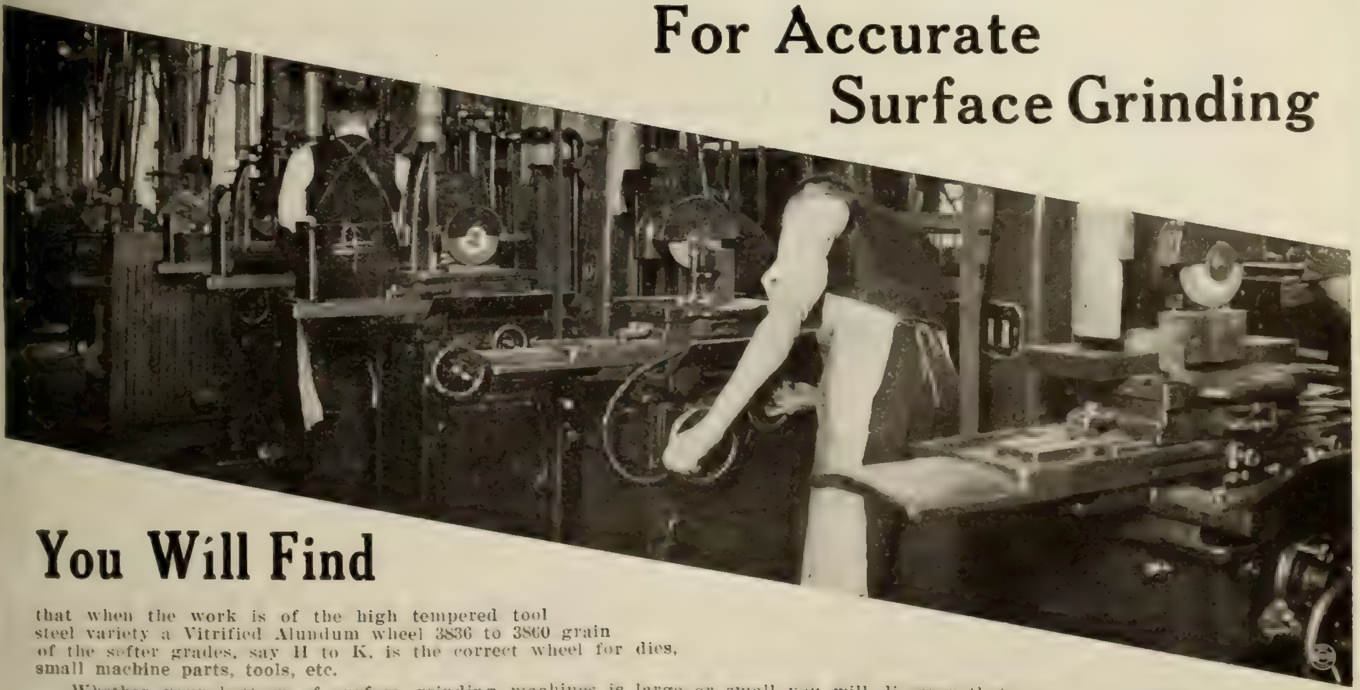

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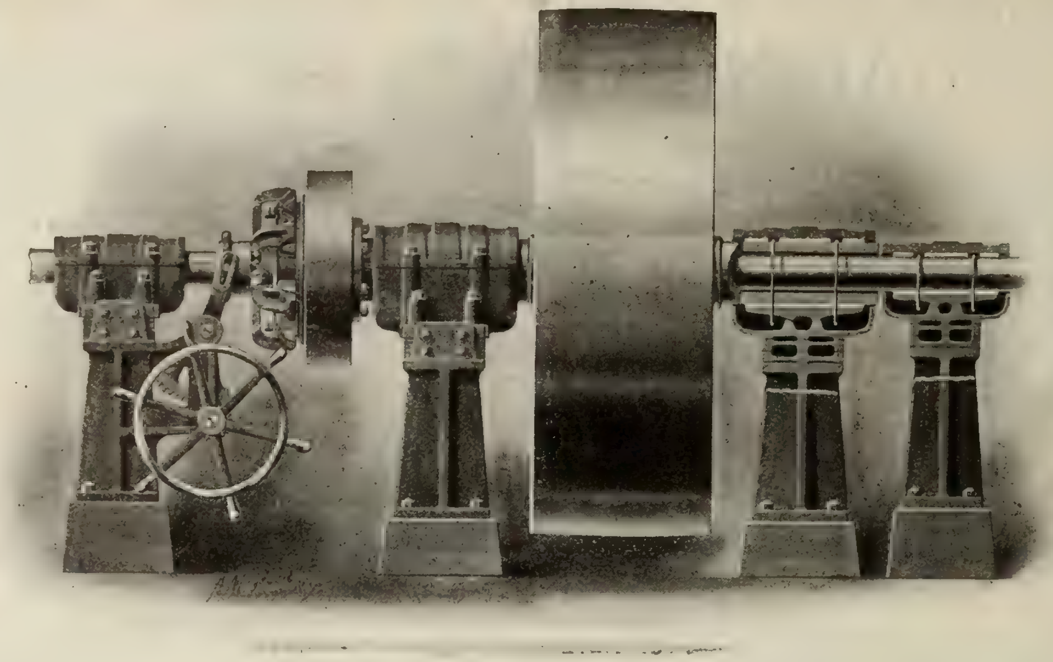

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CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

Machine Shop Equipment, Methods and Processes[*]--II.

By E. R. Norris[**]

Since recent events have demonstrated so strikingly the reliance which must be placed by a nation on its engineering industry as a factor in modern warfare, the subject of the above title assumes a place of importance not previously awarded it by people in general. While not dealing specifically with munitions or other similar product, the application of the principles contained therein may be done with profit in all branches of engineering.

MACHINE tool manufacturers have shown considerable enterprise during late years in dealing with the problems and possibilities presented by the introduction of the new steel. Since greater cutting speeds, feeds and cuts were possible, it became at once apparent that machine tools of greater strength and rigidity, combined with closer speed regulation, were highly desirable. Also, since the cutting speed had been increased, the handling time became of greater relative importance; consequently, machine tools have been produced in which the leading features and improvements are rigid construction, large wearing surfaces, improved means of lubrication, superior balance both in the parts of the machine and in the tool reaction - an increased number of available cutting speeds and feeds, closely graduated indexes, enhanced facilities for simultaneous operation and automatic and semi-automatic time-saving devices. Thus, the selection of the most suitable machine for a specific manufacturing operation has become a matter which requires considerable skill and experience.

Machining With Edge Tools

The selection of machinery for machine shop purposes must depend not only upon the design, size, accuracy and finish required by each class of work, but also upon the quantities which may be manufactured and carried in stock at one time. The following practice, which calls for the use of parting-off machines, centering machines, special rough turning and spotting lathes, cylindric grinding machines and milling machines has been found satisfactory for the manufacture of accurately finished steel shafts, which range in size from 1½ in. dia. (38.1 mm) by 15 inches (381 mm) long to 4½ in. dia. (114.3 mm) by 5½ feet (1.68 metres) long and are manufactured in quantity.

The material from which the shafts are made is hot-rolled axle steel, which has been carefully selected under rigid inspection at the mills. It contains about 0.44 per cent. carbon and 0.55 per cent. of manganese. The ultimate tensile strength must not be greater than 90,000 pounds per square inch (6328 kg. per sq. cm.) or less than 75,000 pounds per square inch (5273 kg. per sq. cm), and the elongation in 2 in. (50.8 mm.) must not be less than 18 per cent. The material is in about 22-foot (6.7 metres) lengths, when received from the mills, and is cut to the desired lengths after arrival at the works, these lengths being usually 1-32 inch (0.79 mm) to 1-16 (1.59 mm) longer than the finished lengths of the shafts. Several kinds of machines are used for cutting this material to lengths. The hollow-spindle cutting-off machine, with its forged steel tools, has been largely abandoned in favor of the revolving-cutter type of cutting-off machine. In the external revolving-cutter type, high-speed steel cutters, which are adjustable, are inserted in the rim of the revolving disk. The machine is provided with a very handy pneumatic clamping device by means of which the work is rigidly and rapidly fixed in position. In another machine, the cutters are arranged around an inner circumference of an annular disk. This machine is built to take stock up to 6 inches (152.4 mm.) in diameter, and the cutting is done by eight inserted high-speed steel cutters. Four of these cutters are round-nosed for roughing and four are square-nosed for finishing, so arranged that each square tool follows a round-nosed tool. The machine is driven by a constant speed motor of 710 revolutions per minute, which gives a cutting speed of 47.6 feet (14.5 metres) per minute. The length of bar stock is conveniently adjusted by means of the hand wheel, rack and gearing, one of the round ways upon which the carriage slides being graduated in feet and inches. A pneumatic clamping device, similar to the one used with the external achine, is also used with this machine. As these machines are used on rectangular and round bars, both external and internal designs are desirable, the latter being more suitable for round stock. Some idea of the relative values of the hollow-spindle cutting-off machine and the internal cutting-off machine may be obtained from the following figures, which were obtained by tests made on 4.75 inch (120.65 mm) diameter by 22.5 feet (6.86 metres) long axle-steel stock.

	6 in. (152.4 mm.) Hollow-Spindle Cutting-off Machines	6 in. (152.4 mm.) Int. Cutting-off Machines.
Cutting speed	64.5 ft. (19.66 metres) per min.	47.6 ft. (14.5 metres) per min.
Feed per min.	0.25 in. (6.35 mm) per min.	2.0 in. (50.8 mm) per min.
Total time on six cuts....	1 hr., 16 min., 10 sec.	33 min.

Centering.

After the shafts have been cut to length they are next centered in a double-head centering machine, which has two self-centering chucks. By this machine, true alignment of centers is secured, and as only one setting is required for centering both ends, this method is quicker than the older method in which a single head was used. Due to rough turning operations, the centers are subject to very heavy stresses, and where the centers are not in alignment these stresses are greatly increased, the centers wear rapidly and the shaft does not run true. This renders necessary an increased allowance of metal for grinding. The centers are drilled with a combination center drill, which drills the pilot hole, counter sinks to 60 degrees and also counter bores the shaft to a depth of 1-16 inch (1.59 mm). As all shafts on one order must have their centers of uniform depth, so that length stops may be used on the lathe, the center drill is provided with a stop.

Rough-turning Shafts for Grinding

The third operation on shafts is that of rough turning and spotting. Shafts from 1½ inch (38.1 mm) dia. by 15 inches (381 mm) long up to 4½ inches (114.3 mm) diameter by 5½ feet (1.68 metres) long may be conveniently rough turned, spotted and threaded in a special lathe. This lathe is equipped with adjustable stops for length and cross feeds, which, after the first setting, render calipering unnecessary and insure uniformity in the spotting for grinding. There are three tools, one for roughing, one for spotting and one for rough cutting the thread. Four cuts are taken with the threading tool, after which an adjustable die head, arranged over the tail-stock spindle and lathe center, cuts the threads to within (0.254 mm) 0.010 inches of the finished size. The thread is brought to size by means of a hand die after all the chief operations have been performed on the shaft; this insures a true thread and corrects any abuse which the thread may have received in handling, while going through the various operations.

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[*] A paper presented at the International Engineering Congress at San Francisco, 1915.

[**] Director of Manufacturing Operations, Westinghouse Electric & Mfg. Co., East Pittsburgh.

Milling Keyways

The next operation is that of milling the keyways. These are milled on a heavy vertical milling machine built for work of this class and provided with a two-fluted end-mill cutter. The cutter or end-mill is held in the spindle of the machine by a draw in collet, run at a high speed and flooded with cutting compound. The shaft is located in the machine by a self-centering device and an end stop. The keyway is then cut by feeding the cutter down to a depth stop by hand, after which the longitudinal feed is used and automatically thrown out by a stop which is set to suit the length of the keyway.

If the ends of keyways are not required to fit round-ended keys, it is found economical to place a number if shafts on "V" blocks and mill them by means of gang milling cutters, which are carefully spaced on the arbor. Where keyways have been cut by this latter method and the design calls for round-ended keys, it is necessary to transfer the shafts to an end-milling machine; and experience shows that it is more economical to complete the operation on one shaft at a time on a vertical machine, because the extra handling and time taken to re-set the work for end milling more than offset the gain made by milling several keyways simultaneously.

Grinding

The final machining operation on the shafts is that of grinding. Satisfactory grinding results can only be obtained by the use of rigid and accurately aligned grinding machines, in which the work is well supported by centers and steady rests, and where due attention has been paid to the grade of wheel, its diameter, width, peripheral speed and also speed and traverse of the work. Careful attention must also be given to the truing of the wheel, if a true and high finish is desired. The method of handling and grinding shafts depends somewhat on their size and the quantities manufactured at one time. On all heavy shafts it is the practice to rough and finish-grind complete the entire shaft before removing it from the grinding machine, except in those cases where the shaft has a taper, in which case the shaft is transferred to another machine to receive the taper grinding operation. In the grinding of heavy shafts, the fits are first ground to size and the journals, or bearings, are rough-ground to approximately .003 inches (.076mm) larger than the finished size, the wheel is next trued up and the bearings finished. In dealing with shafts which may be easily handled by hand, the better practice is to rough-grind journals, grind the fits to size and remove shafts from the machine. After about 50 shafts have been so treated, the wheel is carefully trued up, the shafts replaced in the machine and the journals finish-ground to size .

Milling.

Great advances are being made in milling practice as a result of recent experiments with "stream lubrication." These experiments have shown that cutter and work can be kept cool under very high speeds and feeds by the application of a sufficient quantity of cutting compound. The compound is conveniently and effectively applied to the cutter and work by means of a hood.

Some idea of the importance of "stream lubrication" may be gathered from the following data, which has been taken from various tests. By using stream lubrication while cutting the teeth of a long pinion, it was possible to increase the speed 71 per cent. and to increase the feed 164 per cent. The speed at which keyways in chrome-nickel steel shafts were milled was increased 36 per cent. and the feed 90 per cent. By the same means, the speed for milling the teeth of machinery steel sprockets was increased 86 per cent. and the feed 50 per cent.

Stream lubrication is being used to advantage in cases where, owing to limited capacity of the machine, speeds and feeds cannot be increased. The following is an instance of such a case. In milling grooves to form bars of "H" shaped section, it was possible to mill 300 pieces for each grinding of the cutter—stream lubrication being used—whereas, with the ordinary lubrication, the cutter had to be ground after 15 or 20 pieces.

While stream lubrication gives excellent results on steel of various kinds, it is not aways satisfactory when used on cast iron. This appears to be the case where the hard skin of cast iron must be encountered at all parts of the traverse, as for instance where the cutter is wider than the surface of the casting, and the vertical edges of the casting skin are presented to the cutter at two places only, which are separated by a distance equal to the width of the casting.

Continuous Milling

Since the cutting speeds and feeds have been greatly increased, it is evident that the ratio which the handling time bears to the total time of any milling operation will be greatly increased, unless improved handling and chucking facilities commensurate with the increased cutting capacity be installed. It is also evident that the highest efficiency can be obtained from operator and machine, only when the cutting proceeds continuously. This condition may be obtained, approximately, by what has been called the "continuous" method of operation. The "continuous" method may be used where the work is of such a size and shape that a circular milling attachment or a machine having two or more revolving tables can be used. Continuous milling is employed in finishing the base plates of electric sad irons by mounting them on a circular milling attachment. This circular attachment is provided with 10 independent chucks for holding the castings, thus allowing the operator time to take out the machined castings and put in other castings while the cut proceeds. The efficiency, in this example, may be gauged by the fact that the work was formerly done by one operator on two vertical milling machines fitted with transverse feed, magnetic chuck and high-speed cutters. The output was doubled and 50 per cent. of the floor space saved by the new method.

Double Table Miller

In a comparatively recent machine for continuous milling two tables, which carry the work, revolve about a central column, the revolving and indexing being actuated by means of a foot lever. The operations of this machine are so arranged that the time for setting up the work is equal to or less than the time required to make the cut. Under these circumstances, the only lost time between cuts is 10 seconds, the time required to revolve and index the tables —to which must be added, where the work is short, the time required to traverse the work to and from the cutter at the beginning and end of each cut. As an instance of the saving effected by this machine, may be cited a case where steel keys 9 inches by 1¼ inch wide (288.6 by 31.75 mm), set up two at a time on each table, were milled on both faces in an average time of 3.45 minutes each; whereas the time required to do this work on an ordinary milling machine was 7 minutes each. By mounting 7 pieces on each table, the time per piece was reduced from 3.45 to 1.5 minutes each.

The uses of the spline miller have been extended so as to include curved slots and forms in endless variety, by an ingenious and inexpensive camming attachment. The attachment consists of an angle bracket which is bolted to the plate and carries a supporting roller for the cam. A face plate, or carriage, to which the work is attached slides on the angle bracket, being actuated by a small roller as it travels upon the upper edge of the cam. The pressure between roller and cam is regulated by a spring. One end of the cam is fixed by a tap-bolt to the frame of the machine, the other end being supported by a roller. Straight slots may be produced by fixing the face plate to the angle bracket by means of a wing-nut and stud. This camming attachment has been found remarkably efficient for rounding off the ends of pinion teeth.

Drills and Drilling Machinery

Although the first cost of high-speed drills is much more than that of carbon-steel drills, high-speed steel is now in general use for all drills above 3-16 inch (4.76 mm) diameter; and while carbon steels are frequently preferred for the smaller sizes where the material to be drilled is chiefly brass or cast iron, it will be found economical to use high-speed drills for the small sizes where much steel has to be drilled. There are several reasons why high-speed drills are so generally used, the first of which is undoubtedly their great cutting capacity. Carbon-steel drills are commonly used on machinery steel, with 0.005 to 0.01 inches (0.127 to 0.254 mm) feed per revolution, at a peripheral speed of 20 feet (6.09 metres) per minute, while high-speed drills are ordinary driven at a peripheral speed of 70 feet (21.33 metres) per minute, with feeds ranging from 0.010 to 0.015 inches (0.254 to 0.381 mm) per revolution; and cases are on record where, under best conditions, high speed drills have been used successfully at a peripheral speed of 135 feet (41 metres) per minute, with a feed of 0.06 inches (1.52 mm) per revolution. Another reason why high-speed drills are preferable is found in the saving of grinding time. Still another reason appears in the reduction of the number of drills carried in stock, for, owing to the frequent grindings necessary with carbon-steel drills, operators frequently carried three or four drills of the same size, so as to save the time which would othewise be lost in walking to and from the emery wheel.

Machine Design Revised

As in other machine tools, the adoption of high-speed steel for cutting has been followed by the re-design of the machines due regard being paid to the element of rigidity and the power required to drive new drills to the limits of their capacity. Belt-driven feeds have been largely superseded by spur-geared feeds, and cast iron gears have given place to cut steel and bronze gears. All important bearings are bushed with bronze. Spindles are of forged, high-carbon steel, accurately ground and fitted with ball thrust-bearings, instead of the fibre washers previously used. Automatic time saving devices have received much attention. Attachable multiple-drill heads, having adjustable centers arranged to take 2, 3, 4, 5 or 6 drills, have found many suitable applications. High-speed drills have encouraged the practice of multiple-drilling, and, on repetition work, multiple drilling machines are often arranged to drill complete at one setting. The machine may be arranged for drilling in five or more directions at one time.

WAR-TIME USES OF FOREST PRODUCTS

ONE of the mysteries of the present war, to neutrals and enemies alike, is the source from which Germany obtains the nitrocellulose necessary in the manufacture of smokeless powder, and ordinarily made from cotton. A well-defined belief exists in England that at least part of the nitrocellulose needed by German powder factories is being made from wood. "If this is true," writes A. W. Schorger, chemist of the Forest Products Laboratory at Madison, Wis., "it furnishes another instance of the surprising dependence upon wood, in one form or another, on the part of the fighting nnations. The actual extent to which forest products are put to use in time of war, both for military purposes and for supplying the nation with some of the things it needs to carry on its daily life, is not generally recognized."

Warfare on land has developed in a way to give timber an importance in field operations it never had before, while the vast number of accessories needed for the smooth running of the modern fighting machine, from ammunition to absorbent cotton, have led to an extraordinary demand for certain forest products, and have even brought about new uses for wood born of necessity and unheard of a few years ago.

Black Powder

"For one thing," Mr. Schorger says, "there is the matter of explosives. Ordinary black powders contain about 75 parts saltpetre, 10 parts sulphur, and 15 parts charcoal. The charcoal employed must possess special properties, and is made largely from dogwood, willow and alder. In spite of the advent of smokeless powder, enormous quantities of black powder are still used. It is employed in shrapnel, for which only a moderately powerful explosive is required to drive the bullets. Besides, the smoke produced when the shell explodes is an actual advantage in enabling the gunners to determine the correct range.

Black powder is also used to fill the rings of the time fuses with which shrapnel shells are equipped, for which purpose no satisfactory substitute has yet been found. Furthermore, it is used in most armor-piercing shells, which should attain a great penetration before they go off, and for which the majority of high explosives would be unsuitable because of their explosiveness on contact. Another product of the forest, resin, is employed for filling the spaces between bullets in shrapnel, so that on explosion the missiles will be evenly distributed in all directions. Its brittleness, and at the same time its hardness, together with its low melting point, fit it admirably for the purpose.

Nitrocellulose

The period since the beginning of the war has witnessed a great amount of discussion in England as to whether Germany is actually employing wood from which to make the nitrocellulose for her smokeless explosives. When after a long delay England declared cotton contraband of war, it was maintained by many that this would not inconvenience Germany greatly, since she was already making explosives from wood cellulose. During the discussions that followed it was proposed to destroy the forests of Germany by a giant fleet of aeroplanes armed with bombs; however, as one English editor naively remarks: "This would scarcely be feasible, since about one-third of Germany is forested."

"As a matter of fact, little or no reliable information exists in regard to Germany's use of wood for nitrocellulose, and expert opinion in England differs widely about the matter. Sir William Ramsey believes that such explosives are being made, and Walter F. Reid, who introduced the important gelatinization process in the manufacture of smokeless powder, is emphatic that a nitrocellulose can be made from wood pulp that is equal in every respect to that made from cotton. On the other hand, Clayton Beadle, whose opinion is entitled to great respect, holds that the difficulties attending proper purification of the wood cellulose previous to nitrification are all but insurmountable.

"However, this may be, records published by German scientists before the war show that a high explosive can be manufactured from wood cellulose, though at that time its stability was questionable. While it required forty years of experiment to render guncotton stable, anything like the same time might not be necessary in the case of wood cellulose, for the experience with guncotton should facilitate solution of the present problem. It is highly probable that the chemical difficulties have already been overcome."

Turpentine and Rosin

The long leaf pine forests of the South furnish 90 per cent. of the world's supply of turpentine and rosin. In normal times turpentine is used mainly as a solvent in the arts. According to Mr.

Schorger, it is entirely possible, however, should the need arise, to make from turpentine a synthetic camphor as good for practical purposes as the natural product. In the event of the blockade of the Pacific Coast this should be the means of preserving our celluloid industry, which now consumes the greater part of the 5,000,030 pounds of Japanese camphor imported annually.

Rosin, the use of which in shrapnel has already been mentioned, is employed mainly in the manufacture of cheap soaps and as a size for paper. So acute has become the scarcity of rosin in Germany that the Prussian Minister of Agriculture has suggested such measures for increasing the supply within the empire as distilling resinous wood and collecting the oleoresin which exudes from trees peeled by deer. Prices being paid for rosin by the Central Powers are almost fabulous. Curiously enough, a substitute for paper size recently proposed by a German scientist has wood tar as its base.

* * *

MEETING WAR EXIGENCIES.

THAT Germany is not the only belligerent country that has devised new means of meeting the exigencies of war is shown in a report from the American Counsul, at Bradford, England, who says that English manufacturers have found many ways of providing articles made extremely scarce because of war demands. Artificial leather, a good substitute for leather; artificial silk, various fuel oils, wood pulp for many uses to which cotton was formerly supposed to be alone suited, and new means of recovering rubber from waste rubber goods are some of the extensively developed materials and processes.

Scientific research and invention have been most active in Great Britain since the war began, the consul says, and many substitutes have been found for articles hitherto regarded as practically indispensable. Many of the imported aniline dyes have been supplanted by home-made dyes that were formerly entirely neglected. The production of alcohol from wood pulp has started up and wood pulp is also being employed in silk weaving where before cotton was used. The British are now beginning to make kerosene engines to take the place of gasoline engines, and there is a considerable use of benzol in lieu of gasoline.

One of the interesting substitutes is artificial leather. Linen duck is coated with varnish, to which is added a small quantity of siccative and Venetian red. Several layers of the dried linen are then joined together in sheets of varying thickness. The adhesive mixture used for this purpose consists of four parts of heated wood tar pitch, with the addition, during constant stirring, of two parts of India rubber dissolved in benzol, four parts of Venetian red, mixed to a thick consistency, with French turpentine oil and two parts of cork powder. Sheets thus prepared are compressed between powerful rollers. The product, it is claimed, serves as an excellent substitute for leather, especially for the soles of footwear. It can be easily sewn and pegged, and can replace leather in many of its uses.

* * *

THE MUNITIONS PROBLEM

ACCORDING to the *London Iron and Coal Trades Review*, experiences in America have brought forth the conservative estimate that it would take fifty engineers, designers and draughtsmen at least one year to prepare the drawings for the seventeen sizes of shell now used by the United States army, together with drawings for gauges, jigs, fixtures and tools. To produce the latter would take 800 men, well trained and in well-organize factories, at least five years, calculating 300 working days per year. This, it is estimated, would find employment for 100 factories, each employing 2,000 men, capable of producing a total output of 200,000 shells per day. Twice this number of shells have been used in a single day in the present war by one of the combatants. It was found in America that it would take at least 300 first-class gauge makers six months to furnish the first working set, inspector's set and the master's set necessary for rifles in quantity, and when 1,000 rifles per day are required it means that the working sets must be increased from one to ten, and the inspector's set from one to five, keeping the maser's set for reference purposes. It is believed that in the United States there are not more than 3,000 expert gauge makers. Toolmaking, jigs, fixtures, etc., require a small army. It is calculated that it takes at least 1,000 toolmakers one year to furnish tools for an output of 1,000 rifles a day, and it may be estimated that to put 1,000,000 men in the field requires from 2,000,000 to 3,000,000 rifles.

* * *

SCARCITY OF WOOD PULP

THE News-Print Manufacturers' Association reports that the pulp wood situation in Canada is ominous. Mills which were paying $18 and $26 a month, with board, to ordinary workmen in the woods last year, are now competing with one another for an adequate supply, and are offering from $55 to $60 a month with board, and camps in many cases are not supplied with a full complement of men. There is every probability that the cost of pulp wood will advance very sharply this year as compared with the pulp wood costs of the past, but the chief source of worry will not be the high cost of pulp wood, but the possibility that the mills may not be able to secure a sufficient supply to provide for their requirements during the whole of the year 1917. Statistics showing the production and shipments follow:

	Production,	Shipments,	Stocks,
Week ending	p.c.	p.c.	tons.
Sept. 16...	102.2	104.7	1,323
Sept. 23...	83.2	83.4	1,376
Sept. 30...	106.2	107.6	1,181

The heavy decrease in production and shipments for the week ended September 23 was largely caused by labor trouble at a large Western mill, and by the fact that a number of the smaller mills were running on other grades of paper. The report for the Canadian territory follows:

	Production,	Shipments,	Stocks,
Week ending	p.c.	p.c.	tons.
Sept. 16...	99.5	105.4	8,090
Sept. 23...	96.3	100.8	2,405
Sept. 30...	95.6	90.9	2,852

* * *

BIG DEVELOPMENT IN SHIPPING SERVICES

ACCORDING to a news agency telegram from Glasgow, Scotland, it is stated in well-informed circles there that important negotiations are taking place with a view to a big development of shipping services between the Old Country and Canada. A "regrouping" of the shipping companies is probable, and will, it is stated, "affect the C. P. R., the Allan, the C. N. R., and the Cunard lines."

Early in this month it was pointed out in the London *Times* that the Anchor Line was understood to have acquired an interest in the passenger ships of the Donaldson Line, which trades to Canada, and it would seem likely that this development has given rise to the present report. The interest in this transaction was enhanced by the fact that the Cunard Company holds a controlling interest in the Anchor Line, and that a few months previously the Cunard had concluded a far-reaching agreement with the C. N. R., and had acquired the vessels owned and controlled by that company.

The C. P. R. now owns the Allan Line, the vessels of the two companies being managed by the Canadian Pacific Ocean Services (Limited), and the White Star Line is associated with the Dominion Line as being joint subsidiaries of the International Mercantile Marine Co. of New Jersey. The passenger lines in the Canadiann trades may, therefore, be separated into three principal groups, as follows:— Canadian Pacific and Allan Line; White Star and Dominion; Cunard, Anchor, Canadian Northern and Donaldson.

The Cunard has gradually been extending its trade with Canada since it acquired the Thomson Line in 1911.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data
and Ideas Evolved from Actual Practical Application and Experience

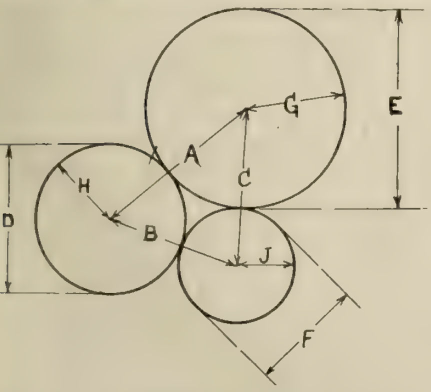
METHODS OF MEASUREMENT FOR EXPERT MECHANICS—II.

By F. Scriber

At the beginning of the previous article attention was drawn to the possibility of error resulting from the dimensioning of a drawing being done in one way and the actual measuring of the piece being done in another way. To prevent loss of time and remove any possibility of error on the part of the shop, dimensions should always be put on a drawing in the same way as the piece will be measured.

For certain purposes of calculation it may be necessary to put on a dimension which cannot be measured in the shop, and, where a high degree of accuracy is required, dimensions which are quite impracticable are frequently employed as shown by Fig. 15.

Impracticable Dimensions



These dimensions are usually the result of a draftsman having a fixed point on a layout from which to work, coupled with the fact that when detailing the parts the dimensions are given from this point without regard to the fact that this point is "out in the air," and cannot be used to measure from. Referring to Fig. 16, the illustrations are shown with the proper dimensions from which all measurements may be taken from within the part itself, thus permitting the work to be checked after laying out as well as facilitating the work of laying out. These two plans of working dimensions differ chiefly from the fact that in Fig. 16 construction holes X are used from which the various locations are obtained, while in Fig. 15 it is not possible to take scale measurements in many cases. Referring to Fig. 15, locating plate, it is obvious the slot A cannot be located accurately from the point B. thus the method of locating in Fig. 16, with dimensions C and D is the better way. Likewise the radius E, Fig. 15, is less likely to be correct if dimensioned as in Fig. 15, than if dimensioned as in Fig. 16, where all measurements may be made in a vertical or horizontal plane by holding a plug in the radius E. The view of the test plate, Fig. 15, is a good example of dimension lines given from "nowhere," as the centre line F cannot be used to measure from with instruments and the centres G and H are out in the air and cannot be used; therefore, if good work is expected some other form of measuring must be resorted to, and the method shown by Fig. 16, with construction hole X, provides an accurate method of measuring this piece.

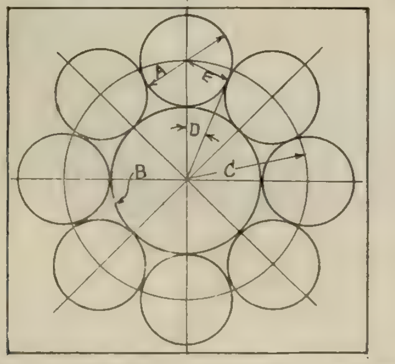


FIG. 17.—UPPER: LOCATING THREE HOLES BY DISCS. LOWER: LOCATING EQUALLY SPACED HOLES BY SAME METHOD.

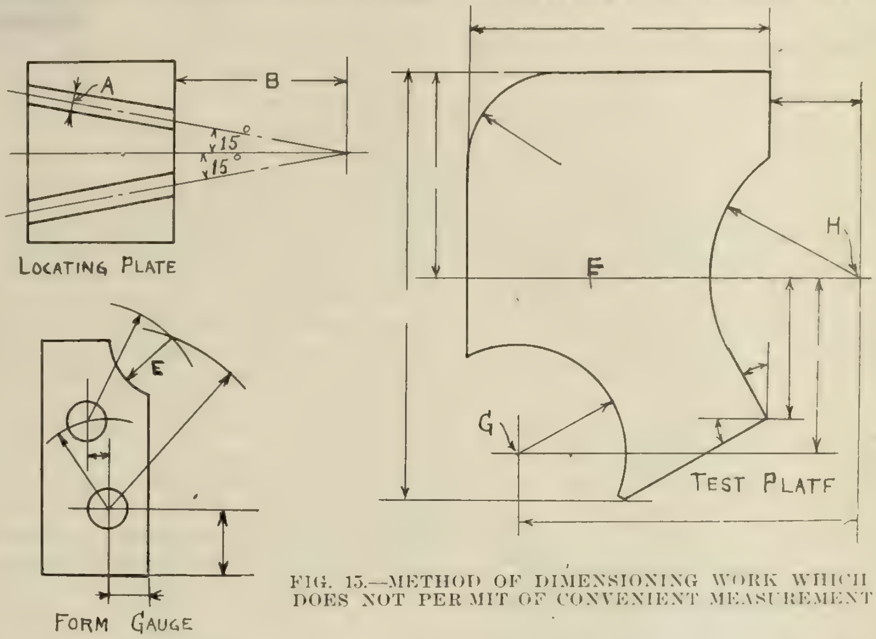


FIG. 15.—METHOD OF DIMENSIONING WORK WHICH DOES NOT PERMIT OF CONVENIENT MEASUREMENT

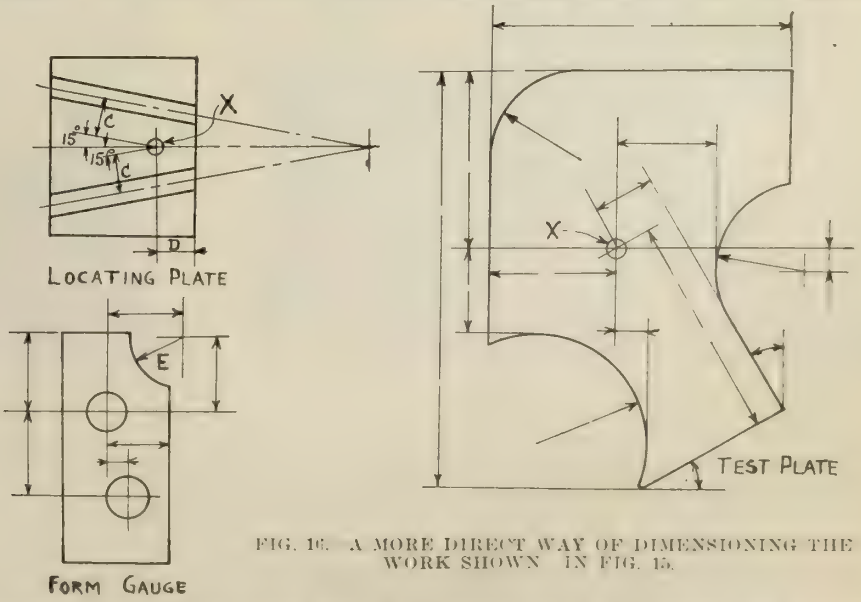
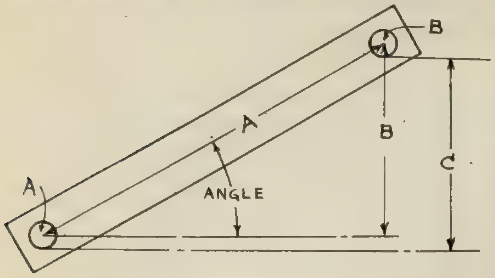


FIG. 16. A MORE DIRECT WAY OF DIMENSIONING THE WORK SHOWN IN FIG. 15.

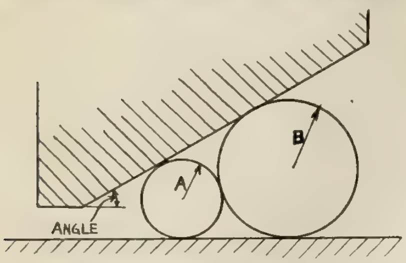
Applying the Disc Method to Boring

The disc method of laying out work

for boring is now quite generally understood, and is illustrated in Fig. 17, upper view, where, having radius A, B and C, it is desired to determine the diameters



B = A × Sine of Angle.
B = C when the pins are the same diameter.



$C = \frac{1}{2}$ angle, $X = B - A$

$$X = \frac{2A \times \sin C}{1 - \sin C} \text{ or}$$

$$X = \frac{2B \times \sin C}{1 + \sin C} \text{ or}$$

FIG. 19.—TWO METHODS OF MAKING ACCURATE ANGULAR MEASUREMENTS.

of discs which, when touching each other, give the desired centre distance. This is obtained by using two discs D and E whose radii equal A when by supplementing these discs with a third disc F, of a diameter which will make the radii B and C, the centres are accurately located. The diameters of discs are found by the following formula: A—B equals difference between radii of discs E and F. Adding this difference to C, we obtain diameter of disc E, E÷2 equals G, A—G equals H, and likewise D—B equals J.

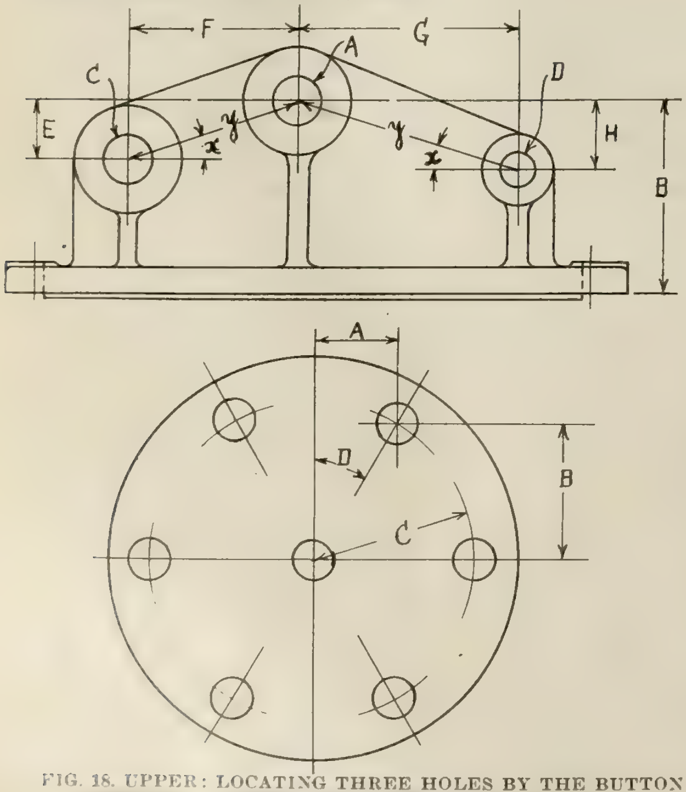


FIG. 18. UPPER: LOCATING THREE HOLES BY THE BUTTON METHOD. LOWER: LOCATING HOLES RADIALLY BY THE USE OF BUTTONS.

In the lower view, Fig. 17, is illustrated a disc method of laying out a number of equally spaced holes, which is easily applied and consists of a number of discs A in contact with a central disc B, and in contact with each other, these discs to be of such a diameter as will bring the centres of the small discs on the radius C. The radius of these discs is found by dividing twice the number of discs or spaces into 360 degrees, which gives the angle D. Having hypotenuse C and angle D using formula—C×cotan of angle = E—the radius of disc A is obtained, and subtracting this from radius C gives radius of disc B.

The disc method does very well for small precision work; while for work of large radius the button method, Fig. 18, is used, which is an adaptation of the disc method, using adjustable buttons in place of discs, and setting these buttons the correct distance apart with the aid of a vernier height gauge or other suitable measuring instrument. In the upper view, Fig. 18, the hole A is first located using dimensions B, following which holes C and D are located using dimensions E, F, G and H, and measuring between the buttons in a vertical or horizontal plane instead of to centres as the dimensions are given. The vertical and horizontal measurements are preferable to the angle X and radius Y on this class of work to insure accuracy. The method of locating centres shown by the lower view, Fig. 18, is obvious, as square figures A and B are given in preference to radial C and angular D.

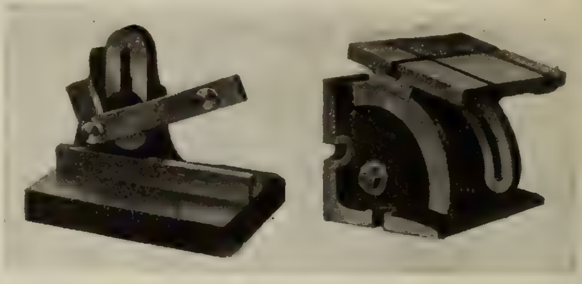


FIG. 20. LEFT: COMMERCIAL SINE PROTRACTOR ON BASE. RIGHT: ANGLE IRON AND SWIVEL TABLE FOR SETTING WORK ON.

The Sine Protractor

As in an article of this type, which is intended to be suggestive, it is not desirable to go deep into the actual method of figuring the problems illustrated, it is assumed that the reader is familiar with the methods of figuring angles by trig-

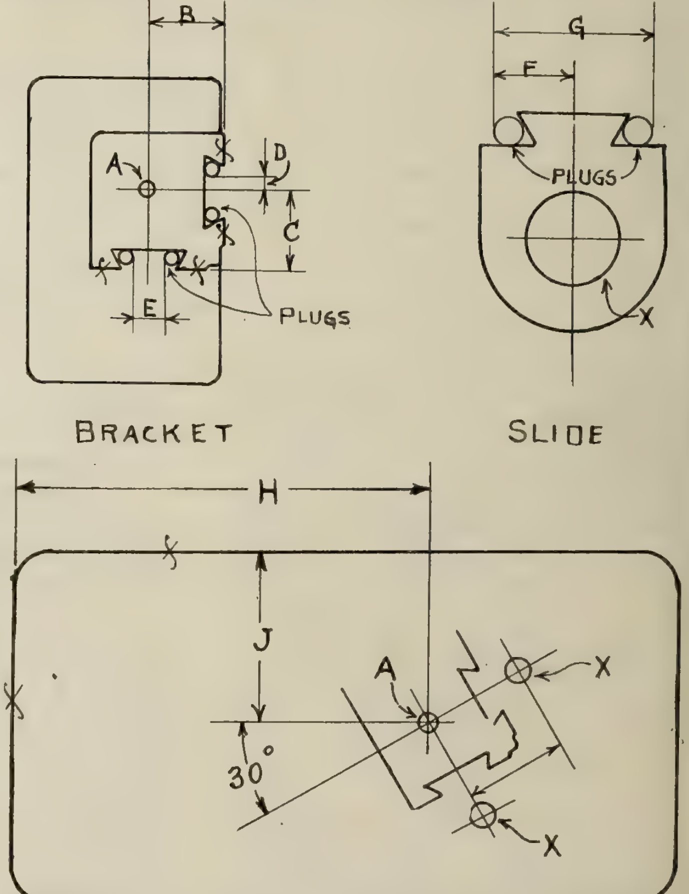


FIG. 21. ARRANGEMENT OF PARTS TO BE ACCURATELY ASSEMBLED.

onometry, upon which the solutions of these problems depend, or can obtain this information from a handbook. In line with this intention note is made of the use of sine protractors for measuring angles, as illustrated in Fig. 19, upper view, with the formula there given for figuring. In the lower view is a formula showing the method of using discs in contact to measure or set up a given angle, this method being in general use, and having been described in some of the late mechanical handbooks.

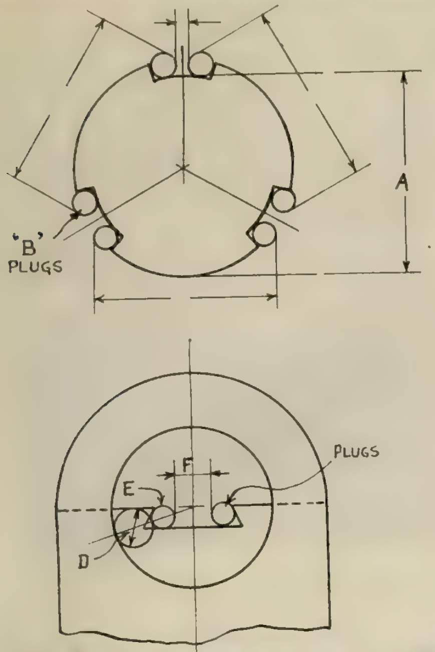


FIG. 22.—UPPER MEASURING THREE GROOVES WITH PLUGS LOWER: LOCATING SLIDE FROM HOLE BY SAME METHOD.

To illustrate the principle on which sine protractors work, reference is made to Fig. 20, which shows at the left a commercial sine protractor mounted on a base, with buttons whose difference in height from base is measured to obtain the angle. At the right, Fig. 20, is shown a convenient angle iron and a swivel table for setting up work at an angle while measuring or machining.

Quite an interesting application of measuring from a construction hole is illustrated in Fig. 21, which also shows the making of dovetail measurements by the use of plugs. In the upper view at the left is shown a bracket, and into this bracket are fitted two slides, as shown at the right upper view. This bracket with the slides is to be accurately located on the base shown in the lower view. To accomplish this result a construction hole A is placed in the bracket, being located from the finished surfaces maked f, as indicated by the lines B and C. With these finished surfaces the two dovetailed grooves are measured by means of the dimensions D and E. The two slides are also measured by means of plugs using dimensions F and G. Again making use of the construction hole A, the bracket is located in position on the base, using the dimensions H and J. Following this, the holes in slide X are accurately located from the construction hole, thus assuring a good job, any part of which may be duplicated by actual measurements without recourse to the common method of fitting the parts together each time any part is made.

Groove Set-up

A set-up used for measuring grooves is illustrated by Fig. 22, upper view. The method of procedure in this case is obvious, as the depth of grooves is first measured, as indicated at A, following which plugs B are set in the grooves and measurements are taken, as indicated by the dimension lines. In the lower view, Fig. 22, it is necessary to locate the dovetail slide in relation to the hole, and this is accomplished by testing with standard plugs D between a plug E held in the angle of slide on one side; measuring between the two plugs in the angles across F indicates whether the width at dovetail is correct.

From these illustrations it is hoped some idea of how to execute various jobs may be obtained when a high degree of accuracy is necessary, but it might be well to bear in mind that much of the work commonly met with in the shop does not require attention to the minuteness of detail which these set-ups show, and it often happens that some simpler and quicked method can be applied which is satisfactory. This, however, is a matter which calls for individual judgment, and no amount of descriptive methods can cover the numerous departures from these examples which will suggest themselves to the wide awake tool-maker.

* * *

INCREASING PRODUCTION

By S. M.

IN the belief of many managers the productive capacity of their shops are limited if their equipment does not happen to be of the very latest type. Their machines may have done good service in days gone by, yet because they are slightly antiquated, the feeling prevails that operations must be performed in the same old time-killing manner. When high speed steel became a reality and an acknowledged success, many superintendents failed to see the advantages accruing from its use. The writer has in mind one such shop which uses at the present time only a very few high speed drills. Although a large bulk of replacements are made with drills of the high speed variety, yet the management cannot see the advantage of discarding the old drills and putting in an entirely new stock, which would prove in a short time an exceedingly profitable investment.

As matters now stand, a compromise is made on feeds and speeds by the operators with a consequent lowering of efficiency. In fact, many of the users of drills about the shop are unacquainted with the use of high speed drills, due to the small number used, and they consequently know but one speed. No doubt in many other manufacturing institutions the same problem exists, especially those of the smaller variety, and which have been in operation for several years. However, where such conditions prevail, it is possible by a proper study of the conditions to sufficiently add to the equipment as to make a decided improvement in the results obtained. Sometimes it is possible

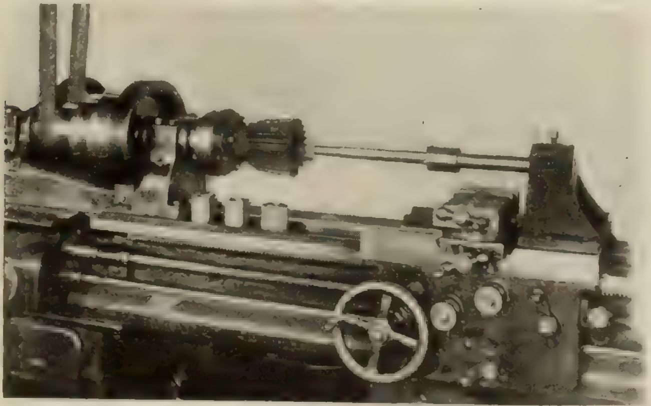


FIG. 1.—SPECIAL TOOLING ON ENGINE LATHE FOR BORING AIR COOLED ENGINE CYLINDERS.

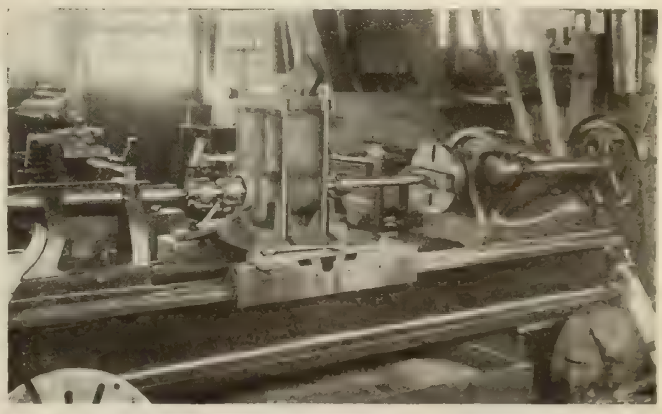


FIG. 2. BORING ENGINE CYLINDER COMPLETE AT ONE OPERATION.

by the addition of very simple fixtures to materially increase the production of any tool. One of the principal differences between the machine tools of today and those of several years ago lies in the fact that the numerous changes of tools are eliminated. Of course, the machines themselves are made considerably heavier, enabling heavier cuts to be taken, but, leaving this consideration aside, the main feature lies in the elimination of unproductive movements on the part of the operator.

The object of this article is to point out one or two instances of increased production as applied to the engine lathe. In any machine shop the most used machine tool is the lathe, and that on which the greater part of the operations are performed. Fig. 1 shows the operation of boring and facing air-cooled cylinders used on small gasoline engines. The original method of doing this job had been to chuck the piece and bore it out with the ordinary boring tool, after which it was reamed, using the tail stock for feeding the reamer through the piece. While it was not possible to do this job on a turret lathe, an effort was made to reproduce conditions there existing, and the same was done with a remarkable degree of success, as evidenced by the increased production. A heavy bridge was placed on the carriage, being dowelled in position and then bored out to receive a boring bar, this bar being also guided by a bushing in the spindle. A fixture was also made for the spindle to which the cylinders were bolted after first being faced on that end. The boring heads were made a loose fit on the bar and were driven by a pin through same. When one cut was taken through the cylinder, the carriage was run back and one head removed by hand and another slipped on. The operation of changing heads practically occupied no more time than that of indexing a turret. After the roughing cuts were taken through the cylinder, the reamer was slipped on the end of the bar, this being tapered to receive it, the final reaming cut being run by hand.. The end of the cylinder was faced, using the cross slide, the tool post having been removed in the cut.

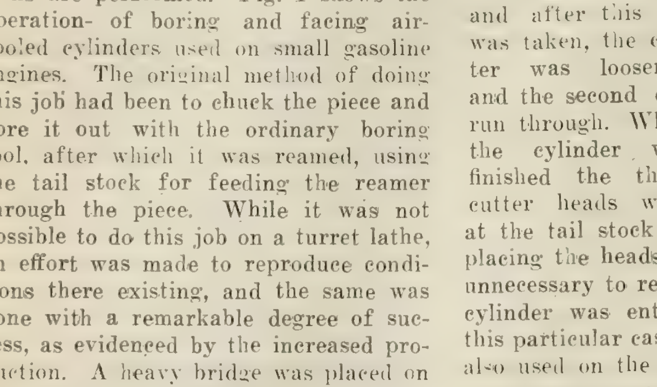


FIG. 4. TAILSTOCK WITH POWER FEED FOR BORING WHILE FACING IN THE REGULAR WAY.

In Fig. 2 is shown a different type of cylinder, which was also used on a gasoline engine. In this case the cylinder was fastened directly to the carriage; the boring bar being made sufficiently long so that the three cutter heads could be slipped on one end of the bar. One of the heads was then held to the bar by a pin, and after this cut was taken, the cutter was loosened and the second one run through. When the cylinder was finished the three cutter heads were at the tail stock end of the bar. By placing the heads all on the bar it was unnecessary to remove the bar until the cylinder was entirely completed. In this particular case a balanced drive was also used on the bar.

In Fig. 3 is shown the small amount of equipment which was used to increase the production of piston rings. The cut shows a ring casting or pot being turned both inside and outside, as well as being made eccentric at the same time. The only equipment in this case was a flat plate, the boring bar, and the inside tool holder, costing in the neighborhood of $15 or $20. This equipment saved something like $350 in the first year of its use over the previous method which had been in operation for a considerable length of time.

In Fig. 4 it was desired to do boring and facing at the same time, and to accomplish this end a power feed was arranged at the tail stock end for a boring bar. A bicycle sprocket was placed just inside the hand-wheel, and could be rigidly connected to same by merely slipping through a pin. Roughing and finishing cutters were provided for the bar for the different jobs. It will be noticed that by this method the carriage is left entirely independent of the bar.

The above instances are merely given to show what can be accomplished along the lines first mentioned, and while they apply to but one type of machine tool, yet they are representative of what may be worked out in almost any small shop, and, with the proper amount of attention given to the equipment, there is no doubt but what greater efficiency may be obtained in the majority of cases. As competition is very keen along any of these lines, it behooves the manufacturer to take advantage of every opportunity of increasing his production, and consequently lowering the cost of same.

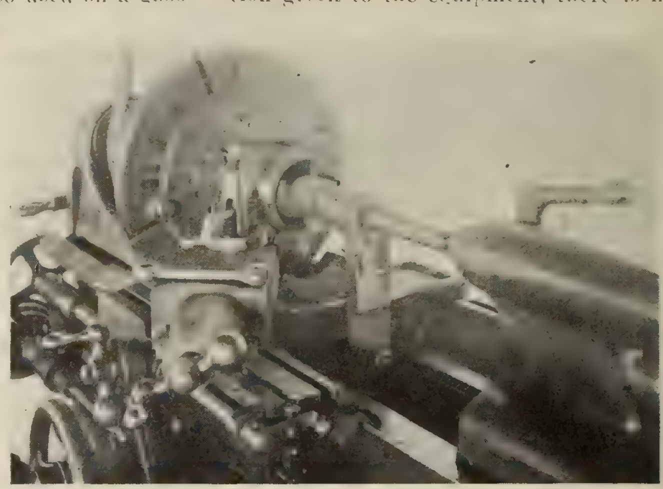


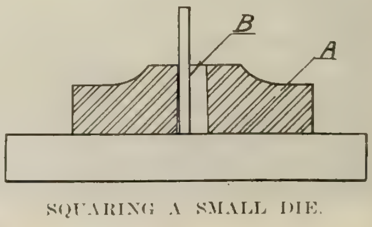
FIG. 3. EQUIPMENT WHICH INCREASED PRODUCTION OF PISTON RINGS.

* * *

SQUARING A SMALL DIE

By J. H.

IN the making of small dies for sheet metal work, it is sometimes desirable to have a small square that will permit the blade to enter the opening. It is sometimes difficult to use a flat-bladed square, owing to the inconvenience experienced in gauging the various faces of the die. A very simple, yet serviceable device is shown in the accompanying sketch, where A is a flat block of cast iron and B a small piece of stub steel driven into a hole in the centre of the block. This short piece of steel is first carefully squared with a small try-square and when the die is placed on the block with the steel pin in the opening, all faces can be accurately gauged with very little trouble. Where the die is very small, marking the steel pin is often an advantage.



SQUARING A SMALL DIE.

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

MACHINISTS' INSTRUCTION COURSE—VIII.

To be able to correctly turn a shaft the right size for a working or running fit, or bore out a wheel or brush a running fit, with the aid of calipers only, depends entirely upon the skill and judgment of the workman. While the following rules are by no means a perfect guide under all circumstances, they have been found to give general satisfaction and will no doubt prove of value to many. The following table shows the amount one leg of the inside calipers should swing inside the hole, when the other leg is resting on the side for a running fit.

Dia. of hole Inches	Swing of Calipers Inches
1—2	¼
2—3	⅜
3—4	½
4—6	⅝
6—8	11/16
8—10	¾
10—12	⅞
12—15	1
15—18	1⅛
18—22	1¼
22—26	1½
26—30	1¾
30—34	2
34—38	2¼
38—42	2½
42—46	2¾
46—50	3
50—54	3¼
54—58	3½
78—62	3¾
62—66	4
66—70	4¼
70—74	4½
74—78	4¾
78—82	5
82—86	5¼
86—90	5½
90—95	5¾
95—100	6

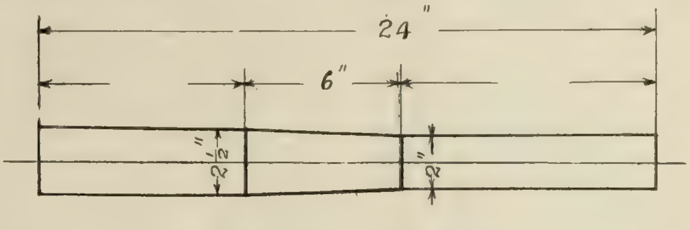
Driving Fits

The allowance for driving fits depends upon a number of circumstances such as the length of the hole, as in a long hole there is more bearing surface than a short hole, consequently the outside diameter of the driven piece can be made a little less. The diameter of the work, the smoothness of the surface, the nature of the metal, and the thickness to resist bursting must all be taken into consideration, so that it is impossible to lay down definite rules. It is in this class of work that experience counts. Generally speaking, if the hole and the shaft are made exactly the same size up to about 6 ft. you will have a pretty snug driving fit. Always oil the surfaces, as it may happen that the fit is a little too tight and if you want to take it out to ease it a little after you have been driving two dry surfaces together, it may give you a lot of trouble.

Making a Forced Fit

The allowance for forced fits is a little more than for driving fits, the main things to take into consideration being the same as have just been mentioned for driving fits. One firm of engine builders allow for forcing on crank pins, one-quarter of a thousandth for every inch in diameter up to 8 in. In fitting car wheels and axles it is generally specified that they shall go together with a certain pressure from 20 to 30 tons. Most firms specify exactly the amount to be allowed on their particular class of work; a 20 to 30-ton fit on a wheel and axle requires an allowance of about .008 in.

In calipering shafts or axles, the amount of difference is not always measured, a snap or limit gauge being sometimes used, or the calipers may be set—the insides to the exact size of the hole, and the outsides to the exact size of the insides, then by letting the outside drag over the work a fairly accurate estimate can be made of the force required to make the fit according to the length of the drag on the outsides.



½" TAPER IN 6 INCHES
FIG. 31.

Shrink Fits

A shrink fit refers to the method of putting two pieces together, usually by heating the metal around the hole, thereby causing it to expand, then putting the piece it is to be shrunk on to through the hole, and allowing it to cool and contract on to the axle or shaft, or whatever it may be. A good rule is to allow .003 in. for the first inch and 1½ thousandths more for every inch up to 20 in. diameter.

Amount of shrinkage for locomotive tires adopted by the American Railroad Master Mechanics' Association:—

38"	or	less	amount	of	allowance	.040
50"	"	"	"	"	"	.053
56"	"	"	"	"	"	.060
62"	"	"	"	"	"	.066
66"	"	"	"	"	"	.070

Taper Work

There are at least three different ways of turning taper work between the centres of a lathe. Each method has its advantages and disadvantages, while to a great extent the choice of one or other of the methods depends upon the work in hand. The first method is by setting over the tail stock spindle or dead centre out of line with the live centre. There are usually graduations on the back of the tailstock with a zero mark indicating when the lathe is cutting parallel. If there are no graduations or reference marks, make one with a fine chisel, then the amount that the tailstock is set over can be measured with a scale.

In order to use this method it is necessary to figure out the amount of taper per ft., or per inch, whichever is the most convenient, and compare it with the length of the job, or else assume that the work is one continuous taper from end to end. Suppose, for example, we had a taper to turn according to sketch, Fig. 31. Here the taper is ½ in. in 6 inches, or 1 inch per ft., but the total length of the job is 3 ft. and if we assumed the taper was continuous from end to end of the job, we should have 1 inch taper per ft. for 3 ft., which would be 3 inches of taper, or that we should have to set the tailstock over 1½ in., which is half the amount, because, when the tool cuts into the work, say, ¼ in., it makes the job ½ in. less in diameter, because you take ¼ in. off each side. Setting over the tailstock is most convenient when the job is a long one and the taper is slight.

Objections to Tailstock

The objection to setting over the tailstock is, that the centres are not in line, therefore they wear unequal and uneven, and the part that is taper is very apt not to run true with the part that is parallel. If a number of pieces of different lengths were to be turned the same taper, the lathe would have to be reset for each piece; and even if they were the same length, if the centers were not all drilled to the same depth it would make an appreciable difference. Another way in which the lathe may be set for turning taper, is to turn a small portion at one end of the taper to the small size, and another portion at the other end of the taper to the large size. Then run the tool backward and forward between the narrow strips that are turned, and adjust the centres until the tool exactly touches both ends, in the same manner as has already been described in testing the lathe for turning parallel. This method is equally adaptable for setting over the tailstock or the compound rest. Tapers can be turned by hand by swinging round the top slide of the compound rest. This is the best method for short, abrupt tapers, and it would greatly facilitate matters for the lathe hand if draughtsmen would give tapers in degrees and state amount per ft. in addition to giving dimensions; then the lathe hand would have nothing to do but put his rest round to the degrees indicated on the drawing.

The following table of tapers and angles will be found useful in connection with lathe work:

Taper per ft. Inches	Angle with Centre Line Degrees	Minutes
1/8	0	18
3-16	0	27
1/4	0	36
5-16	0	45
3/8	0	53
7-16	1	02
1/2	1	11
9 16	1	21
5/8	1	30
11 16	1	39
3/4	1	47
13-16	1	56
7/8	2	06
15 16	2	14
1	2	23
1 1/4	2	59
1 1/2	3	34
1 3/4	4	10
2	4	46
2 1/2	5	57
3	7	08
3 1/2	8	18
4	9	27
4 1/2	10	37
5	11	46
6	14	03

If measured with micrometers, the allowance below standard for running fits up to 6 in. is as follows:

Dia. of hole Inches	Allowance Inches
1/2	.0015
1	.002
2	.0025
3	.00325
4	.004
5	.005
6	.006

◆

READER'S QUERY SOLUTIONS

ON page 392 of October 12 issue appeared a reader's query, by F. L. L., for the finding of the values of x and y, in the equation $A = B \times x \times y$, where A and B are known quantities, and the ratio of x to y is as $3\frac{1}{2}$ to $2\frac{1}{4}$.

From the equation $A = B \times x \times y$ we obtain $x \times y = \frac{A}{B}$; therefore, as A and B are known, and the value of x and y are relatively known, a factor common to x and y must be found to solve the equation. Let this unknown factor be represented by Z, and as an example let A = 100 and B = 10; then using the relative values of x and y, the equation will be $A = B \times xz \times yz$, and transposing we obtain $xz \times yz = \frac{A}{B}$, or

$$Z^2 = \frac{A}{B \times x \times y}$$; then by using the various values, we have

$$Z^2 = \frac{100}{10 \times 3.5 \times 2.25} = \frac{1}{.7875} = 1.2698$$

$$Z = \sqrt{1.2698} = 1.1267.$$

As this is the factor common to both the relative values of x and y, the actual values of these terms will be

$xZ = x \times 1.1267 = 3.5 \times 1.1267 = 3.94$ for x, and

$yZ = y \times 1.1267 = 2.25 \times 1.1267 = 2.54$ for y.

To prove the equation with these values we have $A = B \times x \times y = 10 \times 3.94 \times 2.54 = 100.076$. This value is a little large owing to the cutting off of several decimal places. The solution is, however, obtainable by using ehe relative values of x and y as known quantities, and solving for an unknown factor, common to both, that will alter their values, and still retain the desired ratio.

J. R.

* * *

IN a recent issue, F. L. L. addressed a query regarding the value of x and y in a given equation.

The solution which is quite simple is as follows:—

$$\frac{7x}{2} = \frac{9y}{4}$$

$$y = \frac{9 \times 2}{4 \times 7}x = \frac{18}{28}x = \frac{9}{14}x$$

The given equation will thus give us the value of x in terms all of which are known.

$$A = B \times x \times y = B \times x \times \frac{9}{14}x$$

$$14A = 9Bx^2$$

$$x^2 = \frac{14A}{9B}$$

$$x = \sqrt{\frac{14A}{9B}}$$

and as y is $\frac{9}{14}x$, $y = \frac{9}{14}\sqrt{\frac{14A}{9B}}$

To verify this, let us suppose that A = 5040 and B = 10.

Then $x = \sqrt{\frac{14 \times 5040}{9 \times 10}} = \sqrt{784} = 28$

and $y = \frac{9}{14}$ of $28 = 18$

Thus, $5040 = 10 \times 28 \times 18$, which is a verification of the equation

$$A = B \times x \times y.$$

A. M.

* * *

REPLYING to query by F. L. L. in issue of Oct. 12, the following solution is submitted:—

$A = B \times x \times y.$

Ratio of x to y = $3\frac{1}{2}$ to $2\frac{1}{4}$.

$x : y :: 14 : 9$

$x = \frac{14}{9}y$ (a).

and $y = \frac{9}{14}x$ (b).

By substituting (a), we have

$$A = B \times \frac{14}{9}y \times y$$

$$9A = B \times 14y^2$$

$$y^2 = \frac{9A}{14B}$$

$$y = \sqrt{\frac{9A}{14B}}$$

In case (b) we have

$$A = B \times x \times \frac{9}{14}x$$

$$14A = B \times 9x^2$$

$$x^2 = \frac{14A}{9B}$$

$$x = \sqrt{\frac{14A}{9B}}$$

To prove the foregoing:—

Assume A = 1260 and B = 10. Then

Then $A = 10 \times 14 \times 9 = 1260$

(a). $y = \sqrt{\frac{9 \times 1260}{14 \times 10}} = \sqrt{\frac{11340}{140}} = \sqrt{81} = 9$

(b). $x = \sqrt{\frac{14 \times 1260}{9 \times 10}} = \sqrt{\frac{17640}{90}} = \sqrt{196} = 14$

W. G.

Editorial note: The solutions submitted by A. M. and W. G. are obviously correct, the introduction of an additional factor by J. R. being an unnecessary complication.

◆

THE vertical belt drive has always been a sort of hoodoo, and perhaps always will be. About the only way such a drive can be run satisfactorily without keeping the belt "drum-string-tight" is by the aid of an idler, and—how some men preach against idlers. Personally, I am not opposed to idlers where they are necessary. They don't consume much power if properly designed, aligned, oiled and kept clean. It has been proved in actual tests that idlers of this type consume so little power that the loss isn't even traceable.—N. C. N.

The Development of Irregular Sheet Metal Pipe Connections

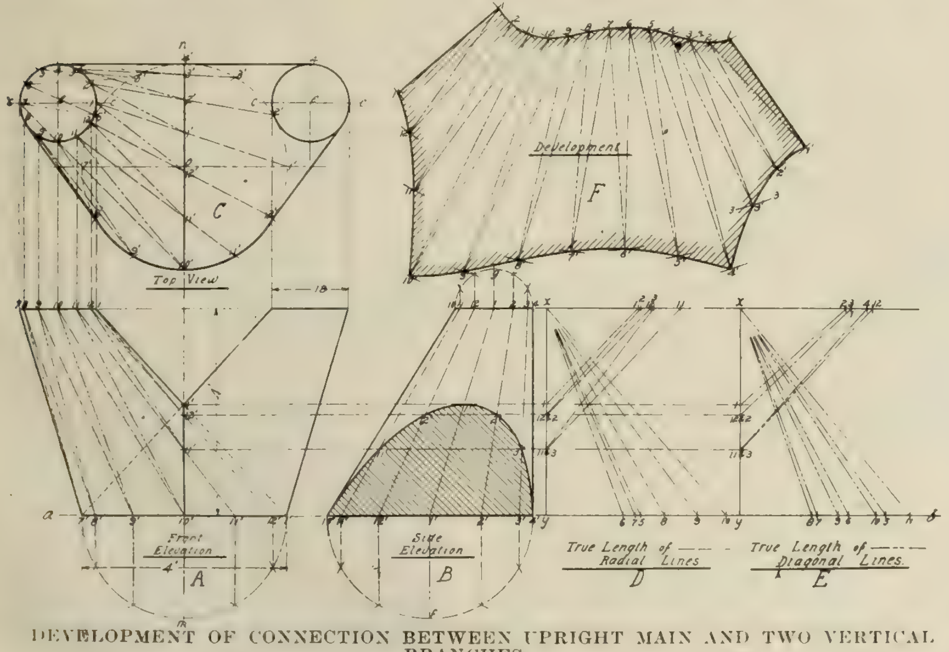
Staff Article

The problems dealt with in this article are typical examples encountered in actual practice, which, while not of very frequent occurrence, may be of considerable importance when met with. They possess considerable divergence from ordinary symmetrical forms and a study of the methods employed will enable them to be successfully applied in practice.

CONNECTING UPRIGHT MAIN TO TWO VERTICAL BRANCHES

By R. Hamilton.

A PIPE connection is required to unite two branches to the main supply pipe; all three pipes of circular cross section and in a vertical position. The main pipe is 4 feet in diameter, the two branches 1 foot 6 inches in diameter, with one side of the connection perpendicular with the base or large opening, and the projection of the pipes—as shown in the top view—tangent to one another, the altitude of the connection being 4 feet.



DEVELOPMENT OF CONNECTION BETWEEN UPRIGHT MAIN AND TWO VERTICAL BRANCHES.

This problem with the accompanying solution illustrates an interesting example in triangular development. To obtain the three principal views necessary for the desired solution, proceed as follows:—First erect the perpendicular centre line mn, and from the point 0 describe a circle having a diameter of 4 feet; tangent to this circle at the point 4 draw the horizontal line 44^14. At a distance below this line, equal to the radius of the small branch pipe, draw the two horizontal lines ce and ce. With O as a centre and a radius equal to the radii of the large and small pipe, describe arcs cutting the lines ce at the point (e); with (e) as a centre, describe a circle representing the opening of the two branches, one on either side of the large circle. The top view can be completed by drawing the tangent lines connecting the three circles, and also the centre line representing the joint between the two halves of the connection, each of which are similar, but formed in the opposite directions. To obtain the front elevation, draw the base line ab and project the various points from the top view, cutting this base line and also the top line, which is drawn parallel to ab and at a height equal to the altitude of the piece; that is 4 feet. To the right of the front elevation, with a radius of 2 feet, and the point I as a centre, draw the semicircle 4^1f10^1 and divide it into six equal parts; from these points erect perpendicular lines cutting the base line as shown. From the point 4^1 draw the vertical 4^14, cutting the top line at the point 4; with 4 as a centre and with a radius equal to the radius of the small pipe, describe an arc cutting the top line at the point I; with the same radius and the point I as a centre describe the semicircle 4g10. Divide this semicircle into six equal parts, projecting the points down cutting the top line as shown. Now, from corresponding divisions in the large and small circles, in the top view, and also those in the front and side elevations, draw lines as shown. For instance, in the top view connect the points 1, 2, 3, etc., in the smaller circle with the points 1^1, 2^1, 3^1, etc., in the large circle; likewise in both elevations.

In the side elevation it is necessary to obtain the true shape of the opening between the two connections. From the points 1^1, 12^1, 11^1 on the centre line mn in the front elevation draw the horizontal projecting lines cutting corresponding radial lines in the side elevation as shown. Through these points draw the curved line 10^1, 11^1, 12^1, 1^1, 2^1, 3^1, 4^1.

True Length of Construction Lines

Before proceeding with the development of the pattern, it is necessary to obtain the true length of both the radial lines and the diagonal lines. The radial lines are those connecting similar points of division on the upper and lower surfaces, and the diagonal lines are those connecting opposite ends of adjacent radial lines; for instance, the line joining the point 9^1 on the base line with the point 10 on the top line is termed a diagonal line, etc. To obtain the true length of a line that is at an oblique angle to both the horizontal and vertical planes, proceed as follows:—By using the projection to a vertical line, of a line in the elevation, as one leg of a right triangle, and the length of the line as represented in the plan or top view, as the other leg, the hypotenuse of such a triangle will be the true length of the line. Therefore, to obtain the true lengths of the radial lines for the development of the pattern, erect the vertical line xy as shown at D, the point (y) being on the base line and the point (x) on the projection of the top surface. With the exception of the lines that intersect the centre line mn, it is evident that the vertical leg of the right triangle will equal the length of the line 4. 4^1, as shown by the horizontal projection. The various lengths of the horizontal legs are obtained from the top view; thus, the distance y6 in D equals the length of the line, 6. 6^1 in the top view; the line y7 in D equals the line 7. 7^1 in C; the line y5 in D equals the line 5. 5^1 in C, etc. For those lines falling on the centre line mn, the vertical leg of the right triangle is obtained by projecting the points 1^1, 2^1, 3^1, 11^1, 12^1 in B to the vertical line xy, the horizontal leg being derived as previously stated, with the exception that the length is taken from the top circle to the centre line mn.

The true length of the diagonal lines is obtained in the same manner, the vertical leg of the triangle being the same, and the horizontal leg being the length of the line in the top view, passing from a certain division on the base circle to the adjacent division on the top surface.

For instance, the distance x9 in E equals the length of the line 9^1, 10 in C, etc. The true lengths of the diagonal lines that intersect the radial lines cutting the centre line mn are found similar to that already described.

Pattern Development

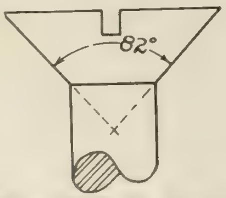
To lay out the development on a flat surface, a start can be made from any point, but as a matter of convenience we will start with the line 4^1, 4, this being the only line whose true length is shown in the elevation. To distinguish the radial lines from the diagonal lines, the former are shown as a series of long dashes, while the diagonal lines are represented by long dashes, with two short dashes intervening. First draw the line 4^1, 4 in F equal to the corresponding line in the front elevation, then with 4 as a centre and the length 3, 4 in E as radius, describe the arc 3, 3 in F. With 4^1 as a centre and the distance 3^1, 4^1 on the irregular curve in B as a radius cut the arc 3, 3 in F at the point 3^1. Then with 3^1 as centre and 3, 3 in D as radius describe the arc x, x, and with 4 as a centre and one of the divisions on the small circle in the top view as a radius, cut the arc x, x in F at the point 3. The completion of the development can be easily understood from the above explanation, care being exercised in following the method described. Remember that when using the points 1, 2, 3, 4, etc., as centres, the radii will be the diagonal lines as found in E, and the distances represented by the divisions on the smaller or top circle. When using the points 1^1, 2^1, 3^1, 4^1, etc., as centres, the radii will be the radial lines as found in D, or the distances represented by the divisions on the larger base circle, or that shown on the irregular curve in B.

The foregoing constitutes the reply to a reader's query.

* * *

Questions and Answers

Question.—When referring to machine screws, etc., what is meant by an included angle of 82 degrees?



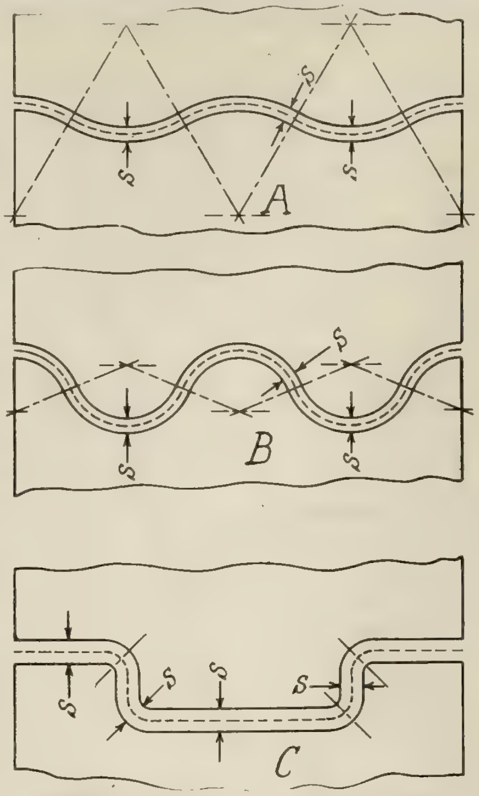
INCLUDED ANGLE ON HEAD OF SET SCREW.

Answer.—The included angle is the number of degrees contained within the angle formed by the opposite edges of the bevel portion of the head, as shown in the sketch. This angle is recognized as the standard for machine screws.

* * *

Question.—When fitting corrugating rolls, should the two rolls fit each other?

Answer.—Flat rolls should fit the entire length, unless they are small in diameter in proportion to their length, when it is sometimes advisable to leave them a little high in the centre to allow for the spring. When fitting forming rolls with an odd-shaped contour, the thickness of stock must be allowed for, to insure perfect operation. Neglecting the question of spring in the metal being worked (which is often an essential factor in the harder metals), the space (S) in the sketch, when measured at right angle to the surface, should equal the thickness of the stock. This can be more clearly shown in the sketches (B) and (C), where certain portions of the stock in the latter are at right angle to the axis of the shafts.



SHOWING AMOUNT OF SPACE LEFT BETWEEN CORRUGATING ROLLS.

* * *

Question.—The foundation for a large machine is to be built of concrete to a depth of 7 feet; the base of the machine measures 18 x 11 feet. If the concrete extends for 6 inches on all sides and the bottom dimensions are 21 x 14 feet, what will be the volume in cubic yards, and the weight of the concrete, the specific gravity being 4.8?

Answer.—The volume can be calculated from the formula,

$$\text{Volume} = D \times \frac{A \times 4\,m}{6} \text{ when}$$

D equals the depth of the prism.

A equals the sum of the areas of the top and bottom.

m equals the area of a section taken parallel with and midway between the top and bottom surfaces.

Top area equals 19 × 12, or 228 square feet.

Bottom area equals 21 × 14, or 294 square feet.

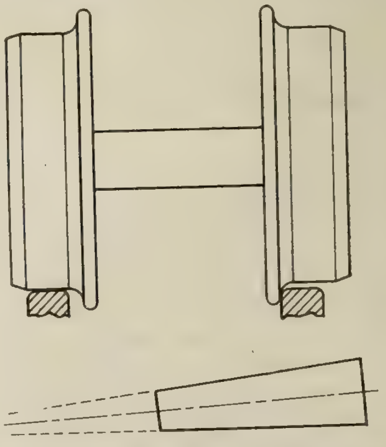
Middle sectional area equals 20×13, or 260 square feet. Then from the formula, volume $= 7 \times \frac{522 \times 4 \times 260}{6} =$ 1,822 cubic feet, or 67.48 cubic yards.

With a specific gravity of 4.8, the total weight will be 62.5×4.8×1,822 equals 546,600 lbs., or 273 tons.

* * *

Question.—When a train is going around a curve, do the outer or inner wheels slip to make up for the difference in length of the outer and inner rails?

Answer.—Just what action takes place when a train is passing around a curve is very difficult to determine, as several elements or forces are combined to effect the change in the train's direction. Some authorities claim that a certain percentage of slip takes place in obtaining the objective, while others contend that the higher elevation of the outer rail causes the force of gravity to draw the load to the lower level, thus effecting the desired change. While the above conditions are undoubtedly true to a large extent, one of the factors that has a great bearing on the question appears to be the tendency of the outer wheel to climb the outside rail. As shown in the sketch, the pair of wheels that are rigidly secured to the one axle, must make the same number of revolutions in travelling a certain distance; but the shape of the wheel profile is such that in rounding a curve the flange of the outer wheel is forced against the rail, the fillet causing the wheel to raise, so that the parallel motion that takes place on a straight track is changed to that of the frustum of a cone rolling on a flat surface, an exaggerated condition of which is shown in the lower sketch. Therefore, it is through the united efforts of the combined forces that the change is brought about.



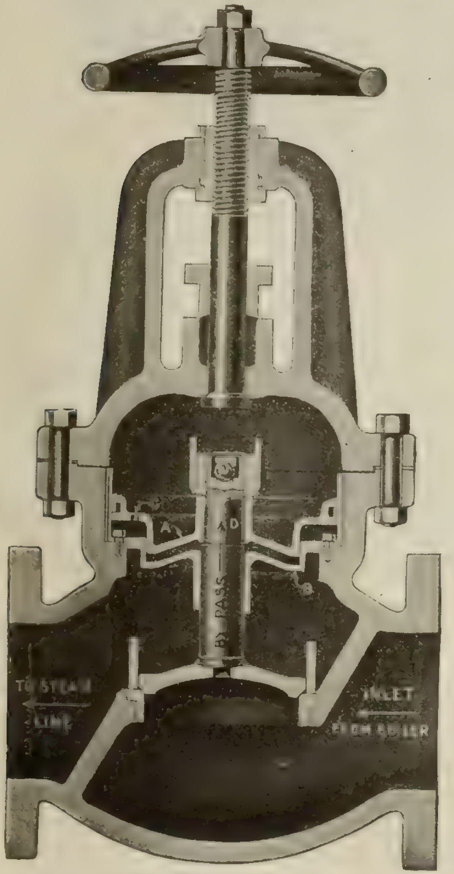
ILLUSTRATING ACTION OF WHEELS GOING ROUND A CURVE.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

AUTOMATIC TRIPLE ACTING NON-RETURN VALVE FOR BOILERS.

NON-RETURN valves prevent the backward flow of steam into the boilers from the header in case of a rupture. The added emergency feature shown in the cuts also prevents an outward rush of steam should a break occur in the main steam line or branches. In a battery equipped with these valves the outflow from every boiler is stopped if anything happens to the header or main piping.



LONGITUDINAL SECTION AUTOMATIC TRIPLE-ACTING NON-RETURN VALVE.

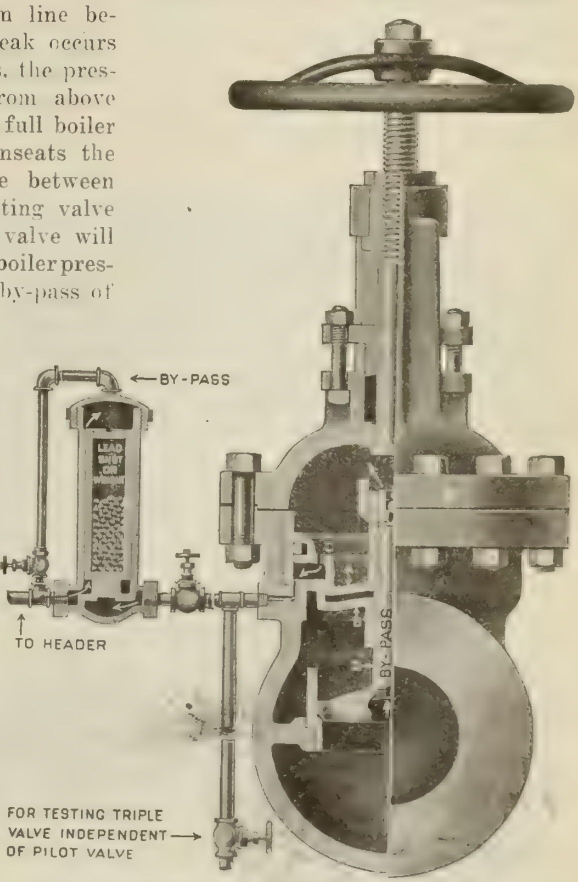
The sectional view shows the inside dash pot A attached to the valve disc, while the outside dashpot B acts as a cylinder, which is held firmly in place by cap bolts. The valve disc has a central port with a ball valve at the top and through this port full boiler pressure reaches the entire space above the liner and underneath the inside dashpot at C, therefore, it is balanced. A pipe connection is made to the exhaust port in the side of the triple acting valve, which communicates with the space between the two dashpots, being piped to the pilot valve which also connects with the outlet side of the valve or header.

The header pressure being on top of the piston of the pilot valve and the boiler pressure underneath, the weighted pilot valve piston, according to weight adjustment supplies the variation on which the triple acting valve will operate in case of a burst steam line beyond the valves. When a break occurs in the steam main or branches, the pressure is instantly removed from above the pilot valve piston and the full boiler pressure being underneath, unseats the piston, allowing the pressure between the dashpots of the triple acting valve to escape. The triple acting valve will immediately close, and the full boiler pressure still coming through the by-pass of the valve disc on top of dashpot A holds the valve to its seat, cutting off the flow of steam from the boilers.

Thorough cushioning of such valves is vitally necessary to eliminate disastrous hammering or pounding, and the Double Corliss Dash Pot arrangement, occupying the full area of the upper portion of the body, insures smooth, economic and reliable operation; holds the valve disc in perfect alignment with the seat, and makes the valve practically indestructible due to service. In the closure of the valves the double cushioned feature allows a quick drop to within 1/8 in. of the seat, then the valve closes easily under the control of the secondary dashpot. By turning the handwheel, the stem may be run down on top of the valve disc, thus making a permanent closure of the valve.

The triple acting valve may be closed or tested at any time independent of the pilot valve by having a small branch line run to any convenient point with a small hand valve attached, as illustrated. Upon opening the small valve and allowing the exhaust of pressure from between the dashpots of the triple acting valve, the latter will close—thus providing for all contingencies and insuring absolute safety in the operation of the plant. An automatic valve should be tested automatically to prove it operative to close in event of accident.

There is no adjustment to be made in the triple acting valve. The automatic pillot valve can be quickly set for any variation of pressure by simply adding or removing shot or other weight from the hollow piston for greater or less variation between the boiler and header pressure. The boiler and header pressure can drop together from say 175 to 50 pounds without operating the valves, but, the instant the variation of pressure reaches that for which the automatic pilot valve is set, the valves will operate quickly—which is the only time you want them to operate. The Golden-Anderson Valve Specialty Co., Pittsburgh, Pa., are the manufacturers of the foregoing.



PART CROSS SECTION THROUGH AUTOMATIC TRIPLE ACTING NON-RETURN VALVE.

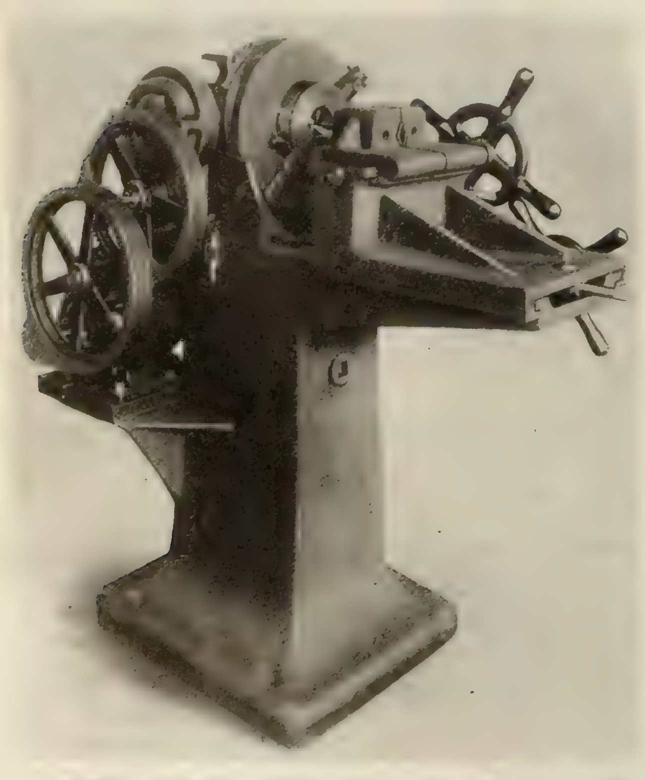
* * *

COMBINATION THREADING AND CUTTING-OFF MACHINE

THE machine shown is one of a line of pipe and nipple machines developed by the Oster Manufacturing Co., of Cleveland, Ohio, to meet the demand for a pipe machine that would perform every one of the many pipe threading jobs ordinarily required, using pieces long or short, straight or bent, over or under size, nipples of any length, and all-thread nipples.

The illustration shows the 300-B machine for ¼ to 2-inch pipe. It is operated by a ¾ h.p., direct or alternating current, Westinghouse motor, the motor being mounted on the machine base, direct connected, with ample power and speed for all classes of work.

The machine illustrated is a combination threading and cutting-off machine, a combination pipe, nipple and bolt machine. It will thread bolts from 7-16 to 1¼ inches. The regular standard equipment consists of motor, geared oil pump, automatic cut-off apparatus, automatic die release, and four sets of right hand pipe dies from ¼ to 2 inches. The special features are the lever operated die head and the open type pipe vise, which makes the machine a rapid producer. The dies are automatically oiled and the operator can see the work of threading at all times.

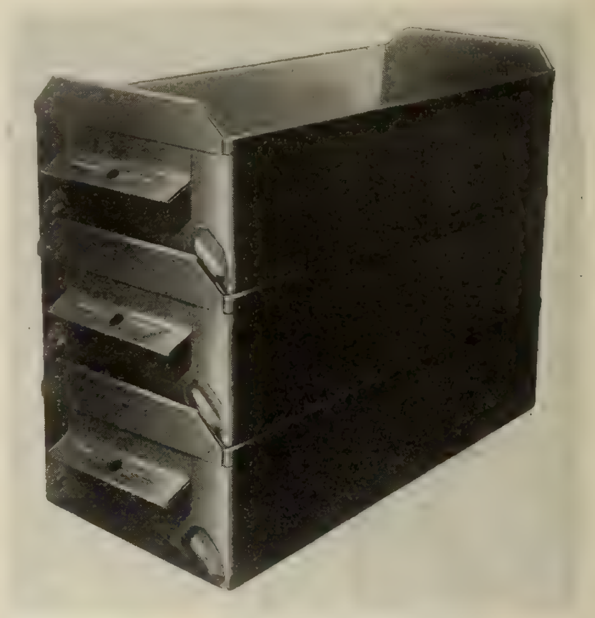


MOTOR DRIVEN THREADING AND CUTTING OFF MACHINE FOR ONE-QUARTER INCH TO TWO-INCH PIPE.

One advantage of the machine is the open type vise which enables the operator to change the work quickly and thereby increase the capacity. Every operating part is right under the hand so that not a moment is wasted. The vise grips the work by a single turn of the wheel, bringing it to an absolute centre, and can be moved up close to the die head for threading short pieces, short bends, nipples, bolts, and casings.

The quick die release feature of the machine makes possible the opening of the dies at the instant the thread is finished. It opens the dies gradually and removes the burr, leaving a clean, perfect thread. At the same time, the vise carrying the pipe is thrown back, withdrawing the pipe from die head. This contributes to faster and more perfect work, and insures duplication of the length of the thread. When adjusted for the length to be cut, it will repeat automatically without any attention on the part of the operator. One set of dies will thread two or more sizes. They are made of a high-grade carbon steel carefully tempered, and are controlled by a lever, being opened or closed by one movement of the hand while the machine is in motion. The lever is fastened to the die arm and is used in releasing the dies when the thread is cut, in setting them to same size for making duplicate threads, in changing the dies from one size to another, and in setting them to graduation on the face plates. When the thread is finished it is only necessary to trip the die lever, and this opens the dies right off the work, without making it necessary to stop the machine.

For threading close nipples the machine may be equipped with two-threaded nipple holders which are attached to the front of the regular jaws by two bolts. The threaded end of the nipple is held in these holders while cutting a thread on the other end. When the thread is cut, the vise jaws are opened by the half turn of the hand wheel and the nipple drops out. The cutting-off apparatus operates automatically by means of a pawl attached to the frame of the machine, a ratchet attachment automatically regulating the feed of the cutter. The oil pump is so arranged that no belt or chains are necessary to drive it. It is connected direct to the gears of the machine and operates constantly while the machine is in motion, thus insuring a steady and constant flow of oil to the dies. It is a combination pump and works both ways, for right and left hand threading. The oil is contained in a reservoir within the base of the machine. The pump lifts the oil from the reservoir and floods the dies and cutters, when the oil is returned to the reservoir through a strainer.



IMPROVED STACKING TOTE BOX.

* * *

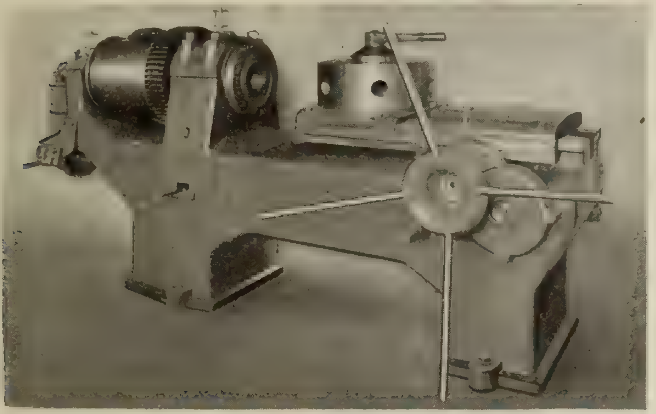
IMPROVED STACKING TOTE BOX.

AN improved stacking tote box is being marketed by the New Britain Machine Co., New Britain, Conn., and in its construction are embodied several features which are designed to eliminate the faults heretofore found in boxes of this type in general.

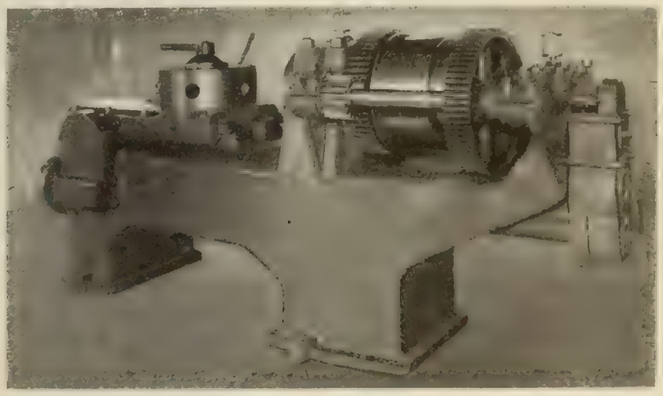
The box is made from No. 16 gauge steel and electrically welded throughout, no rivets whatever being used. Handles are of No. 14 gauge stock, folded double and punched to afford hook hold for dragging box along the floor. The size adopted, 20 in. by 12 in. by 6 in. is considered best for average requirements, being in length and capacity about the limit for comfortable one-man handling.

The sides slope inward just enough to provide support for the box above and are folded on to the ends. The deviation of the sides from square, however, is so small that rectangular work can be packed in as conveniently as irregular pieces. A ¾ in. selvage around the edge of the box greatly increases its stiffness. The ends extend one inch above the sides and are folded over on to the selvaged edge of sides where the latter lap on to the ends. These raised ends are bent outward sufficient to permit box above to slip between.

Spot welded to the bottom and slightly shorter than the box are two half-round runners. These are carefully beveled on ends and so placed that, when box is in stacking position, they are in contact with edges of box below, thus opposing any tendency of sides to spring in under heavy weights. The upper corners of ends are cut off at a 45° angle, and embossed pieces are spot welded to lower corners of ends parallel with the upper corners and in such position as to act as guides in bringing box to stacking position. These guides in conjunction with the runners also serve to prevent any sidewise shifting of boxes while being trucked. As indicating the security of the stacking feature, a stack of ten boxes can be tilted to an angle of almost 45° before buckling.



FRONT VIEW OF SHELL BORING MACHINE WITH INTEGRAL FRAME CASTING.



REAR VIEW SHOWING HEADSTOCK GEARING WITH COVERS REMOVED.

In dragging boxes over the floor the runners present only line friction and remove wear and tear from bottom of box. As a result of this feature, the "New Britain" Stacking Box lends itself to storage in racks because it will slip into and out of rack with great ease. Owing to this small bearing surface and the firmness of the stacking feature, it has been found that a stack of five or six loaded boxes can be dragged along the floor with remarkably slight effort.

By reason of the raised ends generous space is provided above the handle for card holder, in which position it more readily indicates contents of box and is less liable to become soiled.

* * *

SHELL BORING MACHINE

THE rapid and accurate performance of the boring operation on large shells, calls for machine tools which are amply capable of doing heavy duty work, and the Hare Boring Machine, shown in the photograph herewith, and which takes any size shell up to 8 in., has been built by the Reliance Machine Co., Toronto, to meet the demand for machines of this type.

The frame of the machine is a single casting with bed, legs, headstock and bearings integral. The spindle is of semi-steel and is formed with a 15 in. dia. flange which carries a collet type chuck (not shown). The front bearing is 8½ in. dia. by 12 in. long, being large enough to allow a 6 in. shell to enter the spindle. The dia. of the spindle at the drive gear is 9½ in., the gear being 4½ in. wide, and 3 diametral pitch. The two step cone pulley has diameters of 15 in. and 18 in., and a ball thrust bearing is provided at the rear end of the spindle.

The turret is 20 in. dia., and has six 3 in. holes for bars, each hole having a keyway on the bottom side, while two set screws on top serve to hold the bars securely in position. A spigot is provided on the outside diameter of the turret to remove any possibility of tipping, and the center stem has a hole through which boring bars may be knocked out from behind. A hardened steel locking ring and pawl locate the turret in the various positions.

Carriage is 42 in. long with the power feed applied through a steel rack 3 in. wide located centrally on the underside of the carriage. A tripping pawl on the side of the carriage disengages the power feed at any desired point. Four feeds from 1-32 in. to ⅛ in. are controlled through levers on front of machine, ball bearings being provided for all thrusts throughout the feeding mechanism.

All gears are completely guarded in use, and equipment includes countershaft with pulleys, oil pump, pans, piping and wrenches. As equipped for 6 in. shells, the machine weighs 8,000 lbs.

* * *

The Dominion Royal Commission concluded its session in Toronto on Oct. 19. and is now sitting in Ottawa.

CANADA'S ANNUAL TRADE EXCEEDS 1½ BILLION DOLARS

AGGREGATE Canadian trade, exclusive of coin and bullion, for the twelve months ending with July, totalled $1,587,933,707, as against $919,178,659 for the corresponding period ending with July, 1915. This is an increase of $668,755,048.

Imports of merchandize totalled $622,886,350, an increase of more than $200,000,000 as compared with the total for the twelve months ending July, 1915. Exports of merchandize totalled $965,047,457, as against $499,872,322, an increase of $460,000,000. The balance of trade in favor of exports during the calendar year was more than $340,000,000.

The total duty collected during the twelve months was $121,906,788, as against $78,787,427 for the twelve months ending with July, 1915, an increaes of about forty millions. The average ad valorem rate of duty on dutiable goods for the twelve months was 34.44. On all goods imported the average rate of duty was 19.45 per cent.

* * *

FRENCH SYNDICATE SEEK PAPER PLANT

A SYNDICATE of Parisian newspaper publishers is seeking the purchase of the $1,000,000 paper-making plant of the Donnacona Paper Company, which has been in operation two years. It has a valuable waterpower, some 6,000 horsepower of which has been developed, and holds timber lands said to aggregate 228,000 acres. The total output on November 1 will be 100 tons of newsprint daily.

The syndicate endeavored recently to purchase the Remington Paper & Power Company's property in New York State, but was outbid by Sears-Roebuck interests. While the production of the Canadian plant is not so great as that of the Remington company, its location is considered more satisfactory to the French buyers.

The MacLean Publishing Company
LIMITED
(ESTABLISHED 1888)
JOHN BAYNE MACLEAN - - - - - - - - President
H. T. HUNTER - - - - - - - - - - Vice President
H. V. TYRRELL - - - - - - - General Manager
PUBLISHERS OF
CANADIAN MACHINERY
AND MANUFACTURING NEWS
A weekly newspaper devoted to the machinery and manufacturing interests.
PETER BAIN, M.E., Editor. B. G. NEWTON, Manager.
Associate Editors.
A. G. WEBSTER. J. M. WILSON. J. H. RODGERS.
Office of Publication, 143-153 University Avenue, Toronto, Ont
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THE DECIMAL SYSTEM IN CURRENCY, WEIGHTS AND MEASURES

THE present-day tendency, aside from the war effects, is towards standardization, it being clearly evident that the latter makes for efficiency; notwithstanding, to the war and the trade relationships which will prevail as its result will the most pronounced progress towards standarization be traceable. In a word, there are practically certain to be created universally accepted decimal systems of currency, weights and measures in business transactions. Even in Great Britain, where exists the triple antithesis to the decimal system, and where the propriety of adopting the new methods of reckoning has been many times discussed and as often flouted, public opinion is being stirred to action and ripened to the point of ultimate adoption. What is Britain's concern in this matter is also that of Canada, for while we boast a decimal currency we are like her involved in the weights and measures feature. Again, the good and substantial reasons why Britain's manufacturing and commercial interests judge a change to be essential are applicable in every respect to us.

It is contended that we have reached the parting of the ways, in a word the time has come when the decimal system in its entirety must be adopted if we would both secure a footing and maintain it when the anticipated trade war follows the bloody struggle in Europe. We have been parties to the Allies' Conference and have, so to speak, committed ourselves to certain lines of action when peace is declared, one anticipated result being, of course, the derivation of trade benefits and closer commercial ties with our partners in the meantime struggle. As an indication of the importance attaching to this feature, it may be noted that France, Belgium, Serbia, Portugal, Roumania and Italy have each adopted the metric system, and together with Russia and Japan, they have the decimal system of currency.

Opposition and quite strenuous opposition to the change is to be expected, and is indeed far from inactive. The opposition, however, relies less on adduced reasons than on innate, stubborn conservatism and distaste of change, however necessary or desirable be the latter. A wound to national pride would be involved in the nationalization of a decimal system, it is said, on a par with which was the one-time neglect by Britishers of the acquirement of foreign languages, the reason being that if business was wanted to be done, the foreigner should transact it in the English language. The latter attitude, even preceding the war, had happily largely disappeared, yet we are not altogether sure but that a few dregs still remain, as an illustration of which antagonism to the recent and successfully operated Daylight Saving Act in Great Britain amply demonstrates. Not a few people refused to alter their watches, although the official time had been changed and as a consequence of their fight for independence of action, they subjected themselves to no end of inconvenience. The Daylight Saving Act as far as Great Britain was concerned brought untold benefit in a myriad directions, yet it meant a cross to many or was assumed as such because a disturber of their work-a-day existence.

Opposition to national progress and development of the nature indicated is usually as numerically weak as it is trivial, and may be reckoned so relative to the national establishment of decimal systems of currency, weights and measures. It is realized that Germany's success in foreign markets was due in large measure to her appropriation of the decimal system, and it is further realized that with the advent of peace and the resumption of national, commercial intercourse, she will still have that advantage unless Britain and her Colonies do business by like direct standards. Canadian industry and commerce may be said to be equally involved with Britain in this matter of the wholesale adoption of the decimal system of reckoning. We are anticipating and preparing for a footing in the markets of the world, and while our currency is no encumbrance the same cannot be said of our weights and measures which are British. In addition to the Allied Nations already referred to in detail as having in operation the decimal system, neutral nations, including the South American and Latin-American Republics, Holland, Norway, Switzerland, Sweden and Spain are also so provided.

Little heed, if any, has been given to the decimal system need in our projected capture of a share of world markets, judging at least from public pronouncements on the subject. We are of opinion, however, that our business interests will not only find it advantageous to follow Britain's lead in the matter, but will unhesitatingly and unanimously lend active support in establishing in its entirety a decimal system of Empire trading. The Liverpool *Journal of Commerce*, speaking of our weights and measures, says: "Who offhand has any appreciation of the relation of the ounce to the ton or of the foot to the mile? Which of us knows how many square feet make a square mile, or is familiar with the basis of calculation adopted by the bricklayer or the carpenter in roofing a house, for instance, or a land agent in estimating the area of an estate? How many cubic inches constitute a cubic yard, and how does the pint stand in respect to the gallon? We live, in fact, in an arithmetical setting with which few of us are at home, in spite of all the efforts of the elementary schoolmaster. Many opponents of change would, we suspect, reveal under cross-examination that they know little of the so-called systems which they defend. Our tables happen to be British and insular, and therefore we rather like them, but it cannot be said that they have much else to recommend them."

INDUSTRIAL NOTABILITIES

LLOYD HARRIS, of Harris, Cook & Co., financial agents, Brantford, Ont.; vice-president, Canada Starch Co., director, Willys-Overland Co. of Canada; director, Trusts and Guarantee Co.; president, Russell Motor Car Co.; director, Dominion Power & Transmission Co.; director, Steel Company of Canada, Ltd.; president, Canada Glue Co.; managing director, Underfeed Stoker Co. of America, Chicago; vice-president, Canada Cycle & Motor Co., was born at Beamsville, Ont., March 14, 1867, son of John and Jane (Tufford) Harris. He was educated at the Public Schools, Brantford, the Collegiate Institute, and at Woodstock College.

LLOYD HARRIS

He began his business career in the service of A. Harris, Son & Co.; went to Europe in the interests of his firm in 1889; became resident manager in Great Britain, with head office in London, and upon the formation of the Massey-Harris Co. he returned to Canada in 1900, since which time he has devoted his whole time and attention to private interests.

Mr. Harris is a member of the Military Hospitals Commissions; represented Brantford in House of Commons, 1908-1911; member of Brantford City Council, 1905-1906; president, Brantford Board of Trade, 1902-1903; vice-president, Canadian Manufacturers' Association, 1905; director, Ontario Motor League; president, Brantford Lacrosse Club. He was presented to the late King Edward VII., Windsor Castle, in June, 1905; received appointment as Hon. Lieut.-Col. 25th Brant Dragoons, 1909; resigned 1912.

Mr. Harris married Mary Perkins, daughter of James Perkins, Petrolea, Ont., 1887 (deceased 1892); secondly, Evelyn Francis Blackmore, daughter of Capt. William Blackmore, Penzance, England, March 10, 1897; has one daughter. His clubs are Brantford, York, National, Toronto, R.C.Y.C. (all of Toronto); Rideau and Country (Ottawa); Sports (London, Eng.); Hamilton, Tamhaac (Hamilton), and Caledon Mountain Trout Club. His societies are A.F. & A.M., and his recreations motoring, tennis and bowling. In politics he is a Liberal, and in religion Anglican. His residence is 110 Brant Avenue, Brantford, Ontario.

Photo Courtesy British and Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$20 45
Lake Superior, charcoal, Chicago	20 25
Standard low phos. Philadelphia	38 00
Bessemer, Pittsburgh	23 95
Basic, Valley furnace	20 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton	$26 00	$26 50
Victoria No. 1	27 00	26 00
Victoria, No. 2	26 00	25 50

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.35
Steel bars, base, Toronto	3.50
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.25
Twisted reinforcing bars, base	3.30
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...

F.O.B., Toronto Warehouse.	Cents
Steel bars, base	3.50
Small shapes	3.75

F.O.B. Chicago Warehouse	Cents
Steel bars	3.25
Bars, 2 in. and up	3.75
Structural shapes	3.25
Plates	3.75

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs.	
	C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$31 00
Electrolytic copper	31 00	31 00
Castings, copper	30 00	30 00
Tin	45 00	46 00
Spelter	13 00	14 00
Lead	9 00	9 00
Antimony	15 00	18 00
Aluminum	70 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4 75	$4 50
Heads	5 00	4 75
Tank plates, 3-16 in.	5 25	4 75

WROUGHT IRON PIPE

Prices in effect Oct. 2, 1916.

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3.50	$ 5 00
¼ in. and ⅜ in.	3 18	5 31
½ in.	4 08	5 65
¾ in.	4 95	7 07
1 in.	7 31	10 46
1¼ in.	9 89	14 15
1½ in.	11 83	16 91
2 in.	15 91	22 76
2½ in.	25 16	35 98
3 in.	32 90	47 05
3½ in.	39 56	56 50
4 in.	46 87	67 04

Lapweld

2 in.	$17 76	$24 24
2½ in	26 33	36 56
3 in.	34 43	47 81
3½ in.	41 40	57 50
4 in.	49 05	68 13
4½ in.	59 69	83 19
5 in.	69 56	96 94
6 in.	90 24	125 80
7 in.	121 40	165 40
8 in. x 25 lbs. per ft.	127 50	173 80
8 in. x 25 lbs. per ft.	146 90	200 20
9 in.	176 00	239 40
10 in. x 32 lbs. per ft.	163 20	222 40
10 in. x 40 lbs. per ft.	210 10	286 30

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$19 00	$19 50
Copper, crucible	23 00	22 50
Copper, heavy	23 00	22 00
Copper wire	23 00	22 00
No. 1 machine compos'n	18 50	17 50
No. 1 compos'n turnings	15 00	15 00
New brass clippings	15 00	15 00
No. 1 brass turnings	13 00	12 00
Steel, low phos.	14 00	14 00
Heavy melting steel	9 50	12 00
Boiler plate	12 00	10 50
Rails	13 75	15 00
Axles, wrought iron	19 00	19 00
Tires, steel	12 00	11 00
Rails	13 75	13 00
Shafting	16 75	16 00
Malleable scrap	10 25	11 00
Pipe, wrought iron	10 500	9 00
Stove plate	10 25	10 50
Heavy lead	6 50	7 00
Tea lead	5 00	5 25
Scrap zinc	7 50	7 75
Aluminum	35 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	45
Stove bolts	60
Plate washers	25
Machine bolts, ⅜ and less	30
Machine bolts, 7-16 and over	25
Blank bolts	30
Bolt ends	25
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts, hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	35
Boiler rivets, base ¾-in. and larger	$5.25
Structural rivets, as above	5.15
Wood screws, flat, bright	77½
Wood screws, O. & R., bright	72½
Wood screws, flat, brass	45
Wood screws, O. & R., brass	42½
Wood screws, flat, bronze	37½
Wood screws, O. & R., bronze	35

MILLED PRODUCTS

	Per Cent.
Set screws	40
Sq. & Hex. Head Cap Screws	30
Rd. & Fil. Head Cap Screws	15
Flat & But. Hd. Cap Screws plus	15
Fin. & semi-fin. nuts up to 1 in.	30
Fin. & semi-fin., nuts over 1 in.	25
Studs	15
Taper pins	45
Coupling bolts	plus 15
Planer head bolts, without fillet	15
Planer head bolts, with fillet	net
Planer head bolt nuts, up to 1 in.	30
Planer head bolt nuts, over 1 in.	25
Planer bolt washers	plus 10
Hollow set screws	list plus 40
Collar screws	list plus 20
Thumb screws	20
Thumb nuts	70
Patch bolts	add 65
Cold pressed nuts to 1½ in.	add $3.50
Cold pressed nuts over 1½ in.	add $2.00

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$45 00
Open-hearth billets, Pittsburgh	45 00
O. H. sheet bars, Pittsburgh	45 00
Forging billets, Pittsburgh	69 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3.85	$3.95
Cut nails	3 70	3 70
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs		$4 10

MISCELLANEOUS

Solder, guaranteed	0.29½
Solder, strictly	0.27½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	030½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	1.00
Linseed oil, boiled, single bbls.	1.03
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	8 00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.12
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes	35
S.S. drills, 1/16 in. and larger	50
Standard drills to 1½ in.	50
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	20
3-fluted drills over 1½ in.	10
Bit stock	50
Ratchet drills	20
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	25
Sockets	30
Sleeves	40
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$4 15	$4 00
Sheets, black, No. 10	5 25	4 90
Canada plates, dull, 52 sheets	4 75	4 75
Canada Plates, all bright	6 30	6 50
Apollc brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 50	7 75
Fleur-de-Lis, 28 B.W.G.	7 25	7 35
Gorbal's Best, No. 28	7 50	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 25	6 00
Premier, 10¾ oz.	6 50	6 25

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch.	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65
Kearney & Foot, Arcade	65
J. Barton Smith, Eagle	65
McClelland, Globe	65
Black Diamond	65
Delta Files	65
Nicholson	55
Globe	60
Vulcan	65
Disston	..

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$20 00	.....
1¼ in.	23 00	.....
1½ in.	26 00	23 00
1¾ in.	26 00	20 00
2 in.	27 00	19 00
2¼ in.	29 50	.....
2½ in.	32 50	25 00
3 in.	44 00	28 50
3¼ in.	.....	32 00
3½ in.	50 00	33 00
4 in.	57 00	44 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.39 to .40
Tin	.50 to .53
Zinc	.18 to .21

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 in.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.10
Emery in kegs, American.	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Oct. 23, 1916.—Industrial conditions in every part of the Dominion indicate that relaxation of manufacturing and commercial activity is neither present nor near future imminent. The continual advance in price quotations of all classes of commodities gives no indication of an early cessation of current demands. The contemplated strike of C. P. R. trainmen does not tend to improve the present strained business situation, a railroad tie-up at this time being highly undesirable from every aspect. The labor problem is apparently not so acute meantime, owing to the increased employment of women workers in many of our munition plants.

Pig Iron

Increased activity has featured the pig iron situation, and the condition of the market is reflected in the general advance on all grades of American produce. This advance ranges from $1 to $2 per ton; certain grades of low phosphorus pig show an increase of $4 per ton. The demand for steel-making pig is greater than the furnaces can supply.

Steel

The ever-ascending prices of raw and semi-finished materials appear to be the serial feature of the present abnormal steel situation. The demands upon the mills are so incessant, and the orders piling up so rapidly, that deliveries are being extended into the first quarter of 1918. With the mills so crowded with munitions orders, domestic requirements have to be curtailed. Steel for munitions purposes is none too plentiful, and many shell makers are experiencing difficulty in filling their contracts, although reports seem to indicate a little relief in this direction. The demand for billets and sheet bars is extremely heavy, and all mills are pressed to the utmost in their effort to meet the consumers' needs. An advance of $5 per ton is quoted on the East Pittsburg price of forging billets, the quotation at maker's mill being now $75 per ton. No abatement marks the demand for plates, car builders and shipyards being the most persistent inquirers. That a general advance in the price of sheets may be anticipated is indicated by the recent advance of from $3 to $5 on the products of the American Sheet & Tin Plate Co. The revised prices are for first half of 1917 delivery. An advance of $5 per ton is reported on the New York price of steel bars.

The expected advance on wire products has partly materialized, $2 being added to the Pittsburg price of nails and barbed wire; the former being now quoted at $2.70; painted barb at $2.85, and galvanized at $3.55 per hundred pounds. The discount on wire fence (carload) is now 59 per cent., instead of 60. While nothing has been done in local circles regarding the advance in prices, dealers are considering a revision of their present quotations. The only changes reported are on galvanized sheets, Queen's Head having declined 25c per hundred, the current quotation being $7.50. Fleur-de-Lis, quoted at $7.25, shows a decline of 10c per hundred.

Metals

No developments have taken place to change the general quiet tone of the market, which has again resumed its steady position, following the temporary scare of the past two weeks. Copper is firm and strong. Tin is gradually resuming the position held before the recent excitement. Spelter is inactive, but comparatively firm. Lead is very firm, with a stronger undertone. Antimony is fairly active, with quotations strong. Aluminum is quieter.

Copper.—While the general situation continues to retain its extremely strong position, the market is comparatively quiet, and unless something unforeseen should happen to change existing conditions, it is likely to remain so for some time to come. The fact that the majority of consumers are well covered for present and near future requirements tends to inactivity on the open market, although small sales are being quietly made, and while the purchase price is reported to be slightly below the prices quoted, these sales are not likely to affect the general market conditions. Dealers are careful in closing contracts for metal, owing to the uncertainty of obtaining supplies. Producers are so filled with orders that they are not taking any active part in the present market, being content to leave the situation in the hands of the dealers until such times as further developments should take place. The British market remains very firm, with London quoting a 20-shilling advance on spot and a thirty-shilling on futures, the current price of Spot copper being £124 per ton. The New York market is strong and very firm, with quotations on lake and electrolytic unchanged at 28½c and 28¾c per pound respectively; casting is ⅛c higher at 27⅜c per pound. The local situation is unchanged, with prices firm at 31c for lake and electrolytic, and 30c for casting.

Tin.—The scare due to the near activity of submarines, which created such excitement a couple of weeks ago, has practically disappeared, and conditions are again about normal. Pronounced activity is not, however, apparent, although sufficient business is passing to maintain tin in its present strong position. The London market has become a little easier, as indicated in a decline of approximately 20 shillings on this week's quotations. New York has recovered from its last nervous spell, this being reflected in a further decline of ½c in this week's quotation, the nominal price being now 41c per pound. Local dealers report a fairly active market, with quotations at 45c, an advance of ½c per pound.

Spelter.—While sufficient buying is taking place to prevent the market taking on a stagnant appearance the activity is not such as to break the general dullness. However, there appears the possibility that improvement may soon be realized. Now that consumers are showing increased interest in the market, with sellers of metal not anxious to dispose of it at present low prices, a return to higher quotations is not unlikely. With refined spelter on the decline and the cost of ore maintained, producers are not inclined to sell metal at existing prices, believing that the market will shortly return to a position where a profit is possible. London reports a forty shelling decline on spot, and futures are slightly easier. New York has fluctuated during the week, the present quotation being ⅛ cent lower than last week; the nominal price being now slightly below 10c per pound. No change is noted in local conditions and dealers are reporting spelter as firm at 13c per pound.

Lead.—The situation is apparently so sound that any excess demand at the present time would result in higher prices. The supply of metal does not overlap the consumption to any great extent, and producers are well sold for several months ahead. Additional buying developments would therefore create a stronger market, subsequently boosting the price of the metal. However, should business be placed for first quarter delivery, it is possible that a considerable volume would be accepted at current prices. The London situation is very steady, while New York retains its strong position, quotations being 7c "Trust" with independents quoting ⅛c higher. The situation here is unchanged with prices strong and firm at 9c per pound.

Antimony.—The strong tone of the New York market has been maintained by the continued demand for metal from Canadian consumers. The placing of additional munitions orders is responsible for the increased purchasing, and the condition of the market is reflected in present quotations, which at 13¼c is an advance of ½c over last week. Dealers here report an active market, with prices firm at 15c per pound.

Aluminum.—The recent activity has subsided and the market has returned to position of a few weeks back. The situation is still very strong, but prices are again becoming easier, New York reporting a decline of one cent on No. 1 Virgin and 2c on pure remelt, quotations being 66c and 61c respectively. Dealers here report a slightly easier market, but prices are firm and unchanged at 70c per pound.

Machine Tools and Supplies

While the greater volume of present business is in munition making machinery these is in evidence a very encouraging demand for domestic equipment, much of which is due to the activity that Canadian manufacturers are displaying in the possibilities that recent foreign made exhibits have opened up for them. Already many lines of product, hitherto confined to other parts of the world, are being carefully considered with a view to manufacturing and inquiries for suitable machinery indicate that action is likely to result. Owing to the introduction of female help into various lines of industry, the labor question is less acute and additional equipment, necessary for maximum production, is now being installed.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department of Trade and Commerce, Ottawa, is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL
Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE
Valparaiso, British Consul General.

COLOMBIA
Bagota, British Consul General.

ECUADOR
Quito, British Consul General.
Guayquil, British Consul.

EGYPT
Alexandria, British Consul General.

FRANCE
Havre, British Consul Generai.
Marseilles, British Consul General.

INDIA
Calcutta, Director General of Commercial Intelligence.

ITALY
Genoa, British Consul General.
Milan, British Consul.

MEXICO
Mexico, British Consul General.

NETHERLANDS
Amsterdam, British Consul.

PANAMA
Colon, British Consul.
Panama, British Vice-Consul.

PERU
Lima, British Vice-Consul.

PORTUGAL
Lisbon, British Consul.

RUSSIA
Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN
Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN
Stockholm, British Consul.

SWITZERLAND
Geneva, British Consul.

URUGUAY
Monte Video, British Vice-Consul.

VENEZUELA
Caracas, British Vice-Consul.

Delivery of the heavier type of munition lathes is still backward. With few exceptions, shipment of standard tools has become almost normal. That further advances can be expected in the price of supplies is generally conceded, due to the continual advance in the cost of raw materials. Price lists are constantly being revised to meet the higher costs of production, and under the uncertain conditions that now prevail, it is not unlikely that still higher prices will rule in the future.

Scrap

The market in old materials is still retaining its strong position in conjunction with the condition of the steel and metal markets. The recent heavy sales of copper for export purposes has caused this scrap to be in good demand and prices have advanced accordingly. While some dealers have followed the market, others have been inclined to retain their old prices. The majority however are now convinced that existing conditions will prevail for some time, and this week's quotations show an advance of from 10 to 15 per cent. over that of the past few weeks; quotations range upon 19 cents for light to 23 cents for heavy and crucible scrap. Machine compositions are now 18½ cents, with turnings quoted at 15 cents. Brass clippings are now 15 cents and turnings 13 cents; being an advance of 1¼ and ¾ cents respectively. Wrought iron pipe scrap has advanced ¼ cent, and is now quoted at 10½ cents. Heavy and tea lead are ½ cent higher, being quoted at 6½ and 5½ cents respectively.

Toronto, Ont., Oct. 24.—An event of interest to Canadian manufacturers is the exhibition of enemy samples which is being held in Convocation Hall Building in this city. While a number of these samples are of very inferior grade and hardly worth consideration, there are others which might be copied with advantage and manufactured in Canada for sale in foreign markets as well as in this country. The exhibition is being held under the auspices of the Department of Trade and Commerce, Ottawa.

The freight congestion at the local terminals has again assumed serious proportions. Owing to the accumulation of freight in the yards awaiting delivery in the city, the railway companies have been compelled to refuse to accept from outside points consignments bound for Toronto of less than car lots. This embargo is naturally causing considerable delay and loss to local merchants. Shortage of labor, the railway officials say, is responsible for the congestion which has been more or less in evidence all this year.

Steel

The belief that there will be no improvement in the steel situation for at least eighteen months, if not longer, seems to be generally accepted. The mills are in a sold-up condition, and the demand shows no indication of falling off. The steel required for munitions alone will aggregate an enormous tonnage, while the amount of steel used for other purposes will be even greater. The revival in shipbuilding caused by the serious shortage of tonnage has already been partly responsible for what is practically a famine in steel plates, while steel rails are badly wanted, but cannot be obtained in sufficient quantities to satisfy the demand. With such conditions prevailing, prices will continue to advance, and the mills get further behind on deliveries. There are no changes to note this week in bars, sheets, tubes or plates, but wire nails have advanced 15c, and are now quoted at $3.95 per keg, with every possibility of the $4 mark being reached in the near future. Wire products have also advanced 15c per 100 pounds. Mills report the demand for locomotive and merchant tubes very heavy, some makers being sold up for practically eight months. The plate situation is getting tighter, prices being very firm and deliveries running into the second and third quarter of 1917.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

A slight decline in prices of galvanized sheets has been announced this week, but it is hardly likely that the new price will remain in effect very long, as the tending is decidedly in an upward direction. Higher prices on black sheets, particularly the lighter gauges, are expected shortly, in which case galvanized sheets would be affected, as spelter has been holding firm for some weeks. The demand for sheets of all kinds in the primary market is heavy and prices are very firm.

Further indication of continued strength in the steel situation in the U. S. is shown in the fact that agents of the Allied Governments are sounding the American market for steel to be delivered during the third quarter and second half of 1917. No definite tonnage has been named, but it will no doubt be as heavy as their requirements during the first half of next year. A few months ago 500,000 of bars, billets and forgings were purchased for delivery up to July, 1917. A feature of the market has been a tremendous demand for rails. It is said that the entire capacity of the rail mills has been sold through all of 1917. Prices on all steel products are very firm, but there are no price changes to note this week.

Pig Iron

A further advance of $1 per ton has been made on domestic pig iron, due, it is stated, to the increase in cost of iron ore and coke. Considerable strength, however, has recently developed in the market as a result of a better demand and improvement in the situation generally. The pig iron market in the U. S. is very active and prices very firm, with an upward tendency.

Scrap

The situation in the market for scrap metals is improving, and prices are generally firm. There is a shortage of old rails and heavy melting steel, with the result that prices have advanced in both cases. Machine composition and composition turnings are higher, having advanced 1c per lb. Steel turnings are coming in freely, but the demand is not very heavy. The scarcity of copper for 1916 delivery has been a boon to scrap dealers, who are getting unusually high prices for old copper.

Machine Tools

The situation in the machine tool market is practically unchanged. The bulk of the demand is still for heavy duty lathes, generally for one or two machines, but inquiries for other special tools for munitions plants are also being received in fair volume.

Supplies

Prices of all machine shop supplies continue very firm, and some advances have to be noted, the most important being in milled products, which are about 10 per cent. higher. Files have also advanced again, the discount now for the most of the makes being 65 per cent., as against 65 and 5 per cent. formerly. Gasoline is firm, following an advance of 10c per barrel on crude oil in the States. Indications point to still higher prices on crude oil, in which case gasoline and benzine will probably be affected.

Metals

While the metal markets are comparatively quiet, there is a firm undertone, and the situation generally is favorable. The consumption of most metals, particularly copper, continues heavy, which is tending to keep prices up, notwithstanding the large increase in production. Conditions in the trade locally are favorable, the market being steady at unchanged prices, with satisfactory volume of business. Copper has developed further strength during the week, due to increased demand, principally from domestic consumers. Tin is quiet but firm, with no further development in the market to note. Spelter is firmer on account of increased demand from galvanizing interests. Lead, antimony and aluminum are firm, but unchanged.

Copper.—After a short period of quietness, there has been a revival of the demand for copper and the market is very strong. Owing to the possibility of higher prices for copper, consumers are coming into the market, and are covering for their requirements over the second quarter of 1917. Local quotations are nominal and unchanged at 31c per lb.

Tin.—The market is firm and higher in London, but quiet and unchanged in New York. A little more interest is being taken in tin, but business is still very quiet. Local quotations firm at 44c per pound.

Spelter.—There is a better demand for spelter, including a number of inquiries from galvanizing interests. The market is firmer, but unchanged, although it has a higher tendency. There is a heavy consumption of spelter being about equal to production. Spelter is firm locally at 14c per pound.

Lead.—The leading interest is still quoting 7c New York, while independents are pretty close to that figure. The market is dull, but firm, and business is quiet, consumers being well covered for the time being. Reports from New York state that Canadian consumers have purchased about 2,500 tons of lead in the past week for prompt and November delivery at a base price of 6.85c to 6.90c New York. Local quotation 9c per pound.

Antimony.—Canadian consumers have recently purchased considerable quantities of antimony in New York, which has strengthened the market there. Local quotations, however, are unchanged, at 18c per pound.

Aluminum.—Demand is less active, but the market holds steady, and prices are unchanged at 68c per lb.

UNIFORM CONTRACTS FOR SHEET AND TIN PLATE

ADVICES from Pittsburgh state that uniform contracts in the sheet and tinplate industry in which there shall be no guarantees of prices against market declines are contemplated by the National Association of Sheet and Tinplate Manufacturers, which includes in its membership many iron, steel and tinplate corporations in the U.S. Thousands of letters have already been sent out to sheet buyers in the U.S. and Canada calling attention to a resolution recently passed prohibiting guaranteeing prices.

The new contract contemplates an irrevocable sale and purchase not subject to cancellation, postponement of delivery or price revision because of market conditions. Freights are to be paid in cash and not subject to discounts. In order that its business may be legally carried on, the association to-day gave notice that it would apply to the courts on Nov. 8 for a charter.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya, Ploshch 9, Petrograd.

L. D. Wilgress, Canadian Government Commercial Agent, Bukhgolza Ulitza No. 4, Omsk, Siberia.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

AUSTRALIA, B. Millin, Sydney, N.S.W.

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND DENMARK.

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

EXHIBITION OF ENEMY SAMPLES

THE exhibition of enemy samples which opened in the Convocation Hall Building, Toronto University, last Monday will continue until Monday, Nov. 6. The exhibition is open to the general public and large crowds will no doubt avail themselves of the opportunity of carefully examining the goods. The object of the exhibition is to give Canadian manufacturers an opportunity of ascertaining whether any of the goods on exhibition can be made in Canada either for the home market or for export. The Department of Trade and Commerce invites all manufacturers to attend, whether they have received special invitations or not. It will only be necessary to register the name of the manufacturing firm represented to obtain admission. Manufacturers who wish to have the samples examined by expert workmen can secure tickets of admission for them on application to officials of the Department of Trade and Commerce at the exhibition. Wholesale merchants will also be welcomed.

These samples were collected in many countries by the British Government shortly after the outbreak of the war and were exhibited in all the important industrial centres of the United Kingdom. Wherever they were shown the manufacture and export merchants showed great interest in them. On the occasion of Sir George Foster's recent visit to England he arranged to have the samples brought to Canada and exhibited at the expense of the Department of Trade and Commerce.

Some of the samples are so inferior in quality that it would not be worth while for Canadian Manufacturers to attempt to compete with Germans in making them. Canadian manufacturers can however decide for themselves what articles among them it would be worth while to make in this country. An examination of the samples may suggest ideas of value even in cases where it is not considered advisable to make the same things.

Herbert Kershaw, one of the best informed officials of the British Board of Trade, has come to Canada in charge of the samples and will be glad to answer questions of visitors at the exhibition. Officials of the Department of Trade and Commerce will also be present to give information. The exhibition is in Examination Hall at the back of Convocation Hall Building.

There are 8,000 German and Austrian made articles in the exhibit which were bought in the open markets of the world. Wherever possible, each article has the wholesale and retail price, place of purchase, and other details affixed. The articles shown are of great variety and include the following classes of goods:—Textiles, soft and hard haberdashery, fancy and leather goods, glassware and crockery, hardware, enamel goods, aluminum ware, etc., tools, cutlery and electro goods and numerous miscellaneous lines.

The hours during which the exhibition is open each weekday, are from 10 a.m. to 6 p.m. On Thursday and Friday, this week and next week, it will be open until 9 o'clock p.m. to permit industrial workers who may not have the opportunity of getting out during the day to attend in the evening.

* * *

WHAT HAS BEEN WASTED

THE second report of the Committee of Public Accounts issued as a White Paper recently, shows a net deficit on the naval accounts of $258,759,310, and on army accounts of $1,059,337,705. The round total of the two is $1,318,100,000. In the economies effected is a saving of $15,000,000 on jute sand bags. The Ministry of Munitions had effected substantial reductions in prices for equipment, guns, etc., as compared with the early stages of the war, notwithstanding increased cost of labor and materials. The Admiralty had recently placed orders for shells, the price to be settled later, and were employing accountants to investigate the books of the firms as to the actual cost. It was regretted that no such system was adopted before the war in order to break down rings among contractors or to enable economies such as were being effected by the Ministry of Munitions.

As regarded army supplies, after some difficulty a system was evolved in June, 1915, for securing such supplies as were required at prices which were fair and reasonable in the interest of the public. This system was rendered more effective by the legislation in February last, which had the effect of breaking up and preventing a combination of manufacturers against the Government. They had taken control of whole trades, and thereby effected great economies in such necessaries as leather and jute. The committee hoped that the experience gained and the organization instituted for dealing with this aspect of the nation's affairs would not be lost sight of on the conclusion of peace. They hoped the Admiralty and the War Office would henceforth unite in efforts to effect national economy in the buying departments. The cost of hiring ships for detaining alien prisoners has been £450.000.

The committee regretted no organized system existed for the prevention of waste in the food supply to the troops, but this defect was being remedied. They also regretted that arrangements were not made to prevent the payment of undue brokerage commission on the purchase of stores. The committee were informed that sites for all camps, some of which had been regarded as unsuitable, were chosen for military reasons. The committee intimate approval of an Excess Vote for both naval and army deficits. The committee state that the payments in connection with the purchase of sugar at March 31, 1915, amounted to $93,000,000, and the amount received in respect of sales was $57,470,000. The balance was represented by stocks of sugar to a much greater value. The committee are informed that if all sugar were now realized a profit of something like seven and a half million dollars would be made.

* * *

SIX MONTHS' TRADE OVER BILLION MARK

THE hundred per cent. increase in Canadian trade for five months, as shown in the September statement, has been maintained, the total trade of the Dominion for the first six months of the fiscal year being well over the billion-dollar mark.

The monthly return issued under the direction of the Minister of Customs shows an increase from $92,487,862 to $161,797,951 in September, bringing the grand total for six months up to $1,148,899,412, as compared with $559,533,363 in the corresponding period of the previous fiscal year.

The Customs revenue in this period has risen from $44,421,033 to $70,102,854.

Excluding coin and bullion, the September imports amounted to $68,796,262 compared with $38,030,320 in September of last year. In the six month period the imports have reached a total of $390,995,243, an increase of $177,402,724.

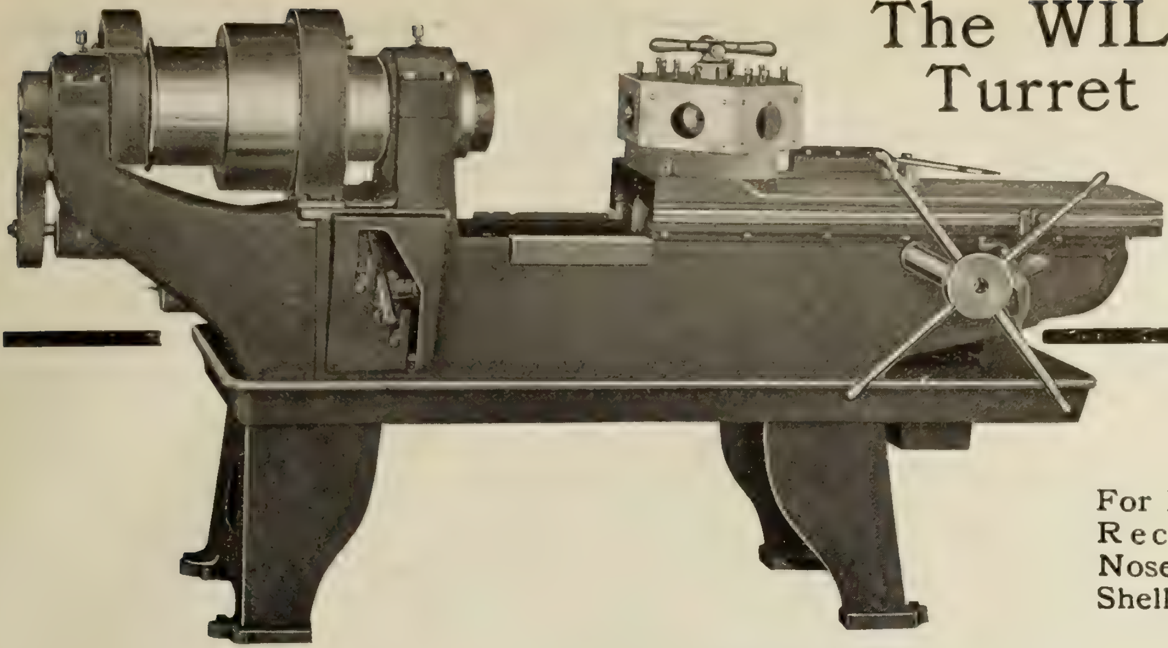
Exports of domestic products, exclusive of coin and bullion, have more than doubled in six months, the figures being $536,721,514, and for last year, $246,392,148. September exports amounted to $90,285,181, a gain of $44,155,446.

The export expansion is found chiefly under the heads of agriculture and manufactures, the increase under the former being from $11,139,935 in September, 1915, to $25,164,034. Exports of manufactures in September increased from $9,244,974 to $37,801,177. In the six month period these exports were, agriculture $206,141,326 a gain of $146,794,343, and manufactures $190,823,240, a gain of $119,346,421. Exports of forest and fishery products declined slightly during September.

* * *

Montreal, Que.—It is understood that a French syndicate are seeking to acquire the Donnacona Paper Co.

The WILLIAMS Turret Lathe



Prompt Delivery

For Boring, Base Recessing and Nose Operation on Shells up to 6 in.

SPECIAL FEATURES

2-Step Cone for 6" Belt.
Hole in spindle bored large enough to take 6" shell.
Extra large spindle bearings.
Can be equipped with 3-jaw Universal or Air Chuck.
Long and Heavy Turret Slide, well gibbed.
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Powerful indexing arrangement with automatic trip.
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Weight about 7,000 lbs.
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Write for full description and prices.

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The A.R. WILLIAMS Machinery Co., Limited

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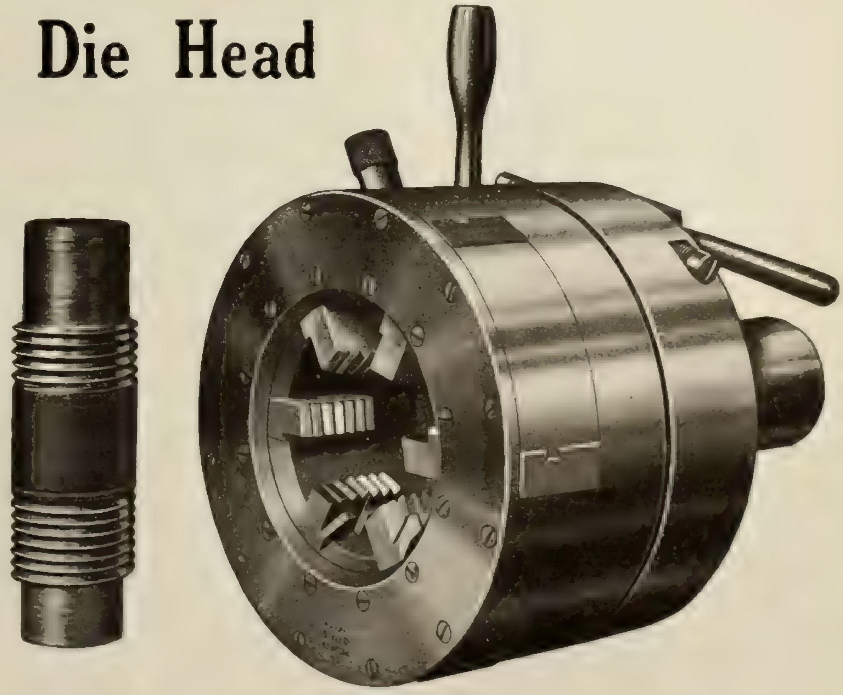
This Geometric Die Head

is making good in a United States Navy Yard. (4½-in. size, Style "D.") It was selected because it was known that it would make good.

One thread is as readily cut as another in a Geometric Self-opening Die Head, because the Head is built for the Thread.

Long threads or short, heavy or light work, large diameters or small, fine threads or coarse—they are all alike to the Geometric Die Head.

Whatever the make of your Screw Machine, a Geometric Self-opening Screw-cutting Die Head can be furnished to fit it. Take up your threading propositions with us.



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Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

If any advertisement interests you, tear it out now and place with letters to be answered.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Mimico, Ont.—The Dominion Abrasive Wheel Co. will build a factory here.

Rainy River, Ont.—Blackmore Bros. will build a machine shop at a cost of $15,000.

Toronto, Ont.—John Inglis & Co. will erect an addition to their forge shop at a cost of $7,000.

Lindsay, Ont.—Fire on Oct. 17, destroyed the office and plant of the Machine Automatic Telephone.

Kitchener, Ont.—The Canadian Blower & Forge Co. will build an extension to their machine shop, to cost about $100,000.

Galt, Ont.—Wells Brothers, of Canada, Ltd., manufacturers of taps and dies, will build an addition to their plant to cost $2,000.

Toronto, Ont.—The Willys-Overland, Ltd., are making repairs and preparing for extensions at their West Toronto plant as rapidly as possible.

Renfrew, Ont.—M. J. O'Brien, of this town is proceeding with the construction of a hydro-electric power plant at Calabogie near here, at an estimated cost of $150,000.

Port Colborne, Ont.—The Foundation Co., who have the contract for the new nickel refinery are getting their plant together ready for starting work on the foundations.

Port Moody, B.C.—The Port Moody Steel Works, Ltd., is now making merchant bars, and proposes to install larger mills after the two open-hearth furnaces now under construction are in operation.

Port Arthur, Ont.—The first unit of the proposed pulp and paper mill to be built here will cost about $500,000 while the plant when complete will represent an investment of $1,000,000. A. G. McIntyre is consulting engineer.

Victoria, B.C.—Permission has been granted to McCarter Bros. to build a corrugated iron shingle mill at the foot of Rock Bay Avenue. The owners promise that combustion chambers of such a type will be used to fire the boilers as will prevent any charred sawdust nuisance.

Welland, Ont.—Judge Wolfe of New York and Eugene F. Diener of Dunnville, Ont., were in Welland recently in connection with plans which are shortly to be carried out to manufacture gasoline in Canada. A site has already been purchased in the Township of Canboro, 5 miles north of Dunnville.

The British Columbia Copper Co. is installing a pumping plant to elevate the water from the Similkameen River to a distributing point 1,700 feet above the river through a pipe line 6,000 feet long. The equipment will consist of triplex pumps, and the pump line will be composed of 4-in. high-pressure hydraulic pipe in the lower station and steel pipe of 6-in. diameter at the discharge. The water will be used to supply the mine, the camp, and a 50-ton experimental mill, which will be used for the working out of a concentration process preliminary to the erection of a 2,000-ton plant on the Similkameen River.

General Industrial

Montreal, Que. — The St. Lawrence Brewery Co., will build an extension to their brewery.

London, Ont.—Fire on October 19 destroyed the William A. Jenkins Mfg. Co. factory, causing a loss of approximately $30,000, which is covered by insurance.

Belleville, Ont.—Frankford cheese factory was totally destroyed by fire on Oct. 18. The entire loss will exceed $8,000, with only $4,000 insurance $3,000 on the building and $1,000 on the contents.

Owen Sound, Ont.—It is reported that a new industry for Owen Sound is under consideration. Mr. Menzies of the Board of Trade is negotiating with the syndicate which is interested in the proposition.

Trenton, Ont.—The Benedict Co., manufacturers of silver plated ware of Syracuse, N.Y., are fitting up the factory lately occupied by Lloyd and Sons, and will manufacture here for their Canadian trade.

Niagara Falls, Ont.—The Perfection Tire Co., are ready to go ahead with the erection of their factory. Satisfactory arrangements will be made to give the company power concessions promised by the municipality without violating Hydro rates or selling power below the price determined by the Commission.

Collingwood, Ont.—Fire on Oct. 18, destroyed the large coldstorage building and receiving warehouse of the Dominion Fish Co., situated on the wharf of the G.T.R. The loss will be several thousand dollars, on which there is said to be some insurance, held by the Booth Fish Co., Chicago.

Municipal

Regina, Sask.—The City Council will build a new pumping station at Boggy Creek.

Smith's Falls, Ont.—Town Council is considering the construction of a filtration plant, at an estimated cost of $20,000.

Shallow Lake, Ont.—A by-law will be voted on by the ratepayers on October 30 to endorse a loan of $4,000 to the R. Caesar Woodworking Co.

St. Romuald d'Etchemin, Que.—It is proposed to make improvements to the waterworks and sewage systems. A by-law to raise the necessary funds will be submitted on October 30.

Electrical

Wainwright, Alta.—The Town Council will install an electric light and power system. The B. L. Perry Co., of Edmonton will do the work.

Dublin Township, Ont.—The Township Council will shortly submit a by-law to authorize the installation of a hydro-electric system at an estimated cost of $5,000.

Building Notes

Toronto.—Smith Bros. have taken out a permit for a paint shop at 175 Duke street to cost $8,000.

Trenton, Ont.—The Board of Education have decided to erect a new High School in East Trenton to cost $3,600.

Toronto. — The Canadian National Carbon Co. have taken out a permit for a three-storey factory on Paton road, to cost $23,402.

Vancouver, B.C.—A permit for the construction of Pantages Theatre has been issued by building inspector McKenzie. The new vaudeville house which

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will have a frontage of 103 feet, will cost $300,000.

Trenton, Ont.—A moving picture studio company, known as the Canadian National Features, Ltd., have made arrangements to erect a large three-storey building in one of the parks here, Jos. Shea, of Toronto, is connected with the enterprise.

Wood-Working

St. John, N.B.—The St. Stephen Lumber Co.'s plant at St. Stephen has been destroyed by fire. The loss will be about $100,00.

Penticton, B.C.—F. Demuth's lumber mill at Milford, on the Kettle Valley Railway, 40 miles from here, was burned down on October 14. The cause of the fire is unknown.

Tillsonburg, Ont. — Fire totally destroyed the box factory of James Trevail & Son of South Middleton on Oct. 17, together with the house and contents. The loss will be very heavy but is partly covered by insurance.

Tillsonburg, Ont.—The box factory of James Trevail & Son, of South Midleton, was destroyed by fire of an unknown origin on October 17. The loss will be heavy, with only $1,000 insurance on buildings and contents.

Deseronto, Ont.—The by-law giving the Dominion Hardwoods, Ltd., free water, and exemption from taxes, except school and war taxes, for ten years, was carried on Oct. 16, by a vote of 350 for and 4 against.

St. Stephen, N.B.—Haley & Sons' lumber and planing mill was totally destroyed by fire on October 17, together with thousands of dollars' worth of lumber. The plant was valued at about $100,000, and is practically a total loss, with $58,500 insurance. Messrs. Haley will rebuild and in the meantime they will run their Calais box and lumber mill day and night to fill their orders.

Tenders

Toronto.—Tenders will be received by the Chairman, Board of Control, City Hall, up to October 31, for the supply and delivery of the following:—Brass and bronze castings; brass work for house services, cast iron pipes, hydrants; pipe fittings and valves, supply of lead pipe, special castings, stop valves, iron castings of manhole, gullies grates, etc., general supplies and tools, iron and steel, house numbers, oils, lubricating, rubber valves. Specifications and forms of tender may be obtained at the Works Department, Room 12, City Hall.

Hawkesbury, Ont.—The Town Council is calling tenders for one electrically-driven turbine pump of 1,000,000 gal. per day capacity, direct connected to a 100-h.p. motor; one pump of 750,000 gal. per day capacity, with 75-h.p. motor, and for one pump of 500,000 gal. per day capacity, with 50-h.p. motor. M. Gareau is town clerk.

Toronto, Ont.—Tenders will be received by Frank Barber, engineer of the Township of York, up to October 30, for the supply and delivery of the following material:—Tender A-1—for supply and delivery of approximately 20,500 ft. of 24 in. cast iron pipe; A-2—for the supply and delivery of cast iron pipe (12 in. and smaller sizes); B-1—for supply and delivery of 24 in. special castings; B-2—for supply and delivery of special castings, 12 in. and smaller sizes; C-1—for supply and delivery of 24 in. valves; C-2—for supply and delivery of 12 in. and 6 in. valves; C-3—for supply and delivery of air valves; D—for supply and delivery of hydrants; F—for supply and delivery of tops, covers and plugs. Plans and specifications may be obtained at the office of Frank Barber, engineer, Toronto.

Ottawa, Ont.—Tenders, addressed to J. W. Pugsley, secretary of the Department of Railways and Canals, Ottawa, Ont., will be received up to November 15 for the construction of a reinforced concrete elevator with a capacity of 500,000 bushels. Plans, specifications and blank form of contract may be seen at the office of the following:—Chief engineer, Department of Railways and Canals, Ottawa; railways, Moncton, N.B., general superintendent, Winnipeg, Man.; resident engineer, Fort William, Ont.; John S. Metcalfe Co., engineers, Montreal, Que. Contractors who wish to obtain plans and specifications temporarily for their own use may obtain same on depositing a certified bank cheque for $100.

New Incorporations

Henden Lumber Co. has been incorporated at Toronto with a capital of $500,000 to carry on a sawmill and planing mill business, Timmins, Ont. Incorporators F. Austin Daly, W. Aston Gordon and Peter MacLeod all of Haileybury, Ont.

American Linseed Co., has been incorporated at Ottawa with a capital of $40,000 to operate elevators and to manufacture linseed oil, cake and other products at Winnipeg, Man. Incorporators, A. P. Allensworth, H. P. Grundy and F. W. Louthood all of Winnipeg.

Canada Gelatine Co., has been incorporated at Ottawa with a capital of $250,000 to manufacture glues, gelatines of all kinds and chemical fertilizers at Brantford, Ont. Incorporators Lloyd Harris of Brantford, George Upton and Jesse Lyman of Boston, Mass.

Contracts Awarded

Dundas, Ont.—The John Bertram & Sons Co. has let the contract for the erection of a pattern shop to E. G. M. Cape & Co., of Montreal.

Lethbridge, Alta.—The contract for a filtration plant has been awarded to the Roberts Filter Mfg. Co., Darby, Pa., Approximate cost, $100,000.

Assinboia, Sask.—The general contract for the construction of a waterworks system has ben awarded to M. S. Holmes, Souris, Man. Approximate cost, $68,000. Consulting engineers. Murphy & Underwood, Saskatoon.

Quebec, Que.—Price Bros. have awarded contracts to the S. Morgan Smith Co. for three turbines for their mill at Rimouski and three turbines from the same concern for the pulp mill at Jonquiere, Que.

Marine

Vancouver, B.C.—The C.P.R. propose extending the passenger pier at this port approximately 400 feet.

Halifax, N.S. — The North Atlantic Fisheries, Ltd., of this city has sold its Port Hawkesbury plant to Leonard Brothers, of Montreal and St. John.

St. Lawrence River Low.—Word was received at Kingston recently, that the water is very low below Iroquois. being some five inches under the usual vessel draught of 14 ft.

Vancouver, B.C.—Captain F. R. Dedrick, on behalf of the Stolt Nielsen Co., has signed contracts for the construction in Vancouver of three steamers for his Norwegian principals. The vessels are to be standard type freight carriers of 8,800 tons, costing $1,225,000 each.

Ottawa, Ont.—The Trade and Commerce Department announces that the Cunard Steamship Co. have chosen Halifax as their Canadian winter port for the new steamship service to be established between Bristol and Canada. Their steamers will call at both Halifax and New York on east and west-bound voyages.

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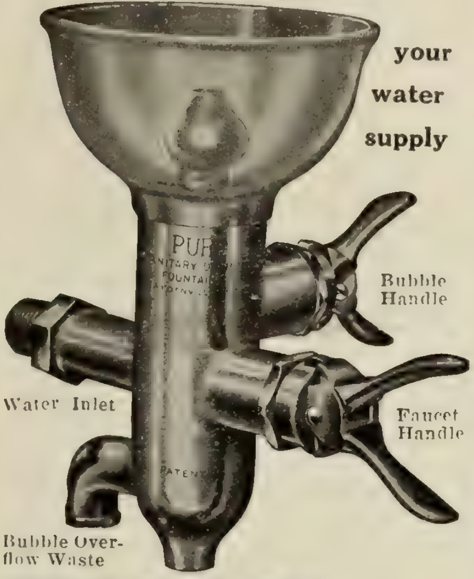

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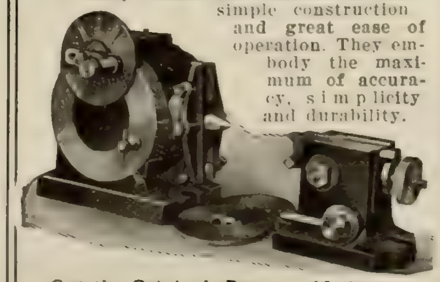

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Great Lakes Water Impure.—Apparatus carried by Great Lakes steamers to purify lake water for drinking is described as 'woefully inefficient'' in a bulletin published by the Public Health Service, Washington, D.C. No purification method is in use by any steamer on the lakes, it is declared, which fulfils Federal requirements by ensuring safe water under all circumstances.

Merchant Shipbuilding. — A substan- increase in merchant shipping under construction in Great Britain for the three months ending October 1 is reported by Lloyd's. The report shows that on October 1st there were 46 vessels building, representing a total of 1,789,054. tons. This represents about 249,000 tons more than the amount under construction at the end of the previous quarter, and 253,000 tons more than that building a year ago.

Bunker Coal Prices.—The advance of 50 cents a ton to a rate of $3.95 in the price of fuel for steamers, announced by a leading shipper of Cleveland, O., has not been made general, and some of the coal men say they have not decided what action they will take along that line. Boat men claim that steamers carrying coal and ore at contract rates cannot stand the advance. At the rate operating expenses are being increased, vesselmen will be slow in making freight contracts for 1917, as boats carrying contract ore and coal are having pretty thin picking.

Vancouver, B.C.—If plans which are at present in contemplation go through successfully, orders for vessels will be placed with the Wallace Shipbuilding Co. on the north shore and with Messrs. Coughlan & Son at their proposed yard on False Creek. So far as Wallace's yards are concerned, it means the expenditure of between four and five million dollars, but with regard to Coughlan & Son, no definite figure has yet been mentioned. Otto Dohl, of Philadelphia, representing a Norwegian shipping syndicate, and Jesse Stearns, representing American capitalists, are here in connection with these schemes.

Anchor-Donaldson Line. — A new steamship company, to be known as the Anchor-Donaldson Line, organized by a fusion of interests of the established Anchor and Donaldson Steamship Co., has been organized for Glasgow—Canadian passenger and freight trade. Directors of both companies will be represented on the Board of the new company, with Sir Alfred Booth of the Cunard Line as Chairman. The steamers Letitia, Cassandra, Athenia and Saturnia, will be transferred to the new organization. The Donaldson Line is now operating a service between Liverpool, the River Plate and leading South American ports. It has a fleet of twenty-five ships, totalling 89,992 tons. The Anchor Line operates a passenger and freight service between Glasgow and New York, calling at Liverpool in conjunction with the Cunard service. It has a fleet of fifteen ships, with a total tonnage of 114,222 tons .

Railways—Bridges

Newcastle, Ont.—The ratepayers have voted in favor of an expenditure of $2200 for a new concrete bridge.

Victoria, B.C.—Tenders for the timber swing span for the reconstruction of the Rock Bay bridge have been opened as follows by the City Council, Clarence Hoard, $21,135; Charles M. Cookson and William Ross, $12,947; Watson, Hall & Huntley, $18,277; MacDonald, Middleton & Bruce, $15,500. The tenders have been referred to the city engineer and the harbor committee.

Personal

J. F. S. Madden, formerly manager of the Canadian General Electric Co. at Winnipeg, has been promoted to the head office at Toronto.

Lieut. C. A. Page, sales manager for the Canadian Hart Wheels, Ltd., Hamilton, Ont., has received an appointment with the 164th Battalion C.E.F., and expects to go overseas shortly.

F. W. Blythe, district manager of the Canadian Allis-Chalmers, Ltd., at Winnipeg, has been promoted to the head office at Toronto.

Col. Thomas Cantley, president Nova Scotia Steel & Coal Co., New Glasgow, N.S., has been elected a director of the Institute to fill the vacancy caused by the death of Thomas J. Drummond.

W. C. Hawkins, of Hamilton, Ont., managing director of the Dominion Power & Transmission Co., and **F. W. Teele**, of Boston Mass., formerly vice-president and general manager of Porto Rico Railways Co., have been elected to the board of Southern Canada Power Co.

Sir William Benjamin Bowring, Bart., of Liverpool, a ship owner, is dead. Sir William Bowring was one of the best known shipping men of England, and was identified with marine interests in Newfoundland and New York. He was born in St. John's, Nfld., in 1837. Sir William was chairman of C. T. Bowring & Co., of London, Liverpool, and Cardiff, and a director of Bowring Brothers, of St. John's.

W. M. Ackworth of London, Eng., will be appointed a member of the Railway Board of Inquiry, which is investigating the railway situation in Canada, in consequence of the resignation through ill health of Sir George Paish. Mr. Ackworth has had great experience in railway matters, having been a member of several commissions on railway questions in Great Britain, and he is the author of several works on the railways of the United Kingdom, upon railway economics.

R. F. Randolph, a steel expert who has been in the employ of the Bethlehem Steel Co. for the past seven years and was recently appointed general superintendent in charge of the steel plant by the Dominion Steel Corporation, has arrived in Sidney, N.S. and will immediately take up his new duties. Mr. Randolph is recognized as being one of the leading steel experts in America. Mr. Martin whom Mr. Randolph replaces, has resigned and it is understood, is leaving Canada.

Trade Gossip

Frank Martin, Canadian representative of Wm. Garthwaite, of Paris, managing director of the Marine Navigation Co., will open an office for the company at Halifax, N.S.

New Output of Customs.—Port Maitland, Ont., has been created an outport of customs and warehousing port under the survey of the port of Hamilton. A permanent harbor headline has also been established at that point.

Hamilton Brass Ltd., has taken over the business of the Hamilton Brass Mfg. Co., and will manufacture bib cocks, hose nozzles, couplings, etc. N. L. Bailey, formerly with the Tallman Brass & Metal Co., will be superintendent.

Labor Adviser to Munitions Board.—At the request of the Imperial Munitions Board of Canada, H. E. Morgan of the labor supply department of the Ministry of Munitions, London, has been temperarily detached by the Minister for the purpose of proceding to Canada to advise the Board on British procedure in regard to the labor in munition factories.

No Imports of Steel.—The London *Daily Chronicle's* parliamentary correspondent understands that the iron and steel sub-committee of Lord Balfour's committee, which was appointed to make recommendations on a basis of the Paris economic proposals, has presented a report urging prohibition of iron and steel imports into Britain after the war, during at least the period of demobilization and reconstruction.

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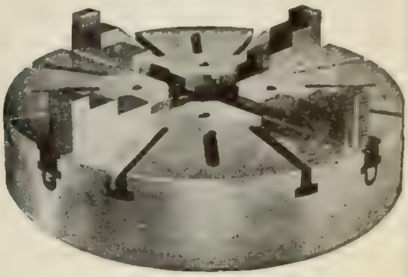

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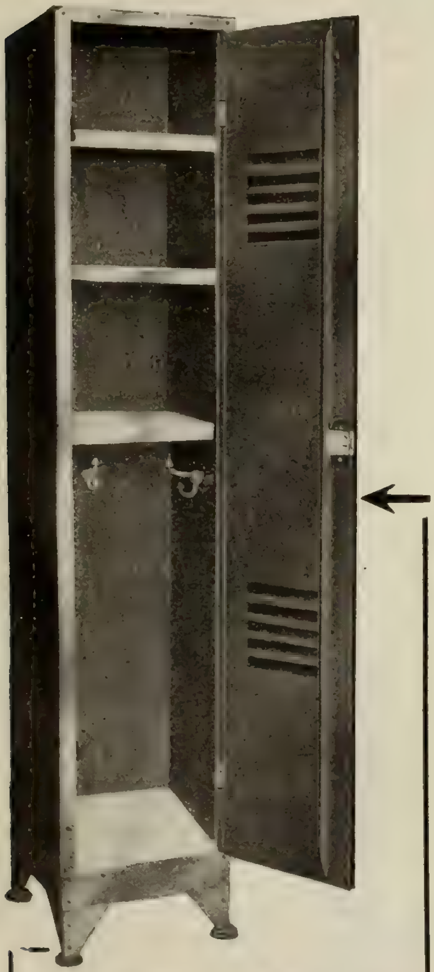

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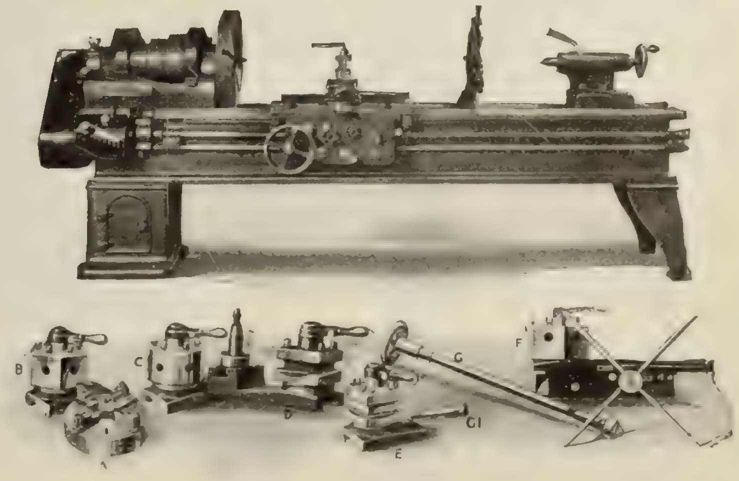

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Will Report to Russia on Hydro.—A favorable and exhaustive report of the practical use that is being made of Hydro power by the farmers of Ontario province, particularly in Oxford and Waterloo Counties, will be forwarded to the Russian Government by Prof. Boris Bakhmeteff, of the Agricultural Department of the Electro Technical International Commission of Russia.

Vancouver, B.C.—Robert Dollar, head of the Canadian Dollar Co., steamship owners has bought the sawmill equipment of the Ruskin mill and intends to manufacture lumber for export through Vancouver. The mill, which was built and formerly operated by the E. H. Heaps Lumber Co., is one of the most modern mills in the coast district with a capacity of 100,000 feet of lumber and half a million shingles daily.

The Dominion Bridge Co., in conjunction with the Montreal Ammunition Co., and the Dominion Copper Products Co., are displaying at the electrical exhibition, Winnipeg several sizes of shells in the various stages of manufacture. The exhibit comprises complete and half sections of all shells, ranging from the 18 pound shrapnel and the 18 pound high explosive shell to the 6 and 9.2 howitzer shells. The cartridge cases for these shells are also on display, showing the various steps in their manufacture from the original brass disc. Included in the exhibit are 75 mm. shells which have been manufactured for the Russians.

Magazines as Packing—The Alexandria & Ramleh Railway Co., Egypt, calls attention to the inconvenience that may result from possible delay in withdrawing goods from the local customs, on account of the presence in cases containing merchandise of illustrated newspapers and magazines used as packing material. Exporters should be warned against using printed matter of any nature in packing merchandise intended for belligerent countries. An ulterior motive is always suspected when uncensored printed matter comes to a belligerent country through channels other than the public post.

Change of Firm Name.—The engineering work at the Provincial Hospital for the Insane at Whitby, Ont., which was designed by MacMullen, Riley & Durley. Constructing engineers Montreal and Toronto will be carried to completion by the firm of MacMullen, Riley & Angus who have taken over the unfinished work of the former firm. Mr. Angus whose name appears in the new organization is well-known in engineering circles in Toronto and has been for some years practising his profession in this city. The new firm will continue the design of heating, ventilating, plumbing and electrical equipment of buildings as carried on by them separately in the past and will also specialize in the building design and equipment of industrial plants.

Freight Embargo at Toronto.—The inability of the railways and the teaming companies to obtain ample labor has forced the G.T.R. to place an embargo against less than a carload of freight from all points consigned to Toronto. The C.P.R. also had an embargo which became effective on October 9th, but they have been able to check up their congestion in the local freight sheds, with the result that the embargo has been discontinued. If the company finds it impossible to keep pace with the enormous volume of freight moving, the order will be restored. The embargo placed by the Grand Trunk is applied to all freight less than a carload, except perishable goods and munitions. The Toronto terminals are congested with freight, much of which cannot be delivered.

C.M.A. Maritime Branch Convention—The Convention of Maritime Province manufacturers held in New Glasgow, N.S., towards the end of last week may be said to have more than fulfilled the highest expectations of its promoters in every direction. Considerable interest was shown by those present in the work of constructing locks on the East River for the improvement of ocean vessel navigation, and in the scope and variety of work being undertaken at the plants of the Eastern Car Co., and Nova Scotia Steel & Coal Co., New Glasgow. Among those who addressed the Convention sessions were G. M. Murray, secretary the Canadian Manufacturers' Association, and Hon. Geo. H. Murray, Premier of Nova Scotia. "Development of a Canadian Mercantile Marine," and "Development of our Resources" were the subjects discussed by these gentlemen respectively.

Catalogues

Planing Machine. — Joseph Appleyard, Bradford, Yorks, England, has issued a leaflet dealing with a side planing machine. The machine is illustrated and described while testimonials are also included.

Laundry Machinery.—Two bulletins issued by Joseph Applevarl Bradford, Yorks, England, deal with an extensive line of laundry machinery. Each type of machine is illustrated and described while shipping weights and prices are also given. A number of testimonials are included.

Book Review

Railway Organization and Management, by James Peabody, lathe statistician, Atchison, Topeka & Santa Fe Railway. A clear and usable book on this subject has long been needed and Mr. Peabody's attractive volume will be found more than adequate. His position as chief statistician of the Santa Fe system gave him unique opportunities for collecting material, and he proved himself capable of scholarly and interesting presentation when, shortly before his death, he wrote this book. "It is not surprising," he remarks in the introduction, "that the railroad organization to the uninitiated seems to be bound round and round with an endless amount of red tape, exhausting patience and trying and expensive; whereas if the organization were properly understood and the activities of each department borne in mind, this seeming overcomplexity would disappear. "Railway administration involves so many and such widely varied subjects as to require for its successful conduct the largest possible survey as to commercial conditions, coupled with a knowledge of detail that takes into account all the varied operations incidental to the service. Properly to manage such an undertaking necessitates the employment of many men of many minds, and the plan by which homogeneity and efficiency are attained is known as railway organization." The various departments are taken up in order, administration, engineering, operation, traffic, accounting, etc.—and the work of each and the arrangements for performing that work are clearly set forth. No such complete list and description of railway positions had been put into any previous work. Elaborate charts show the relations of the officials to each other and guide the reader through the almost infinite complexities of the organization. The book also discusses in a most interesting fashion the problems of all kinds which railroad men have to meet, from the occasional vagaries of law makers to the scarcity of wood for ties. Such vital topics as government regulation, valuation, education of apprentices, pensions, staff versus line control, reports, statistics, advertising, competition, track elevation, electrification, traffic associations, rate-making, interline billing, the management of great terminal stations, all have concise but illuminating treatment. So wide is the range of subjects and so incisive the handling of them that the volume may well be called the most attractive general introduction to the business of railroading that has yet been published. The book is issued by the La Salle Extension University, Chicago

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PATENTS

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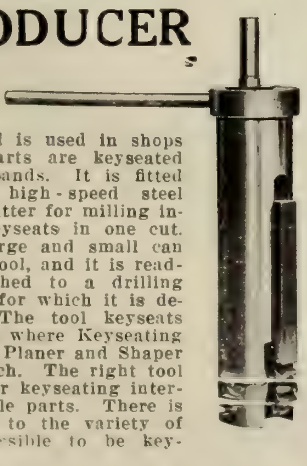
Patent Solicitors. Head Office, Royal Bank Bldg., Toronto. Ottawa Office, 5 Elgin St. Send for our Plain Practical Pointers. Copy of National Progress, in which our patents are advertised, mailed free.



QUANTITY PRODUCER

This tool is used in shops where parts are keyseated by thousands. It is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. Shops large and small can use the tool, and it is readily attached to a drilling machine for which it is designed. The tool keyseats in places where Keyseating Machine, Planer and Shaper can't reach. The right tool to use for keyseating interchangeable parts. There is no limit to the variety of work possible to be keyseated.

NATIONAL MACHINE TOOL CO.
2270-2272 Spring Grove Avenue,
Cincinnati, Ohio, U.S.A.

Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria.

WIRE SPRINGS OF ALL KINDS

Machine Springs, Valve Springs, Automobile Cushion Springs, etc., of a quality that defies competition. Tell us your requirements. Send sample or specification for price.

JAMES STEELE, LIMITED
GUELPH, ONTARIO

Steel Shell Forgings or Billets of any size or weight will move any distance or about curves upon our specially constructed Gravity Carriers and Incline or Horizontal power devices. No labor required.

Canadian Mathews Gravity Carrier Co., Toronto, Ont.

MORTON MANUFACTURING CO.
PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R.R SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE AND WORKS: MUSKEGON HEIGHTS U.S.A.

We are qualified Tool, Die, Jig, Gauge and Fixture Makers.

WRITE US.

Windsor Machine & Tool Works.
WINDSOR, ONT.

The "Dupont" PATENT Power Hammer

The strength, durability, economy of power and simplicity of adjustment of the Dupont Power Hammer make it a decidedly superior tool.

Made carefully from carefully selected, high-class materials.

Positively Guaranteed

Seven sizes.
With rams from 35 to 300 lbs.

Write for full details.

THE PLESSISVILLE FOUNDRY
Plessisville, Que.

Ontario and Western Agents:
The General Supply Co. of Canada Ltd.
Ottawa Toronto Winnipeg

METAL STAMPINGS

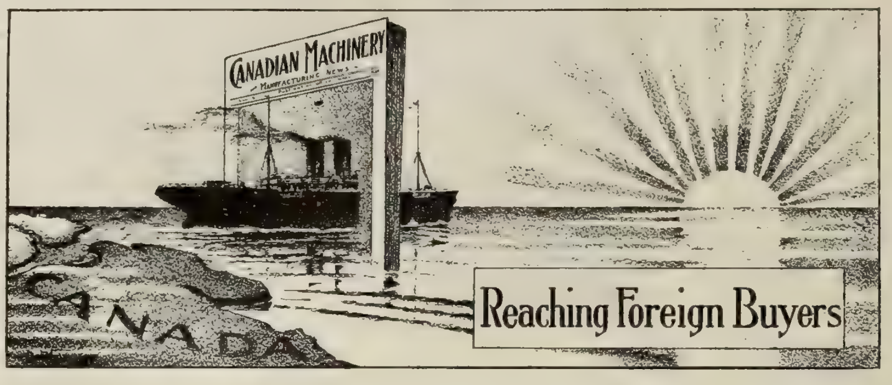
We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS
372 Pape Avenue, Toronto, Can.


CANADIAN MACHINERY
MANUFACTURING NEWS
CANADA
Reaching Foreign Buyers

Next
Export Number
November 2

Canadian Machinery
and Manufacturing News
143 University Ave., Toronto, Canada

To Investors

THOSE WHO, FROM TIME TO TIME, HAVE FUNDS REQUIRING INVESTMENT, MAY PURCHASE AT PAR

DOMINION OF CANADA DEBENTURE STOCK

IN SUMS OF $500 OR ANY MULTIPLE THEREOF.

Principal repayable 1st October, 1919.

Interest payable half-yearly, 1st April and 1st October by cheque (free of exchange at any chartered Bank in Canada) at the rate of five per cent per annum from the date of purchase.

Holders of this stock will have the privilege of surrendering at par and accrued interest, as the equivalent of cash, in payment of any allotment made under any future war loan issue in Canada other than an issue of Treasury Bills or other like short date security.

Proceeds of this stock are for war purposes only.

A commission of one-quarter of one per cent will be allowed to recognized bond and stock brokers on allotments made in respect of applications for this stock which bear their stamp.

For application forms apply to the Deputy Minister of Finance, Ottawa.

DEPARTMENT OF FINANCE, OTTAWA,
OCTOBER 7th, 1916.

Who is Your Customer ?

THE finding, holding and multiplying of customers is your great business—probably your great problem. There's no royal road—no priceless route—to them. The plain way to find, interest and persuade them is the well-traveled way, the way of Public Advertising.

But the ideal medium—what is it?

If you are seeking a single medium of potency, of prestige, of sufficient circulation, you will find it in

MACLEAN'S MAGAZINE

You know of this magazine, but do you know it through use?

It can't do everything, but it can do much. It can make your product, commodity or service known nationally—and this at small cost per annum.

N.B.—Objectionable advertising not accepted. Both editorial and advertising columns are closely censored to keep them clean and decent.

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The MacLean Publishing Co., Limited
143-153 University Avenue, Toronto, Ontario

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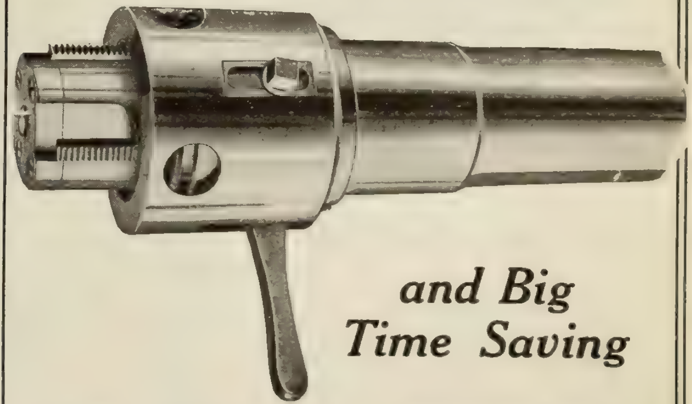


and Big Time Saving

VICTOR Collapsible TAPS

"Victor" Collapsible Taps are simple in construction: the few parts can be made large and strong; the body is machine steel, and the chasers are high-speed; screw adjustment from front end makes it easy to maintain close accuracy; trip is automatic; reset by means of lever. The above features and others—make the "Victor" a time and money saver for severe service. It is being used by many shell manufacturers.

Victor Tool Company
Waynesboro, Pa., U.S.A.

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Display rates on application.

FOR SALE

16 H.P. IDEAL GAS ENGINE — ALSO quantity of pulleys. Chipman & Millman, Brantford, Ont. (16)

6½ H.P. WESTINGHOUSE AND 1/3 H.P. Toronto & Hamilton Electric Co. 60-cycle motors, in first-class order. Geo. H. Lees & Co., Hamilton. (17)

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 227, Canadian Machinery. (15)

FOR SALE — HOT SAW AND MILLING machine, Ajax. New; never used. Address Canadian Warren Axe & Tool Co., St. Catharines, Ont.

FOR SALE—45 H.P. GAS PRODUCER AND engine, complete. Good condition. For particulars write Canadian Warren Axe & Tool Co., Ltd., St. Catharines, Ont.

BRASS RODS, 1¼, 1½, 1¾ UP TO TEN FT. Brass tubings, 2⅜ o.d., with ¼ wall; all lengths to ten feet. Louis Lovitz, 186 Markham St., Toronto. Telephone College 5711. (17)

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 226 Canadian Machinery. (15)

FOR SALE—ONE 2 H.P., 60-CYCLE CHAPman & Walker motor, single phase, 110 volts, or will exchange for a 2 H.P., 25 cycle motor, 550 volts, three-phase. Address The R. S. Bickle Company, Woodstock, Ont. (14)

For Sale Cheap

1—Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.

1 12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 3 tons capacity; complete, less the Hoist.

1 Brantford (Gas) Bake Oven and 4 Racks.

1 Lindeman 2-Spindle Boring Machine.

1 26" Drill, London Machine Tool Company.

1 Bowser 40 Gal. Varnish or Oil Pump and Tank.

11 New 1 13 16" High Speed Twist Drills, No. 5 Morse Taper Shank.

30 Used 1 13 16" High Speed Twist Drills, No. 5 Morse Taper Shank

M. BEATTY & SONS
Limited
Welland, Ont.

BUSINESS FOR SALE — MACHINE SHOP with a good, steady run of work and always busy. A good opening for a young man to get into business. Owner has other interests. Box 224, Canadian Machinery. (13)

WE CAN GIVE EARLY DELIVERY ON difficult fixture cutting, also on gauges and jigs. We have a large shop and the finest equipment. Apply Box 235, Canadian Machinery.

FOR SALE — IMMEDIATE SHIPMENT — New Heavy Duty Shell Boring Lathe for manufacture of 6" High Explosive Shells. Write for complete specification. Wm. Hamilton Co., Ltd., Peterboro, Ont. (20)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

FOR SALE.—ONE BROWN-BOGGS MARKing Machine, suitable for 6" Mark XVI. or Mark III. English Shells. Only object in selling is that other methods of marking have been adopted. Price on application. Taylor-Forbes Co., Ltd., Guelph. (14)

ONE REED TURRET LATHE, 8' BED, swing 28"; 4 2" holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 226, Canadian Machinery. (16)

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. ,Box 213, Canadian Machinery.

GAP LATHE — LONDON TOOL CO. — swings 41" in the gap, 26" over shears, 20 ft. bed, rod and screw feed, compound rest, steady rest, countershaft, 2 face plates, 4-jaw chuck, weight about 10,000 lbs. This tool has been very little used, and is in excellent condition. Bargain for quick sale. Winnipeg Machinery Exchange, Sutherland & Gladstone Sts., Winnipeg, Man. (17)

WE HAVE FOR SALE THE FOLLOWING equipment: Complete nickel and copper plating plant, including direct connected dynamo and motor; one second operation cast iron plug machine, and two first operation cast iron plug machines manufactured by the Brown Engineering Corporation; 2 16-inch turret lathes; 1 38-inch engine lathe, 20-foot bed. The above outfit will be sold en bloc or separate. Apply direct to Foundry & Machine Co., Ltd., Montreal. (13)

FOR SALE—McDOUGALL ENGINE LATHE, 20" swing, 10' bed; never been used. Baker Keyseater No. 2, good as new. Boring Mill, 2 bars, will bore up to 30" dia. Boston Forge Blower, 27", good condition. Cresent Swing Cut-off Saw, almost new. 7½ H.P. Westinghouse D.C. Motor, in good order. Gurney Platform Scale, 2,000 lb., 16" wheels. Mandrills, Couplings, Hangers, Post Boxes, Pulleys, Belting, Cap Screws, Bolts, etc. Special prices on above, write for particulars. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (14)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

SITUATIONS WANTED

TOOL MAKER IN CHARGE DESIRES change. Competent to take charge of machine shop or tool room. Good references. Box 225, Canadian Machinery. (17)

SUPERINTENDENT—FIRST-CLASS PRACtical mechanical man is open for an engagement as works manager or superintendent. Can give best of reference as to character and ability to handle help and produce results. Box 227, Canadian Machinery.

SITUATIONS VACANT

WANTED—NIGHT SUPERINTENDENT TO take charge of factory making 4.5 sockets. Apply Box 237, Canadian Machinery.

FOREMAN TOOL-MAKER WANTED — TO take charge of tool room in plant manufacturing 4.5 sockets and other munition work. Apply Box 236, Canadian Machinery.

WANTED — EXPERIENCED STEEL works draftsman for Nova Scotia. Give full particulars, including salary, permanency. Apply Box 234, Canadian Machinery. (17)

FOREMAN FOR LARGE WINNIPEG MAchine shop — must be aggressive and mechanic with good practical experience in jobbing, stock and transmission work. When applying, state age, experience and salary expected. Applications treated confidentially. Box 229, Canadian Machinery. (16)

SUPERINTENDENT FOR 4.5 SHELL FACtory all equipped and tooled for 400 to 500 shells per day. Shipping since May. Must have ability to thoroughly organize, and be capable of producing maximum results in short time, and have previous shell experience. To the right man we will pay a liberal salary and bonus. State fully (in confidence) past experience, present record and salary expected. Box 228, Canadian Machinery. (14)

WANTED

WANTED TO MANUFACTURE A FEW lines of metal products, sheet metal preferred. We have complete equipment for high-class work. Give complete description and rating in first letter. Apply Box 221, Canadian Machinery. (17)

WANTED—12" BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Aplly Box 218, Canadian Machinery.

PATENTS

PLEASE TAKE NOTICE THAT THE UNdersigned attorneys for the patentee are prepared to grant licenses, at a reasonable price, to anyone desiring to use the processes of converting fats, acids, oils, etc., described and claimed in Canadian patents Nos. 152620 and 152621, of December 16th, 1913, and the process of regenerating consumed catalysts described and claimed in Canadian patent No. 162437, of May 4th, 1915, all granted to Mose Wilbuschewitsch. They are also prepared to receive offers for the purchase of the patents. Ridout & Maybee, 59 Yonge Street, Toronto, Canada.

MOTORS

We have for Immediate Delivery:

No.	H.P.	Phase	Cycle	Volt	R.P.M.	
1	100	3	25	550	750	new
1	40	2	25	550	750	new
2	40	3	25	550	750	used
1	20	3	25	550	750	new
2	15	3	25	550	1400	new
2	10	3	25	550	750	new
2	10	3	25	550	1400	new
2	7½	3	25	550	1400	new
3	5	3	25	550	750	new
3	5	3	25	550	1400	new

We also have a number of 40 and 50 H.P. Motors, 25 cycle, 3 phase, for early delivery, about Nov. 15th.

Also one 10-ton 40-ft. span 3 motor Direct Current Crane.

The A. R. **WILLIAMS** MACHINERY CO., LIMITED
64-66 FRONT STREET WEST, TORONTO

WANTED

Seamless Steel Tubing in any Quantity. Cash Paid.

Apply Box 233, Canadian Machinery

A MAN was wanted as Tool-room Foreman. He was found by a condensed ad. in

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto

FAIRBANKS-MORSE
New and Used Machinery

In Stock at Toronto

- 1—⅞" 4-spindle National Acme Automatic; used.
- 2—No. 3 1" Foster Hand Screw Machines.
- 4—No. 4 1½" Smurr & Kamen Turret Lathes.
- 1—10" x 5' Seneca Falls Lathe; used.
- 2—18" x 8' Springfield Lathes; new.
- 5—20" x 9', 19 16" x 7', 3 16" x 9' Fairbanks-Morse Lathes; new.
- 2—No. 1 Racine Hacksaws; new.
- 1—No. 304A Oster Pipe Machine; new.
- 1—20" x 8' Hendey Lathe; used.
- 1—Gisholt 16" Special Lathe, type C, 6½ bore.
- 1—Walcott 20" x 8' Engine Lathe.
- 5—Barnes 18" x 8' Engine Lathes; new.
- 7—Potter & Johnson No. 6A Automatics; used.

In Stock at Montreal

- 3—Gisholt 16" Turret Lathes; new.
- 2—Gisholt 25" Turret Lathes; new.
- Waving and Grooving Machines, 6" shells; new.
- 1—Hendey 16" Lathe; used.
- 2—American 16" x 6' Tool Room Lathes; new.
- 1—Rivett Precision Lathe; used.
- 1—Brown & Sharpe No. 1½ Universal Mill; used. used.
- 1—Valley City No. 1½ Universal Mill; used.
- 2—Ford-Smith 26" Wet Tool Grinders; new.
- 1—Wilmarth & Morman Drill Grinder; new.
- 3—2" Back geared Drills; new.
- 1—25" Sliding Head Drill; new.
- 1—Banfield Plug Miller, 6" shells; new.

This is only a partial list of our stock of Machine Tools.

CFM

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

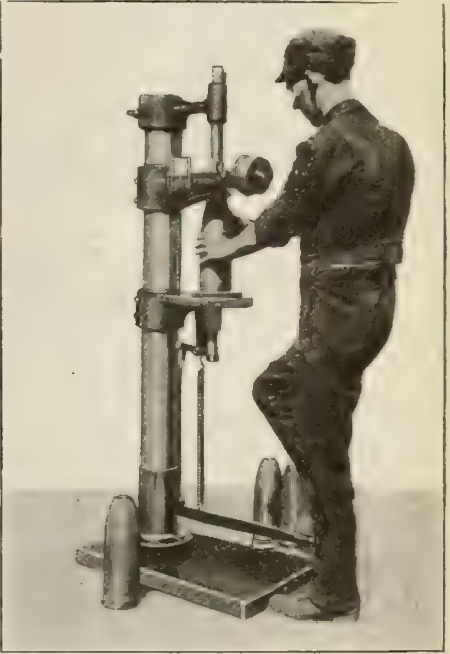
CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

MONARCH
Milling Machine
(Made in Canada)

For Milling the three slots in the nose of

Mark 7 Shells

Adjustable to take any size shell from 4.5 to 9.2 inclusive.



ONE MOVEMENT of foot lever clamps the shell and feeds the three cutters in to the right depth.

CAPACITY ON 4.5—6 to 8 shells per minute. Actual cutting time is simply -- "zip" and the three slots are finished.

THE MACHINE is complete with High Speed Cutters and drive pulleys which should run at about 550 revolutions per minute. It can be driven by three 2-inch belts, either from overhead counter or line shaft. The clamping device does not interfere with copper band, and altogether it will be found to be a very satisfactory tool—CONVENIENT and ACCURATE.

For further particulars address

H. W. PETRIE, LTD.
FRONT STREET WEST, TORONTO
Sole Selling Agents for Canada

Baird's Good Machine Tools

LATHES

1—18" x 10' Draper Engine Lathe.
2—18" x 8' Walcott Quick Change Engine Lathes.
1—17" x 7' Heavy Duty Street Engine Lathe.
1—36" Double Head Pulley Lathe.
1—14" x 6' Carroll & Jamieson Lathe.
1—16" x 8' Flathers Engine Lathe.
1—20" x 10' Walcott Quick Change Lathe.
1—14" x 10' Lodge Shipley Quick Change Lathe.

SCREW MACHINES

1—3¼" Gridley Automatic Screw Machine almost new.
1—2¼" Modern Flat Turret Lathe.
1—¾" Cleveland Automatic Screw Machine.
1—No. 53 Acme Automatic (New).
1—No. 3 Stecher Friction Back Geared Screw Machine.

MILLERS & GEAR CUTTERS

1—No. 2 Cincinnati Heavy Duty Milling Machine.
1—No. 3 Brown & Sharpe Vertical Milling Machine.
1—No. 3 Brown & Sharpe Plain Milling Machine.
1—No. 1 Farwell Gear Hobber.
1—No. 1½ Cincinnati Universal Miller.

DRILL PRESSES

2—4 Spindle Foote Burt Sensitive Drills.
1—Double Head Taylor & Fenn Sensitive with tapping attachment.
1—36" Mueller Radial Drill tapping attachment.
1—36" American High Speed Radial.
1—Allen High Speed Single Spindle.
1—Reed High Speed Single Spindle.

GRINDERS

1—No. 4 Landis Universal Grinder.
1—Greenfield Universal Tool Grinder.
1—10" x 36" Landis Plain Grinder.
1—No. 2 Modern Universal Grinder.
1—30" Gardner Disc Grinder.

W. J. BAIRD MACHINERY COMPANY

54-56 Jefferson Ave., Detroit, Mich.

High-Grade

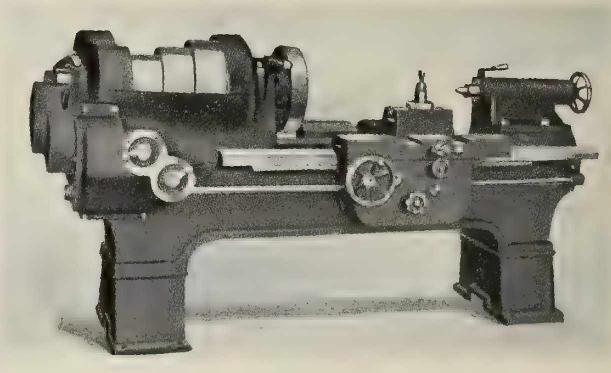
MACHINE TOOLS

The list below is a small portion of our present stock. Write for complete lists.

2—18" x 10' Rahn Mayer H.S., C.R.
18" x 10' Cincinnati H.S., C.R.
9—17" x 8' New National Quick Change.
14" x 10' Prentice Taper Attachment.
13" x 7½' Carroll Jamieson, New.
2" x 24" Jones & Lamson.
1" x 8" New Pierce Screw Machine.
¼" x 5' Bridgeport Turrett.
¼" Hartford Auto Screw Mch., with slotting attachment.
36" Baker Bros. tapping and boring drill.
36" Currie & Snyder sliding head drill.
No. 2 M. U. Garvin New Miller.
No. 210 Heald Wet Ring Grinder.
48" x 48" x 11' 6" Sellers Planer, 4 heads
42" x 42" x 10' Fitchburg Planer, 2 heads.
22" x 22" x 6' Powell Planer.
18" x 18" x 5' Pond Planer.
12—26" x 48" x 14' new style McCabe double spindle heavy pattern new lathes.
32" x 16' New Rahn Larmon D.B.G.
32" x 12' New Rahn Larmon D.B.G.
24" x 10' New Carroll Jamieson.
20" x 8' Prentice H.S., C.R., T.A.
3—19" x 8' New Sidney D.B.G. swing 21".
3—19" x 8' New Sidney D.B.G. Quick Change, swing 21".
3—17" x 8' New Sidney D.B.G. Quick Change, swing 19".
20" Cincinnati B.G. Shaper.
16" New Steptoe Shaper.

FRANK TOOMEY, INC.

127-131 North Third St., PHILADELPHIA, PA., U.S.A.



For Immediate Delivery

5 Heavy Duty, double back geared manufacturing lathes.

Machinery Department

Wm. Pattison Tool & Supply Co.

CLEVELAND, OHIO

For Sale—48" Engine Lathe

48" Enterprise compound rest engine lathe with power cross feed, gears, steady rest, faceplate, wrenches and countershaft; bed 24' long. Ready for immediate shipment, $1350.00.

Clark Machinery Co., **Cleveland, Ohio**

Long Distance is Calling!

Telegrams and Long Distance Telephone Messages are not uncommon among the replies to ads in our Classified Advertising Section.

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

Machine Tools For Sale
In Stock for Immediate Delivery

LATHES.
2 20 x 10 Hamilton (new).
1 16-24 x 8 Sebastian Gap Lathe.
1 13 x 6 Barnes.
1 9" Porter Cable Mfg. Lathe (new).
1 16 x 6 Canedy-Otto (new).
2 16 x 6 Style A Hamilton (new).

BENCH LATHES.
A variety of new and used bench lathes with collets.

BENCH MILLERS.
1 B. C. Ames (new).

PROFILER.
1—No. 14 Garvin.

HAND MILLING MACHINES.
1—No. 2 Garvin (new).
1—No. 1 Standard (new).

MILLING MACHINE.
1 No. 1 Van Norman Plain (like new).

DISC GRINDERS.
2 No. 6 x 20" Ring Diamond Disc Grinders with compound table, micrometer adjustment.
2 No. 6 x 14" Ring Diamond Grinders with table, same as above

GRINDERS
2 No. 1 Cutter and Reamer Grinders (new).

SLAB MILLER.
1 16 x 48 Bement Slab Miller.

COLD SAW.
1 9-inch Lea Simplex with saw grinder (new).

DRILL PRESSES.
1 4 Spindle Barr.
1 3-Spindle Avey.
1—36" Snyder, T.A.

SHAPERS.
1—16" G. & E.B.G.
1 14" G. & E. Plain.
1 Double Head Traveling Head Bement-Miles.

SCREW MACHINES.
2 No. 2 B. & O. (new).
1—1-inch Pierce (new .
2 1½ inch B. & O. (new).
1 No. 2½ Garvin (new).
1—No. 4 Foster.

MILLING MACHINE.
1—No. 3 B. & S. Plain

AUTOMATIC SCREW MACHINE.
1—No. 2 B. & S.

COLD ROLLED STEEL.
We have an extremely large stock of new round, flat, square and hexagon in our Rochester warehouse. Write for quotations on immediate deliveries.

STRONG & HERY CO.
225 State St. **Rochester, N.Y.**

FOR SALE

Two 70-Gallon Hydraulic Pumps for 1,500 lb. Pressure.

One 90-H.P. General Electric Co. Motor, 3-Phase, 60-cycle, 200-Volt, $700.

Two Sheldons, No. 3, Cast Iron Fans.

These machines can be seen and inspected at

National Steel Car Co., Limited
HAMILTON, CANADA

(18)

WANTED!

Any amount Brass Tubing, Sheets and Rods

Bought for Cash

Apply Box 232

CANADIAN MACHINERY

MACHINE TOOLS

LATHES.
1 68 x 20 Fifield, face plate drive, triple geared.
1 30 x 27 Reed, heavy type, with taper attachment.
1 18 x 36 x 10 Niles Extension Bed Lathe.
1 22 x 14 Engine Lathe, C.R., H.S.
1—28 x 15 Engine Lathe, C.R., H.S.
1 20" LeBlond Heavy Duty, with turret.
1 18 x 8 Jones & Lamson Engine Lathe.
2 16 x 6 Barnes Engine Lathes.
1—16 x 8 Cincinnati Engine Lathe.
1—16 x 6 Walcott Engine Lathe.
1—16 x 6 Reed Engine Lathe.
1—16 x 8 Porter Engine Lathe.
1 14 x 5 Lodge & Shipley Engine Lathe.

MILLING MACHINES.
1 No. 1½ B. & S. Universal with vertical attachment.
1—No. 3½ Fox, Plain.
1—No. 3 Chicago Hand Miller.
2—No. 12 P. & W. L.T. Millers.
4—No. 13 P. & W. L.T. Millers.
1—No. 3-H. B. & B. Vertical Miller.
1 Warner & Swasey Profiler.

GRINDERS.
1—No. 1 B. & S. Universal, with all attachments.
1—No. 1 Landis Universal.
2—12 x 36 Landis, plain, geared head.
1—No. 5 Springfield Oscillating Surface Grinder.
1—No. 2 Gardner Disc Grinder.
1—No. 34 Gardner Double Spindle Disc Grinder.
3—Webster Perks Heavy Grinders.

PLANERS.
1—Pond, 62" (widened pattern type), 9' bed.
1—36 x 26 x 10 Industrial Planer, 1 rail head and 1 side head.
1—34 x 10' Badger, S.H.

TURRET LATHES.
1—No. 6 Foster Friction Geared Hand Screw Machine.
1—No. 4 W. & S. Friction Geared Hand Screw Machine.
1—No. 4 Smurr & Kaven Friction Geared Hand Screw Machine.
1—14" B. & O. Chucking Machine.
1 No. 5 Pearson Hand Screw Machine.
1—1 x 8 Pierce Hand Screw Machine (new).
1—2" Cleveland Automatic Screw Machine (model A).
2—2" Cleveland Jigger Feed Screw Machines.
1—5/8" Cleveland Automatic Screw Machine (model A).

AIR COMPRESSORS.
Steam.
1—12 x 12 x 12¼ x 12 Ingersoll-Rand, Class M.F.I.
1—16 x 18 x 12 D. A. Union S.L. 2 S. Air Compressor.

Belt.
3 10 x 10 Bury Hor., Belt-Driven (182 C.F.).
1 10 x 10 Curtis Vertical, D.C., with base (160 C.F.).
1 8 x 8 Ingersoll Sergent Horizontal (100 C.F.).
1—8 x 8 Chicago Pneumatic Horizontal (110 C.F.).
1—10 x 6 Bury Horizontal.

DRILLS AND SLOTTERS.
1 24" Niles Geared Slotter.
1 28" Prentiss, B.G., P.F., W. & L.F.
2—20" Rockford, B.G., P.F., W. & L.F.
3 20" Buffalo (new), W. & L.F.
1—17-Spindle Moline.
1 5-Spindle Barnes.

PUNCH PRESSES.
1 No. 64 Toledo, S.S., B.G.
1—No. 95 Consolidated Press.
2—Briscoe S.S., 7" stroke.
2—1200-lb. B. & S. Roll Board Hammers.
1—800-lb. B. & S. Roll Board Hammer.

We carry a large line of Boilers, Pumps, Engines, Motors, Generators, etc.

Riverside Machinery Depot
Detroit, Mich.

Immediate Shipment

BORING MILLS

10 ft. Betts Vertical Boring Mill, two heads.
66″ Betts Vertical Boring Mill, two heads.
Binsse Horizontal Boring Mill, 3¼″ bar.
Industrial Horizontal Boring Mill, 2½″ bar.
36″ Niles Vertical Boring Mill, two heads.

DRILLS

3½ ft. Niles Plain Radial Drill.
Two 3½ ft. Gang Plain Radial Drills.
Two 2½ ft. Fosdick Plain Radial Drills.
Six 24″ Baker Bros. High Speed Drills.
4 spindle Bickford back geared Drill.
4 Spindle Barr back geared Drill.

GRINDERS

12″ x 72″ Norton Plain Cylindrical Grinder.
10″ x 30″ Norton Plain Grinder.
Three No. 1½ Landis Internal Grinders.
No. 1 Brown & Sharpe Internal Grinder.
Springfield Surface Grinder, working surface of table 17″ x 50″.
Two No. 1 Cincinnati Universal Cutter and Tool Grinders.
Two No. 3 Brown & Sharpe Universal Cutter and Reamer Grinders.
No. 2 Garvin Cutter and Reamer Grinder.

SHAPERS

30″ Morton Draw Cut Shaper.
24″ Steptoe Shaper.
22″ Steptoe Shaper.
20″ Steptoe Shaper.
24″ Hendey Shaper.
16″ Smith & Mills Shaper.
16″ Juengst Shaper.
14″ Sellers Traveling Head Shaper.

PLANER

44″ x 44″ x 16′ Niles Planer, two heads.
44″ x 42″ x 17′ Betts Planer, two heads.
42″ x 42″ x 13′ Sellers Planer, two heads.
36″ x 36″ x 12′ Chandler heavy duty Planer; weight 35,000 lbs.
30″ x 30″ x 12′ Detrick & Harvey open-side Planer, three heads.
28″ x 28″ x 7′ 6″ Putnam Planer.
24″ x 24″ x 4′ Wright Planer.
18″ x 18″ x 36″ Wheeler Planer.
16″ x 16″ x 36″ Pease Planer.

SCREW MACHINES

1⅜″ National Acme 4 spindle Automatic Screw Machine
1″ National Acme 4 spindle Automatic Screw Machine.

New York Machinery Exchange

Offices: 50 Church St., NEW YORK

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The Motch & Merryweather Machinery Co.

707-715 Lakeside Ave. N.W., Cleveland, O.
Branches: Detroit, Cincinnati, Pittsburgh

AUTOMATICS.

2—2″ Cleveland Modern.
No. 56 National Acme.
14″ Fay Automatic Lathe.
2—No. 2 Brown & Sharpe.

BORING MILLS.

60″ Niles Vertical.
2½ Bar 36″ Niles Horizontal.
2—No. 2 Baker Cylinder Borer.

DRILL PRESSES.

4′ Prentiss Gear Box Radial.
4′ Baush Radial.
40″ Aurora Sliding Head Upright.
24″ Cincinnati Sliding Head Upright.
2—Quint Turret Head.
8-Spindle Fox Round Head.

GEAR CUTTERS.

2—No. 3 26″ x 8″ Brown & Sharpe.
36″ Flather.
50″ G. E. Spur and Bevel; old.
2—5″ Bilgrim.

GRINDERS.

No. 1½ Bath Universal.
10 x 50 Norton.
14 x 50 Norton.
14 x 72 Norton.
No. 6 Modern Arranged Internal.
No. 6A Bryant Internal.
Springfield Brandis Surface Motor Drive.
No. 12 Gardner Disc.
No. 2 Leland & Faulker Wet Tool.
Polishing and Buffing Stands.

HAMMERS.

2000-pound Chambersburgh Steam.
800-pound Morgan Williams.
36 William White Justice Tire Welder.
500-pound Chambersburgh.
No. 0 Baker.

KEYSEATERS.

2—No. 2 Baker.
No. 3 Mitts & Merrill and equipment.
18″ x 1½ Morton.

LATHES.

11—18″ x 8′ Davis, 3-Step Cone, D.B.G., C.R., Semi-Q.C.
7—26″ x 12′, 3-Step Cone, D.B.G., Q.C. Bridgeford Standard Engine.
18″ x 12′ L. & S., Patent Head.
18″ x 10′ Bradford.
2—18″ x 8′ Hamilton.
13″ x 5′ American Turret on Shear.
16″ x 6′ Blaisdell, R.F. Rest.
6—14″ x 6′ Fay & Scott; new.
22″ x 14″ Davenport; new.
Tindel-Morris Crankshaft Lathe.

MILLING MACHINES.

No. 3 Brown & Sharpe Plain.
No. 4 Brown & Sharpe Plain.
No. 2a Becker, Circular Tables.
Pratt & Whitney Spline.
No. 6 Whitney Hand.

PLANERS.

48″ x 48″ x 12′ Hewes-Phillips, 2 H.
24″ x 24″ x 6′ Cincinnati, 1 Rail Head.
24″ x 24″ x 6′ Gray, 1 Rail Head.
26″ x 26″ x 10′ Gray, 1 Rail.

PRESSES.

Long & Alstatter, D. End, 1″ Punch.
6″ x 6″ x 1″ Angle Shear.
No. 5 Buffalo Forge Hand Shear.

SCREW MACHINES.

4½″ x 36″ Bardons & Oliver, M. Drive.
1⅛ Bardons & Oliver, No W.F.
1″ Foster Kimbill, No W.F.
⅞ Garvin, No W.F.
1″ Warner & Swasey.

TURRET LATHES.

7—24″ Gisholt, 6¼ hole, 1 year old.
4—24″ Gisholt, 5¼ hole, 1 year old.
5—21″ Gisholt, 2⅝ hole, 1 year old.
22″ Libby.
3—36″ Pratt & Whitney Flat.
3—36″ J. & L.
2″ x 24″ J. & L. Bar.

TAPPING MACHINES.

7″ Baker.
No. 2 Garvin.

MISCELLANEOUS.

Rockford Fly Wheel Balancing Machine.
72″ Niagara Folder.

Immediate Delivery

NEW STEAM ENGINES

Two 5 x 6 Vertical steam engines, 8 horse	$105.00	each
Two 6 x 6 Vertical steam engines, 10 horse	125.00	"
One 7 x 8 Vertical steam engine, 15 horse	175.00	
One 8 x 8 Vertical steam engine, 20 horse	200.00	
Two 4 x 6 Horizontal steam engines, 6 horse, with base	100.00	"
One 5 x 6 Horizontal steam engine, 8 horse, with base	125.00	
Five 6 x 6 Horizontal steam engines, 10 horse, with base	135.00	"
Five 6 stroke engines, with base, 10-15 H.P.	150.00	"
Two 6 x 6 Automatic, with base, 12-20 H.P.	250.00	"
Two 7 x 6 Automatics, with base, 15-25 H.P.	275.00	"
One 8 x 8 Automatic, with base, 20-42 H.P.	500.00	
One 10 x 10 Automatic, with base, 39-82 H.P.	700.00	
One 11 x 10 Automatic, with base, 47-85 H.P.	725.00	

YOUNG, CORLEY & DOLAN, Inc.
115 Broadway, NEW YORK CITY
Telephone: Rector 7866

(tf)

DOMINION MACHINERY CO. TORONTO

We Are Going to Build

Our Warehouse has to Come Down

Here's Your Opportunity

Twelve New Motors at Bargain Prices
Sizes 3 to 20 H.P.

25 cycle, 3 phase, 550 and 220 volt,
700 and 1400 R.P.M.

We have twelve motors in stock which must be moved in the next thirty days and we will dispose of same at prices that CAN'T BE BEATEN. WRITE QUICK.

Dominion Machinery Company

Toronto, Ontario, Canada

OFFICE: **110 Church Street**
FACTORY: **14 Darling Avenue**

Used Machinery for Immediate Delivery

BORING MILLS.

51" Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52" Niles Car Wheel Boring Mill.

DRILLS

22" Aurora, S.H., B.G., P.F.
24" Hamilton, B.G., P.F.
32" Hamilton, S.H., B.G., P.F.
32" Hoefer, S.H., B.G., P.F.
34" Barnes, S.H., B.G., P.F.
2½' Dreses Radial.
3½' Industrial Radial.
12 spindle Multiple.
No. 30 C Baush, 12 spindles.

GEAR CUTTERS

24" x 7" G. & E., for spur.
30" x 9" G. & E., spur and bevel.
36" Walcott, for spur.

GRINDERS

No. 5 Diamond Water Tool.
14" x 20" B. & S. Universal.
Gisholt Tool Grinder.

LATHES

12" x 5' Davis, C.R.
14" x 6' LeBlond, C.R., taper.
14" x 6' Porter, C.R.
14" x 6' Rockford, C.R.
14" x 6' Fairbanks, C.R., taper.
15" x 6' Goddard, C.R., taper.
16" x 6' Prentice, C.R.
16" x 6' Sebastian, C.R.
16" x 6' Walcott, C.R.
16" x 8' Lodge & Shipley Pat. Head, C.R., Q.C.G.
16" x 10' Greaves & Klusman, C.R.
17" x 10' Blaisdell, C.R.
18" x 6' Bradford, C.R. taper.
18" x 8' Lodge & Shipley, Pat. Head, C.R. taper.
18" x 8' Bradford, C.R. with turret.
18" x 12' Greaves & Klusman, C.R.
20" x 10' Flather, C.R.
21" x 12' New Haven, C.R.
24" x 16' Schumacher & Boye, C.R.
30" x 14' Reed, C.R.
32" x 16' Blaisdell, C.R.
36" x 12' American, C.R.
36" x 28' American, C.R.

MILLING MACHINES

No. 12 B. & S., plain.
No. 2 Cincinnati, plain.
No. 3 Brown & Sharpe, plain.
No. 4 LeBlond, plain.
No. 13 P. & W., Lincoln.
No. 4 Becker Vertical.

PLANERS

Morton Portable.
22" x 22" x 6' Gray, one head.
24" x 24" x 6' Cincinnati, one head.
30" x 30" x 12' Cincinnati, two heads.
36" x 36" x 12' Powell, one head, arranged for two.
36" x 36" x 12' Cincinnati, two heads.
36" x 36" x 16' Sellers, one head.
39" x 39" x 12' New Haven, one head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.

SCREW MACHINES

No. 1 Chicago Automatic.
1 3/16" Hartford Automatic.
2" Cleveland Automatic.
2¾" Cleveland Automatic.
1" B. & S. Plain.
16" P. & W. Plain.

PRESSES

No. 30 A. Perkins, O.B., Inc.
No. 6 N. American Can. S.S.
No. 174 Consolidated Double Crank.
No. 25 Toledo, O.B., Inc., Cam Drawing.

MISCELLANEOUS

24" Gisholt Turrett Lathe, capacity 6¼".
Allan 2-spindle drill press (new).
Allan 4-spindle drill press (new).
No. 2 Baker Keyseater.
Whitton Centering Machine.
1½" Acme Bolt Cutter.

Write for our stock list.

The H. A. Stocker Machinery Company, **566-572 W. Randolph St., CHICAGO, ILL.**

FOR SALE

GRINDING MACHINES
1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10″ x 36″ Landis Plain Grinder (new).
1 10″ x 20″ Landis Plain Grinder.
2 12″ x 24″ Modern Plain Grinders (nearly new).
1 14″ x 50″ Norton Plain Grinder (nearly new).
2 18″ - 30″ x 96″ Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16″ x 66″ Landis Crank Shaft Grinder (18 months old).
2 14″ Swing Special Internal Grinders, capacity ½″ to 14″ dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES
58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13″ Gisholt Semi-Automatic (12 mos. old).
20 21″ Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES
1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72″ table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES
1 8-spindle Bausch Multiple, 1″ capacity.
1 12″ Spindle Garden ½″ capacity.
6 Barnes 24″ 2-spindle All Gear Drive (new).
1 24″ Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26″ Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14″ swing, ¾″ capacity.
2 Peerless 20″ (new).
1 20″ Mechanics (new).
1 20″ Buffalo (new).
1 28″ Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25″ Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾″ x 14″ flute, 21″ over-all (new).

RADIAL DRILLS
1 36″ Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES
38 16″ x 8′ Fairbanks-Morse (new).
1 18″ - 36″ x 8′ Fay & Scott Extension Gap (fine condition).
1 30″ x 12′ LeBlond.
1 12″ x 6′ American.
1 28″ x 14′ Fifield.
1 14″ x 4′ Blaisdell.
1 No. 4½ Barnes.
1 54″ x 21′ Detrick & Harvey.
1 26″ x 10′ Bradford.

MARKING MACHINES
2 Noble & Westbrook No. 1 (new).

PROFILERS
1 No. 3H Becker (new).

PLANERS
1 30″ x 30″ x 10′ Ohio with two heads (new).
1 44″ x 44″ x 12′ L W Pond with three heads.
1 40″ x 40″ x 12′ New Haven, with one or two heads.
1 36″ x 36″ x 12′ Sellers widened to 72″.

AUTOMATIC GEAR CUTTERS
1 No. 3 Brown & Sharpe 26″ (old machine).
1 36″ x 4″ Fellows Gear Shaper (fine condition).
1 18″ Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES
1 4″ Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20″ inserted tooth blades (new).

BELT LACING MACHINES
1 12″ Jackson (new).

KEY SEATERS
1 No. 1 Catlin (new).

SCREW MACHINES
1 No. 3 Stecher (new).
1 1″ x 8″ Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜″ capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2″ x 24″ Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼″ capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES
1 No. 3 La Pointe (nearly new).

BOLT CUTTERS
1 2″ Landis Double Head (nearly new).

BORING AND TURNING MACHINES
1 4′ Bickford Boring & Turning Mill (nearly new).
1 20″ swing 4-Spindle Moline Vertical Boring Machine with 18″ x 36″ table.

BULLDOZERS
1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES
1 Large Filing and Sawing Machine with 12″ stroke.

PUNCHES AND SHEARS
1 No. 3 Walsh Punch Press.
1 Moser 1½″ stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8″ throat capacity ¼″ x ¼″.
1 27½″ throat lever punch ½″ capacity 1¼″ stroke.
1 Thompson Bevel Shear ½″ capacity.

PIPE MACHINES
1 6″ Saunders.

SHAPERS
1 14″ Hendey Geared Friction.
1 20″ Hendey Geared Friction.

TAPPING MACHINES
1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2″ collapsible taps (new).

THREAD ROLLING MACHINES
1 Waterbury Farrell ⅜″ capacity (nearly new).

THREADING MACHINES
5 Special Threading Machines for threading 3″ steel shells (nearly new).

SPOT WELDERS
1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

Write us what you want new or second-hand.

32 North Clinton Street, Chicago

W. F. Davis Machine Tool Co.

403 Singer Building, New York City

MACHINE TOOLS NEW AND REBUILT

NEW MACHINERY

6—17 x 8 Semi-Quick Change Gear National Lathes. In stock.
10 12 x 6 Seneca Falls Lathes, quick change gear. In stock.
10—16 x 6 Canedy-Otto Lathes. October delivery.
3 -18 x 8 Cisco Lathes, quick change gear. In stock.
1 -13 x 5 South Bend Lathe. In stock.
1 -14 x 6 Carroll-Jamison Lathe, Q.C.G., taper attach., relieving attach., draw-in collets, pan bed, October delivery.
2 --1½ American Plain Milling Machines, October delivery.
-No. 1 Dow Milling Machines, Plain, October delivery.
-No. 1 Bickford Hand Milling Machines. Stock.
2 No. 1 Standard Hand Milling Machines. Stock.
No. 24 Heavy Oesterlein Plain Milling Machine. Stock.
No. 1½ Valley City Universal Milling Machine. October delivery.
No. 1½ Plain Valley City Milling Machine. October delivery.
No. 3 Kempsmith Plain Milling Machine, October delivery.
1 No. 34 Heavy Oesterlein Plain Milling Machine. October delivery.
10—No. 6 Standard Universal Tool and Cutter Grinders. Stock.
-No. 1 Wilmarth & Morman Surface Grinders. Stock.
1—Style W. P. L. Wilmarth-Morman Drill Grinder. Stock.

This is a few of our special opportunities. Complete list for the asking.

REBUILT MACHINERY

MILLERS.
12 -Pratt & Whitney Lincoln Type Millers, perfect condition.
2--No. 7 Becker-Brainard Lincoln Type Millers, like new.
1 —No. 32 Kempsmith Lincoln Type Miller.
1 -Newton Vertical Miller, circular table.
1 -No. 15 Garvin Plain Miller, with index head.
1 No. 2 Cincinnati U. Miller, complete.

SHAPERS.
1 24-in. Gould & Eberhardt Shaper.
1 28-in. Ohio Shaper, good as new.

BORING MILLS.
1 36-in. Bickford Boring Mill, single pulley drive.
3 60-in. Sellers Boring Mills.

TURRET LATHES.
1 Pratt & Whitney, 7 3[illegible] in. Hole, cut-off slide.
20 No. 2 Warner & Swasey power feed to turret, used three months.
1 Potter & Johnson semi-aut. [illegible] in. H.S.
1 Davis Turret Lathe complete.
9--2¼-in. Bardon & Oliver, power feed to turret.
4 -No. 9 Bardon & Oliver, power feed to turret, cut-off slide.

PLANERS.
1 24 x 24 x 6 Lathe-Morse Planer, univ. Milling head.
1 -24 x 24 x 6 Gray Planer, excellent condition.
1—30 x 30 x 7 Flather High Duty.
1—30 x 30 x 8 Pond Extra Heavy type.
1—60 x 60 x 12 Potts Solid bed, 3 heads.
1-54 x 54 x 16 Sellers Solid bed, 3 heads.

GRINDERS.
3 -Bridgeport Shell Grinders.
1 10 x 36 Landis Plain Self-Contained.

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ALBANY N.Y. U.S.A.
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MACHINERY

Simmons Machine Company, Inc.

903 Singer Building,
New York City

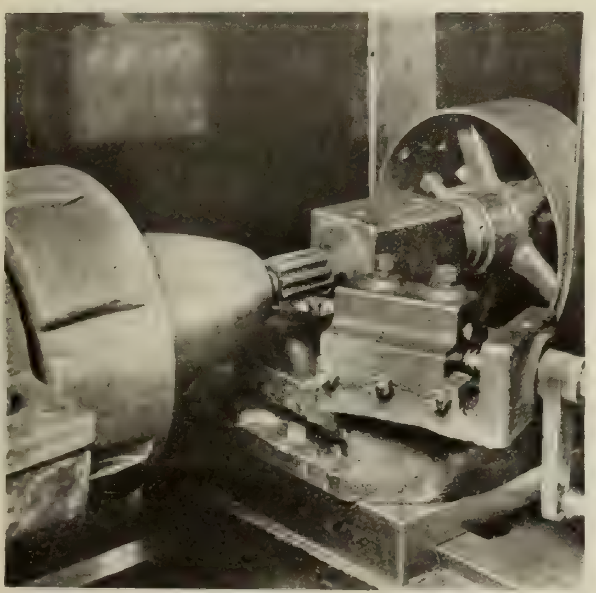
989 Broadway,
Albany, N.Y.

4.5 Mark VII Plant For Sale

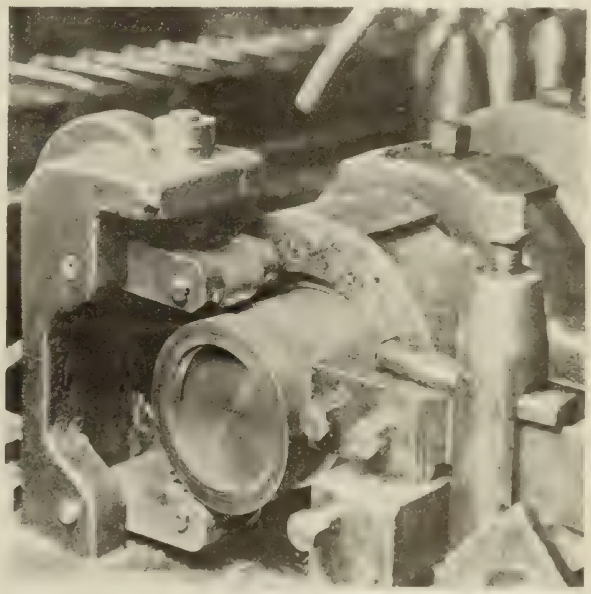
Immediate Delivery

The following machines have been changed from the mark V shell to the mark VII. We will dispose of these machines with their tooling. Every machine has been examined and put into first-class shape.

2—30" American Turret Lathes, Triple Geared; 36" turret base; will take both 3" and 4" boring bars; extension heads on turrets; special small turret or cross-slide with six 1½" holes; 20" 3 jaw Universal steel chucks; Power Feed and Power Reverse. All tooled, boring bars, pot chuck, etc., each	$1300
2—24" Morse Turret Lathes; with 3-jaw Universal chuck; 16" base turret having six 3" holes. All tooled, with pot chuck, for hogging-out base of Mark VII. shell, each	$800
1—Jenckes Band Turning Machine; collet chuck. This machine has band-turned about 15,000 shells. All tooled for Mark VII. shells	$900
1—24" x 12 Bertram Engine Lathe, all tooled with special milling fixture for threading the base recess of Mark VII. shell	$900
1—24" Morse Special Turret Lathe; carriage feed; all tooled with pot chuck and forming tool for finish base recess of Mark VII. shell, each	$900
1—Special Painting Machine, with 110 volt alternating current motor	$50
1—150-ton Hydraulic Nosing Outfit, consisting of 1 Triple Action Pump (Perrin); 1 Accumulator (Perrin); 1 Nosing Press (Perrin), with Mark VII. die complete; 1 Chapman Banding Attachment for Press	$1075



The only correct time to perform the seating operation is to do it in the same fixture with the milling operation This fixture will fit any engine lathes, and costs only $120.00, including milling, cutter and seating tool. The angle of seating can never vary.



Most of the British Shells may now be knurled. This fixture is quick in operation and most accurate. The cost is only $100.00, and it can be used as an attachment to almost any lathe.

We have all gauges for both Mark V and Mark VII Shells, consisting of plug, length, outside diameter, form, thread and seating gauges.

Our Nosing Die Outfit is the best for the Mark VII shell. Leading manufacturers, such as P. L. Robertson Co., Milton; Wilford & Co., Lindsay; Manitoba Engines, Ltd., Brandon; Canadian Westinghouse, Hamilton; Vancouver Engineering Works; Vulcan Iron Works; Otis Fenson Elevator, etc., are using our dies.

Toronto Type Foundry Company, Limited

50 Coleman Avenue, TORONTO, ONT.

HINTS TO BUYERS

FOR YOUR
HARDENING BATHS

Too much depends on the accuracy and uniformity of your hardening baths to run risks without pyrometers.

BRISTOL'S
ELECTRIC PYROMETERS

are accurate, dependable and inexpensive. The pioneer pyrometer for shop use. Equipped with high-grade Weston movements. Write for Bulletin I. 205.

THE BRISTOL CO., Waterbury, Conn., U.S.A.
Branch Offices:
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The Asa S. Cook Company
HARTFORD, CONN.

Rivet Machines
WITH
Absolutely Accurate Automatic Feed

In sizes to work blanks up to 6 inches long, 7/16 in. diameter stock. Capacity from 80 to 200 rivets per minute, according to size.

WRITE FOR COMPLETE PARTICULARS.

Eliminate All Guesswork

Make sure you are getting the quality and standard you are paying for. Our International Bureau of Inspection, Tests and Consultations is at your disposal.

CANADIAN INSPECTION AND TESTING LABORATORIES, LIMITED
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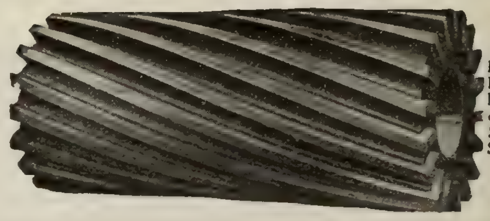
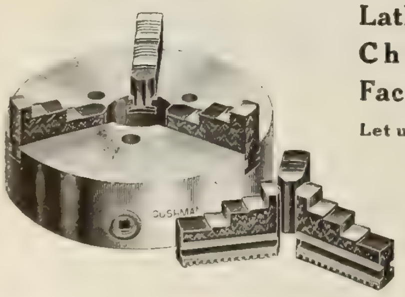
Taylor-Newbold Milling Cutters



Fast Cutting
Powerful
Inserted Helical Blades of High-Speed Steel

THE HEIGHT OF EFFICIENCY, MADE IN 4" DIAMETER FOR GENERAL MACHINE SHOP USE
Write for Bulletin R-P
THE TABOR MANUFACTURING COMPANY
PHILADELPHIA, PA., U.S.A.

Cushman Chucks



Lathe Chucks, Drill Chucks, Portable Face Plate Jaws.
Let us send you our catalog.

The Cushman Chuck Co.
Hartford, Conn., U.S.A.

RIVETED STEEL TANKS FOR EVERY PURPOSE

THE TORONTO IRON WORKS
LIMITED
TORONTO ONT.

OIL STORAGE - GASOLINE TANKS - AIR RECEIVERS
PNEUMATIC WATER SUPPLY TANKS - SMOKE STACKS
BOILER BREECHING - RIVETED STEEL PIPE - BINS & HOPPERS

NORTHERN CRANE WORKS, Limited
WALKERVILLE, ONT.
BUY IN CANADA!

NORTHERN CRANES
ELECTRIC AND HAND POWER
ALL SIZES, CAPACITIES AND TYPES.
ALSO ELECTRIC AND AIR HOISTS
Foundry Equipment—Cupolas, Ladles, Etc.

Allen Safety Set Screws

Made by a patent process which increases the strength of the metal over 30%.

All sizes from ¼" to 1" carried in stock by Williams & Wilson, Montreal, Canada.

THE ALLEN MFG. CO.
Hartford, Conn., U.S.A., and 173 Princess St., Manchester, England

HIGH CARBON STRUCTURAL
STEEL TUBING
BUTTED & BRAZED
BENDS & SHAPES

SHEET METAL STAMPINGS

CANADIAN METAL PRODUCTS. Limited,
GUELPH, ONTARIO

MALLEABLE, GREY IRON, ALUMINUM AND BRASS CASTINGS

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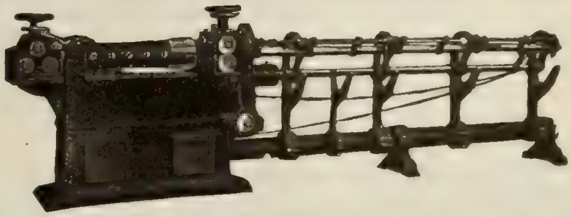

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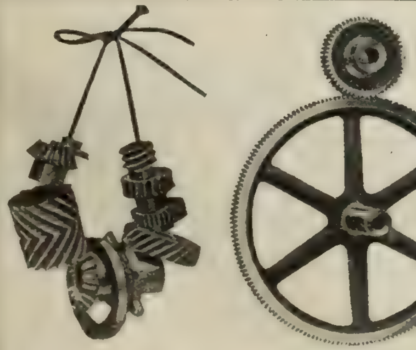

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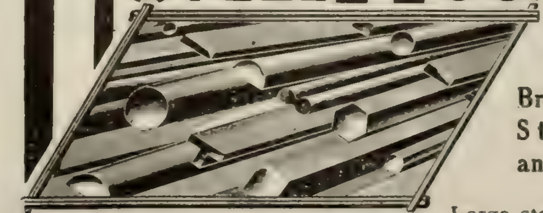

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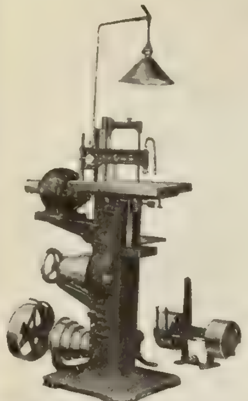

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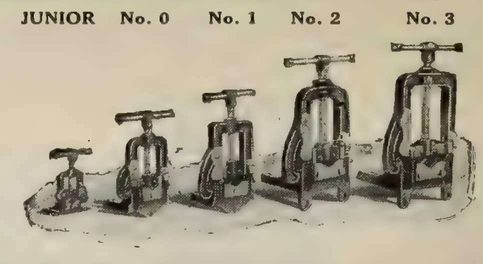

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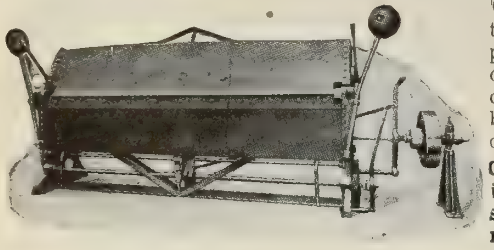

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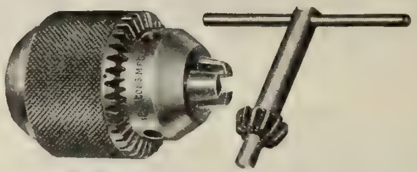

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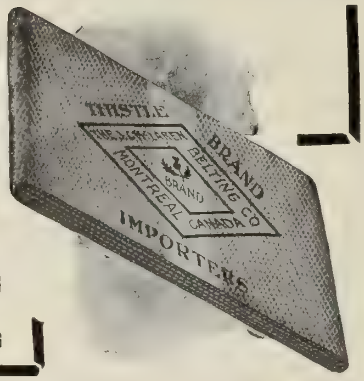

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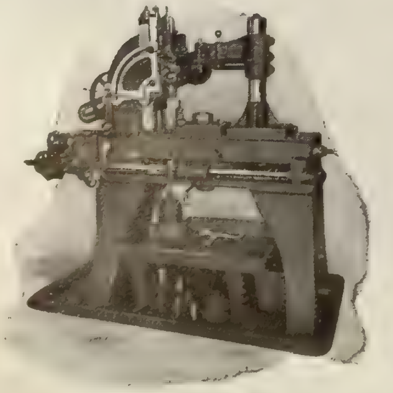

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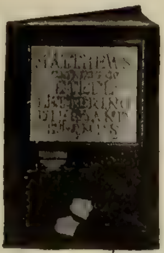

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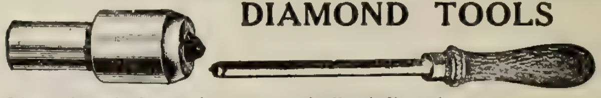

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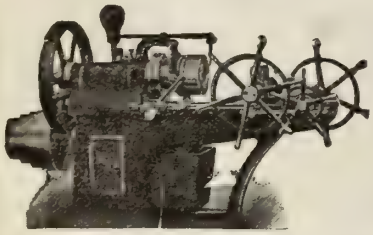

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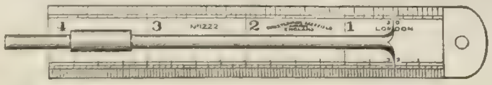

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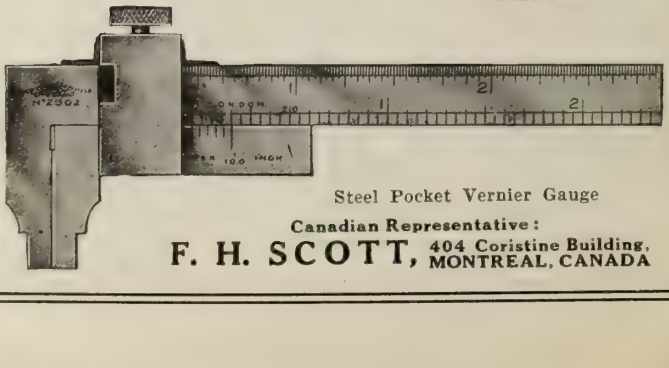

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Plessisville Foundry Co., Plessisville, Que.

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Dominion Steel Foundry Co., Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Wm. Kennedy & Sons, Ltd., Owen Sound.
Galt Malleable Iron Co., Galt.
Ontario Specialties, Ltd., Ottawa, Can.

CASTINGS, MALLEABLE.

Can. Steel Foundries, Ltd., Montreal, Que.
Galt Malleable Iron Co., Galt.

CASTINGS, NICKEL STEEL.

Hull Iron & Steel Foundries, Ltd., Hull, Quebec.

CEMENT, IRON.

Shelton Metallic Filler Co., Derby, O.

CEMENT MACHINERY.

Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son, Montreal.
H. W. Petrie, Toronto.

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Wells Brothers Co., Greenfield, Mass.
John Bertram & Sons Co., Dundas.
Gardner, Robt., & Son, Montreal.
Hurlbut, Rogers Machy. Co., South Sudbury, Mass.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.

CHAIN BLOCKS.

Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Foss & Hill Machy. Co., Montreal.
Lyman Tube & Supply Co., Montreal, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

CHEMISTS.

Can. Inspection & Testing Lab., Montreal, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Toronto Testing Laboratory, Ltd., Toronto.

CHUCKS, AERO, AUTOMATIC.

Garvin Machine Co., New York.

CHUCKS, DRILL, LATHE AND UNIVERSAL.

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Can. Blower & Forge Co., Berlin, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Celfor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Cushman Chuck Co., Hartford, Conn.
Detroit Pneumatic Chuck Co., Detroit, Mich.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford.
Manufacturers Equipment Co., Chicago, Ill.
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McCrosky Reamer Co., Meadville, Pa.
Modern Tool Co., Erie, Pa.
Montreal General Tool Co., Montreal, Que.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Skinner Chuck Co., New Britain, Conn.
Thomas Elevator Co., Chicago, Ill.
D. E. Whiton Machine Co., New London, Conn.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS.

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Aikenhead Hardware Co., Toronto, Ont.

CHUCKS, FRICTION AND TAP

Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, RING WHEEL.

Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

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Garvin Machine Co., New York.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Turner Machine Co., Danbury, Conn.
Warner & Swasey Co., Cleveland, O.

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Positive Clutch & Pulley Works, Ltd., Toronto.

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Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

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Hanna & Co., M. A., Cleveland, O.
Zenith Steel & Coal Products, Montreal, Que.

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Sheldons, Limited, Galt.

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McCrosky Reamer Co., Meadville, Pa.
Stone Tool & Supply Co., J. R., Detroit, Mich.

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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Smart-Turner Machine Co., The, Hamilton.
Wickes Brothers, Saginaw, Mich.

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Darling Bros., Ltd., Montreal, Que.

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Lachapelle, J. D., & Co., Montreal, Que.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
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Whiting Foundry Equipment Co., Harvey, Ill.

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John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

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Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.

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Baird Machine Co., Bridgeport, Conn.
Webber Bros. Mach. Co., Toronto, Ont.

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Independent Pneumatic Tool Co., Chicago, Ill.

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Northern Crane Works, Walkerville.

CRANES, GANTRY.

Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, GOLIATH AND PNEUMATIC

Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

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Northern Crane Works, Walkerville.
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Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

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Graton & Knight Mfg. Co., Montreal.

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Northern Crane Works, Walkerville.
H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

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Cleveland Twist Drill Co., Cleveland.
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Foss & Hill Machinery Co., Montreal.
Garvin Machine Co., New York.
Morse Twist Drill and Machine Co., New Bedford.
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H. W. Petrie, Toronto.
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Garvin Machine Co., New York.
Hurlbut, Rogers Machy. Co., South Sudbury, Mass.
John H. Hall & Sons, Brantford, Ont.
Wm. Kennedy & Sons, Owen Sound, Ont.
Peerless Machine Co., Racine, Wis.
H. W. Petrie, Ltd., Montreal.
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Pratt & Whitney Co., Dundas, Ont.
Racine Tool & Machine Co., Racine, Wis.
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Gardner, Robt., & Son, Montreal.
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Modern Tool Co., Erie, Pa.
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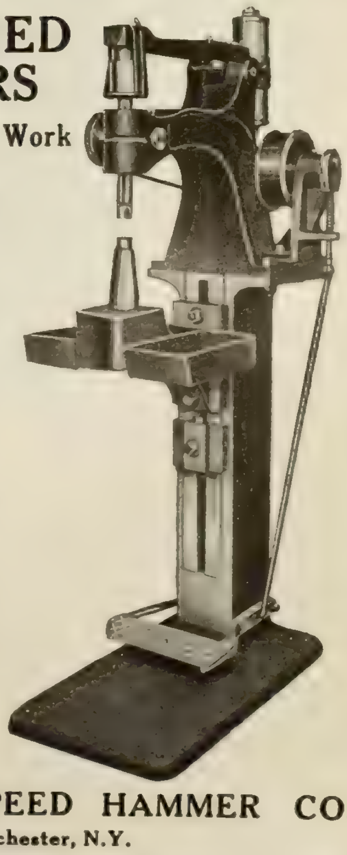

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Can. Fairbanks-Morse Co., Montreal.
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Cleveland Power Transmission Co., Cleveland, O.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill and Machine Co., New Bedford.
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Baird Machine Co., Bridgeport, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Toronto.

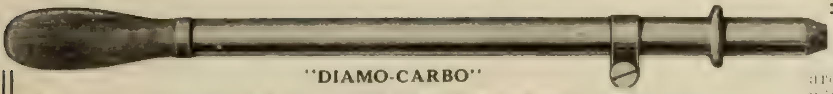
FRICTION LEATHERS
Graton & Knight Mfg. Co., Montreal.

FURNACES, ANNEALING, ETC.
Can. Hoskins, Ltd., Walkerville, Ont.
Lachapelle, J. D., & Co., Montreal, Que.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

FURNACES, BLAST
Toronto Iron Works, Ltd., Toronto.

FURNACES, BRASS, MALLEABLE
Whiting Foundry Equipment Co., Harvey, Il.

FURNACES, HEAT TREATING, HARDENING AND TEMPERING
Northern Crane Works, Ltd., Walkerville, Ont.



"DIAMO-CARBO"

You can make your dull or coated grinding wheels like new in efficiency by dressing them with

DESMOND-STEPHAN
GRINDING WHEEL DRESSERS

and you will eliminate delayed production and lost time, due to the loss of their cutting properties.

Insist upon having your dealer supply you with one of our tools for trial. If he cannot, write us, and we will send any of them on approval.

The Canadian Desmond-Stephan Mfg. Company
HAMILTON, ONTARIO

Our **"Diamo-Carbo"** Dressers are the economical substitute for the Black Diamond Dressers. They are so low priced that each grinding stand may be provided with its own dresser.

Our **"Sherman Huntington"** Dressers are for use on large and coarse wheels upon which the Diamond cannot be used. It is the most satisfactory Dresser ever designed.

"SHERMAN-HUNTINGTON"

Alfred Herbert, Ltd., Coventry, Agents for Great Britain.

Don't Keep It--Sell It!

If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor

or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY
Classified Advertising Section
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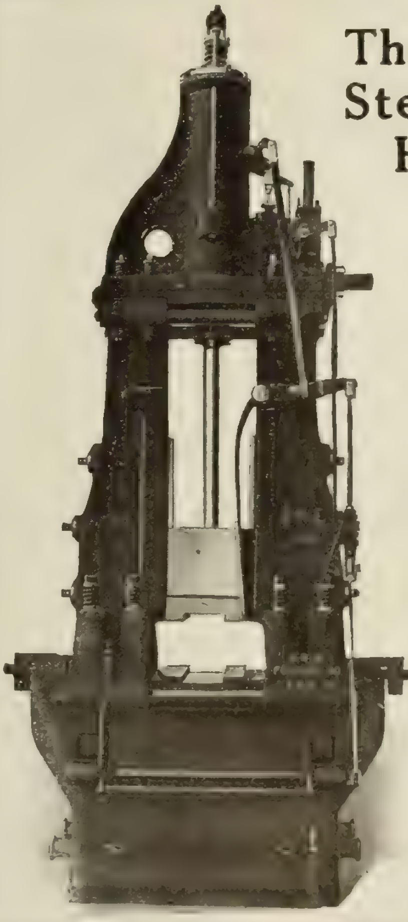

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A list will be supplied upon request.

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Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

Erie Foundry Co.
ERIE, PA.

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NEW HAVEN, CONN.

"CRAWFORD SECTIONAL" OVENS
Heated with our Enclosed Flame Gas Burners, or Electricity
FOR BAKING JAPANS AND OTHER FINISHES ON METAL.

Ovens carried in stock and built to meet requirements of manufacturers.

Builders of All-Steel Oven Trucks with Roller Bearings.

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GALVANIZING MACHINERY
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Armstrong Bros. Tool Co., Chicago.

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Sheldons, Limited, Galt.

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GAS PRODUCER PLANTS
Can. Fairbanks-Morse Co., Montreal

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Charles F. Elmes Eng. Works, Chicago

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Brown Engineering Corp., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Foundry & Mach. Co., Montreal, Que.
Garvin Machine Co., New York.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Hartford, Conn.
Stenotype Co., Indianapolis, Ind.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

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H. W. Petrie, Toronto.
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D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.

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Hamilton Gear & Machine Co., Toronto.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
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Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.

GEARS, RAWHIDE
Hamilton Gear & Machine Co., Toronto.
Gardner, Robt. & Son, Montreal.
Grant Gear Works, Boston, Mass.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.

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Dominion Machinery Co., Toronto.
Lancashire Dynamo & Motor Co., Toronto.
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H. W. Petrie, Toronto.
Wickes Brothers, Saginaw, Mich.
A. R. Williams Machy Co., Toronto.

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Norton Co., Worcester, Mass.

GRAPHITE
Aikenhead Hardware Co., Toronto, Ont.

GRAVITY CARRIERS
Can. Matthews Gravity Carrier Co., Toronto, Ont.

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Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.

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Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Gray Mfg. & Machine Co., Toronto.
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Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford
New Britain Machine Co., New Britain, Conn
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
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United States Electrical Tool Co., Cincinnati, O.

GRINDERS, CUTTER
Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Pratt & Whitney Co., Dundas, Ont.

GRINDERS, DIE CHASER
Bignall & Keeler Mfg. Co., Edwardsville, Ill
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

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Aikenhead Hardware Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
United States Electric Tool Co., Cincinnati, O.

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Foss & Hill Machy Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Greenfield Machine Co., Greenfield, Mass.
Modern Tool Co., Erie, Pa.
R. E. T. Pringle, Ltd., Toronto, Ont.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.

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Brown & Sharpe Mfg. Co., Providence, R.I.
Dominion Machy. Co., Toronto, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Greenfield Machine Co., Greenfield, Mass.
Norton Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
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Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Greenfield Machine Co., Greenfield, Mass.
H. W. Petrie, Ltd., Montreal.
Tabor Mfg. Co., Philadelphia, Pa.

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Pratt & Whitney Co., Dundas, Ont.
Stenotype Co., Indianapolis, Ind.

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Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
Niles-Bement-Pond Co., New York.
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H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.

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Foss & Hill Machy. Co., Montreal.
Norton Co., Worcester, Mass.
H. W. Petrie, Toronto.

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Dennis Wire & Iron Works, London, Canada.
Ford-Smith Mach. Co., Hamilton, Ont.
New Britain Mach. Co., New Britain, Conn.

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Boker & Co., H., Montreal, Que.
Diamond Saw & Stamping Works, Buffalo, N.Y.
Foss & Hill Machy. Co., Montreal.
H. W. Petrie, Ltd., Montreal.
Racine Tool & Machine Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
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Zenith Coal & Steel Products, Montreal, Que.

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Garvin Machine Co., New York City.

HACK SAW MACHINERY
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Brown, Boggs Co., Ltd., Hamilton, Canada.
Canadian Billings & Spencer, Ltd., Welland.
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Niles-Bement-Pond Co., New York.
Plessisville Foundry Co., Plessisville, Que.
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West Tire Setter Co., Rochester, N.Y.

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Erie Foundry Co., Erie, Pa.

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Independent Pneumatic Tool Co., Chicago, Ill.
R. E. T. Pringle, Ltd., Toronto, Ont.

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Niles-Bement-Pond Co., New York.

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Dodge Mfg. Co., Toronto, Ont.
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H. W. Petrie, Toronto.
The Smart-Turner Machine Co., Hamilton.

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Sheldons, Ltd., Galt, Ont.

HEAT GAUGES, HARDENING AND ANNEALING
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HINGES
London Bolt & Hinge Works, London, Ont.

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Jenckes Mach. Co., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
H. W. Petrie, Ltd., Montreal.
Whiting Foundry Equipment Co., Harvey, Ill.

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Ford Chain Block & Mfg., Philadelphia, Pa.
Jenckes Mach. Co., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

HOISTS, ELECTRIC
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The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Northern Crane Works, Walkerville, Ont.

HOLDERS, STEEL DIE FOR MARKING
Matthews, Jas. H. & Co., Pittsburg, Pa.

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Toronto Iron Works, Ltd., Toronto, Ont.

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Independent Pneumatic Tool Co., Chicago, Ill.

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Garvin Machine Co., New York.

IRON ORE
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JACKS
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Northern Crane Works, Walkerville.
Norton, A. O. Coaticook, Que.
H. W. Petrie, Toronto.

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JACKS, PNEUMATIC
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"Keystone Quality"

KEYSTONE—WESTON

"KEYSTONE" Weston Ratchet

For Square Shank Drills Only.
STRONGEST RATCHET MADE.
Fully guaranteed.

The Name or Mark—"Keystone Quality" on a tool is "Nuffsed." It stands for perfection in everything—design, function, material.

"Keystone Quality" tools are supplied by all better class supply houses. Write for name of nearest dealer.

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BUFFALO, N.Y.**

THE KEYSTONE MFG CO.
WESTCOTT

**The Original
"WESTCOTT" Adjustable "S" Wrench**

HANDLE MALLEABLE IRON, JAW FORGED STEEL.

The "Westcott" Wrench is acknowledged to be the most convenient and useful wrench for general use, and can be used in many places inaccessible to the Monkey Wrench. These wrenches are made of first-class material, are strong and durable.

The genuine "Westcott" Wrenches have the trade mark "Westcott" on the handle.

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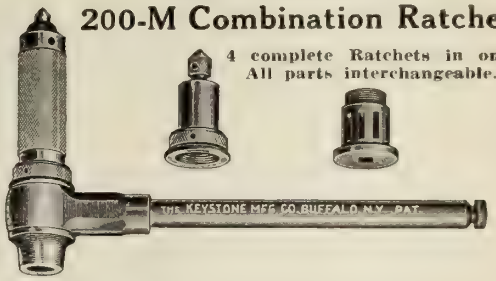
200-M Combination Ratchet**

4 complete Ratchets in one.
All parts interchangeable.



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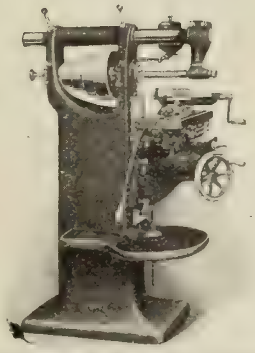
Large Millers for large work—STEPTOE MILLERS for small work.



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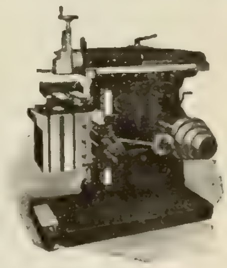

Will result in increased production; less money invested in machinery, and increased profit.

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CUMMINSVILLE, CINCINNATI, OHIO, U.S.A.

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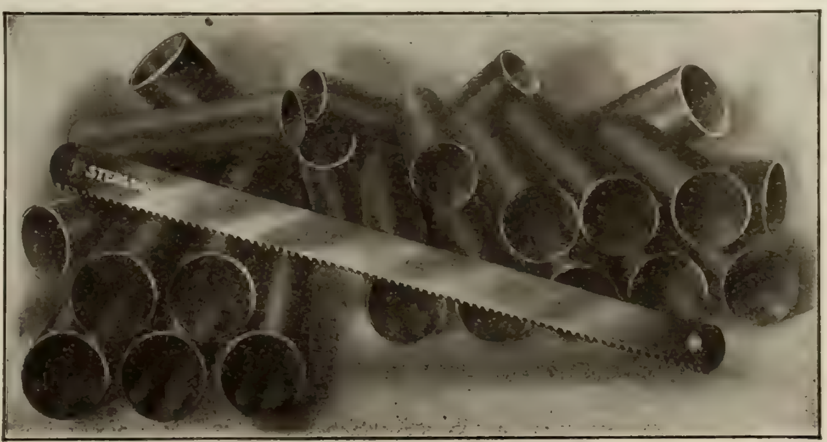
will prove an economical investment. Give them a trial and be convinced.



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U.S.A.**

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Sheldons, Limited, Galt, Ont.

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Whiting Foundry Equipment Co., Harvey, Ill.

LAG SCREW GIMLET POINTERS
National Machy. Co., Tiffin, Ohio.

LATHE CHUCKS (SEE CHUCKS)

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Foss & Hill Machy. Co., Montreal.
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New Britain Mach. Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.

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Gardner, Robt., & Son, Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Gisholt Mach. Co., Madison, Wis.
Hendey Machine Co., Torrington, Conn.
Hepburn, John T., Ltd., Toronto, Ont.
Himoff Machine Co., New York.
Houston, Stanwood & Gamble, Cincinnati, O.
Hyde Engineering Works, Montreal, Que.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
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Wickes Bros., Saginaw, Mich.
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Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
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H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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Himoff Machine Co., Inc., New York, N.Y
The Jenckes Mach. Co., Ltd:, Sherbrooke, Que.
Roelofson Mach. & Tool Co., Toronto, Can.
Root & Van Dervoort Engr. Co., East Moline, Ill.

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Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Gisholt Mach. Co., Madison, Wis.
Hepburn, John T., Ltd., Toronto, Ont.
Niles-Bement-Bond Co., New York.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

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Canada Machinery Corp., Galt, Ont.
Cincinnati Iron & Steel Co., Cincinnati, O.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Hepburn, John T., Ltd., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
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Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

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LOCOMOTIVES
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Cataract Refining & Mfg. Co., Toronto.

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Roper, C. F., & Co., Hopedale, Mass.

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CONTRIBUTORS:

- Arthur Stringer
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- Robert W. Service
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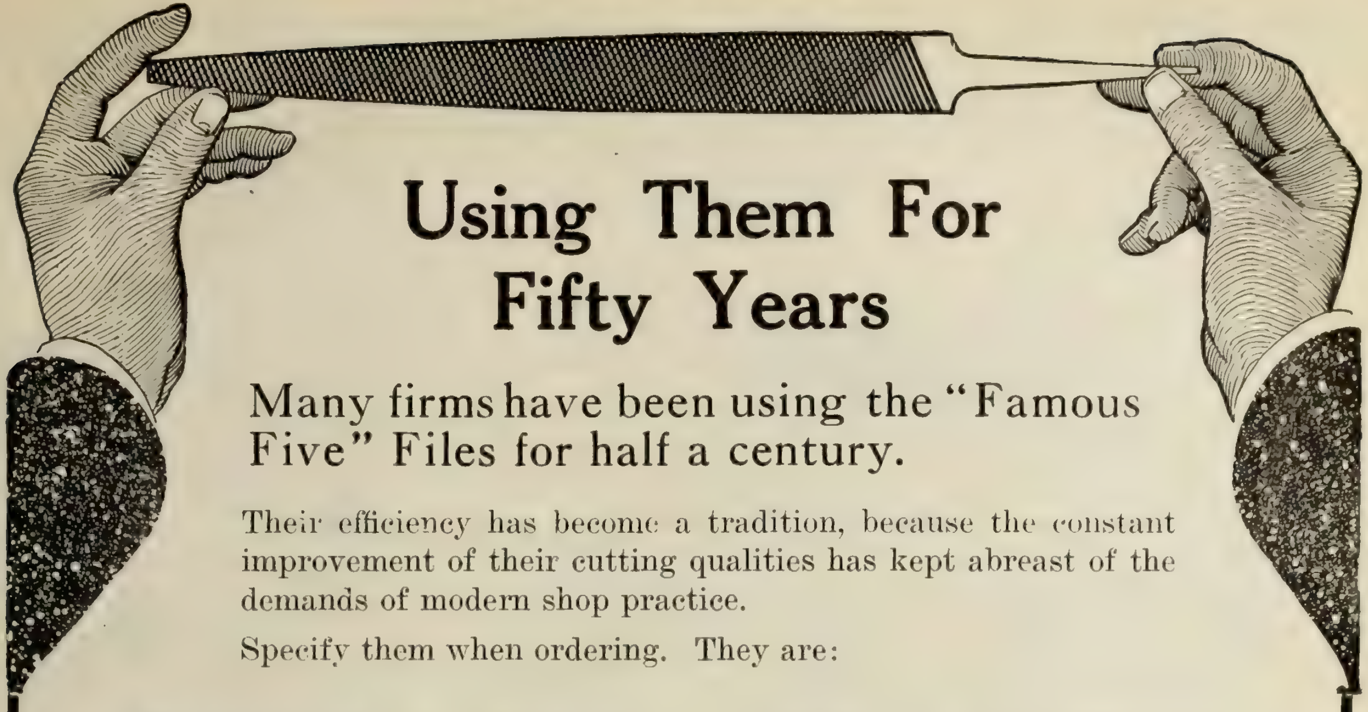

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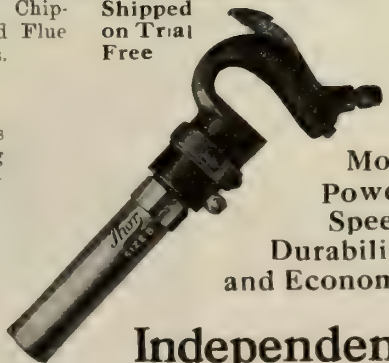

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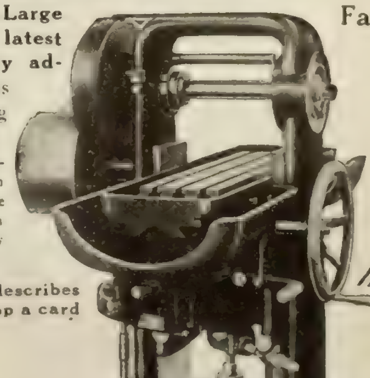

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Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.

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High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.
Wickes Brothers, Saginaw, Mich.

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RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
L. S. Starrett Co., Athol, Mass

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Curtis Pneumatic Machinery Co., St. Louis, Mo.
Gray Mfg. & Machy. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

SAW MILL MACHINERY
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Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt. & Son, Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Wickes Brothers, Saginaw, Mich.
A. R. Williams Machy. Co., Toronto.

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H. A. Drury Co., Montreal.
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SAWS, INSERTED TOOTH
Tabor Mfg. Co., Philadelphia, Pa.

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Bawden Machine Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
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Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler.
Milholland, W. K., Co., Indianapolis, Ind.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
[illegible] Co., Indianapolis, Ind.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

SCREW MACHINES, MULTIPLE SPINDLE
New Britain Machine Co., New Britain, Conn.
Windsor Machine Co., Windsor, Vt.

SCREWS
Galt Machine Screw Co., Galt, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
Wells Bros. Co. of Canada, Galt, Ont.

SCREW SLOTTERS
Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

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Baird Machy. Co., W. J., Detroit, Mich.
Cleveland Power Transmission Co., Cleveland, O.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
New York Machinery Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Simmons Machine Co., Albany, N.Y.
H. A. Stocker Co., Chicago, Ill.

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Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

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H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.

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Can. Drawn Steel Co., Hamilton, Ont.
Dodge Mfg. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
A. R. Williams Machy. Co., Toronto.

SHARPENING STONES
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

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Sheldons, Ltd., Galt, Ont.

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Bertrams, Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.
Wickes Brothers, Saginaw, Mich.

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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

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Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
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Peck, Stow & Wilcox, Cleveland, O.
Steel Bending Brake Works, Ltd., Chatham, Ont.

SHEET METAL STAMPINGS
Dominion Forge & Stpg. Co., Walkerville, Ont.

SHELL BANDING MACHINES, HYDRAULIC
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Hydraulic Press Mfg. Co., Mount Gilead, O.
Lymburner, Ltd., Montreal.
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Wm. R., Toronto.
West Tire Setter Co., Rochester, N.Y.

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The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

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High Speed Hammer Co., Rochester, N.Y.

SHRAPNEL SHELL MARKER
Brown-Boggs Co., Hamilton, Ont.
Noble & Westbrook Mfg. Co., Hartford, Conn.

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Armstrong Bros. Tool Co., Chicago.

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Geo. H. Lees & Co., Hamilton, Ont.

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Whitman & Barnes Mfg. Co., St. Catharines, Ont.

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Niles-Bement-Pond Co., New York.

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MacKinnon, Holmes Co., Sherbrooke, Que.

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Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
J. H. Williams & Co., Brooklyn, N.Y.

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Brown, Boggs & Co., Hamilton, Can.

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Canada Metal Co., Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.

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W. H. Banfield & Sons, Toronto.
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Baird Machine Co., Bridgeport, Conn.
Bawden Machine Co., Toronto, Ont.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Brown Engineering Corp., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
Grant Mfg. & Machy. Co., Bridgeport, Conn
John H. Hall & Sons, Brantford.
Himoff Machine Co., New York, N.Y.
Jardine, A. B., & Co., Hespeler.
Jenckes Mach. Co., Sherbrooke, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
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Root & Van Dervoort Engr. Co., East Moline, Ill.
Smart-Turner Machine Co., Hamilton, Ont.
Webber Bros. Mach. Co., Toronto, Ont.
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Cleveland Wire Spring Co., Cleveland.
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Morse Chain Co., Ithaca, N.Y.
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Canada Machinery Corp., Galt, Ont.

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Vanadium-Alloys Steel Co., Pittsburgh, Pa.
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Union Drawn Steel Co., Hamilton, Ont.

STEEL DRUMS
Smart-Turner Machine Co., Hamilton, Ont.

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Can. Fairbanks-Morse Co., Montreal.

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Boker & Co., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Ltd., Montreal.
Hawkridge Bros. Co., Boston, Mass.
H. W. Petrie, Toronto.
Tivani Electric Steel Co., Belleville, Ont.
Vanadium Alloys Steel Co., Pittsburg, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Young, Corley & Dolan, Inc., New York, N.Y.
Zenith Coal & Steel Products, Montreal, Que.

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Tivani Electric Steel Co., Belleville, Ont.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa.

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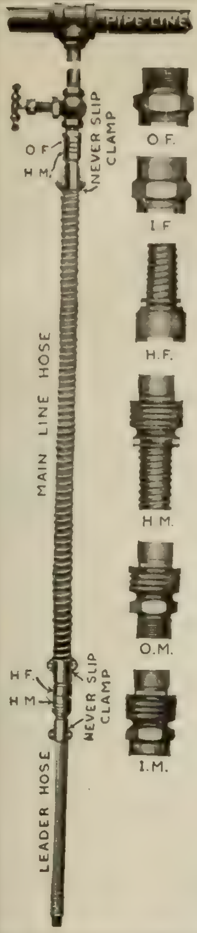


CLEVELAND HOSE SPECIALTIES

Bowes Automatic Air Hose Couplings

Over 1,000,000 in general use

STYLE O.F. is an Outside Thread Female Pipe End. Made in sizes ⅜-in. to 1½-in.

STYLE I.F. is an Inside Thread Female Pipe End. Made in sizes ¼-in. to 1½-in.

STYLE H.F. is a Female Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes ¼-in. to 1½-in.

STYLE H.M. is a Male Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes ¼-in. to 1½-in.

STYLE O.M. is an Outside Thread Male Pipe End. Made in sizes ⅜-in. to 1½-in.

STYLE I.M. is an Inside Thread Male Pipe End. Made in sizes ¼-in. to 1½-in.

The Male and Female Ends of Bowes Couplings interchange in sizes, ¼-in. to ¾-in. Sizes 1-in. and 1¼-in. interchange. The 1½-in. ends interchange only with themselves.

BOWES COUPLINGS

Are instantly connected or disconnected.

They are absolutely air-tight under all pressures.

They quickly pay for themselves by stopping costly leaks.

They interchange in sizes most commonly used.

They have no loose parts to be mislaid or lost.

They are made of brass and will not rust.

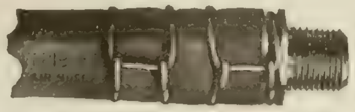
The U-shaped interchanges in couplings ¼-in. to ¾-in.

The Cleveland Never Slip Hose Clamp

Made in same sizes as Bowes Couplings

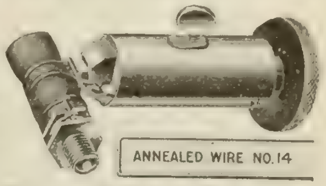
The adjoining cut of Never Slip Hose Clamp shows the "Flanges" which engages the groove provided in all hose ends of Bowes Couplings. The "Model Hose Line" illustrated shows correct styles of couplings to use and proper way to attach the clamps.

CLEVELAND GROOVED HOSE NIPPLE



Grooved Nipples when attached to hose with the wire clamp cannot "blow-out," as one half of the Wire Clamp lies in Nipple Groove, and the other half on the hose, uniting nipple and hose permanently. "Blow outs" are expensive, as one to five men are idle while new connection is being made; time wasted, ten to thirty minutes. Can you afford it?

WIRE CLAMP TOOL



To apply Wire Clamps to Grooved Hose Nipples you need the Wire Clamp Tool illustrated, a small hand-operated tool at moderate cost which we carry in stock for immediate delivery.

In Stock: Riveting and Chipping Hammers, Four piston Air Drills, Corner Drills, Emery Grinders, Sand Rammers, Holder Ons, Etc.

WRITE FOR BULLETIN NO. 29.

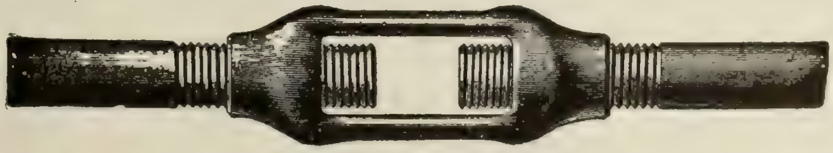
IMPORTANT:—The Small Leaks in your "AIR LINE" mean serious loss in DOLLARS. Have you any idea of the amount of "Air" wasted in small leaks at your connections? Air Leakage through 1-16 in. opening equals 5.32 cu. ft. per minute at 80 lbs. It will pay you to install Bowes Couplings and stop costly leaks.

Write for Catalog No. 12, which illustrates our complete line of Air Tools.

CLEVELAND PNEUMATIC TOOL CO. OF CANADA LTD., 84 Chestnut St., TORONTO

A. R. WILLIAMS MACHINERY CO., TORONTO. WILLIAMS AND WILSON, MONTREAL

Plyers, Structural Wrenches, Track Wrenches, Machine Wrenches, Eye Bolts, Lathe Dogs, Journal Box Wedges, Etc.



B

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DROP FORGINGS

Our facilities and equipment enable us to give you a top-notch quality at a very reasonable price.

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Foss & Hill Machy. Co., Montreal.
Geometric Tool Co., New Haven, Conn.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
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Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York
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CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

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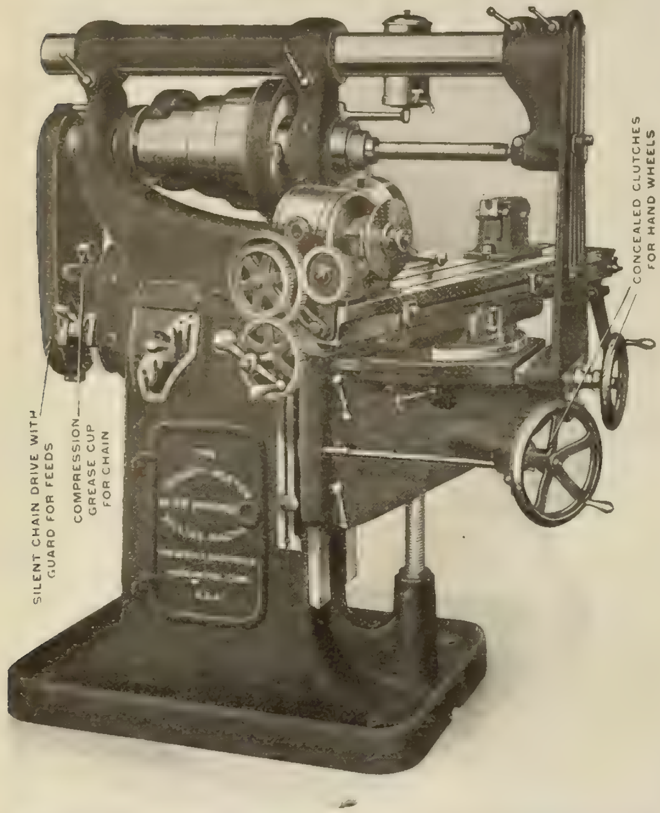
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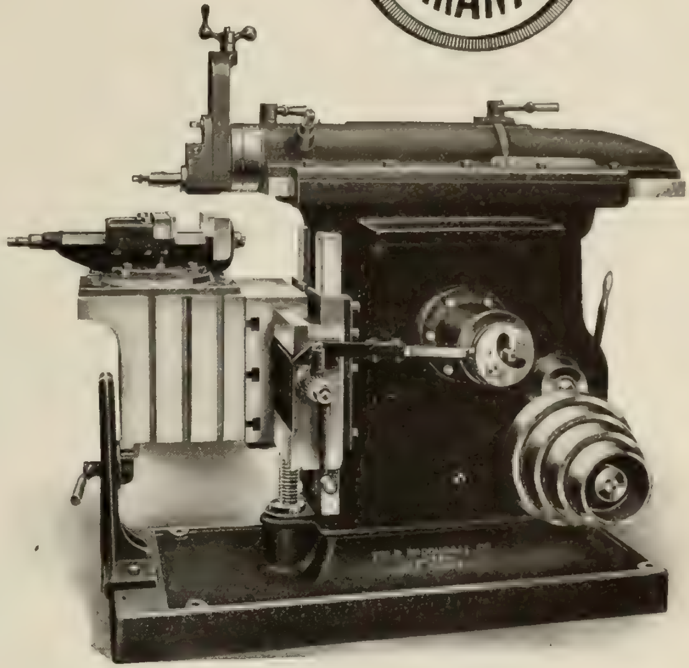

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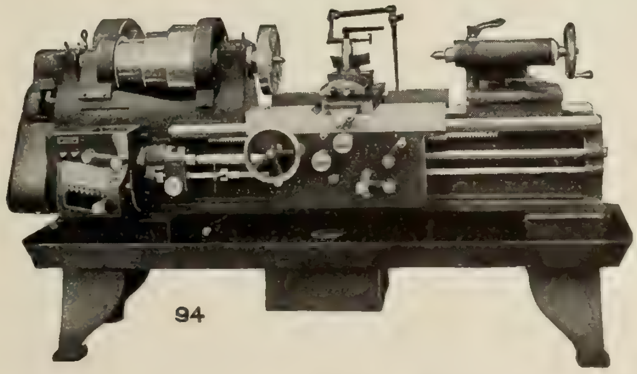

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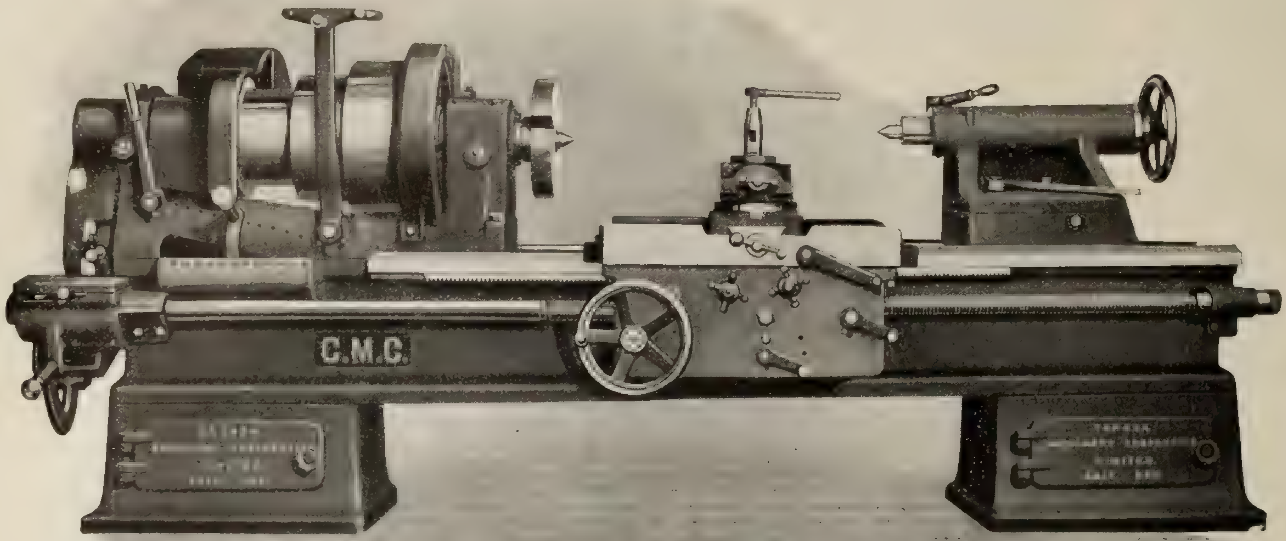

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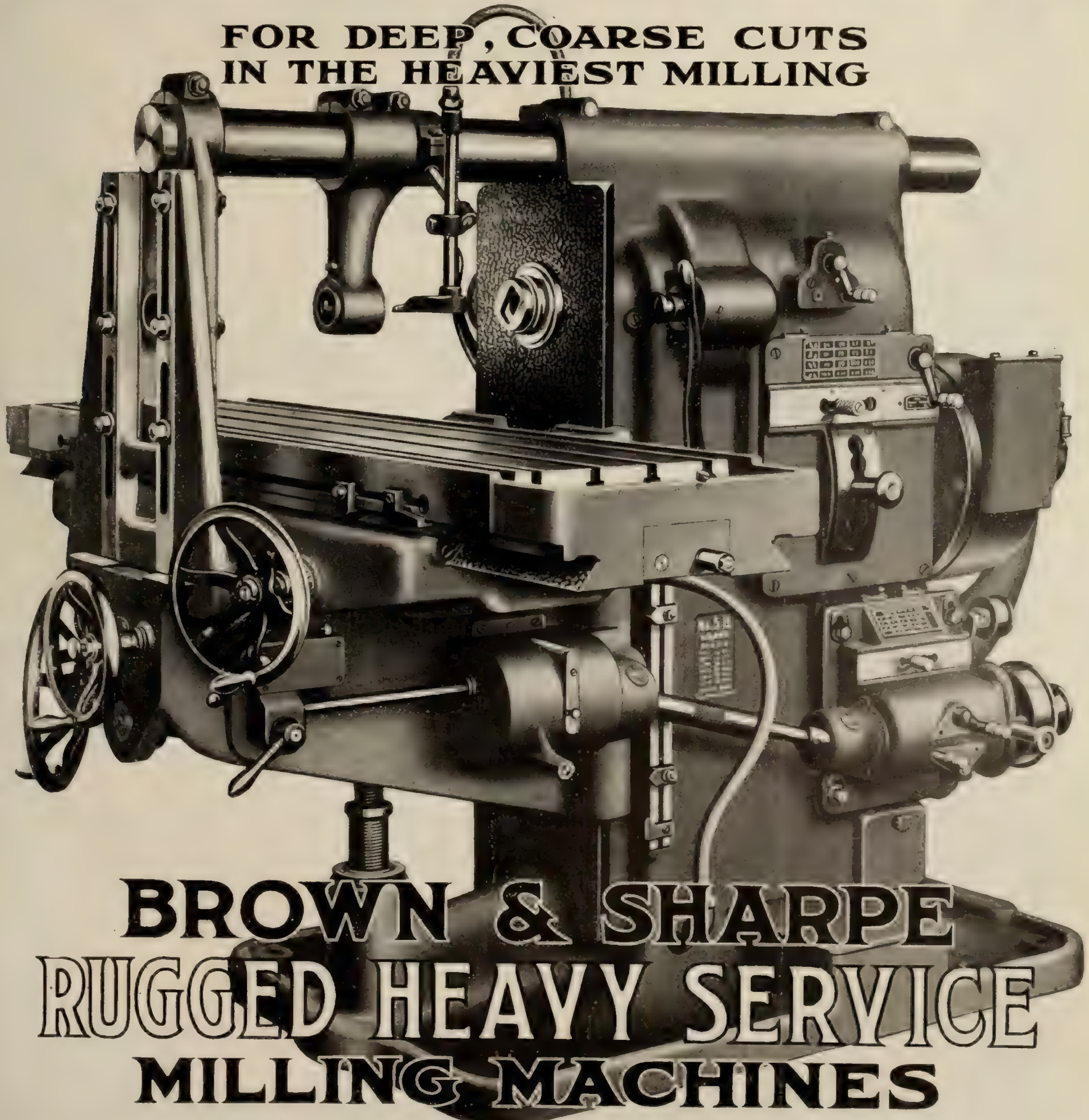
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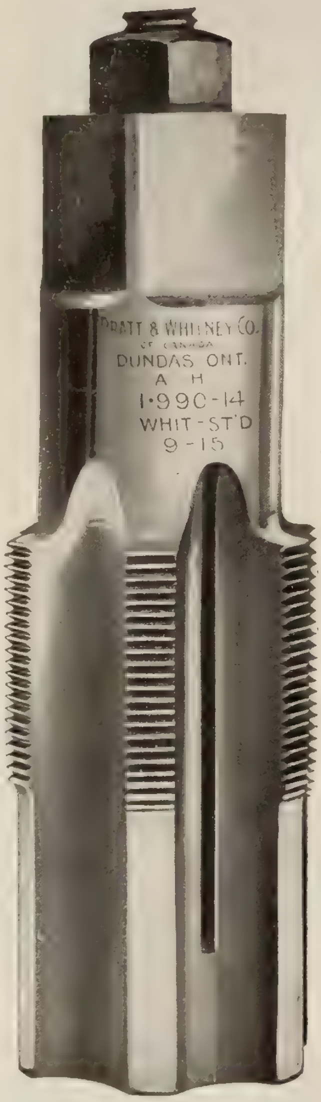
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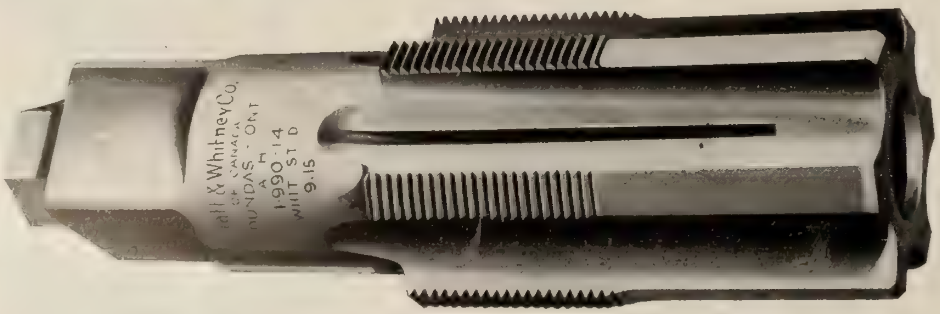
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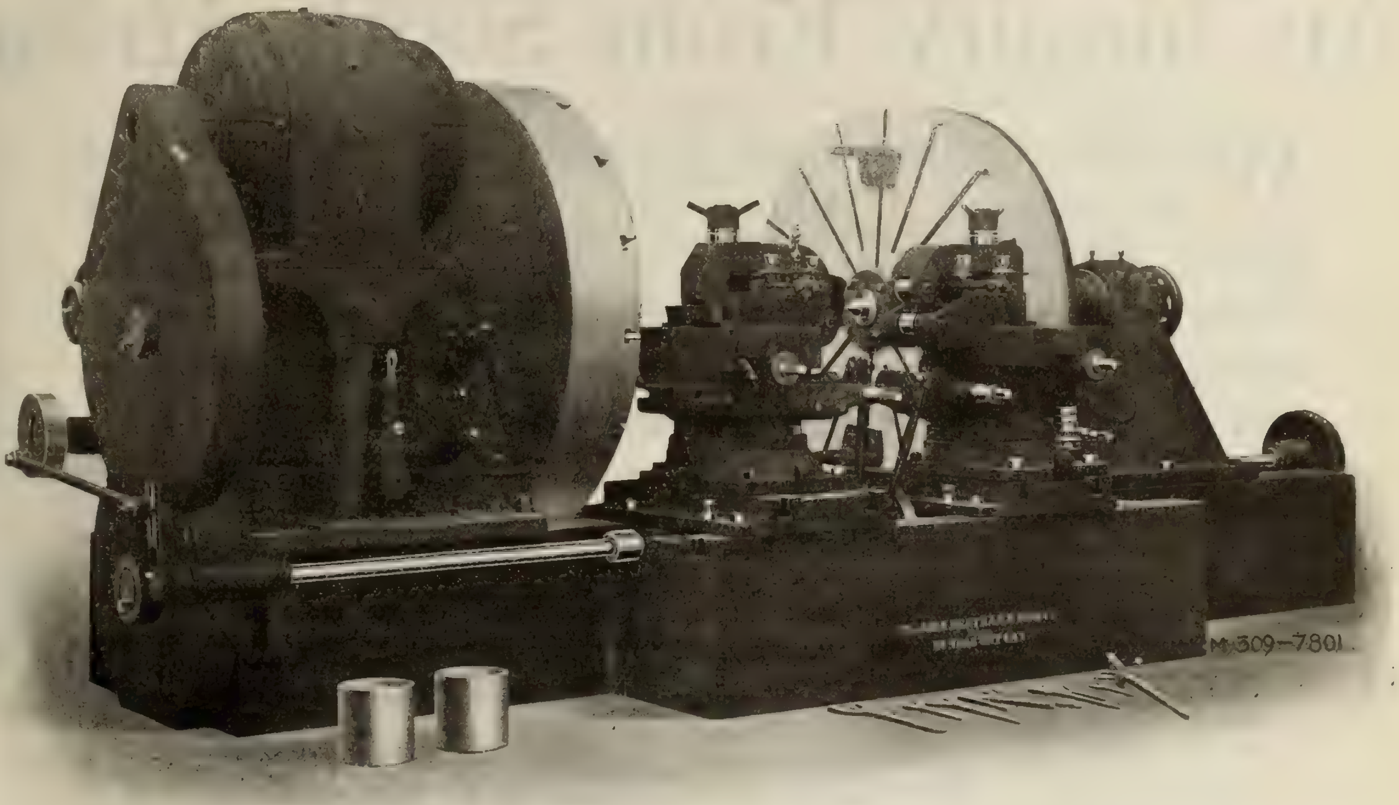

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The Publisher's Page

TORONTO November 2, 1916

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> *21, 22, Exploration Buildings,*
> *Fox Street,*
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> *13th September, 1916.*
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> *The Editor,*
> *The MacLean Publishing Co.,*
> *Toronto, Canada.*
> *Dear Sir,—*
>
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>
> *Some of your makers may be contemplating appointing Agents in this territory, and as we have been for 20 years in Engineering and Mining Material here, and known to every Mine Official and Buyer, we are in the position to properly represent enterprising Makers, and to advise them as to what this market needs.*
>
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>
> *Kindly send us copies of your* CANADIAN MACHINERY AND MANUFACTURING NEWS, *and put your advertisers in correspondence with us.*
>
> *Awaiting the favor of your reply, we remain,*
> *Yours faithfully,*
> (*Sgd.*) M. J. ADAM & CO.

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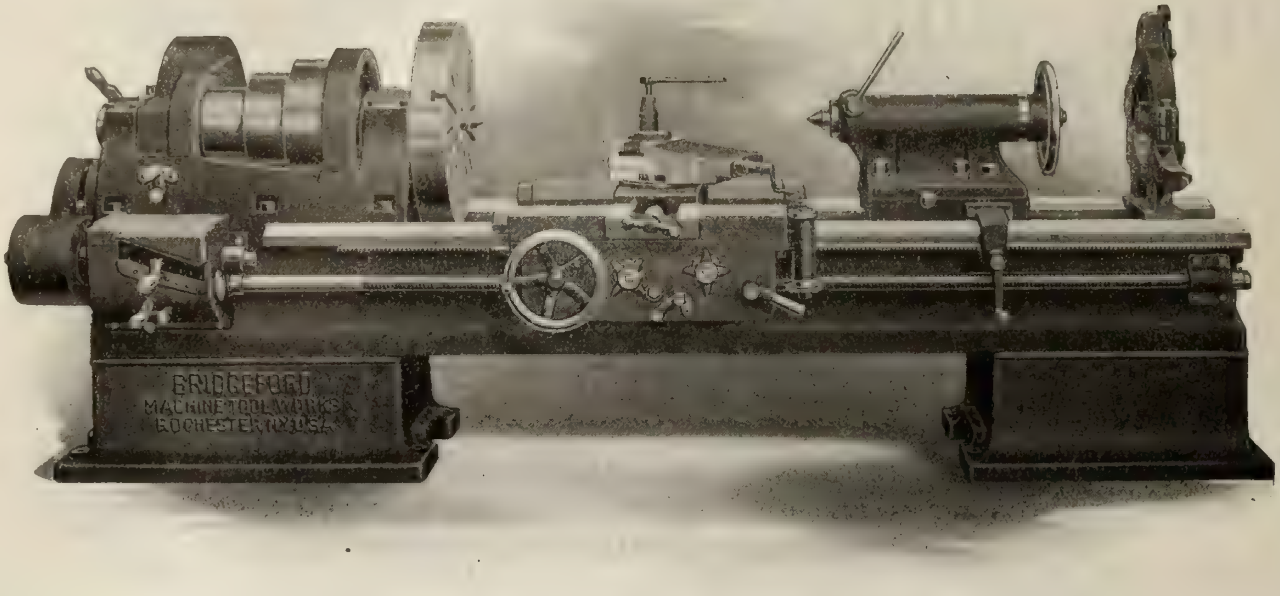
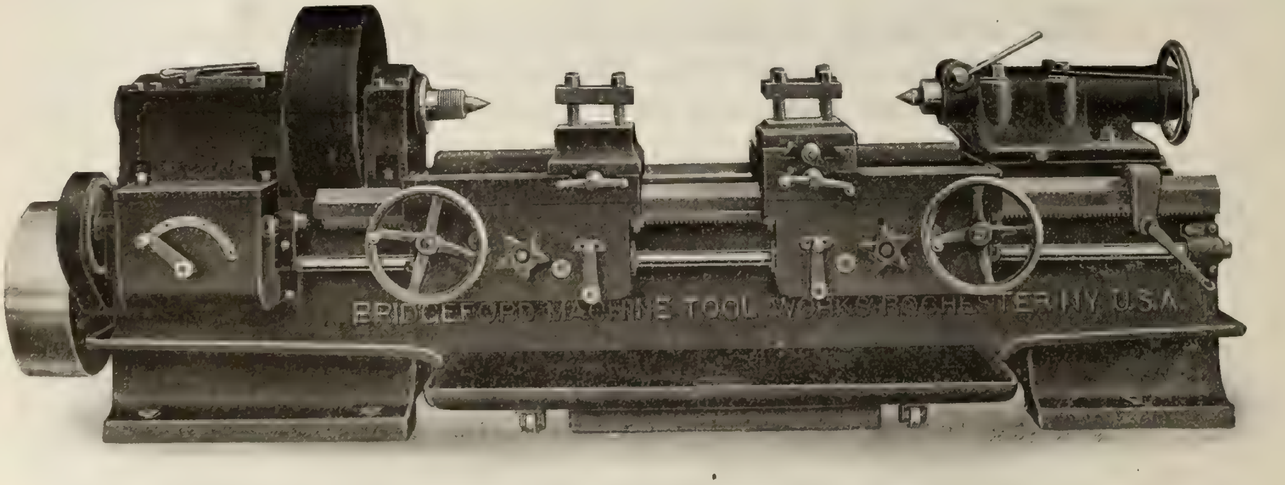


Bridgeford 26" Cone-driven Lathe, Heavy Pattern.

A powerful, heavy duty, double back-geared lathe with high gear ratio and three-step cone for 5" double belt. Recommended for rough turning 4.5" and 6" shells and for finish turning, band turning and other sundry operations on larger shells.



Bridgeford Heavy Duty Plain Turning Machine.

Also a rapid worker. The powerful drive and convenience of operation insure a maximum output. Very simple. No complicated mechanism. An inexperienced operator can quickly become proficient in the operation of the machine, obtaining maximum results.

For Increased Production "Use a Bridgeford"

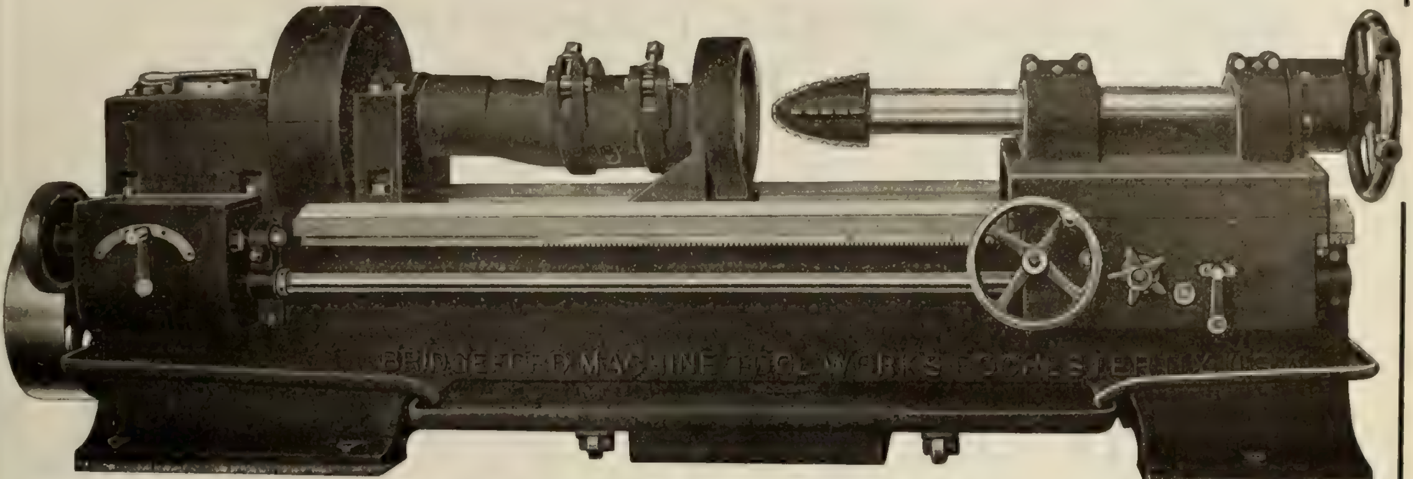
BRIDGEFORD MACHINE TOOL WORKS

HEAVY LATHE SPECIALISTS FOR 20 YEARS

237 MILL STREET
ROCHESTER, N.Y.

Bridgeford—

for big returns on the investment



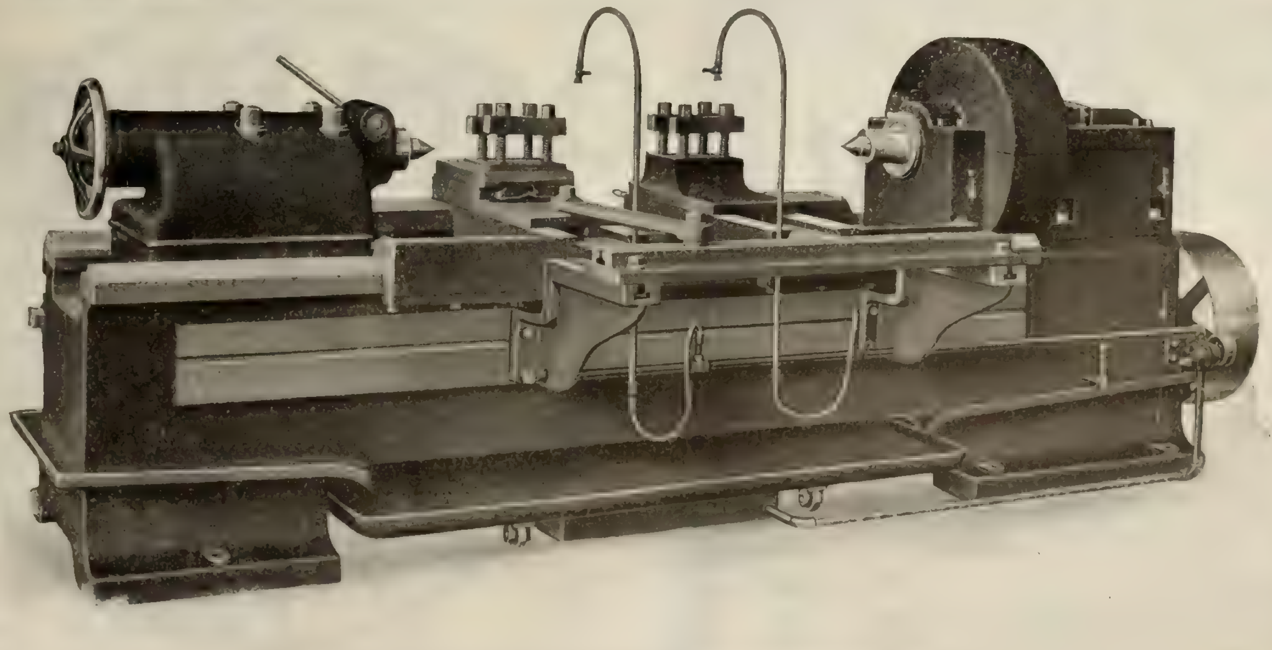
BORING LATHE For 8", 9.2 and Larger Shells.

Marvellous for strength, accuracy and production.

A machine of the heavy, low-swing type, having specially designed carriage with auxiliary hand feed for internal profile.

Carries a 5½" steel bar with male taper, allowing for light design of cutter heads; three speed changes—automobile style. All speed gearing is steel, hardened, running in oil bath.

Regular equipment includes water attachment, pump, pan and piping, pot chuck, boring bar and steady rest — everything except cutter heads.



Our Heavy Duty Plain Turning Machine Arranged for Shell Turning.

For Increased Production "Use a Bridgeford"

BRIDGEFORD MACHINE TOOL WORKS

HEAVY LATHE SPECIALISTS FOR 20 YEARS

237 MILL STREET

ROCHESTER, N.Y.

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX	Carbon Tool Steel
High Speed Steel, Atlas LX	"Deward" Oil Tempering,
Chrome Vanadium Steel	Non-Shrinking

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

YOUNG, CORLEY AND DOLAN, Inc.

115 BROADWAY, NEW YORK CITY, U.S.A.

Red Cut Superior High Speed Steel

Quality First

THE BEST FOR MACHINING
ALL HARD MATERIALS

Are your tools made of **Red Cut**?

Send for folder

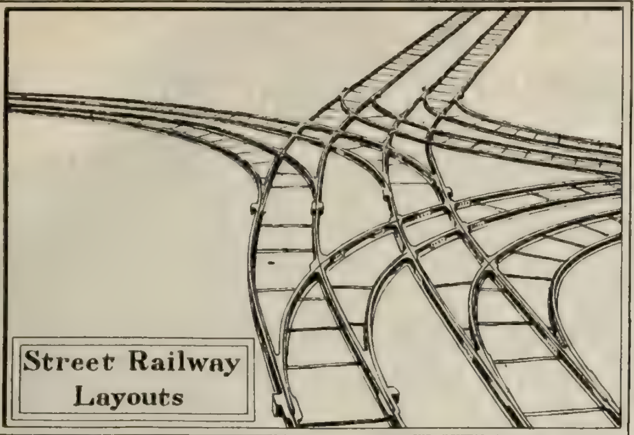
**VANADIUM-ALLOYS
STEEL COMPANY**

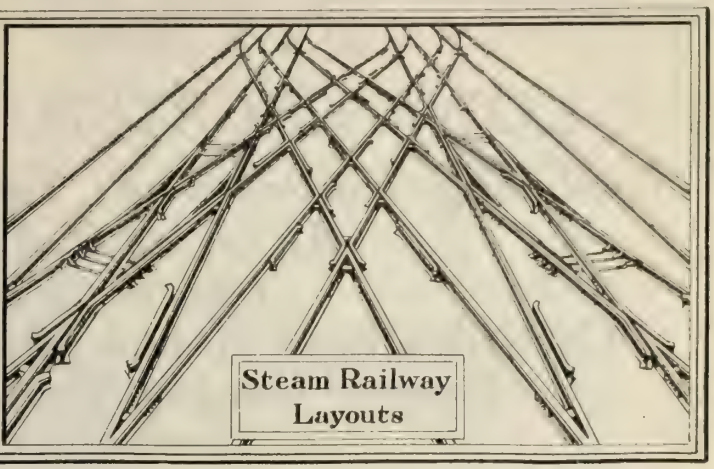
PITTSBURGH, PA.
Works at Latrobe, Pa.

WOLFRAM
MADE IN THE U.S.A
HIGH SPEED STEEL
TRADE MARK

Wolfram Cobalt High-Speed Steel, BEST FOR TURNING SHRAPNEL. Vulcan Hot Piercing Steel, FOR ALL KINDS OF HOT WORK. Vulcan Regal No. 2 Steel, FOR BRASS FINISHINGS. Vulcan Special "W" Steel, For Special Taps and Dies. Vulcan Non-Shrinkable Steel, For Intricate Dies. Vulcan Special Vanadium Steel Does Twice the Work of Regular Carbon Steels.

VULCAN CRUCIBLE STEEL COMPANY
ALIQUIPPA, PA.


Street Railway Layouts


Steam Railway Layouts

Switches, Frogs and Every Description of Trackwork.
Solid Manganese Steel Construction. Cast Iron and Cast Steel bound Construction with Manganese Steel Inserts.

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

PIG IRON

"Victoria" Foundry and Malleable, made by The Canadian Furnace Co., Port Colborne, Ont., Canada

M·A HANNA &Co.

M.A.HANNA&Co. Sales Agents: **CLEVELAND, O., U.S.A.**

JAMES McKAY COMPANY, PITTSBURGH, PENNA., U.S.A.
Manufacturers of

SHELL FORGINGS

We have the Equipment and Experience and can execute orders for

Nose Sockets Base Plates Adapter Plates

For any size Shells. Can execute orders promptly.

SPECIAL FORGINGS—We can make any forging that can be made under Drop Hammers.
CHAINS AND ACCESSORY FORGINGS—We have a complete line.

Address our Representative: JOHN A. BUCHANAN, King Edward Hotel, Toronto

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO, LIMITED, SHEFFIELD, ENGLAND

Sole Agents for Canada:

H. BOKER & CO., Inc.

(Formerly Hermann Boker & Co.)

332 St. James Street, Montreal, P.Q.

Established 1837 Incorporated 1914

Special Vanadium Steel Piercing Die Forgings

For Hot or Cold Work

Made from High-Grade Special Vanadium Tool Steel and hammered in any size.

These forgings cut down your machining costs 100% and give you a tougher, more durable Die than you have ever had.

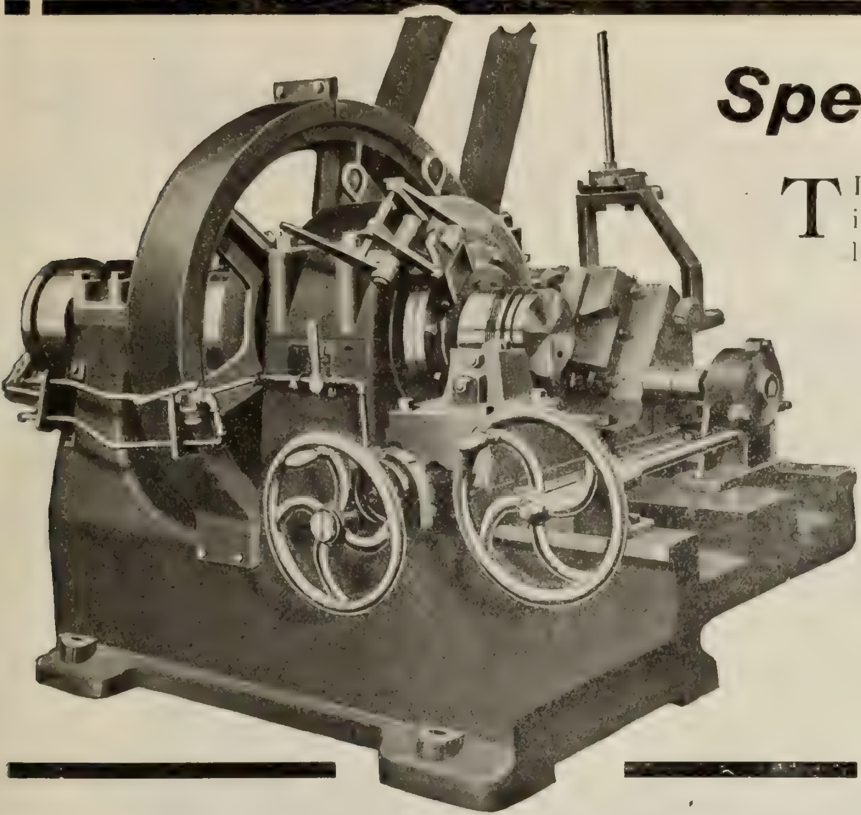
Punches made to match the dies.

Send us your Blue Prints.

Hammond Steel & Forging Co. Inc.

SYRACUSE, N. Y.

Fine Tool Steels, Specialists in Manufacture of High Grade Hammered Forgings, Hammered Alloy Steels, Weldless Rings—Special Shapes, Die Blocks



Speed—Accuracy

THE two most important factors in shell-making. The former is desirable, the latter absolutely necessary. Both are assured by the use of *Jenckes Single Purpose Lathes for Shell Work.*

Illustration shows the latest addition to this famous line—a Banding Lathe for 8″ shells. Note the liberal proportions, the general appearance of sturdiness. They mean an extra measure of long and efficient service.

These machines are also manufactured for 18 pdr., 4.5″, 5″, 6″, 8″, 9.2″, 12″ and 14″ shells; are tooled when required for the mm. sizes corresponding to Russian and French ammunition.

THE JENCKES MACHINE COMPANY, LIMITED

WORKS: Sherbrooke, Que.
St. Catharines, Ont.

SALES OFFICES:

727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

CAREFUL STUDY

FOR fifteen years we have made a careful study of the wants and requirements of the Miner and the Lumberman.

The experience gained in that time has taught us just the kind of tools required and what is required of them for the mining and lumbering industry.

Our tools are all made on practical designs and are guaranteed to give satisfaction. We make a complete line and can give prompt deliveries.

Write us for prices.

J. W. CUMMING & SON, LTD.
NEW GLASGOW, - - CANADA

Wood or Steel let Cummings make it.

ECONOMY

Rapid production is dependent on the use of

Economical Tools and Steel.

It is safer NOT to specify High Speed Steel but

Demand "TYR," the Economy Steel.

(MADE IN CANADA)

Armstrong, Whitworth of Canada, Limited

OFFICES: 22 Victoria Square, Montreal, P. Q.
Dominion Bank Building, Toronto, Ont.
WORKS: Longueuil, P. Q.

STELLITE

HIGH SPEED TOOL METAL

MADE IN CANADA
STELLITE

STANDS UP UNDER THE SPEEDS FAR IN EXCESS OF THE POINT WHERE THE BEST HIGH SPEED STEEL FALLS DOWN.

Not a Steel

Contains no Iron

It cuts so much faster than any high-speed steel that production is increased 20 to 300%. Stellite cuts well when red hot,—it won't burn up, no matter how fast the machines are driven.

The hardest, toughest and fastest cutting metal known.

Can you afford to ignore the big production advantages Stellite offers you?

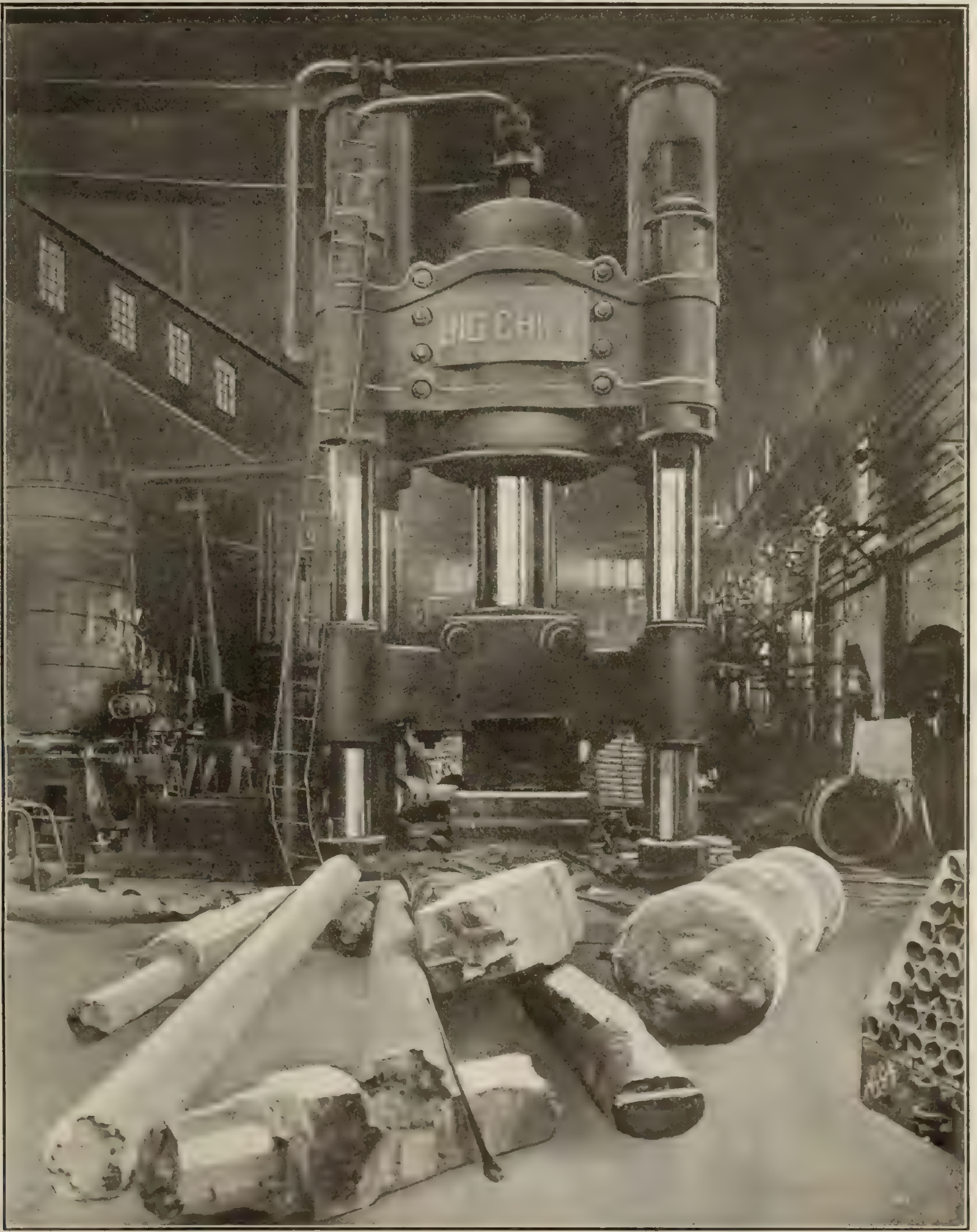
Made in Canada by
THE DELORO MINING AND REDUCTION CO., LIMITED
DELORO, ONTARIO

The Canadian B. K. Morton Co., Limited
SOLE SELLING AGENTS FOR CANADA AND NEWFOUNDLAND
49 Common St., MONTREAL, QUE. 86 Richmond St. East, TORONTO, ONT.

Nova Scotia Steel & Coal Company

Limited

New Glasgow, Nova Scotia, Canada



4,000 TON STEAM HYDRAULIC FORGING PRESS FOR MARINE AND OTHER HEAVY FORGINGS.

The product of a modern steam-hydraulic press is denser and more homogeneous than can be obtained with the steam hammer, due to the effect of the blow of the latter not penetrating to the centre, in contradistinction to the uniform kneeding effect of the press; while the amount of work that can be done by the latter at one time with little variation in temperature, strongly tends towards a better product. The greater uniformity and reliability of steam hydraulic forgings make their use imperative wherever high-class products are required.

BASE PLUGS

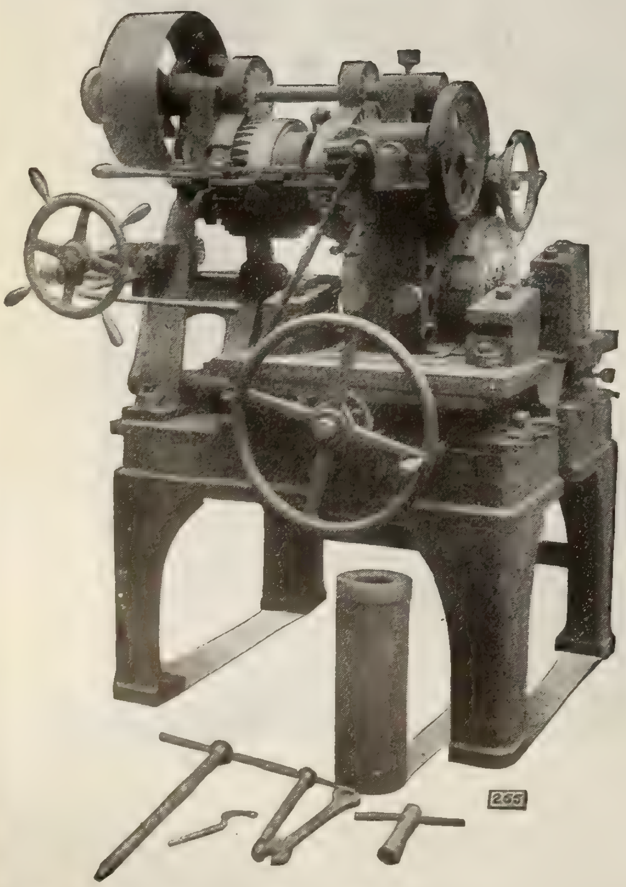
Machined to Government Specification

Have in stock for immediate shipment machined plugs for 4.5", 5" and 6" High Explosive Shells.

Capacity 3,000 per day. Write for prices.

EDWIN J. BANFIELD
STAIR BLDG. ∴ TORONTO, ONT.

Manufacturer of Plug Milling Machines for All Sizes of Shells



CUTTING-OFF MACHINES

Quick Delivery

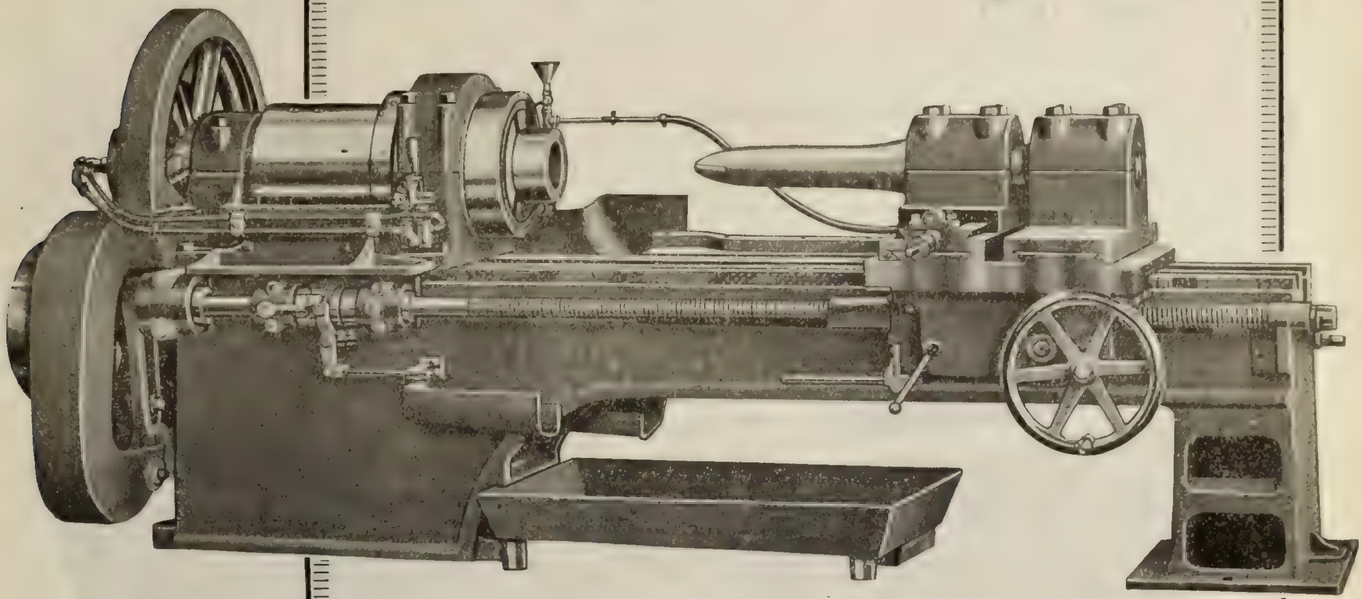
For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal

The "R & V" Boring Lathe



Equipped with cam for Roughing, Profiling and Finishing 8" and 9.2" Shells.

WE have brought out a line of Special Single Purpose Lathes for the manufacture of High Explosive Shells, specializing on

Cutting-Off Lathes
Outside Roughing Lathes
Outside Finishing Lathes
Inside Boring Lathes
Inside Roughing Lathes
Inside Finishing Lathes
Band Seat Turning Lathes
Waving and Undercutting Lathes
Copper Band Turning Lathes
Facing End and toWeight Lathes

They are all of exceptionally heavy construction and simple design to meet the severe service and special requirements of the Munition manufacturers.

These machines are making records equalled by few, and are already favorably known.

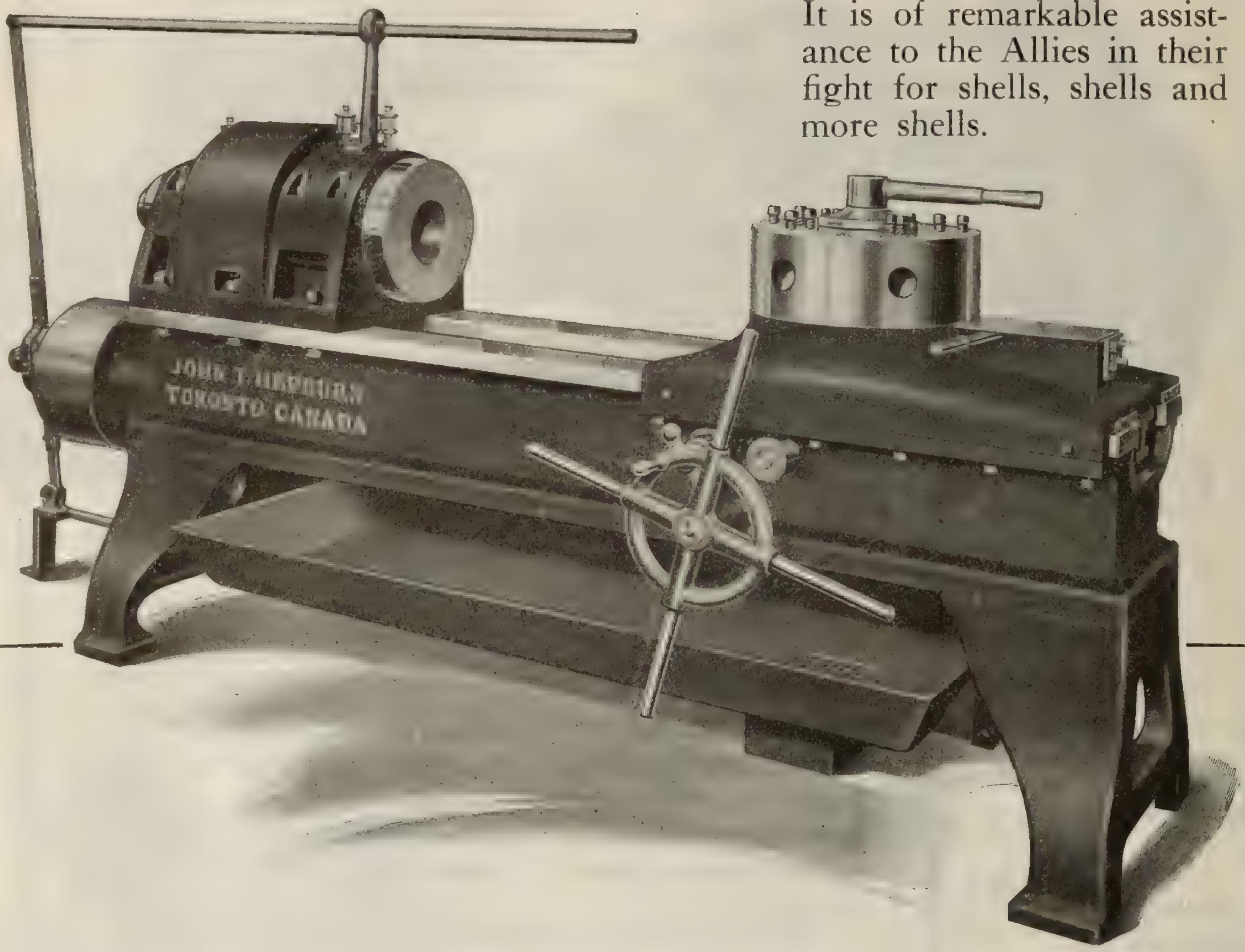
If you are a manufacturer of, or contemplate making shells, write us for estimates and deliveries.

The Root & Van Dervoort Engineering Company

EAST MOLINE, ILLINOIS, U.S.A.

A machine tool that's doing a big bit in the war—

It is of remarkable assistance to the Allies in their fight for shells, shells and more shells.



Hepburn Heavy-Duty Shell Lathes

are invaluable to manufacturers of munitions. More speed means increased profit.

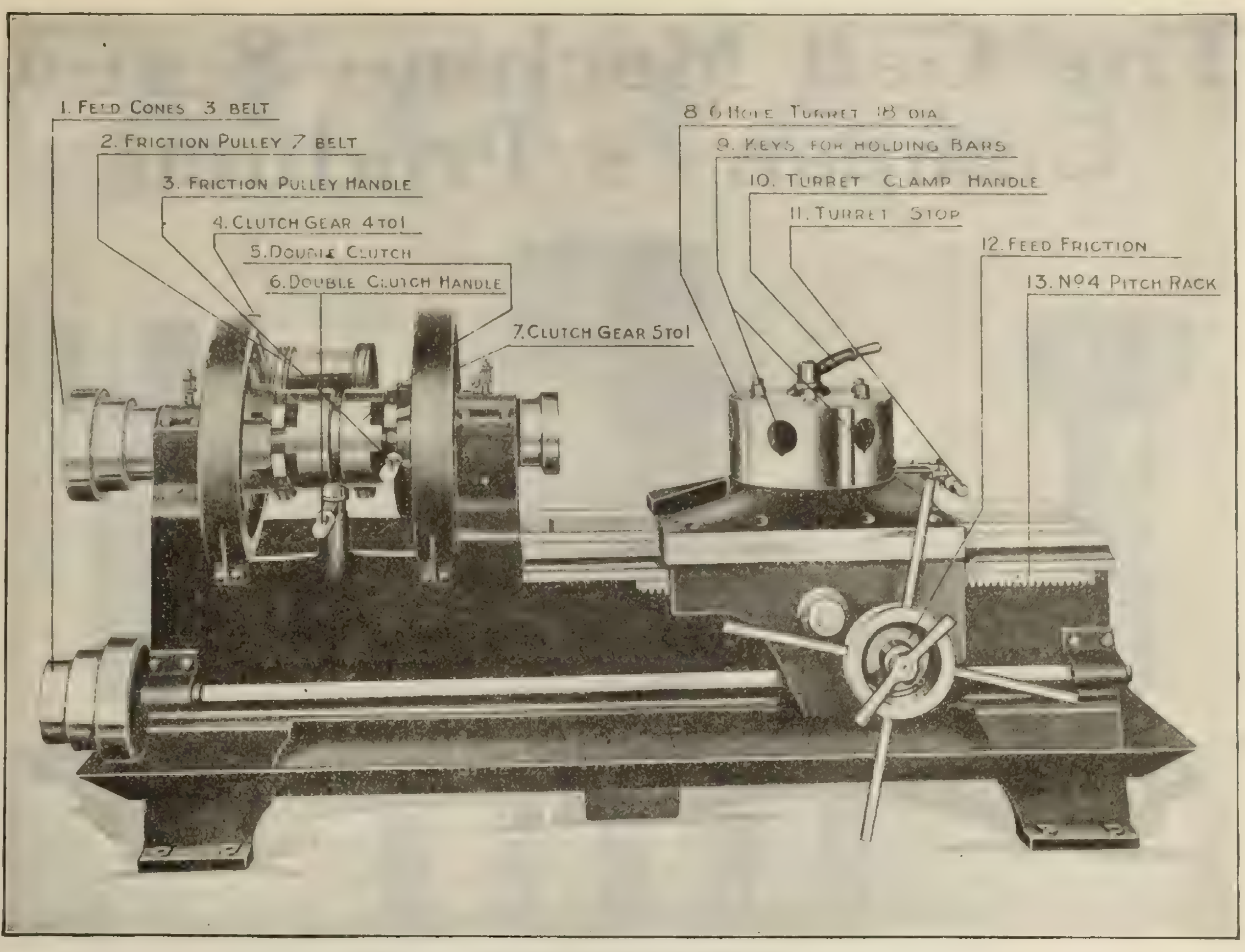
Hepburn speed, power and accuracy should be investigated by you right now.

Hepburn capacity gives you the advantage of *immediate delivery* and enables us to give the very best of service.

We manufacture Turning and Turret Lathes up to and including 9.2" and can ship promptly.

Speed, Accuracy, Power, Strength, Simplicity

John T. Hepburn, Limited, 18 to 60 Van Horne Street
TORONTO, CANADA


1. Feed Cones 3 belt
2. Friction Pulley 7 belt
3. Friction Pulley Handle
4. Clutch Gear 4 to 1
5. Double Clutch
6. Double Clutch Handle
7. Clutch Gear 5 to 1
8 6 Hole Turret 18 dia
9. Keys for holding Bars
10. Turret Clamp Handle
11. Turret Stop
12. Feed Friction
13. No4 Pitch Rack

SPECIAL SHELL LATHE

For boring and turning shells from 9.2 down. Above cut shows bed turret for boring operations. We have them in stock for both boring and turning.

Among other good features, note the following:—

No. 1—3" belt on feed.
" 2—7" belt and 75 H.P. friction.
" 8—18" turret.
" 9—Keys for boring bars.
" 12—External Feed friction.
" 13—Four-pitch rack.
Note ratio of gearing.

Note Sheet Steel Oil Pan.
No countershaft required.
Bronze bearings throughout.
Sight feed oilers.
Hardened and ground thrust collars.
An overplus of strength throughout.
Workmanship guaranteed.

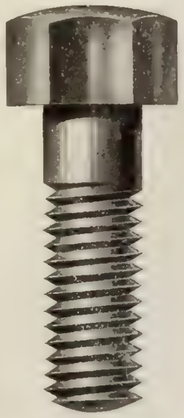
This lathe will give you satisfaction.

Immediate Shipment From Stock

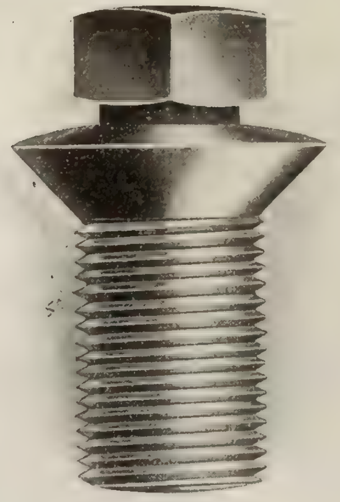
(Subject to Prior Sale)

The Foundry & Machine Co., Limited
1167 Carriere Road
Montreal, Canada

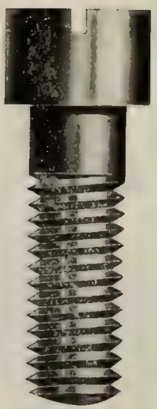
The Galt Machine Screw Company's Products



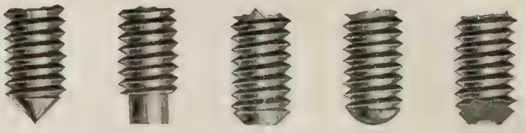
Hexagonal Cap Screw



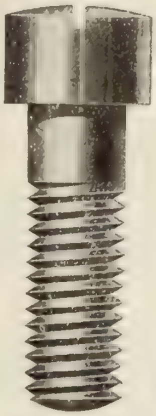
Patch Bolt



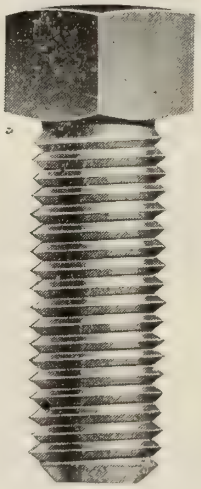
Flathead Cap Screw



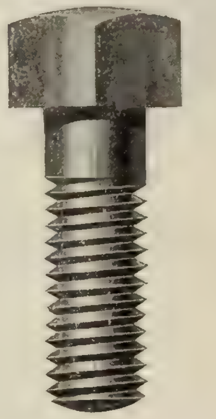
Types of Grub Screws



Fillister Head Cap Screw



Set Screw



Square Cap Screw

The Galt Machine Screw Co., Limited

GALT, ONTARIO, CANADA

Eastern Representatives:

THE CANADIAN B. K. MORTON CO., Limited, 49 Common Street, Montreal, Que.

ACCURACY

Being some account of the Galt Machine Screw Company's Products

"ACCURACY" in the production of such parts as are illustrated opposite, as WE understand the term, means more than uniformity of pitch and body diameter, concentricity of body and thread, contour and finish of heads--it means all this and more—it means CONTINUOUS uniformity, no matter what time may elapse between your orders.

We admit that spasmodic accuracy is possible in ANY plant, but we realized from our advent into business that continuous uniformity was possible only when a complete organization existed, no small part of which would be a splendidly-equipped tool-room, which makes mechanical accuracy constantly possible.

Therefore, only high-grade machine tools were purchased, thus giving us the means of producing the necessary accurate tools from which to make the accurate parts.

With the occupancy of our new factory, our organization has produced better results, so that we are in a position to deliver, in the strictest sense of the term, HIGH-GRADE Cap and Set Screws of all kinds, Semi-Finished and Finished Hexagon Nuts, Studs, Coupling Bolts, etc.,—in fact any first-class automatic screw machine product.

The Galt Machine Screw Co., Limited

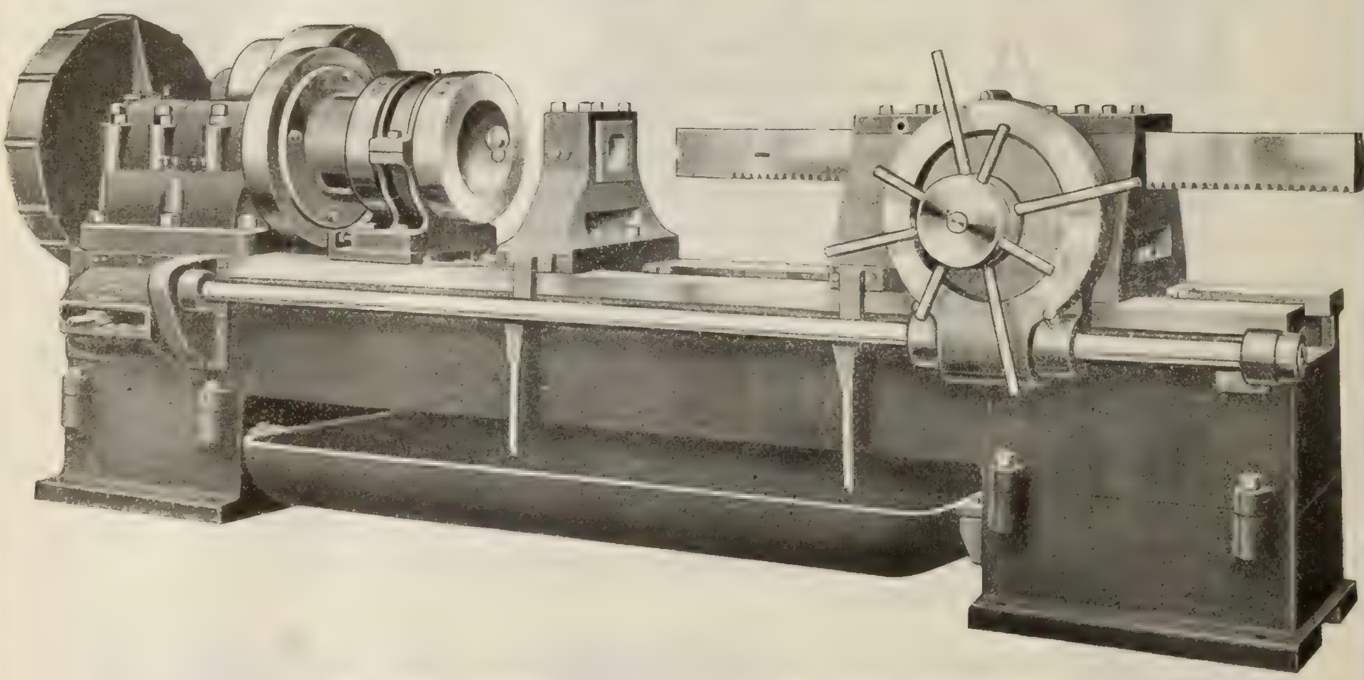
GALT, ONTARIO, CANADA

Eastern Representatives:

THE CANADIAN B. K. MORTON CO., Limited, 49 Common Street, Montreal, Que.

FOR 9.2" SHELLS

The "Connecticut" High Duty Lathes for Boring or Turning



RAPIDITY AND ACCURACY, which mean PRODUCTION and PROFIT can be obtained with shells of this calibre only by using machine tools designed especially for the purpose.

The illustration shows the "Connecticut" 26 in. High Duty Lathe with pot chuck and boring tailstock.

The same powerful headstock is used for turning operations, with carriage in place of steady-rest, and screw tailstock in place of the rack-feed.

Get machines that are RIGHT for your job, i.e., "Connecticut" High Duty Lathes.

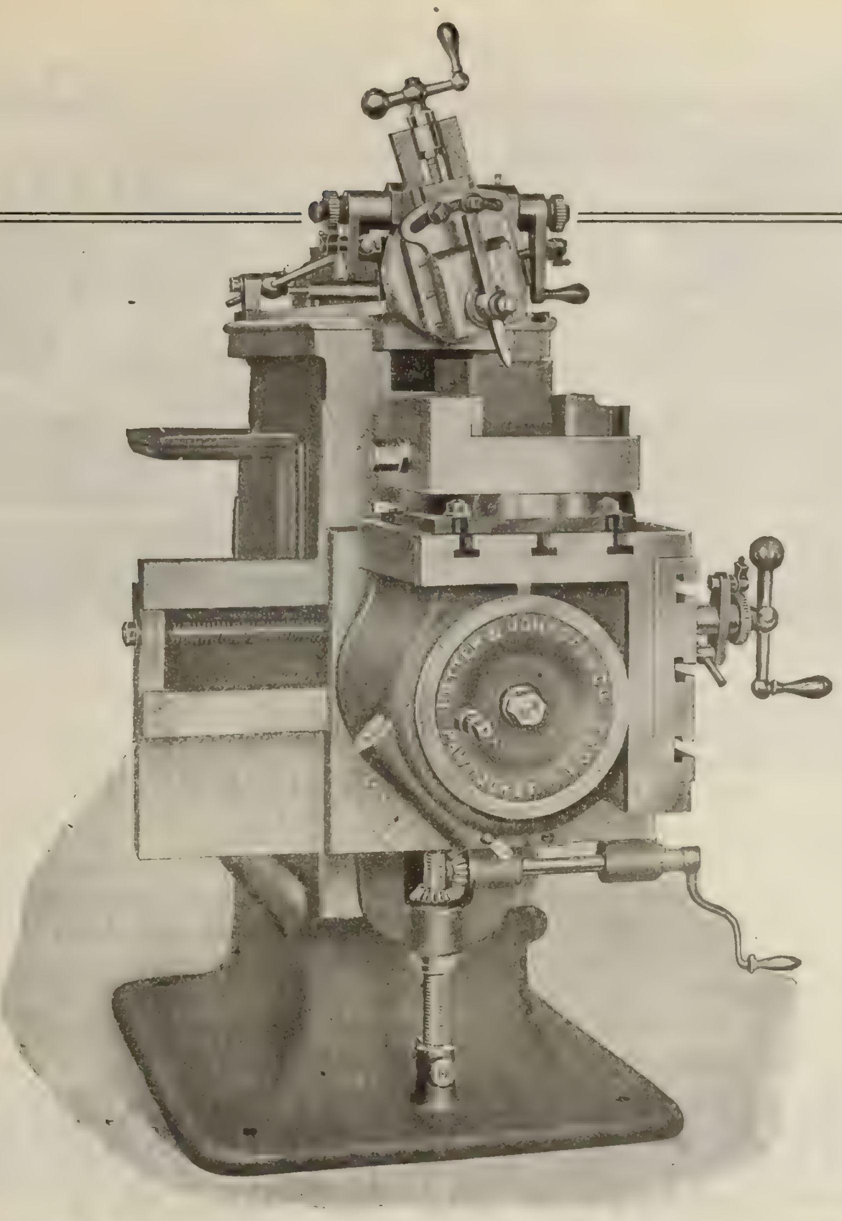
PRINCIPAL DIMENSIONS:—Diameter Spindle, 6 in. Ratio of gearing, 20 to 1, Two step cone, Two speed countershaft, 5½ in. Square Boring Rack. Write for further details to any of the addresses below.

Agents: **The Canadian Fairbanks-Morse Company, Limited, Toronto**
Williams & Wilson, Limited, Montreal

MANUFACTURED BY **W. & B. DOUGLAS (Incorporated)**

Middletown, Connecticut, U.S.A.

ESTABLISHED 1832



Potter & Johnston 15-inch Universal Shaping Machine

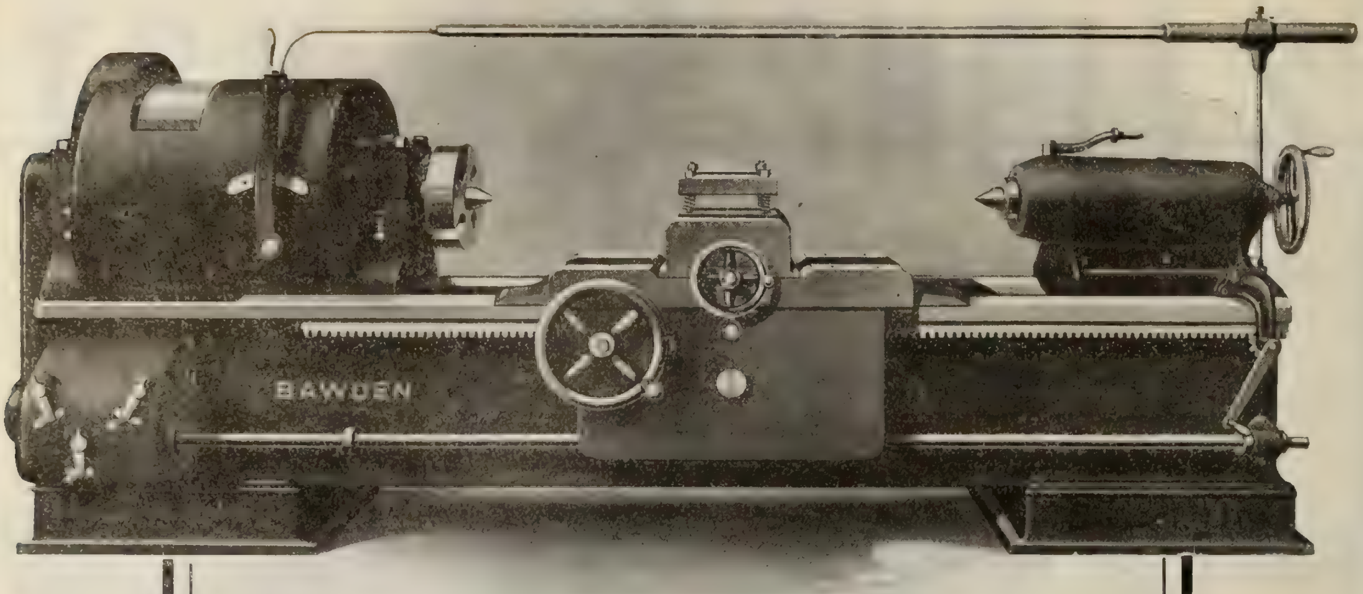
Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

It may be that you are contemplating the purchase of a lathe for Shell-making, and it may even be that you are finding it necessary to scrap a lathe which you bought months ago in the confidence that it would do the work required of it, and stand up under the strain. **It would have stood up** had it been a

BAWDEN

Heavy Duty Shell Lathe

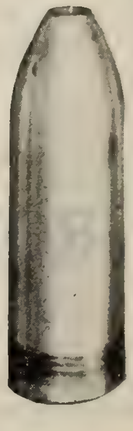
We can say this positively and confidently because many Bawden Lathes installed one and two years ago in munitions plants are doing their work to-day just as satisfactorily as when first installed.

Bawden Lathes are built right—are, rigid, heavy, tremendously strong, and perfectly suited to the work required of them.

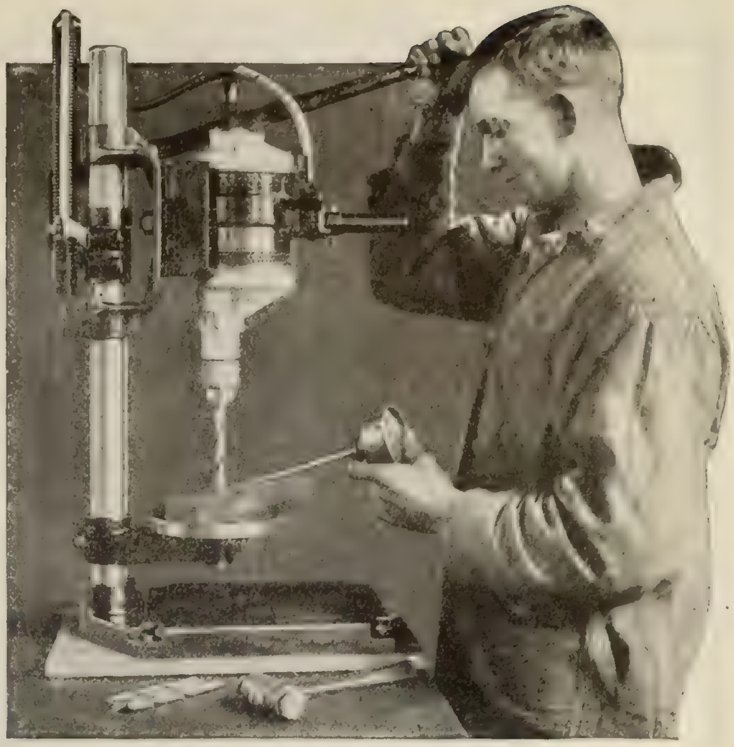
Send for specifications. Also ask for names of factories in which they are in operation.

The Bawden Machine Co., Limited

TORONTO, CANADA



Van Dorn Electric Drills



Van Dorn electrically operated tools are manufactured to meet practically every possible condition of drilling, reaming or grinding.

They are recognized as the most economical machines used to-day in the short run because of their **wonderful speed and efficiency** in operation, and in the long run because of their endurance.

The reason for their superiority is found in twelve years of specialization of the manufacturing, the proof in the universal and growing use of Van Dorn Tools throughout the world.

Van Dorn Electric Tools made light and quick work of the hardest problems, and they soon pay back their initial cost many times over.

If you will write us about your requirements we shall be glad to give you our recommendations and supply you with illustrated catalog.

R. E. T. PRINGLE, Limited,
Manufacturers' Agents

Tyrrell Bldg., 95 King Street E., Toronto
809 Unity B'dg, Montreal
3402 Osler Ave., Vancouver, B.C.

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO.

LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

WE HAVE AT TORONTO FOR IMMEDIATE DELIVERY:—

New **Davis 6″ Cutting-off Machines,** fully equipped, size of hole in spindle 6⅞″.
New **Giddings & Lewis** 18″ x 8′ Heavy Duty Engine Lathes, 3- step Cone, Double Back Gears, regular equipment.
New Heavy Duty Lathes for turning 8″ and 9.2″ Shells.
Thor pneumatic hammers and drills.
Appleton Grinder—Challenge No. 1—slightly used.

Special 16,000 lb. 40″ Boring Lathes for 6″ Projectiles.
Immediate Delivery—Special Price—Write for Cuts, etc.

Good Delivery now on Lodge & Shipley 24″ Lathes.
Ask for information about machines for any operation on 3″, 4.5″, 5″, 6″, 8″ or 9.2″ Projectiles.—Our Experience is at Your Service—

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds

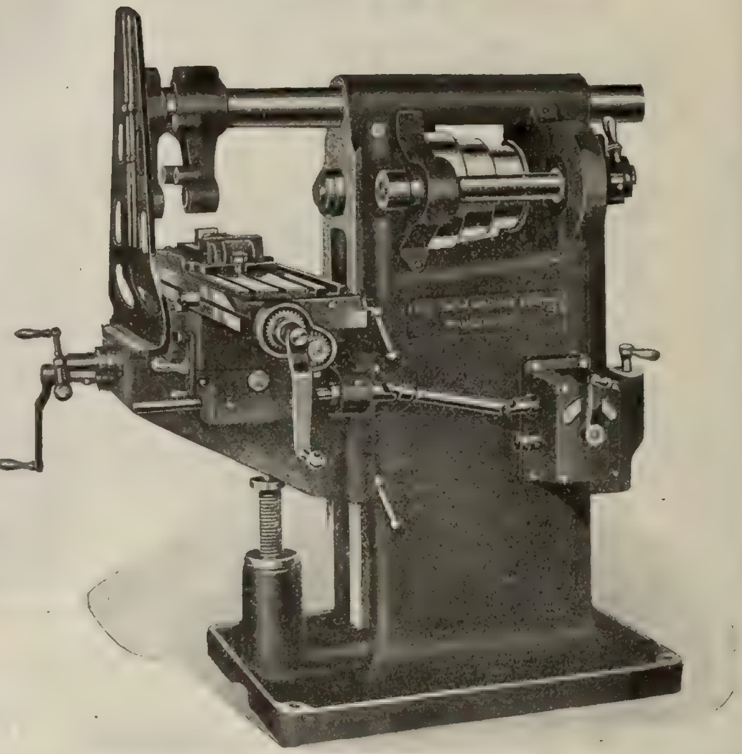
The Ford-Smith Machine Company

Ford-Smith

27" x 19" x 7½"

Milling Machines

ALL GEAR FEEDS



Following up our policy of manufacturing only Strictly High Grade Machine Tools, we are pleased to announce that all our Millers are now equipped with "ALL GEAR FEED."

A direct train of Gears allows nine changes of Feeds in both directions of table.

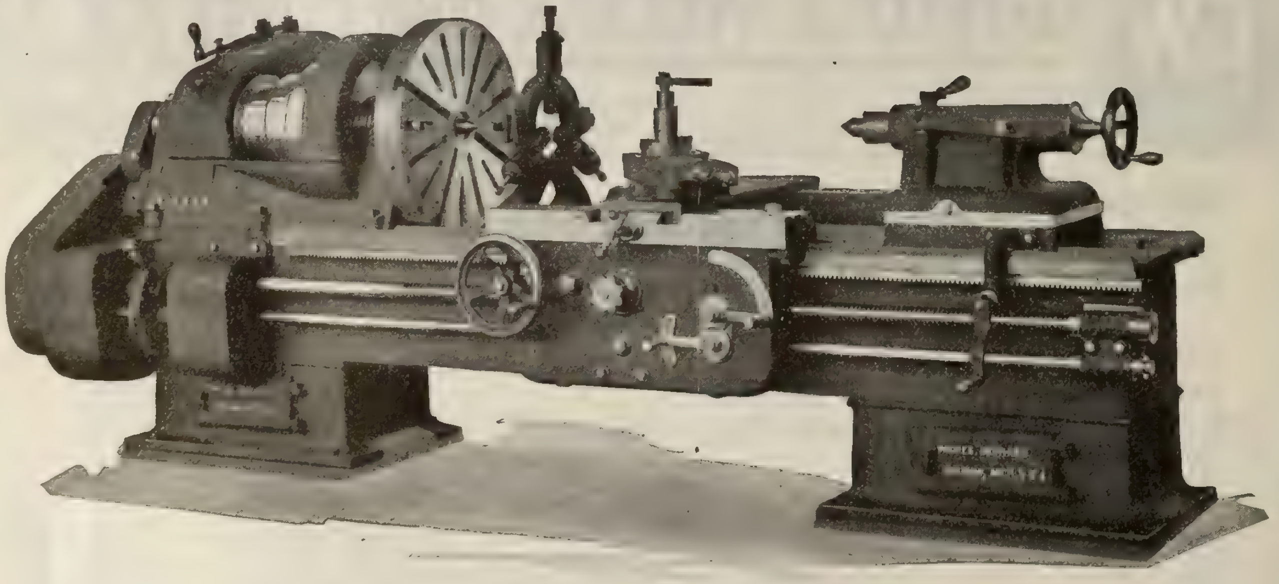
There are other points of excellence in our Millers, and the finish and accuracy leave nothing to be desired.

Suppose you write for our Miller Bulletin to-day, and look it over.

Additions to our plant and equipment, enable us to offer interesting deliveries.

The Ford-Smith Machine Company
LIMITED
Hamilton - - - - Canada

Wickes Heavy Duty Engine Lathe



The Wickes 26" Heavy Duty Lathe.

Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.

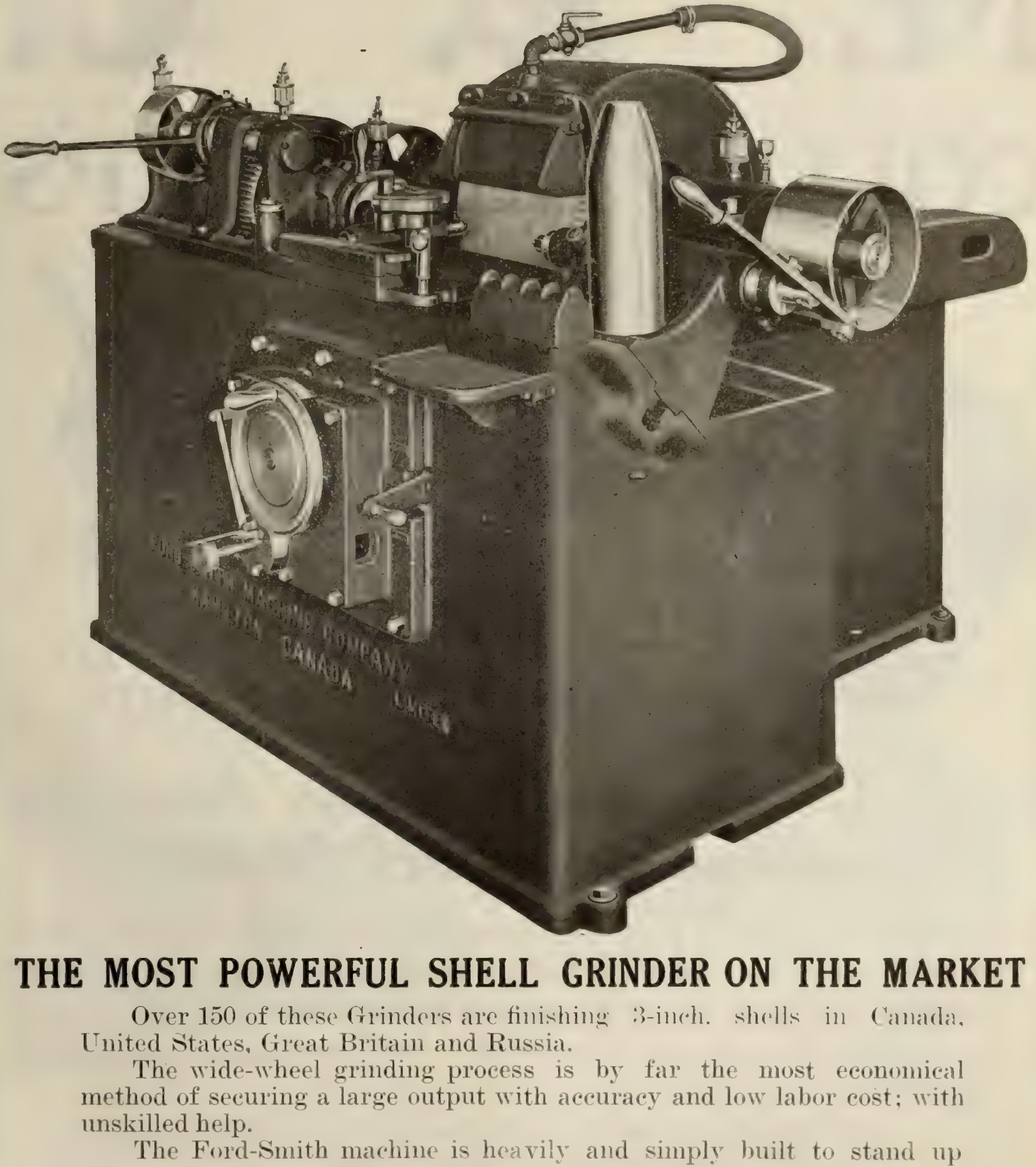
This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.

Let us tell you about this lathe and our 20", 32", also our 17" Rapid Production Lathe for Automobile and other work.

We can make prompt shipment.

WICKES BROTHERS Saginaw, Michigan

The Ford-Smith Shell Grinder



THE MOST POWERFUL SHELL GRINDER ON THE MARKET

Over 150 of these Grinders are finishing 3-inch. shells in Canada, United States, Great Britain and Russia.

The wide-wheel grinding process is by far the most economical method of securing a large output with accuracy and low labor cost; with unskilled help.

The Ford-Smith machine is heavily and simply built to stand up under continuous operation.

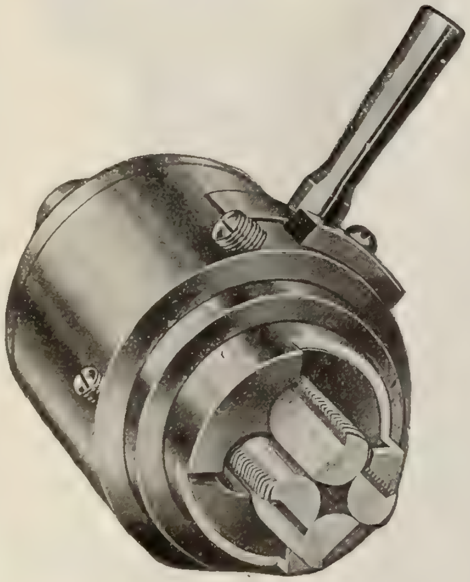
Investigate at once and place your order to secure early delivery.

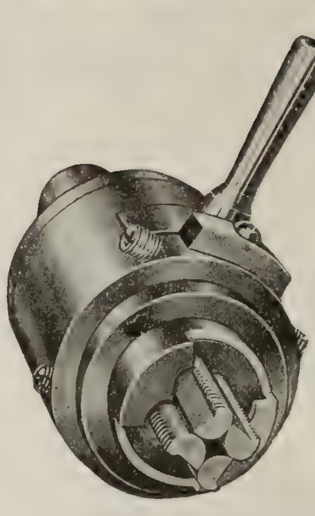
Ford-Smith Machine Co., Limited

HAMILTON, CANADA

M. E. C.

COLLAPSIBLE TAPS





WILL INCREASE YOUR PRODUCTION AND PROFITS

M. E. C. Collapsible Taps Are Big Favorites With Shell Makers

Invaluable because of their convenience, rigidity and accuracy. Many of the largest manufacturers of munitions have adopted them as a *practical way of reducing cost and increasing output,* after putting them to a severe test.

Would you like to hear what users have to say? We'll be glad to put you in touch with customers in your locality.

Drop us a line now for our proposition—it's a liberal one that's sure to appeal to you.

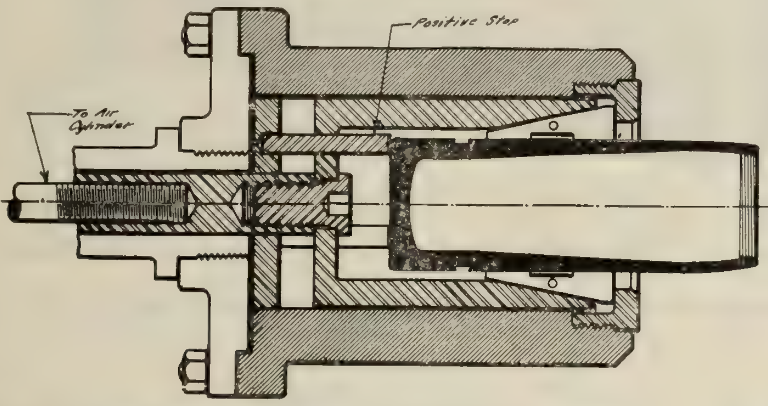
Manufacturers Equipment Company

175-179 North Jefferson Street, CHICAGO

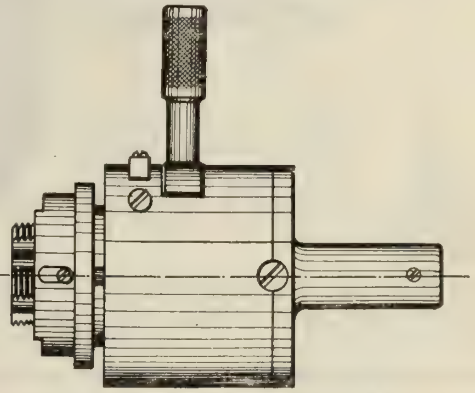
FOREIGN AGENTS: C. W. Burton Griffiths & Co., Ludgate Circus, Ludgate Hill, London, England. Bureaux & Caisse, 39 Rue de Lappe, Paris, France.

M. E. C.

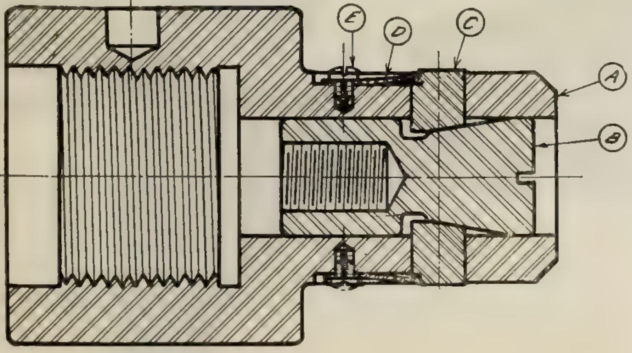
AIR OPERATED CHUCKS AND EXPANDING MANDRELS HAVE BECOME FAMOUS WITH SHELL MAKERS AND OTHER MANUFACTURERS THROUGHOUT CANADA, GREAT BRITAIN, RUSSIA, FRANCE, INDIA and other European Countries, which prove beyond doubt their dependability and productive qualities. Put to the test M.E.C. air operated chucks and expanding mandrels STAND UP. No Manufacturer who is desirous of increasing production can afford to be without these chucks and mandrels. We are auxious to have you demonstrate in your own plant just what this line will accomplish for you.



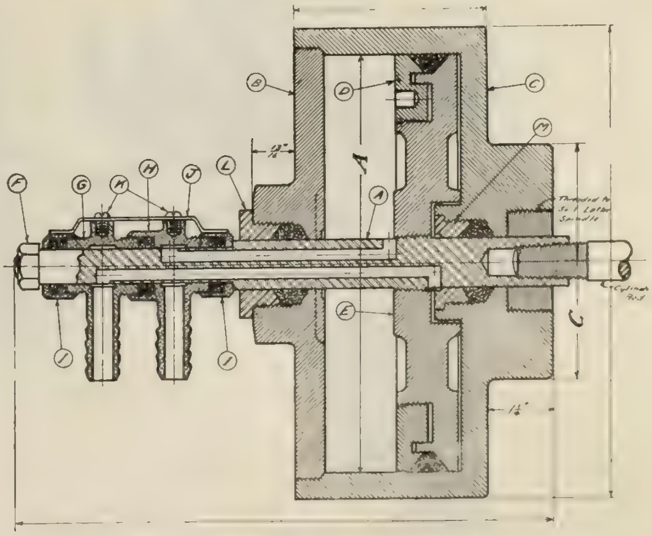
M. E. C. Air Operated Hinge Collet Chuck adapted for rough and finish boring operations.



M. E. C. COLLAPSIBLE TAP.



M. E. C. MANDRELS are indispensable in production of shells. We furnish Mandrels for rough and finished work. Acquaint us with your problems.



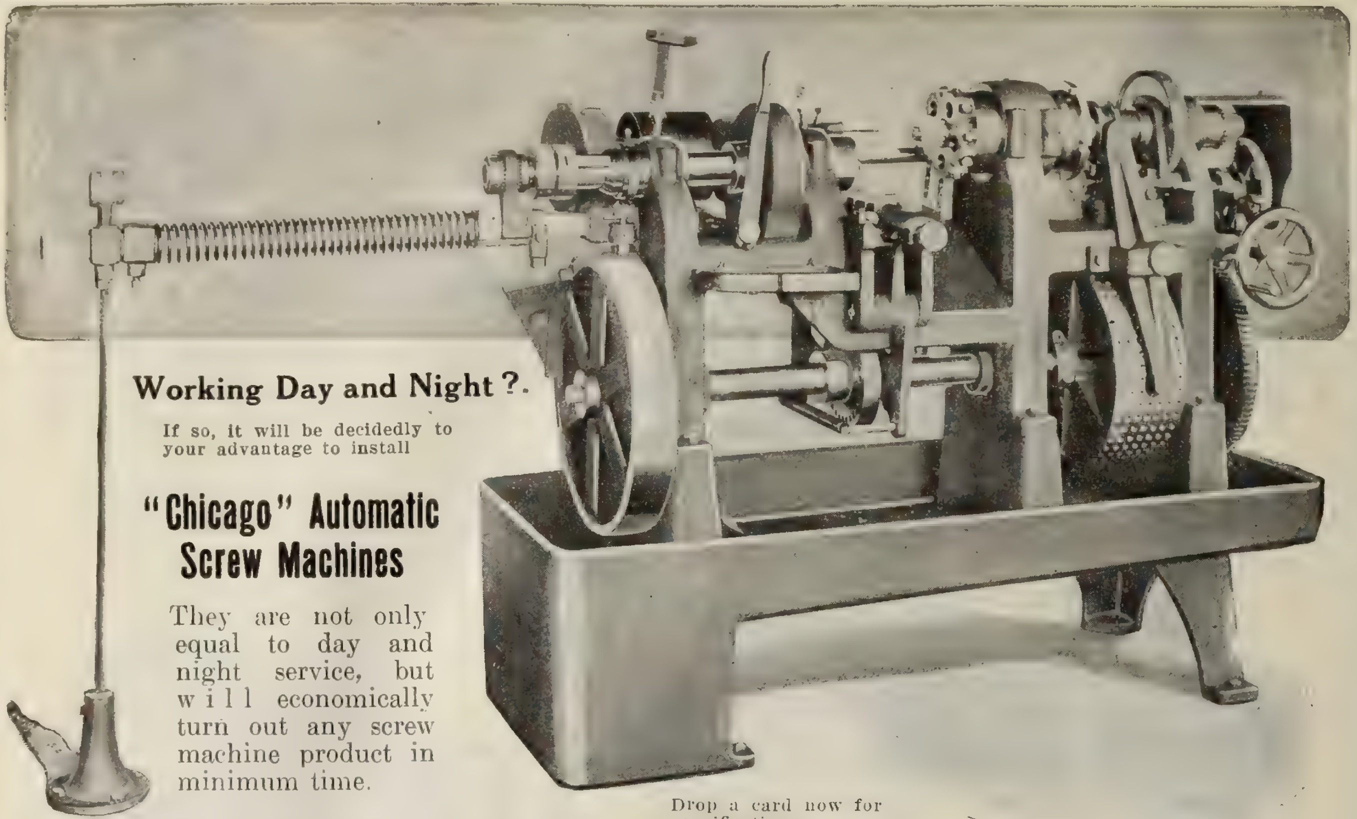
M. E. C. AIR CYLINDERS will solve your difficulties, as they embody every strong feature consistent with up-to-date requirements. Construction of piston permits adjustment, preventing unnecessary loss of air.

Manufacturers Equipment Company

175-179 North Jefferson Street, CHICAGO, ILL., U.S.A.

FOREIGN AGENTS—C. W. Burton Griffiths & Co., Ludgate Circus, Ludgate Hill, London, Eng.

CANADIAN AGENTS—A. R. Williams Machinery Co., Ltd., Winnipeg, Man.



Working Day and Night ?.

If so, it will be decidedly to your advantage to install

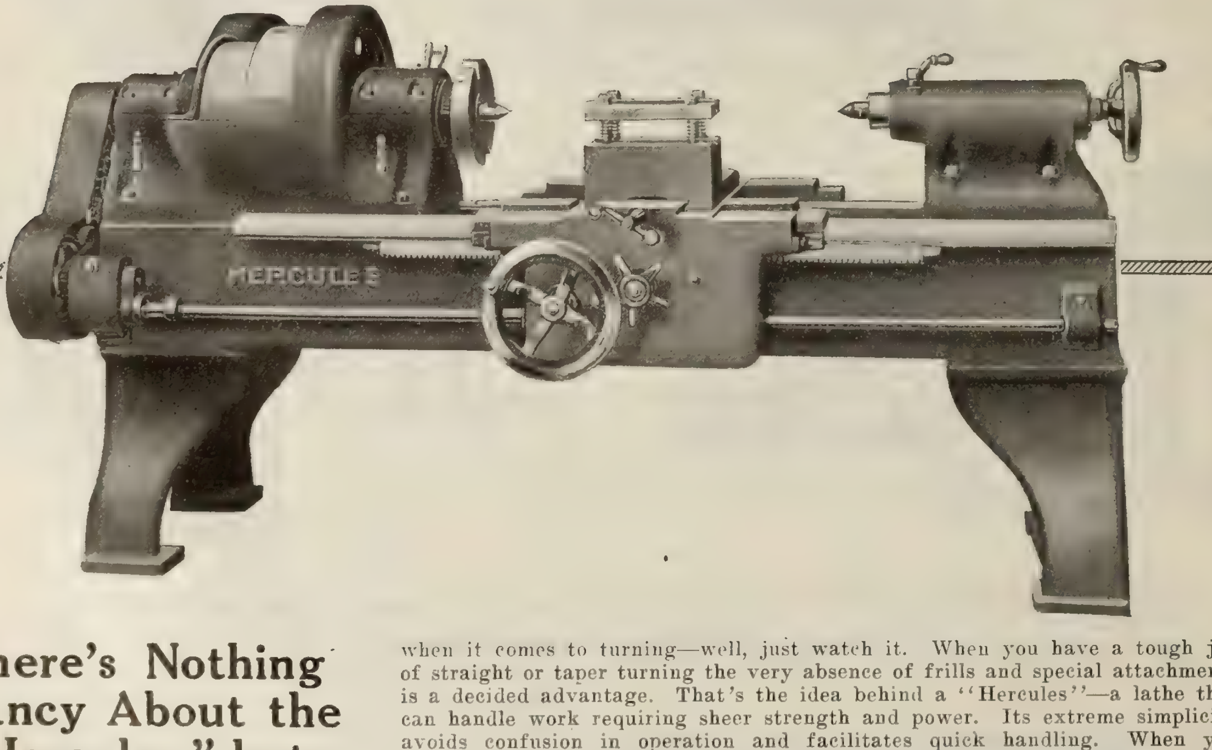
"Chicago" Automatic Screw Machines

They are not only equal to day and night service, but will economically turn out any screw machine product in minimum time.

Drop a card now for specifications.

READY FOR OPERATION IN YOUR PLANT IN LESS THAN SIX WEEKS from the time your order reaches us.

The John MacNab Machinery Co., 90 West Street NEW YORK,
European Representative: John MacNab, Hyde, England.

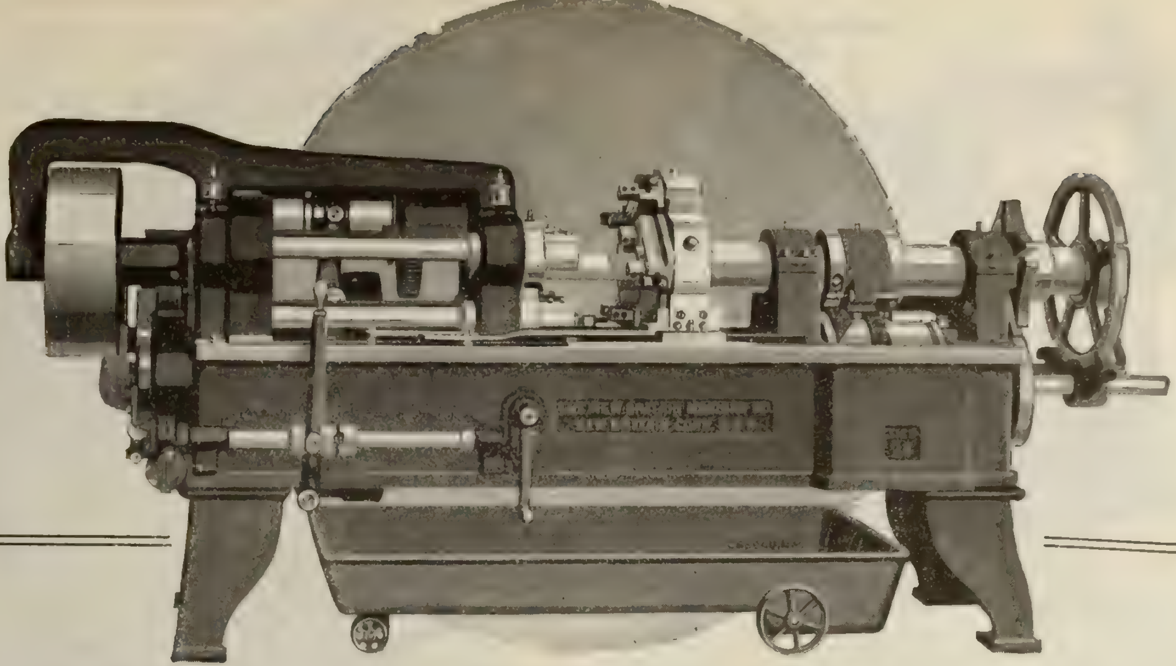


There's Nothing Fancy About the "Hercules," but—

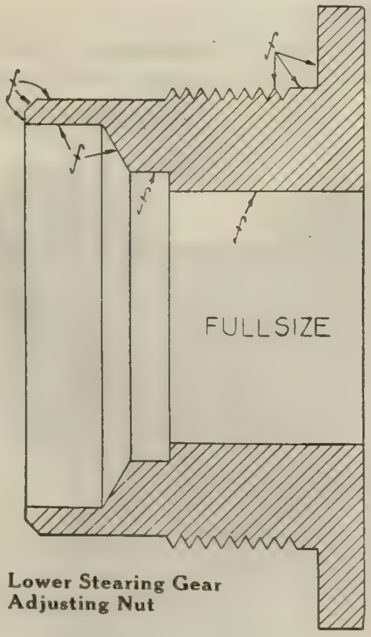
when it comes to turning—well, just watch it. When you have a tough job of straight or taper turning the very absence of frills and special attachments is a decided advantage. That's the idea behind a "Hercules"—a lathe that can handle work requiring sheer strength and power. Its extreme simplicity avoids confusion in operation and facilitates quick handling. When you realize that the majority of lathe work is plain turning, there are possibilities in the "Hercules" well worth considering. Early deliveries. Write us now.

Investigate our Turret Screw Machines

Himoff Machine Co., 128 Mott St., New York City



"Overland" Standards of Efficiency Demand "New Britain" Chucking Methods



Lower Stearing Gear Adjusting Nut

Operations:

Turn, Chamfer, Bore, Counterbore, Face End and Flange, and Thread.

Production:

72 pieces per hour (50 seconds apiece) finished complete as indicated at one setting in Size 24 Four-Spindle Machine.

Material:

Malleable Iron.

STANDARDIZED manufacturing processes applied to large output result in lowest costs.

An early recognition of this fact by its manufacturers has given the "Overland" a tremendous lead in volume of sales over other cars in its class.

No machine enjoys floor space in this huge 100-acre plant that does not do its particular work with accuracy and in less time than other machines of its type.

Efficiency is the watchword—the secret of "Overland" success.

"NEW BRITAIN" Multiple-Spindle Automatic Chucking Machines play no small part in the manufacture of the 1,000 "Overlands" produced per day.

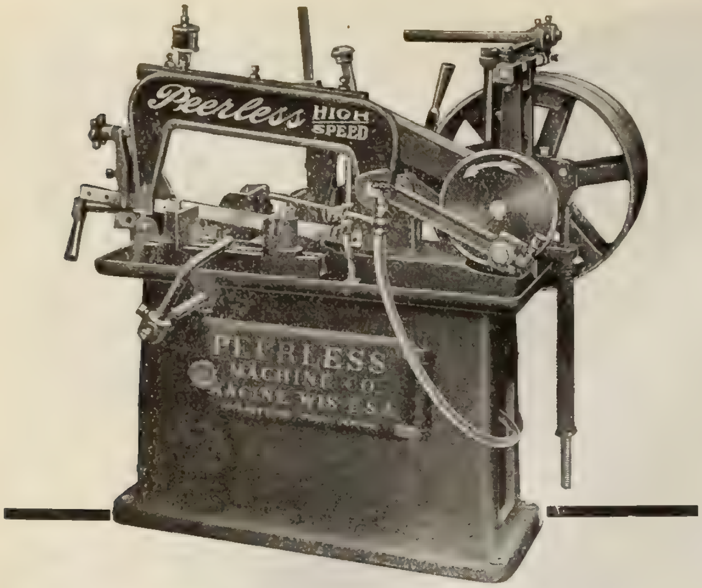
To their already large equipment of these Automatics, new machines are continually being added, handling such parts as Valve Stem Guides, Connecting Rod Bushings, Clutch Yokes, Carburetor Bodies, Fan Pulley Hubs, Push Rod Guides, etc.

If you have similar pieces to chuck, whether castings, forgings, or second-operation screw machine work, it would pay you to investigate the reason for the adoption of "New Britain" Automatics by the large automobile manufacturers.

The NEW BRITAIN MACHINE COMPANY

Automatic Screw and Chucking Machines

NEW BRITAIN, CONNECTICUT, U.S.A.



"100% Better, Faster and More Reliable

than any Sawing Machine we have ever used; we have had almost all makes of Sawing Machines manufactured."

Just what a customer in Toledo, Ohio, reports after a thirty days' trial.

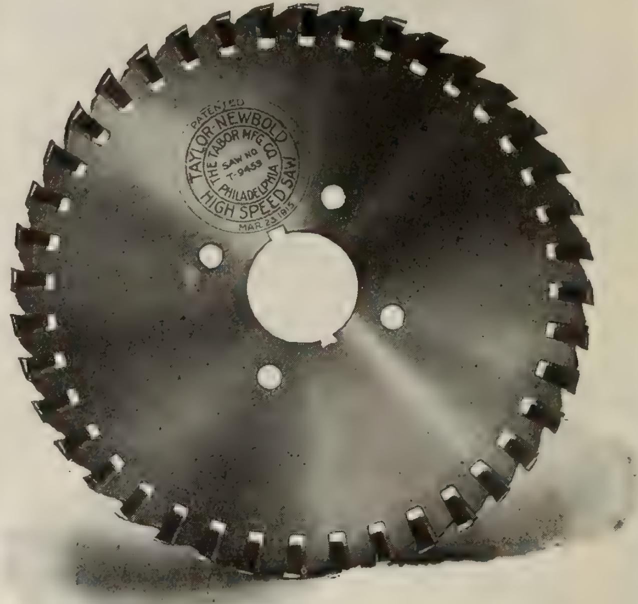
You don't have to take anybody's word for it, try it out under your own conditions. You are under no obligations if it fails—remember we also pay the freight both ways.

Not only 100% more production, but saves 100% floor space. These problems have handicapped many manufacturers for some time. They can now readily be solved by the Peerless High Speed Heavy Duty Metal Cutting Saw.

Write us for complete description and references. Some of these machines may be working in your vicinity.

Peerless Machine Co., 1607 Racine St., Racine, Wis.

THE IMPROVED TAYLOR-NEWBOLD



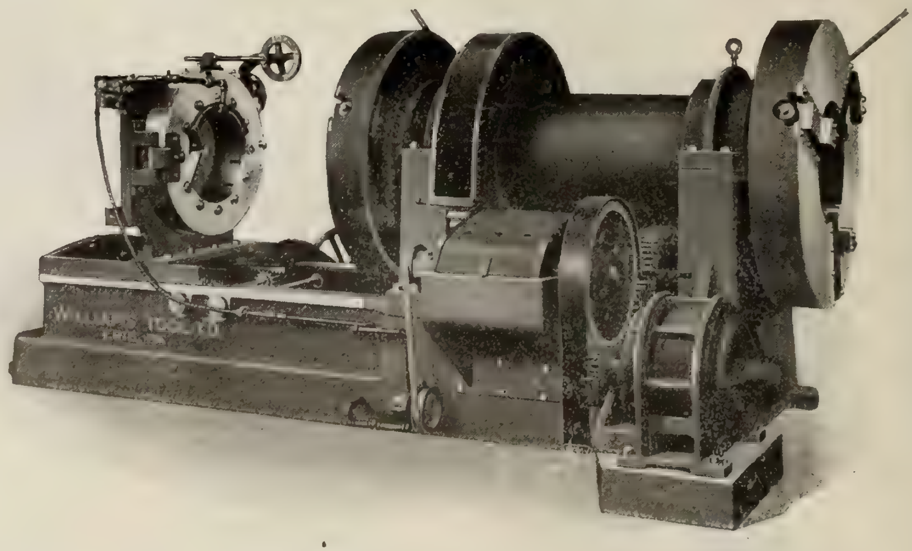
INSERTED TOOTH COLD SAW

Write for Bulletin T-S

Tabor Mfg. Co., Philadelphia, U.S.A.

WILLIAMS PIPE MACHINES

Received Highest Award at Panama Exposition



The Following Letter Explains Why:

Williams Tool Co., Erie, Pa.: Rochester, N.Y., 12-3-14.

Gentlemen:—We are so pleased with our No. 3 Pipe Machine, and it is doing such splendid work for us at a minimum of expense that we are now considering the advisability of displacing two smaller machines for one of your No. 1½ or No. 2 motor drive.

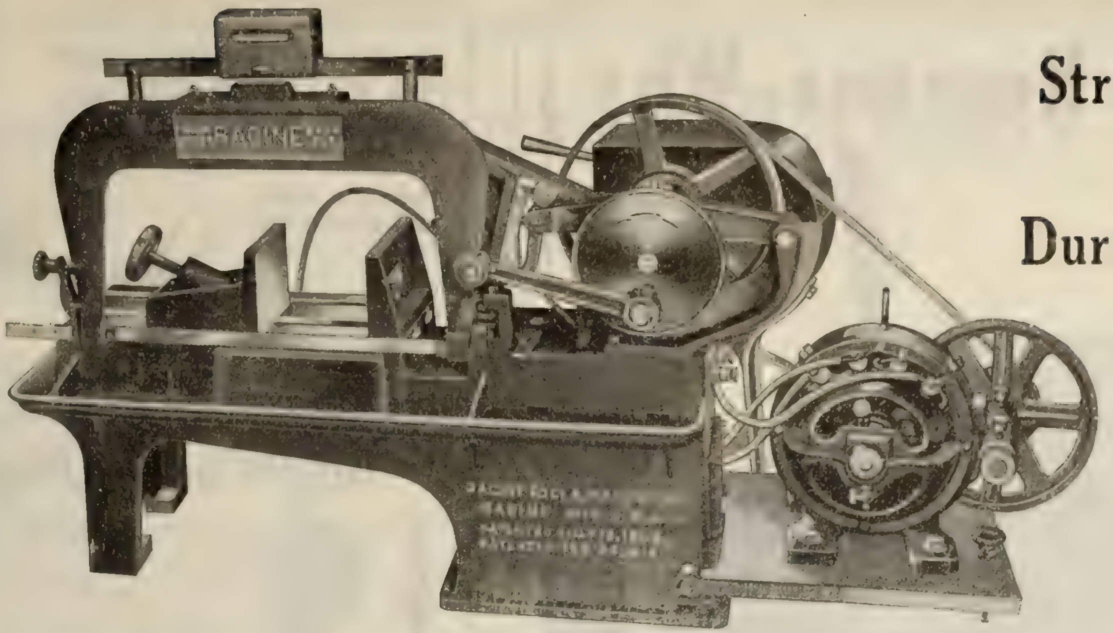
The machines which we would displace, if we make a change, are belt drive, are (names of two of the oldest and best known machines on the market) equipped with nipple holders, extra dies, etc. Both of these machines are still in fairly good condition. On what basis could we make an exchange with you?

Yours very truly, SAMUEL SLOAN & CO.

WILLIAMS TOOL CO. - - - ERIE, PA.

Rapid **Strong**

Massive **Durable**



RACINE

High Speed Metal Cutting Machine

More Speed Less Blades

The "RACINE" is the ORIGINAL, AUTOMATIC, POSITIVE LIFE, DRAW CUT, METAL CUTTING MACHINE—the World's STANDARD in metal cutting.

A machine tool – not a hack saw.

One of the big features of these Racine Metal Cutters is the *Patented Return Stroke Automatic Lifting Device* which lifts the blade clear of the work. It eliminates dragging back on the non-cutting stroke, thereby increasing both the output and endurance of the blade 500 per cent.

This machine is equipped with our Special THREE-SPEED TRANSMISSION, enabling you to cut all kinds of metal at the proper speed—PRACTICALLY THREE MACHINES in ONE.

THE "RACINE" is absolutely positive in every action; it will duplicate itself in every cut during the entire life of the machine.

All bearings are long, heavy and adjustable.

Used extensively in Canadian Plants. One Canadian Steel Company is using 120.

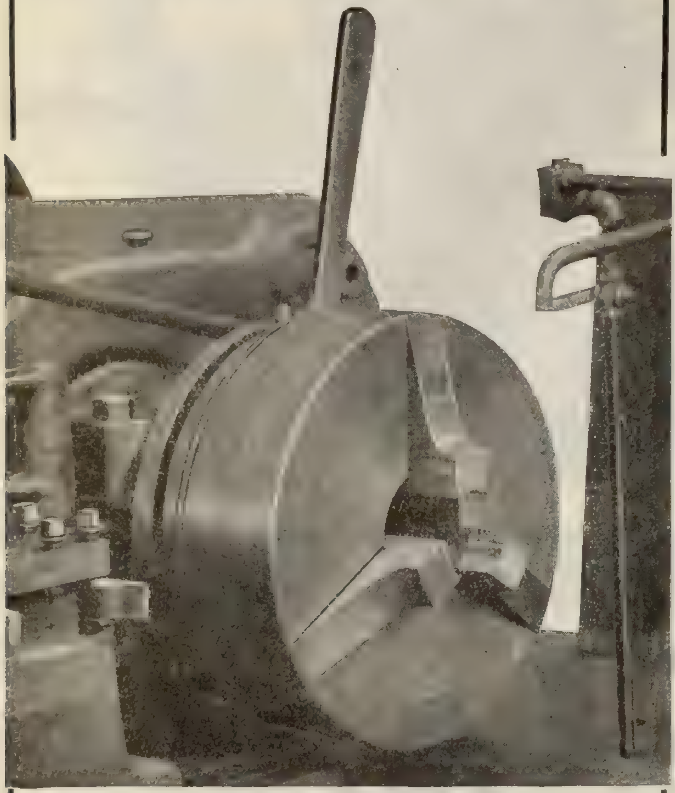
Made in four sizes—6" x 6"; 8" x 8"; 12" x 12" and 12" x 15".

We'll gladly put you in touch with users and send full details.

Racine Tool & Machine Company

15 Melbourne Ave., Racine, Wisconsin, U.S.A.

8 Reasons Why



Barker Wrenchless Chucks

should be on every lathe in your shop—they save time and increase production.

They Are

1. Opened and closed while machine is in motion.
2. A single unit, the operating mechanism and chuck being combined as one.
3. Strong, sturdy and practically trouble-proof.
4. Mounted in the same or less time than ordinary chucks.
5. Wrenchless.
6. Practically frictionless.
7. Costs nothing to install.
8. Overhang $\frac{1}{3}$ less than any air chuck same capacity.

Barker Wrenchless Chucks are not an experiment, but a vast step forward in modern shop practice.

Send for free descriptive literature—no obligation incurred.

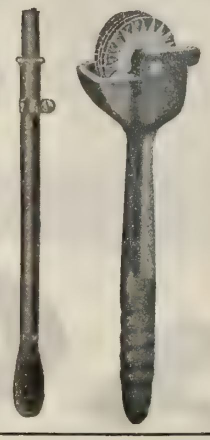
Thomas Elevator Co.
22 So. Hoyne Ave., Chicago, Ill., U. S. A.

IT TAKES MORE TIME TO SHARPEN A TOOL WHEN WHEELS ARE DULL OR COATED—

there's a delay in production too.

Both these losses are offset by the use of

Desmond-Stephan Grinding Wheel Dressers



No matter whether it is the ordinary shop grinding wheel or the largest, coarsest, hardest wheel, we have the tool that will return it to its original cutting efficiency.

Insist upon having your dealer supply you with one of our tools for trial. If he cannot, write us, and we will send any of them on approval.

For the ordinary shop grinding wheel specify the "DIAMO-CARBO."

For large, coarse hard wheels ask for the "SHERMAN-HUNTINGTON."

The Canadian Desmond-Stephan Manufacturing Company
Hamilton, Canada

Alfred Herbert, Limited, Coventry, Agent for Great Britain

The "Steno" Duplex Surface Grinder

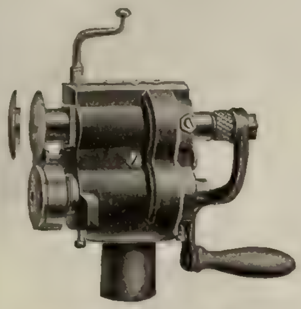
Every Shop Needs

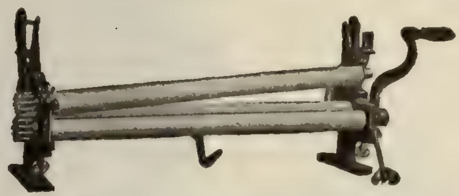
this two-in-one grinder. Fast on rough work—accurate on fine work. Two operators can work without interference from each other.

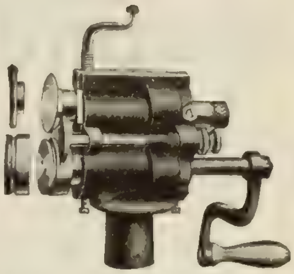
THE STENOTYPE COMPANY, INDIANAPOLIS, INDIANA, U.S.A.
Manufacturers of the "STENO" Duplex Surface Grinder, the "STENO" 1" x 7" Turret Hand Screw Machine and "STENO" Milling Cutters, Reamer, Fixtures, Jigs and Gauges.

Sheet Metal Working Machinery

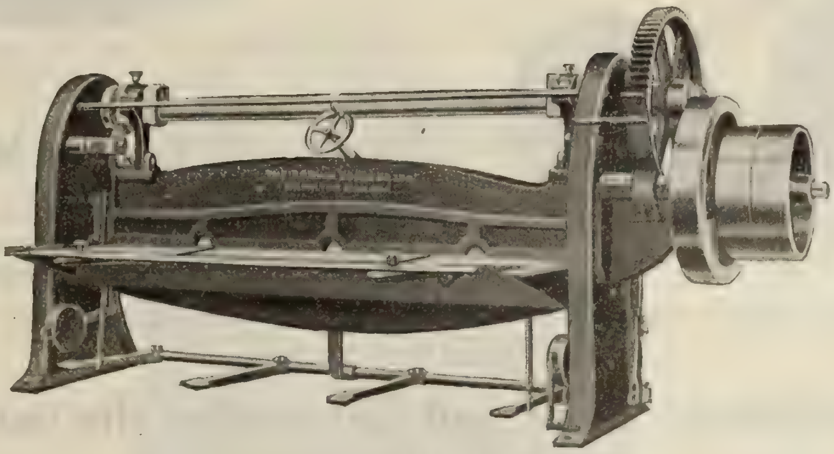
Of Any Description


Encased Large Burr

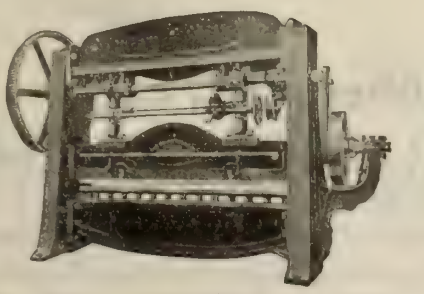

No. 9. Slip Roll Former

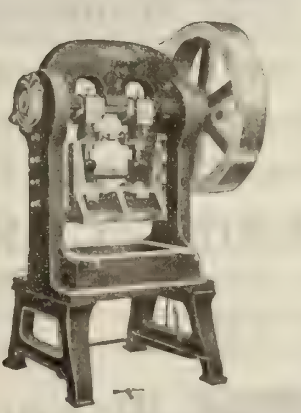

Encased Small Turner

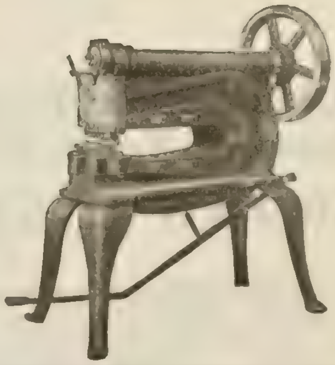
For
Quality
Efficiency
Durability



For
Speed
Accuracy
Production


No. 500. Power Brake or Press


No. 20½. Power Press


No. 126
Deep Throat Power Punch

THE BROWN, BOGGS CO., LIMITED

HAMILTON, CANADA

Manufacturers of
Tinsmiths' Heavy Sheet Metal Working Machinery, Canners and Evaporating Machinery, etc.

Montreal Agent:
W. L. HALDIMAND, Jr.

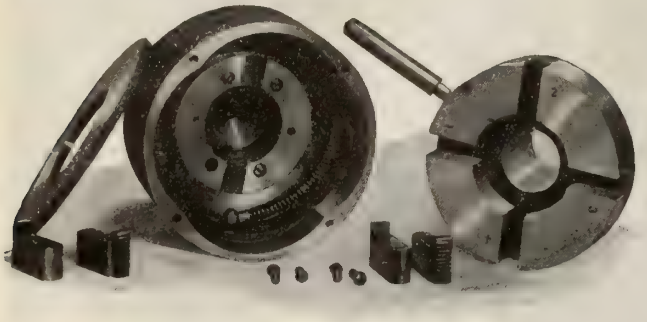
Western Agents:
BISSETT & WEBB, Winnipeg

British Columbia Agents:
E. A. EARL & CO., Vancouver

The "IDEAL" Die
for
Shrapnel

Quick, accurate work in threading Fuse Plugs for Shrapnel Shells is essential if you would make maximum profits. Your field is unlimited and your output governs your income. **Why not give the special type "C" Ideal Die a hard trial at this work and see if it will not boost production for you?**

Let the "IDEAL" cut the threads that bind you to low production. They will fit your machines. Circular on request.



"IDEAL" is a *different* die. The head revolves around a stationary cam, thereby utilizing the belt power or cutting strain as opening power. Chasers are supported directly back of cutting strain, which will remove any tendency to bell out and cause taper threads.

The Ideal Tool & Mfg. Company

BEAVER FALLS PA., U.S.A.
A. M. ELLICOTT CO., MONTREAL, QUEBEC
Distributors for Province of Quebec and Ottawa

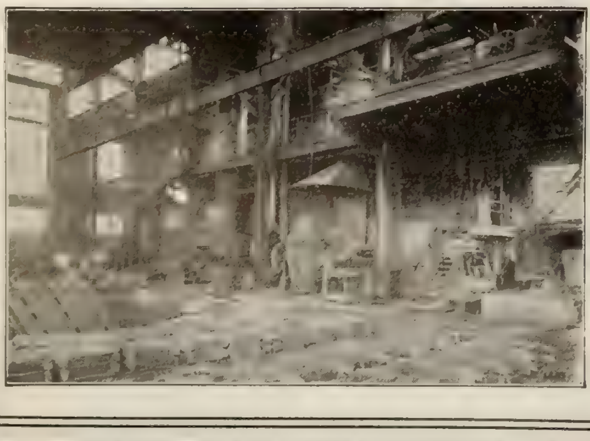
WE MANUFACTURE

Special Machinery, Tools and Gauges for the manufacture of Munitions.

WE MAKE TO ORDER

Special Machinery for any purpose.
Gauges, Tools, Cut Gears, Molds for rubber, Etc., Etc.

BROWN ENGINEERING CORPORATION, Limited
415-419 King St. W., TORONTO, Ont.



We Equip Foundries Complete

Grey Iron, Brass, Car Wheel, Pipe, Steel (OH. & Converter) and Malleable

from laying out the plant to starting it in operation. Our experts know the foundry and its problems from the ground up. Profit by our long experience.

Cranes of all Kinds

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB.

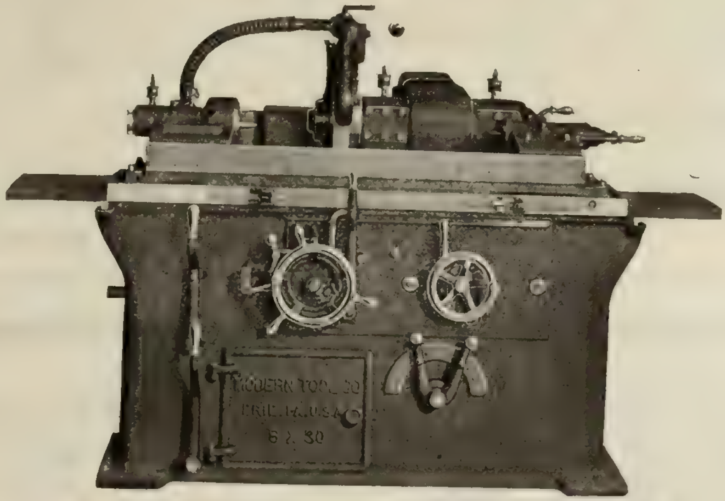
Catalogs on Request

For Economy

USE A

"Modern" Grinder

—not because the initial cost is less, but because the Modern will last longer and do more and better work every time it is used. We have spent years building grinding machines and offer a product unsurpassed by any on the market.



"MODERN" 8" x 30" Self-Contained Plain Grinding Machine.

Every detail of the "Modern" is worked out with the idea of making it the most all-round efficient grinding machine it is possible to make. It is the machine for **you.** Literature on application.

Write for Catalogue and full particulars

We strive to make the "Modern" every inch a "Quality" machine

Modern Tool Company

Main Office and Works:
State and Peach Streets Erie, Pa., U.S.A.

New York Office, 50 Church Street Chicago Office, 32 N. Clinton Street
F. Wesley Parker, Resident Engineer and Export Agent, 2 Rector St., New York

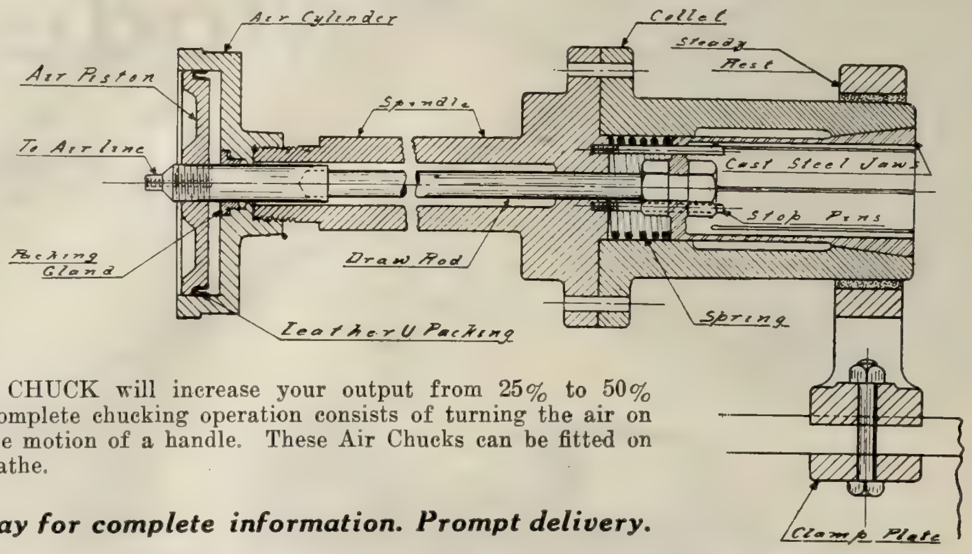
Get Out Your Watch and Time Your Chucking

With most screw chucks you have to use brute force or the hammer to tighten, and even then your shell is not always rigid.

H.E.W. AIR COLLET CHUCK IS RIGID

Saves Time

Saves Money

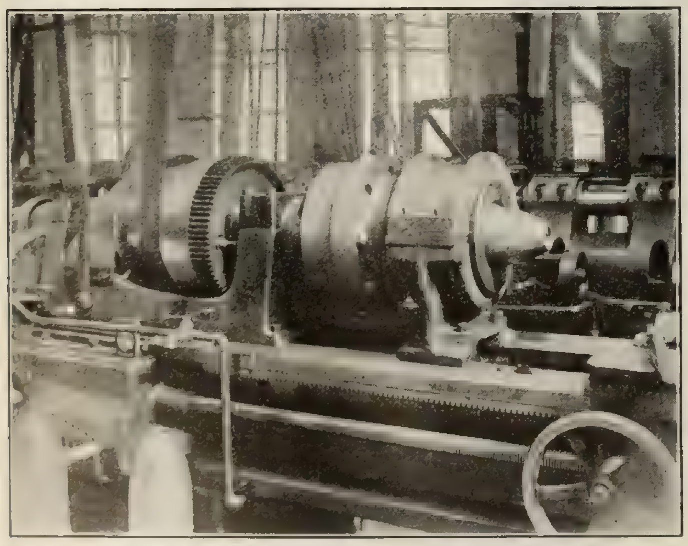


H.E.W. AIR CHUCK will increase your output from 25% to 50% because the complete chucking operation consists of turning the air on and off, by the motion of a handle. These Air Chucks can be fitted on almost any Lathe.

Write to-day for complete information. Prompt delivery.

HYDE ENGINEERING WORKS

P.O. BOX 1164
27 William St., MONTREAL



Cut shows Chuck on nosing operation. This is one of over two hundred in this Canadian plant.

This chuck is *built on the duplicate part system. It is simple, effective and fool-proof.*

It grips the shell in a predetermined position. The jaws will not slip on the shell. It has shell interior and exterior adjustable stops.

A trial on one of your lathes will convince you that this is THE Chuck for shell work.

A Big Efficiency Unit in Your Shell Plant

A. J. LAVOIE'S

LOW PRESSURE

Compressed Air Chuck

This chuck can be applied to any make of lathe, without alteration to the machine, and will increase production from 25% to 75%. It grips and releases the shell while in motion—no need to stop your machine.

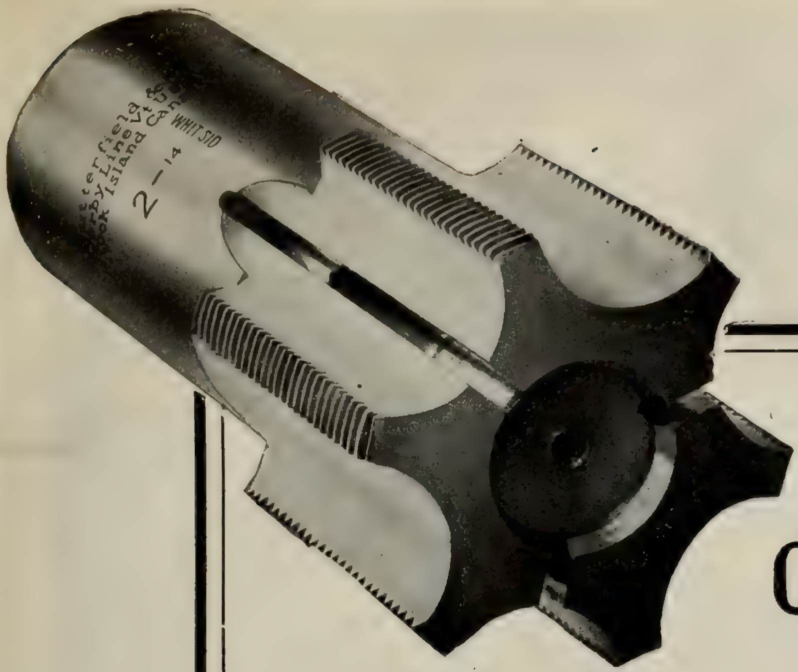
It is a single unit combination attached to the face plate of lathe, supported by an additional heavy duty bearing, thus making a heavy duty lathe out of a light machine. A small lever operates the chuck. Will operate with a pressure of 60 lbs. per sq. in.

MANUFACTURED BY

The Montreal General Tool Co.

673-5 Notre Dame Street, Maisonneuve, Montreal, P.Q.

Also manufacturers of shell tools, and special machine attachments of all kinds made to order.


Butterfield & Co.
Derby Line Vt.
Rock Island Can.
WHIT. S/D
2-14

ON TIME!

These Butterfield High-Power Tools will help you get out your rush work on time. They are built to stand up under the heavy strain of exceptional production. Look at them! See their strength! Their compact, rigid design. We have developed this line of Taps especially for shrapnel and shell work.

The name "Butterfield" on your taps, dies and reamers is a guarantee of quality—a mark of superiority. We build into every one the experience of thirty-five years devoted to the manufacture of high-grade tools.

That is what makes Butterfield quality. We have a new catalog. Let us send you a copy.

Butterfield & Co., Inc.
Rock Island,
QUEBEC

Butterfield & Co.
Derby Line, Vt. U.S.A.
Rock Island, Canada.
WHIT. S/D
2-14

Toronto Office:
1505 Traders Bank Bldg.,
Phone Main 1382.
H. A. Harrison, Mgr.

STARRETT TOOLS
TRADE MARK REG. U.S. PAT. OFF.
No 446
The L.S.Starrett Co. Athol, Mass. U.S.A.

An Important Combination

The Man—the Machine—and the Tool

Even an expert workman is unable to accomplish much without good machines and accurate measuring instruments. Part of his skill lies in using the instruments to guide him in his work at the bench or with a machine tool. The country's ablest toolmakers and machinists rely for their fine measurements on

Starrett Tools

No matter how delicate the job, nor how difficult, there is always a way to get an accurate working knowledge by the aid of some Starrett Tool. The line includes:

Rules, squares and levels, micrometers, calipers and dividers, surface gages, combination sets, depth and height gages, etc.

Send for free catalog No. 213, describing the whole line.

The L. S. Starrett Co.
The World's Greatest Toolmakers
Athol, Mass.

42-514

CELFOR

HIGH SPEED DRILLS

What Do You Pay For Holes?

DOES your work require the utmost in accuracy or does it require SPEED, combined with the ordinary amount of accuracy?

We have a drill—Type "A"—that will put a hole through metal just a little faster than you thought possible in any drill.

This drill is strong, durable, less expensive than milled drills and capable of feeds and speeds impossible with any other kind of a drill.

A good stock of all sizes assures prompt delivery.

Celfor
TOOL
COMPANY

Get our catalog Number 15 and learn more about these time and money-saving drills.

CELFOR TOOL CO.

BUCHANAN, MICH.

Agents—Canada: Rudel-Belnap Machinery Co., Montreal and Toronto. Great Britain: Coats Machine Tool Company, Caxton House, London. Japan: Andrews & George, Tokyo.

Just Off the Press

To Canadian Manufacturers:

Your copy of this latest catalog on steel lettering dies and stamps is now ready for distribution.

You will find, we believe, that this is the largest and most complete catalog, covering the particular subject, ever distributed in Canada. It embraces steel dies and stamps that can be used in your plant and every plant in Canada irrespective of the nature of the business.

Fully illustrated with half-tone reproductions. Prices shown so that a minimum of time is required to determine cost of your requirements. Handsomely printed and bound and of a standard catalog size for easy filing. Forty-six pages of valuable information. Notice some of the subjects covered:

Partial Contents

Barrel embossing outfits.

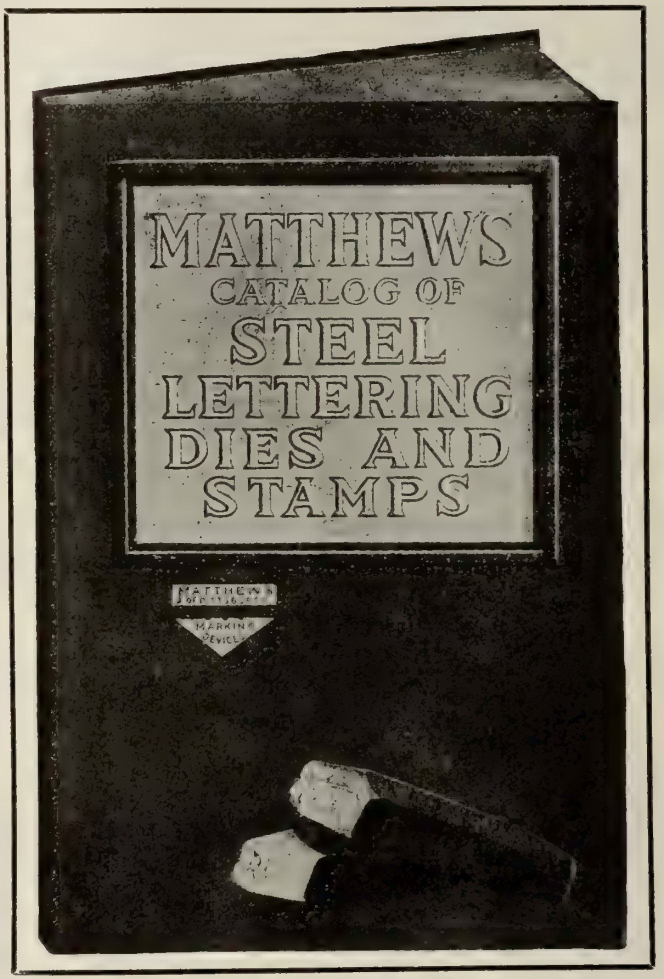
Inspection hammers.

Steel dies for use in presses or special marking machines.

Dies for tin plate.

Machines for embossing tags (metal).

Lumber marking stamps and hammers.



THIS IS THE BOOK

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Symbol stamps for inspection.

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Stencil dies.
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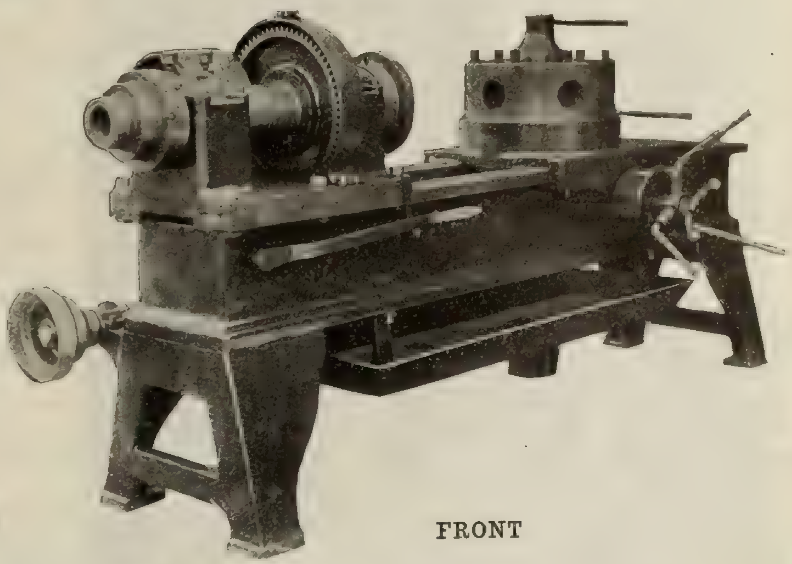

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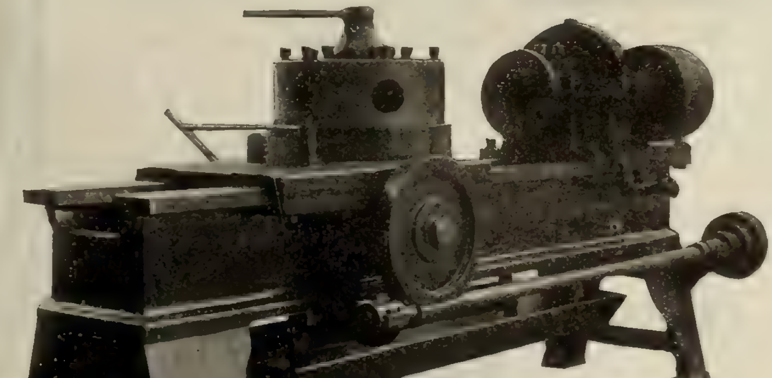

BACK

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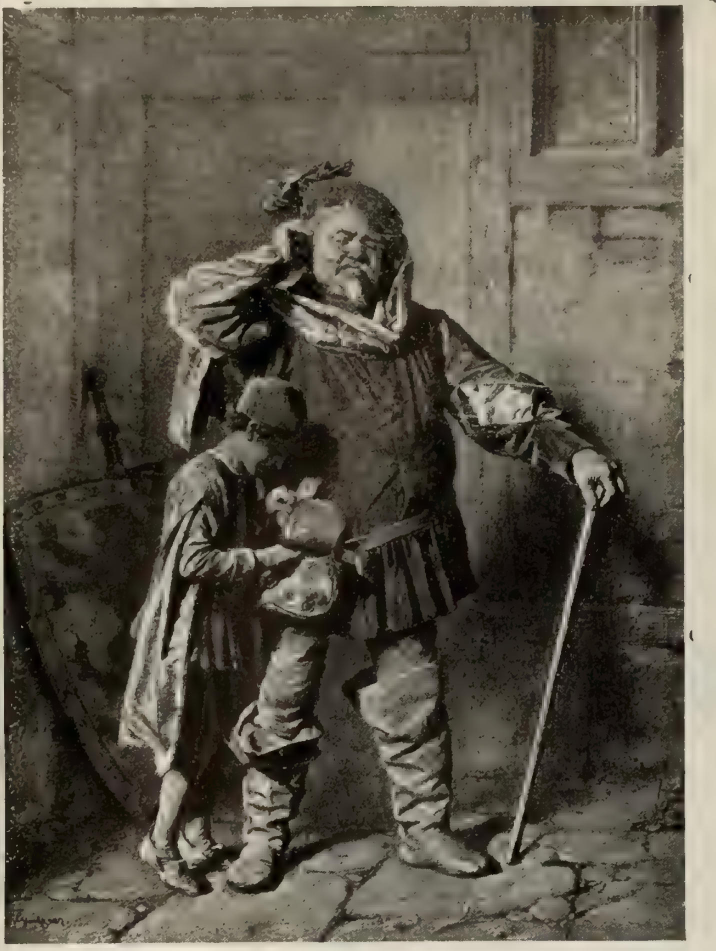

FALSTAFF AND PAGE
FALSTAFF:
"What money is in my purse?"
HENRY IV.

SERIES No. 6

FALSTAFF

was often asking the question though his purse was mostly empty.

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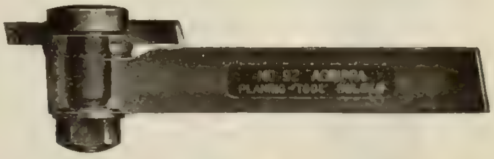

The Planing Tool with thirty-six angles of adjustment may be used on shapers or for heavy turning on lathes.

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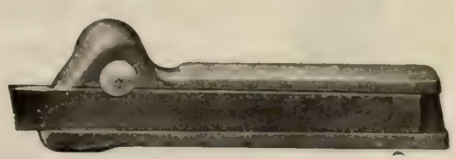

A tool that performs both cutting-off and side work by the mere substitution of suitable cutters tells its own story of economy.

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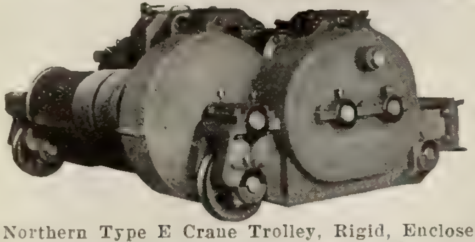

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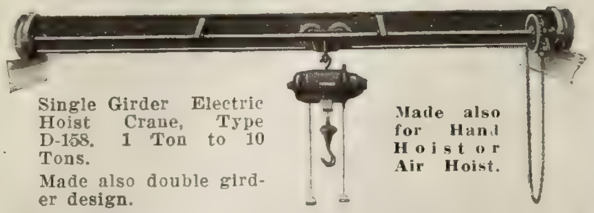

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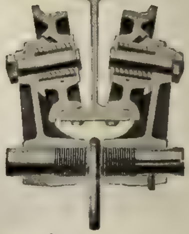

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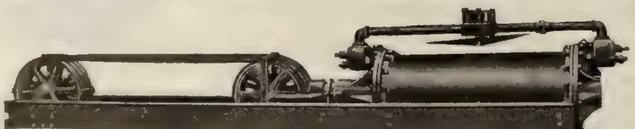

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No Set Screws

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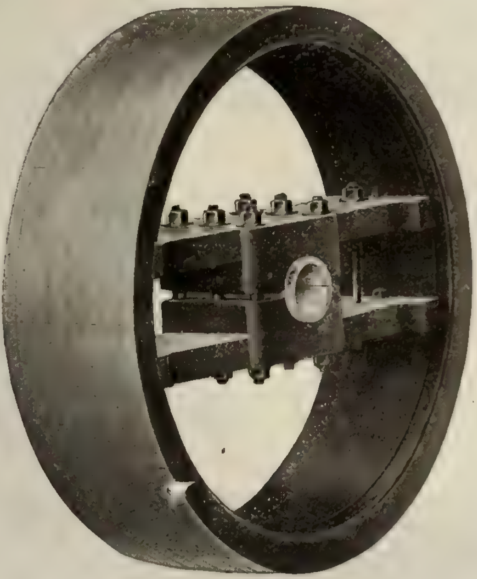

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Better Belt Surface

The Dodge Standard Wood Split Pulley

The Wood Split Pulley is better than either cast iron split pulleys or steel split pulleys for the following reasons—

The wood pulley is lighter, stronger, better balanced, and provides a very much better belt surface. It costs 33 1-3% less money and provides 50% more returns in horse-power value. It may be run at very much higher speeds with no danger of bursting—also it may be had quicker and in a greater range of sizes.

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Huntington, W. Va.

Feb. 11, 1916.

The Graton & Knight Mfg. Co.,
Philadelphia, Pa.,

Gentlemen:-

You will undoubtedly be interested to learn of the service we have derived from the 24" 3-ply Heart Belt we installed January 7th, 1913. This belt drives our entire factory, it has not been taken up since it was placed in operation, and is still giving perfect satisfaction.

Since installing this 24" Heart Belt, we have found it to our advantage to standardize on your Heart Belting throughout our plant. This will indicate more forcibly than words the satisfactory service we have derived from the use of your belting.

Yours very truly,
NICHOLSON-KENDLE FURN. CO.
C. W. Kendle

CWK/EC

"There's no use arguin' agin' a success."
—Josh Billings.

—This bit of homely philosophy explains why the Nicholson-Kendle Furniture Company, and others, standardize on Heart Belting.

—Manufacturers to-day are considering as never before efficiency and economy as applied to plant operation, and a belting must be "a success," must make good before that particular belting is adopted as standard equipment.

—In all industries wherever STRICTLY FIRST QUALITY HEAVY belting is required, Heart Brand is the selection because it is made from the choicest oak tanned leather, tanned in our own tannery slowly, uniformly, and expressly for belting purposes—because it is made carefully, intelligently and honestly—because it is graded to a certain specified standard of quality—because it is "a success."

—You, too, may place full dependence upon Heart Belting, for "There's no use arguin' agin' a success."

THE GRATON & KNIGHT MFG. COMPANY

Manufacturers of the Famous Spartan Belting

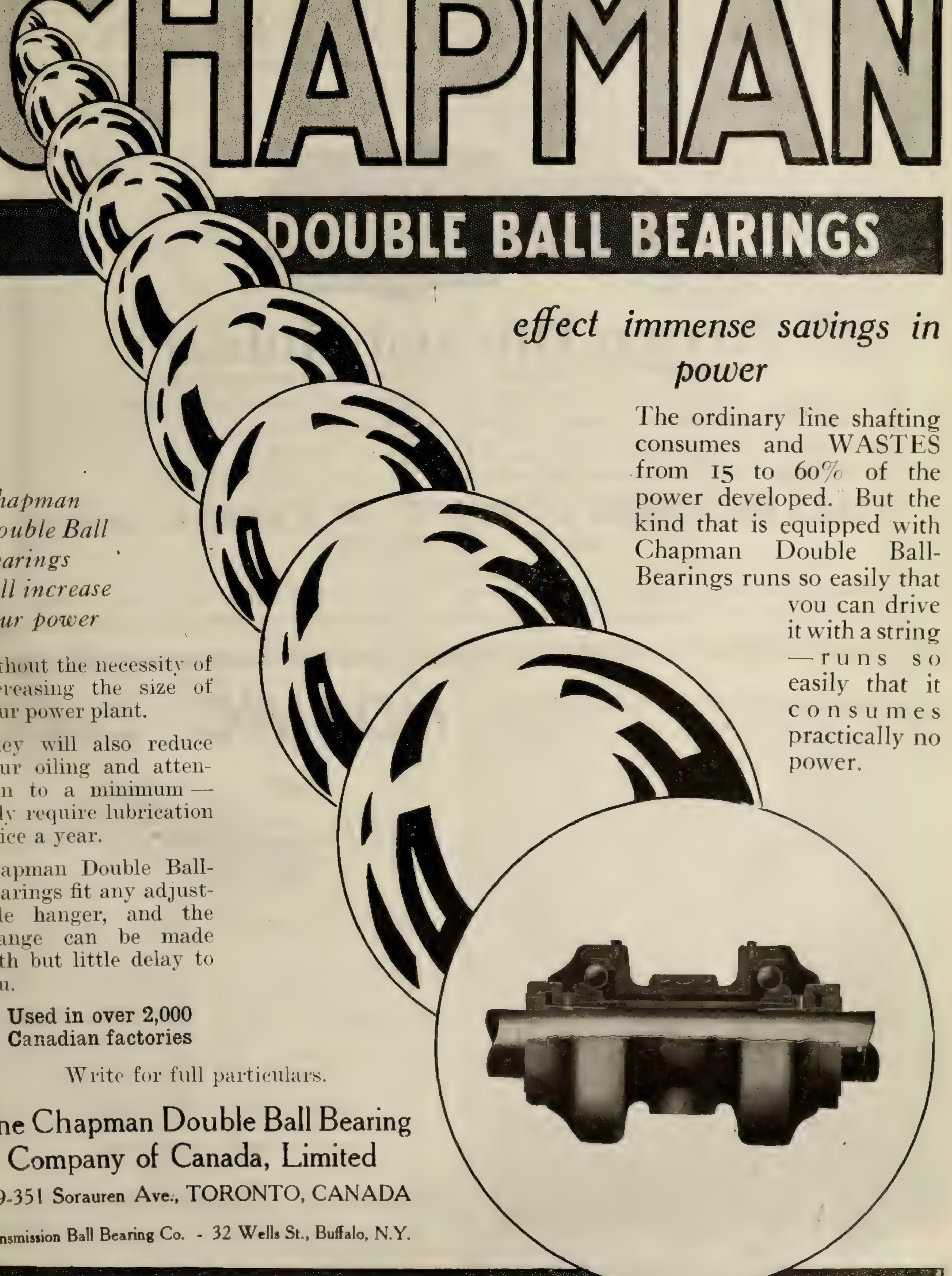
WORCESTER, MASS,, U.S.A.

Representatives in Canada; The Canadian Fairbanks-Morse Co., Limited, St. John, Toronto, Quebec, Hamilton. Montreal, Ottawa, Vancouver

"Consult our Engineering Department in connection with your Transmission Problems."

CHAPMAN

DOUBLE BALL BEARINGS



effect immense savings in power

The ordinary line shafting consumes and WASTES from 15 to 60% of the power developed. But the kind that is equipped with Chapman Double Ball-Bearings runs so easily that you can drive it with a string—runs so easily that it consumes practically no power.

Chapman Double Ball Bearings will increase your power

without the necessity of increasing the size of your power plant.

They will also reduce your oiling and attention to a minimum—only require lubrication twice a year.

Chapman Double Ball-Bearings fit any adjustable hanger, and the change can be made with but little delay to you.

Used in over 2,000 Canadian factories

Write for full particulars.

The Chapman Double Ball Bearing
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Transmission Ball Bearing Co. - 32 Wells St., Buffalo, N.Y.

Economical Screw Threads

—the producing of them is the problem of thousands of manufacturers. We took a long step toward the solving of this problem in producing the

Acorn Die and Holder

It has so many advantages over the old style spring die and various other forms of dies and holders for machine use that it is difficult to enumerate them all.

A demonstration of the Acorn Die and Holder on your own work and on one of your own machines will give you a new standard for economy in screw threads.

WELLS BROTHERS COMPANY OF CANADA, Limited
GALT - ONTARIO

Sales Agents:
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NOSING DIES

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FOR

4.5", 5" and 6" H.E. Shells

We have one in use now that has nosed over 24,000 shells and is still doing business.

CHEAP AND EFFICIENT

Write or wire for particulars.

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There's one to every 33rd man

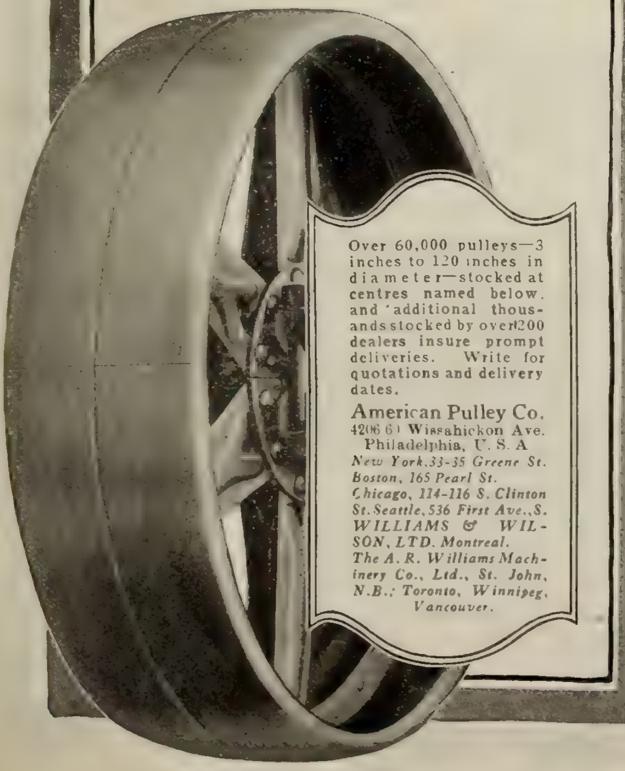
People do not always realize just what it means when we tell them that we have marketed about three million American Steel Split Pulleys.

The significance of these figures lies in the tremendously widespread use of this pulley.

When you compare that part of the population of the country *interested* in steel pulleys, with the total population, it looks like a mighty small factor—but when you consider that this small portion of all the people in the United States has bought so many "AMERICANS" that there is one to every 33rd person in the country, you will get some idea as to the magnitude of this business.

Definite points of merit, definite superiority in service, definite increase in value per dollar—these are some of the reasons why there is one "AMERICAN" Pulley to every 33rd man.

AMERICAN
STEEL SPLIT PULLEY



Over 60,000 pulleys—3 inches to 120 inches in diameter—stocked at centres named below, and additional thousands stocked by over 200 dealers insure prompt deliveries. Write for quotations and delivery dates.

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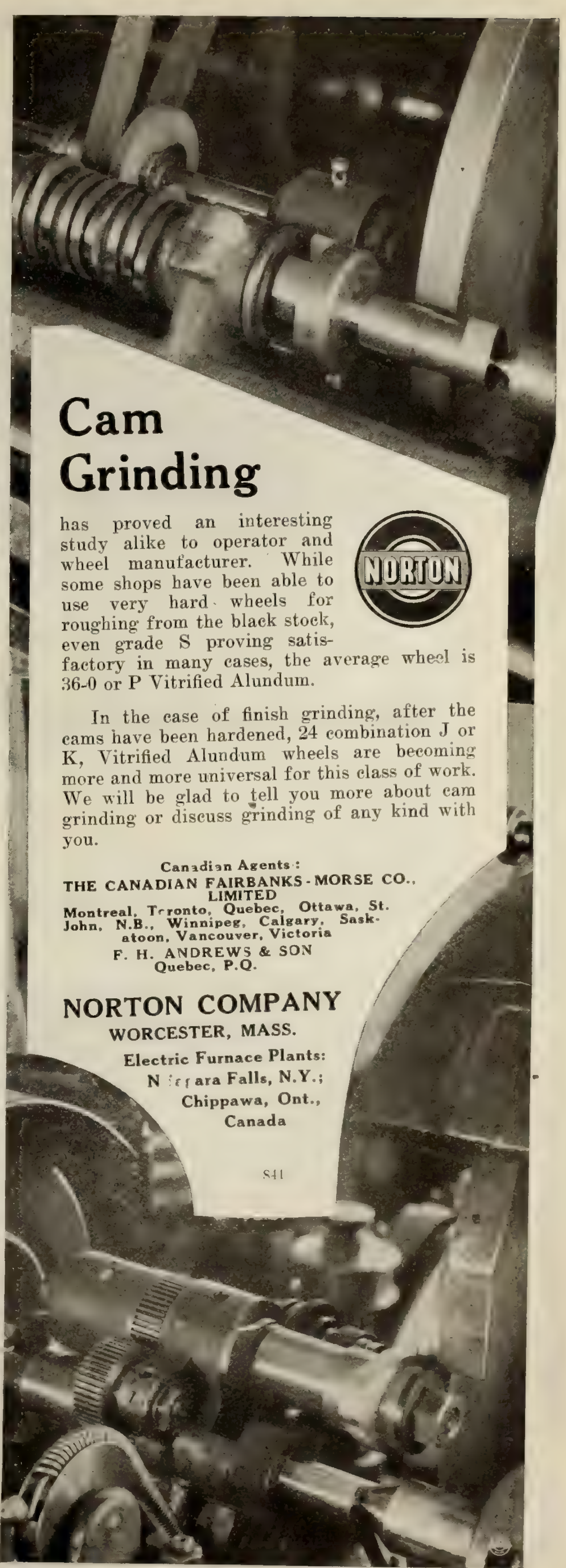
Boston, 165 Pearl St.
Chicago, 114-116 S. Clinton St.
Seattle, 536 First Ave., S.
WILLIAMS & WILSON, LTD. Montreal.
The A. R. Williams Machinery Co., Ltd., St. John, N.B.; Toronto, Winnipeg, Vancouver.



Cam Grinding

has proved an interesting study alike to operator and wheel manufacturer. While some shops have been able to use very hard wheels for roughing from the black stock, even grade S proving satisfactory in many cases, the average wheel is 36-0 or P Vitrified Alundum.

In the case of finish grinding, after the cams have been hardened, 24 combination J or K, Vitrified Alundum wheels are becoming more and more universal for this class of work. We will be glad to tell you more about cam grinding or discuss grinding of any kind with you.

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F. H. ANDREWS & SON
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NORTON COMPANY
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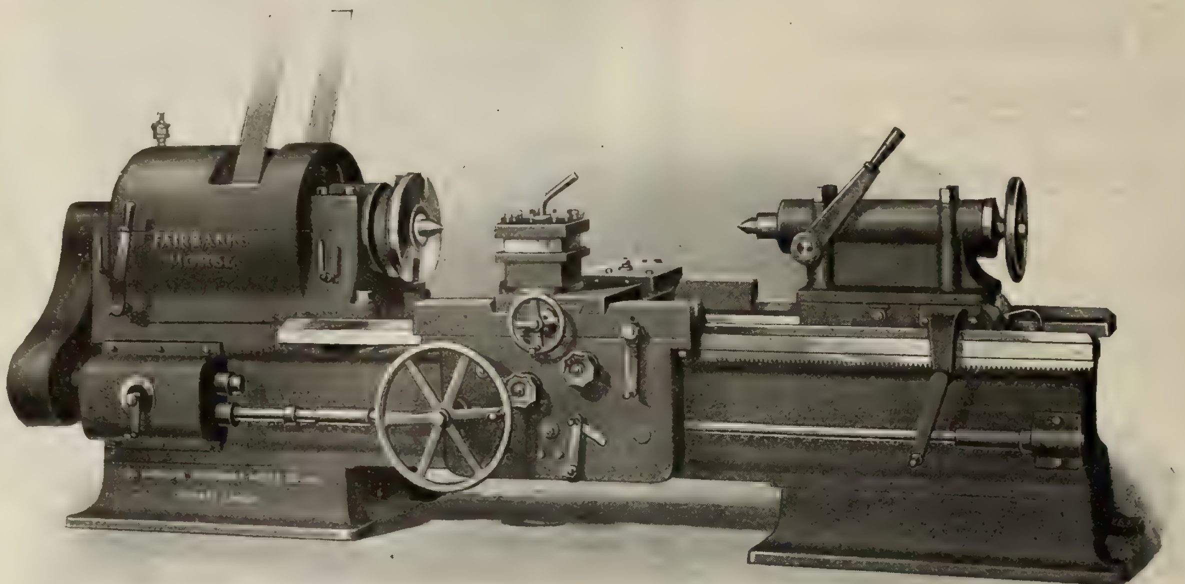
Electric Furnace Plants:
Niagara Falls, N.Y.;
Chippawa, Ont.,
Canada

S41



Fairbanks-Morse 26" Heavy Duty Lathe.

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3.—Machine Tools

Having developed the power, and then transmitted it to the shop, we wish to call your attention to our Machine Tool Department. Here you may select a machine to perform practically every operation necessary to the metal working industry.

The demand for machine tools during the past two years has been extreme. In spite of this fact, we have been able to secure the shortest possible deliveries for our customers.

The list on the left gives a partial idea of the tools which we have been supplying to the Manufacturers of Canada for many years.

Let us know your requirements, and look up our large stocks in Toronto and Montreal, before placing your order.

See our partial stock list on page 89

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Canada's Departmental House for Mechanical Goods.

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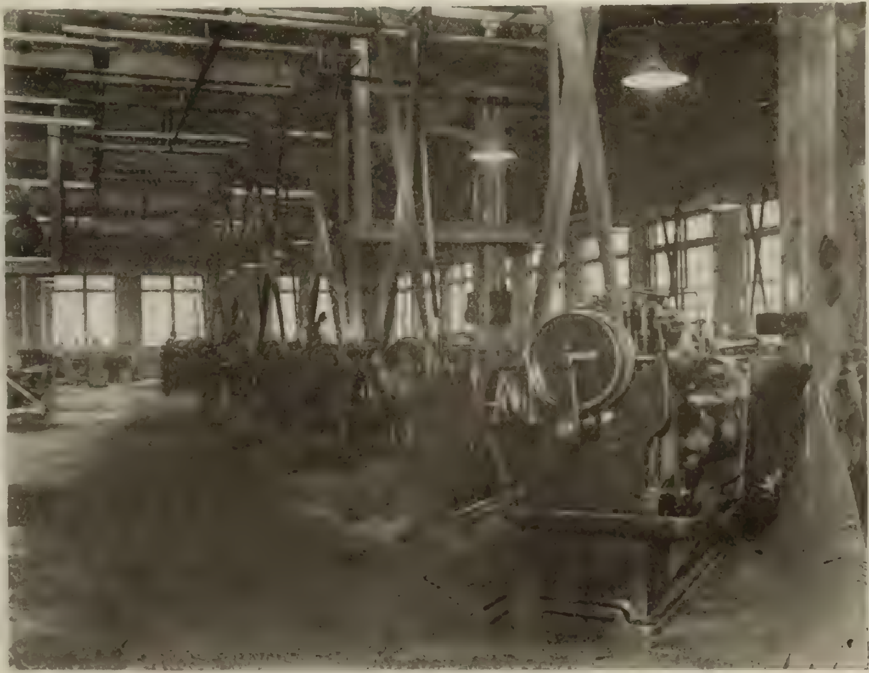
FRONT AND END VIEW OF THE AUTOMATIC MACHINE ROOM AND OFFICE. FINISHING AND STOCK ROOM ARE NOT SHOWN, BEING AT REAR.

Galt Machine Screw Co.—Its Plant Equipment and Product

Staff Article

Development of our metal-working industries has in the past two years been almost wholly in the direction dictated by the demand for munitions, and instances have been few in which the specific purpose of a plant establishment or extension has been to break into other opportunity offering. The subject matter of this article is, however, an instance of the latter, even notwithstanding the fact that for a time munitions production in line with the scope of the installed equipment was successfully undertaken.

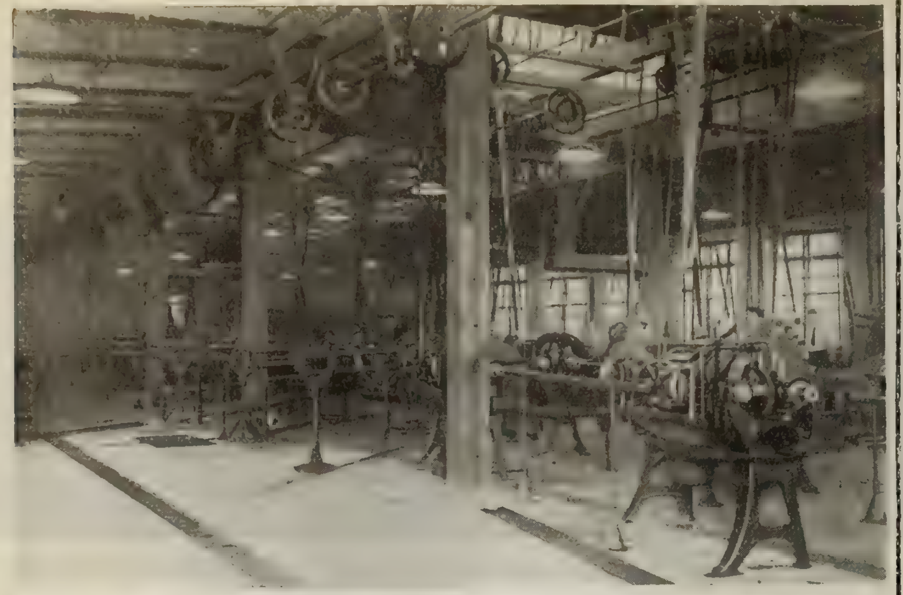
THE Galt Machine Screw Co., started operations in October, 1915, at their new plant located at the north end of Jackson Park, Galt, Ont. Incidentally, we might say, this section of the city is developing into an important manufacturing district. The company was organized by R. W. Roelofson, a prominent citizen of Galt, and was at a later date incorporated. Mr. Roelofson is president and general manager, and C. K. Jansen, secretary-treasurer. At the time of its inception, the demand for the product which the company proposed manufacturing, prompted the belief that there was a wide field for such goods, particularly if the product were of high class manufacture and accurate. A high degree of accuracy has, therefore, been the principal aim of the company, and in the various manufacturing operations this is kept in view. One of the most interesting features from a mechanical standpoint is the installation of automatic machines which take up practically half the floor area in the main shop and are arranged so that they occupy a minimum of room consistent with efficient operation.



Group of four-spindle automatics of the larger sizes, which are used for making all kinds of automatic products from bar stock, as well as heavier sizes of cap and set screws.

Plant Layout.

The factory is of modern design and was constructed and equipped entirely for the purpose of making all kinds of machine screws. It is served by track connections from both the C.P.R. and G.T.R., while cheap power is available from the Ontario Hydro-Electric System. The building is modern in design and is of slow burning mill construction. The walls are brick, with wood columns. The centre bay of the main shop has a saw-tooth roof, providing ample light in addition to that from the windows at the side. The shops and offices are all on the ground floor, with a basement under the main, or machine shop. This shop covers a considerable proportion of the entire plant. At the north end of the factory is a large stock room with commodious offices adjoining, the offices being bright, airy, and well appointed. Adjoining the stock room is the heat treating department, equipped with the most modern apparatus of that nature available. The stock room comprises the raw material storage, finished product storage, shipping room and time-keeper's office, where the employees' entrance is located, and in which is installed an International Time Recorder Co. time clock.



Group of smaller four-spindle automatics with some of the latest types of single spindle automatics in the foreground.

The machine shop content embraces equipment of the most modern type available for the manufacture of the product. At one end of the shop is a well-appointed tool room. In the machine shop are installed several Canadian Crocker-Wheeler electric motors, ranging from 18 h.p. to 50 h.p., which drive the main line shafts. The motors take power from the Ontario Hydro-Electric 550-volt line. The machines are all driven from individual countershafts and are arranged in groups so that certain sections or batteries of machines can be operated by one or more motors, as the case may be.

The health of the employes is a primary consideration in view of its economical advantages. The shops are bright and well ventilated, while bubbling fountains have been installed for drinking purposes. The illumination at night is almost as bright as during the day, being in fact a "daylight factory" all the time. The care of the employes is shown in another way. All cutting oil after being used in the automatic machines is pumped to a tank in the basement and purified by blowing steam through same. The oil is then allowed to settle in other suitable tanks, by which means all metallic particles and other foreign matter are eliminated. This treatment not only improves the lubricating properties of the oil, but it is also rendered antiseptic and will not cause sore places on the operators' hands.

The artificial lighting system, particularly in the machine shop, is most effective and helps in no small degree towards the general efficiency of the plant. Nitrogen-filled lamps of 250 watts are installed in the shops, each lamp having a white enameled reflector. The lighting value in the machine shop is equal to 2½ c.p. per square foot of floor area, an unusually high percentage.

The plant is heated by means of a low pressure steam system. The firebox boiler for this was supplied by the Taylor-Forbes Co., Guelph, Ont., and is located in the basement—the boiler room being of concrete construction and fireproof. The heating pipes are installed along the walls in sections and the system is so arranged that the amount of radiation can be regulated according to the outside temperature. An automatic sprinkler system is also installed.

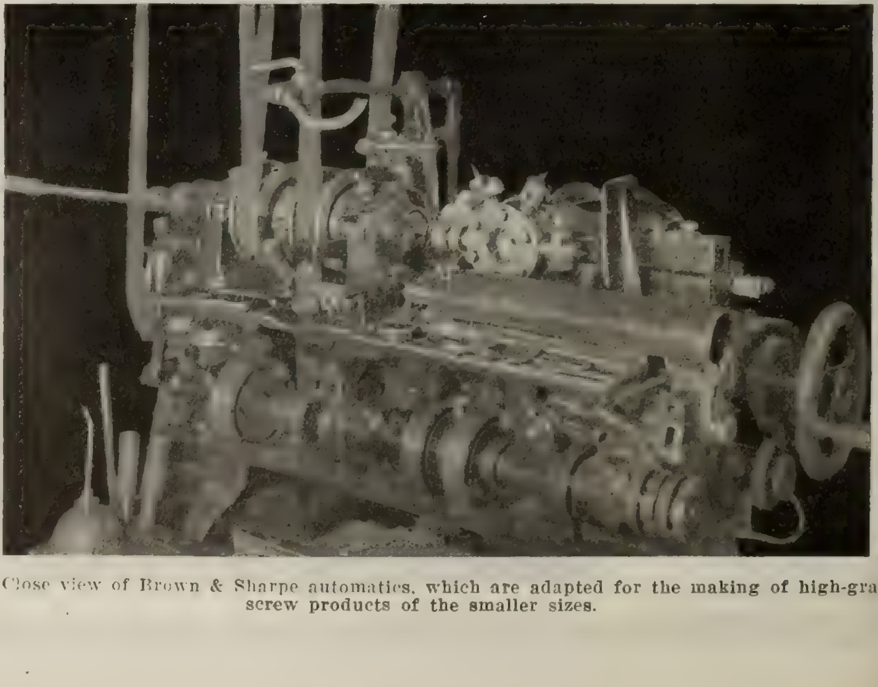
Product.

The company makes a full line of cap and set screws, square and hexagon head, round, flat, filister and button head; taper pins, finished and semi-finished nuts, studs, coupling bolts, patch bolts, washers, etc. The line in fact includes anything that can be produced from bar stock, in steel, brass, copper, or fibre, etc. The range is wide and includes parts that would be used in the construction of anything from a locomotive to a typewriter. The product is used in the construction of machines of various kinds, such as wood and iron working tools, agricultural machinery, sewing machines, typewriters, adding machines, computing scales, washing machines and all manner of automobile parts.

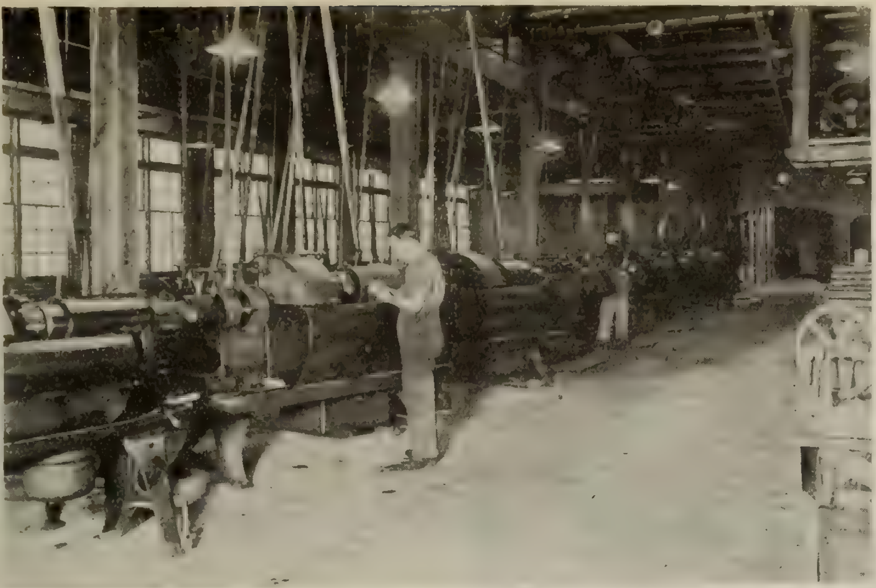
In order to measure up to the high degree of accuracy demanded, great care has to be taken in manufacturing to ensure the desired results. The company make their own tools and fixtures in order to obtain the required accuracy. The "Johansson" system of Swedish gauges is used for all standards other than for threads, and for thread standards the Brown & Sharpe thread micrometer is used for establishing all pitch diameters. All bar stock is unloaded from the cars on the tracks running alonside the factory, and is piled in racks in the stock room. The different grades of bar stock used must conform to physical tests before being shipped from the mills, none but the highest grades of stock being used.

Automatic Machine Installations.

In the manufacture of screws, automatic machines plan an important part, and the plant of the Galt Machine Screw Co. is no exception to the rule, in this regard. The principal equipment therefore consists of eighteen automatic machines of various sizes and capable of producing any size or type of machine screw required. Of this number, thirteen are "Gridley" automatics, built by the Windsor Machine Co., Windsor, Vt., and five are "Cleveland" automatics, built by the Cleveland Automatic Machine Co., Cleveland, Ohio. The installation of "Gridley" automatics includes two 1¾-inch, 4-spindle machines; five 1¼-inch, 4-spindle machines; five ¾-



Close view of Brown & Sharpe automatics, which are adapted for the making of high-grade screw products of the smaller sizes.



Group of single spindle Cleveland type automatics of the larger sizes. These machines are adapted for the production of very accurate work from bar stock in a variety of diameter and length, and applicable alike to typewriters and the very heaviest type of iron-working equipment.

inch, 4-spindle machines and one 2¼-inch, single spindle machine. The installation of "Cleveland" automatics consists of two ⅞-inch to 1¼-inch machines, two 1¼ to 1½-inch machines, and one 2¼-inch machine. The sequence of operations is the same on all machines when producing the same class of work. The extensive line that can be produced on these machines, however, requires a large and varied assortment of tools and fixtures, the application of which differs according to the work to be performed. A detail of manufacture covering each and every product of the company on these machines is not included in the present article. A brief description covering the production of a cap or set screw on a "Gridley" automatic may not be without some interest, however.

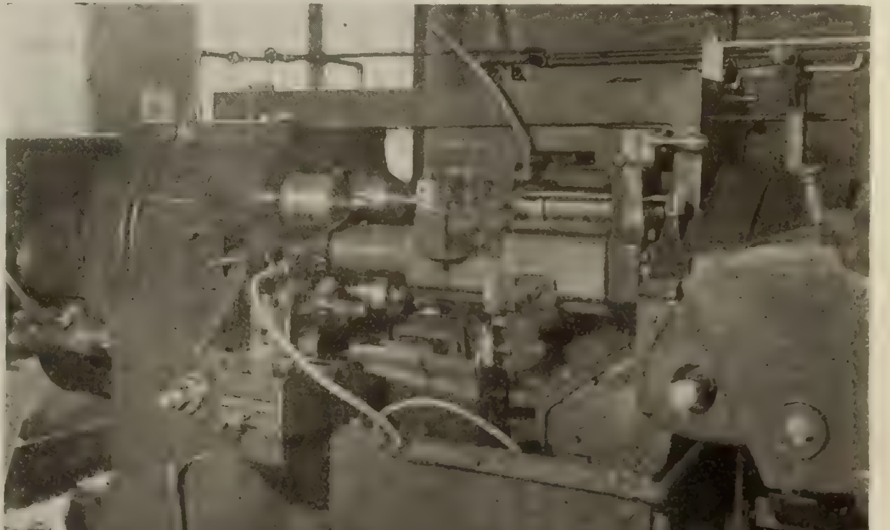
The machine in question holds four bars, and the work is completed at four positions, making one revolution of the rotary spindle. A carrier spindle holds the tooling fixtures, while on the cross slide are two tools, front and back, for forming and cutting off. The bar stock is fed through at the fourth or cutting-off position, and comes up against a stop on the carrier spindle. The machine then indexes to the first position where the first turning operation is performed by a tool on the carrier spindle. While this is being done, a forming tool on the cross slide in front faces up the head of set screw. The machine then indexes to the second position where the finish turning operation is done; at the third position, a die attached to the carrier spindle travels forward and cuts the threads. At the fourth and last position, the cap screw is cut off by a tool on the back of the cross slide. The operation of the machine is practically the same for all classes of work but the tools of course are different.

One of the "Cleveland" automatics installed is a 2¼-inch single spindle machine for heavy work. This machine can take four tools on the turret and has a cross slide for the forming and cutting off tools. Only one length of bar stock is used at one time on this machine. The "Cleveland" single spindle automatic has a turret or carrier which will hold five tools. This machine also has a cross slide with forming and cutting-off tools. When set up for making pins it has one tool and a stop on the tool carrier. In the first position, the bar stock is fed through against the stop, after which the tool turns the pin and the forming tool on front of cross slide forms the head. The last operation, or cutting off, is performed by the tool on back of the cross slide. This machine, of course, is capable of producing a large variety of work and is tooled up accordingly.

Secondary Operations.

In the manufacture of the screws and pins, etc., the primary operations are performed on the automatic machines. There is still, however, more work to be done on them before they are finished, such as slots to be made and burrs removed, and, in some cases, holes drilled. These secondary or finishing operations are performed on a number of machines installed for the purpose, and include those for facing, grinding, polishing, burring, milling, and drilling. For performing the secondary operations the following equipment is installed, there being also included tools of minor importance for making bolts, etc. Some of these tools have also been used in making primers in which case they had special attachments designed for the purpose. Drill presses were supplied by Henry & Wright, Hartford, Conn.; Cincinnati Pulley Machine Co., Cincinnati, Ohio; The Sipp Machine Co., Paterson, N.J., and the Perfect Machine Co., Galt, Ont.; a tapper by the Garvin Machine Co., New York; nut threading machine by the National Machinery Co., Tiffin, Ohio; stud machine by the Foster Machine Co., Elkhart, Ind.; small screw machine by Pratt & Whitney, Hartford, Conn.; stud machine by the T. M. Smith Machine Co., Grand Rapids, Mich. There is also a "Sterling" hack saw machine and a centrifugal oil extractor.

One machine of particular interest was designed by the Galt Machine Screw Co. for facing stud and bolt heads. This machine has five spindles in a row, each having a collet chuck for holding the studs. In front of the machine are five rocking arms, one in front of each chuck, each holding a tool for facing the stud



A close view of one of the heavy four-spindle automatic machines with the oil guard removed to show system of tooling. These machines are used for the production of all kinds of standard cap and set screw work, as well as a multiplicity of other automatic products, four bars being worked on simultaneously.

Illustrating one of the Steel Storage Racks.

head. The arms are operated by cams on the back of the machine and work in succession, permitting the operator to remove each stud when finished without stopping the machine.

Tool Room.

The tool room is an important feature of the plant, as the desired accuracy can only be obtained by using properly designed and accurate tools. The company make practically all their own tools and fixtures in order to ensure the high degree of accuracy required in the manufacture of their product. The machinery installed in tool room consists of a Brown & Sharpe miller, and "Excelsior" 20-inch drill press; a Cincinnati Universal grinder; a tool room lathe by R. McDougall, Galt; a Blake & Johnston drill press, and a Stewart gas furnace supplied by the Chicago Flexible Shaft Co., Chicago.

The heat treating plant adjoining the stock room is well equipped and modern in every respect. The principal equipment installed consists of Rockwell, and Tate-Jones furnaces, using natural gas. The electric hydrometers installed are of "Tycos" make.

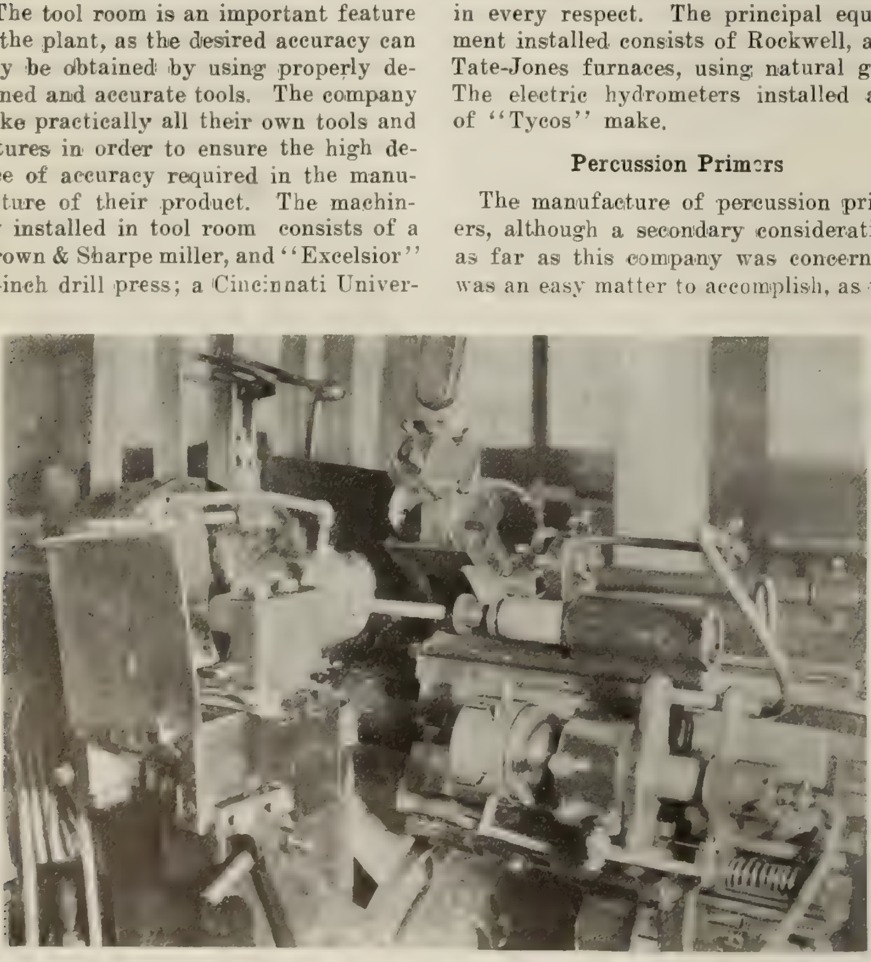
Percussion Primers

The manufacture of percussion primers, although a secondary consideration as far as this company was concerned, was an easy matter to accomplish, as the greater part of the equipment required for such work was already installed. They have completed a large order, and are now confining their energies entirely to the production of their regular product, viz., machine screws.

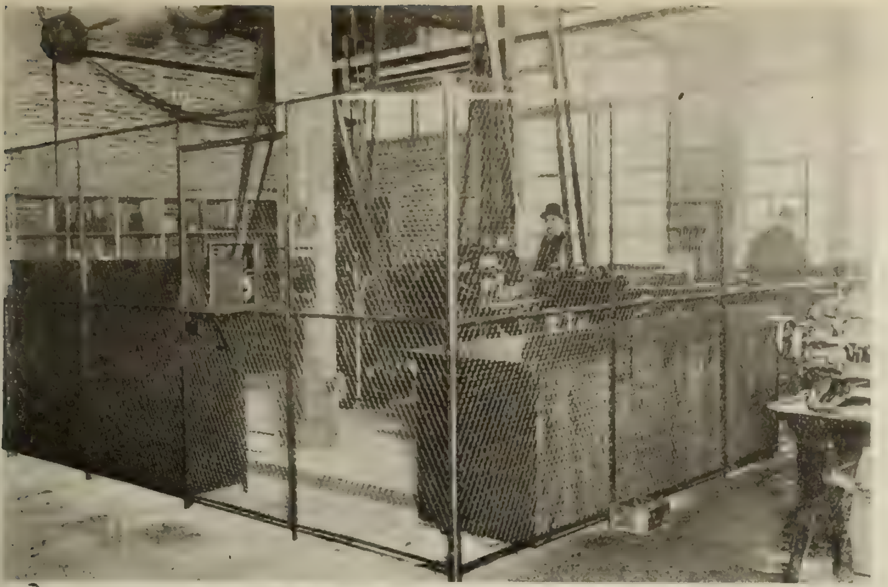
The primer comprises six parts—the body, anvil, plug, disc, copper ball and percussion cap. The body is made from 1 7-16 in. round brass bar stock, the first series of operations being performed on a Gridley 1¾ inch multiple spindle automatic machine. The other parts are also made of brass, with the exception of the copper ball. The initial operations on the automatic machines are performed in the following order:

The first operation consists of forming the outside and rough drilling the inside, the forming tool being on the front of the cross slide and the drill on the spindle tool carrier. At the second position the outside is finished by a tool on the carrier, while at the third position the external diameter is threaded. At the fourth operation the inside bore is finished by a reamer on tool carrier, and the cutting-off tool on the back cross slide finishes the work on the automatics. After cutting off, the bar stock is fed forward for the next primer.

On the Cleveland automatic single spindle machines, the sequence of operations is practically the same. The bar stock is fed through to a stop on the tool carrier. The carrier then moves round to the next position, and a combination fixture rough turns the outside diameter and drills the inside. At the third position a similar fixture finishes the body, both inside and outside. At the fourth operation the outside thread is cut by a die on the tool carrier. The cutting-off tool is on the front of the cross slide. After leaving the automatic machine, the primers are washed and inspected. The ends are then faced on a Pratt & Whitney hand screw machine. The next operation consists of milling the key slots in the base in a Brown & Sharpe hand milling machine, which is equipped with a special indexing fixture. The following operation is reaming the tap hole and the smaller hole in the base on a Henry & Wright two-spindle drilling machine carrying a combination reamer. The small hole is then tapped in a Garvin tapping machine. The percussion cap hole is next finish reamed. This is done on a Sipp drill, using special fixtures. The next operation is hand chasing the outside threads, after which the base is stamped and the primer washed in a solution to remove the grease. It is then inspected and placed in an electric oven at a temperature of 160 degrees for about 15 minutes, after which follows the lacquering process. At this stage there is another careful inspection.



Close view of one of the heavy types of automatic turret lathe. These machines are capable of producing highest grade heavy work with extremely fine limits of tolerance, and lend themselves to the production of automatic parts which would be difficult to produce on machines less rigidly built.



Tool room equipped with the most modern appliances for the production of high-grade and accurate tools required by the various machines.

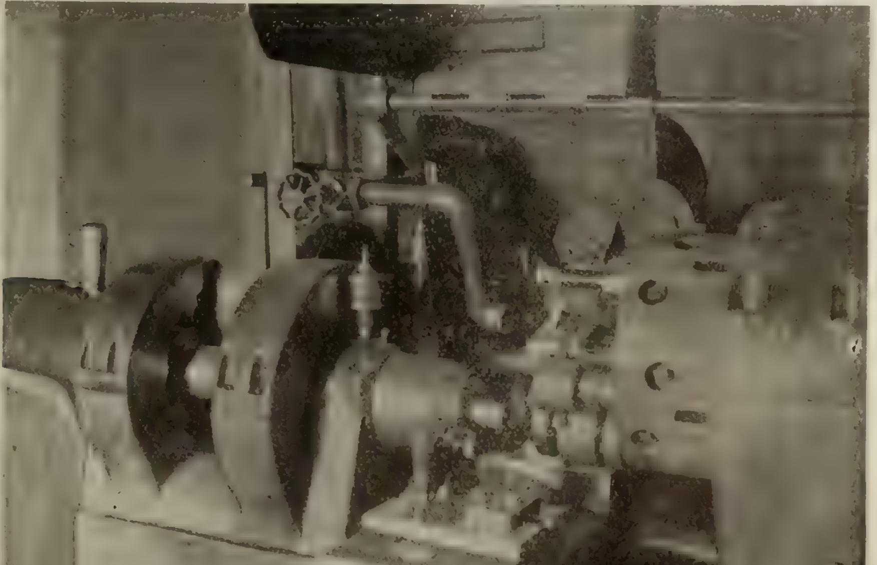
Anvils

The anvil is made from 3/8 in. round brass bar stock, most of the operations being performed on a Brown & Sharpe automatic screw machine. The sequence is as follows:—First operation stock is fed to a stop. The second tool on turret bores the hole, while a forming tool on front of cross slide forms the dome on the anvil. The outside threads are then cut, after which the cutting-off tool parts the anvil from the rod. A clever device is attached to the machine, which lifts the anvil after being cut off and holds it while the burrs are being removed.

The next operation on the anvil is slotting, which is done on a Pratt & Whitney screw machine fitted with a special fixture made at the plant. The anvil is held in a collet chuck, while a rotary cutter forms the slot. The machine is fitted with a device working on a trip for tightening the anvil, and also ejecting it when the operation is completed. The fire holes, three in number, are drilled in a Cincinnati Pulley Machinery Co. drill press, equipped with a special indexing fixture, also designed at the plant.

Plugs

The plug is made on a Brown & Sharpe automatic screw machine from 3/8 in. round brass stock, the order of operations being as follows:—Feed bar to stop, then form and cut the groove. The thread is then cut and the plug cut off. This machine also has a burring attachment. The fire holes in the plug are drilled in the same machine as the anvils, but a different fixture is used. In the anvil the holes are drilled at an angle, whereas in the plug they are parallel.



Close view of one of Cleveland type automatic machines. The tooling illustrated was for the production of primers, one of which is shown in the chuck, finished ready to cut off.

Discs

The closing discs are punched out from a brass strip on a Brown, Boggs Co. press. They are then cupped on a Pratt & Whitney screw machine, during which operation the disc is held in a special chuck with the cupping tool in the turret. After being cupped, the discs are annealed, then slit and closed back on Brown, Boggs punch presses. The discs are next inspected. The percussion cap is made of brass in a small punch press, a combination blanking and cupping punch and die being used. The ball is made of soft copper, and is purchased outside.

Inspection forms an important feature in the manufacture of primers, as a high standard of workmanship and accuracy is required. It is, therefore, necessary, in order to check any possible errors during the various operations, that the various parts should be inspected at different stages of manufacture. The final inspection is very rigid, and is conducted in a department set apart for that purpose. Although the majority of the machine tools installed are of standard type, practically all the tooling fixtures and special jugs were designed and made on the plant. It is in this feature perhaps that the chief interest lies and contributed largely to the success attained by the product of this plant.

* * *

CANADA'S FIRE LOSS A NATIONAL HANDICAP

IT is perhaps not fully realized by all the advocates of foreign trade expansion that Canada, by reason of the enormous proportions of her fire loss, will find it increasingly difficult to meet the competition of lower-priced labor in Europe. A contributor to *Conservation* for October, calls attention to the excessive cost of fire protection in this country and the manner in which it is bound to retard that future development now so hopefully looked forward to:—

The fire loss of Canada has reached enormous proportions. The drain upon her financial resources constitutes an economic loss which no country can afford and still meet competing nations on an equal footing. The war has had far-reaching effects upon commerce. European countries, in greater or less degree, are realizing their latent powers, production is being speeded up, resources are being developed, trade openings are being sought and established. Prior to the war, Canada found herself handicapped in any scheme of trade expansion by the lower cost of production in Europe. It therefore follows that, with the realization by European countries of their commercial possibilities, this trade handicap will be greatly accentuated.

On the basis of averages, and from the data available as to the cost of insurance and upkeep of fire departments, the following comparisons may be deduced:—

For the past three years the average rate for fire insurance in Canada has been $1.18 per $100 of insurance. The average rate in Sweden is .40, in Austria .30, in England .23, in Germany .22, in France .21, in Spain .19, in Italy .19.

A Canadian employer of labor with 100 employes, carrying an insurance of $50,000 on plant and buildings, and, assuming that $2,000 insurance is carried or paid for by each employee on furniture and dwelling—or a total of $250,000—would, on the foregoing basis, have to provide in wages and overhead charges $2,950. His competitor in Sweden would only require $1,000, in Austria $750, in England $575, in Germany $550, in France $525, in Spain and Italy $475.

For upkeep of fire departments Canada is heavily taxed in comparison with competing countries. In 1914, Paris, France, with a population of 2,846,986, had a total fire department expenditure of approximately $656,479, or 23 cents per head. Toronto, for the same year, with a population of 470,144,, spent $675,146 on her fire department, equal to $1.43 per head.

The Toronto manufacturer—and this is only an example for all Canada—has to provide for himself and family and for each employee and his family $1.43 to cover fire department costs, as against the 23 cents his Paris competitor must provide; or, with an average of five to a family, for his 100 employees, he would have to pay in salaries and wages $722.15 as against $116.15 by his European competitor. For insurance and upkeep of fire department the Toronto employer of 100 hands, as representative of Canadian industry, must pay $3,672 against $641 in Paris, a handicap equal to $30 per employee.

The Census Report of 1911 gives 515,203 as the number of employees engaged in manufacturing in Canada; consequently at $30 per head, there is a handicap of $15,456,090 against Canadian manufacturers in the cost of fire insurance and municipal fire departments. The salaries and wages paid to these 515,203 employees amounted to $241,008.416. an average of $467.80, or approximately $9.00 per week. The foregoing handicap of $30 per employee represents the wages for 3.3 weeks of each employee.

In 1910 the products of Canadian manufacturers were valued at $1,165,975,639. This charge for insurance and municipal fire protection therefore represents an added tax of 1.3 per cent. upon Canada's entire output of manufactures. The fact that much the larger portion of this amount is buried in the pay-roll can be accepted as the reason why our employers have given so little attention to the question. The charge must be met, however, whether by direct or indirect means.

Employers complain of the rising cost of manufacturing; employees complain of the rising cost of living and demand increased wages. In view of the foregoing, employers should seriously consider reduction of the burden imposed by the enormous destruction of our created resources by fire—that their earnings may not be reduced by these charges and thus remove one of our heavy handicaps before Canadian employers and employees meet world competition under the new trade conditions which will develop after the war.

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DEATH OF CAPT. F. R. NEWMAN

THE death of Captain Frank Ross Newman in London, England, on October 23, as a result of wounds received in action, will be received with regret by a wide circle of friends. Capt. Newman was wounded on Sept. 28th on the Somme front and was progressing favorably, until tetanus supervened, resulting in his death. He had previously been invalided to England suffering from trench fever, but recovered, and was able to return to duty. Capt. Newman was born in Montreal in 1879, and was educated in that city, graduating from McGill University.

THE LATE CAPTAIN FRANK ROSS NEWMAN.

He started his business career with Caverhill, Learmont & Co., wholesale hardware, Montreal, his father, Thomas H. Newman, now deceased, being a partner in the concern. In course of time he left this firm, and went to Winnipeg to open a branch office for the Canadian Fairbanks Co., being appointed manager. He eventually resigned this position and joined the staff of the Laurentide Paper Co., at Grand Mere, Que. In 1911 he returned to the Canadian Fairbanks-Morse Co. as manager of the Toronto sales office, which position he held until the autumn of 1914, when he resigned upon being appointed to a captaincy in the 19th Battalion, C.E.F.

Soon after coming to Toronto in 1911, Capt. Newman joined the Queen's Own Rifles as a lieutenant, and was an officer in that regiment until his appointment as captain and quartermaster of the 19th Battalion, which went overseas in the spring of 1915.

The deceased was unmarried, and is survived by his mother, who lives in Montreal, and also by two brothers, Capt. Harry Newman, of the 5th Royal Highlanders, and John Newman, manager of the Montreal branch of the McClary Mfg. Co. His only sister married Capt. Gurd, Canadian A.M.C., who is now on active service. His mother sailed for England just before the arrival of the cablegram announcing her son's death.

Capt. Newman was as keen and efficient as an officer as he was in business. His kind and genial disposition endeared him to all with whom he came in contact. He was a man of peace, but died loyally serving his country. The remains will be sent to Montreal and accorded a military funeral.

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B. C. LUMBER OUTPUT

THE timber returns for August, issued by the Forest Branch, show the total scale of saw-logs for the province to be 107,843,857 feet B.M., in addition to 257,589 lineal feet of poles and piles, and 26,635 cords of shingle bolts, posts etc.

The returns according to forest districts are as follows:—Vancouver, 73,313,384 feet saw-logs, 62,430 lineal feet poles, etc., and 3,215 cords of bolts, ties, etc.; Cranbrook, 12,855,604 feet sawlogs, 20,330 lineal feet poles, etc., and 7,715 cords of posts, bolts, etc.; Island, 12,411,953 feet sawlogs and 209 cords bolts, ties, etc.; Prince Rupert, 4,378,017 feet sawlogs, 47,083 lineal feet poles and piles, and 60 cords of bolts, posts, etc.; Kamloops, 2,920,687 feet sawlogs, 114,582 lineal feet poles, etc., and 3,215 cords of posts, bolts, etc.; Vernon, 177,157 feet sawlogs; Hazelton, 83,184 feet sawlogs; Lillooet, 9,538 feet sawlogs and 11,282 lineal feet poles and piling; Fort George, 8,344 feet sawlogs, 1,882 feet poles and piles, and 100 cords of posts, etc.

Timber sales made during the month of August cover an estimated total of 21,844,000 feet sawlogs, 13,250 lineal feet poles and piling, and 498 cords of shingle bolts, posts and cordwood, to produce an estimated revenue of $34,929.

PRODUCTION METHODS AND DEVICES

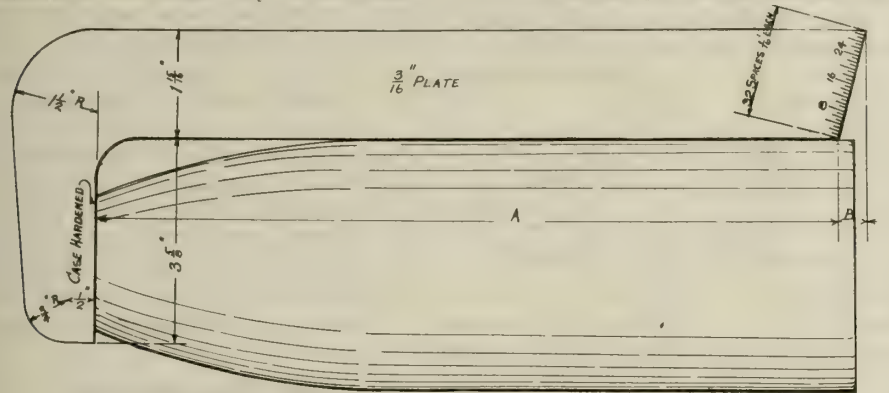
A Department for the Interchange and Distribution of Shop and Office Data and Ideas Evolved from Actual Practical Application and Experience

WEIGHT ADJUSTING GAUGE FOR SHELLS

By John S. Watts.

THE sketch shows a gauge used for indicating the maximum amount of weight that may be machined from the base of a shell without reducing its length below the minimum.

To use the gauge, the shell is first weighed in the usual way to determine the number of ounces it is overweight. Then the gauge is placed on the shell and a scale laid across the base will indicate the ounces which may be removed and still not get the shell short for length. If the overweight, as shown by the weighing, is, say, 10 ounces, and the gauge indicates that only 8 ounces can be removed from the base, we mark 8 on the shell as the number of ounces to be faced off the base end, and the other two ounces are removed later from the inside of the shell.



GAUGE FORADJUSTING WEIGHT OF SHELLS.

On the other hand, if the gauge showed, say, 12 ounces as removable from the base, we mark 10 on the shell and face off the whole 10 ounces from the base.

To make the gauge, the length A is made to the minimum length of the shell, plus about 1-64 in. for tracing up the base after riveting in the base plug. The length B of the gauge is made equal to that length of the shell which will weigh 32 ounces (or such other amount as may be preferred), and the slanting end is divided into 32 equal divisions, each of which will then represent a weight of one ounce in the length of the shell over the minimum length and hence removable if necessary.

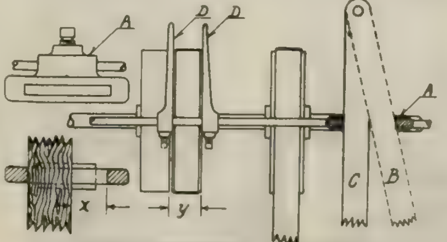
The idea of making the divisions on the slant is to have them sufficiently far apart to be easily readable.

* * *

BELT SHIFTER TROUBLE

By J. H. R.

MACHINE operators are often annoyed by the gradual starting or stopping of their machines, due to the creep of the belt from one position to another. This may be caused by faulty belting or shafting out of alignment. However, in many instances the trouble originates through the action of the shifter, especially where the wooden stick makes a great angle with the perpendicular, the weight being sufficient to overcome the friction of the various joints; thus the heavy stick seeks to return to a vertical position, with the result that the belt is forced over to the adjacent pulley. In an effort to remedy this trouble, a foreman in a small shop adopted the method shown in the sketch, where the belt shifter stick remains in a vertical position, after the machine has been started or stopped. Instead of the stick being pivoted to the shifter rod, it is allowed to swing freely in a slotted bracket A, which is fastened to the rod upon which the shifting forks D-D are secured. When hanging free, the stick is always perpendicular as shown at C; the position B (to the right or left) being so after shifting the belt. After the belt has been shifted, the stick will return to a vertical position, so that whether you are starting or stopping the machine, the belt stick will always be in the same position. The length of the slot will equal the width of the stick plus the distance (x); the latter being equal to the space (y), or the side movement of the belt in its passage from one pulley to the other.



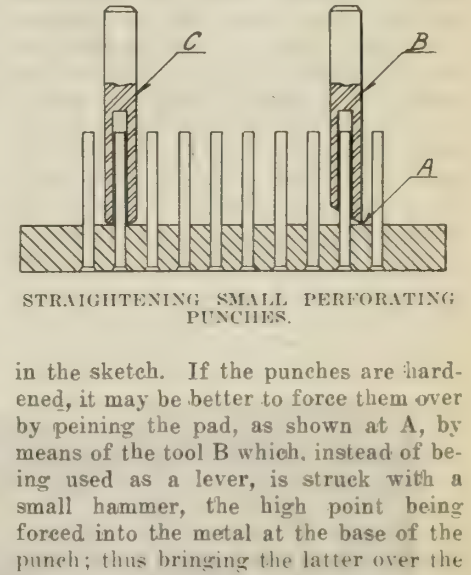
BELT SHIFTER TROUBLE.

STRAIGHTENING SMALL PERFORATING PUNCHES

By J. Hamilton.

WHEN making perforating dies for light sheet metal, it is often found that several of the punches will incline a little from the perpendicular, owing to a slight bend in the wire or to the drill having run when drilling the punch pad. In order that the punches will enter the die or allow the stripper to slide freely, they must be at right angles to the pad surface; it is, therefore, necessary that bent or inclined punches should be straightened. Where the fault is in the punches themselves, they can be replaced by new ones, but where the cause is in the pad, the pin must be bent to straighten it up. If the punches are soft, they can be easily bent, but care must be taken to have the bend come close to the pad.

A very handy tool for this purpose is shown at C. This can be either a piece of cold-rolled stock or a piece of stub steel, with a hole drilled in one end slightly larger than the punches, and deep enough to clear the end, as shown in the sketch. If the punches are hardened, it may be better to force them over by peining the pad, as shown at A, by means of the tool B which, instead of being used as a lever, is struck with a small hammer, the high point being forced into the metal at the base of the punch; thus bringing the latter over the desired amount. The point of the tool B should be hardened and tempered.



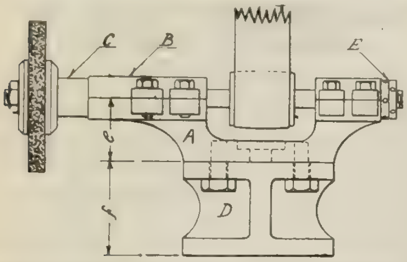
STRAIGHTENING SMALL PERFORATING PUNCHES.

* * *

ROUGH, BUT SERVICEABLE GRINDER

By R. James.

OCCASION often arises in small jobbing shops, where it is necessary to use a grinder to finish hardened work, and as many of such plants are not provided with electric grinders, the device used for the purpose is generally one of home-made construction. The sketch herewith shows a simple but serviceable grinder, used in a shop where sheet metal dies are made and repaired. The main casting A, which carries the shaft, is designed to secure good long bearings, the front one being extended to allow of operating on internal surfaces. For bores of small diameter, shaft extensions are screwed to the main shaft. The height (e) is made to conform to that of the smallest lathe on which it may be used, while distance blocks D are provided for use on the larger machines, the height (f) being such as to raise the centre of the wheel to the level of the lathe spindle. Lateral play is eliminated by means of the adjusting nuts E.



ROUGH BUT SERVICEABLE GRINDER.

* * *

PROTECTING TUMBLING BARRELS

By D. O. B.

IN many factories the proper guarding of tumbling barrels is not given the necessary attention which the conditions demand. Many cases might be mentioned in which accidents have happened in this connection. In the cut is shown the method of protecting tumbling barrels as employed in one large agricultural plant. These guards are constructed of one-inch pipe with ordinary woven wire across the upper halves. They are merely dropped into holes in the floor and held by flat braces attached to the pedestals. These guards are extremely effective, and prevent anyone coming in contact with the moving barrels, yet at the same time being readily removable.

GUARDS MADE OF WOVEN WIRE AND PIPE FOR PROTECTING TUMBLING BARRELS.

A SCREW MACHINE TOOL

By D. S. Mann.

HAVING to machine a large number of cast-iron pieces of the shape shown in Fig. 1, it was decided to put the job on a small screw-machine. These pieces were drilled and reamed, faced on the end and turned on the outside for a short distance from the end in order to give a finished appearance when assembled. The pieces were chucked and all the operations with the exception of reaming performed with the tool shown in Fig 2. The drill was held in the regulation manner in one of the turret holes and the tool clamped directly on the drill body. This was a steel casting, split and provided with a screw for clamping. The two projecting lugs each carried a tool which completed the turning on the outside, these tools coming into action when the drill entered to the requisite depth. After turning off the outside, the feed was thrown out and the end faced with the two tools set directly into the body. This then completed the three operations in the time ordinarily required for the drilling. The same tool could just as conveniently be used in the drill press. Oftentimes large bosses occur on castings where it is impossible to turn them on the outside in any other way.

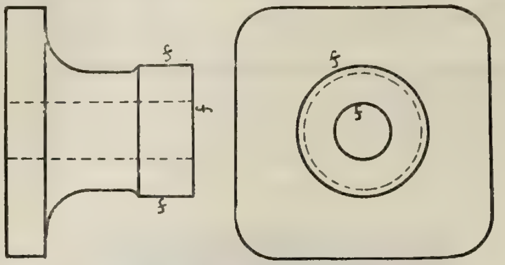


FIG. 1.—PIECE FOR WHICH TOOL SHOWN IN FIG. 2 WAS DESIGNED.

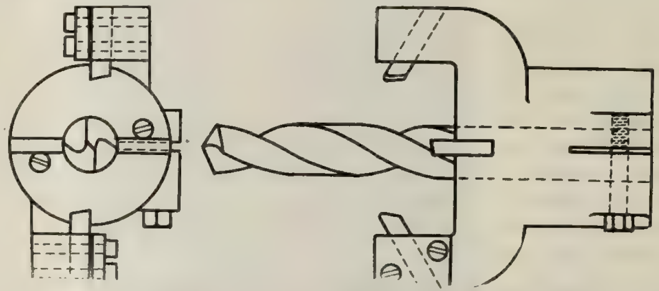


FIG. 2.—TURNING TOOL CARRYING DRILL USED ON SCREW MACHINE.

* * *

MOULDING AN ANGLE IRON FORMER CASTING WITHOUT A PATTERN

By J. H. Eastham

A RUSH order for a number of 24 inch diameter angle iron rings of 1 inch by 1 inch by 3-16 inch section necessitated the provision of a former casting of dimensions and shape as shown at Figure 1, the order for this casting being handed over from the blacksmith department to the foundry at four o'clock in the afternoon, with a request that the piece be delivered the following morning without fail. Obviously, at that late hour, time to make a pattern, except of the crudest type, was out of the question, hence the introduction of the material and means of production described herewith.

Preparatory Operations

A circle 24¼ in. dia. was marked out on the smithy floor, and a piece of 2 in. by ¼ in. flat was heated, its outside face bent to the radius just described as accurately as possible, cut off at twenty inches long from tip to tip, cooled, and handed over to the foundry foreman. Meantime a bed had been leveled and struck off on two straight-edges 24 in. long, and placed 18 in. apart, while a wooden wedge A, Fig. 2, was driven in level with the surface at the point indicated to serve as a support for one end of the trammels which are now employed to mark the outer radius as shown. This radius was 12⅛ in., the extra ⅛ being contraction allowance.

The wedge was now withdrawn, moved back three inches to position B.

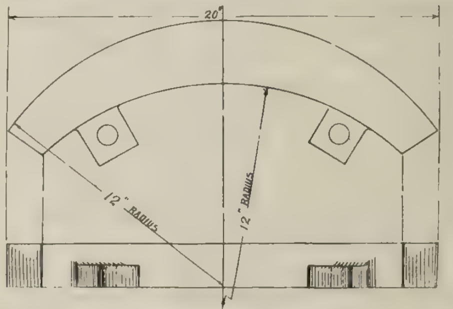


FIG. 1. PARTICULARS OF FORMER BLOCK TO BE MOULDED.

and again driven in to act as centre for a curve of the same radius which is drawn out on the bed to mark off the inside surface of the casting.

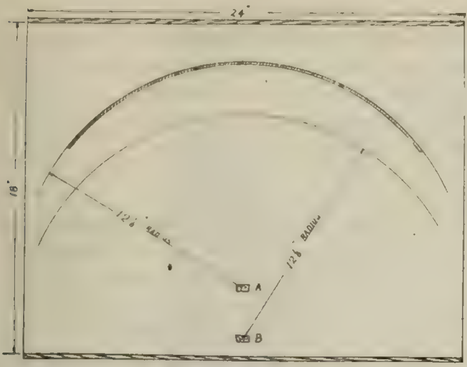


FIG. 2. IRON HOOP IN POSITION FOR RAMMING UP.

Ramming the Hoop Iron

The hoop iron segment was now laid on the bed, its outer face touching the outer circle as in Fig. 2, rammed up on the outside only and then drawn forward till its inner face touched the circle struck from wedge B. Sand was then rammed to its inner surface, and strickled off level, the hoop being next finally removed, leaving a mould which, after the ends were stopped in by the aid of a 2 in. flat strip, measured 20 in. long over all, 2 in. square at each end, and 2 in. deep by 3 in. wide at the centre. The extra thickness at that point was desirable, as that particular place the former block would naturally receive the maximum number of blows with consequent tendency to facture, if of too light a section. The mould at this stage and previous to withdrawal of the hoop pattern is shown at Fig. 3, both radii being shown at the end or 2 in. square section of the casting.

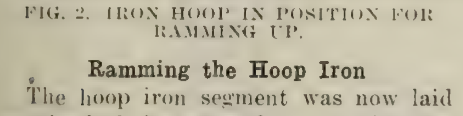


FIG. 3. SECTION OF RAMMED MOULD.

Cutting and Coring Lugs

The lugs needed to secure the former block to a foundation plate whilst in use were next cut out with trowel and cleaner, being approximately 2 in. by 2 in. across, and 1 in. deep, and heavily filleted on their under and outer junctions with the main casting, a coreprint $\frac{3}{4}$ in. dia. being next sunk in the centre of each.

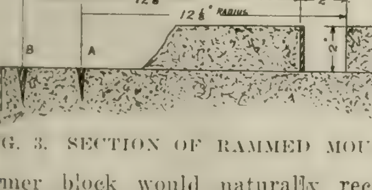


FIG. 4. SECTIONAL VIEW OF MOULD READY FOR POURING.

Pieces of $\frac{3}{4}$ in. round stock core were now sawn off to the required length, and pushed down till level with the joint, the holes formed by these cores being intended to accomodate $\frac{5}{8}$ in. bolts, which, along with the size and location of the lugs were considered ample to secure the greatest degree of rigidity whilst in use.

Slabs of core, one inch thick were now filed to fan shaped sections to suit the circular mould and placed end to end in the form of a cover, one being pierced with a one inch round hole to facilitate pouring.

These cores, with pouring arrangement, are shown in the cross sectional view of the finished mould Fig. 4, as well as in plan in the composite view Fig. 5.

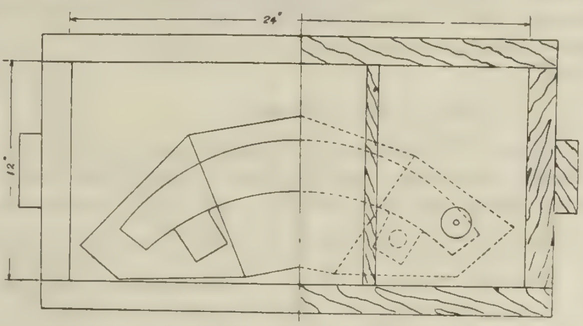


FIG. 5. PLAN VIEW OF MOULD SHOWING SLABS OF CORE.

Forming Cope and Pouring

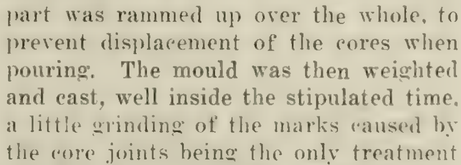
Sand was now rammed lightly round the entire mould and the slab cores, up to their upper surface, and struck off to a level joint, and a 24 in. by 12 in. cope part was rammed up over the whole, to prevent displacement of the cores when pouring. The mould was then weighted and cast, well inside the stipulated time, a little grinding of the marks caused by the core joints being the only treatment the casting required after rumbling.

* * *

DRILL JIG FOR SMALL SHELLS

By R. E. N.

THE accompanying sketch illustrates a useful jig for drilling the small grub screw hole in the noses of the shells. The pocket in the piece A is bored out to fit the nose of the shell, and the hole for the drill bush B located in the desired position. The vee block C is shaped out so that the centre line of shell will be parallel with the base of the jig. The lug D is tapped out to receive the screw E upon which the wheel F is secured. The operation is rapid and very satisfactory.



DRILL JIG FOR SMALL SHELLS.

* * *

THE COST OF MUNITIONS

IN the first and second reports from the Committee of Public Accounts, under the heading "Vote for the Ministry of Munitions of War," particulars are given with regard to the cost of shell, from which it appears that this has now been reduced from 25 to 30 per cent., compared with the prices paid during the early period of the war. It appears that whereas the cost of the 18-pounder bodies was formerly from $4.86 to $5.61, the price has now been cut to $3.04. The prices prices for 4.5 shell ranged between $11.40 and $15.80, and these have now been cut down to $8.10. Sixty-pounders that formerly cost from $15.35 to $20, are now cut down to $12.75. The 6-in. shells which cost from $19.44 to $24 formerly, are now being made for $17; the 9.2-in. shells which now cost $55.28, formerly cost from $63.80 to $74.10. As complaints have been made that the Ministry of Munitions did not appear to deal equitably with the small producers of shell, it is interesting to note that an attempt has been made by this department to regulate, to some extent, the prices paid in inverse proportion to the output; that is to say, the prices paid to the smaller makers are somewhat higher than those to the larger producers.

A range of prices was fixed by the department running from the works producing 200 per week to the firms producing 2,000. The 200 per week shop was cut to $3.90, and the 2,000 per week shop to $3.40 on the 18-pounder shell. For quantities over 2,000, contracts are made as low as $3.05. With regard to the 4.5 Mark V. shell, makers of not more than 200 per week received $11.20 per shell body, while contractors for 1,500 per week were paid $9.50. In these cases the forgings were supplied by the Ministry to the works at a specific price. The 4.5 in. shell forgings were charged at the rate of $4.35 each. As the forgings were bought at $3.15, the Government was getting a set-off of about $1.20.

It appears from the evidence given by S. H. Lever to the committee, that these new prices have been fixed as a result of a system of costing in the national shell factories, from which a monthly return in detail of the cost of each shell is furnished. The cost covers labor, material, and all overhead expenses, except depreciation of plant and interest on capital, and in many cases where services are given free. The management salaries are not included.

Machine Shop Equipment, Methods and Processes[*]--III.

By E. R. Norris[**]

Since recent events have demonstrated so strikingly the reliance which must be placed by a nation on its engineering industry as a factor in modern warfare, the subject of the above title assumes a place of importance not previously awarded it by people in general. While not dealing specifically with munitions or other similar product, the application of the principles contained therein may be done with profit in all branches of engineering.

SINCE Mr. E. G. Acheson produced the substance known as Carborundum, about twenty-five years ago, investigators and manufacturers of abrasives have given great attention to the grain, grade and bonding of their products, with the result that to day we have abrasive wheels and discs of emery, Carborundum, Aloxite, Alundum and Crystolon in great variety of size, shape, grain and grade, of superior quality, and adapted to a wide range of service.

The demand for accurately finished parts of machinery at a low cost has been largely responsible not only for the development in abrasives, but also for the great improvement in grinding machinery. Since manufacturers of machinery began to realize that abrasive discs and wheels were truly cutting instruments, in which innumerable cutting points and edges were presented to the work, much work that was previously performed on millers, planers and lathes has been tranferred to the grinders.

Dry Disc Grinding Versus Milling

Considerable saving is being effected by the use of disc grinders on many flat surfaces that were formerly milled. This is more noticeable in dealing with castings that are liable to be chilled and brittle. Grinding also possesses decided advantages where the shape of the casting or forging is such that, in order to prevent springing, great care is necessary in chucking or clamping the work in the milling machine.

Motor driven, double disc grinders are in use, in which the discs are of steel, 23 inches (584.2 mm) diameter and running at 1450 revolutions per minute. The abrasive circles are glued to the discs by a cold glue, which is readily soluble in water. When the abrasive circle becomes somewhat worn, it may be used on the corners or edges of work or upon work which presents surfaces of comparatively small area, and when worn out, the abrasive circle may be removed from the steel disc by immersion in a tank of warm water. As disc grinders of this kind are invariably dry grinders, they must be connected up with a dust extracting system, and on account of the dust, it is not considered good practice to install these machines near other machinery.

In another type of disc grinder, two constant-speed motors are used, one of which is fixed on the bed, while the position of the other is adjustable along the bed by means of rack and pinion. The spindle of this latter motor, together with its grinding disc, is adjustable in a longitudinal direction and may be controlled by a micrometer stop. By this means, work having parallel surfaces may often be rapidly and accurately finished.

Use of Ring Wheels.

Instead of the abrasive circles mentioned above, ring wheels may be used with advantage for roughing off scale and stock which is too rough to be ground economically by abrasive cloth circles. There is another advantage possessed by the ring wheel, in that the life of the wheel is much longer than that of the abrasive circle. The case of the grid cited above furnishes a good example of the relative wear of circle and wheel. Wheels of 15-inch (381 mm) outside diameter, 9inch (228.6 mm) inside diameter and 3 inches (76.2 mm) thickness were used instead of abrasive cloth circles, and it was found that each wheel was worn down 1-16 inch (1.59 mm) on the face after one month's work; whereas, two abrasive circles are usually worn out by 4 days' work.

Another form of dry disc grinder has a disc 48 inches (1.219 metres) diameter which rotates at the rate of 400 r.p.m. in a horizontal plane. This machine represents the most recent addition to the family of dry disc grinders, and is remarkably efficient on certain kinds of work. Its chief peculiarity lies in the fact that the work bears directly on the abrasive and is ground by the pressure exerted by its own weight, hence, frail castings which are difficult to machine on the milling machines because of the tendency to spring while being clamped, may, in many instances, be faced truly and economically by this process, which requires comparatively unskilled labor. Figure 3 is taken from castings which have been faced by the horizontal grinding process, and the following table shows the savings due to this method.

Name of Piece.	Operation.	Time on Milling Mach.	Time on Grinder.	Time Saved Each Piece.
JJunction Box, "A"	Face	16 min.	3 min.	13 min.
Controller Base, "B"	Face Bosses	10 min.	3 min.	7 min.
Half Bearing, "C"	Face Joint	7 min.	1¾ min.	5¼ min.

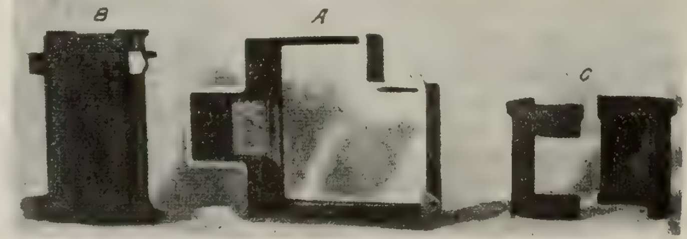


FIG. 3. TYPICAL SAMPLES OF WORK FACED ON HORIZONTAL GRINDING MACHINE.

Wet Grinding.

For the production of true flat surfaces on hardened-steel punches and dies, the vertical surface grinder has been found highly efficient. A cup wheel 16 inches (406.4 mm) in outside diameter, running at a constant speed of 1000 r.p.m. is used. The work is held and presented to the wheel by means of a strong magnetic chuck, which forms the machine table; this latter has six different speeds of rotation. The feed mechanism is so graded as to allow of feeds ranging from 0.0002 inches (0.005 mm) to 0.005 inch (0.127 mm) in increments of 0.0002 (0.005 mm). A sheet iron guard surrounds the wheel, and splash guards prevent the cutting compound from being thrown beyond the machine.

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[*] A paper presented at the International Engineering Congress at San Francisco, 1915.

[**] Director of Manufacturing Operations, Westinghouse Electric & Mfg. Co., East Pittsburgh.

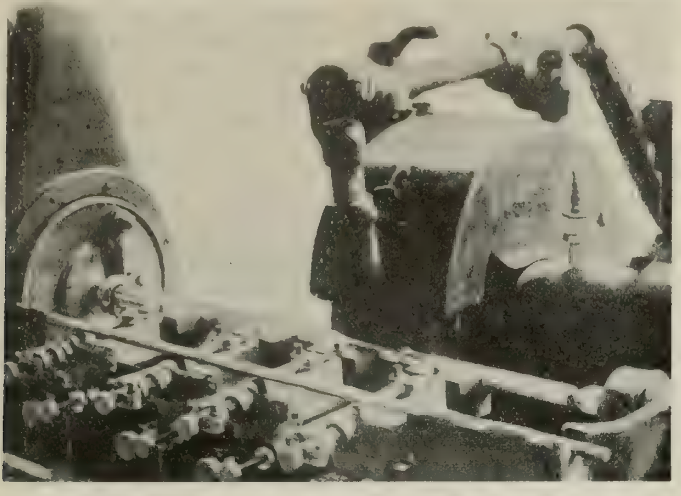

FIG. 4. SLAB-GRINDING A SHAFT 1¼ IN. DIA. X 30 IN. LONG.

Much of the work now done on the vertical machines was formerly done on grinders of an old type, having horizontal spindles and cylindric wheels. The superiority of the vertical machine is due chiefly to the adjustable feeds and speeds, also to the method of chucking and face contact instead of line contact of the wheel.

In the up-keep of wheels, the vertical grinder costs five times more than the obsolete horizontal machines mentioned above, but since the vertical grinder produces from 50 to 75 per cent. more work, the wheel cost per die is very little more. On small dies, having surfaces up to, say 3inch by 6-inch (76.2 by 152.4 mm), the saving due to the vertical machine is about 75 per cent.; on large dies up to 30inch (762 mm) dia. (the maximum capacity of the machine), the saving is about 50 per cent.

Cylindric Grinding.

The finishing of cylindric surfaces on cast iron and steel by grinding has been a well established machine shop process for many years. It is common practice on shaft grinding up to 6 inches (152.4 mm) diameter to use wheels of 2 inches (50.8 mm) face, and to give a work traverse of from ½ to ¾ of the wheel width per revolution of the work. With the correct combination of work and wheel speeds, wheel grain, grade and materials, each pass of the wheel, when roughing, may remove from 0.003 to 0.004 inches (0.076 to 0.102 mm) from the diameter of the shaft. At the end of each stroke, or pass, the longitudinal movement, or traverse, is suspended, while the work makes from one to two revolutions. The total number of passes required to rough grind any fit, therefore, depends on the amount of stock which has been allowed for grinding. This allowance varies considerably in different machine shops according to the class of work, the condition of the roughing lathes and the inspection of the roughturned shafting. In general, however, the amount allowed for grinding depends on the diameter and the length of the work and tables have been constructed which give this allowance for any shaft of given diameter and length. From what has just been said, it is evident that a considerable reduction in grinding time may be effected by increasing the width of wheel. In the latest development of cylindric grinding, which someone has called "slabbing," the advantages of the very wide wheel are obtained. This new method appears to have possibilities which are limited only by the width of the grinding wheel and the rigidity of the machine. Fig. 4 shows the application of the "slabbing" process to a 1.4 inch (35.56 mm) diameter by 30-inch (762 mm) long shaft; from which it will be seen that, with the exception of one fit, the wheel exceeds the length of each shaft fit. By this means, the end traverse of wheel or work is in a large measure eliminated, and a corresponding decrease in grinding time realized.

File Sharpening.

Although for a number of years attempts at file sharpening have been made, it is only within the last few years that the process has become a commercial success. A sand blasting apparatus is being used for file sharpening, with success, by several large manufacturing establishments. This apparatus consists of a sheet-iron chamber provided with uptake, settling tank, slurry mixing-tank, slurry overflow-pipe, air agitating pipe and slurry projector. A door gives access to the inside of the chamber. The slurry projector is inclined to the horizontal at an angle of 25 degrees, and the nozzle extends slightly within the chamber. This projector consists essentially of a bronze body to which are fitted steam pipe, slurry suction-pipe and nozzle. The steam supplies sufficient water for the slurry.

The files are sharpened by being held in the slurry jet in such a manner as to expose the backs of the file teeth to the cutting action of the sand. After the file has been sharpened, it is cleaned and dried by the steam, after the slurry supply has been cut off by a foot lever.

Success in file sharpening depends on the skilful selection of the files to be sharpened, maintenance of the correct angle between files and jet while sharpening, and the selection of a suitable sand. Experience shows that a sharpened file often does as much work as a new one, and the cost of sharpening averages about one-fifth of the cost of new files. The following results have been obtained under ordinary manufacturing conditions and may be taken as representative of the economies which are effected by the efficient use of this apparatus.

Treated No. of Files	Size	Total Cost Blasting Sand	Price Recut	Price Files of New
109	4 in. files	$0.88	$	$ 11.99
1245	6 in. files	9.96	....	136.95
1333	8 in. files	14.20	....	199.95
943	10 in. files	15.07	56.00	169.74
1206	12 in. files	28.98	96.48	241.20
831	14 in. files	26.69	99.72	174.51
566	16 in. files	22.64	90.56	124.52
143	18 in. files	6.28	27.17	34.32

Electric Driving of Machine Tools

That the electrically-driven machine shop possesses advantages, is evident from the rapidity with which electric driving has been substituted for mechanical driving. Among the advantages claimed for electric driving are the following:—

Power may frequently be obtained from a public supply corporation at a less cost than would be possible were it generated in a private power station. In such a case the first cost of a private generating plant is unnecessary.

When an electrically driven shop, having its own power station, is in the vicinity of a public supply system, power may be obtained for machine shop purposes when the private station is idle.

Where electric driving is used, the position of the power house may be determined by a convenient source of fuel and water supply and facilities for the dispesal of ash; whereas, mechanical transmission usually makes a definite relation of machine shop and power house imperative.

Transmission shafts, counter shafts, fixings and belts, with their expensive delays and repairs, are eliminated. As a result of the elimination of belting, there is less obstruction to light.

Electrically driven machinery may usually be more easily arranged to suit the sequence of manufacturing operations, and where the machines are individually driven, any machine may be operated irrespective of others. Closer and more conveniently obtainable cutting speed regulation, with a consequent increase of from 15 to 25 per cent. in output, together with a great reduction of moving parts, is usually made possible by the substitution of electric for mechanical control of machine tools.

Great improvements have been made recently in the design and construction of machine shop electrical equipment. Motors have been reduced in weight and increased in mechanical strength by the substitution of pressed steel for cast iron and cast steel. Automatic starters and controllers have been improved and are now used to advantage on machines which are frequently started and stopped.

Advantages of Electric Control

Among the advantages secured by automatic control—sometimes called "push button" control—may be cited the following:—

Simplicity and safety in operation.

Speed regulation to suit the hardness of material to be cut.

Protection of motor from excessive starting current.

Protection of motor from overload.

Convenient location of the push buttons greatly facilitates the setting up of work on the machine. This feature is highly desirable for planers and boring mills. A very full description of automatic control for industrial motors may be found in the Electric Journal of December, 1914.

It frequently happens that existing machine tools may be readily altered and greatly improved by the substitution of electrical for mechanical control, as in the following case: A lathe, in which the work speeds were obtained through numerous spur gears, clutches, levers, and fittings, had caused considerable expense and delay due to repairs, and it was decided that a change from mechanical to electric control should be tried, as a possible means of reducing the repair bill. Fourteen spur gears, two double clutches and their levers and fittings were removed from the headstock and an adjustable speed motor and controller were installed. After the change, instead of the nine original speeds, thirty-two were available under the new conditions. In addition to the advantages of closer speed regulation and reduction of wearing parts, an appreciable reduction in power used is recorded, and speed changes are obtained with less effort.

Conclusion

From what has been said with reference to modern cutting tools and machinery, it is evident that rapid advances have been made in machine shop methods and equipment; it is also a fact that the cost of equipment has increased greatly. Also, the first cost of buildings, with the superior hygienic conditions under which men work; the increased cost of management due to the more highly developed and complex conufacturing conditions and competition; and other items connected with the production of machinery, all combine to swell the total overhead factory expense. Under these circumstances, it is essential that a high state of efficiency be maintained in the machine shop, and this can be secured only when the machinery is kept running at or near its maximum capacity. There are many factors involved in the realization of this latter condition, not the least of which is the ability of the machine tool operator; and in order that the operator may work to the best advantage, it is now customary, in large organizations where a great many tools are used, to employ a staff of expert demonstrators, whose business it is to instruct operators and demonstrate the capabilities of machines. The demonstrator is also expected to keep himself abreast of the latest developments in this class of work, and to devise means for simplifying and improving machining operations. The paper read by Mr. G. O. Gridley, on "Safe Selling Guarantees" before the National Machine Tool Builders' Association, in the fall of 1913, brings out very forcibly the benefits to be derived by machine tool builders from the demonstration of the value of their machinery.

The buyer of machinery is naturally influenced by the design and workmanship in the tools offered, but, generally speaking, his final decision in making a purchase will rest upon the quantity and quality of the work which the tools will produce in a definite time and under working conditions which are conducive to a reasonably long period of usefulness and efficiency. Therefore, the machine tool builders who are in a position to study the requirements of their customers and to furnish data as to how work should be done and the time in which the work can be done, have decided advantages over those who do not render such service. The market now offers a great many competitive machines for doing practically the same class of work, and it is not to be expected that the users can always accurately decide what is best for their requirements.

Before making a guarantee that a machine tool will perform a definite piece of work in a certain time, the builder of the machine should be in a position to demonstrate that the work can be performed in the time specified; otherwise, it is unsafe to make such a guarantee. Actual demonstration is convincing, and its influence as a selling agent is very far reaching. Demonstration provides a means of obtaining the most suitable arrangement of tools and the best combination of feeds, speeds, and cuts for the work in hand. During a demonstration, an itemized record, or time study, can be made of the operations, the material, the cutting feeds, speeds or cuts, the handling time and the time consumed in manipulating the machine. Such records, when conveniently filed, form a valuable source of information, which may be used to advantage when estimating the cost of similar work.

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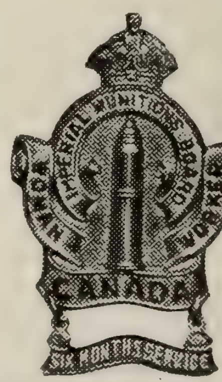
OFFICIAL BADGE FOR WOMEN WORKERS

WOMEN munition workers are to receive official recognition from the Imperial Munition Board, and with this end in view an official badge has been issued by the Board which will be given to each woman munition worker who has been engaged in the manufacture of munitions for thirty days. The badge is unique and of interesting design, showing a completed artillery shell in its cartridge case on a shield surmounted with a crown, and with scroll work carrying the words: "Woman Worker" and "Imperial Munitions Board," with "Canada" beneath. A feature of the badge analogous to the bars on military medals will be a service bar bearing the words, "six months' service," which will be attached below the badge, an additional bar being added for each six months of continuous work at one plant.



OFFICIAL BADGE FOR WOMEN MUNITION WORKERS.

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

CULTIVATING THE INITIATIVE

By A. E. R.

NO man should content himself with absolute subordination. Strict obedience is very often a highly desirable factor; but to carry it to extremes, at the expense of personality, is to sacrifice all self-respect and confidence in one's personal ability. Original thought and individual initiative have invariably been two of the greatest forces in the advancement of mankind; the first—whether visionary or the development of previous ideas—has always found expression in the latter, where an active brain and willing hand has been ready to put into concrete form the fruits of mental conception.

Everyday Requirements.

Workmen should always be mentally alert; quick to see an opportunity wherein their own and the firm's interests can be advanced. Because work has been performed in a certain way for a long period of time, is no reason that it should be accomplished in the same identical way indefinitely. While in the majority of cases, present methods of doing certain operations might not very well be improved on, there are many instances where a little thought, logically applied, would greatly increase the productiveness of a man or machine; often eliminating much labor otherwise uselessly expended.

A man's loyalty to the firm may be shown in the implicit way he follows the directions of his superiors, and yet he may be quite indifferent to efficiency possibilities that would be clear to a more receptive mind or observant eye.

How Initiative Originates.

Concentration of thought upon the work in hand is the forerunner of a creative mind. While many trains of thought carry no freight, the essential factor is to keep the train moving, so as to be in a position to take on freight when the opportunity offers.

When men are enthusiastic about their work, their minds are alert, they are productive, prolific in ideas, original, creative, strong and effective. What hope of advancement is there for the man who can only answer, "I do not know"?

Fruitful Criticism.

One of the best ways of cultivating the creative thought, is to study the methods of the other fellow; not with the purpose of adopting his ideas, but to see wherein any particular principle may fit in with your own line of work, and at the same time become conversant with progressive and up-to-date equipment. Few workmen, however, have the opportunity of studying this development by actual observation, owing to the small circle in which their practical experience is confined.

Trade Journals Helpful

The one best method for the isolated mechanic to obtain the current trade progress, is to avail himself of this privilege through the medium of the trade paper, which reflects in print the latest improvements of that particular field of industry. The careful and conscientious study of these pages broaden and train the mind to think out original and effective ideas for individual and collective benefit. The circulation of ideas among different shops stimulates thought all along the line.

Discourage Discouragement

No man should be discouraged because his first attempt at original thought has not met the approval of his immediate superiors. Your proposal may even be resented, but do not get "cold feet," it is a weak man that cannot rise after being knocked down. The man that suggested floating iron boats was termed a fool; wireless telegraphy was laughed at when first spoken of; a railroad president had no time to waste with George Westinghouse when he wished to "stop a train with wind." So it has been with many new ideas that have afterwards proven beneficial to the human race.

Great achievements are possibly not open to everyone, but even the most insignificant improvement is often the first step towards higher and more important goals. Never before was there such a demand for the resourceful man; the man who can think, who can devise, and who can put his thoughts into execution.

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RECOGNITION OF ABILITY

By R. Hamilton.

ONE of the agents that tend to destroy the spirit of loyalty, is the lack of appreciation accorded for work well done. In many instances this reasoning does not apply; but where it does, the seed of dissatisfaction once planted, may ultimately grow up and stunt the growth of the surrounding grain. It is generally recognized that the foreman is responsible for the efficiency of his department, and to maintain a high standard it is essential that the shop associations should be of such a nature, that the workmen can be relied upon to put forward their best efforts at all times.

Men Are Not Machines

Men should not be considered solely as units of a productive force, for unless an essence of goodwill permeates the whole plant, loyalty to the firm will gradually disappear, and the value of the men will deteriorate. Treat a workman as your slave, and you will get from him sullen service; and a half-hearted service means limited and inferior production. Consider him as a co-worker; one whose efforts are not only satisfactory, but appreciated, and an important part of your high efficiency problem will be solved, so far as output is concerned.

Need for Personal Judgment

It is the workman's privilege to improve his opportunities, and his superior's duty to see that he gets them. Men should be encouraged to use their own judgment in many of the minor details of their work. Profitable results are very often obtained by men "thinking" of their work in addition to doing it.

Although the foreman is nominally in charge of the shop, and ordinarily supposed to answer "shop" questions, it behooves all men to practice the analyzing of detail problems, the simpleness of which often try the patience of the best of foremen. And then again, there are men in authority who are so self-conscious of their own limited accomplishments, that they are reluctant to accept suggestions from the men under them. However, the world—at least the mechanical world—is making such rapid strides that no one man's past or present experience is so broad that he can lay claim to a monopoly of original thoughts or ideas

Ridicule Kills

Do not despise or ridicule the well-meant suggestion of an interested shop man. Nothing will "kill" a man quicker than to ignore his proferred aid in the solution of a shop problem. Ideas are sometimes advanced by the men in the shop for the improvement of certain tools or devices, which the foremen reject at the time ,and afterwards use with some small alterations; but the "powers that be" are under the impression that the saving is the work of the foreman and not the man.

A Steal

A case is recalled where the foreman

actually ''takes'' the credit at the very moment the suggestion is offered. A thoughtful planer hand seeing where he could save considerable time by the use of a certain fixture, explained in detail his idea to the foreman. Just as the latter was convinced of the advantage to be gained, the manager comes along and is advised by the foreman that, '' 'I' have just thought out a plan where we can make a saving of 25 per cent. on this operation.'' The device was designed and constructed, but it was the means of ''killing'' the real author, with subsequent loss to the firm. While cases similar to that just stated may be exceptions to the general rule, it is often these same exceptions that prove the undoing of some enterprising concern, ''blessed'' with a poor executive.

Ability Seeks Recognition

Men who are keen to recognize their own ability, wish to have it appreciated, and if it is not, these men will invariably seek a position where it is.

Every worker in an organization whose aim is his own advancement and the welfare of the firm, is justly entitled to at least the moral recognition for any suggestion whereby the efficiency of the plant may be increased. To stimulate thought and promote the suggestive idea, every shop should have some organized system to induce the workmen to take an active interest in the economic handling of product and equipment. Money talks, and a small cash consideration for an adopted idea, is nearly always an incentive for future developments of an original nature.

WORKING WITH A PURPOSE

By P. H.

SEARCHING for a job that entails the minimum expenditure of physical labor, for the greatest cash returns, is a trait common to a large number of present-day workmen; in fact, many of those who are now occupying such ''coveted'' positions spend much of their time in abusing the privileges with which they are surrounded. There is something demoralizing in trying to get through life without a struggle.

Helping Others Helps Oneself.

To achieve success in any field of activity, the employee must realize, that while he is working for another, he is nevertheless in business for himself. Every bit of work he does heartily, honestly and thoroughly, is developing his own capacity, making him a bigger, broader, more capable man. Remember that cash remuneration is not the only returns you are receiving for your labors.

Future Assets.

The knowledge that you acquire in the course of your daily ''grind,'' is to be one of the chief assets of the future; therefore, the value that is placed upon your services in after years, will not be, what you have done for your previous boss, but rather what you have learned and can apply profitably to the subsequent positions you are called upon to fill.

The seriousness of life should be impressed upon every young man during the early period of his career. No man should expect to journey through this life without having accomplished, during the passage, something worth while.

Luck Versus Ambition.

That man is destitute of ambition who is content to drift along, passively indifferent to those qualities that make for success. These men, as a rule, will look at the other fellow's advancement as a matter of ''luck,'' never realizing that this good fortune is invariably the result of earnest application and eagerness to excel.

Luck is the tide, nothing more. The strong man rows with it, if it makes toward his goal; he pulls against it if it flows the other way. A man waited for 20 years for an opportunity to come along; becoming weary, he decided to take a nap, and while asleep the opportunity passed him by. A receptive mind, and an alert and creative brain, are the two goal posts through which opportunity scores a goal.

Industrious Idlers.

Idleness, in any form, is not only the key to beggary, but it is cowardly; inasmuch as the portion of life's activity that one person endeavors to avoid must be taken by another. It may be alright to cry aloud that the world owes us a living, but let none of us appease our conscience by letting someone else pay the debt. While idleness is generally supposed to allude to an anti-work habit, this non-productive trait may be exercised during the periods of useful effort in the daily routine of the average man. Some men, knowing they have accomplished a certain job in extra good time, will spend the ''saved'' time in telling their shopmates about it. These men are not only losing the respect of their superiors but what is probably worse, they are putting sand into the foundation of their future character, the stability of which should be one of the first duties of every young man, as his best strength depends upon the materials used in its construction.

Genius Discounts Itself.

A man of genius, one that is truly loyal to his self interest, invariably feels that what he has performed does not do credit to his aim or purpose; while on the other hand, the braggart is content to waste his own and his employer's time by trying to convince others of his own importance.

''Some people, in their lives and in
their labors,
Seem larger to themselves than to
their neighbors.''

No man should be satisfied with doing just what he is told to do and no more. He should strive to overcome the tendency of getting in a rut, out of which it is often very difficult to emerge. Men cannot remain stationary; in whatever sphere they are engaged, they must either advance or retrogress. If a man's fund of experience does not increase his skill and production improve, he must stand idly to one side while others pass him by. Every day should see something added to his store of knowledge, and likewise profit to himself and his employer.

Control Effort.

The cause of many failures is not so much in the lack of effort as in the waste of it. A large amount of energy is often non-productive, where the same amount of inherent power properly expended might accomplish marvelous results.

Have courage to go forward. Don't be afraid to try, even if you fail; remember that a worm is about the only thing that can't fall down. Every earnest determination to remedy a failure or overcome an obstacle, makes the next trial just a little easier. If you cannot surmount a difficulty, take positive hold of it and make it serve you.

ORGANIZATION AND SYSTEM

By A. L. Haas.

CARD indexes, routing memoranda, stores orders, shop orders in duplicate, triplicate, quadruplicate, of every kind and all colors of the rainbow, are the order of the day. In spite of these counsellors of perfection, jobs are delayed, stores may be wasted, and time at so much per hour does get unaccountably lost. It is clear that under no routine, however cleverly planned, can the human factor be eliminated or entirely disregarded.

Routine, system, bookkeeping are all self-acting machines, which should automatically care for some repetition details, and relieve the staff from wasting time. It is, however, easy to make a fetish of what is after all a tool, to regard system as an end in itself. When routine becomes master of the situation it is high time to adjust its incidence. There are present-day instances where foremen have so much daily red tape to wind that clerical duties occupy an inordinate time and impair the real functions of their position.

A Frequent Weakness

Instead of system being an assistance with its literary aspect cared for by a clerical staff, it frequently happens that the latter needlessly consult the shop executive and waste his time. Where the management place greater reliance upon filing cards and data than upon getting work out—and such instances, criminal, though true, are not unusual—the information obtained and the data filed are apt to be unreliable.

It must be remembered that the severest critics of systematic want of common sense are those who have to furnish the needed information; these in too many instances feeling that 50 per cent. of the effort so expended is waste energy. The management who, enthroned in high places, issue general orders and binding instructions, occasionally find some systematic routine valuable, and are apt to pursue this interesting pastime to the bitter end. Never having trod a shop floor in the shoes of a foreman, the fact that a special staff and assistance are needed in the matter does not occur to them.

Common Sense a Requisite

System, whose value is unquestioned, should be permeated with obvious sense, so that those expected to find intervals in a busy day for the due performance of its ritual will be found in sympathy with, and not antagonistic to its forms. Where a trivial order costs the same amount as a $2,500 order for this tool of commerce, it is time for revision. Not merely the profit but the amount of the invoice itself may be devoured by the machine of system.

Now, system and organization are not the same thing; so obvious a fact needs mention since misconceptions are abroad on the subject. Actually, one is the direct complement to the other. Organization supplies, or should supply, the human element, correcting, modifying, or supporting the system by which its decrees are carried into effect. While organization is the life blood of industry, system may be likened to the nerves of the industrial body, it should therefore possess contractile and reflex functions; but, minus the life blood of the organizer, system, while a perfect framework, will not keep away or correct defects. The perfect system is yet to be discovered and each isolated firm finds considerable difference in method from other similar concerns.

Foreman's Duties Executive

Any routine which makes the foreman's life a burden is clearly against efficiency; consideration of this does not get the attention it deserves. Provided that he is capable, it is quite immaterial whether a foreman can read and write; his functions in the shop are executive and not clerical. Being shop organizer, if he be turned into a second rate clerk, his peculiar virtues are placed in a wrong channel and the shop assuredly suffers in more ways than one.

System, then, should be elastic, and of the least burdensome character which it can be made to assume while serving its designed ends. These requirements should be clearly visualized before it is installed. There should be enough horse sense about it so that its value can be recognized and gain the sympathy of those who have to bear the incidence of its burden. If quantities of clerical labor are involved these should, in the main, be in the custody of a clerk, not of an active organizer such as a shop foreman.

Some concerns seem to fear that their shop executives should have a leisure moment, much less an idle hour. Without some leisure for reflection, unhampered by clerical and other duties, it is impossible for the average rational man to exercise foresight, provide for contingency and keep up the personnel under his control to proper pitch. On a lower plane wastage of time, material and stores may go unchecked for want of personal supervision.

System Secondary to Organization

Rational organization should take care of the system, not system rule the organizer. System is, after all, of secondary and not prime importance, however alluring the data it compiles. The main object of the hsop is to turn out good work with maximum production. System and the time it occupies is, after all, an overhead charge to be earned and is no end in itself.

As an instance in point of the unchecked ravages of system—A large concern, whose activities occupy many fields and cover a wide range of specialties, appointed a new works manager. Contrary to previous practice, he insisted on getting into direct touch with the commercial side of the business. He asked for monthly returns of sales for the last five years. From these he prepared what he termed curves of tendency. With this information he went carefully through stock and finished parts in hand, making some rather important discoveries. He calculated that in some instances stock in hand for certain specialties was sufficient to last at least 10 years. In others, odds and ends were being continually made singly. Some stuff was season sales, but stock and finished goods went on being made at one and the same time.

After the entire matter had been thoroughly sifted, he sought audience of his managing directors, the net consequence being that the shareholders got no dividend that year. The system appeared perfect, certain definite amounts of stock being held as spares, and against future orders. As operation was automatic, shop orders to replenish stock issued from the office at regular intervals. Market tendencies were ignored by the system in vogue, also the incidence of season on trade. The passage of years had entrenched the system, while the same interval of time had altered the sales.

System Organized

To-day the management get returns of sales month by month, the tendency curves are plotted and passed to the works manager, who adjusts the quantity of stock, using his knowledge of how the shops are fixed and exercising a balanced judgment as to what is necessary.

It is insisted that the system was good, but very misleading. The distinction between system and organization, it is hoped, is made clearer by the instance cited.

While system without due organization may bring the large firm into trouble, in the small shop the lack of both sometimes conjures up a gentleman known to fame as the official receiver.

In the small shop, where one single brain can carry the whole business, there is perhaps little loss in the want of system. It is when the particular brain ceases, or the business grows that an element of order must perforce be introduced. Possibly the efforts of the small shop at this stage of the evolution are of supreme interest. The men grow restless under the supposed slur on their honesty, and think the checking out and in and the exercise of automatic supervision unnecessary and rather childish.

One Man Organization

A man who took over the management of a country shop found his life not a bed of roses when, after a decent interval, he decided to re-organize. The troubles were rendered more acute by reason of the necessity for relying upon the memory of the men for details of repeat jobs, as no records were previously kept. Bare material and other things were stored in the open and castings in heaps. The scrap heap of considerable dimensions, was a local mine where material was obtained for odd jobs. The time lost looking for sizeable pieces was never added to the bill and this obviously overset the advantages of the practice.

The junk pile was duly sacrificed to the foundry or sold, quite a proportion placed in proper custody, properly sorted out, and a primitive, but efficient system installed. The bar material went into racks, and bit by bit, with patience and tact, difficulties were straightened out. Grumbles were heard, but the man in question enlisted the sympathy of the employees, who soon found the benefit accruing from the changes, and the shop is now in a flourishing shape, with the relations between worker and management excellent.

System, organization, and a live man, in co-operation, is the real ideal to be sought. All three are necessary, especially the live man.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

GEARED HEAD FOR SCREW MACHINES

INSTANTLY obtainable speed changes and increased pulling power due to the high belt speed employable, are two of the principal reasons for the growing demand for single pulley drive machines. An interesting example of this type of drive is shown in Figs. 1 and 2 which illustrate an all geared head recently designed by the Foster Machine Co., Elkhart, Ind.

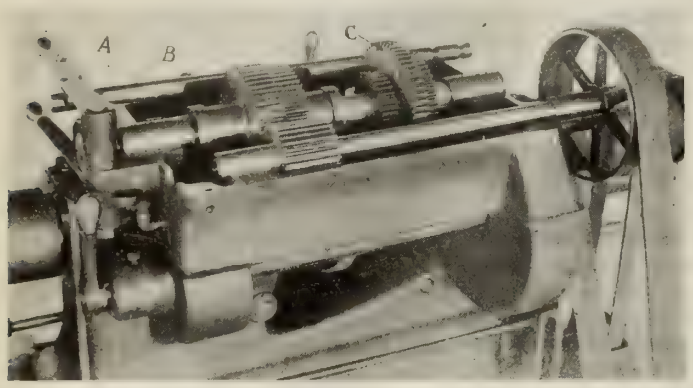


FIG. 1. UNIT GEARED HEAD FOR SCREW MACHINES.

This head is designed on the unit principle so that while in itself it is new, it may be fitted to the standard Foster No. 5 screw machine. In order to do this the cone pulley of the standard machine is removed from the spindle and replaced by a three gear cluster, which engages with the various diameters of a triple sliding gear mounted on a shaft directly above the spindle. This sliding gear is shown in Fig. 1, the method of operating being by a rod A, and hand lever B, a slot in the rod engaging the largest diameter of sliding gear C. The sliding gear shaft is journaled in bronze boxes carby the main head casting.

On this same shaft are mounted two friction driven gears with a cone type of friction clutch arranged to engage either of them for the purpose of stopping, starting, and reversing, one of the friction gears meshing with a reverse idler gear which is just visible below the driving pinion on the pulley shaft in Fig. 1.

The driving pulley is 10 in. dia. by $2\frac{1}{2}$ in. wide and is run at 900 revs. per min. giving a belt speed of 2,350 ft. per min., which under ordinary conditions will deliver 6.2 horse-power to the machine. General requirements however do not call for more than 2 horse-power and in Fig. 2, a General Electric motor of this capacity at 1,800 revs. per min. is shown mounted on the rear side of the leg, the small size of the motor permissible due to the high belt speed employed, being very apparent. Belt guards of very efficient design are fitted, while if desired, the machine can be driven equally as satisfactorily from a line shaft with ordinary countershaft gear.

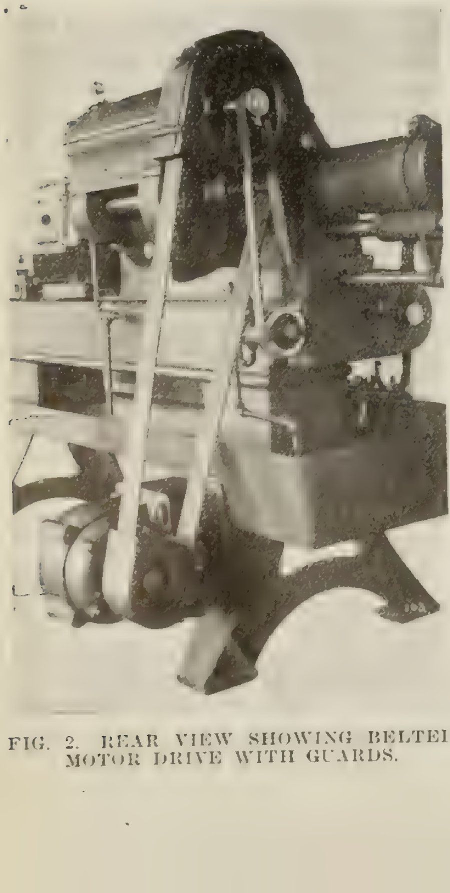


FIG. 2. REAR VIEW SHOWING BELTED MOTOR DRIVE WITH GUARDS.

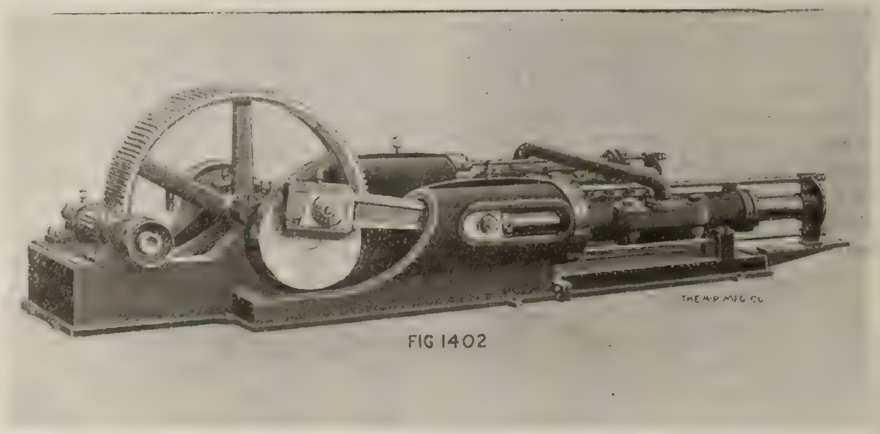
Six speed changes are obtained through the geared head, ranging in geometrical progression from 34 to 466 revs. per min. The collet type chuck regularly supplied, has a capacity of 1 13-16 in. and swing over cut off slide $8\frac{1}{4}$ in. the cut off carriage being equipped with hand longitudinal, and power cross feed with four feed changes.

*

MOTOR DRIVEN FOUR PLUNGER HORIZONTAL HYDRAULIC PUMP

THE hydraulic pump illustrated by the accompanying photograph is a recent addition to the extensive line of high pressure hydraulic pumps built by The Hydraulic Press Mfg. Co., Mount Gilead, Ohio. It is of the horizontal, four-plunger type and designed to fill the requirements for a simple, heavy duty hydraulic pump for supplying a large volume of water or other fluid against a high pressure.

It is designed so that it may be equipped with sixteen different sizes of plungers ranging from $1\frac{3}{8}$ inches to 5 inches in diameter, advancing by quarter inches. The water cylinders are made of forged steel for the highest pressures. For the medium pressures, 1500 to 2900 lbs. per sq. in. inclusive, cast steel is used, and for the lowest pressures the cylinders are semi-steel. The pressures range from 9500 to 700 lbs. per sq. in., and the water capacity from 24 to 326 gals. per min. All sizes have bronze valve seats and bronze or nickel steel valves.



MOTOR-DRIVEN HORIZONTAL HIGH PRESSURE HYDRAULIC PUMP.

The pump illustrated is built for motor drive, requires 150 horse power to operate, and is equipped with a flexible shaft coupling for motor connection. Any motor having a speed of from 450 revs. per min. to 750 revs. per min. may be used. The speed of the shaft is 60 revs. per min. The stroke of the plungers is 16 inches, the two cranks being set at 90 degs. so that a more uniform flow of fluid may be obtained than with a triplex pump.

At all points where the strain and wear is most severe, the parts such as main bearings, connecting rod ends, cross head guides, valves and valve seats, are of easy access for adjustment and replacement. The frame or pump bed consists of two heavy castings securely bolted together, the cross head guides and main bearing containers being machined in the frame. This insures perfect alignment and gives the most rigid construction. The pump occupies a floor space 18 feet, 8 inches in length by 6 feet, 10 inches in width. While the illustration shows the pump equipped with a spur gear and pinion, it may also be equipped with a herringbone gear and pinion.

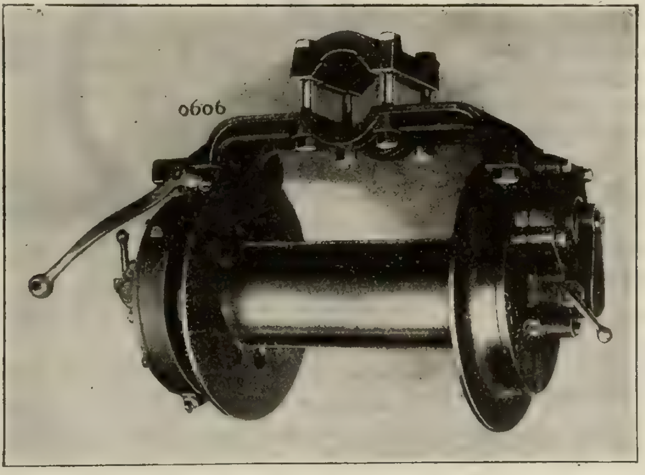
* * *

SPECIAL LATHE WITH THREAD MILLING ATTACHMENT

THE illustration shown herewith represents the latest development by the Gisholt Machine Co., Madison, Wis., of a special machine for performing the operations of boring, facing, and thread milling in the base or in the nose of shells. It can be adapted for cutting either right or left-hand threads, internal or external, U. S. standard or metric. The machine illustrated has a nominal swing of 25 in. with 10 ft. bed, and will handle shells up to 12 in. dia., while a larger machine, 29 in. swing with 16 ft. bed, will handle shells up to 16 in. dia.

This machine has been primarily designed to overcome the difficulty, generally experienced among shell makers, of securing a perfect thread when it is necessary to re-chuck the work for the threading operation after completing the boring and facing operations. The design, therefore, is such that the boring, facing and threading operations can be finished complete at the one chucking, avoiding any imperfections, and saving the labor of transferring the work and re-chucking in another machine.

Simplicity of design, rigidity of construction, and accuracy of workmanship are features of the machine.



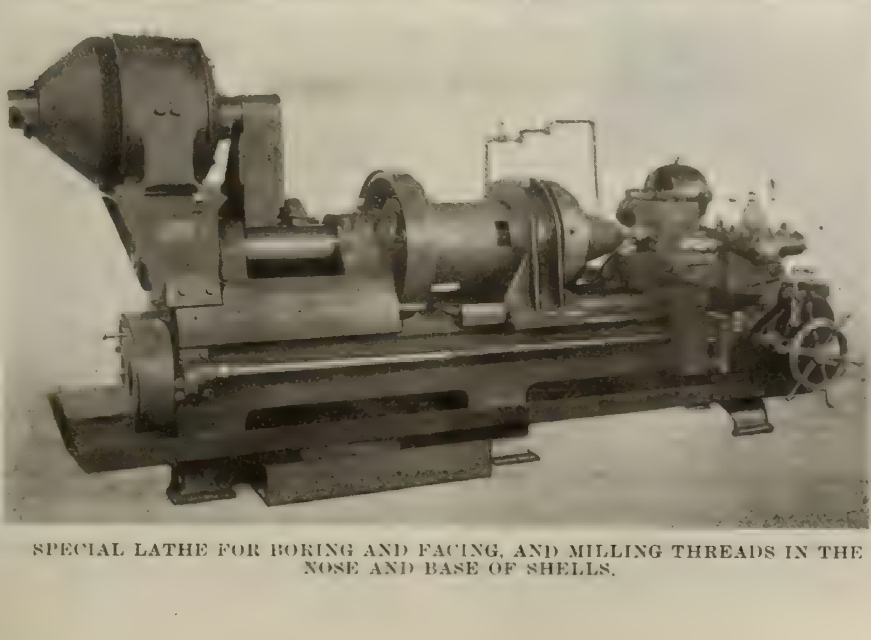
PNEUMATIC ROPE HOIST WITH MAXIMUM PULL OF 600 LBS.

The collet chuck is supported at its outer end by a heavy steady rest, and is driven direct from a spiral pinion on the back gear shaft engaging with a spiral gear secured to the collet chuck flange, which in turn is secured to the ends of the spindle nose. The spindle is 6¼ in. bore, and has large bearings provided with bronze bushings and the end thrust of the spindle is taken by a ball bearing against the rear housing. The drive from motor to back gear shaft is through a silent chain.

Special back gearing through worm and worm wheel is provided for reducing the speed of the spindle to the proper speed for milling the thread at one revolution of the spindle. Either the slow speed for milling or the regular speed for boring and turning can be instantly obtained by shifting of headstock lever. Change gears are provided, so that the relative speed between the boring speed and the milling speed can be varied to suit conditions. Three rates of quick change feeds are provided at headstock end of machine, and also the usual change gears for obtaining various feeds and for threads required for the screw cutting operation. The power feed for boring operation is through rack and pinion in apron mechanism, and interlocking mechanism is provided to prevent the engagement of the rack feed and the screw cutting feed at the same time.

The tool post is of cast steel and is mounted on the front of the cross slide. It is provided with four holes, 2¾ in. bore, for carrying suitable boring bars holding either single or double-ended cutters. Index pin on cross slide insures accurate lining up of the tool post holes with the headstock spindle when it is desired to use double-ended boring cutters.

The thread milling attachment is mounted on rear of the cross slide, and is provided with radial adjustment for aligning the spindle of the thread milling attachment with the lathe spindle. The thread milling spindle is mounted in adjustable bronze taper bearings, and has thrust washers and adjusting collar for preventing backlash of the spindle. The spindle is driven by worm and worm wheel and spiral gears from small motor mounted directly on the cross slide. Spindle is fitted with arbor for hob. The front end of cross feed screw is provided with an adjustable cam for accurately feeding in the hob to the correct depth of thread before the main spindle starts to revolve.



SPECIAL LATHE FOR BORING AND FACING, AND MILLING THREADS IN THE NOSE AND BASE OF SHELLS.

* * *

NEW MODEL LITTLE TUGGER HOIST

FOR the use of those who prefer Manila rope to wire rope for light hoisting and hauling, the Ingersoll-Rand Company, New York, has brought out a new model little tugger hoist, which is designated No. 11.

The square piston, reversible driving engine, automatic lubrication, enclosed gearing, drum release clutch and worm operated band brake, are essentially the same as in the No. 1 model, which was described on page 265 of this journal, September 17, 1914. The main differences are in the diameter and length of the drum, the width of the flanges, and, necessarily, the main frame and overall dimensions.

The new No. 11 Little Tugger has a hoisting drum 7 inches in diameter x 17 inches long, with 5-inch flanges. This accommodates 300 feet of ⅞-inch Manila rope. The maximum capacity of this hoist is conservatively rated at 600 pounds. The weight of the hoist itself is 358 pounds. It is 21½ inches long, 31¼ inches wide and 23 inches high.

Like the No. 1 model, this apparatus is built for operation both by compressed air and steam. The standard clamp fits a 4½ in. diameter column or pipe, but by removing the clamp the hoist can be readily bolted directly to any convenient support, timber, flooring, etc. Although designed primarily for underground work, it is suitable for all around hoisting, hauling and handling in mines, tunnels, quarries and industrial plants.

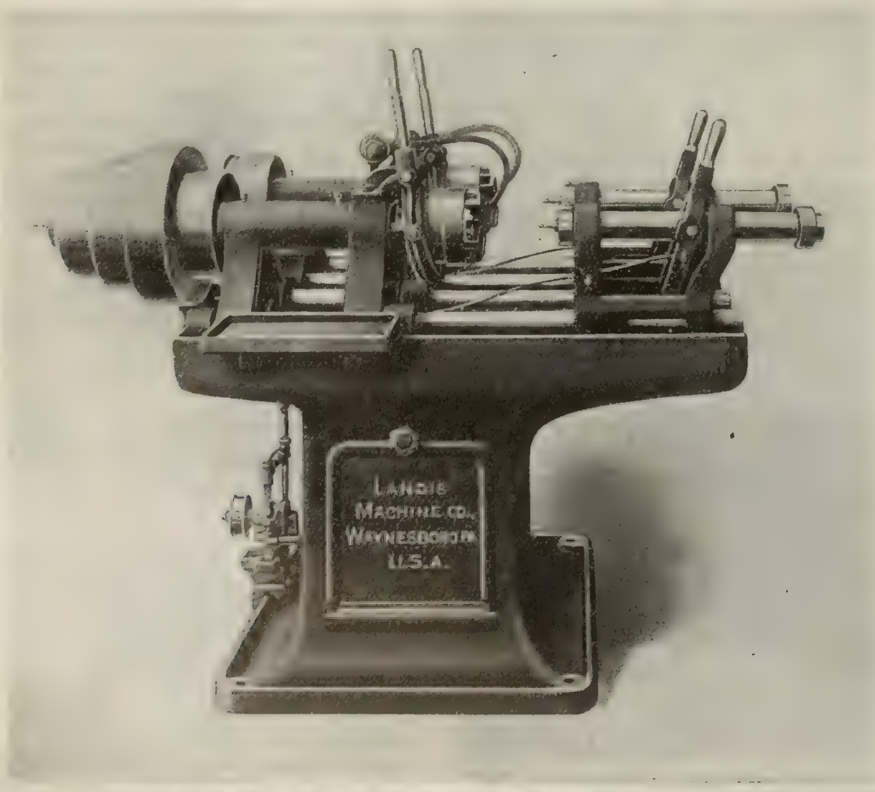
◆

THREADING MACHINE FOR HOLLOW SET SCREWS

A THREADING machine, equipped with special carriages for threading hollow safety set screws, has been recently placed on the market by the Landis Machine Co., Waynesboro, Pa., which, while primarily designed to thread hollow safety set screws, may be employed in threading stock where there is a continuous thread and a similar method of holding. The carriages proper are stationary, and support two spindles which have a free horizontal movement. These spindles are brought to the threading die-heads by means of weights, which are attached by chains to the levers operating the spindles. These weights exercise a continuous force upon the spindles in the direction of the die-heads, making it unnecessary for the operator to advance the stock for the threading operation.

The heads of the spindles are bored and fitted with mandrels for holding the set screws. A collar is placed on the rear of each spindle, making it adjustable for cutting any desired length of thread. For the threading operation the set screw is placed upon the mandrel and the spindle automatically forces it into the die head. When the screw is threaded, it remains in a tube, which extends through the spindle from the face of the threading die-head to the rear of the machine. The subsequent threading of screws forces the finished pieces through the tube, where they drop into a receptacle placed at the rear of the machine.

These machines may also be used for threading standard bolts by attaching automatic opening and closing attachments for the die-heads. When standard bolts are threaded, the heads of the spindles on the carriages are fitted with bolt sockets for the various diameters within the range of the machine. These machines are equipped with Landis all-steel die-heads, which employ long-life chasers.



THREADING MACHINE FOR HOLLOW SAFETY SET SCREWS.

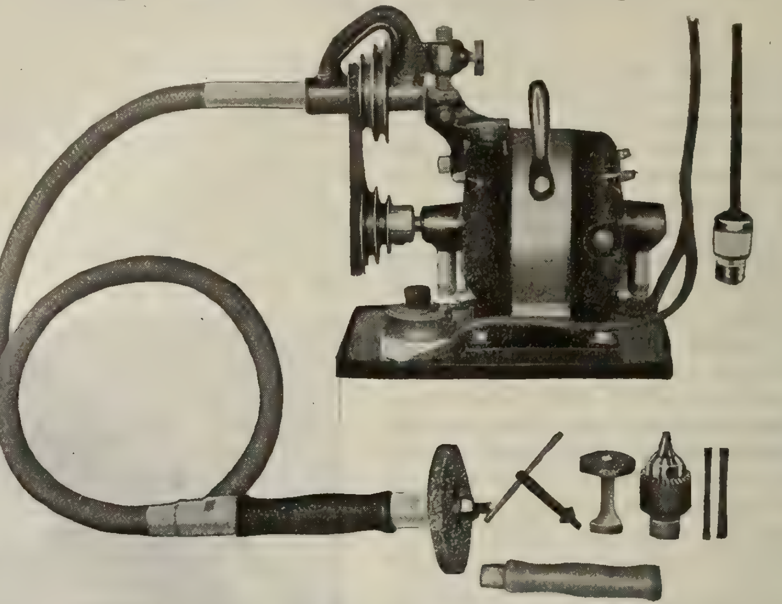


FIG. 1. FLEXIBLE SHAFT OUTFIT FOR LIGHT GRINDING, POLISHING AND DRILLING.

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FLEXIBLE SHAFT EQUIPMENT

THE economies to be effected by the use of flexible shafting on suitable work are now so widely recognized that its position as a standard item of machine shop equipment is thoroughly assured. Recent improvements in their product characterize the Strand Flexible Shaft, which is marketed by R. E. T. Pringle, Toronto.

Two types of this apparatus are illustrated, Fig. 1 showing an outfit for light grinding, polishing or drilling. It is built with either a 1-10 or a ¼ horsepower motor, which drives a 4 in. x ⅜ in. and 5 in. x ½ in. wheel respectively, the former weighing 60 lbs. and the latter 75 lbs. A three-speed countershaft is incorporated in the design, the one-piece leather belt acting as a safety drive to prevent overloading of the motor. By removing the detachable handle and wheel, the drill chuck can be attached in a convenient manner.

A similar equipment, designed for use in tool posts of various machines, is shown in Fig. 2. This outfit is also arranged to give change of speed for different size grinding wheels, and is adapted for internal as well as external grinding. Two sizes of this equipment are offered. The smaller has a ¼ horse-power motor driving a 7-16 in. shaft at 3,500-5,000-6,000 revs. per min., external work being done with a 6 in. x ½ in. wheel, and internal work with a 1 in. x ¼ in. wheel, the outfit weighing 75 lbs. The larger size has a ½ horse-power motor driving ½ in. shaft at 900-1,800-3,600 revs. per min., with wheels 8 in. x ¾ in. and 2 in. x ⅜ in. for external and internal work respectively. The sleeve which is held in the tool post is adjustable for different depths, and in the case of the larger outfit it is possible to grind the full depth of an 8 in. cylinder with a diameter as small as 2 in. For lesser diameters the small internal attachment is provided.

All shafts supplied with these outfits are made with an improved metal casing, which eliminates much of the trouble usually experienced with flexible shafts. It is so constructed as to be freely flexible to a certain radius, where it automatically forms a stop, thus preventing accidental short bends.

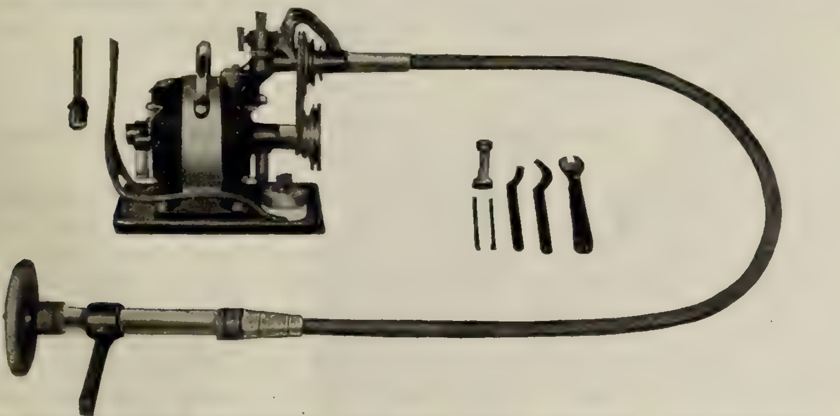

FIG. 2. MOTOR-DRIVEN TOOL POST EQUIPMENT FOR INTERNAL AND EXTERNAL GRINDING.

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DAVIE SHIPBUILDING CO. CHANGES

GEO. D. DAVIE, president, and Thomas Robb and D. W. Ogilvie, directors of the Davie Shipbuilding & Repairing Co., Levis, Quebec, resigned from the board of that company at a meeting held in Montreal on October 20, as a result of financial changes that have placed new interests in control of the company. The only remaining member of the board is C. A. Barnard, of the Montreal law firm of Barnard, McKeown & Choquette, and he is at present on the other side, having sailed for England in company with Canada Steamship officials last week.

Geo. D. Davie, the retiring president, has been associated with the company since its inception a number of years ago under the name of the Geo. Davie & Sons Co., and, following the reorganization of three years ago, when the company assumed its present form and name, he became president. It is understood that Mr. Davie continues to own most of the mortgages outstanding.

The company is one of the oldest shipbuilding concerns on the St. Lawrence, and is the largest in Canada, with the exception of Canadian Vickers, Ltd., Montreal. Its greatest achievement is the boat now under construction for the British Columbia Government, which is nearly 400 feet long.

◆

RECOVERING TIN FROM SCRAP

INCREASED efforts toward the recovery of various metals are being made as a result of prevailing high prices. Copper, tin and brass are amongst the principal non-ferrous metals now receiving close attention, tin being of especial interest to metal users on this continent because of the fact that the supply has to be almost all imported from foreign sources.

The recovery process used in a large American tinplate works consists of three stages. Tin scrap is first "leached" in large vats by a 20 per cent. solution of stannic chloride, containing about 0.5 per cent. hydrochloric acid, the latter being to prevent formation of xides and oxy-chlorides of tin. Working at 150 deg. F., the leaching process occupies from 3 to 20 minutes, according to the condition of the solution. When the latter is saturated with tin—that is, completely converted to stannous chloride, it is pumped into small electrolyzing vats and electrolyzed at 5 volts, using a current density of 30 amps. per sq. ft., with two graphite plates as anodes and removable iron rods as cathodes. Electrolysis is continued till the liquor is again converted to stannous chloride, when it is ready for leaching a fresh batch of scrap. Tin is deposited on the cathodes in very fine crystals, which are scraped off the iron rods at intervals.

The final operation is to reduce the tin crystals to pig, and this is difficult, owing to their fineness and the ease with which they become oxidized. An electric furnace is found the only really satisfactory type, and the one actually used is of the shaft pattern, resembling a miniature blast furnace and standing about 3 ft. high. Once the fluxing slag is melted, the furnace is worked on the resistance principle, wet tin crystals mixed with carbon being fed in at the top of the furnace. The top of the latter is quite cool and, air being excluded from the furnace, there are no oxidation troubles. High quality pig tin is run off from the bottom of the furnace, and up to one ton of crystals can be melted daily.

◆

GRAND TRUNK RAILWAY SYSTEM ANNIVERSARY

THE Grand Trunk Railway management celebrated last week-end in Montreal the sixtieth anniversary of the inauguration of the inter-city communication between Toronto and Montreal. On November 27, 1856, the first train which joined the cities along the St. Lawrence waterway pulled into Montreal after a journey of 14 hours. The train itself was the last word in railway equipment of that date. The advancement of equipment and operation is shown in the fact that the distance is now covered in seven and one-half hours, or very nearly half of what it took sixty years ago.

In 1852 the Grand Trunk was incorporated to build a railroad between these two cities, and the first section of 125 miles to Brockville was open November, 1855. The following year the section from Brockville to Toronto was operated. In that year the pioneers of the road were proud that they had 849 miles of railroad, while they now have 8,115.

◆

DETENTION EXTRAORDINARY

AFTER excusing itself for indulging in such frivolity, an exchange tells the story of a salesman who bought the only remaining sleeping car space. An elderly lady next to him in line in front of the ticket window burst into tears.

"I must have a berth in that train!" she exclaimed; "it's a matter of life or death!"

The salesman gallantly sold his reservation to her.

Next morning the salesman's wife was astonished to receive the following telegram from him:

"Will not arrive until to-morrow. Gave birth to an old lady last night."

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GENERAL BUSINESS, SHIPPING AND SHIPBUILDING

NOT the least important feature of the prevailing prosperity in Canada is the marked improvement in the financial condition of many of our manufacturing establishments, large and small, particularly those engaged upon war orders. These concerns have been able to liquidate their liabilities and in many cases are accumulating substantial reserves. What is true in the sphere of general manufacturing is equally so as regards our shipbuilders and shipping corporations. Shipbuilding is booming as never before in our history, at least relative to steel construction, and as regards wood construction the present activity compares very favorably with past achievement. In the realm of shipping even more satisfactory returns are perhaps being realized, due to the dual circumstance that both lake and ocean transportation conspire to that end as compared with the former only in pre-war days. Vessel shortage for ocean service is all the time becoming more acute, and each day, so to speak, finds Canada's pre-war capacity for vessel production, turning down thousands of tons of building orders. Surely the time has arrived for our Government to interest itself to the point of action in fostering the establishment of greater and more widespread enterprise in shipbuilding, realizing as they cannot fail to do from the happenings of the past two years, that whatever other conditions may prevail when peace is declared, shipbuilding on a gigantic scale will claim precedence and be maintained at high pressure for probably a decade thereafter. Is the pressure being applied to Ottawa as powerful as is available and cannot the issue be forced to a successful conclusion? Additional, and the necessary pressure is, we believe, available to force a successful issue.

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ENEMY SAMPLES EXHIBITION

WHILE the British Board of Trade and Sir George Foster, Canadian Minister of Trade and Commerce, who was instrumental in having the exhibit of enemy samples brought to Canada, deserve credit for giving our manufacturers an opportunity of inspecting certain lines of German goods that have been sold in numerous markets of the world, the commercial value of the undertaking as we see it is a doubtful quantity. The exhibit is interesting in that it reveals the technical and practical ability of the German artisans to utilize raw materials to the fullest possible advantage as well as their aptitude for supplying the special kind of articles which certain markets call for. In this respect the exhibit is an object lesson. As far as Canada is concerned, however, it looks as if little thought had been given to conditions which prevail within her borders.

It would, we think, be practically impossible to manufacture ninety-five per cent. of the articles in Canada because the production cost is prohibitive; there is therefore precluded the possibility of competing in markets where these cheap goods have been sold. The cost in Canada of raw materials alone, even in normal times, is such that the class of goods shown could not be produced profitably at a competing price. It has to be remembered that the standard of living in Germany is considerably lower than in Canada, wages being correspondingly on a much lower scale, reducing thereby manufacturing cost. Germany in normal times has direct steamer connections with the markets represented by her wares, which we have not, and cannot have until we have our own merchant marine, or at least until reciprocal trade within the Empire, at least, has developed considerably more than at present.

As an initial effort, put forth with the best intentions and anticipatory of more or less satisfactory results, we may not be too critical. To those concerned, the present exhibit in the matter of the interest displayed—aside altogether from ultimate results, should be an inspiration to further development, and that along the lines of not only a better class enemy goods exhibit as regards value, but relative also to such basic industries as agriculture, mining, mechanical and electrical engineering and allied spheres.

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COST AND VALUE OF TRADE AND TECHNICAL PAPERS

ONE effect of munitions manufacture by Canadian metal-working plants that daily comes under our notice is the intelligent interest being taken by operators—yes, and by executives, in the outputs of kindred establishments, and the methods, devices and scheduled routine by which specific results are being achieved. In no direction is the interest more apparent than in that relating to the subscription personnel—numerical and otherwise of this journal. A higher cost of knowledge of one's trade or profession has, like the high cost of living, thrust itself to the front, due of course like the latter to a combination of circumstances, avoidable and perhaps not.

Sources of knowledge are not circumscribed, neither are its demands, in consequence centralization of the former for distribution becomes necessary, and printer's ink and paper are the mediums of accomplishment. Each of these commodities has been caught in the swirl of the universally prevailing abnormally high prices, cost of knowledge distribution having in consequence to follow suit. Whether in pre-war days the low cost at which up-to-date information in a trade and technical journal was assessed at its true value, by subscribers or otherwise, has become of little moment, because of the greater appreciation, due to the enlarged outlook, now being displayed; the relatively determining evidence being that of the alertness with which increased subscription rates have been responded to by those concerned. The cost of developing one's intelligence and aptness to pursue successfully a chosen trade or business career is still well removed from such a classification as "high."

INDUSTRIAL NOTABILITIES

JAMES THOMAS CUMMING, managing director, J. W. Cumming & Son, Ltd., manufacturers of coal drills, machines, tools and mine cars, New Glasgow, N.S., was born at Thorburn, N.S., June 1, 1887, son of John William and Catharine (MacIntosh) Cumming. He was educated at New Glasgow High School. The present business established by the above John William Cumming, May, 1902, grew rapidly until fifty-seven men were employed and many of the coal drills, mining machines, etc., used in the coal mines of the Maritime Provinces were being supplied. Upon the death of his father, the subject of our sketch, took over the business. A large market has been secured in Western Canada; the firm having well-established connections at Vancouver and various other points in the West, as also a warehouse and office at Lethbridge, Alta. The business was incorporated in 1911.

JAMES THOMAS CUMMING.

Mr. Cumming is a member, New Glasgow Town Council, and a Commissioner, New Glasgow School Board. He married Jean May Burns, daughter of Capt. W. W. Burns, of Norton, N.B., June 17, 1913, and has one daughter. His clubs are: Scotia; New Glasgow, and Royal Cape Breton Yacht (Sydney); and his societies: A.F.&A.M.; L.O.L. His recreations are fishing and shooting In politics Mr. Cumming is Liberal-Conservative, and in religion Presbyterian. His residence is at New Glasgow, N.S.

—Photo, courtesy International Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$20 95
Lake Superior, charcoal, Chicago	20 25
Standard low phos., Philadelphia	41 00
Bessemer, Pittsburgh	24 95
Basic, Valley furnace	20 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton	$30 25	$29 00
Victoria	30 25	29 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.35
Steel bars, base, Toronto	3.50
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.00
Steel bars, base, Montreal	3.50
Twisted reinforcing bars, base	3.55
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.50
Small shapes	3.85
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.25
Bars, 2 in. and up	3.75
Structural shapes	3.25
Plates	3.75

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$31 00
Electrolytic copper	31 00	31 00
Castings, copper	30 00	30 00
Tin	45 00	46 00
Spelter	13 00	14 00
Lead	9 00	9 00
Antimony	15 00	18 00
Aluminum	69 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$4 75	$4 75
Heads	5 00	5 00
Tank plates, 3-16 in.	5 25	5 00

WROUGHT IRON PIPE

Prices in effect Oct. 2, 1916.

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3.50	$ 5 00
¼ in. and ⅜ in.	3 18	5 31
½ in.	4 08	5 65
¾ in.	4 95	7 07
1 in.	7 31	10 46
1¼ in.	9 89	14 15
1½ in.	11 83	16 91
2 in.	15 91	22 76
2½ in.	25 16	35 98
3 in.	32 90	47 05
3½ in.	39 56	56 50
4 in.	46 87	67 04

Lapweld

2 in.	$17 76	$24 24
2½ in	26 33	36 56
3 in.	34 43	47 81
3½ in.	41 40	57 50
4 in.	49 05	68 13
4½ in.	59 69	83 19
5 in.	69 56	96 94
6 in.	90 24	125 80
7 in.	121 40	165 40
8 in. x 25 lbs. per ft.	127 50	173 80
8 in. x 25 lbs. per ft.	146 90	200 20
9 in.	176 00	239 40
10 in. x 32 lbs. per ft.	163 20	222 40
10 in. x 40 lbs. per ft.	210 10	286 30

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$19 00	$19 50
Copper, crucible	23 00	23 00
Copper, heavy	23 00	23 00
Copper wire	23 00	23 00
No. 1 machine compos'n	18 50	18 00
No. 1 compos'n turnings	15 00	15 00
New brass clippings	15 00	15 00
No. 1 brass turnings	13 00	12 00
Steel, low phos.	14 00	14 00
Heavy melting steel	10 00	12 00
Boiler plate	12 00	10 50
Rails	13 75	15 00
Axles, wrought iron	19 00	19 00
Tires, steel	12 00	11 00
Rails	13 75	13 00
Shafting	16 75	16 00
Malleable scrap	10 25	11 00
Pipe, wrought	10 50	9 00
Stove plate	10 25	10 50
Heavy lead	6 50	7 00
Tea lead	5 00	5 25
Scrap zinc	7 50	7 75
Aluminum	35 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	45
Stove bolts	60
Plate washers	25
Machine bolts, ⅜ and less	30
Machine bolts, 7-16 and over	25
Blank bolts	30
Bolt ends	25
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts, hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	35
Boiler rivets, base ¾-in. and larger	$5.25
Structural rivets, as above	5.15
Wood screws, flat, bright	77½
Wood screws, O. & R., bright	72½
Wood screws, flat, brass	45
Wood screws, O. & R., brass	42½
Wood screws, flat, bronze	37½
Wood screws, O. & R., bronze	35

MILLED PRODUCTS

	Per Cent.
Set screws	40
Sq. & Hex. Head Cap Screws	30
Rd. & Fil. Head Cap Screws	15
Flat & But. Hd. Cap Screws plus	15
Fin. & semi-fin. nuts up to 1 in.	30
Fin. & semi-fin., nuts over 1 in.	25
Studs	15
Taper pins	45
Coupling bolts plus	15
Planer head bolts, without fillet	15
Planer head bolts, with fillet	net
Planer head bolt nuts, up to 1 in.	30
Planer head bolt nuts, over 1 in.	25
Planer bolt washers plus	10
Hollow set screws list plus	40
Collar screws list plus	20
Thumb screws	20
Thumb nuts	70
Patch bolts add	65
Cold pressed nuts to 1½ in. add	$3.50
Cold pressed nuts over 1½ in. add	$2.00

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$50 00
Open-hearth billets, Pittsburgh	50 00
O. H. sheet bars, Pittsburgh	50 00
Forging billets, Pittsburgh	73 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$3.85	$3.95
Cut nails	3 70	3 70
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs		$4 10

MISCELLANEOUS

Solder, guaranteed	0.29½
Solder, strictly	0.27½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	030½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	1.00
Linseed oil, boiled, single bbls.	1.03
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	8 00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.12
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes	35
S.S. drills, 1/16 in. and larger	50
Standard drills to 1½ in.	50
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	20
3-fluted drills over 1½ in.	10
Bit stock	50
Ratchet drills	20
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	25
Sockets	30
Sleeves	40
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, Black, No. 28	$4 15	$4 25
Sheets, black, No. 10	5 25	4 90
Canada plates, dull, 52 sheets	4 75	4 75
Canada Plates, all bright	6 30	6 50
Apollc brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 45	7 35
Gorbal's Best, No. 28	7 75	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 25	6 00
Premier, 10¾ oz.	6 50	6 25

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch.	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65
Kearney & Foot, Arcade	65
J. Barton Smith, Eagle	65
McClelland, Globe	65
Black Diamond	65
Delta Files	65
Nicholson	55
Globe	60
Vulcan	65
Disston	..

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$20 00	.....
1¼ in.	23 00	.....
1½ in.	26 00	23 00
1¾ in.	26 00	20 00
2 in.	27 00	19 00
2¼ in.	29 50	.....
2½ in.	32 50	25 00
3 in.	44 00	28 50
3¼ in.	.....	32 00
3½ in.	50 00	33 00
4 in.	57 00	44 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

1st Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke on application.

Connelsville Foundry Coke	$7.02
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	4.30
Best Slack	3.87

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.39 to .40
Tin	.50 to .53
Zinc	.18 to .21

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck	1.10
Emery in kegs, American	.04 to .05
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.25 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.14
Cobalt sulphate	.80
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.10
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.45
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.42
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Que., Oct. 30, 1916.—The strength of the steel market and the continual advance of prices is still the feature of the industrial situation, developments taking place on such a scale that the near future at least is practically in obscurity as far as definite prediction is concerned. The labor situation is still causing anxiety, but is not quite so acute as a few weeks ago.

Pig Iron

Record activity is taking place in the pig iron market, the situation being again featured by a general advance in practically every line of basic and foundry iron. The advance ranges from 50 cents per ton on foundry to $3 on Bessemer and low phosphorus pig.

Steel

That the existing condition in the steel market will be maintained throughout the entire year of 1917 is now taken for granted. The demand is so enormous that present production facilities are totally inadequate. Price is a secondary consideration to that of getting orders booked for definite delivery. Under these circumstances, it is more than likely that further advances may be expected. Pittsburg quotations on forging billets have advanced $5 per ton. Railroad activity is developing, and fair-sized orders are also being placed by coal and lumber interests more especially for light-weight rails. An insistent demand continues for all kinds of plates; shipbuilding and car requirements being the most active. Iron and steel bars have been advanced $2 per ton, the Pittsburg quotation being now $2.85; and $2.70 respectively.

Activity in sheets is very pronounced at present, increased interest having developed recently in galvanized sheets. which have been advanced $5 per ton, the base price being now $5 per hundred. Blue annealed is $3.30, an advance on the week of $1 per ton. In addition to the advance noted in wire products last week, an advance of $5 is reported this week on wire rods, Pittsburg, the base price being now $65 per ton. This is largely due to the marked scarcity in this class of material.

Wrought iron pipe and boiler tubes are very active, the base price of cold-rolled steel strip showing an advance of ¼c per pound, and being now 6¾c. The local situation is practically unchanged. although dealers here are contemplating an advance on some lines. Some slight changes are noted in sheets. Queen's Head is now $7.75; Fleur-de-Lis, $7.45, and Gorbal's Best, $7.75.

The situation in high-speed steel is not so acute as a few months back, the increased facilities for production having placed the producers in a position where they can supply the entire demands of the consumer. Owing, however, to the high cost of all raw materials, little relief has been shown in regard to price of the commercial article. One of the factors that has much bearing on present conditions is that the total amount of the orders placed at the present time by large consumers is comparatively small relative to those placed about a year ago. This is due to the fact that users do not wish to be overstocked, in event of any sudden cessation of hostilities. Some users are buying regular shipments of steel, sufficient for immediate needs, weekly shipments being subject to cancellation on two weeks' notice. The price of high-speed steel at the present time ranges from $2.50 to $3 per pound.

Metals

The metal situation has not been marked by any important features during the week, although the general conditions are somewhat disturbed by the political situation in the States. Copper is quiet and firm, with further buying imminent. Tin is irregular, but firm. Spelter is quiet after recent activity. Lead is steady, but with an easier tendency. Antimony is quiet, but firm. Aluminum is easier.

Copper.—The market continues to retain a very strong position, and, while quiet at present, an undertone of early activity is apparent. Reports are current of probable developments for additional export business, but delivery must necessarily extend well into next year, owing to the pressure already placed upon smelters and refineries. The abnormal consumption is almost entirely due to munitions demand, but it is anticipated that the requirements for domestic purposes, which are expected to be exceptionally heavy, following the close of the war, will be of such a volume that, although a decline will naturally result, the market will retain a high level for some years to come. The London report shows copper in a strong position and slightly higher. New York is very firm, with quotations unchanged. The local market is steady, prices being firm at 31c and 30c per pound.

Tin.—The irregular condition of the market has caused a little fluctuation in price quotations during the past week. The apparent accumulation of stocks on the American market has caused the British authorities to become reluctant in regard to shipping permits. This has had the effect of disturbing conditions in these markets. Prompt demand is comparatively quiet, with futures showing more activity. London quotations have advanced on a strong market, while present prices on the New York market are ⅞c higher than last week, the current quotation being 41⅞c per pound. Local dealers report a steady market, with prices firm and unchanged at 45c per pound.

Spelter.—With galvanizers taking increased interest in the spelter situation, the market has been more active. The demand, however, has again quietened down, and it is the general opinion that nothing of importance will develop while the American situation is awaiting the result of the Presidential election, not that the present market can be much affected by the event. It seems, however, an ingrained trait that industrial conditions should be unsettled under the circumstances. London is strong and firm, and New York is ½c higher than last week, the quotation being now nominally 10⅜c per pound. The local market is steady and fairly active, with prices firm and unchanged, the nominal quotation being 13c per pound.

Lead.—The market is quiet, but recent activity has maintained this metal in a steady position. Recent Canadian demands have been fairly heavy, owing to munition requirements. The easing up of the demand has placed producers in a position to offer fair-sized lots for early delivery. General conditions are, however, unchanged and quotations on all markets are firm. New York quotes 7c and 7⅛c, and local dealers are quoting 9c on a strong market.

Antimony.—The market is quiet after the short period of brisk buying. Inquiries are light, but the situation is firm. Quotations are steady, both on the New York and local markets, the former being 13¼c; dealers here are quoting 15c.

Aluminum.—The situation has again resumed the position held a few weeks ago, a decline of 1c during the past week putting the New York quotation at 65c for No. 1 Virgin and 60c for pure remelt. Local dealers are quoting 69c, a decline of 1c over last week.

Machine Tools and Supplies

With the demand for shell-making equipment gradually decreasing, the pressure on machine tool builders is becoming much lighter, and conditions are assuming more normal proportions. The market, however, is still quite active, as a brisk business is still being maintained in single and small lot requirements. Inquiries for special machinery is still active, but actual demand is not heavy. Owing to the continual advance in steel prices, the quotations on many lines of small tools and shop supplies have been advanced.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Scrap

Following the activity of the past few weeks, the scrap market at present is comparatively quiet. A steady demand is prevalent for old copper, and high prices are still maintained. Scrap zinc is fairly active, as is heavy melting steel scrap. Prices are invariably firm, with heavy melting steel showing an advance of ½c, the local price being now 10c per pound.

Toronto, Ont., Oct. 31.—Trade continues active and the country is remarkably prosperous. The full benefit however is not being obtained owing to somewhat restricted production due to scarcity of raw materials and shortage of labour. Prices are also very high, but this does not seem to be affecting the volume of busuiness to any marked degree. The demand for goods generally is not being fully met owing to the difficulty that is being experienced in obtaining deliveries from manufacturers. Export trade is steadily growing and is extending in scope as more industries develop their sphere of action. The Dominion Government returns up to the end of last month prove conclusively the remarkable expansion that has taken place in the export during the past twelve months. For the month of September alone, manufactures headed the list, being valued at thirty-eight million dollars as against nine million for the corresponding month of 1915. The statement recently issued covering the period mentioned is extremely gratifying.

Steel.

The situation in the trade is getting tighter all the time and the scarcity of steel is steadily getting more acute. With a large proportion of the production of the mills reserved for munitions, a comparatively small tonnage is available for other purposes. The mills have been some time operating at capacity, and, notwithstanding extensive additions to their plants, deliveries are getting more backward than ever. The demand for steel is so insistent and the need so urgent that the steel companies are doing their best to cope with the situation, but cannot, and the situation is thus getting steadily worse. Indications point to a continuance of these conditions for an indefinite period as the mills are now sold up for practically twelve months. Prices are still withdrawn and orders are only taken on the understanding that delivery will be made at mill convenience. Prices on steel bars are entirely nominal and an advance may be looked for any time. Owing to the scarcity of steel some consumers are substituting iron bars for steel in order to secure deliveries. For domestic business, practically the only orders being taken by the mills are with contract customers of long standing and with no delivery dates specified. Small angles, channels and tees have advanced 10c and are now quoted at $3.85 per 100 pounds. Plates have advanced 25c and are now quoted at $4.75 for ¼ in. and larger, $5.00 for tank plates 3-16 in. and smaller. These prices are however for delivery at mill convenience which would not be inside twelve months. For delivery in from two to four months' prices range around 5c at mill. A considerable tonnage of plates is being used by shipbuilders and premiums are being paid for comparatively quick delivery.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department of Trade and Commerce, Ottawa, is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL

Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE

Valparaiso, British Consul General.

COLOMBIA

Bagota, British Consul General.

ECUADOR

Quito, British Consul General.
Guayquil, British Consul.

EGYPT

Alexandria, British Consul General.

FRANCE

Havre, British Consul General.
Marseilles, British Consul General.

INDIA

Calcutta, Director General of Commercial Intelligence.

ITALY

Genoa, British Consul General.
Milan, British Consul.

MEXICO

Mexico, British Consul General.

NETHERLANDS

Amsterdam, British Consul.

PANAMA

Colon, British Consul.
Panama, British Vice-Consul.

PERU

Lima, British Vice-Consul.

PORTUGAL

Lisbon, British Consul.

RUSSIA

Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN

Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN

Stockholm, British Consul.

SWITZERLAND

Geneva, British Consul.

URUGUAY

Monte Video, British Vice-Consul.

VENEZUELA

Caracas, British Vice-Consul.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya, Ploshch 9, Petrograd.
L. D. Wilgress, Canadian Government Commercial Agent, Bukhgolza Ulitza No. 4, Omsk, Siberia.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

AUSTRALIA, B. Millin, Sydney, N.S.W.

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.
R. H. Curry, Nassau, Bahamas.

NORWAY AND DENMARK.

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

Tubes are very firm, and higher prices are looked for, while an advance in wrought pipe is expected in the near future due to the recent advance in skelp, this material being also very scarce. Higher prices on bolts, rivets and pressed spikes are also anticipated.

Black sheets No. 28 gauge have advanced 25c, and are now quoted at $4.25 per 100 pounds, while an advance in "blue annealed" is probable. Sheet bars are now quoted at $50 Pittsburgh, and are getting scarce owing to the heavy demand. It is possible that a famine in steel sheets will exist during the first six months of next year so great is the scarcity of raw material. Higher prices on galvanized sheets are assured on account of the steady advance in black sheets and increase in cost of production.

An advance of nearly 100 per cent. in the price of coke has created a serious situation in the Pittsburgh district. The market continues very firm and prices of all steel products have an upward tendency. The export demand for steel is at a rate far in excess of the unsold capacity of the mills to accept and a lively competition is expected between export and domestic buyers which will result in higher prices. The U.S. Steel Corporation has announced advances in the leading tonnage materials for forward delivery, or to 2.70c for bars, 2.85c for shapes and 3.75c for plates. Higher prices on semi-finished steel have been announced representing an advance of $5 per ton. Bessemer and open-hearth billets are now quoted at $50, open-hearth sheet-bars $50, and forging billets $73.00 per ton, Pittsburgh. The scarcity of steel in the States is acute and higher prices are inevitable, notwithstanding the present record levels.

Pig Iron

Price of pig iron after several months of quietness are now advancing rapidly. This is due largely to the enormous demand for steel, but the sharp advance in coke and possible higher prices on iron ore next January are also affecting the situation. The activity in the U.S. pig iron market is also affecting the trade locally and the market is very strong. Domestic pig irons have advanced $2.50, Hamilton and Victoria being now quoteed at $29.00 per ton. Practically all brands of U.S. pig iron have advanced, the following prices now being quoted: Grey forge Pittsburgh, $20.95, and Bessemer, Pittsburgh $24.95.

Scrap

The market is very firm all along the line and advances have to be noted in some grades of scrap copper, affecting crucible, heavy, copper wire, and machine composition. Heavy melting steel continues in good demand with a shortage of supplies. Steel turnings are in good supply, but there is very little market for this material.

Machine Tools

The machine tool market has been more active this week following the placing of further contracts for shells and fuses. For making the latter, a number of orders have been received by a local machinery house for screw machines, high speed bench drills, and bench milling machines. Inquiries have also been received for machine tools for shrapnel plants. Tool room equipment is in good demand but deliveries on this class of tools are slow and restricting business. There is still a steady demand for heavy duty lathes, in many cases for single tools. Prices on machine tools generally are still very high and there is no sign of a decline. Shapers, grinders and milling machines will probably advance. Canadian machine tool builders are still very busy. New types of tools for shell plants are continually being placed on the market with satisfactory results.

"CANADIAN MACHINERY" IN ENGLAND

Permit me to compliment you on your publication. Two copies of the September 7 monthly Export issue have come to hand. The articles on the National Steel Car Co. plant, the Montreal Locomotive Shops, and the new C. P. R. Station at Quebec, are specially good, and ought to be of great interest to rolling stock people on this side. Additional copies would not be amiss here.—H. D. J., Bristol, England.

Supplies

The situation as regards machine shop supplies continues satisfactory, good business generally being reported. Prices are very firm and advances in many lines may be expected any time although there are no changes of particular importance to note this week. With raw materials, particularly steel, advancing at the present rate, many lines of supplies will naturally be affected such as taps, dies, cutters, files, etc.

Metals

The metal markets this week have been unusually steady with quotations generally well maintained. The situation locally continues favorable with a satisfactory volume of business. Copper although unchanged is still strong, largely due to an enquiry from Russia, France, and Italy for 100,000,000 pounds of metal for delivery during the next six months. Spelter is in fair demand, but tin and lead are dull and unchanged. Antimony is also dull, but aluminum is fairly active. The coming Presidental Election in the States is tending to keep the market quiet there.

Copper.—The market ontinues strong but quiet as domestic consumers appear to be covered for the rest of the year and producers are practically sold up until February. It is reported from New York, that Russia, France, and Italy are enquiring for 100,000,000 pounds of copper, but, as delivery cannot be made before February, the business may not be closed. Domestic buying is good and very little copper available for delivery over the next few months is unsold. Local prices are firm and unchanged, lake and electrolytic being quoted at 31c and casting at 30c per pound.

Tin.—The London market is easier but New York is unchanged. The New York market will probably become firmer as some difficulty is now being experienced in getting permits to ship tin from London owing to the heavy stocks in the U.S. The local situation is unchanged and quotations are firm at 46c per pound.

Spelter.—Producers appear to be looking for higher prices as they are not over anxious to do business. There is a fair demand for spelter principally from galvanizers, and export business continues heavy. Local price is firm at 14c per pound.

Lead.—There is no essential change in the situation, the market being dull and business quiet. The leading interest is still quoting 7c New York. Local quotation 9c per pound.

Antimony. — Quotations are nominal and the market quiet. Antimony is quoted at 18c per pound locally.

Aluminum. — Demand has shown slight improvement and the market is steady with quotations unchanged at 68c per pound.

◆

CANADA'S TRADE SHOWS HUGE INCREASE

THE total of Canadian trade, exclusive of coin and bullion, for the twelve months ending September 30 last, amounted to $1,738,204,256. This is an increase of $803,038,833 over the total for the corresponding twelve months of 1915, and of $737,140,757 in 1914. The total trade for the month of September amounted to $161,067,661, an increase of several millions over the trade for September, 1915, and of eighty millions over the same month in 1914.

The total imports of merchandise for twelve months ending September 30 last amounted to $685,278,605, an increase of 268 millions over that for the corresponding period of 1915, and of 154 millions over that for the 1914 period. Total imports for September amounted to $68,796,262, an increase of 30 millions, or nearly double that of September, 1915, and of 32 millions over September, 1914.

Duty Collected

The duty collected during the twelve months amounted to $129,610,574, an increase of 50 millions over that collected during the 1915 period, and of nearly 40 millions over the amount collected during the 1914 period. During September, $11,942,791 was collected, an increase of four millions over September, 1915, and of nearly six millions over September, 1914.

The total exports of merchandise amounted to $1,052,925,651 during the year, an increase of 535 millions over those for the 1915 period, and of nearly 600 millions over 1914. For the month, the exports totaled $92,271,399, an increase of nearly 40 millions over the total for September, 1915, and of 51 millions over that for 1914. During the twelve months, agricultural and animal products provided just about 50 per cent. of the Dominion's total exports.

Manufactures Higher

Manufactures provided about 33 per cent.; mining products came next with 7 per cent.; forestries with 5 per cent., and the fisheries with about 2½ per cent.

Some idea of the effect of the war may be gathered from the fact that while during the 1915 and 1914 periods the products of the farm provided about 40 per cent. of the exports, manufactures in the 1915 period provided only about 25 per cent., and in the 1914 period only about 14 per cent., as against a proportion of 33 per cent. in 1916.

In the total export trade for the twelve months ending in September, agricultural products headed the list with a total of $396,455,537, animal products totaling $111,331,332, while those of manufactures were $361,381,419. Exports of agricultural products trebled as compared with 1915 or 1914, while manufactures did the same as compared with 1915, and were nearly six times those for 1914.

For the month of September, manufactures led the exports with nearly 38 million dollars, as against only 9 millions for September, 1915, and 5 millions for the same month in 1914; agricultural products came next with 25 millions, as against 11 millions for 1915 and 7½ millions for 1914. Animal products provided 12 million dollars worth of exports, as against 10 for September, 1915, and 7 for September, 1914. Exports of the products of the forest were nearly a million less for September, 1916, than for September, 1915.

CANADIAN TRADE WITH FOREIGN COUNTRIES

CANADIANS still buy from the Germans. The war has not wholly severed Canada's trade with the enemy. Whether it be all-necessary dyes, medicines, chemicals, or goods that the Canadians could do without, the Canadian Government returns show that during the year ending March 31 last $86,304 worth of dutiable and "free" imports for consumption had been brought into Canada from Germany. Of this amount $41,126 were dutiable and $45,178 were free; that the figure of $86,304 represents goods shipped from Germany prior to the declaration of war, but which had not been entered at Customs until some time during the year ending March 31, 1915.

Under the caption, "Trade of Canada with Germany," the official report of the Department of Trade and Commerce gives some interesting figures regarding trade with the Empire's allies and enemies.

During the past decade Canada's trade with Germany steadily increased. Between the years 1912 and 1913 the total business transacted between Canada and Germany increased from $14,904,919 to $17,616,941. A year later, the year war was declared, Canadian-German trade, up to March 31, amounted to $19,019,959. But when war broke out trade did not cease. The official report points out that the results obtained from "Canadian Returns" show that the gross value of Canadian-German trade up to March, 1915, seven months after hostilities commenced, amounted to $7,248,996. Of this amount, $3,887,906 worth of dutiable goods were imported as well as $1,199,080 of "free" goods, making a gross value of German imports of $5,086,986.

Canadian Exports to, Germany

During the same period the Canadian exports to Germany were valued at $2,162,010, divided up as follows: Goods listed as "Canadian produce," $1,447,391, and $714,619 worth of foreign produce. While Canada still continued to import supplies from Germany after March 31, 1915, the returns state that Canadian exports to Germany ceased at that time.

The returns given by the Department of Trade and Commerce show that during the twelve months ending March 31 $394,077 worth of goods was sent to and brought from Belgium. The listed value of Canadian produce sent to Belgium is figured at $334,762.

Franco-Canadian Trade

Franco-Canadian trade during the year ending March 31 last was almost 100 per cent. greater than during the previous year. During the last fiscal year for which the figures are ascertainable, $42,035,224 worth of business was transacted between the two countries. Of this amount, $5,949,411 is stated as the value of the imports; the exports were valued at $36,085,813, a very acceptable balance of trade if the figures did not cover the war business, which cannot be taken into consideration when permanent trade relations of the two countries are taken into consideration.

Big Italian Trade

The returns cited in connection with the Italian-Canadian trade show the tremendous impetus given these relations by the war. For the year ending March 31, 1915, $3,313,709 worth of goods was interchanged by the two countries. During the following twelve months the gross value increased to $11,653,559. Of this amount only $920,271 covers the value of goods imported by Canada from Italy, while $10,733,288 represents the value of Canadian and foreign produce exported by Canada to Italy.

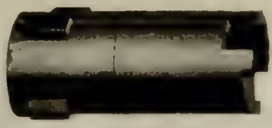
Canada still carries on a vigorous trade with Japan, although in this case there is an adverse balance. During the same fiscal year, as cited above, Canada sold $998,240 worth of goods to the Japanese, and bought $4,015,125 worth of goods from the Flowery Kingdom.

BRITAIN SHOULD SEEK OUR TRADE

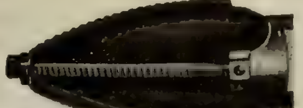
SUGGESTIONS for improving Canada's trade with the other parts of the Empire and outside countries were made by F. C. T. O'Hara, Deputy Minister of Trade and Commerce, to the Dominions' Royal Commission on October 25, at Ottawa. Mr. O'Hara said British manufacturers did not get after the Canadian trade like the American manufacturers. "The goods won't sell themselves," he said, "and it needs some one to sell them."

Merchants in Canada could order their goods overnight from New York and often they had to procure English products in that way.

"With all due deference to energy and ability displayed by the present British Board of Trade Commissioners in Montreal," he continued, "I think Canada should be sub-divided into areas within which additional British commissioners should be appointed, reporting

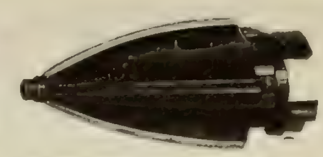


Rough Bore, Straight Diameter.



Rough Bore, Inside Radius.

Finish Bore, Straight Diameter.



Finish Bore, Inside Radius.

8" Shells

9.2" Shells

50% Boring Economy!

High-salaried men are employed to keep the cost of production down, but in this case a boy could see the advantages to be obtained through these boring heads.

25% to 50% reduction is obtained only by the use of Davis Boring Heads. These consist of 16 sizes and 26 different styles, and embrace every operation from a shell of the smallest calibre to 8" and 9.2". (The quality of work produced is limited, and that limit is highest quality.)

Davis Boring Heads are constructed of high-speed steel and are the result of scientific knowledge of boring-tool requirements and the experience obtained by the "pioneering" days.

WRITE FOR PARTICULARS.

The heads illustrated here are used for operations on 8" and 9.2" shells. The heads are all equipped with micrometer adjustments. This enables more speed to be put to the operation, leaving the adjusting of the cutters to the micrometer.

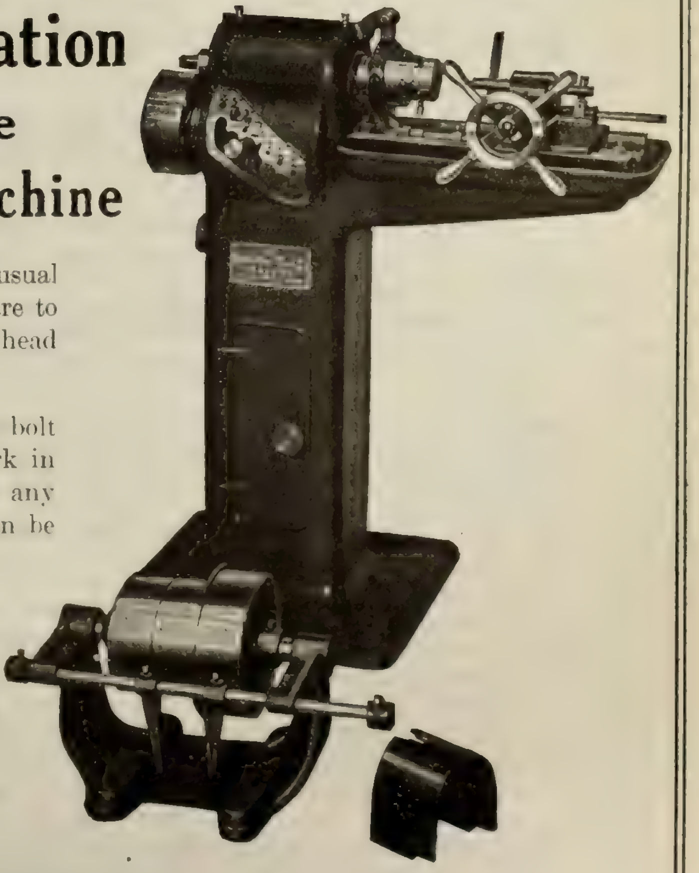
The A. R. Williams

Machinery Co., Limited

64-66 Front St W., Toronto

Rapid and Perfect Duplication

That is the Mission of the Geometric Threading Machine



From ⅛-in. pipe thread to 1-in. diameter is the usual range of the machine, but where fine pitch threads are to be cut on larger diameters, it can be fitted with a die head that will take care of the work.

The Geometric Threading Machine is not the usual bolt threader, but a machine for producing accurate work in quantity—work that cannot be done economically in any other way, and gives threads as true and clean as can be produced on any screw machine.

Get acquainted with the machine by sending for our Threading Machine Booklet.

The Geometric Tool Company

New Haven, Conn., U.S.A.

Canadian Agents: Williams & Wilson, Ltd., Montreal: The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.

to and being directly responsible to the Board of Trade in London."

He suggested that such commissioners be appointed in Vancouver, Winnipeg, Toronto, Montreal and Halifax.

"The United States leaves nothing undone to secure Canadian trade. There are some hundred consuls of the United States here, and thousands, I might say millions, of advertising circulars are sent into this country every year. There are also the innumerable trade and other magazines which carry advertisements of American goods which all swell the trade."

The Deputy Minister of Trade and Commerce also recommended that the various overseas dominions have representatives in Canada.

Toy Exhibit Fruitful

The recent Canadian Government made-in-Canada toy exhibit at Toronto Exhibition greatly interested the Royal Commissioners. Both Sir George Foster and Mr. O'Hara said that it had done much good to interest manufacturers and give an impetus to trade. Hon. J. H. Sinclair, New Zealond, wanted to know if the showing of German goods did not advertise the latter, but Mr. O'Hara said the opposite was the fact. It gave Canadian makers fresh ideas.

R. H. Campbell, Dominion Director of Forestry, said in answer to questions that the supply of timber had not materially decreased here. When the high price of paper was mentioned, Mr. Campbell was asked if the cost of labor in pulp manufacture had gone up. He said it was not within his knowledge.

VALUE OF ENEMY SAMPLES EXHIBITION

THE registration for the first week of the Exhibition of Enemy Samples now being held in Toronto were approximately 1200, which included a large percentage of manufacturers. Herbert Kershaw, representing the British Board of Trade, who is in charge of the exhibits, expressed himself to a representative of CANADIAN MACHINERY as being highly gratified with the attendance and also with the interest shown in the various exhibits. Manufacturers from several industrial centres in Ontario and also local manufacturers have visited the exhibition. Many borrowed samples such as blankets, carpets, hardware, soaps, lamps, small tools, etc., to name a few, for closer examination at their factories, in some cases expressing a belief that such articles could be made in Canada.

Manufacturers visiting the exhibition realized the need for overseas markets and have shown deep interest in the possibility of selling Canadian goods in the markets as indicated on the samples. In this regard, the exhibition has served not only to inspire manufacturers to take up new lines but also to assist them in realizing the various classes of articles which have been sold extensively in remote parts of the world such as Africa, India, Asia, etc. A manufacturer who is sufficiently alert and imaginative also sees in a particular contrivance a peculiar form of mechanism which can be beneficially applied to his own lines of manufacture. It is here where a man with an inventive faculty can effectually combat his less fortunate rival.

The exhibition has doubtless stimulated a desire to learn more about foreign markets, the classes of goods most in demand, how they are sold, credits etc. It has also shown how the Commercial Intelligence Branch of the Department of Trade and Commerce can be utilized to assist in the development of trade with these countries. The Department has means of obtaining much valuable information which is placed at the disposal of any manufacturer requiring same. Another feature of the exhibition is the number of ideas that can be obtained by inspecting the samples and which can be applied in making other goods. The majority of the articles are admittedly cheap but many have embodied in their construction or design some feature which might be copied in the manufacture of similar or entirely different articles, depending of course on what any special idea might consist of.

While it is too early to determine what benefits may have occurred to Canadian industries, there is little doubt that the exhibition will stimulate a desire to develop export trade not necessarily in the class of goods exhibited, but in any product that might be possible to sell in any foreign market. The field is unlimited and the opportunity waiting. It is understood that at some future date an exhibition may be held of articles of German and Austrian manufacture which have been sold in the Canadian market. The exhibition at the Convention Hall will be open until November 6 inclusive.

HUDSON BAY ROUTE BENEFITS DOUBTED

WHAT benefits are to be derived by the Dominion as the result of the construction of the Hudson Bay Railway was the chief point dwelt upon by the members of the Dominions' Royal Commission at their afternoon sitting on Oct. 25, when it heard W. A. Bowden, chief engineer of construction work of the Department of Railways and Canals.

"The problem is more complex than any other I have had to deal with," the engineer stated, when asked what the benefits to be derived from this big expenditure would be. He outlined the advantages in that the distance from the grain centres to Port Nelson was the same as the distance from Winnipeg to Fort William. The distance from Port Nelson to Liverpool was the same as from Montreal to Liverpool. Accordingly in distance there was a saving by the Hudson Bay route equal to that from the head of the Great Lakes to Montreal. The cost of haulage over this distance is from five cents to twelve cents a bushel.

Initial Information Unreliable

"The information we had when we started the work has proven very unreliable during the five seasons we have been working. For example, our information was to the effect that the route through Hudson Bay would be open to navigation about the last of June or the first of July. The facts are that it is not open until the last of July or the first of August. The date when it closed was not fixed in that early information. However, ordinary tramp steamers have left Port Nelson on October 23, and have gone through without damage by ice. A Government tug went through on Nov. 1, but the ice would have damaged a tramp. By having observation points at the Straits to direct the boats to open water, it would be possible that the season could be lengthened past Oct. 23."

"Would the grain be harvested in time to be shipped this way?" Mr. Bowden was asked.

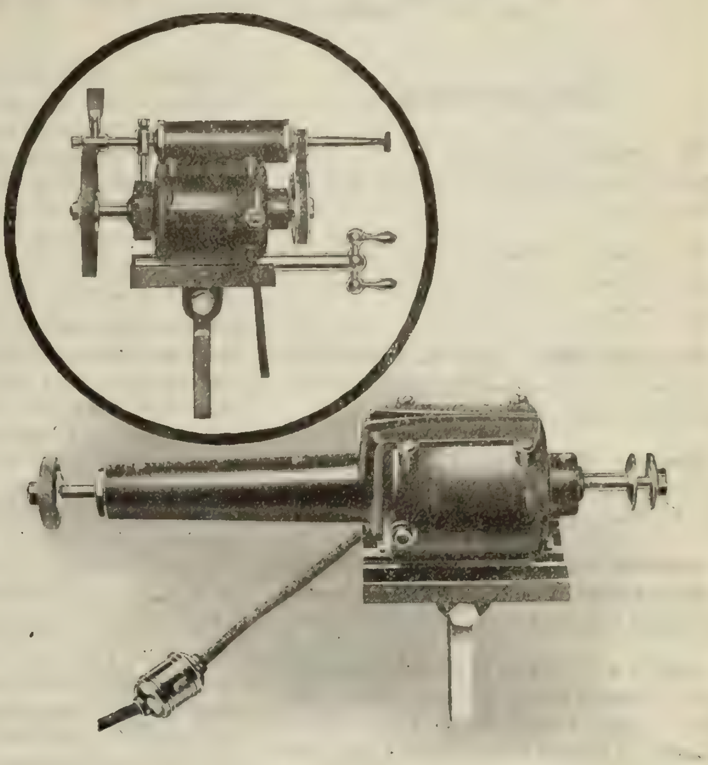
"For August the grain shipped would be that which had been left over from the year before. There is always some at the head of the Great Lakes now at that time. The new grain would come on in September, and could be shipped through the months of September and October."

"Before this great expenditure was undertaken," asked one of the Commissioners, "were any steps taken to insure steamship service when the road is completed?"

"No, I do not think there should have been," replied the engineer, "because such a service would have been based on the worst conditions that might arise and, therefore, at the maximum expense."

* * *

Seek Markets in Russia.—Japanese merchants are making active efforts to obtain a market in Russia for Japanese goods. They are adapting their merchandise to the demand of Russian traders and studying the Russian household and its needs.



Aikenhead's DUMORE GRINDER

Portable
Practical
Efficient
Accurate

Aikenhead Hardware Limited
17 Temperance Street - Toronto, Canada

To Investors

THOSE WHO, FROM TIME TO TIME, HAVE FUNDS REQUIRING INVESTMENT, MAY PURCHASE AT PAR

DOMINION OF CANADA DEBENTURE STOCK

IN SUMS OF $500 OR ANY MULTIPLE THEREOF.

Principal repayable 1st October, 1919.

Interest payable half-yearly, 1st April and 1st October by cheque (free of exchange at any chartered Bank in Canada) at the rate of five per cent per annum from the date of purchase.

Holders of this stock will have the privilege of surrendering at par and accrued interest, as the equivalent of cash, in payment of any allotment made under any future war loan issue in Canada other than an issue of Treasury Bills or other like short date security.

Proceeds of this stock are for war purposes only.

A commission of one-quarter of one per cent will be allowed to recognized bond and stock brokers on allotments made in respect of applications for this stock which bear their stamp.

For application forms apply to the Deputy Minister of Finance, Ottawa.

DEPARTMENT OF FINANCE, OTTAWA,
OCTOBER 7th, 1916.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

St. Catharines, Ont.—The St. Catharines Brass Works will build a foundry here.

St. Alexis, Que. — The Saguenay Light & Power Co., are building a power house here.

Winnipeg, Man.—The Manitoba Pulp & Paper Co., propose building a power plant at Grand Rapids.

Toronto, Ont.—The Taber Laundry Works will build an addition to their boiler room on Bathurst Street.

Toronto, Ont.—The Canadian Fairbanks-Morse Co. will build an extension to their plant on Bloor Street West.

Galt, Ont.—Plans are being prepared for a brick factory to cost about $50,000, for the Dodge Metal Hose Co. J. Evans, 30 Water Street, is the architect.

Sault Ste. Marie, Ont.—On October 24 the big coal unloading bridge at New Ontario Dock, valued at $50,000, was blown over in the gale and reduced to scrap.

St. John, N.B.—Tenders will shortly be called for the erection of a pumping station for the St. John Railway at St. John, N.B. G. G. Murdock, is the engineer.

Port Colborne, Ont. — The International Nickel Co., is getting prices on equipment for the refinery which will be built here. All buying will be done through the head office at 43 Exchange Place, New York.

Vancouver, B.C.—The Shell Oil Co. may establish a large refinery near here. A site has been acquired on Lulu Island, adjoining the Fraser River. W. M. Smith, president of the company, has been here looking over the ground.

St. Catharines, Ont.—Fire totally destroyed a frame structure, 225 by 50 feet, on section 2, Welland ship canal, erected and owned by Baldry, Yerburgh & Hutchinson, contractors, and used as engine house, machine shop, blacksmith shop, and storehouse. The machine shop was one of the best equipped on the canal. The loss will be in the neighborhood of $40,000, only partly covered by insurance.

Sarnia, Ont. — The Imperial Oil Company has secured a large tract of land at the south end of the city and will start construction of another refinery in the very near future, according to information secured to-day. The new plant will be separate from both No. 1 and No. 2 plants and will cost several hundred thousand dollars in initial outlay, and will be enlarged later. The land was secured sometime ago, and comprises two city blocks and the houses and other buildings will be wrecked to make way for construction.

Port Arthur, Ont.—By a vote of 1,200 to 40, the ratepayers of Port Arthur on October 24 ratified an agreement between the city and Annwell G. McIntyre, of Toronto and Montreal, by which the latter, representing interests which now have four pulp mills in Canada, will build another mill here. They plan a plant of 150 tons output per day in three units of fifty tons per day each, to which is to be added a paper mill. Under the agreement upon which pulp limits are secured from the Ontario Government, the 150-ton plant must be completed in three years, at a cost of $1,000,000. Construction is to be started immediately. The plant will be located at Bare Point, in the north end of the city. The municipality gives 100 acres of land, with no exemption from taxation or other bonus.

General Industrial

New Toronto, Ont.—The Dupont Fabrikoid Co. are building a factory here.

Niagara Falls, Ont.—The Nesbitt Billings Co. will build a factory here to cost $15,000.

Belleville, Ont.—The Maple Leaf Tires, Ltd., have commenced the erection of a large factory here.

Moose Jaw, Sask.—The Saskatchewan Clay Products Co., propose making extensive additions to their plant.

Teeswater, Ont.—The Orangeville Lime and Cement Co. has purchased the William Gordon farm and purpose erecting a plant, valued at $75,000, during the winter and coming summer. The Toronto Lime Co. is engaged in erecting kilns at present, on the property purchased from Mr. Watson.

Municipal

Grand Forks, B.C.—The Town Council propose extending the municipal power plant.

Hespeler, Ont.—The Town Council propose making extensions to the waterworks system.

St. John, N.B.—The City Council will shortly call for tenders on the supply of about 3,000 feet of 20-in. cast iron pipe.

Lethbridge, Alta.—A by-law was carried to authorize a payment of $17,000 for extensions to the electric light system.

Cornwall, Ont.—The Town Council propose building an extension to the pumping station and installing centrifugal pumps.

Bridgetown, Ont. — A by-law was passed by the City Council to raise $1,319 to pay for the cost of an ornamental lighting system.

Strathroy, Ont.—Dr. McCullough, of the Provincial Health Department, has ordered the installation of a chlorination plant for the water system here.

Fredericton, N.B.—The City Council has decided to purchase a motor-driven hose truck and a horse-drawn hook and ladder truck. The total cost will be about $8,000.

Bracebridge, Ont.—By-laws will be submitted to the ratepayers on Nov. 20 to guarantee bonds of the Beacon Match Co., to the extent of $15,000, and granting the company fixed assessment for ten years.

Winnipeg, Man.—Controller Astley proposes that a by-law should be prepared for the purpose of raising the sum of $275,000, to be expended on the erection of a part of a new city hall, to occupy the present location of what is known as the old city market.

Contracts Awarded

The Polson Iron Works, Toronto, have been awarded a contract for boilers by the Lincoln Paper Mills Merritton, Ont.

The Turnbull Elevator Mfg. Co., Toronto, have been awarded contracts for elevators by the Canadian Bag Co., Toronto and H. Greisman, Toronto.

EXPORT TO RUSSIA

Russia wants electrical goods, machinery of all kinds and plants, motor cars, bicycles and accessories, paints, varnishes, medical instruments, shipbuilding materials, railway materials, builders' hardware and material, many textile products, laces, fancy goods, haberdashery, cutlery, jewellery, glass and pottery, steel, aluminum, leather, tools, plumbing goods, pumps, chemicals, agricultural implements, canned goods, furniture, games and toys, household utensils, and hundreds of other products.

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This announcement is printed so that manufacturers whom we have not already reached may inquire. Book goes to press in December.

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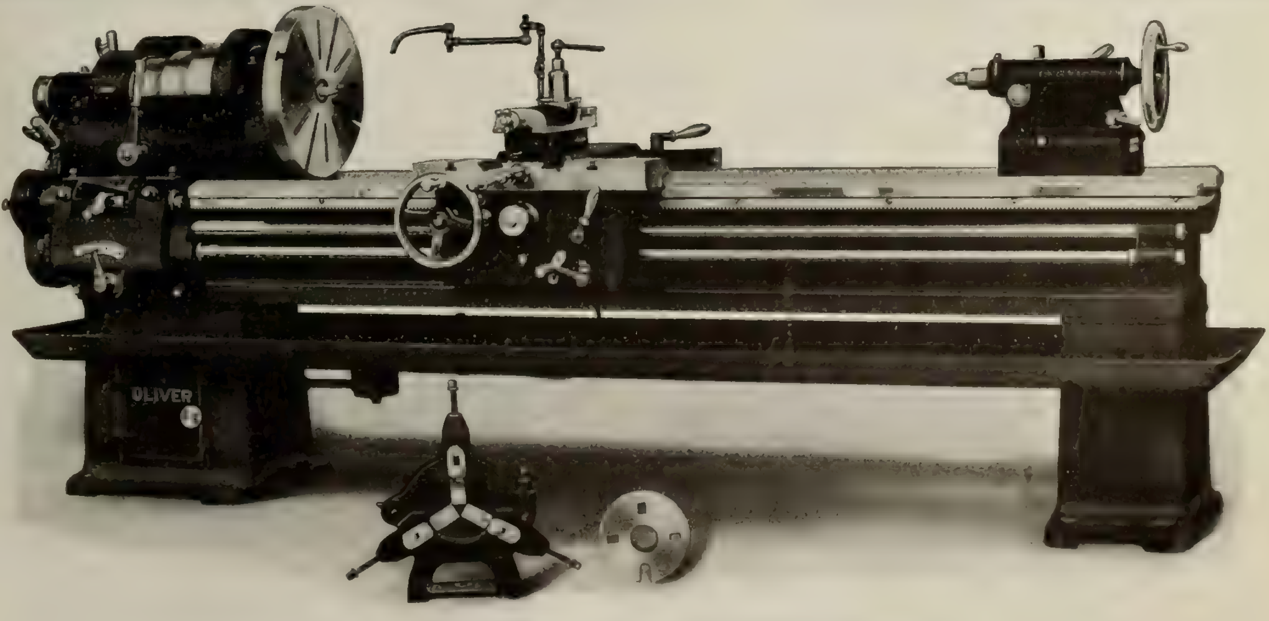

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Montreal, Que.—The Board of Control has awarded a contract for building a bridge over the canal at Church street to the F. J. Jago Co., for $78,000.

Building Notes

Toronto. — The Toronto Hydro-Electric system are to erect a new three-storey brick sub-station on the east side of Jefferson avenue, near Liberty street, at a cost of $20,000. The city architect has approved of the plans and a building permit has been issued accordingly.

Montreal, Que.—Operations on the site of Montreal's new million dollar theatre for Marcus Loewe on Mansfield and St. Catherine streets have been started by W. Lajeunesse & Co. Tenders for the erection of the building are being received. The building will have a terra-cotta front.

New Incorporations

The Weir Machinery Co. of Vancouver has been incorporated with a capital of $25,000.

The Pacific Steel Co., of Vancouver, B.C., has been incorporated with a capital of $100,000.

Canadian Metals & Equipment Co., of Vancouver has been incorporated with a capital of $25,000.

La Compagnie de Pneus Roger, Ltd., has been incorporated at Ottawa to manufacture automobiles, tires, engines, etc., at Montreal. Incorporators: W. J. G. Roger, T. Leduc and C. R. Lasalle, all of Montreal.

Machine Builders, Ltd., has been incorporated at Ottawa, with a capital of $50,000, to manufacture metal goods of all kinds. Head office, Montreal. Incorporators: J. W. Cook, T. B. Heney and T. B. Gould, all of Montreal.

Commercial Chemical, Ltd., has been incorporated at Ottawa, with a capital of $50,000, to manufacture chemicals. Head office at Toronto, and the incorporators are: E. A. Seburn, P. Robinson and Marcus Smith, all of Toronto.

Gunn Richards & Co., a New York corporation, has been licensed at Toronto, with a capital of $40,000, to carry on business as production engineers, factory organizers, with head office at Toronto. John Murray Clark is the attorney.

A. R. Whittall Can Co. has been incorporated at Ottawa, with a capital of $500,000, to take over the business of A. R. Whittall & Co., manufacturers of cans and containers of all kinds at Montreal. Incorporators: Albert R. Whittall, Fred R. Whittall, and M. A. Phelan, all of Montreal.

Canadian Molybdenite, Ltd., has been incorporated at Toronto, with a capital of $100,000, to acquire and develop mineral lands and deposits, with head office at Toronto. Incorporators: F. M. McDowell, G. R. Sproat and C. H. Kemp.

The Reliance Motor & Tool Co. has been incorporated at Toronto to carry on business as manufacturers of machinery and metal goods of all kinds at Toronto. Provisional directors are: W. B. Sturrup, J. S. Duggan, and C. A. St. Clair McKay, all of Toronto.

The van der Linde Rubber Co. has been incorporated at Ottawa, with a capital of $350,000, to manufacture rubber goods and appliances of all kinds, the head office being situated at Toronto. Incorporators are: W. A. McFarlane, V. T. A. Foley, and L. M. Keachie, all of Toronto.

Marine

Buy Ships in Vancouver.—The China Mail Steamship Co., which began trans-Pacific operations a year ago with the liner China, purchased from the Pacific Mail Co., has bought two steamers under construction at the Wallace Shipyard, Vancouver, B.C., paying $2,500,000 each for the liners, delivery to be made within ten months.

Will Build Wooden Vessels.—A. B. Mackay, of Hamilton, Ont., states that he has placed orders for six more scooners for the Mackay lake fleet, at a cost of $500,000. He declared that wooden sailing vessels of the type but on a larger scale than those used years ago are coming back on the Great Lakes. A four-masted schooner now under-construction at Meteghan, N.S., for Mr. Mackay will be launched on Nov. 15.

Vancouver, B.C.—It is reported to be not improbable that in the near future a shipbuilding yard on a somewhat extensive scale will be laid down on the south side of False Creek, Vancouver. Already plans have been drawn, and it is anticipated that a start will be made just as soon as these can be put into shape and a sufficient number of workmen engaged to go thead. The firm interested in the scheme is that of Messrs. John Coughlan & Sons, the well-known steel manufacturers who have a big steel plant on Beatty Street, Vancouver.

Tenders

Weir, Que.—Tenders for furnishing all labor and materials and constructing a steel bridge and appurtenances to be erected over the Rouge River (Rivington Bridge), addressed to the undersigned, will be received by the Municipal Council of Harrington until Saturday, December 2nd, 1916. All tenders shall be in accordance with the plans and the specifications prepared by the Engineer of the Department of Public Works and Labour, and which may be seen at the Office of the undersigned, Pierre Cantin, Treasuruer, P.O. Box 44, Weir, Que.

Ottawa, Ont.—By direction of the Honorable the Minister of Militia and Defence, the following old stores will be sold by public auction on November 9, at Toronto, Ont.:—Old brass, copper, gunmetal and ordinary, iron cast, iron wrought, files only, steel scrap, nickel. These articles may be seen on application to the Senior Ordnance Officer (Old Fort), Toronto.

Ottawa, Ont.—Tenders, addressed to J. W. Pugsley, secretary of the Department of Railways and Canals, Ottawa, Ont., will be received up to November 15 for the construction of a reinforced concrete elevator with a capacity of 500,000 bushels. Plans, specifications and blank form of contract may be seen at the office of the following:—Chief engineer, Department of Railways and Canals, Ottawa; railways, Moncton, N.B., general superintendent, Winnipeg, Man.; resident engineer, Fort William, Ont.; John S. Metcalfe Co., engineers, Montreal, Que. Contractors who wish to obtain plans and specifications temporarily for their own use may obtain same on depositing a certified bank cheque for $100.

Toronto, Ont.—Tenders will be received by Frank Barber, engineer of the Township of York, up to Nov. 6, for the supply and delivery of the following material:—Tender A-1—for supply and delivery of approximately 20,500 ft. of 24 in. cast iron pipe; A-2—for the supply and delivery of cast iron pipe (12 in, and smaller sizes); B-1—for supply and delivery of 24 in. special castings: B-2 for supply and delivery of special castings, 12 in. and smaller sizes; C-1—for supply and delivery of 24 in. valves; C-2—for supply and delivery of 12 in. and 6 in. valves; C-3—for supply and delivery of air valves; D—for supply and delivery of hydrants; F—for supply and delivery of tops, covers and plugs. Plans and specifications may be obtained at the office of Frank Barber, engineer, Toronto.

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Personal

Robert Hastwell, superintendent of the International Malleable Iron Works at Guelph, Ont., passed away recently following a short illness.

Allan Purvis is appointed general superintendent of the Ontario Division, replacing **J. T. Arundel,** during his absence on account of illness.

J. H. Boyle is appointed general superintendent of the Eastern Division, replacing **Allan Purvis,** temporarily transferred to the Ontario Division.

H. J. Roast, of the James Robertson Co., of Montreal, was recently elected one of the three vice-presidents of the American Institute of Metals at its annual convention.

Goodwin Shenton has resigned his position with Lyman Tube & Supply Co., Toronto, to take over the position of engineer to Messrs. Taylor & Arnold, Ltd., Montreal.

Hugh Girvan, 120 Cannon Street, London, E.C., has been appointed sole agent in Great Britain by the Dominion Sheet Metal Co., Hamilton, Ont., for the sale of their galvanized corrugated and flat sheets.

Harry H. Angus, B.A.Sc., who has been in private practice at Toronto, has joined the firm of MacMullen, Riley & Durley, consulting engineers, Montreal and Toronto, Mr. Durley having resigned.

J. Edward Dailey, formerly with the Algoma Steel Co., Sault Ste. Marie, Ont. has been appointed general superintendent of the open-hearth steel plant of the Youngstown Iron & Steel Co., Youngstown, Ohio.

George Arthur Grier, president of G. A. Grier & Sons, Montreal, died on Oct. 25, aged 67. Mr. Grier was also president of the Dominion Glass Co., St. Lawrence Flour Mills Co., and a director of the Dominion Textile Co.

Thos. L. Morrissey, for 44 years mechanical superintendent for Robert Mitchell & Co., Montreal, died on Oct. 22, aged 72, at his home, 596 St. Antoine Street. He retired a short time ago on account of ill-health.

Dr. Albert H. Abbott has been appointed director of the Department of Labor of the Imperial Munitions Board, the appointment to take effect Nov. 1. Dr. Abbott has temporarily retired from the position of secretary of the Provincial Organization of Resources Committee appointed a few months ago by the Ontario Government.

Edwin F. Goodison, president of the John Goodison Thresher Co., of Sarnia, Ont., and one of the province's well known manufacturers, died on Sunday, at Hamilton, while en route from Sarnia to Toronto. The late Mr. Goodison was the son of the late Mr. Goodison, founder of the Goodison Company. He was 44 years of age, and a native of Mount Brydges, Middlesex County.

Hon. Col. Harry Cockshutt, president and manager of the Cockshutt Plow Co., Brantford, Ont., has completed and sent to France a report on the use of farm machinery in labor saving for use after the war. It is probable that the effect will be to largely increase the export trade of agricultural implements from Canada, Brantford being the chief centre of this industry.

Major Owen Thomas, who purchased motor cars for the Militia Department and has been styled a director of mechanical transport, has resigned and is going back to New York to engage in the automobile business. Major Thomas bought most of the equipment for the second and subsequent divisions. **Col. E. E. Clarke** will take over the direction of mechanical transport services.

Virgil G. Bogue, a well-known engineer, died recently. Mr. Bogue was born at Norfolk, N.Y., in 1846, and was connected with many important engineering works on this continent. He prepared the plans for the Rogers Pass tunnel on the C. P. R., through the Rockies, and also made plans for the development of the terminal and waterfront at Prince Rupert, B.C., for the G. T. P.

J. W. Norcross, vice-president and managing director; **F. S. Isard,** comptroller, and **C. A. Barnard,** director of Canada Steamship lines, sailed from New York recently on the American line boat St. Paul for London. The trip is largely for the purpose of cleaning up the loose ends of the English business in connection with the ships that have been chartered for service on the other side during the war.

C. W. Peterson of Calgary has been appointed by R. B. Bennett, M.P. Director-General of National Service, to the post of secretary of the National Service Commission in place of G. M. Murray, who resigned with Sir Thos. Tait. Mr. Peterson was born in Denmark, and is about fifty years of age. By profession he is an agriculturist. Latterly he has been engaged in business for himself, and is head of the Western Printing & Lithographing Co. of Calgary, and editor of the Farm and Ranch Review.

Trade Gossip

The Reliance Machine Co., Toronto, have sold two 6-inch shell boring machines to the Canadian Blower & Forge Co., Kitchener, Ont.

The Main Belting Co. of Canada, Ltd., Montreal, have appointed W. W. Hicks, 567 Banning St., Winnipeg as sales agent for that district.

Russian Firm Changes Name.—We are advised that the business formerly conducted by L. Knoop at Moscow, Russia, has been taken over by the Trading & Industrial Co., "Volokno" of Moscow.

Copper Output in U.S.—Twenty leading copper companies operating in the United States, Canada and South America, produced approximately 895,000,000 pounds of copper in the first half of 1916, an increase of 295,000,000 pounds, or 50 per cent. over the corresponding period of last year.

Trade Enquiry.—The following enquiry has been received by the Department of Trade and Commerce Ottawa. 1245. Steel bars, plates, sections, billets, etc.—A Dundee firm will be pleased to enter into correspondence with reliable iron and steel manufacturers in Canada with a view of obtaining quotations for the above.

Owen Sound, Ont.—At the meeting of the Utilities Commission held on Oct. 24, it was decided to reduce the light and power rates of the Hydro-Electric system 10 per cent. The decision followed representations which were made to the Hydro Commission in July. This is the first reduction since the Eugenia Power lines were connected with Owen Sound's system.

Canadian Business Tax.—Twelve millions of revenue is promised from the operation of the business tax imposed by the budget of the last session of Parliament. The initial assessment is due in November and payments are now being made to the Finance Department by corporations and individuals whose excess profits come within the scope of the Act. Some will pay as high as a million dollars. The money appears to be forthcoming willingly.

French Farmers Need New Machinery.—The French Government has officially designated a commission for developing the use of agricultural machinery among the farmers of France. In the memorandum addressed to President Poincare, upon which the official action was based, Jules Meline, the Minister of Agriculture, calculates that for the invaded and devastated districts of France alone

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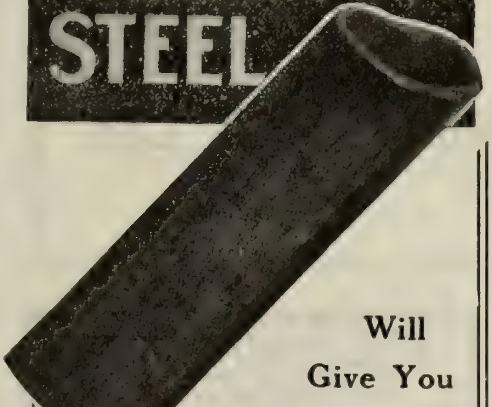

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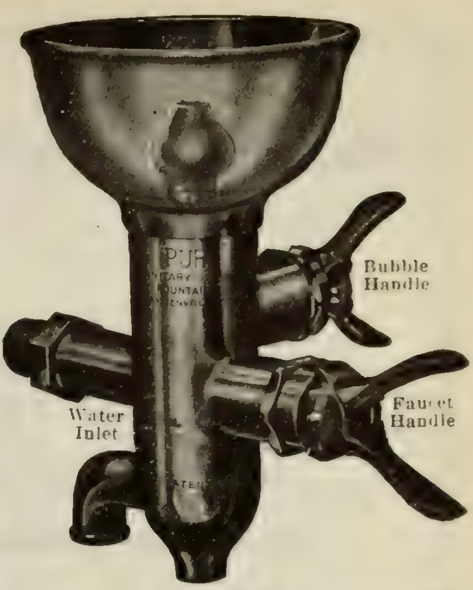

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A Puro Sanitary Drinking Fountain will cut that water bill 35%. We can prove that it has done that for others.
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Vancouver, B.C.—The Dominion Government will promote the building of merchant ships in Canada for Norway. A telegram received from Ottawa reported that H. H. Stevens, M.P., had stated that an Order-in-Council granting necessary permission had been passed. Contracts for three vessels valued at $3,500,000, were already signed with Vancouver shipbuilding yards, and only required the assurance of the Government that the transfer would be granted on completion to become effective. Orders for seven or eight other vessels will be given almost immediately, and the total value will reach not less than $20,000,000.

Women Munition Inspectors.—The first class in Canada for women munition inspectors was started last Friday at Central Technical Schools, Toronto, when ten students, the total number possible for a class, were given their first instructions. The course will take a week or ten days and the hours will be regular school hours. This class was filled up immediately the announcement was made that it was to be held and about a hundred more have applied to be placed in later classes. As soon as the course is completed these women will be placed in positions now held by men. All applications must go through Miss Wiseman, 504 Traders Bank Building, Toronto and her hours are from 9 to 10 in the morning and from 5 to 6 in the afternoon.

Car Ferry Across Lake Erie.—A car ferry route has been established across Lake Erie between the ports of Port Maitland and Ashtabula, on the south shore of Lake Erie, by the T. H. and B. Navigation Co. The initial trip of the car ferry was made Oct. 21st with a full load for Hamilton and other points. The steel car ferry, Maitland No. 1, is the latest in car ferry building, carrying thirty-two loaded freight cars, and is equipped with every device for safe handling of the cars and freight. She will ply between Port Maitland, Ont., and Ashtabula, Ohio, connecting at the latter point with the New York Central and with the Pittsburg and Lake Erie at Youngstown, thus affording a new and fast route from the Pittsburg. Connellville and Cleveland districts.

The Polson Iron Works, Toronto, have signed a contract for two steel freighters for Christoffer Hannevig, Christiania, Norway. The ships will be 261 ft. over all, 43 ft. 6 in. beam, and 22 ft. 11½ in. deep. The total deadweight carried will be 3,500 tons. The two vessels will cost about $1,200,000, and will be completed July or August, 1917.

Intercolonial Railway Improvements. Hon. Frank Cochrane, Minister of Railways, accompanied by F. P. Gutelius, General Manager of Government Railways have returned to Montreal from a tour of inspection of improvements being completed on the Government system of railways at several points in the Maritime Provinces with a view to the handling of the increasing shipments of munitions, transportation of troops, etc., over a quarter million dollars being involved. The Minister expressed satisfaction with the work, and Manager Gutelius said the Government railways had undertaken to handle 80,000 tons of war supplies per month this winter, an increase of twenty-five per cent. over last winter's business.

Advertising the West.—Western Canada attractions will be made known in all the chief centres of the United States during the coming winter in a more attractive form and on a more extensive scale than has been hitherto attempted. By means of the moving-picture camera, the life and resources of the West will be shown over a circuit covering 4,000 theatres, and in this way many thousands of people will be reached and interested in the Dominion who might otherwise only hear of the country incidentally. The films have been taken under the auspices of the Grand Trunk Pacific, and will include a variety of pictures in the prairie harvest fields, and through the Canadian Rockies. One of the most interesting pictures is the arrival of a fishing boat at Prince Rupert with 80,000 pounds of halibut on board.

G. T. R. Celebrates Anniversary.—On Oct. 27, was celebrated the sixtieth anniversary of the inauguration of railroad communication between the cities of Montreal and Toronto. On October 27th, 1856, the Grand Trunk operated its first through train between these two important Canadian centres. Toronto and Montreal had been dependent for their communication upon the St. Lawrence waterway and the stage routes, and after the close of navigation each year intercourse was maintained with great difficulty. The Grand Trunk Railway Co. was incorporated in 1852 to build a railroad between the cities, the undertaking being looked upon as one of great national importance. The first section from Montreal to Brockville, 125 miles, was completed in November, 1855, and it was on the 27th of October of the following year that the second section from Brockville to Toronto was thrown open, joining up the two principal centres.

Subscriptions Invited From Friends Abroad

Canadian Machinery and Manufacturing News is published weekly. Representing, as it does, the industrial life and activities of Canada, it should prove of very considerable value to those who wish to buy Canadian products, and to those who may wish to sell in Canada.

As a technical journal it compares very favorably, we think, with any other high-class publication, and will be found to be well worth the subscription price, and more.

If you are favorably impressed with this number, we think you will find other issues equally interesting. Canadian Machinery contains from eighty to one hundred and twenty pages—fifty-two issues in the year. We invite subscriptions from our friends abroad, and attach a coupon for the sake of convenience.

Subscription Order Form

To the Publishers,
CANADIAN MACHINERY,
143 University Ave.,
Toronto, Canada.

Gentlemen,—

You may enter our subscription to CANADIAN MACHINERY for one year, and until ordered discontinued, to be sent to address below. We enclose money order covering same.

Yours truly,

Name ....

Full address ....

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The subscription price to Great Britain and her colonies is 12s. 6d. United States, $3.50, other countries 16/- per year.

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Display rates on application.

FOR SALE

HEAVY DROP HAMMER FOR SALE. Metallic Roofing Co., Toronto. (21)

16 H.P. IDEAL GAS ENGINE — ALSO quantity of pulleys. Chipman & Millman, Brantford, Ont. (16)

6½ H.P. WESTINGHOUSE AND 1/3 H.P. Toronto & Hamilton Electric Co. 60-cycle motors, in first-class order. Geo. H. Lees & Co., Hamilton. (17)

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 227, Canadian Machinery. (15)

FOR SALE — HOT SAW AND MILLING machine, Ajax. New; never used. Address Canadian Warren Axe & Tool Co., St. Catharines, Ont.

FOR SALE—45 H.P. GAS PRODUCER AND engine, complete. Good condition. For particulars write Canadian Warren Axe & Tool Co., Ltd., St. Catharines, Ont.

BRASS RODS, 1¼, 1½, 1¾ UP TO TEN FT. Brass tubings, 2⅜ o.d., with ¼ wall; all lengths to ten feet. Louis Lovitz, 186 Markham St., Toronto. Telephone College 5711. (17)

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 226 Canadian Machinery. (15)

FOR SALE—TWELVE H.P. GAS OR GASOLINE Engine. Goold, Shapley & Muir Ideal. In first-class condition. Cheap. Stedman Brothers, Ltd., Brantford, Ont. (21)

For Sale Cheap

1 -Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.
1—12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 3 tons capacity; complete, less the Hoist.
1—Brantford (Gas) Bake Oven and 4 Racks.
1—Linderman 2-Spindle Boring Machine.
1—26" Drill, London Machine Tool Company.
1 Bowser 40 Gal. Varnish or Oil Pump and Tank.
11 New 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.
30 Used 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.

M. BEATTY & SONS
Limited
Welland, Ont.

FOR SALE -FIVE THOUSAND FEET OF 1" black piping. Newell Mfg. Co., Prescott, Ont. (18)

BUSINESS FOR SALE — MACHINE SHOP with a good, steady run of work and always busy. A good opening for a young man to get into business. Owner has other interests. Box 224, Canadian Machinery. (13)

WE CAN GIVE EARLY DELIVERY ON difficult fixture cutting, also on gauges and jigs. We have a large shop and the finest equipment. Apply Box 235, Canadian Machinery.

FOR SALE — IMMEDIATE SHIPMENT — New Heavy Duty Shell Boring Lathe for manufacture of 6" High Explosive Shells. Write for complete specification. Wm. Hamilton Co., Ltd., Peterboro, Ont. (20)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

FOR SALE.—ONE BROWN-BOGGS MARKing Machine, suitable for 6" Mark XVI. or Mark III. English Shells. Only object in selling is that other methods of marking have been adopted. Price on application. Taylor-Forbes Co., Ltd., Guelph. (14)

ONE REED TURRET LATHE, 8' BED, swing 28"; 4 2" holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 226, Canadian Machinery. (16)

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

GAP LATHE — LONDON TOOL CO. — swings 41" in the gap, 26" over shears. 20 ft. bed, rod and screw feed, compound rest, steady rest, countershaft, 2 face plates, 4-jaw chuck, weight about 10,000 lbs. This tool has been very little used, and is in excellent condition. Bargain for quick sale. Winnipeg Machinery Exchange, Sutherland & Gladstone Sts., Winnipeg, Man. (17)

WE HAVE FOR SALE THE FOLLOWING equipment: Complete nickel and copper plating plant, including direct connected dynamo and motor; one second operation cast iron plug machine, and two first operation cast iron plug machines manufactured by the Brown Engineering Corporation: 2 16-inch turret lathes: 1 38-inch engine lathe, 20-foot bed. The above outfit will be sold en bloc or separate. Apply direct to Foundry & Machine Co., Ltd., Montreal. (13)

FOR SALE—McDOUGALL ENGINE LATHE, 20" swing, 10' bed; never been used. Baker Keyseater No. 2, good as new. Boring Mill, 2 bars, will bore up to 30" dia. Boston Forge Blower, 27", good condition. Crescent Swing Cut-off Saw, almost new. 7½ H.P. Westinghouse D.C. Motor, in good order. Gurney Platform Scale, 2,000 lb., 16" wheels. Mandrills, Couplings, Hangers, Post Boxes, Pulleys, Belting, Cap Screws, Bolts, etc. Special prices on above, write for particulars. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (14)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

SITUATIONS WANTED

TOOL MAKER IN CHARGE DESIRES change. Competent to take charge of machine shop or tool room. Good references. Box 225, Canadian Machinery. (17)

SUPERINTENDENT—FIRST-CLASS PRACtical mechanical man is open for an engagement as works manager or superintendent. Can give best of reference as to character and ability to handle help and produce results. Box 227, Canadian Machinery.

SITUATIONS VACANT

WANTED—NIGHT SUPERINTENDENT TO take charge of factory making 4.5 sockets. Apply Box 237, Canadian Machinery.

FOREMAN TOOL-MAKER WANTED — TO take charge of tool room in plant manufacturing 4.5 sockets and other munition work. Apply Box 236, Canadian Machinery.

WANTED — EXPERIENCED STEEL works draftsman for Nova Scotia. Give full particulars, including salary, permanency. Apply Box 234, Canadian Machinery. (17)

FOREMAN FOR LARGE WINNIPEG MAchine shop — must be aggressive and mechanic with good practical experience in jobbing, stock and transmission work. When applying, state age, experience and salary expected. Applications treated confidentially. Box 229, Canadian Machinery. (16)

WANTED — SUPERINTENDENT FOR 18-pdr. shrapnel shell factory equipped and now turning out 1,200 shells per day; must have good executive ability and able to produce results; liberal salary to right man. State fully past experience and record, and salary expected. Address Box 238, Canadian Machinery. (19)

WANTED — MANAGER MACHINE TOOL department. Must have full knowledge of general miscellaneous machinery, especially for munition plants. Position affords every opportunity for advancement. Please state experience and salary expected. Apply to Box 239, Canadian Machinery. (18)

WANTED

WANTED TO MANUFACTURE A FEW lines of metal products, sheet metal preferred. We have complete equipment for high-class work. Give complete description and rating in first letter. Apply Box 221, Canadian Machinery. (17)

WANTED—12" BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Aplly Box 218, Canadian Machinery.

WANTED — THREE TURRET LATHES suitable for steel sockets, also Thread Millers suitable for milling outside thread of sockets. Give price and particulars to Steel Furnishing Co., New Glasgow, N.S. (19)

For Sale—48" Engine Lathe

48" Enterprise compound rest engine lathe with power cross feed, gears, steady rest, faceplate, wrenches and countershaft; bed 24' long. Ready for immediate shipment, $1350.00.

Clark Machinery Co., Cleveland, Ohio

WANTED

Seamless Steel Tubing in any Quantity. Cash Paid.

Apply Box 233, Canadian Machinery

Watch These Pages

Every week new propositions are offered to you here. Look them all over.

—Are you looking for a job?

—Do you want to buy or sell second-hand machinery?

You'll find them all offered in this section.

CANADIAN MACHINERY

Classified Advertising Section
143 University Ave., Toronto, Canada

FAIRBANKS-MORSE
New and Used Machinery

In Stock at Toronto

1—7/8" 4-spindle National Acme Automatic; used.
2—No. 3 1" Foster Hand Screw Machines.
4—No. 4 1½" Smurr & Kamen Turret Lathes.
1—10" x 5' Seneca Falls Lathe; used.
2—18" x 8' Springfield Lathes; new.
5—20" x 9', 19 16" x 7', 3 16" x 9' Fairbanks-Morse Lathes; new.
2—No. 1 Racine Hacksaws; new.
1 No. 304A Oster Pipe Machine; new.
1 20" x 8' Hendey Lathe; used.
1 Gisholt 16" Special Lathe, type C, 6½ bore.
1—Walcott 20" x 8' Engine Lathe.
5—Barnes 18" x 8' Engine Lathes; new.
7—Potter & Johnson No. 6A Automatics; used.

In Stock at Montreal

3—Gisholt 16" Turret Lathes; new.
2—Gisholt 25" Turret Lathes; new.
Waving and Grooving Machines, 6" shells, new.
1—Hendey 16" Lathe; used.
2—American 16" x 6' Tool Room Lathes; new.
1—Rivett Precision Lathe; used.
1—Brown & Sharpe No. 1½ Universal Mill; used. used.
1—Valley City No. 1½ Universal Mill; used.
2—Ford-Smith 20" Wet Tool Grinders; new.
1—Wilmarth & Morman Drill Grinder; new.
3—20" Back-geared Drills; new.
1—25" Sliding Head Drill; new.
1—Banfield Plug Miller, 6" shells; new.

This is only a partial list of our stock of Machine Tools.

CFM

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

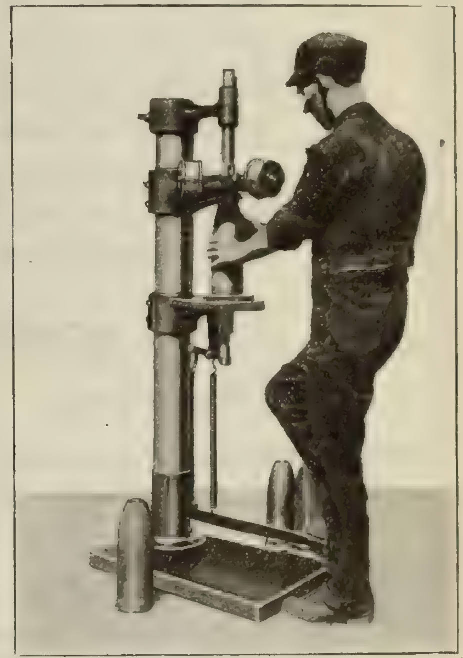
CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

MONARCH
Milling Machine
(Made in Canada)

For Milling the three slots in the nose of

Mark 7 Shells

Adjustable to take any size shell from 4.5 to 9.2 inclusive.



ONE MOVEMENT of foot lever clamps the shell and feeds the three cutters in to the right depth.

CAPACITY ON 4.5—6 to 8 shells per minute. Actual cutting time is simply — "zip" and the three slots are finished.

THE MACHINE is complete with High Speed Cutters and drive pulleys which should run at about 550 revolutions per minute. It can be driven by three 2-inch belts, either from overhead counter or line shaft. The clamping device does not interfere with copper band, and altogether it will be found to be a very satisfactory tool—CONVENIENT and ACCURATE.

For further particulars address

H. W. PETRIE, LTD.

FRONT STREET WEST, TORONTO
Sole Selling Agents for Canada

SPECIAL PRESSES

Ten No. 60½ BLISS GEARED REDUCING PRESSES, RACK AND PINION MOVEMENT, 4 in. to 42 in. ADJUSTABLE STROKE; PRACTICALLY NEW; WEIGHT 12,500 lbs. EACH; LESS THAN YEAR OLD.

Toledo Double Crank Geared Forging Press; weight 28,000 lbs.
Farrel Double Crank Geared Press; weight 9,000 lbs.
PG—6 Ferracute Geared Punching Press; weight 12,000 lbs.
No. 2 new Bliss Straight Sided Double Crank Press; weight 5,000 lbs.
Sellers Hydraulic Wheel Press, 100 ton capacity.
Hoe & Co., Hydraulic Vertical Press, 500 ton capacity.
No. 24 Zeh & Hahnemann Power Press, 2″ stroke.
No. 4 Farrel Punching Press, 1½″ stroke.
No. 1 Bliss Straight Sided Press, 8″ stroke.
No. 3 Manville Stamping Press, 1″ stroke.

NEW YORK MACHINERY EXCHANGE

50 Church Street **New York, N. Y.**

FOR SALE

GRINDING MACHINES

1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10″ x 36″ Landis Plain Grinder (new).
1 10″ x 20″ Landis Plain Grinder.
2 12″ x 24″ Modern Plain Grinders (nearly new).
1 14″ x 50″ Norton Plain Grinder (nearly new).
2 18″ - 30″ x 96″ Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16″ x 66″ Landis Crank Shaft Grinder (18 months old).
2 14″ Swing Special Internal Grinders, capacity ½″ to 14″ dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES

58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13″ Gisholt Semi-Automatic (12 mos. old).
20 21″ Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES

1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72″ table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES

1 8-spindle Bausch Multiple, 1″ capacity.
1 12″ Spindle Garden ½″ capacity.
6 Barnes 24″ 2 spindle All Gear Drive (new).
1 24″ Hoefer Sliding Head (new).
4 Henry & Wright No 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26″ Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14″ swing, ¾″ capacity.
2 Peerless 20″ (new).
1 20″ Mechanics (new).
1 20″ Buffalo (new).
1 28″ Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25″ Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾″ x 14″ flute, 21″ over all (new).

RADIAL DRILLS

1 36″ Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES

38 16″ x 8′ Fairbanks-Morse (new).
1 18″ - 36″ x 8′ Fay & Scott Extension Gap (fine condition).
1 30″ x 12′ LeBlond.
1 12″ x 6′ American.
1 28″ x 14′ Fifield.
1 14″ x 4′ Blaisdell.
1 No. 4½ Barnes.
1 54″ x 21′ Detrick & Harvey.
1 26″ x 10′ Bradford.

MARKING MACHINES

2 Noble & Westbrook No. 1 (new).

PROFILERS

1 No. 3H Becker (new).

PLANERS

1 30″ x 30″ x 10′ Ohio with two heads (new).
1 44″ x 44″ x 12′ L W Pond with three heads.
1 40″ x 40″ x 12′ New Haven, with one or two heads.
1 36″ x 36″ x 12′ Sellers widened to 72″.

AUTOMATIC GEAR CUTTERS

1 No. 3 Brown & Sharpe 26″ (old machine).
1 36″ x 4″ Fellows Gear Shaper (fine condition).
1 18″ Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES

1 4″ Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20″ inserted tooth blades (new).

BELT LACING MACHINES

1 12″ Jackson (new).

KEY SEATERS

1 No. 1 Catlin (new).

SCREW MACHINES

1 No. 3 Stecher (new).
1 1″ x 8″ Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜″ capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2″ x 24″ Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼″ capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES

1 No. 3 La Pointe (nearly new).

BOLT CUTTERS

1 2″ Landis Double Head (nearly new).

BORING AND TURNING MACHINES

1 4′ Bickford Boring & Turning Mill (nearly new).
1 20″ swing 4-Spindle Moline Vertical Boring Machine with 18″ x 36″ table.

BULLDOZERS

1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES

1 Large Filing and Sawing Machine with 12″ stroke.

PUNCHES AND SHEARS

1 No. 3 Walsh Punch Press.
1 Moser 1½″ stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8″ throat capacity ¼″ x ¼″.
1 27½″ throat lever punch ½″ capacity 1¼″ stroke.
1 Thompson Bevel Shear ½″ capacity.

PIPE MACHINES

1 6″ Saunders.

SHAPERS

1 14″ Hendey Geared Friction.
1 20″ Hendey Geared Friction.

TAPPING MACHINES

1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2″ collapsible taps (new).

THREAD ROLLING MACHINES

1 Waterbury Farrell ⅜″ capacity (nearly new).

THREADING MACHINES

5 Special Threading Machines for threading 3″ steel shells (nearly new).

SPOT WELDERS

1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

Write us what you want new or second-hand.

32 North Clinton Street, Chicago **W. F. Davis Machine Tool Co.** **403 Singer Building, New York City**

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

Machine Tools For Sale

In Stock for Immediate Delivery

LATHES.
2—20 x 10 Hamilton (new).
1—16-24 x 8 Sebastian Gap Lathe.
1—13 x 6 Barnes.
1—9" Porter Cable Mfg. Lathe (new).
1—16 x 6 Canedy-Otto (new).
2—16 x 6 Style A Hamilton (new).

BENCH LATHES.
A variety of new and used bench lathes with collets.

BENCH MILLERS.
1—B. C. Ames (new).

PROFILER.
1—No. 14 Garvin.

HAND MILLING MACHINES.
1—No. 2 Garvin (new).
1—No. 1 Standard (new).

MILLING MACHINE.
1—No. 1 Van Norman Plain (like new).

DISC GRINDERS.
2—No. 6 x 20" Ring Diamond Disc Grinders with compound table, micrometer adjustment.
2—No. 6 x 14" Ring Diamond Grinders with table, same as above.

GRINDERS
2—No. 1 Cutter and Reamer Grinders (new).

SLAB MILLER.
1—16 x 48 Bement Slab Miller.

COLD SAW.
1—9-inch Lea Simplex with saw grinder (new).

DRILL PRESSES.
1—4-Spindle Barr.
1—3-Spindle Avey.
1—36" Snyder, T.A.

SHAPERS.
1—16" G. & E.B.G.
1—14" G. & E. Plain.
1—Double Head Traveling Head Bement-Miles.

SCREW MACHINES.
2—No. 2 B. & O. (new).
1—1-inch Pierce (new.
2—1½ inch B. & O. (new).
1—No. 2½ Garvin (new).
1—No. 4 Foster.

MILLING MACHINE.
1—No. 3 B. & S. Plain.

AUTOMATIC SCREW MACHINE.
1—No. 2 B. & S.

COLD ROLLED STEEL.
We have an extremely large stock of new round, flat, square and hexagon in our Rochester warehouse. Write for quotations on immediate deliveries.

STRONG & HERY CO.
225 State St. Rochester, N.Y.

FOR SALE

Two 70-Gallon Hydraulic Pumps for 1,500 lb. Pressure.

One 90-H.P. General Electric Co. Motor, 3-Phase, 60-cycle, 200-Volt, $700.

Two Sheldons, No. 3, Cast Iron Fans.

These machines can be seen and inspected at

National Steel Car Co., Limited
HAMILTON, CANADA

(18)

WANTED!

Any amount Brass Tubing, Sheets and Rods

Bought for Cash

Apply Box 232

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AND to that somebody you must make known — by advertising — what you sell, why it is good, and so on. Also, you must have a medium—a publication read by your customers or should-be customers.

All this you consent to without demur. What may perplex you a little is the **Medium** to employ.

This should not be a puzzle if your product or commodity is one purchased by the general public, and if your constituency of buyers is found everywhere in Canada.

The one medium of quality and of national circulation is

MACLEAN'S
MAGAZINE

You can find no substitute for it at a lower cost, and none that will carry your proposals or announcement with greater acceptability.

The conclusion is plain.

N.B.—Objectionable advertising not accepted. Both editorial and advertising columns are closely censored to keep them clean and decent.

Published by
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MACHINE TOOLS

LATHES.
1—68 x 20 Fifield, face plate drive, triple geared.
1—30 x 27 Reed, heavy type, with taper attachment.
1—18 x 36 x 10 Niles Extension Bed Lathe.
1—22 x 14 Engine Lathe, C.R., H.S.
1—28 x 15 Engine Lathe, C.R., H.S.
1—20" LeBlond Heavy Duty, with turret.
1—18 x 8 Jones & Lamson Engine Lathe.
2—16 x 6 Barnes Engine Lathes.
1—16 x 8 Cincinnati Engine Lathe.
1—16 x 6 Walcott Engine Lathe.
1—16 x 6 Reed Engine Lathe.
1—16 x 8 Porter Engine Lathe.
1—14 x 5 Lodge & Shipley Engine Lathe.

MILLING MACHINES.
1—No. 1½ B. & S. Universal with vertical attachment.
1—No. 3½ Fox, Plain.
1—No. 3 Chicago Hand Miller.
2—No. 12 P. & W. L.T. Millers.
4—No. 13 P. & W. L.T. Millers.
1—No. 3-H. B. & B. Vertical Miller.
1—Warner & Swasey Profiler.

GRINDERS.
1—No. 1 B. & S. Universal, with all attachments.
1—No. 1 Landis Universal.
2—12 x 36 Landis, plain, geared head.
1—No. 5 Springfield Oscillating Surface Grinder.
1—No. 2 Gardner Disc Grinder.
1—No. 34 Gardner Double Spindle Disc Grinder.
3—Webster Perks Heavy Grinders.

PLANERS.
1—Pond, 62" (widened pattern type), 9' bed.
1—36 x 26 x 10 Industrial Planer, 1 rail head and 1 side head.
1—34 x 10' Badger, S.H.

TURRET LATHES.
1—No. 6 Foster Friction Geared Hand Screw Machine.
1—No. 4 W. & S. Friction Geared Hand Screw Machine.
1—No. 4 Smurr & Kaven Friction Geared Hand Screw Machine.
1—14" B. & O. Chucking Machine.
1—No. 5 Pearson Hand Screw Machine.
1—1 x 8 Pierce Hand Screw Machine (new).
1—2" Cleveland Automatic Screw Machine (model A).
2—2" Cleveland Jigger Feed Screw Machines.
1—⅝" Cleveland Automatic Screw Machine (model A).

AIR COMPRESSORS.
Steam.
1—12 x 12 x 12¼ x 12 Ingersoll-Rand, Class M.F.I.
1—16 x 18 x 12 D. A. Union S.L. 2 S. Air Compressor.
Belt.
3—10 x 10 Bury Hor., Belt-Driven (182 C.F.).
1—10 x 10 Curtis Vertical, D.C., with base (160 C.F.).
1—8 x 8 Ingersoll Sergent Horizontal (100 C.F.).
1—8 x 8 Chicago Pneumatic Horizontal (110 C.F.).
1—10 x 6 Bury Horizontal.

DRILLS AND SLOTTERS.
1—24" Niles Geared Slotter.
1—28" Prentiss, B.G., P.F., W. & L.F.
2—20" Rockford, B.G., P.F., W. & L.F.
3—20" Buffalo (new), W. & L.F.
1—17-Spindle Moline.
1—5-Spindle Barnes.

PUNCH PRESSES.
1—No. 64 Toledo, S.S., B.G.
1—No. 95 Consolidated Press.
2—Briscoe S.S., 7" stroke.
2—1200-lb. B. & S. Roll Board Hammers.
1—800-lb. B. & S. Roll Board Hammer.

We carry a large line of Boilers, Pumps, Engines, Motors, Generators, etc.

Riverside Machinery Depot
Detroit, Mich.

MACHINE TOOLS NEW AND REBUILT

The World is Our Field
SIMMONS
ALBANY N.Y. U.S.A.
har
MACHINERY

NEW MACHINERY

6—17 x 8 Semi-Quick Change Gear National Lathes. In stock.
10—12 x 6 Seneca Falls Lathes, quick-change gear. In stock.
10-16 x 6 Canedy-Otto Lathes, October delivery.
3 16 x 8 Cisco Lathes, quick-change gear. In stock.
1-13 x 5 South Bend Lathe. In stock.
1-14 x 6 Carroll-Jamison Lathe, Q.C.G., taper attach., relieving attach., draw-in collets, pan bed, October delivery.
2—1½ American Plain Milling Machines, October delivery.
3—No. 1 Dow Milling Machines, Plain, October delivery.
3—No. 1 Bickford Hand Milling Machines. Stock.
2—No. 1 Standard Hand Milling Machines. Stock.
1-No. 24 Heavy Oesterlein Plain Milling Machine. Stock.
1-No. 1½ Valley City Universal Milling Machine. October delivery.
1-No. 1½ Plain Valley City Milling Machine. October delivery.
1-No. 3 Kempsmith Plain Milling Machine, October delivery.
1—No. 34 Heavy Oesterlein Plain Milling Machine. October delivery.
10—No. 6 Standard Universal Tool and Cutter Grinders. Stock.
3-No. 1 Wilmarth & Morman Surface Grinders. Stock.
1-Style W. P. L. Wilmarth-Morman Drill Grinder. Stock.

This is a few of our special opportunities. Complete list for the asking.

REBUILT MACHINERY

MILLERS.

12—Pratt & Whitney Lincoln Type Millers, perfect condition.
2—No. 7 Becker-Brainard Lincoln Type Millers, like new.
1—No. 32 Kempsmith Lincoln Type Miller.
1—Newton Vertical Miller, circular table.
1—No. 15 Garvin Plain Miller, with index head.
1—No. 2 Cincinnati U. Miller, complete.

SHAPERS.

1—24-in. Gould & Eberhardt Shaper.
1-28-in. Ohio Shaper, good as new.

BORING MILLS.

1—36-in. Bickford Boring Mill, single pulley drive.
3—60-in. Sellers Boring Mills.

TURRET LATHES.

1-Pratt & Whitney, 7-32-in. Hole, cut-off slide.
20—No. 2 Warner & Swasey, power feed to turret, used three months.
1—Potter & Johnson semi aut. 4½-in. H.S.
1—Davis Turret Lathe, complete.
9-2¼-in. Bardon & Oliver, power feed to turret.
4-No. 9 Bardon & Oliver, power feed to turret, cut-off slide.

PLANERS

1—24 x 24 x 6 Lathe-Morse Planer, univ. Milling head.
1—24 x 24 x 6 Grey Planer, excellent condition.
1—30 x 30 x 7 Flather High Duty.
1—30 x 30 x 8 Pond Extra Heavy type.
1—60 x 60 x 12 Betts Solid bed, 3 heads.
1—54 x 54 x 16 Sellers Solid bed, 3 heads.

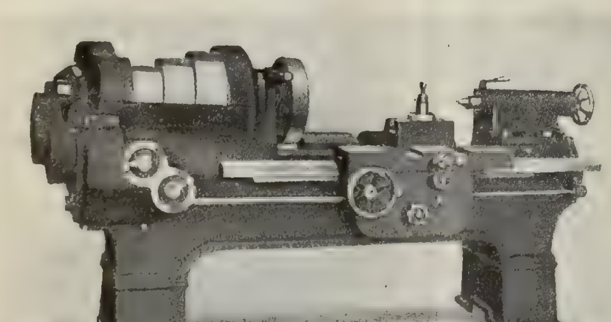
GRINDERS.

3—Bridgeport Shell Grinders.
1 10 x 36 Landis Plain Self-Contained.

Simmons Machine Company, Inc.

903 Singer Building,
New York City

989 Broadway,
Albany, N.Y.



For Immediate Delivery

5 Heavy Duty, double back geared manufacturing lathes.

Machinery Department

Wm. Pattison Tool & Supply Co.
CLEVELAND, OHIO

They must be getting results--

or why would they continue to advertise each week? That's logic, isn't it? This is a *direct-result* department. Have you noticed that each week the same firms' lists appear? If you don't care to use large space, insert a "liner" ad.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto, Ont.

Used Machinery for Immediate Delivery

BORING MILLS.

51" Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52" Niles Car Wheel Boring Mill.

DRILLS

22" Aurora, S.H., B.G., P.F.
24" Hamilton, B.G., P.F.
32" Hamilton, S.H., B.G., P.F.
32" Hoefer, S.H., B.G., P.F.
34" Barnes, S.H., B.G., P.F.
2½' Dreses Radial.
3½' Industrial Radial.
12 spindle Multiple.
No. 30 C Baush, 12 spindles.

GEAR CUTTERS

24" x 7" G. & E., for spur.
30" x 9" G. & E., spur and bevel.
36" Walcott, for spur.

GRINDERS

No. 5 Diamond Water Tool.
14" x 20" B. & S. Universal.
Gisholt Tool Grinder.

LATHES

12" x 5' Davis, C.R.
14" x 6' LeBlond, C.R., taper.
14" x 6' Porter, C.R.
14" x 6' Rockford, C.R.
14" x 6' Fairbanks, C.R., taper.
15" x 6' Goddard, C.R., taper.
16" x 6' Prentice, C.R.
16" x 6' Sebastian, C.R.
16" x 6' Walcott, C.R.
16" x 8' Lodge & Shipley Pat. Head, C.R., Q.C.G.
16" x 10' Greaves & Klusman, C.R .
17" x 10' Blaisdell, C.R.
18" x 6' Bradford, C.R. taper.
18" x 8' Lodge & Shipley, Pat. Head, C.R. taper.
18" x 8' Bradford, C.R. with turret.
18" x 12' Greaves & Klusman, C.R.
20" x 10' Flather, C.R.
21" x 12' New Haven, C.R.
24" x 16' Schumacher & Boye, C.R.
30" x 14' Reed, C.R.
32" x 16' Blaisdell, C.R.
36" x 12' American, C.R.
36" x 28' American, C.R.

MILLING MACHINES

No. 12 B. & S., plain.
No. 2 Cincinnati, plain.
No. 3 Brown & Sharpe, plain.
No. 4 LeBlond, plain.
No. 13 P. & W., Lincoln.
No. 4 Becker Vertical.

PLANERS

Morton Portable.
22" x 22" x 6' Gray, one head.
24" x 24" x 6' Cincinnati, one head.
30" x 30" x 12' Cincinnati, two heads.
36" x 36" x 12' Powell, one head, arranged for two.
36" x 36" x 12' Cincinnati, two heads.
36" x 36" x 16' Sellers, one head.
39" x 39" x 12' New Haven, one head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.

SCREW MACHINES

No. 1 Chicago Automatic.
1 3/16" Hartford Automatic.
2" Cleveland Automatic.
2¾" Cleveland Automatic.
1" B. & S. Plain.
16" P. & W. Plain.

PRESSES

No. 30 A. Perkins, O.B., Inc.
No. 6 N. American Can. S.S.
No. 174 Consolidated Double Crank.
No. 25 Toledo, O.B., Inc., Cam Drawing.

MISCELLANEOUS

24" Gisholt Turrett Lathe, capacity 6¼".
Allan 2-spindle drill press (new).
Allan 4-spindle drill press (new).
No. 2 Baker Keyseater.
Whitton Centering Machine.
1½" Acme Bolt Cutter.

Write for our stock list.

The H. A. Stocker Machinery Company,
566-572 W. Randolph St.,
CHICAGO, ILL.

SMALL TOOLS

Delivered at once

Our stocks are very large and made up of different well-known manufacturers' lines in standard sizes, including

CARBON AND HIGH-SPEED TWIST DRILLS, REAMERS, MILLING CUTTERS, TOOL STEEL, AND SPECIAL TOOLS, TAPS, DIES, SCREW PLATES, NEW AND SECOND-HAND MACHINERY.

If you wire us an order at once we will reserve stock subject to confirmation when you receive our prices.

THE CLEVELAND POWER TRANSMISSION CO.
CLEVELAND, OHIO

QUALITY FIRST
DOMINION
MACHINERY CO.
TORONTO

Grasp This Opportunity

Our stock must be cleared in thirty days to make room for our new warehouse. Our Motor prices can't be beaten.

THE FOLLOWING TOOLS FOR SECOND-HAND TOOLS ARE—PAR EXCELLENCE.

1 - 24" Cincinnati Shaper
1—18" Barker Shaper
1—34" Barnes, back-geared drill
1—20" Davies, back-geared drill
1—20" Barnes, wheel and lever feed drill

THE FOLLOWING ARE FOR THIRTY DAYS DELIVERY.

1—9.2 Copper Band Machine
1—6" Cut-off Machine
1—20" Ohio back-geared Shaper

Dominion Machinery Company
Toronto, Ontario, Canada

FACTORY:
14 Darling Avenue

OFFICE:
110 Church Street

FOR SALE BY

The Motch & Merryweather Machinery Co.

707-715 Lakeside Ave. N.W., Cleveland, O.
Branches: Detroit, Cincinnati, Pittsburgh

AUTOMATICS.
2—2" Cleveland Modern.
No. 56 National Acme.
14" Fay Automatic Lathe.
2—No. 2 Brown & Sharpe.

BORING MILLS.
60" Niles Vertical.
2½ Bar 36" Niles Horizontal.
2—No. 2 Baker Cylinder Borer.

DRILL PRESSES.
4' Baush Radial.
24" Cincinnati Sliding Head Upright.
2—Quint Turret Head.
8-Spindle Fox Round Head.

GEAR CUTTERS.
2—No. 3 26" x 8" Brown & Sharpe.
36" Flather.
50" G. E. Spur and Bevel; old.
2—5" Bilgrim.

GRINDERS.
10 x 50 Norton.
14 x 50 Norton.
14 x 72 Norton.
No. 6 Modern Arranged Internal.
No. 6A Bryant Internal.
Springfield Brandis Surface Motor Drive.
No. 12 Gardner Disc.
No. 2 Leland & Faulker Wet Tool.
Polishing and Buffing Stands.

HAMMERS.
2000-pound Chambersburgh Steam.
800-pound Morgan Williams.
36 William White Justice Tire Welder.
500-pound Chambersburgh.

KEYSEATERS.
No. 0 Baker.
2—No. 2 Baker.
No. 3 Mitts & Merrill and equipment.
18" x 1½ Morton.

LATHES.
18" x 8' Davis, 3-step Cone, D.B.G., C.R., Semi-Q.C.
26" x 12' 3-Step Cone, D.B.G., Q.C. Bridgeford Standard Engine.
18" x 12' L. & S., Patent Head.
18" x 10' Bradford.
18" x 8' Hamilton.
13" x 5' American Turret on Shear.
16" x 6' Blaisdell, R.F. Rest.
14" x 6' Fay & Scott; new.
22" x 14" Davenport; new.
Tindei-Morris Crankshaft Lathe.

MILLING MACHINES.
No. 3 Brown & Sharpe Plain.
No. 4 Brown & Sharpe Plain.
No. 2a Becker, Circular Tables.
Pratt & Whitney Spline.
No. 6 Whitney Hand.

PLANERS.
48" x 48" x 12' Hewes-Phillips, 2 H.
24" x 24" x 6' Cincinnati, 1 Rail Head.
24" x 24" x 6' Gray, 1 Rail Head.
26" x 26" x 10' Gray, 1 Rail.

PRESSES.
Long & Alstatter, D. End, 1" Punch.
6" x 6" x 1" Angle Shear.
No. 5 Buffalo Forge Hand Shear.

SCREW MACHINES.
4½" x 36" Bardons & Oliver, M. Drive.
1⅛ Bardons & Oliver, No W.F.
1" Foster Kimbill, No W.F.
⅜ Garvin, No W.F.
1" Warner & Swasey.

TURRET LATHES.
24" Gisholt, 6¼ hole, 1 year old.
24" Gisholt, 5¼ hole, 1 year old.
21" Gisholt, 2⅝ hole, 1 year old.
22" Libby.
36" Pratt & Whitney Flat.
36" J & L.
2" x 24" J. & L. Bar.

TAPPING MACHINES.
7" Baker.
No. 2 Garvin.

MISCELLANEOUS.
Rockford Fly Wheel Balancing Machine.
72" Niagara Folder.

FOR SALE

New Stock Motors

We have following motors, Canadian General Electric Co. make, in Canadian stock for immediate delivery:

1—I-S-10-900-K-550 Volt Motor No. 17328, Rotor 15367, less base and pulley.
1—NR 1612 A-2 Compensator, No. 40117, 10 H.P., V. 60 cycle, 3-phase, 550 volts.
1—K.T. 8-5-900 C 550 V. Motor, No. 18959, rotor 16674, less base with pulley 8 x 5.
2—M.T.C. 5200 5 H.P. 900-500 Volt 60 cycle A.C. 3phase induction Motor No. 159816, with controller and Cat. 74789 C.R. 198 rheostat.
2—S-A-1-18-2-½ Ds Solenoid Brakes mounted on above motors.
1—M.T.C. 5200, 5 H.P., 900-500 volt, 60 cycle, A.C., induction motor No. 672456, with controller and Cat. 74789 C.R. 198 rheostat.
1—M.T.C., 5200, 5 H.P., 900-500 60 cycle, A.C., induction motor No. 670340, with controller and Cat. 74789 C.R. 198 rheostat.

If interested, address The Dominion Foundry Supply Co., Ltd., Montreal, P.Q., or Toronto, Ont., or write direct to

Whiting Foundry Equipment Company

HARVEY, ILL., U.S.A.

Immediate Delivery

NEW STEAM ENGINES

Two 5 x 6 Vertical steam engines, 8 horse	**$105.00**	**each**
Two 6 x 6 Vertical steam engines, 10 horse	**125.00**	"
One 7 x 8 Vertical steam engine, 15 horse	**175.00**	
One 8 x 8 Vertical steam engine, 20 horse	**200.00**	
Two 4 x 6 Horizontal steam engines, 6 horse, with base	**100.00**	"
One 5 x 6 Horizontal steam engine, 8 horse, with base	**125.00**	
Five 6 x 6 Horizontal steam engines, 10 horse, with base	**135.00**	"
Five 6 stroke engines, with base, 10-15 H.P.	**150.00**	"
Two 6 x 6 Automatic, with base, 12-20 H.P.	**250.00**	"
Two 7 x 6 Automatics, with base, 15-25 H.P.	**275.00**	"
One 8 x 8 Automatic, with base, 20-42 H.P.	**500.00**	
One 10 x 10 Automatic, with base, 39-82 H.P.	**700.00**	
One 11 x 10 Automatic, with base, 47-85 H.P.	**725.00**	

YOUNG, CORLEY & DOLAN, Inc.

115 Broadway, NEW YORK CITY
Telephone: Rector 7866

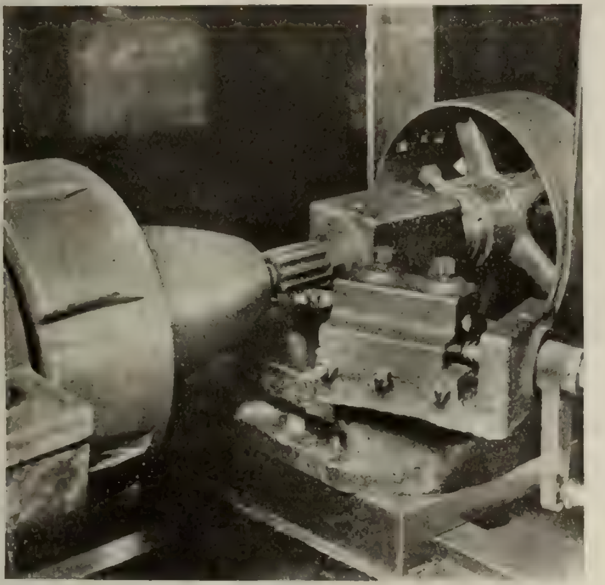
(tf)

4.5 Mark VII Plant For Sale

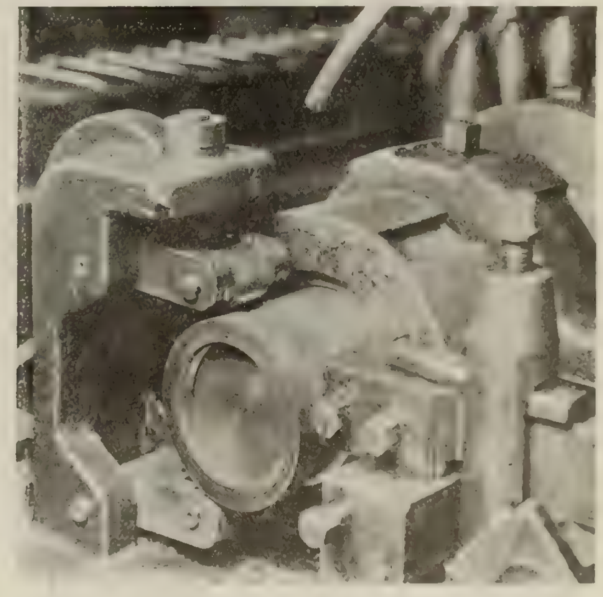
Immediate Delivery

The following machines have been changed from the mark V shell to the mark VII. We will dispose of these machines with their tooling. Every machine has been examined and put into first-class shape.

2—30" American Turret Lathes, Triple Geared; 36" turret base; will take both 3" and 4" boring bars; extension heads on turrets; special small turret or cross-slide with six 1½" holes; 20" 3 jaw Universal steel chucks; Power Feed and Power Reverse. All tooled, boring bars, pot chuck, etc., each	$1300
2—24" Morse Turret Lathes; with 3-jaw Universal chuck; 16" base turret having six 3" holes. All tooled, with pot chuck, for hogging-out base of Mark VII. shell, each	$800
1—Jenckes Band Turning Machine; collet chuck. This machine has band-turned about 15,000 shells. All tooled for Mark VII. shells	$900
1—24" x 12 Bertram Engine Lathe, all tooled with special milling fixture for threading the base recess of Mark VII. shell	$900
1—24" Morse Special Turret Lathe; carriage feed; all tooled with pot chuck and forming tool for finish base recess of Mark VII. shell, each	$900
1—Special Painting Machine, with 110 volt alternating current motor	$50
1—150-ton Hydraulic Nosing Outfit, consisting of 1 Triple Action Pump (Perrin); 1 Accumulator (Perrin); 1 Nosing Press (Perrin), with Mark VII. die complete; 1 Chapman Banding Attachment for Press	$1075



The only correct time to perform the seating operation is to do it in the same fixture with the milling operation This fixture will fit any engine lathes, and costs only $120.00, including milling, cutter and seating tool. The angle of seating can never vary.



Most of the British Shells may now be knurled. This fixture is quick in operation and most accurate. The cost is only $100.00, and it can be used as an attachment to almost any lathe.

We have all gauges for both Mark V and Mark VII Shells, consisting of plug, length, outside diameter, form, thread and seating gauges.

Our Nosing Die Outfit is the best for the Mark VII shell. Leading manufacturers, such as P. L. Robertson Co., Milton; Wilford & Co., Lindsay; Manitoba Engines, Ltd., Brandon; Canadian Westinghouse, Hamilton; Vancouver Engineering Works; Vulcan Iron Works; Otis Fenson Elevator, etc., are using our dies.

Toronto Type Foundry Company, Limited

50 Coleman Avenue, TORONTO, ONT.

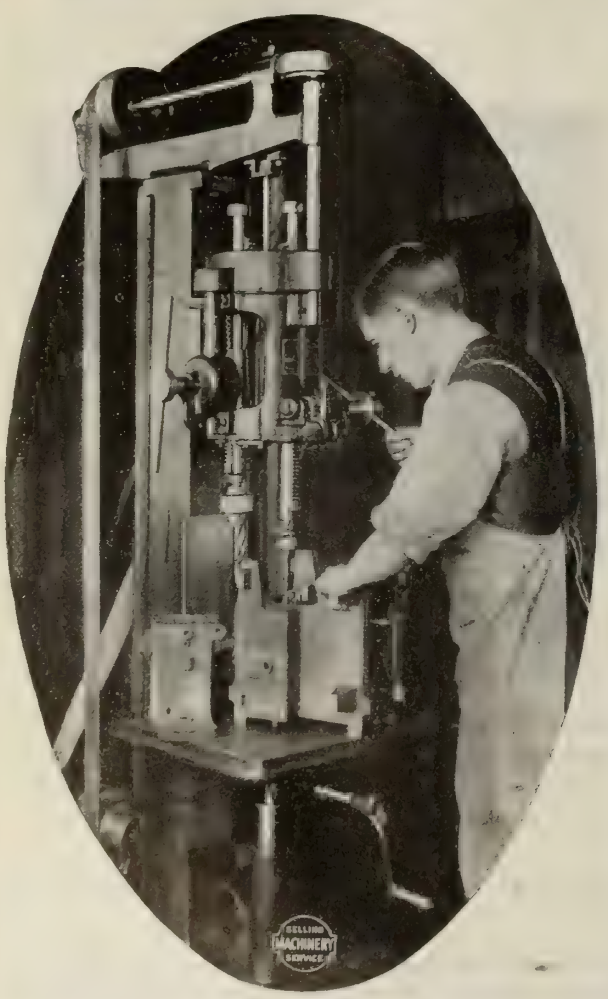
THE TURNER TURRET

is very profitable even on short run work

A Turner Turret is profitable on runs of work shorter than most machines can be set up for **because the tooling is simple and easily applied.**

The Turner Turret is a machine of practical design, rigid construction and wide adaptability—a machine that cuts operating time to closest limits, turns out accurate work and does not require a skilled operator.

Mail us your blue prints and let us give you estimates on the Turner Turret—the machine of "Drill Press Simplicity—Turret Lathe Output."



Turner Machine Co.

DANBURY, CONN. and Newark, N.J. U.S.A.

Incorporated with Turner, Atherton & Co., Ltd.,
Denton, Manchester and Stockport, England

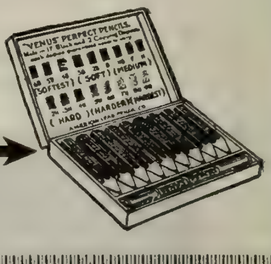
For Engineering Men Especially

VENUS 10¢ PENCIL

NO group of men demands more of a pencil than does the engineering profession. For very fine lines a very hard pencil is wanted; for blacking in, the very softest—and between these two extremes there are many gradations for which a special hardness is desirable. That is why Venus pencils are made in 17 degrees from 6B softest to 9H hardest. These with the hard and medium copying, will do whatever you want a pencil to do, and will do it perfectly. Look for the distinctive Venus water mark finish.

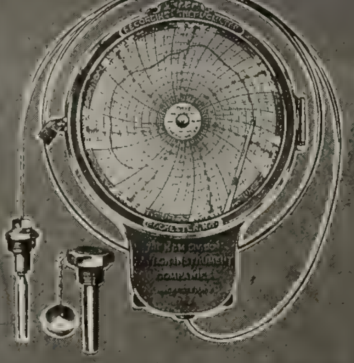
FREE To technical users writing on their business letterhead a box of Venus drawing and copying pencils and a Venus Eraser will be sent free.

Write to-day for yours.



American Lead Pencil Co.
238 Fifth Ave., New York
and Clapton, London, England

The Recording Thermometer



Past
Present
Future

A Catalog Cheerfully Sent Upon Application

The H&M Division
Taylor Instrument Companies
Rochester, N.Y.

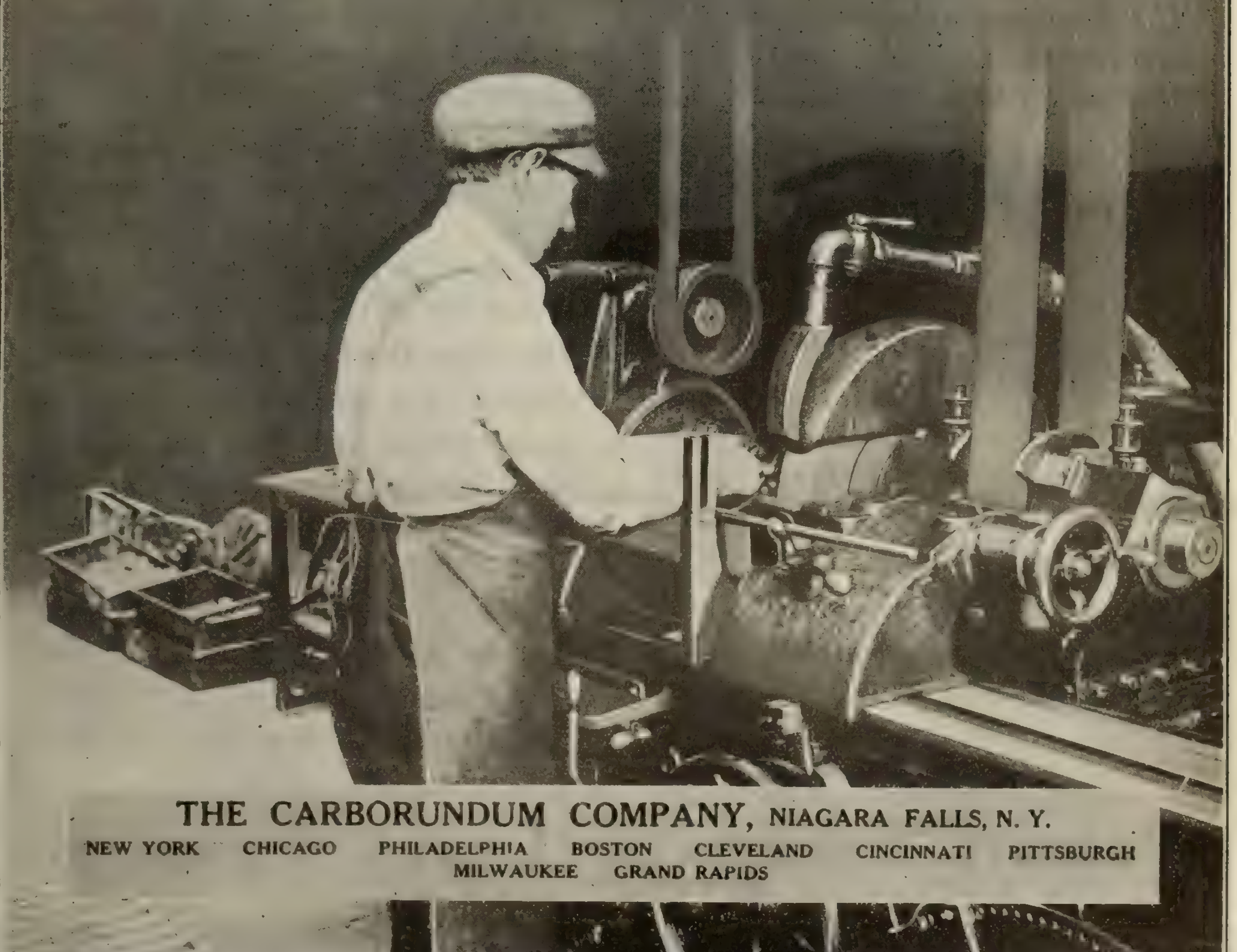
The Grinding Wheel that Pays Dividends

THE logical grinding wheel to use on any grinding job is the wheel that pays dividends—dividends in the added amount of work it produces—the time it saves; in the reduction of wheel loss and in the saving of labor.

HERE IS AN ALOXITE WHEEL THAT SURELY IS PAYING

It is roughing and finishing the shanks of machinery steel gears in a Cincinnati plant, removing .012 in roughing and .001 in finishing.
The wheel cuts clean and fast—requires but little dressing—gives a splendid uniform finish and has broken all shop production records for this job.

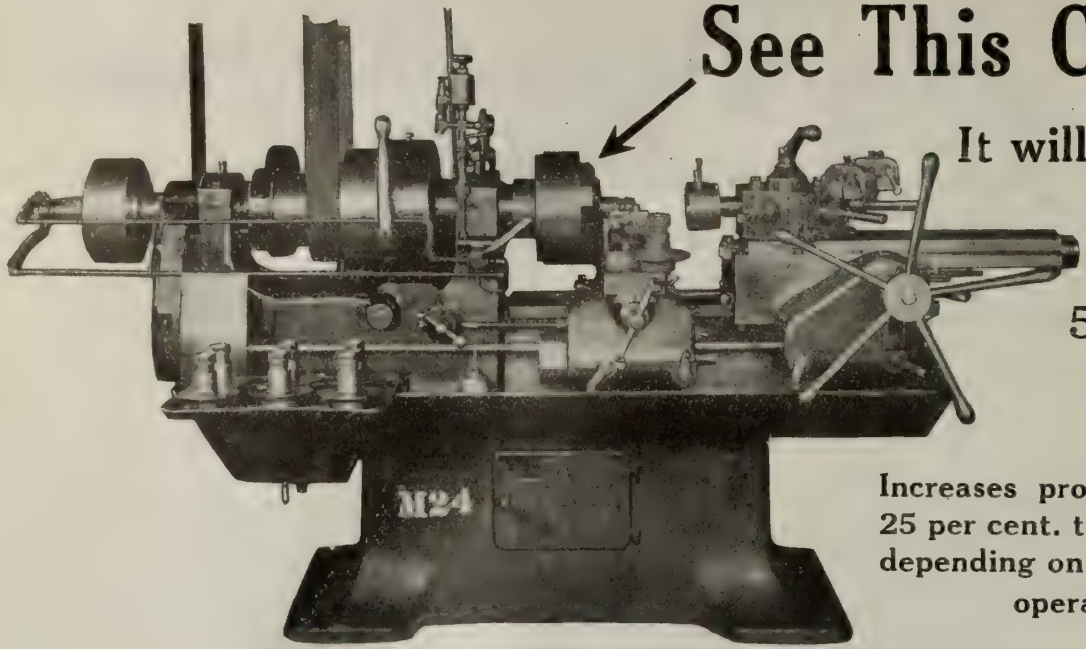
Its the Right Wheel in the Right Place—just the sort of paying wheel we can give you for any grinding work.



THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.
NEW YORK CHICAGO PHILADELPHIA BOSTON CLEVELAND CINCINNATI PITTSBURGH
MILWAUKEE GRAND RAPIDS

See This Chuck!

It will Chuck a Piece of Work in 5 Seconds



Increases production from 25 per cent. to 50 per cent. depending on the length of operation.

Are you making Shells, Shrapnel, Fuses or Piston Rings?

If you are, get in touch with us. We want to lay a cost-cutting plan before you. We want to prove to you that

Detroit Pneumatic Chucks

will chuck a piece of work in five seconds. THIS is just about fifty-five seconds quicker than it can be chucked by hand.

The shorter the operation, the more chucking and the greater the saving with DETROIT "AIRGRIP" CHUCKS.

They fit all hollow spindles and are made entirely of steel. Gripping power is adjustable.

Made in two-jaw and three-jaw types. All sizes from 6" to 18" diameter.

Our Chucks are made entirely of steel; our workmanship is of the very highest grade; our air cylinder is a decided improvement over anything else on the market, as packing on piston is adjusted automatically.

We are just completing a new factory which will be the largest and best equipped plant in the United States for the exclusive manufacture of pneumatic chucks.

We have some open territory and will be glad to hear from good, live agents.

"We can chuck parts of any kind"

Detroit Pneumatic Chuck Company

DETROIT, MICH.

THE
NATIONAL
ELECTRIC WELDER CO.
WARREN, OHIO

The
National
Electric Spot Welder

DO YOU

Want to Save Your High Speed Steel Bit Ends?

Figure out how much you *lose* in a year through the high-speed steel scrap pile.

Imagine how much you could *save* if you could use the bit ends up instead

AND YOU CAN

by means of a "National" Electric Spot Welder. Hundreds of other manufacturers are doing it—cheating the scrap pile every day.

Want to know HOW?

We want to show you.

Only cost you a stamp and a few minutes time to get the data.

Want to Reduce Production Costs?

That's the eternal problem with modern manufacturers—especially just now with raw material prices sky-high and still soaring.

If you use rivets or solder in assembling your product,

YOU CAN DO IT

by spot welding the joints with a "National" Electric Spot Welder instead of riveting or soldering them.

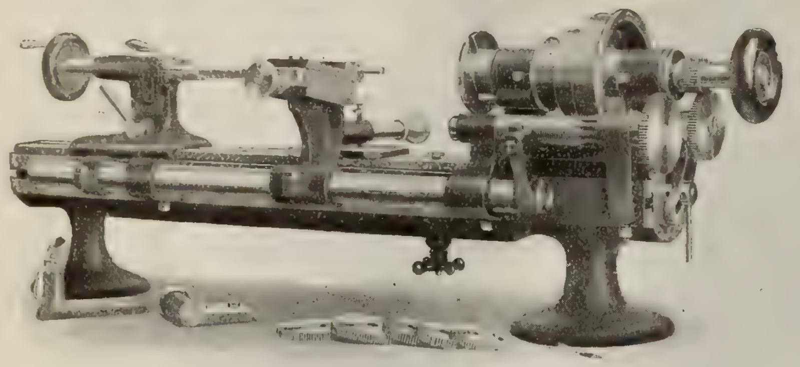
It's CHEAPER, QUICKER, BETTER.

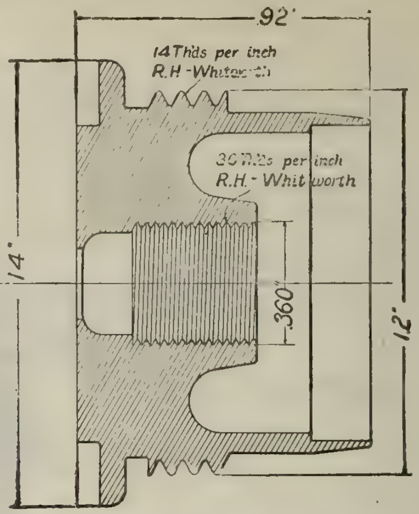
The same stamp will bring you the information you require on this also.

NATIONAL ELECTRIC WELDER COMPANY

WARREN, OHIO, U.S.A.

THE CATARACT BENCH LATHE WITH CHASING ATTACHMENTS





We have sold many of our lathes to Canadian concerns who are eminently satisfied with results. Will you be next?

For work requiring greatest accuracy and rapidity, THE HARDINGE CATARACT BENCH LATHE will not disappoint you. Machine equipped with Automatic Chuck Closer for rapid operation of chuck, and with chasing bar arranged with multiple point, chasing tool is producing from ten to twelve hundred 14-pitch Whitworth threads on primers in TEN HOURS. Prompt deliveries. Catalogue No. 15 is ready to mail TO YOU. You are invited to write for it to-day.

HARDINGE BROTHERS, Inc., 1770 Bertau Ave., CHICAGO, U.S.A.

A Wonderful Combination in Riveting

Speed—

One rivet per second.

Uniformity—

Each rivet headed with same degree of tightness or looseness as desired.

Finish—

Perfectly formed rivet heads, highly polished surface. No hammer or tool marks shown.

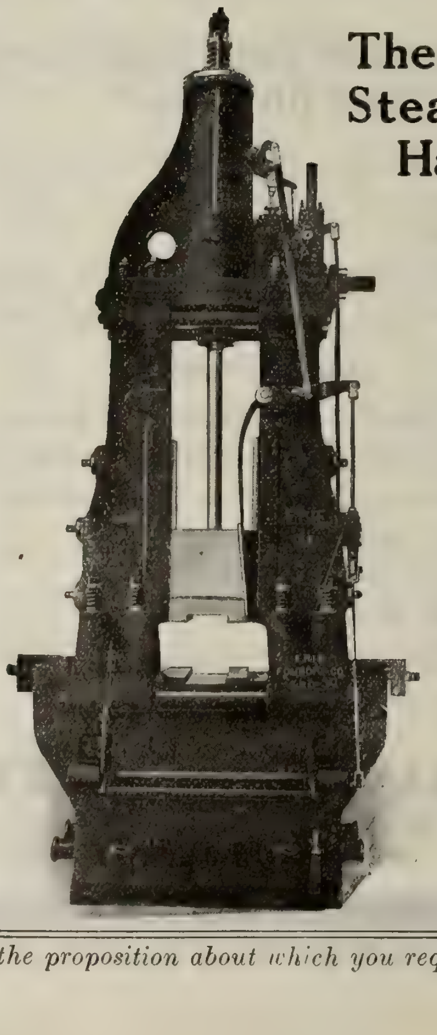
Grant Noiseless Rivet Spinning Machines are the only machines built that will accomplish the above.

Catalog ?

The Grant Mfg. & Machine Co.

Holland Ave.
Bridgeport, Conn.

The "ERIE" Steam Drop Hammer



is the last word in Hammer construction. Ask any user.

A list will be supplied upon request.

We also build Trimming Presses.

Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

Erie Foundry Co.

ERIE, PA.

Mention this paper when writing advertisers. It will identify the proposition about which you require information.

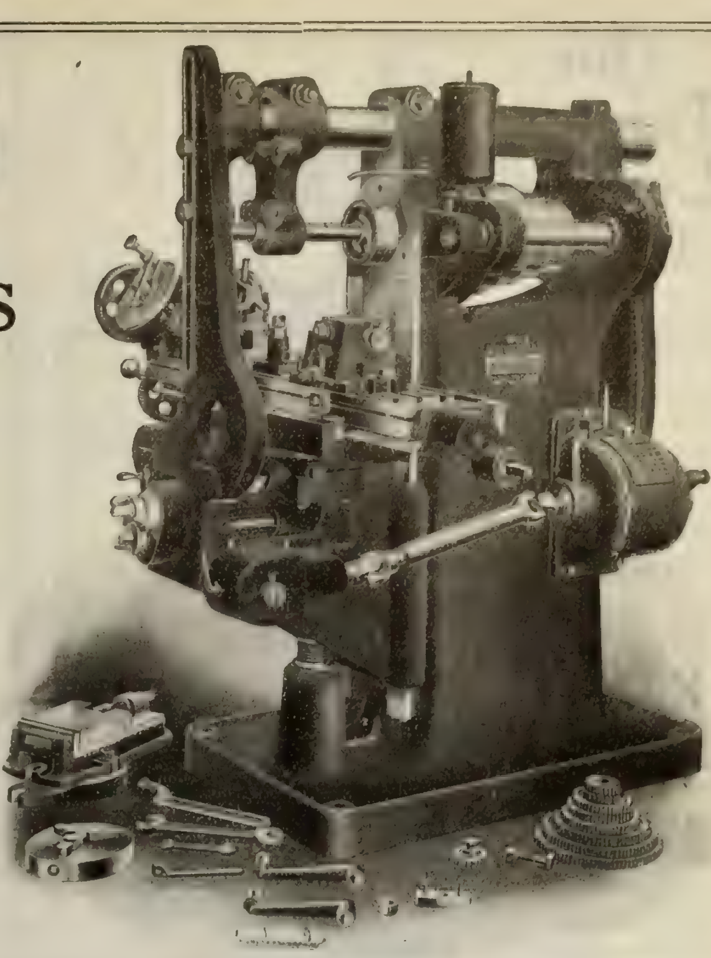
KEMPSMITH

UNIVERSAL MILLING MACHINES

When installing a Universal Milling Machine for tool room work, one of the prime considerations is simplicity of machine and convenience of operation.

Kempsmith Milling Machines are notable leaders in these two requirements. Note especially that all feeds are reversed by one lever at the front of the knee. Likewise all power feeds are tripped and engaged by one compound lever, also located at the extreme front of the knee. The swiveling table is clamped rigidly at any angle by a quarter-turn of a single bolt.

Our catalogue illustrates and describes more fully the feature mentioned. A copy will be gladly sent on request.

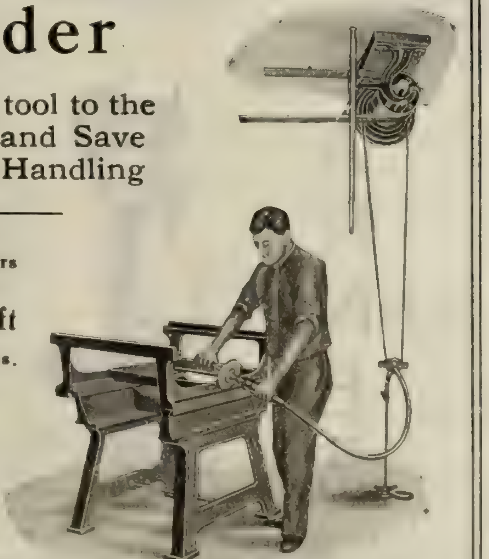


Kempsmith Manufacturing Co.
MILWAUKEE, U. S. A.

Agents:—Foss & Hill Machinery Co., Montreal
General Supply Company, Toronto and Ottawa
Western Supply and Equipment Co., Calgary

Portable Emery Grinder

Take the tool to the Work and Save Heavy Handling



We are inventors of the
Flexible Shaft
For all Purposes.

The oldest and largest manufacturers in the world.

CAN FURNISH MOTOR DRIVEN WHEN DESIRED

Write Us for Catalogue and Prices.

STOW MFG. CO. BINGHAMTON NEW YORK

Established 1875

Oldest Portable Tool Manufacturers in America.

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85 Queen Victoria St., LONDON, ENG.

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New Pistol Grip Chipping Calking and Flue Beading Hammers

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This Tapper Lowers Costs

Our claim is that the

R. & S. Tapping Machine

is the speediest and most sensitive tapper built. This claim is based on a knowledge of what other tappers do.

If our claim is borne out by the testimony of its users and by the performance of the Machine itself, there is sound reason why you should at least investigate the R. & S. Tapping Machine.

Our Catalogue will give you fuller particulars. Send for it.

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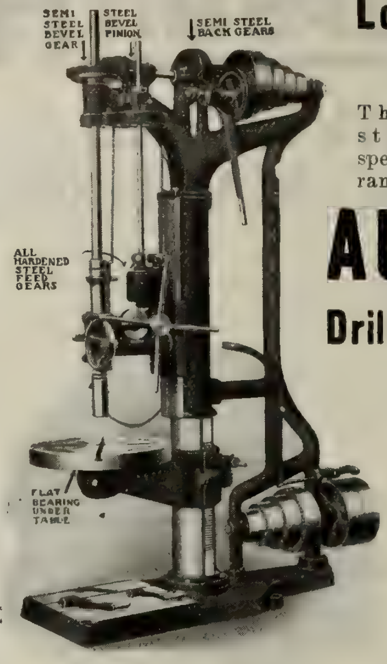

There is unusual strength, accuracy, speed, convenience and range in

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You can use them to great advantage on **HIGH EXPLOSIVE SHELLS** or any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

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The Aurora Tool Works, Aurora, Indiana

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Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

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Equipped for Various Operations on Shells and READY TO USE

DESIGNED AND BUILT FOR HEAVY
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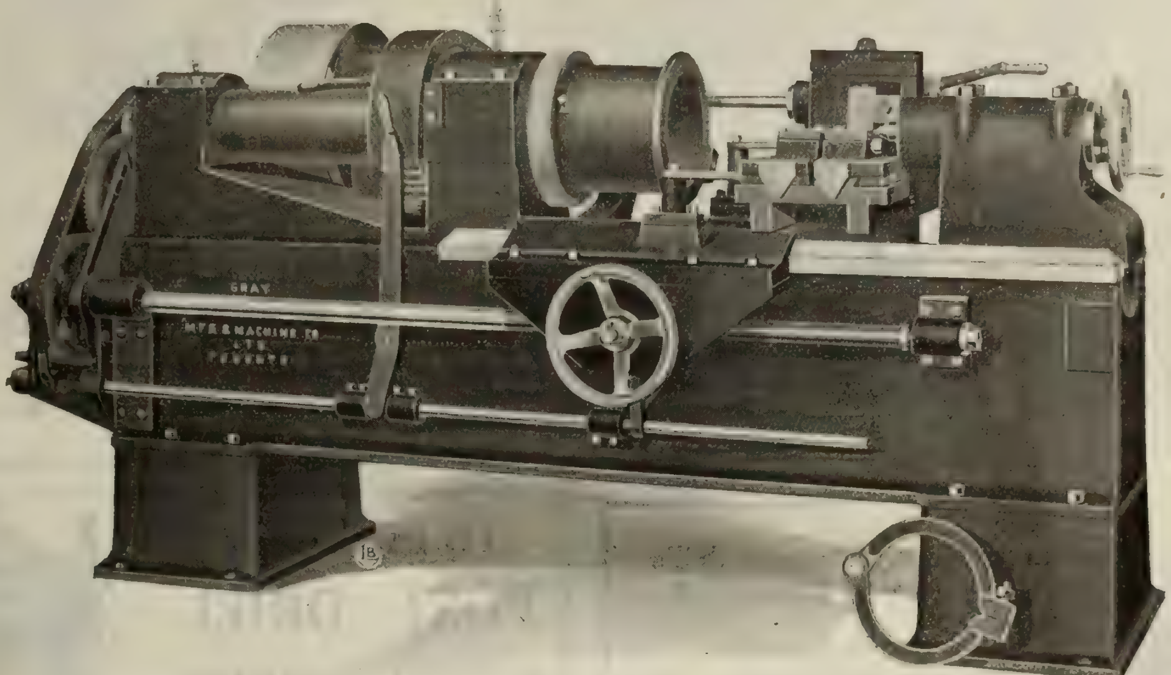

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For all size shells from 4.5-in. to 12-in.

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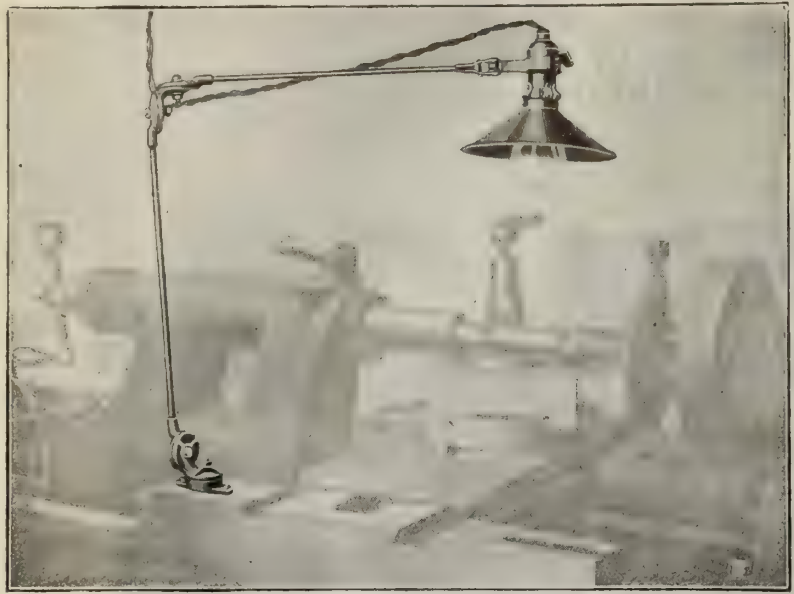
Just a slight push or pull puts the light where you want it, when you want it.

Any workman will do more and better work if his light is always in just the right place and under instant control.



The Searchlight Bracket

will pay for itself many times over in one season. The period of short days is approaching. Many shops are working night and day the whole year through. The cost is trifling compared with results. Only $1.50 each, with big discount, according to quantity.

Write now for samples and let us show you how your whole factory could be equipped at a big saving to you. Any quantity sent on 30 days' trial to any responsible concern. You can't possibly lose, and **You Might Win!**

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You can drive high speed drills up to 2½" diameter

with the new box-column type

Heavy Duty "Rockford"

Drilling Machine

This Rockford machine tool meets the most exacting requirements.

It is **STRONG, RIGID, ACCURATE AND FAST,** with individual features. Built in three styles.

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Rockford Machines Cut Costs.

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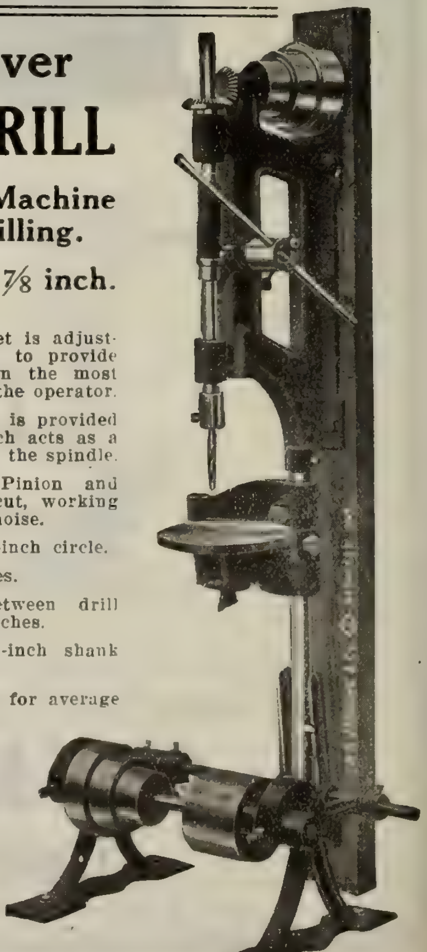
16 in. Lever POST DRILL

A Giant Little Machine For Light Drilling.

Will drill up to ⅞ inch.



The Feed Lever Socket is adjustable on the feed shaft, to provide for setting the lever in the most convenient position for the operator.

An adjustable friction is provided for the feed shaft, which acts as a balance to the weight of the spindle.

Bevel Gears, Feed Pinion and Rack are all machine cut, working smoothly and without noise.

Drills to centre of 16-inch circle.

Run of feed 5¼ inches.

Greatest distance between drill spindle and table, 22 inches.

Spindle bored for ½-inch shank twist drills.

Speed of countershaft for average work, 300 per minute.

A. B. Jardine & Co.
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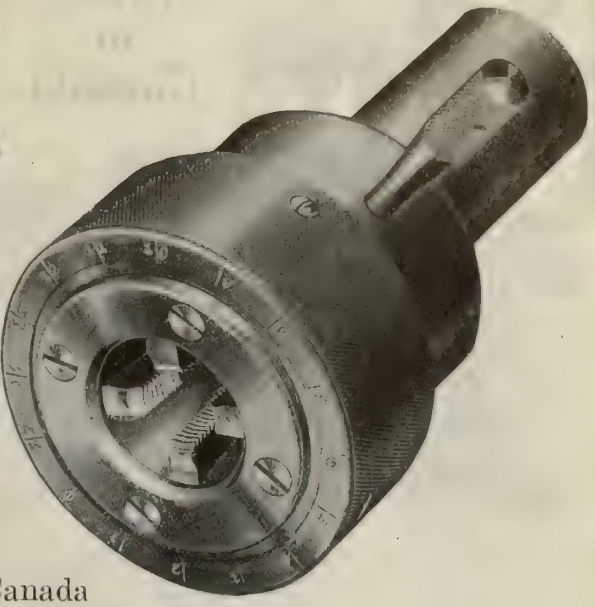
They're All Using Murchey Tools



Practically all the largest makers of shells in Canada and the United States are using Murchey Taps and Dies. They have certainly made a hit throughout this country, and judging from present orders their popularity doesn't seem to be diminishing.

The superiority of the **Murchey** design has been a big factor in building up the success of **Murchey Tools** in the plants of shell makers.

And consider this—

Re-chucking is eliminated, thus doing away with all chance of the work getting off-center.

Use **Murchey Tools** and you can get "A1" results without tying up capital and floor space in expensive machinery. Let Murchey Collapsing Taps and Automatic Dies stand between you and increased power, heavy upkeep and depreciation.

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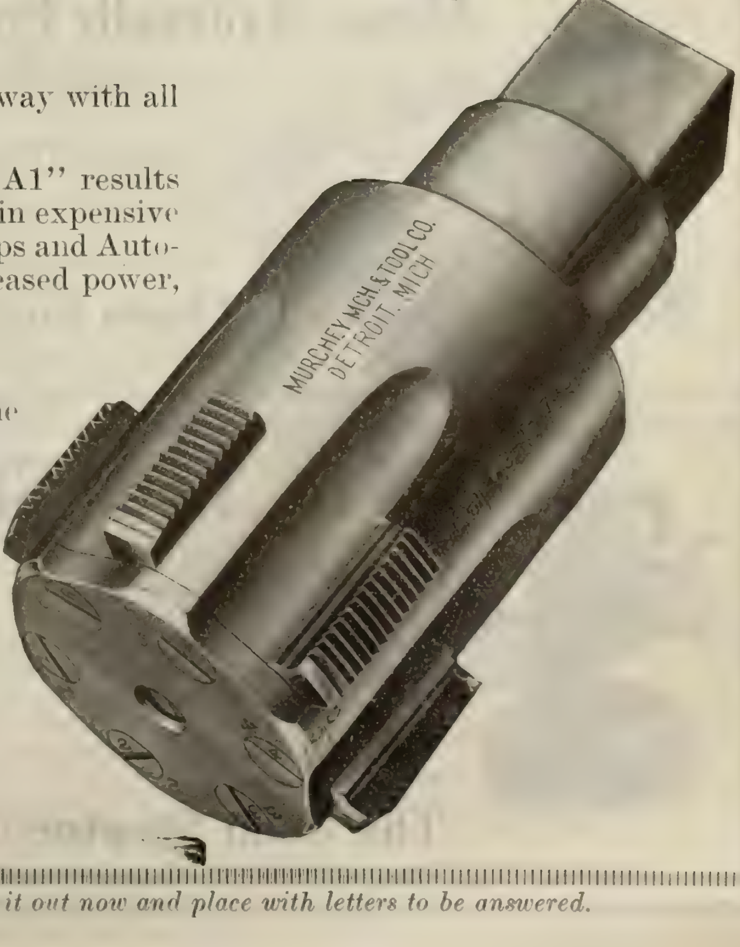
**Murchey
Six-Chaser
Hand Sizing
Tap**



Murchey Machine & Tool Company

75 Porter St., Detroit, Mich.

The Coats Machine Tool Company Caxton House, Westminster, London, S.W., England, Glasgow, Newcastle-on-Tyne, and Fenwick Freres & Company, 15 Rue Fenelon, Paris, France.

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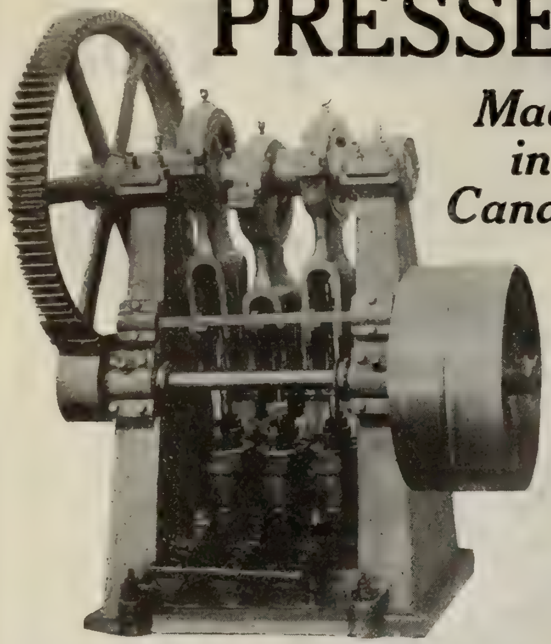

Hydraulic Presses, Pumps and Accumulators for all purposes.

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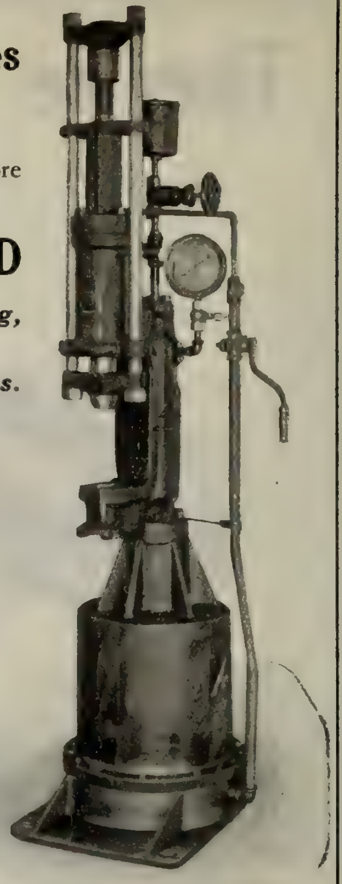
No tool in your shop is more efficient than this

METALWOOD

Combination Forcing, Broaching and Straightening Press.



It is one of the handiest of shop tools for all work such as pressing in bushings, broaching, and the straightening of small shapes. Auxiliary tables and fixtures not shown in illustration. Once installed, a multitude of special uses for the machine keep suggesting themselves and its speed makes it a **great producer.**

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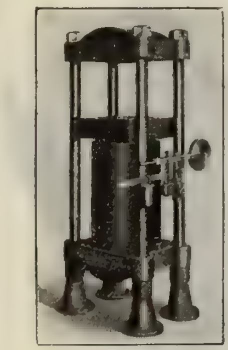

Elmes Hydraulic Press No. 676

With ¾-in. Automatic Lever Operating Valve No. 677-A

This press is of steel and semi-steel construction, and the stands which support the press are threaded at the ends to receive the steel columns and have holes for fastening to the floor. The platen is guided by the columns.

The operating valve is attached to the cylinder, and is designed with a weight to be set for the pressure desired, and releases automatically. To start the ram up, the lever is pushed down; upon the ram reaching the desired pressure, the lever automatically releases (acting as a safety valve as well), causing the ram to descend. Valve body is made of bronze, and other parts are made of tool steel and machine steel. If desired a hydraulic gauge can be attached to show the various pressures, although with this valve it is not necessary.

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Over 50 years' experience building hydraulic machinery.

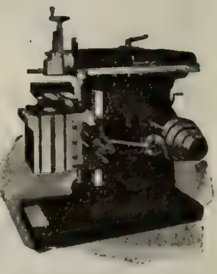
Cut Your Shop Costs

Nobody would think of putting 16-inch lathe work on a 30-inch lathe, then why leave small parts on a large Milling Machine?

A Steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

That same principle applied to your small planer work will cut the cost of planer work.

A Steptoe Shaper will do the work faster because it can be handled quicker.



The John Steptoe Company, CUMMINSVILLE
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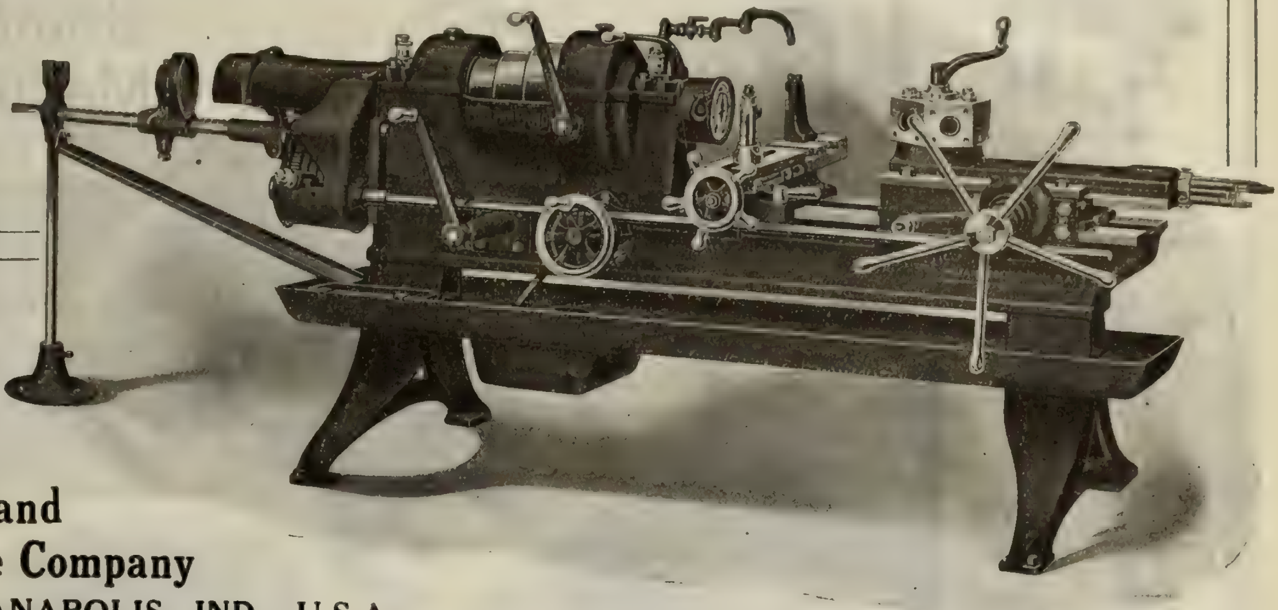
Millholland 1⅝x10 Turret Screw Machine

The combined result of two generations of engineering and mechanical experience. While, as a whole, it is no radical departure from established lines of the turret lathe, it has many original features, and with these features are combined well-known devices.

Safety, rigidity, convenience, production and durability are the ideas behind every step in their construction.

Your request will get you full details and specifications by early mail. Make it.



W. K.
Millholland
Machine Company
INDIANAPOLIS, IND., U.S.A.

Air-Operated Arbor Press

Increases Production 20 to 100%

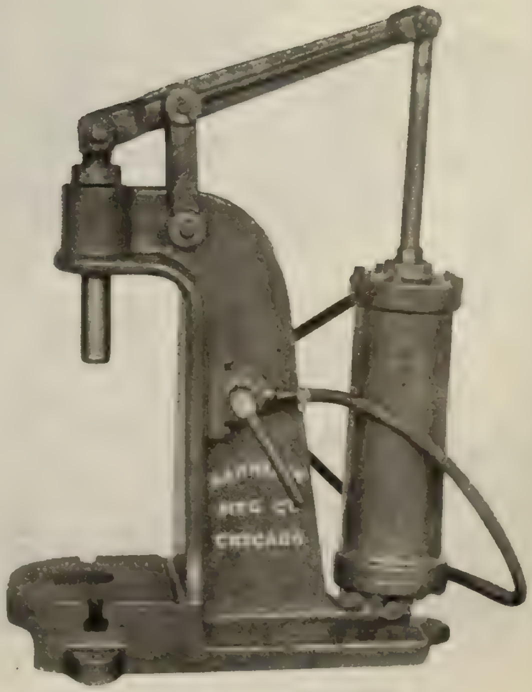
This Hannifin air-operated arbor press is designed to eliminate the slow and tiresome operation of a hand-operated arbor press.

With the air-operated arbor press, arbors and bushings can be pressed into place with one stroke, and no exertion is required of the operator.

The downward or pressing stroke of this press is an even, steady movement, and the upward stroke is a fast stroke, making the time of the complete operation a minimum.

The air-operated arbor press is constructed of the highest quality of workmanship and material and is of a durable and simple construction.

The arbor is provided with a stop collar which enables the setting of the downward stroke to a definite stop, so that duplicate operations can be performed without attention being given to the position of the arbor or bushing being pressed into position.



The above press is made in two sizes.

The power developed in No. 1 is 7,900 pounds at 80 pounds air pressure, and No. 2 developing 12,000 pounds at 80 pounds air pressure.

Send for complete specifications.

J. R. Stone Tool & Supply Co.
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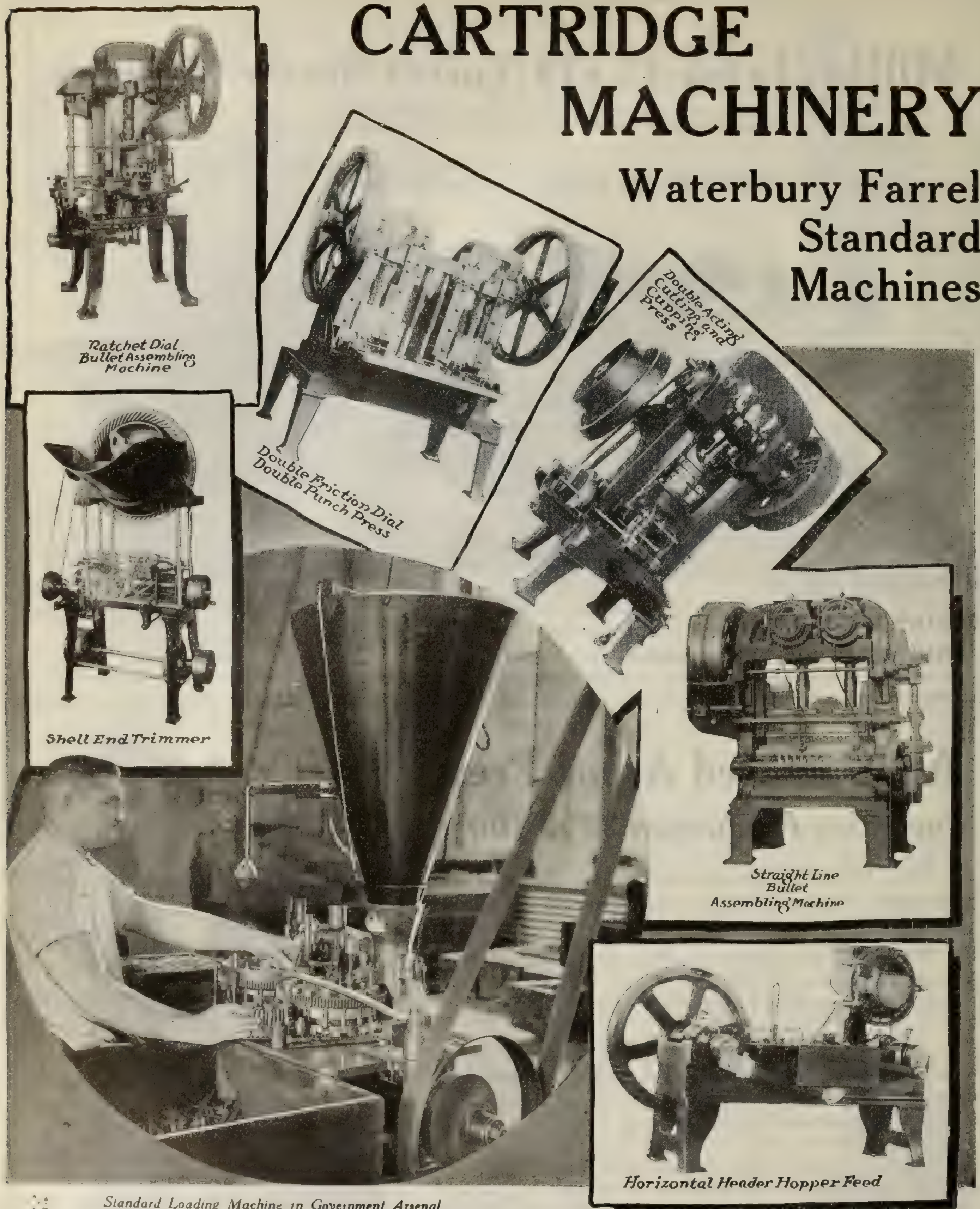
CARTRIDGE MACHINERY

Waterbury Farrel Standard Machines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Straight Line Bullet Assembling Machine
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Standard Loading Machine in Government Arsenal

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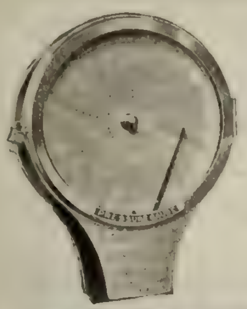

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WITH
Absolutely Accurate Automatic Feed

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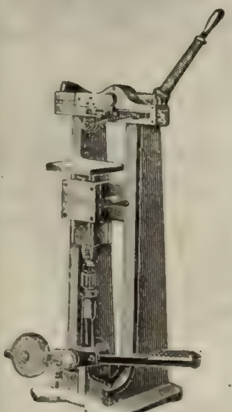

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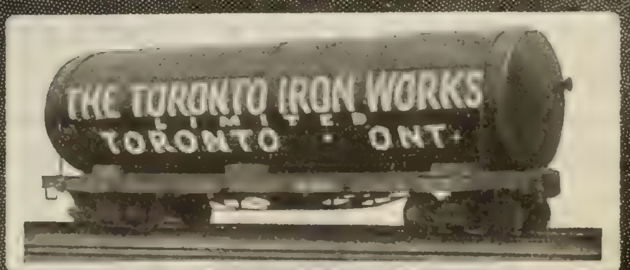

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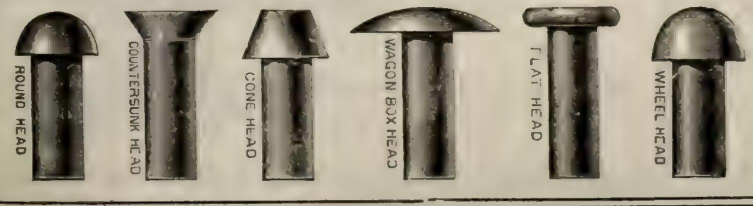

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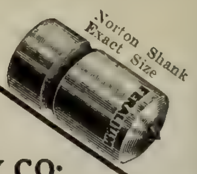

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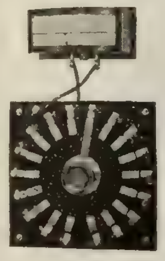

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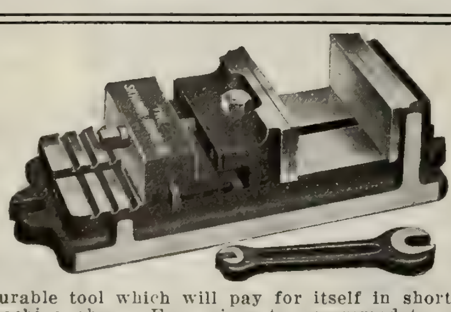

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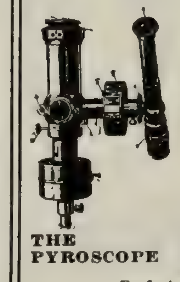

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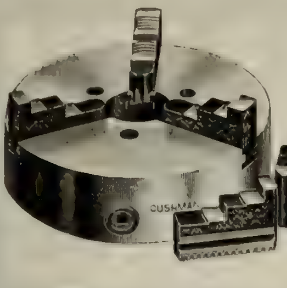

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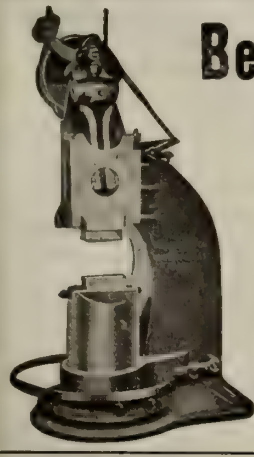

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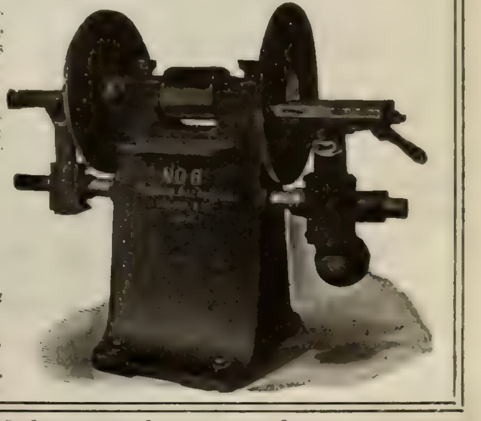

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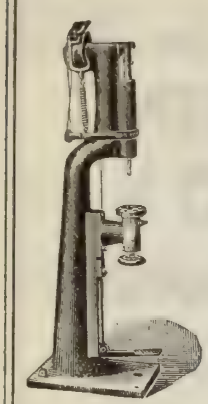

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VERY POWERFUL, **RIGID AND ACCURATE.**
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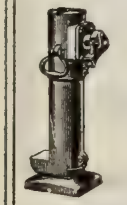

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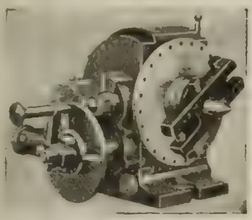
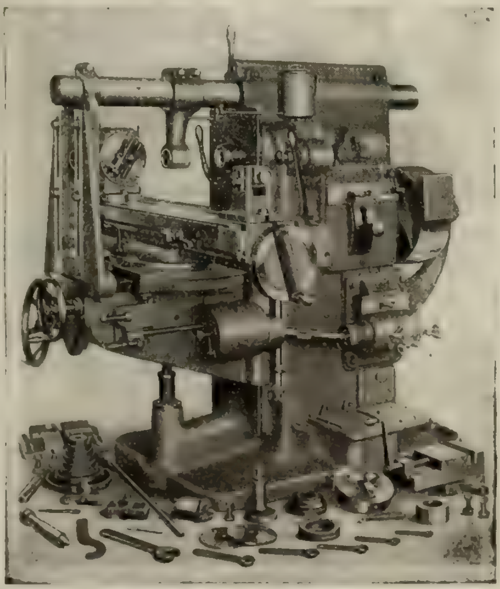
A Hardened and Ground Worm in Every B. & S. Spiral Head



After being carefully cut, the indexing worm on our Spiral Heads for Universal Milling Machines is hardened to insure maintenance of the original accuracy. The teeth are then ground true to pitch and form on special precision machinery, eliminating all errors due to hardening. After this the assembled head is put through a very sensitive test, proving that it indexes exactly enough for the most delicate work.

So much for accuracy and reliability; in addition, the construction is strong and rigid. The graduated index sector allows the arms to be set to include any number of holes without counting. Also the index pin can be moved to the nearest hole without disturbing the work or the work adjusted without moving the pin, for the crank has radial and circumferential adjustment. These points are all important, for over 70 per cent. of universal milling depends for success on the Spiral Head.

B. & S. Universal Milling Machines, on which these Spiral Heads are furnished, combine the power and ruggedness required for manufacturing, with the accuracy and handiness necessary on tool work. You will find them doing well the fine, jeweler's tool work and manufacturing in the big engine and machine tool shops, for the range of sizes covers all requirements. If you have work for a Universal Milling Machine we have an efficient machine that will just fit the job.



Brown & Sharpe Mfg. Co.

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Canadian Agents: The Canadian Fairbanks-Morse Co., Limited, Toronto, Montreal, Winnipeg, Calgary, Vancouver, St. John, Saskatoon

THE FAMOUS FIVE

ON ACTIVE SERVICE

One or other of the "Famous Five" Files will be found on the benches in nearly every workshop in Canada. The machine shop man likes them for their balance and cutting qualities.

The carpenter chooses them for the same reasons.

The blacksmith prefers them for their rugged strength.

Sixty millions of them are made and used every year.

And they always give satisfaction. Specify them when ordering.

The "Famous Five" are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE
(MADE IN CANADA)

The Nicholson File Company

Dealers Everywhere

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Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
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H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
A. R. Williams Machinery Co., Toronto.

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Canada Machinery Corporation, Galt, Ont.

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Canada Machinery Corporation, Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
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Rockford Drilling Mach. Co., Rockford, Ill.

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Dominion Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
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Turner Machine Co., Danbury, Conn.

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Foss & Hill Machy. Co., Montreal.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
R. E. T. Pringle, Ltd., Toronto, Ont.

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John Bertram & Sons Co., Dundas.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rockford Driling Mach. Co., Rockford, Ill.
A. R. Williams Machy. Co., Toronto.

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Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.

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W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.

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Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy. Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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Aikenhead Hardware Co., Toronto, Ont.
Celfor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
L. S. Starrett Co., Athol, Mass.

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Cleveland Pneumatic Tool Co. of Canada, Toronto

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Can. Blower & Forge Co., Kitchener, Ont.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Lachapelle, J. D., & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.
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United States Electrical Tool Co., Cincinnati, O.
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DRILLS, HIGH SPEED
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Cleveland Twist Drill Co., Cleveland.
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Foss & Hill Machy. Co., Montreal.
Morse Twist Drill & Machine Co., New Bedford.
W. F. & John Barnes Co., Rockford, Ill.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, MULTIPLE SPINDLE
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.

DRILLS, PNEUMATIC
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Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York.
R. E. T. Pringle, Ltd., Toronto, Ont.

DRILLS, RATCHET AND HAND
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Armstrong Bros. Tool Co., Chicago.
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy Co., Montreal.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy Co., Montreal.
Morse Twist Drill and Machine Co., New Bedford

DRILLS, TWIST
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Armstrong, Whitworth of Canada, Ltd., Montreal.
Boker & Co., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Celfor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill and Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

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Sheldons, Ltd., Galt, Ont.
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Can. Matthews Gravity Carrier Co., Toronto, Ont.

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Ford-Smith Mach. Co., Hamilton, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.

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Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Norton Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

ENGINES, BALANCED VALVE
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Plessisville Foundry Co., Plessisville, Que.

ENGINES, GAS AND GASOLINE
Can. Fairbanks-Morse Co., Montreal.
Lachapelle, J. D., & Co., Montreal, Que.
H. W. Petrie, Toronto.

ENGINES, HORIZONTAL AND VERTICAL
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H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
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Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.
Sheldons, Ltd., Galt, Ont.
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FILES
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Delta File Works, Philadelphia, Pa.
Nicholson File Co., Port Hope, Ont.

FIRE ESCAPES
Canada Wire & Iron Goods Co., Hamilton, Ont
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FISH PLATES
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Stow Mfg. Co., Binghamton, N.Y.

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Sheldons, Limited, Galt, Ont.

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Canadian Billings & Spencer, Ltd., Welland
Cumming & Son, J. W., New Glasgow, Canada.
Dom. Forge & Stpg. Co., Walkerville, Ont.
Hammond Steel & Forging Co., Syracuse, N.Y.
McKay, James Co., Pittsburgh, Pa.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
J. H. Williams & Co., Brooklyn, N.Y.

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Hammond Steel & Forging Co., Syracuse, N.Y.

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Bliss, E. W., Co., Brooklyn, N.Y.
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Positive Clutch & Pulley Works, Toronto.

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Lachapelle, J. D., & Co., Montreal, Que.
Northern Crane Works, Ltd., Walkerville, Ont
Whiting Foundry Equipment Co., Harvey Ill.

FURNACES, BLAST
Toronto Iron Works, Ltd., Toronto.

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CLEVELAND DRILLS

"Don't Scrap This Drill"

Just because its tang is twisted off is no reason for scrapping it. In the tool room you'll find a

PERFECT DOUBLE TANG SOCKET

You'll be interested in Catalog 358

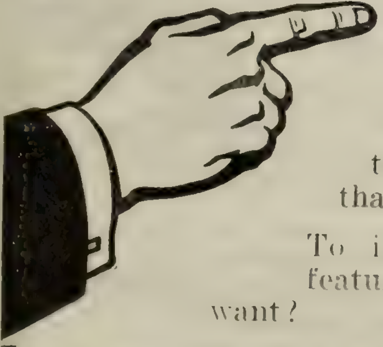
Get it. Grind a new tang on the drill—just below the old one—and slip it into the "Perfect Double Tang" socket. You'll have this drill back on the job in three minutes, and it will be 25 to 60 percent stronger than before.

The "Perfect Double Tang" socket gets full drilling life from every drill regardless of the life of the original tang, and it eliminates the waste incident to broken and twisted tangs.

It's in one piece—simple, inexpensive and fool-proof —a necessary adjunct to every economical shop.

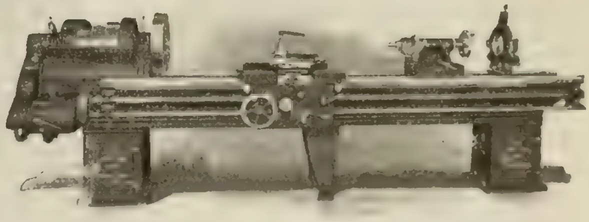
THE
CLEVELAND ◆ TWIST DRILL CO.
NEW YORK CLEVELAND CHICAGO

THIS LATHE HAS THE FEATURES YOU WANT



Here is a "heavy turning" tool of wonderful accuracy — with costly, efficiency-producing features — offered at a price that is very modest indeed!

To illustrate: Here are some features. Are they not want you want?



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SAFETY! SPEED!

17 inch and 19-inch plain change engine lathe, all double back geared. Built 8, 10 and 12-foot lengths of bed.

20% steel mixture in bed casting. You know what that indicates.
Heavy carriage vee 2½" wide. High carbon rack pinned and bolted to bed.
50-point carbon steel head stock spindle.
Offset 1" off centres for heavy duty work.
40-point carbon lead screw 1 7-16" diameter, 2 pitch thread. And others.
Write SIDNEY for all the features that make this lathe exceptionally attractive.

THE SIDNEY TOOL COMPANY, Sidney, Ohio, U.S.A.

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Brown Engineering Corp., Toronto, Ont.
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Cleveland Twist Drill Co., Cleveland.
Foundry & Mach. Co., Montreal, Que.
Garvin Machine Co., New York.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Hartford, Conn.
Stenotype Co., Indianapolis, Ind.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

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Brown Engineering Corp., Toronto, Ont.
Can. Steel Foundries, Ltd., Montreal, Que.
Lyman Tube & Supply Co., Montreal, Que.
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H. W. Petrie, Toronto.
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D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.

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Bridgeford Mach. Tool Works, Rochester, N.Y.

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Grant Gear Works, Boston, Mass.
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Hull Iron & Steel Foundries, Ltd., Hull, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia. Pa.
Smart-Turner Machine Co., Hamilton, Ont.

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Gardner, Robt. & Son, Montreal.
Grant Gear Works, Boston, Mass.
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Lancashire Dynamo & Motor Co., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Wickes Brothers, Saginaw, Mich.
A. R. Williams Machy Co., Toronto.

GRAIN FOR POLISHING
Norton Co., Worcester, Mass.

GRAPHITE
Aikenhead Hardware Co., Toronto, Ont.

GRAVITY CARRIERS
Can. Matthews Gravity Carrier Co., Toronto, Ont.

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Canada Machinery Corp., Galt, Ont.
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Dominion Machy. Co., Toronto, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Gray Mfg. & Machine Co., Toronto.
Niles-Bement-Pond Co., New York.
Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie. Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.

GRINDERS, CUTTER
Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Pratt & Whitney Co., Dundas, Ont.

GRINDERS, DIE CHASER
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

GRINDERS, DRILL
Aikenhead Hardware Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
United States Electric Tool Co., Cincinnati, O.

GRINDERS, CYLINDER, INTERNAL
Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Greenfield Machine Co., Greenfield, Mass.
Modern Tool Co., Erie; Pa.
R. E. T. Pringle, Ltd., Toronto, Ont.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.

GRINDERS, PORTABLE, ELECTRIC, HAND TOOL, POST, FLOOR AND BENCH
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Dominion Machy. Co., Toronto, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Greenfield Machine Co., Greenfield, Mass.
Norton Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machy. Co., Toronto.

GRINDERS, TOOL AND HOLDER
Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Greenfield Machine Co., Greenfield, Mass.
H. W. Petrie, Ltd., Montreal.
Tabor Mfg. Co., Philadelphia, Pa.

GRINDERS, UNIVERSAL, PLAIN
Modern Tool Co., Erie, Pa.

GRINDERS, VERTICAL SURFACE
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Pratt & Whitney Co., Dundas, Ont.
Stenotype Co., Indianapolis, Ind.

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Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.

GRINDING WHEELS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Carborundum Co., Niagara Falls.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Norton Co., Worcester, Mass.
H. W. Petrie, Toronto.

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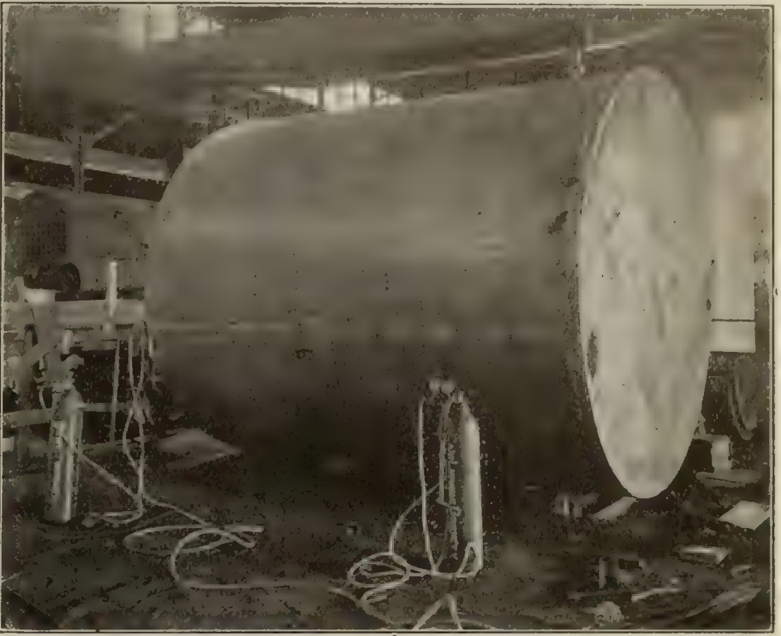

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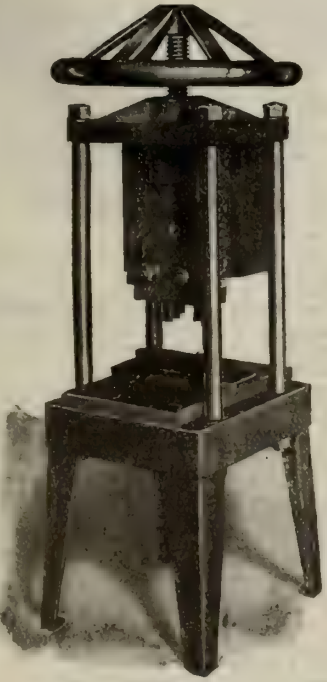

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A. R. Williams Machy. Co., Toronto.

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Bignall & Keeler Mfg. Co., Edwardsville, Ill.
John H. Hall & Sons, Ltd., Brantford, Ont.
H. W. Petrie, Ltd., Montreal.

PIPE, RIVETED STEEL

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto.

PLANER JACKS

Armstrong Bros. Tool Co., Chicago.

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John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Oliver Machy. Co., Grand Rapids, Mich.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

PLANING AND SHAPING MACHINERY

Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio
A. R. Williams Machy. Co., Toronto.

PLANING MILL EXHAUSTERS

Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Niles-Bement-Pond Co., New York.

PLIERS

Aikenhead Hardware Co., Toronto, Ont.
Canadian Billings & Spencer, Ltd., Welland.

PLUG MILLERS

PRESSES, ARBOR

Banfield, Edwin J., Toronto.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
Atlas Press Co., Kalamazoo, Mich.

PRESSES, BROACHING, FORGING AND FLANGING

Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, CAM, TOGGLE, EYELET

Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo, O.

PRESSES FOR SHELLS

Atlas Press Co., Kalamazoo, Mich.
Charles F. Elmes Eng. Works, Chicago.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER

Lymburner, Ltd., Montreal.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, DROP AND FORGING

W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago, Ill.
Can. Fairbanks-Morse Co., Montreal.
Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Niles-Bement-Pond Co., New York.
Wm. R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

PRESSES, HYDRAULIC

Bawden Machine Co., Toronto, Ont.
John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill
Dominion Machy. Co., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
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H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo
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PRESSES, HYDRAULIC DIE STAMPING

Hydraulic Press Mfg. Co., Mount Gilead, O.

PRESSES, PNEUMATIC

Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, POWER

Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, BALING

Hydraulic Press Mfg. Co., Mount Gilead, O.
William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT

Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

PRESSES, SCREW

Barnes, W. F. & John. Co., Rockford, Ill.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING

Erie Foundry Co., Erie, Pa.

PRESSURE REGULATORS

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Ontario Specialties, Ltd., Ottawa, Can.

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Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Dodge Mfg. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Ltd., Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

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Wells Bros. Co. of Canada, Galt, Ont.

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Darling Bros., Ltd., Montreal, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL

Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Darling Bros., Ltd., Montreal, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

PUMPS, HIGH PRESSURE

Charles F. Elmes Eng. Works, Chicago.
Darling Bros., Ltd., Montreal, Que.
Hydraulic Press Mfg. Co., Mount Gilead, O.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

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Can. Blower & Forge Co., Kitchener, Ont.
Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

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Darling Brothers, Montreal.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto.

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Roper, C. F., Co., Hopedale, Mass.

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Brown, Boggs Co., Ltd., Hamilton, Canada
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Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
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H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

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John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York

PUNCHES, PNEUMATIC

Jno. F. Allen Co., New York.

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John Bertram & Sons Co., Dundas.
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Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Wickes Brothers, Saginaw, Mich.

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Niles-Bement-Pond Co., New York.

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Cumming & Son, J. W., New Glasgow, Canada.
Niles-Bement-Pond Co., New York.

RAILS, STEEL

Cumming & Son, J. W., New Glasgow, Canada.

RATCHETS

Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMER FLUTING MACHINES

Garvin Machine Co., New York.

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McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Stenotype Co., Indianapolis, Ind.
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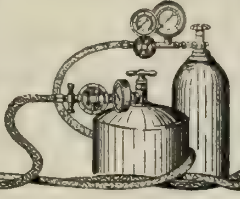

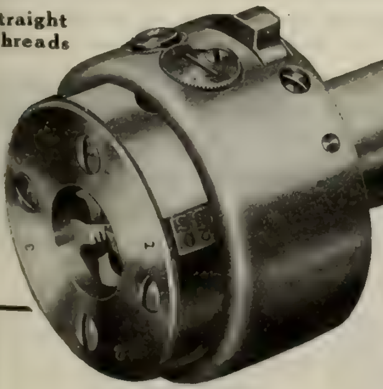

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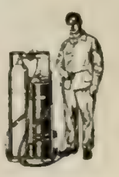

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Oliver Machy. Co., Grand Rapids, Mich.

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Gardner, Robt. & Son, Montreal.
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H. W. Petrie, Toronto.
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Stenotype Co., Indianapolis, Ind.
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New York Machinery Co., New York.
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Perrin, Wm. R., Toronto.
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Bawden Machine Co., Toronto, Ont.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Brown Engineering Corp., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
Grant Mfg. & Machy. Co., Bridgeport, Conn
John H. Hall & Sons, Brantford.
Himoff Machine Co., New York, N.Y
Jardine, A. B., & Co., Hespeler.
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Root & Van Dervoort Engr. Co., East Moline, Ill.
Smart-Turner Machine Co., Hamilton, Ont.
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Cleveland Wire Spring Co., Cleveland.
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Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.

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Dennis Wire & Iron Works, London, Canada.

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STAMPING MACHINERY
Brown, Boggs & Co., Hamilton, Can.
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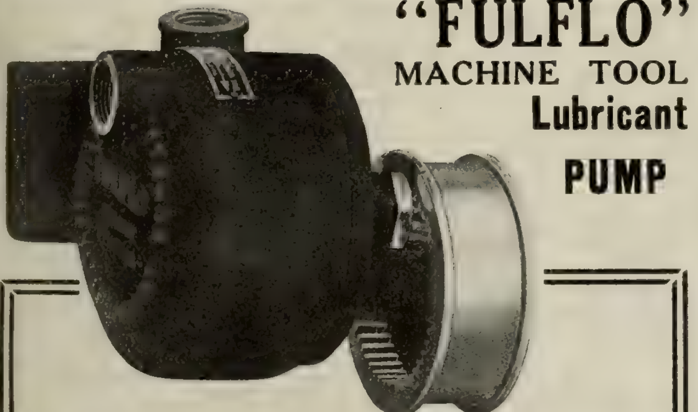

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A weekly newspaper devoted to the machinery and manufacturing interests.

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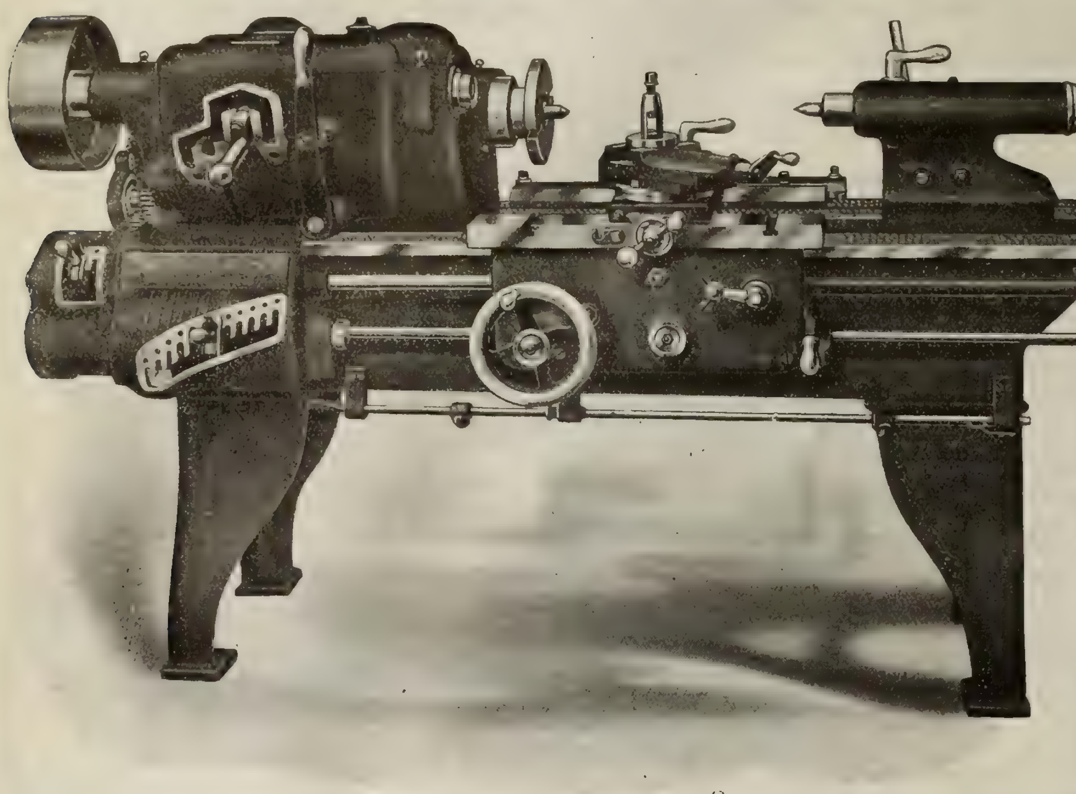

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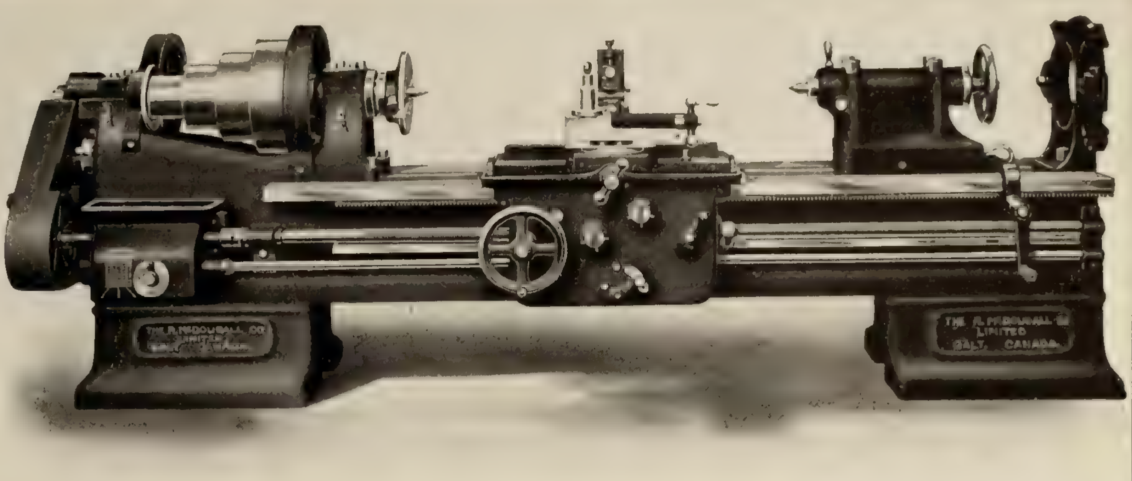
McDougall Lathes for Big Production

16, 18, 20, 22 and 26 inch Swing.



ARE-MAC-DEE IS A GUARANTEE

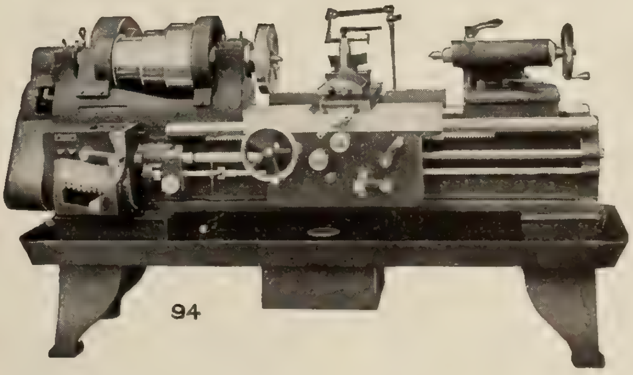
Big Shells require Lathes which are built to stand the strain of high speed production.

McDOUGALL Lathes are built right and of the best materials. They will easily handle any thing up to the limits of their rated capacity.

Furnished with all the regular attachments of modern machine tool practice.

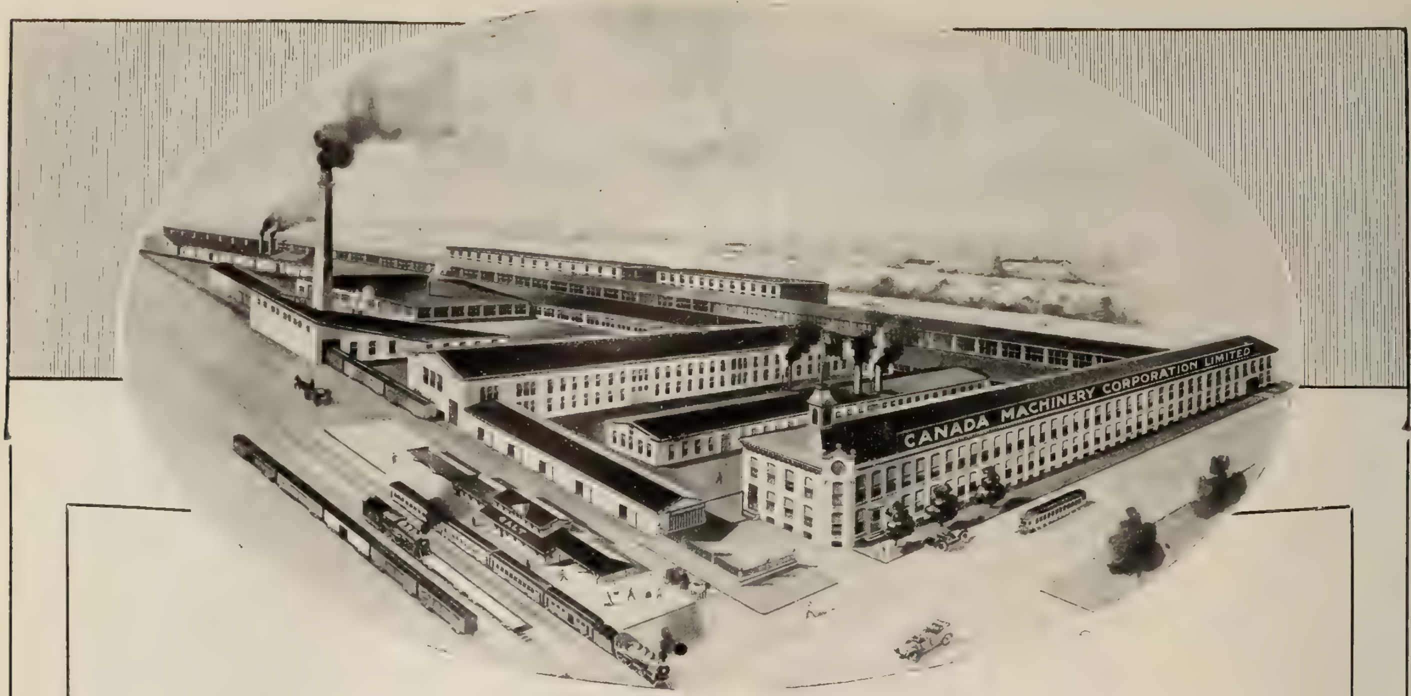
The R. McDougall Company, Limited
Manufacturers
GALT, Ont., Canada
The Canadian Fairbanks-Morse Co., Limited, Sales Agents.

In Stock for Immediate Delivery



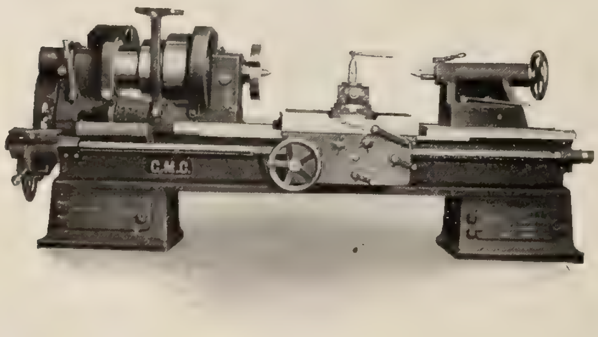
1 No. 2 Brown & Sharpe Plain Milling Machine.
1 16" Ohio Back geared Shaper.
1 Garvin Hand Surface Grinder.
1 No. 2 Diamond Surface Grinder.
1 Style B. Yankee Drill Grinder.
1 Style B.X. Wilmarth & Morman Cutter, reamer and drill grinder.
1 No. 1 Sipp Ball bearing drill press.
[illegible] 20" Back geared drill presses.
[illegible] 14" Single spindle sensitive drill presses.
1 14" Two-spindle sensitive drill press.
2 16" Three spindle sensitive drill presses.
2 16" Four spindle sensitive drill presses.
1 13" x 5' Lancaster screw cutting lathe.
1 2½ x 26" Greenlee flat turret lathe.
2 21 x 8 Roulsted heavy type turret lathe for 4.5 and 6" shells.
1 36" x 14' 0" Conradson Turret lathe, three-step cone, triple back-geared for 6" and 9" shells.
1 18" x 8" Flather engine lathe, quick-change gear, four-step cone, draw in attachment and collets.
1 18 x 12 American engine lathe, quick-change gear, five-step cone, single back gear and compound rest.
1 26 x 10 Bradford engine lathe, 5-step cone, single back gear, chuck and taper attachment.
[illegible] 28 x 16 Lodge & Davis lathe, quick-change gear, five-step cone, single back gear.
1 16 x 8 South Bend lathe.
[illegible] [illegible] x 8 Blakeslee single purpose, heavy duty lathe for turning 6" shells.
1 16 x 8 Prentise all geared head turret lathe.
1 20 x 8 C.M.C. turret lathe, 3 step cone.
1 17 x 8 Sidney Lathe quick change gear, 3 step cone double back gear.
1 18½ x 8 Cincinnati lathe, 3-step cone, double back gear and quick-change gear.

THE FOSS & HILL MACHINERY CO.
305 ST. JAMES STREET - - - - MONTREAL, QUE.


CANADA MACHINERY CORPORATION LIMITED

The Plant Behind

C.M.C.



CANADA MACHINERY CORPORATION

LIMITED

GALT, ONTARIO

BUILDERS OF MACHINE TOOLS AND WOODWORKING MACHINERY

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CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied field. Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XVI—No. 19 Publication Office: Toronto, November 9, 1916 Subscription Price $3.00 per Year

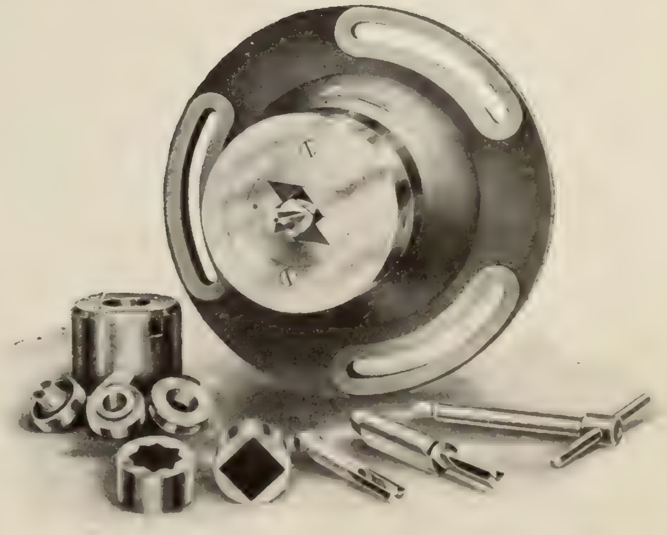
Aikenhead's

RADBORE HEAD

Drills Accurate Square Holes For Every Class of Work

Radbore Heads will drill square holes through the material or they will drill square holes to any desired depth with perfectly flat bottoms! Once in your shop the uses that spring up for this head will be remarkable.

THE RADBORE HEAD HAS SEEN CONSTANT SERVICE FOR TWO YEARS! ∴ ∴



Maximum Accuracy—Minimum Cost

The Radbore Booklet will throw some interesting facts on your work. Write for a free copy now.

AIKENHEAD HARDWARE LIMITED

17 TEMPERANCE STREET, TORONTO

WHY P. & W. Taps WIN

It's in the Design

One-third of the land from the cutting edge is concentric.

The remaining two-thirds has eccentric relief.

The taper-tap has a cylindrical pilot.

The taper and plug-taps have an eccentrically-relieved chamfer relieved clear from the cutting edge. The highest grade of steel obtainable is used.

What it Means to You

Taps can be sharpened at the only correct point—on the face of the cutting edge.

Sharpening in no way affects their size.

Can be sharpened long after other so-called eccentrically relieved taps are rendered useless.

We obtain the freest cutting tap with the longest life —an exclusive combination.

Accuracy nowhere else obtainable is secured together with a degree of finish and refinement heretofore thought impossible with a commercial tool.

For a number of years we have made taps with this style of relief. They have won out steadily and consistently on merit alone.

The Tap with the

(Trade Mark)

Con-eccentric Land

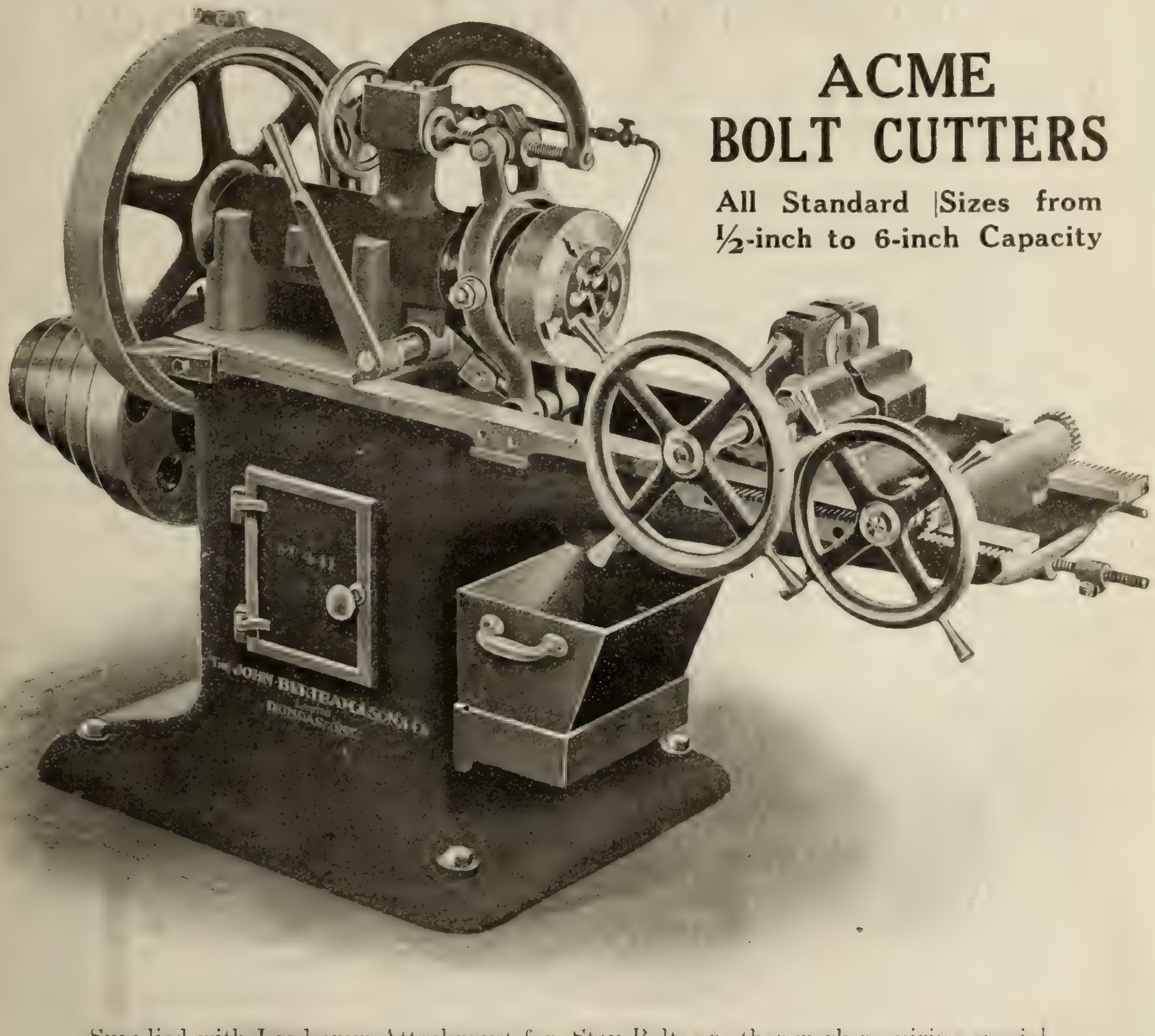
(Registered U. S. Patent Office)

Pratt & Whitney Company of Canada
Limited

DUNDAS	MONTREAL	WINNIPEG	VANCOUVER
Ontario	723 Drummond Bldg.	1205 McArthur Bldg.	B. C. Equipment Co.

P.&W.CO.
HARTFORD
CONN.
U.S.A.

BERTRAM MACHINE TOOLS



ACME BOLT CUTTERS

All Standard Sizes from ½-inch to 6-inch Capacity

Supplied with Leadscrew Attachment for Stay Bolts or other work requiring special Accuracy of pitch.

WRITE US FOR FULL DETAILS ON ANY MACHINE OR MACHINES IN WHICH YOU ARE INTERESTED

The John Bertram & Sons Company
Limited

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO **November 9, 1916**

Concerning An Experience

A YEAR or so ago a certain advertiser in this journal was fortunate enough to secure one of our front covers. For a long while he could not be "sold" on advertising. It was a good thing—an uncommonly good thing—for any line but his. But, in his case, while it wouldn't exactly be throwing the money away he insinuated that, at least, it would be investing it in a rather poor proposition. Finally, good arguments, good patience and good judgment prevailed and a front cover announcement was made. The effect was mutually gratifying. The man was permanently sold, and entered upon a contract for regular space with what might be termed (in the light of his former skepticism) as genuine enthusiasm, real "honest to goodness" gusto. In his eagerness he seemed to be trying to make up for lost time and lost opportunities.

We have had on our files for several months a contract for several of our 1917 covers for this advertiser, and his regular space is steadily growing in size.

Now this advertiser, by virtue of the direct results he secured, was made an everlasting convert to advertising. He told us about replies he had received, about the visits to his office, and about steadily increasing sales. But he doesn't know, and we don't know, and nobody knows or can estimate the full force of this man's advertising. For instance, we heard in a rather direct way not long ago that a competitor really felt the effect of the advertising as much as the advertiser himself did!—only the competitor felt it adversely. See the point?

If your competitor advertises and you don't, you may not be exactly bound and gagged, but there will certainly be a noticeable impediment in your speech. If you advertise and your competitor doesn't—well, he should worry.

And if you both advertise you will both benefit because there are enough benefits to go around. If you can sell your line by word of mouth you can sell with advertising and sell with less effort and with greater profits. Moreover, your name will be impressed indelibly on the minds of buyers, both present and future.

Cyrus Curtis says "It pays to advertise because it does." Cyrus Curtis charges as much for one back cover of The Saturday Evening Post, as we charge for one hundred front covers of Canadian Machinery, and successful national advertisers line up for Post back covers like patrons at a nickel show extraordinary—waiting to get in! And if they can't get a box seat they sit with the crowd and enjoy themselves just the same. That's the spirit of the advertiser who knows advertising pays!

(Canadian Machinery has no back covers open and only three front covers for 1917 are available. They will be sold only to advertisers using regular space inside.)

CANADIAN MACHINERY
and Manufacturing News
143-153 University Avenue, Toronto

Quality **Service**

Courtesy in Business

* * *

Fittingly framed and hanging in the Offices of one of the most important Public Service Corporations on this North American Continent is the following

> **'Did you say Please and Thank you?'**

Broad minded men direct the destiny of that Corporation, men who know that public or private enterprises to be lastingly successful must operate for the public good.

Quality and Service are the two important factors in our business life today, but Courtesy is the door through which they must enter.

We are large producers of Hamilton Pig Iron and our output of Open Hearth Steel Blooms and Billets, Iron and Steel Bars of all shapes and size runs into enormous tonnage.

The products of our mills include practically everything that can be manufactured from Iron and Steel and these we distribute to thousands of satisfied customers.

Our business is an extensive one and a successful one. The World is our market: but our prosperity and success in the future, as in the past, depend upon the continued confidence, co-operation and good-will of the people we serve.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO, LIMITED, SHEFFIELD, ENGLAND

Sole Agents for Canada:

H. BOKER & CO., Inc.

(Formerly Hermann Boker & Co.)

332 St. James Street, Montreal, P.Q.

Established 1837 Incorporated 1914

Special Vanadium Steel Piercing Die Forgings

For Hot or Cold Work

Made from High-Grade Special Vanadium Tool Steel and hammer-forged in any size.

These forgings cut down your machining costs 100% and give you a tougher, more durable Die than you have ever had. Punches made to match the dies. Send us your Blue Prints.

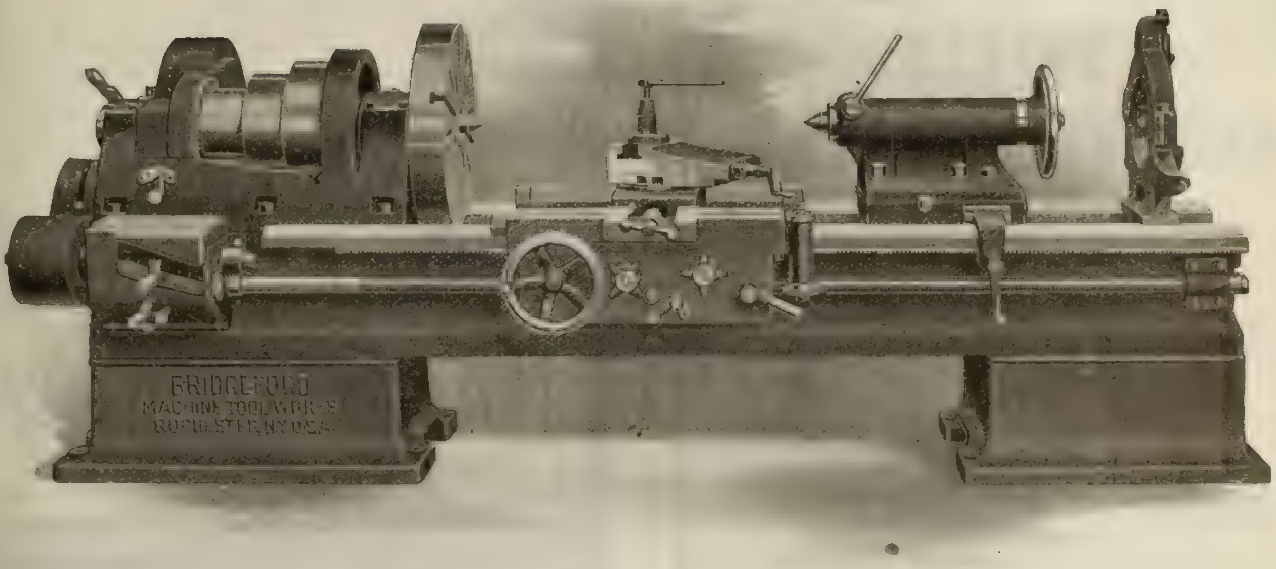
Hammond Steel & Forging Co., Inc.

SYRACUSE, N.Y., U.S.A.

Fine Tool Steels, Specialists in Manufacture of High Grade Hammered Forgings, Hammered Alloy Steels, Weldless Rings—Special Shapes, Die Blocks

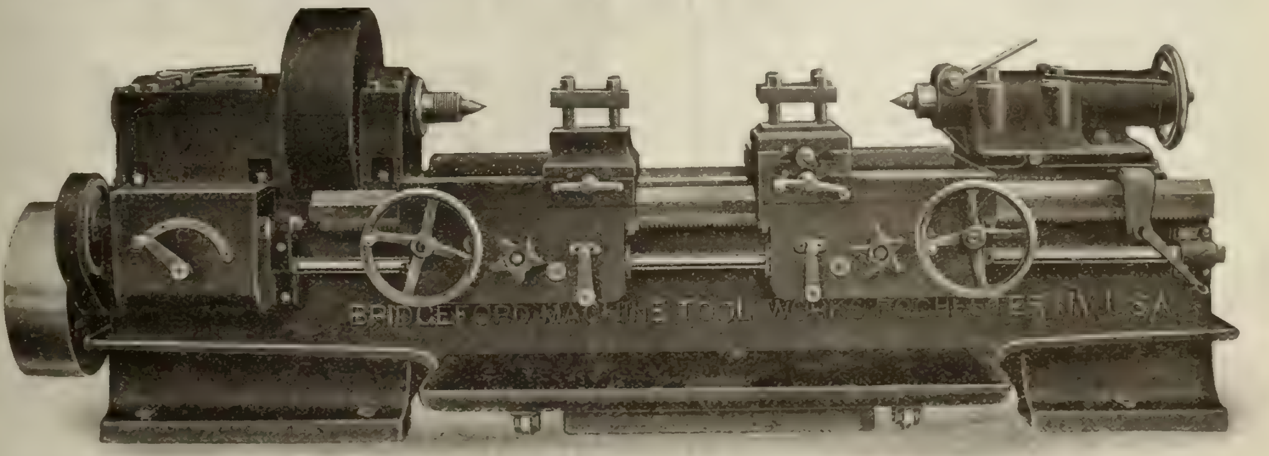
Bridgeford—

for highest efficiency, speed and long life



Bridgeford 26″ Cone-driven Lathe, Heavy Pattern.

A powerful, heavy duty, double back-geared lathe with high gear ratio and three-step cone for 5″ double belt. Recommended for rough turning 4.5″ and 6″ shells and for finish turning, band turning and other sundry operations on larger shells.



Bridgeford Heavy Duty Plain Turning Machine.

Also a rapid worker. The powerful drive and convenience of operation insure a maximum output. Very simple. No complicated mechanism. An inexperienced operator can quickly become proficient in the operation of the machine, obtaining maximum results.

For Increased Production "Use a Bridgeford"

BRIDGEFORD MACHINE TOOL WORKS

HEAVY LATHE SPECIALISTS FOR 20 YEARS

237 MILL STREET **ROCHESTER, N.Y.**

STEEL

for

SHRAPNEL SHELLS

AND SHELL BLANKS

Only Company in Canada producing steel ingots by the "HARMET" Liquid Process.

REASONS WHY THESE INGOTS ARE SUPERIOR TO THE ORDINARY KIND:

1. Prevention of cracks, due to shrinkage; of internal stresses and resulting cracks and fissures.
2. Early cessation in the crystallization of the metal, and the production of fine crystallization of the metal, without cleavage planes.
3. Lessening of segregation, i.e., reduction of tendency to carbon and other impurities to concentrate in the central and upper parts of the ingot.
4. Prevention of "Pipes" or interior cavities, and thus preservation of absolute solidity in the ingot.
5. Improvement in physical properties.
6. Reduction in waste of ingot.

WE CAN SUPPLY FORGINGS OF ALL SHAPES AND SIZES MADE OF ORDINARY OR "HARMET" FLUID COMPRESSED OPEN-HEARTH STEEL ON THE SHORTEST NOTICE.

Nova Scotia Steel and Coal Company

Limited

Head Office:
NEW GLASGOW,
N.S.

Western Sales Office,
Room 14 Windsor Hotel,
MONTREAL

EXTRA

Die Steel

is produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

You get extra service from "EXTRA" DIE STEEL. A trial is convincing.

H-A-DRURY COMPANY LIMITED STEEL

MONTREAL TORONTO NEW YORK

Manufactured By SANDERSON BROTHERS & NEWBOULD, Limited
SHEFFIELD, ENGLAND

Red Cut Superior High Speed Steel

Quality First

THE BEST FOR MACHINING
ALL HARD MATERIALS

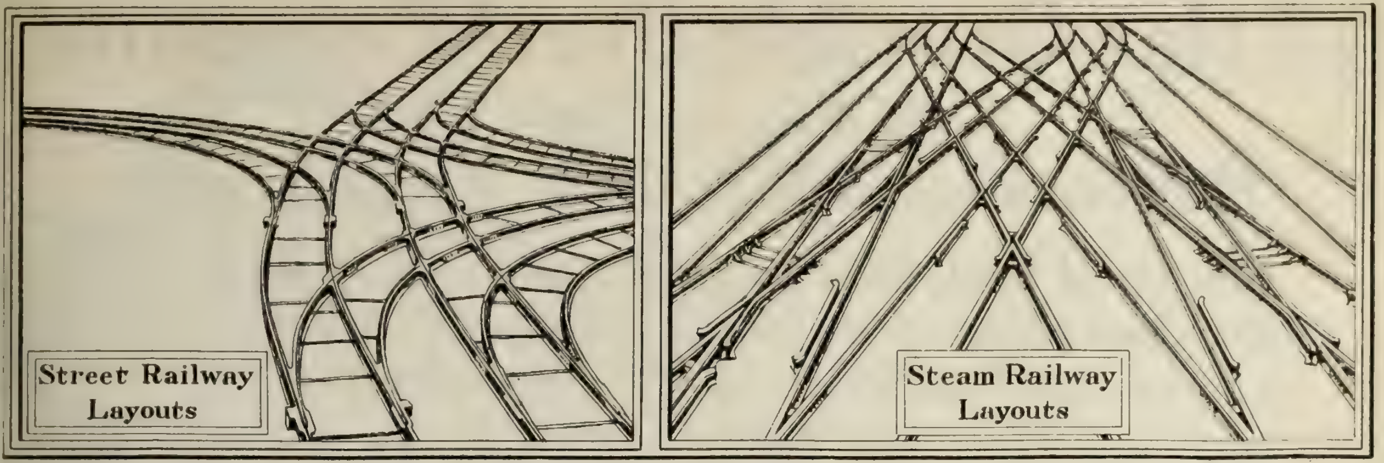
Are your tools made of Red Cut?

Send for folder

VANADIUM-ALLOYS STEEL COMPANY

PITTSBURGH, PA.

Works at Latrobe, Pa.



Switches, Frogs and Every Description of Trackwork.
Solid Manganese Steel Construction. Cast Iron and Cast Steel bound Construction with Manganese Steel Inserts.

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

PIG IRON

"Victoria" Foundry and Malleable, made by The Canadian Furnace Co., Port Colborne, Ont., Canada

M·A HANNA &Co.

M.A. HANNA & Co. Sales Agents: CLEVELAND, O., U.S.A.

JAMES McKAY COMPANY, PITTSBURGH, PENNA., U.S.A.
Manufacturers of

SHELL FORGINGS

We have the Equipment and Experience and can execute orders for

Nose Sockets Base Plates Adapter Plates

For any size Shells. Can execute orders promptly.

SPECIAL FORGINGS—We can make any forging that can be made under Drop Hammers.
CHAINS AND ACCESSORY FORGINGS—We have a complete line.

Address our Representative: JOHN A. BUCHANAN, King Edward Hotel, Toronto

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX
High Speed Steel, Atlas LX
Chrome Vanadium Steel

Carbon Tool Steel
"Deward" Oil Tempering, Non-Shrinking

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

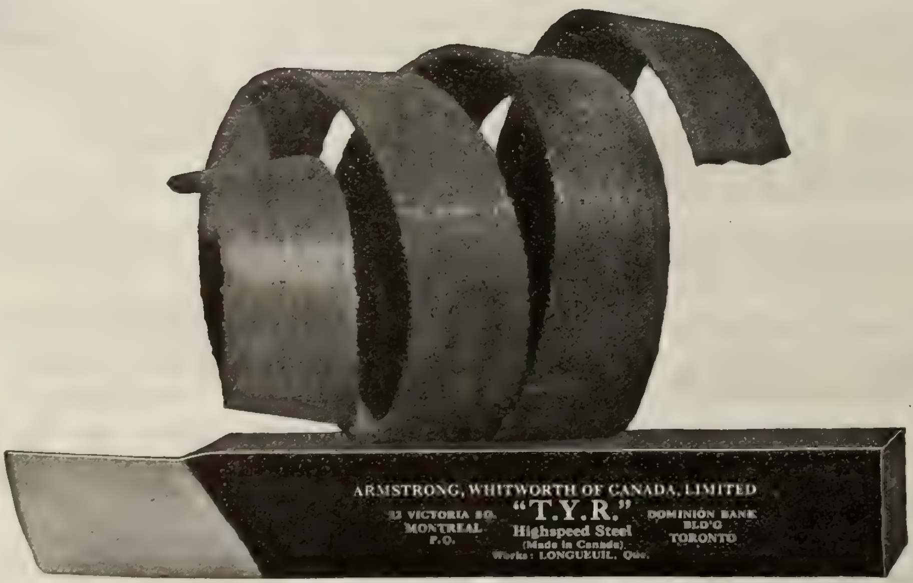
"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

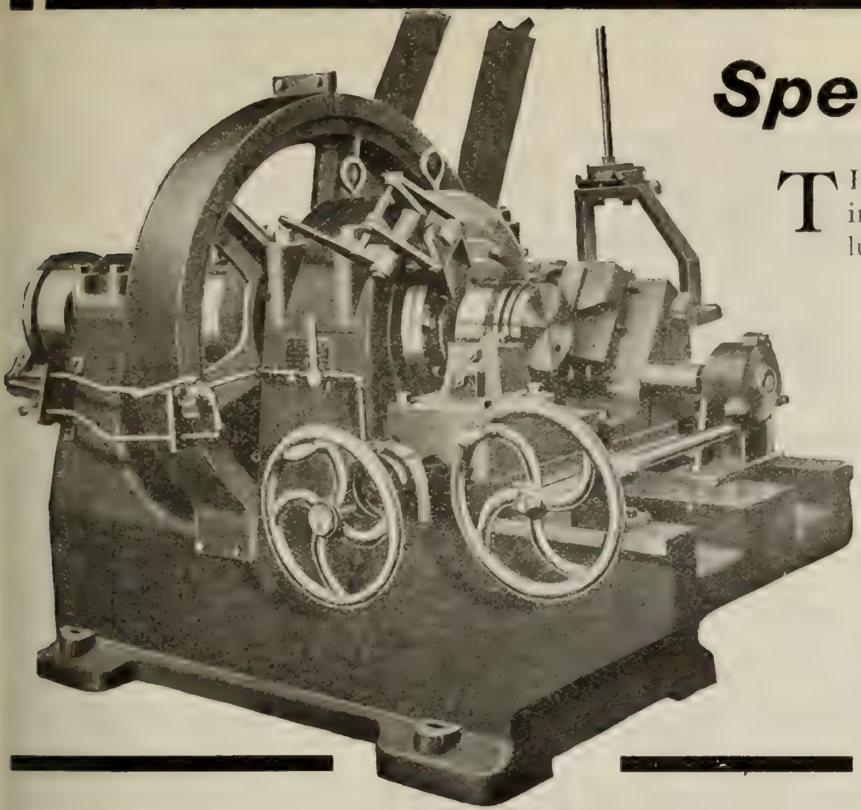
YOUNG, CORLEY AND DOLAN, Inc.

115 BROADWAY, NEW YORK CITY, U.S.A.


ARMSTRONG, WHITWORTH OF CANADA, LIMITED
22 VICTORIA SQ. MONTREAL P.O.
"T.Y.R."
Highspeed Steel
(Made in Canada)
Works: LONGUEUIL, Que.
DOMINION BANK BLD'G TORONTO

Immediate shipment of all standard sizes and shell-turning sizes can be made from stock.

MADE IN CANADA



Speed—Accuracy

THE two most important factors in shell-making. The former is desirable, the latter absolutely necessary. Both are assured by the use of *Jenckes Single Purpose Lathes for Shell Work.*

Illustration shows the latest addition to this famous line—a Banding Lathe for 8″ shells. Note the liberal proportions, the general appearance of sturdiness. They mean an extra measure of long and efficient service.

These machines are also manufactured for 18 pdr., 4.5″, 5″, 6″, 8″, 9.2″, 12″ and 14″ shells; are tooled when required for the mm. sizes corresponding to Russian and French ammunition.

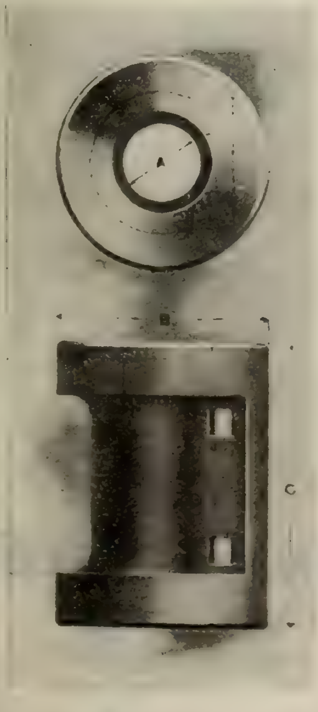
THE JENCKES MACHINE COMPANY, LIMITED

WORKS: Sherbrooke, Que.
St. Catharines, Ont.

SALES OFFICES:

727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

Mining Machinery Parts



Two-key Tappet

Shoes and Dies, Tappets, Bosses, Cams and Stamp Heads

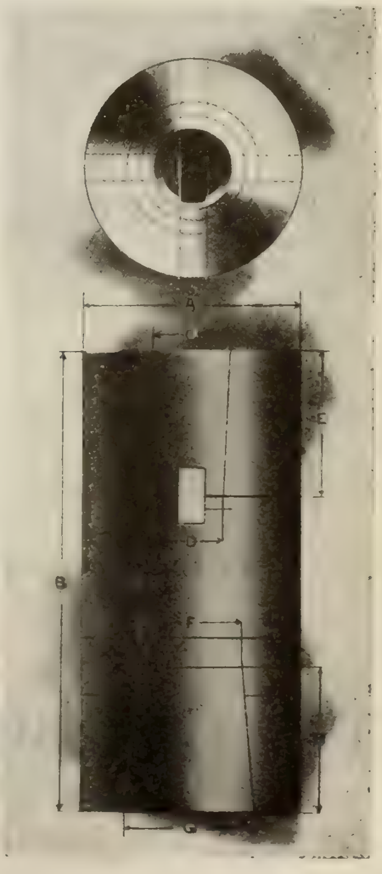
Also Manufacturers of Lining Plates for Ball and Tube Mills Concaves and Heads for Gyratory Crushers.

Machine Moulded Gears

Any size up to 18 feet in diameter. No patterns needed.

Send Us Your Specifications, We Do the Rest. Write—

Hull Iron & Steel Foundries, Limited
HULL, P.Q.



Stamp Head

STELLITE

HIGH SPEED TOOL METAL

MADE IN CANADA STELLITE

STANDS UP UNDER THE SPEEDS FAR IN EXCESS OF THE POINT WHERE THE BEST HIGH SPEED STEEL FALLS DOWN.

Not a Steel

Contains no Iron

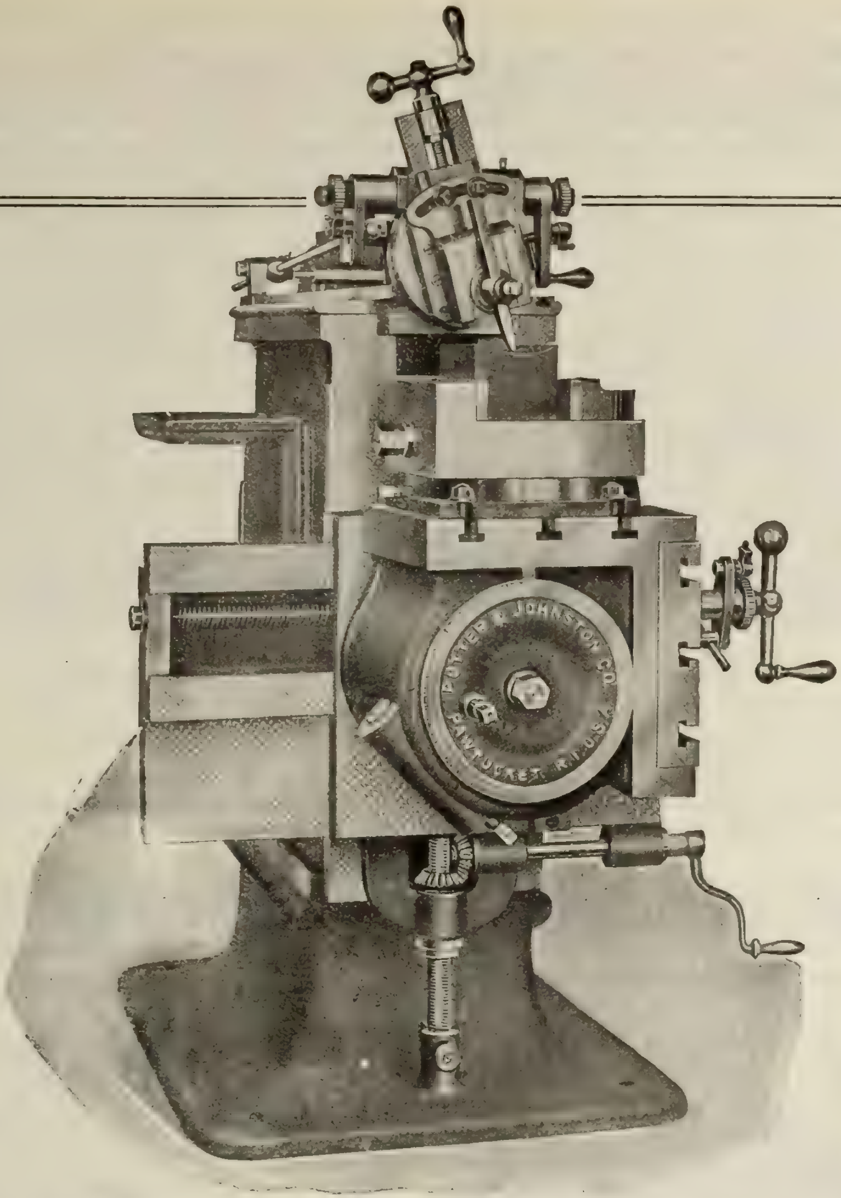
It cuts so much faster than any high-speed steel that production is increased 20 to 300%. Stellite cuts well when red hot,—it won't burn up, no matter how fast the machines are driven.

The hardest, toughest and fastest cutting metal known.

Can you afford to ignore the big production advantages Stellite offers you?

Made in Canada by
THE DELORO MINING AND REDUCTION CO., LIMITED
DELORO, ONTARIO

The Canadian B. K. Morton Co., Limited
SOLE SELLING AGENTS FOR CANADA AND NEWFOUNDLAND
49 Common St., MONTREAL, QUE. 86 Richmond St. East, TORONTO, ONT.



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO.
LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

WE HAVE AT TORONTO FOR IMMEDIATE DELIVERY:—

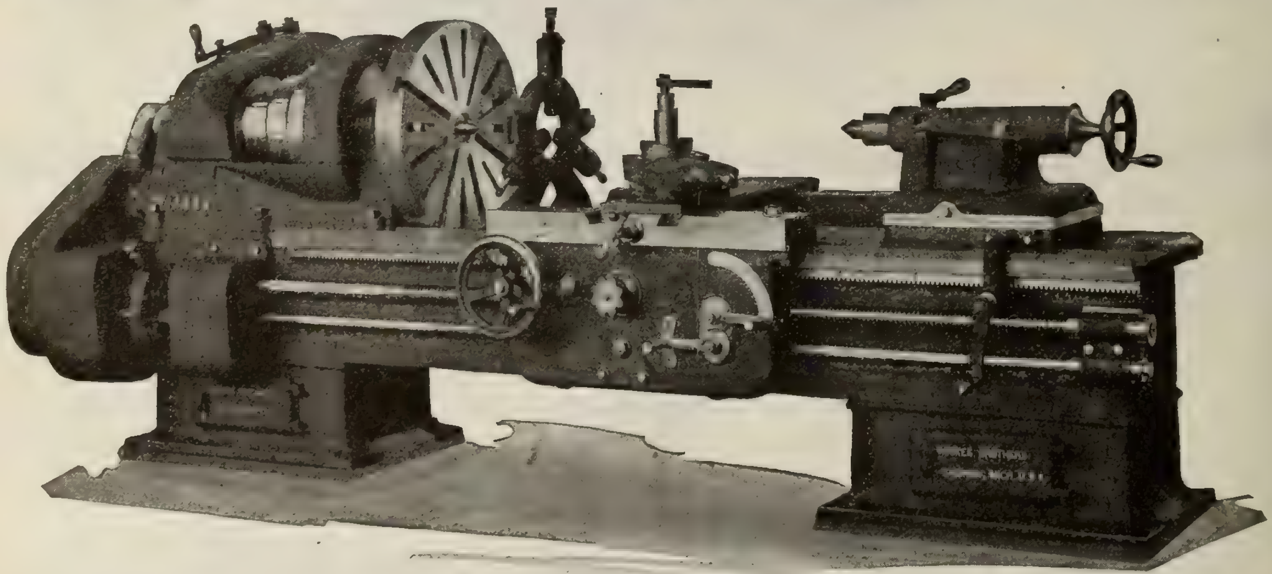
New **Davis 6″ Cutting-off Machines,** fully equipped, size of hole in spindle 6⅞″.
New **Giddings & Lewis** 18″ x 8′ Heavy Duty Engine Lathes, 3-step Cone, Double Back Gears, regular equipment.
New Heavy Duty Lathes for turning 8″ and 9.2″ Shells.
Thor pneumatic hammers and drills.
Appleton Grinder—Challenge No. 1—slightly used.

Special 16,000 lb. 40″ Boring Lathes for 6″ Projectiles.
Immediate Delivery—Special Price—Write for Cuts, etc.
Good Delivery now on Lodge & Shipley 24″ Lathes.
Ask for information about machines for any operation on 3″, 4.5″, 5″, 6″, 8″ or 9.2″ Projectiles.—Our Experience is at Your Service—

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds

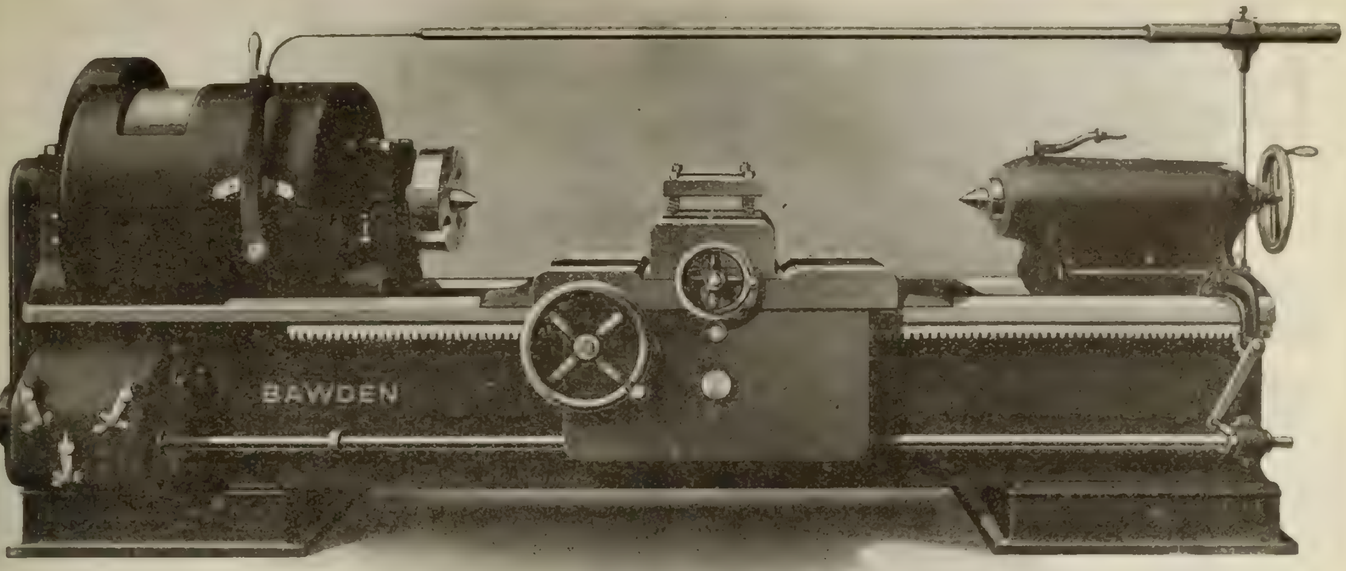
Wickes Heavy Duty Engine Lathe



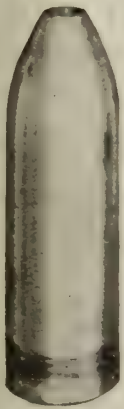
The Wickes 26″ Heavy Duty Lathe.

Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.
This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.
Let us tell you about this lathe and our 20″, 32″, also our 17″ Rapid Production Lathe for Automobile and other work.
We can make prompt shipment.

WICKES BROTHERS **Saginaw, Michigan**



36 in. Triple Geared Lathe for Shells, 8 in., 9 in., 10 in. and 12 in.
24 in., 19½ to 1 Ratio. Back Geared Lathe for Shells up to 6 in.

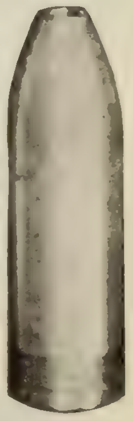


The War Is Not Over—

Millions upon millions of shells will be required by the Allies to accomplish their purpose. Canada will supply many millions of the shells that will help in the war, and many, many hundreds of thousands of these Canadian-made shells will be, and are being made on—

Bawden Heavy-Duty Shell Lathes

for the good reason that these lathes enable a contractor to turn out perfect Shells at a maximum of Speed, with a minimum of defect.



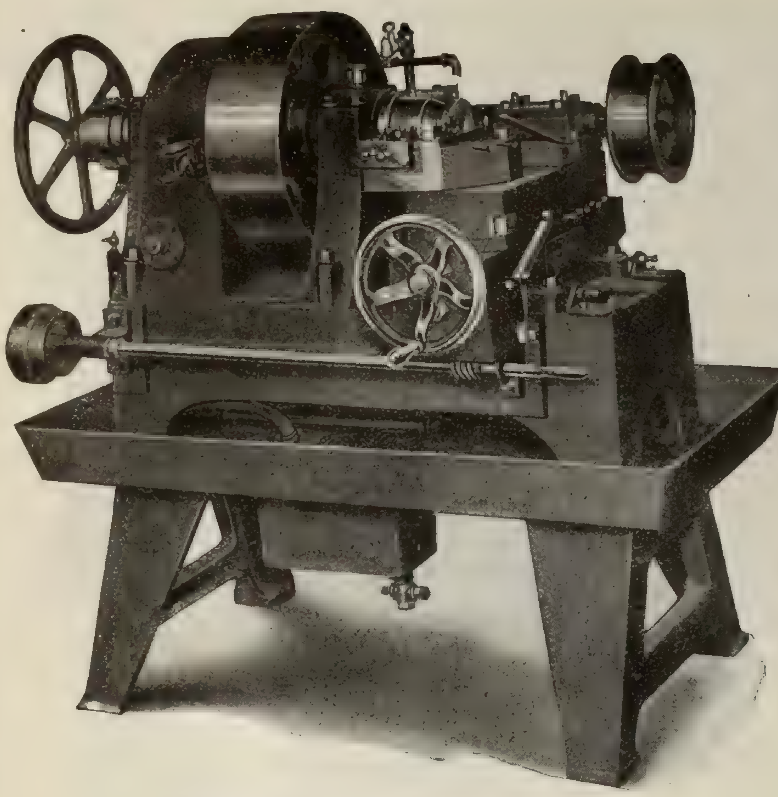
Many lathes in Canadian factories have definitely failed after prolonged use, but never a *Bawden.*

Will you permit us to give you proof—chapter and verse—for this statement about the *Bawden?* Send for Specifications of Lathe illustrated.

Note: We manufacture a full line of gauges for all sizes of British, French and Russian Shells, and component parts.

The Bawden Machine Co., Limited

TORONTO, CANADA



For Turning, Facing and Milling the thread on Gas Check Plugs for 6-inch High Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling. driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells, Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

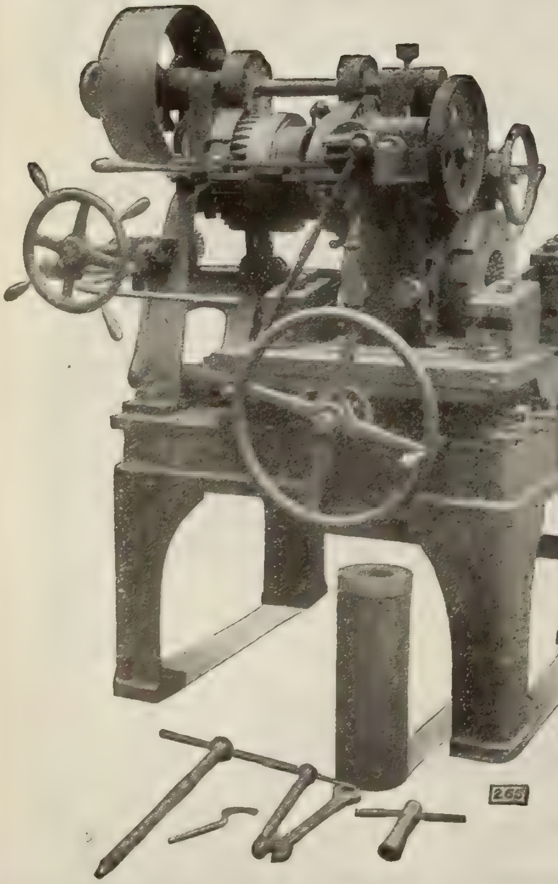
These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield
STAIR BUILDING, TORONTO, ONT.



CUTTING-OFF MACHINES

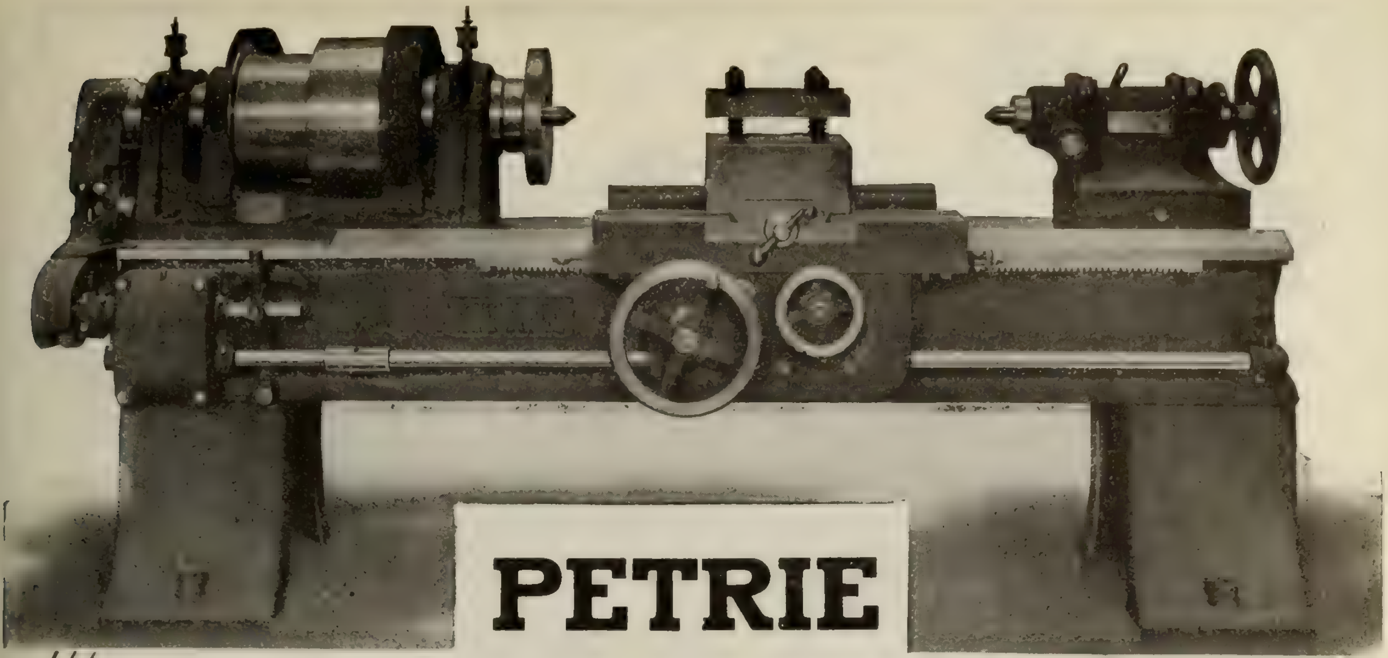
Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Canadian Sales Agents
THE W. W. BUTLER CO., Limited, Transportation Building, Montreal



PETRIE

20-inch Heavy Duty Manufacturing Lathe

DESIGNED AND BUILT ESPECIALLY FOR MACHINING HIGH EXPLOSIVE AND SHRAPNEL SHELLS UP TO AND INCLUDING 8-INCH. USED AND ENDORSED BY SOME OF THE LARGEST AND MOST SUCCESSFUL SHELL MANUFACTURERS.

DESCRIPTION

HEADSTOCK—All Headstock journals are provided with well lubricated, renewable bronze bearings.

Alternate heat treated steel and bronze washers take the end thrust and a simple adjustment is provided to take up wear.

All gears are covered with neat and substantial cast iron guards that may be quickly removed when desired.

BED—The Bed is of deep construction and width to give the greatest rigidity under heavy cuts.

The shears are made extremely massive and the bed walls extra thick, providing the necessary mass of metal to absorb the vibration and shocks incident to heavy turning at high speeds.

Heavy box girths tie the front and rear walls of the bed together at close intervals.

Improved type wide angle V on front shear to take thrust of cutting tool.

The rear bearing of carriage on bed is flat instead of V-shaped.

At the rear of the bed planed pads are provided for attaching Taper and Forming Attachments.

CARRIAGE—The bridge is very wide and extraordinarily deep; it will not spring under the heaviest cuts.

The carriage is gibbed to the bed at the rear on the outside and will not lift under any conditions.

APRON—The apron is of heavy double plate type affording a support or bearing to both ends of all shafts.

Apron is tongued and grooved to the carriage, also bolted and dowelled.

The feed friction has a greatly increased diameter and will pull the heaviest feeds and cuts without slipping.

For engaging the friction a hand wheel several inches in diameter is provided and seats the friction firmly with very small effort on the part of the operator.

All studs in apron revolve and simple but adequate oiling facilities are provided.

FEEDS—Positive Gear drive through headstock spindle steel gears in gear box, three rates of feed are provided for through sliding key type. Feeds per revolution of spindle being ⅛ in., 1-16 in. and 1-32 in.

All gears in the feed train are fully guarded.

TAILSTOCK—The tailstock is a massive casting, rigidly braced internally, and is provided with a long nose, making it unnecessary to extend the tailstock spindle for ordinary work.

It is clamped to the bed by four large locking bolts operated at the top of the barrel.

A simple binder locks the tailstock spindle in correct alignment, this clamp is located at the extreme front end where it grips the spindle with the utmost rigidity and absolutely does away with distortion of any kind.

The screw is unusually large to resist any buckling tendency.

Suitable screws are provided for setting over for Taper Work.

EQUIPMENT—Unless otherwise specified Lathes are furnished with 8 ft. bed, one driving plate, hand cross feed, heavy duty plain rest, necessary wrenches, and two speed tight and loose countershaft.

Forming attachment, turret tool post, hand or power feed bed turret, oil pan, pump, and connections can be furnished as extras when desired.

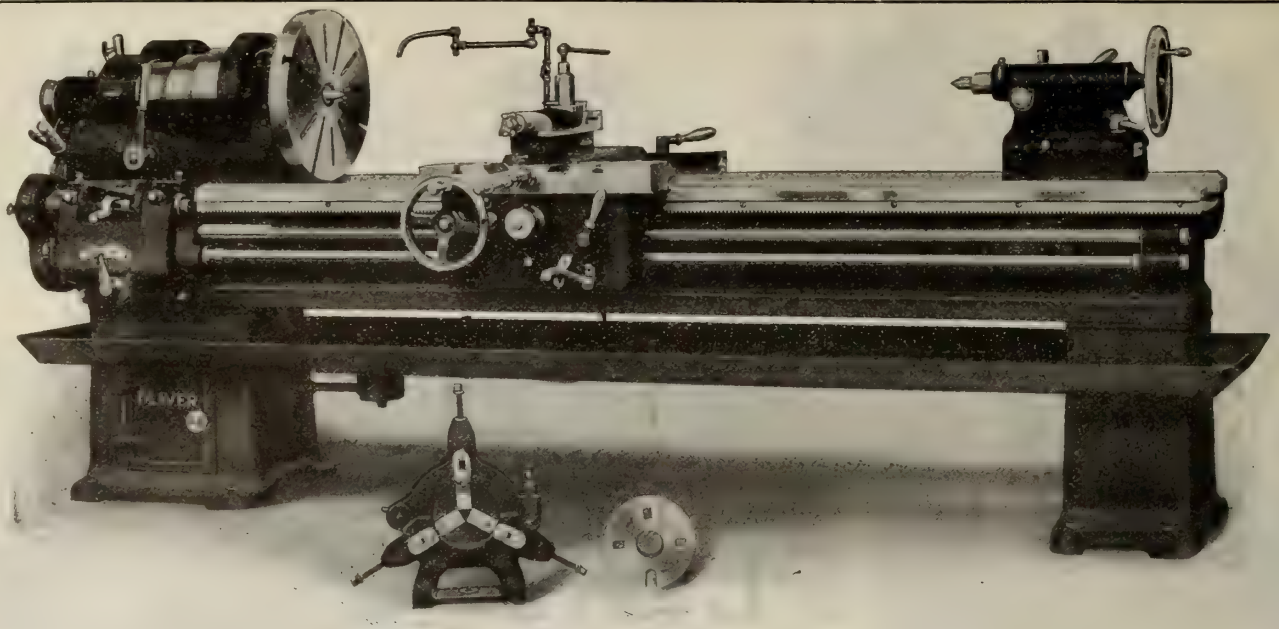
DIMENSIONS

Swing over bed	20 in.	Width of Tool Slide	12 in.
Swing over carriage	11 in.	Diameter of Headstock Cones	11 in. and 14 in.
Length of Bed Standard	8 ft.	Belt Width	6 in.
Distance between centres 8 ft. bed	40 in.	Number of Feed Changes	3
Width of bed overall	19½ in.	Feeds per Revolutions of spindle	⅛ in., 1-16 in., 1-32 in.
Height from floor to centres	40 in.	Speed of Countershaft	110 R.P.M.
Dimensions of front spindle bearing	4 15-16 in. x 6¾ in.	Size of Tight and Loose Pulleys	16 in. x 6¼ in.
Dimensions of rear spindle bearing	4 in. x 5½ in.	Ratio of Back Gearing	6.7 to 1
Diameter Nose of spindle	4 in.	Face of Back Gears	2¾ in. and 2¼ in.
Hole through spindle	1 5-16 in.	Length of Carriage Bearing	30 in.
Diameter Tailstock spindle	2⅜ in.	Width of Carriage Bridge	12 in.
Travel of Tailstock spindle	6 in.	Number of Spindle Speeds with Two-Speed Countershaft	8
Morse Taper—Centres	No. 5	Weight Approximately, 8 ft. Bed	5,200 lbs.

A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.



"Oliver" 18-inch Heavy-Duty Engine Lathe, 10-foot bed.

ENGINE LATHES
TURRET LATHES
SCREW MACHINES

DOMINION MACHINERY CO., TORONTO
Agents for Ontario

OLIVER MACHINERY CO.
GRAND RAPIDS, MICH.

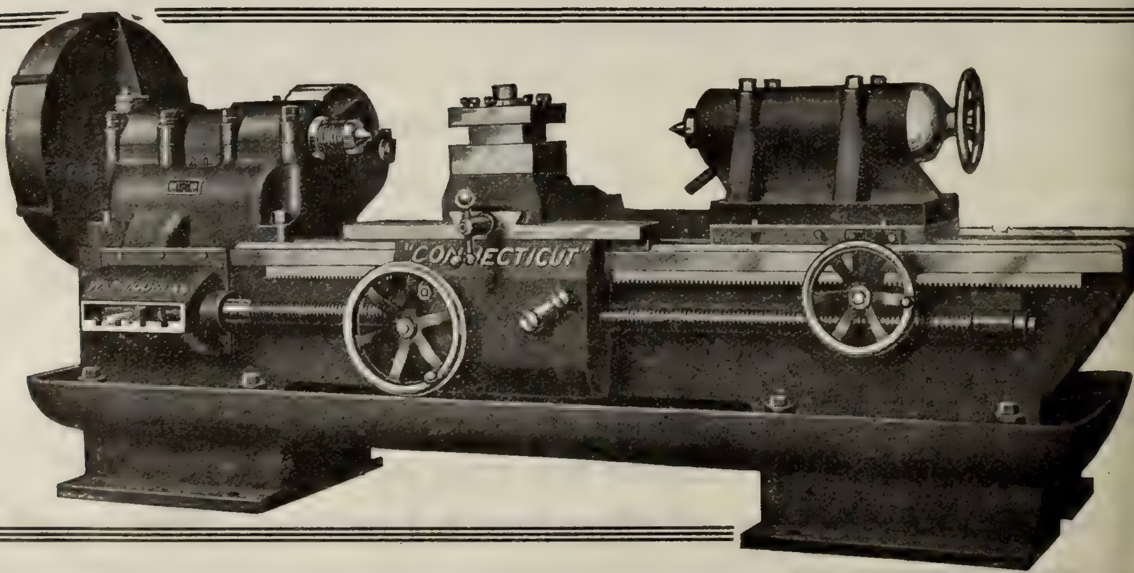
Machining High-Carbon Steel with a Connecticut

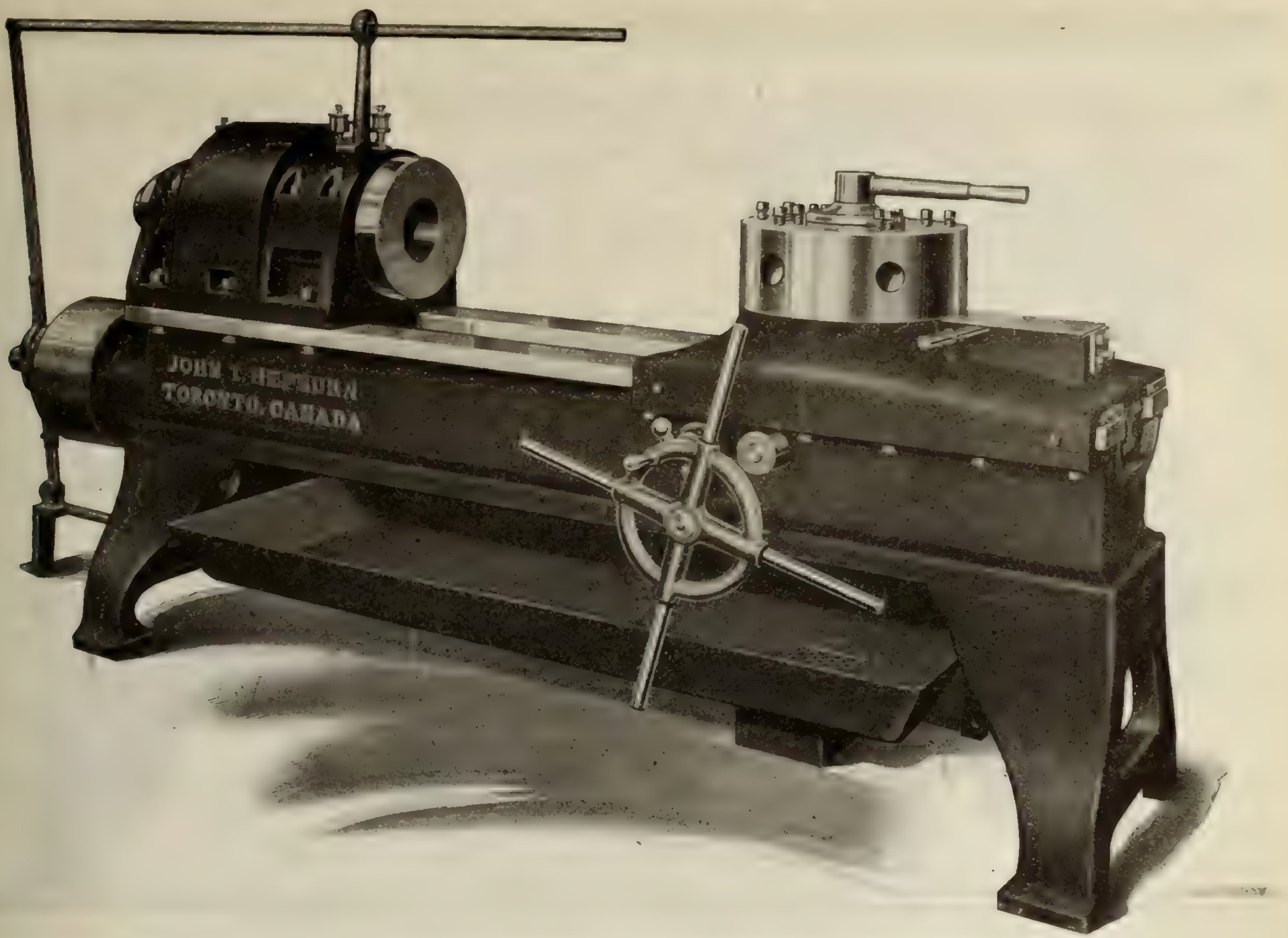
THE Connecticut Lathe illustrated below is for the machining of high-carbon steel at maximum speed—this lathe combines power, accuracy and rigidity in fullest measure.

The bed is cross ribbed with heavy box shaped girths 15 inches apart. All gears and pinions are of steel except the big gear, which is semi-steel with 4-inch face. The head stock, the tailstock—every detail from pulley to base—are built to the most liberal dimensions. The utmost power is built right into Connecticut Lathes.

Get the Details of this Machine

W. & B. DOUGLAS, *Middletown, Conn.*





HEPBURN LATHES

for

Speed
Accuracy
Power

Simplicity
Strength
Design

Here is a heavy duty Shell Lathe that saves its price. This has been demonstrated in factories in which a Hepburn and other makes have stood side by side doing the identical work. The Hepburn by reason of its SPEED, ACCURACY, RIGIDITY, STRENGTH and SIMPLICITY gives a better output than many lathes of lesser worth, and when outputs are reckoned the Hepburn is found to be a money-saver which means that ultimately its cost becomes wiped out.

We want to prove this advertisement with documentary evidence. Will you put it up to us to make good our statement.

We make turret and turning lathes up to and including 9.2″.

John T. Hepburn, Limited
18 to 60 Van Horne St.
Toronto, Canada

If any advertisement interests you, tear it out now and place with letters to be answered.

Davenport 22-Inch Lathe — For Extra Heavy Service

These lathes are built exceptionally rigid and heavy. No feature has been omitted, to secure great strength and power. The bed, the headstock, the tailstock, the carriage—every detail has been designed and constructed with a view to driving the heaviest cut that any tool will stand up against. At present we can make quick deliveries on this machine.

Built with ordinary change gears unless otherwise specified.

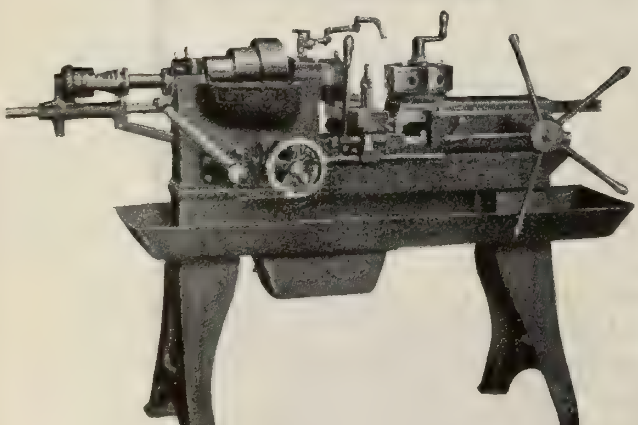
Write at once for Bulletin. It gives full details of construction.

DAVENPORT LOCOMOTIVE WORKS
DAVENPORT, IOWA

Length of Bed, 8′, 10′, 12′, 14′.

Canadian Representatives:
Williams & Wilson, Ltd , Montreal
A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver

The "STENO"
1" x 7" TURRET HAND SCREW MACHINE

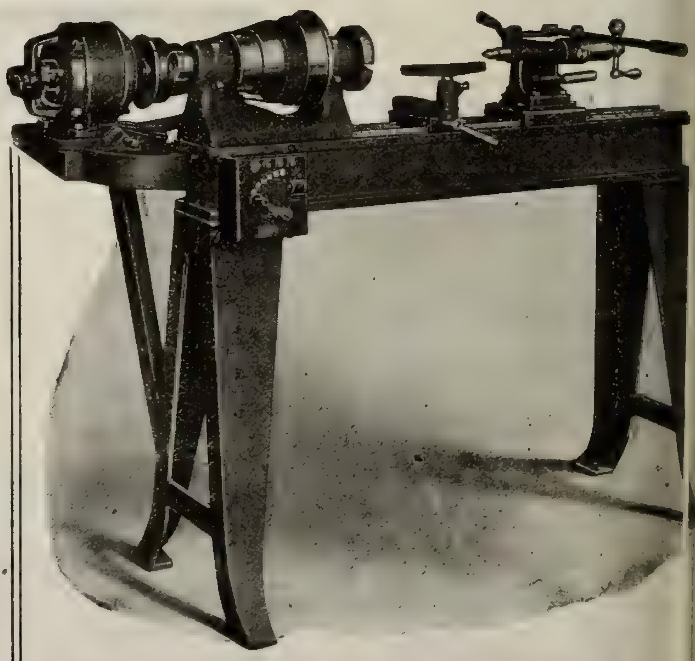


A WELL-BUILT MACHINE—
Down To The Last Screw

Our unusual equipment and our well-trained force and great care in manufacture make this a thoroughly dependable machine.

The Stenotype Company Indianapolis, Indiana, U.S.A.

Manufacturers of the "STENO" Duplex Surface Grinder
The "STENO" 1 in. x 7 in. Turret Hand Screw Machine and
"STENO" Milling Cutters Reamers, Fixtures, Jigs and Gauges.



Motor Driven Speed Lathe

This style of motor drive employs a constant speed motor mounted on plate having an extension arm to support a bearing for the outer end of th motor shaft. The motor plate is fitted to a slide on a shelf which is securel fastened to the back of the lathe bed. The motor plate is moved by mean of a screw which tightens or loosens the belt. A four-step cone pulley o the motor shaft is belted to a four-step cone pulley on the spindle. Thi gives the same speed variation as when a countershaft is used, and by mean of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, an running in self-oiling bronze bearings. The tailstock has screw and leve feed. The bed is crossed-braced and all clamping levers are above the way

J. G. BLOUNT CO. - Everett, Mass., U.S.A

Two Cuts at One Time

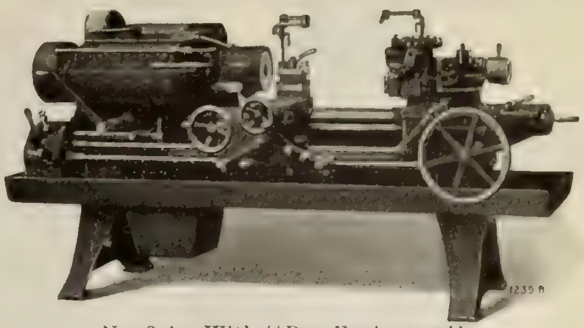
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

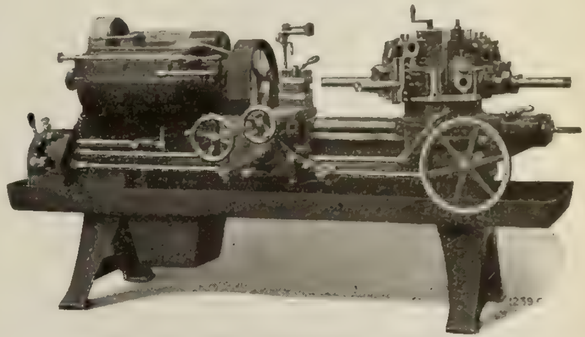
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



No. 2-A—With "Bar Equipment"



No. 2-A—With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal

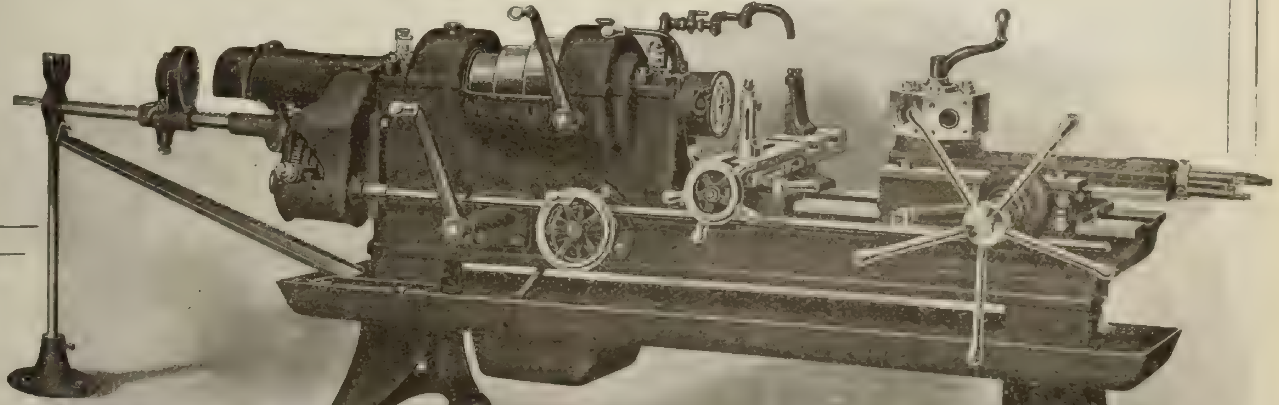
---

Millholland $1\frac{5}{8}$x10 Turret Screw Machine

The combined result of two generations of engineering and mechanical experience. While, as a whole, it is no radical departure from established lines of the turret lathe, it has many original features, and with these features are combined well-known devices.

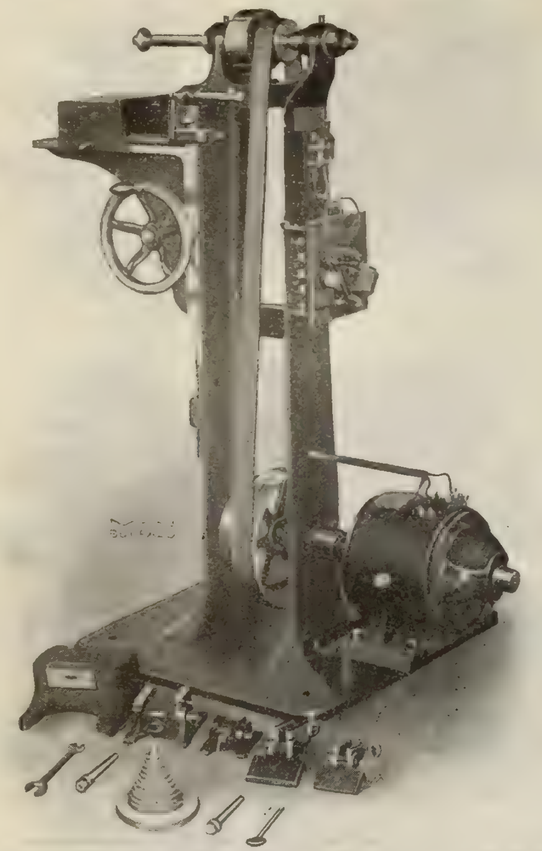
Safety, rigidity, convenience, production and durability are the ideas behind every step in their construction.

Your request will get you full details and specifications by early mail. Make it.



**W. K.
Millholland
Machine Company**
INDIANAPOLIS, IND., U.S.A.

"MODERN" CHASER GRINDER



ARE YOU USING THREADING DIES?

Where Self-opening Dies are used, in fact, where any thread cutting is done, the MODERN CHASER GRINDER, Belt-Driven or a complete Self-Contained Motor-Driven Unit, as illustrated, is a necessity.

Those who value accuracy and correctness in gauge of thread will find, by using the MODERN CHASER GRINDER, that each Chaser will do its portion of duty, being ground true to the axis of the head, and that the life of the Chasers, as well as that of the Die Head, will be greatly prolonged.

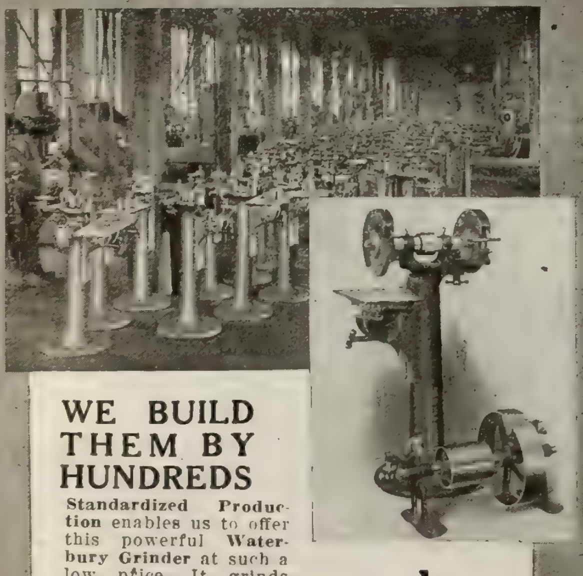
PROMPT DELIVERIES.
Bulletins upon request.

MODERN TOOL COMPANY

Main Office and Works :
State and Peach Streets : : Erie, Penna.

New York Office—2 Rector Street. Chicago Office—32 N. Clinton Street.
Detroit Office—246 Gladstone Avenue.

F. WESLEY PARKER, ***Resident Engineer and Export Agent,***
2 Rector Street, New York.



WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only $60 Complete

The Blake & Johnson Co., Waterbury, Conn.

Assuming that you want a grinder that is better than the average—

A grinder with massive table, micrometer adjustments, very long knee and gibs, and extra heavy head- and tailstock—it will pay you to investigate the

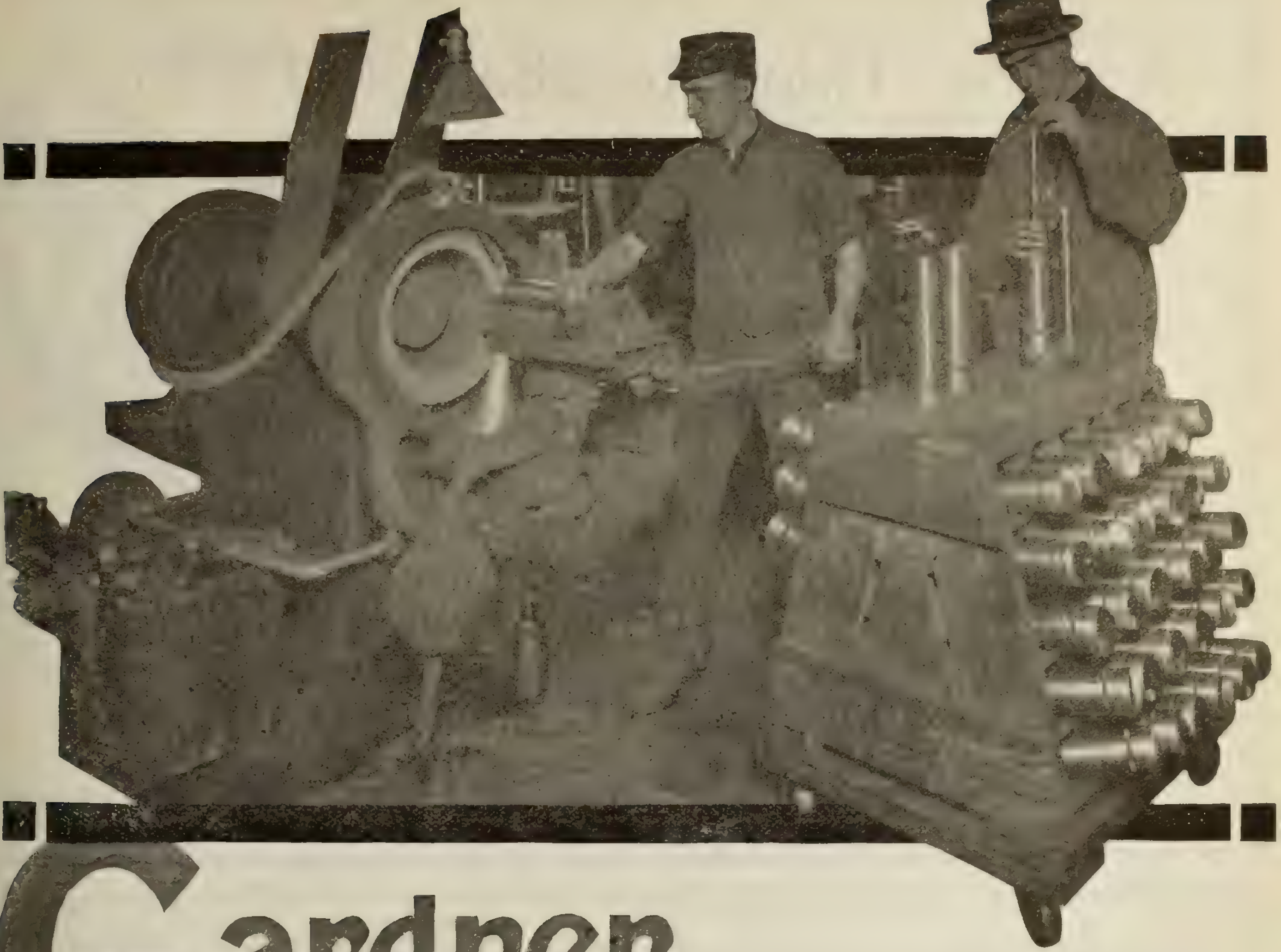
Standard No. 6
Universal Grinding Machine

In addition, you'll find that the headstock is fitted with large bearing for chuck spindle and with special bronze bearings of navy specifications, spindle is tapped and tapered, bored to take wheel arbors and bearings are 1 in. in dia. and 2¾ in. long, and an exceptionally simple and sturdy countershaft with self-lubricating bearings.

Start the investigation by sending for the full details—to-day.

Simmons Machine Co., Inc.

1001 Singer Bldg., New York City
981 Broadway, Albany, N.Y.



Gardner Grinders

Illustration shows a grinder developed especially for removing the hub or centre projection from the ends of shells. This machine is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates. We build a much more powerful grinder to be used for these same operations on 6-inch shells.

Features:

High-grade Babbitt Bearings and Lever Feed.

Rapid clamping of Shell into "V" fixture.

Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.

Can be equipped and operated at both ends for double output.

Output, according to size of projection to be removed from 40 to 100 per hour. Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever-feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments. Weight, 4,500 lbs.

For further particulars write:

The Gardner Machine Company, Beloit, Wis., U.S.A.

A New Thing in Shell Gauges

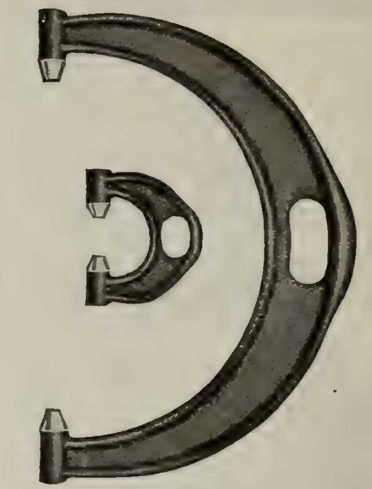
A snap gauge for calipering all outside diameters, with absolute accuracy.

Can be furnished suitable for waving, grooving, rough or finish turning—all sizes of shells, from 9.2" down.

Note the improvement on this gauge for holding.

In ordering, specify diameter and part to be calipered.

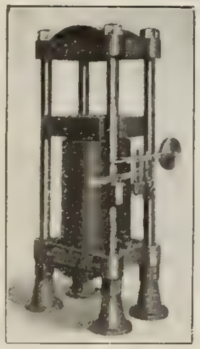
Immediate shipment can be made from stock.



Note the hole for handling when using.

Save the Operators' Fingers

The Foundry & Machine Co., Limited
1167 Carriere Road
MONTREAL, CANADA



Elmes Hydraulic Press No. 676

With ¾-in. Automatic Lever Operating Valve No. 677-A

This press is of steel and semi-steel construction, and the stands which support the press are threaded at the ends to receive the steel columns and have holes for fastening to the floor. The platen is guided by the columns.

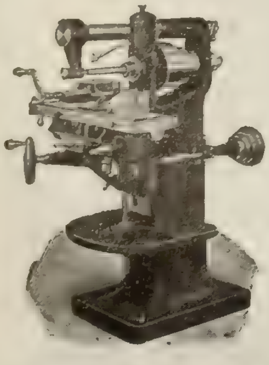
The operating valve is attached to the cylinder, and is designed with a weight to be set for the pressure desired, and releases automatically. To start the ram up, the lever is pushed down; upon the ram reaching the desired pressure, the lever automatically releases (acting as a safety valve as well), causing the ram to descend. Valve body is made of bronze, and other parts are made of tool steel and machine steel. If desired a hydraulic gauge can be attached to show the various pressures, although with this valve it is not necessary.

Write for our Hydraulic Machinery Catalogue.

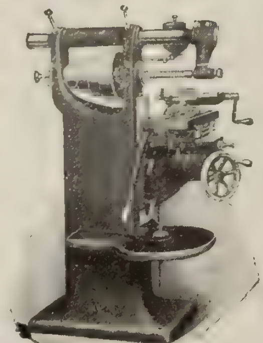
Charles F. Elmes Engineering Works 217 N. Morgan St
Chicago, U.S.A.

Over 50 years' experience building hydraulic machinery.

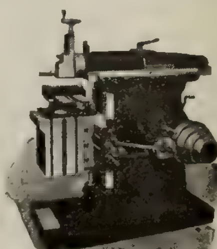
Increased Production Means Increased Profits



Large Millers for large work
—STEPTOE MILLERS for small work.

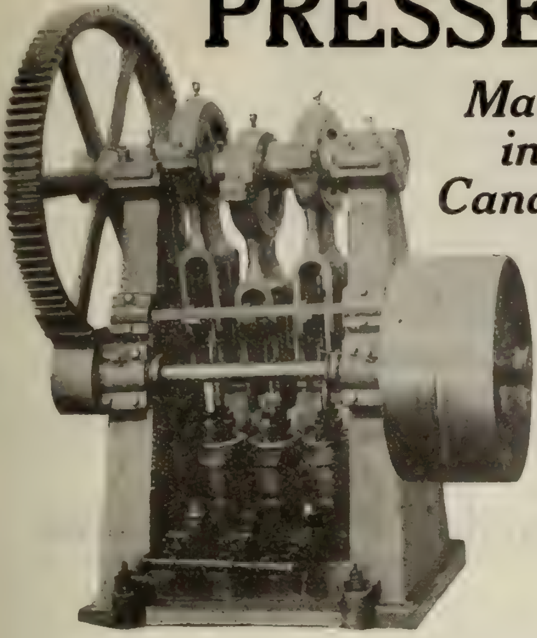


Large Planers for large work
—STEPTOE SHAPERS for small work.



Will result in increased production; less money invested in machinery, and increased profit.

THE JOHN STEPTOE COMPANY
CUMMINSVILLE, CINCINNATI, OHIO, U.S.A.



PRESSES

Made in Canada

Hydraulic Presses, Pumps and Accumulators for all purposes.

WRITE FOR PRICES AND DELIVERIES

WILLIAM R. PERRIN, Limited
TORONTO, CANADA

A Combination of Rigidity, Accuracy, Simplicity and Ease of Operation

Bodies are inclinable and convenient for handling dies and material. Slides are long and well gibbed.

BLISS

Inclinable Power Presses

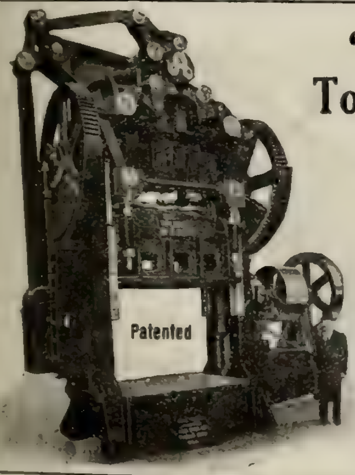
reduce the maintenance cost of both machine and tools.

Built in eighteen sizes.

Adapted for many operations in the manufacture of tin cans, pieced tinware, metal packages, brass goods, electrical goods, trimmings, etc.

Catalog 2-G, decribing them, sent on request.

E. W. Bliss Co., No. 20 Adams Street
Brooklyn, N.Y., U.S.A.
Chicago Office: Peoples Gas Co., Bldg.
Detroit Office: Dime Bank Building



"TOLEDO" Toggle Drawing Presses

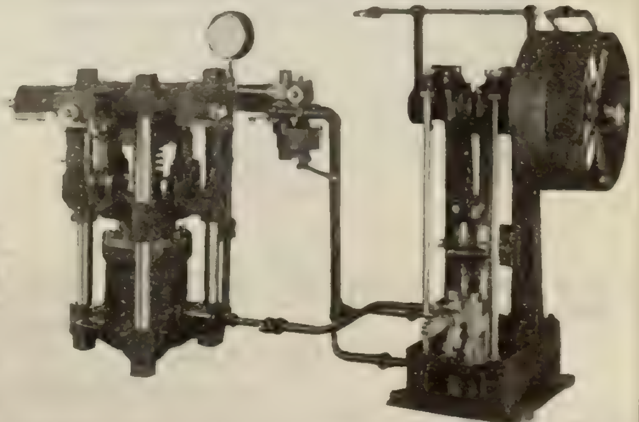
Embody advantages that permit greater achievement in drawn and deep stamped work.

An all-steel, fool-proof, simple toggle mechanism insures an absolute rest of dwell—elimination of wasters—perfect timing, silent running, and absolute safety to operator.

Many other advantages worthy of investigation.

60 sizes—single and double crank.

The Toledo Machine & Tool Co., Toledo, Ohio



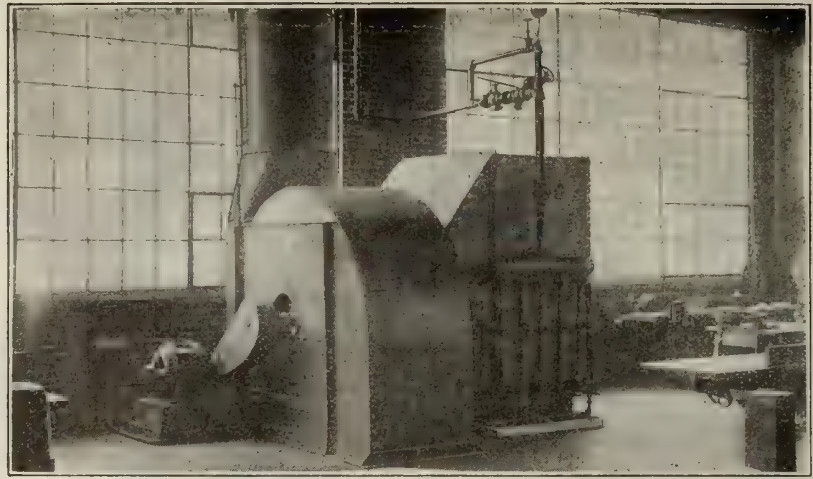
A very rapid worker

In fact the operation of this press is so rapid that it is impossible for human operators to handle the work to and from as quickly as it completes its operations. It is impossible to utilize its full capacity.

"Metalwood" Horizontal Banding Press for Shells from 3 to 5 in.

Press is combination of Hydraulic and toggle with means of adjustment both for amount of pressure applied and stroke. Has six concentric dies coming to a common centre forming a complete circle when closed to required diameter of band.
All working parts are fully enclosed, at the same time easily accessible for changing of dies. Toggles are arranged with adjustment so that pressure delivered on dies can be varied to suit the pressure or pressures applied on hydraulic cylinder. 2,500 lb. approximate pressure required, developing 120 tons on 9" ram.

Metalwood Manufacturing Co.
Leib and Wight Sts., DETROIT, MICH.



"Canadian" Heating and Ventilating Apparatus

More than five times as efficient as direct radiation.
Much lower in first cost, in upkeep and operation costs.
Perfect distribution and diffusion of heat; no overheating.
Provides economically, rightly tempered air.
These are some of the reasons why "Canadian" apparatus will serve you best.
HEATING AND VENTILATING OF INDUSTRIAL PLANTS shows the many advantages of the "Canadian" Fan System. Ask for Catalogue No. 198-16.

Canadian Blower and Forge Co., Ltd., Kitchener, Ont.
St. John Montreal Toronto Winnipeg Vancouver

ACCURACY

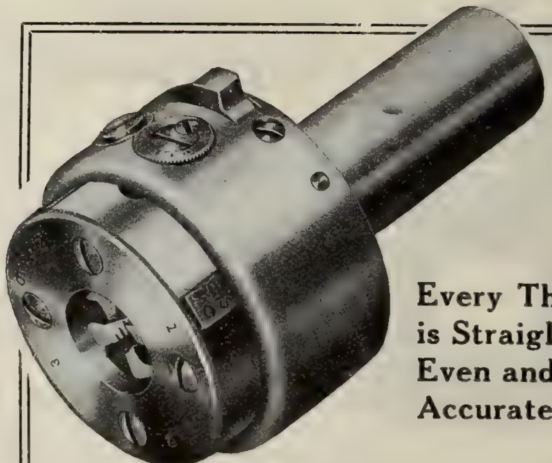
Good screws must have good threads—in both fit and finish.

When nuts are added and drawn up tight, the contact is even. **"GALT"** Cap and Set Screws are always accurate.

Specialists in Cap and Set Screws.

THE
GALT MACHINE SCREW CO.,
LIMITED
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company, Limited, 49 Common St., Montreal Que.



Every Thread is Straight, Even and Accurate

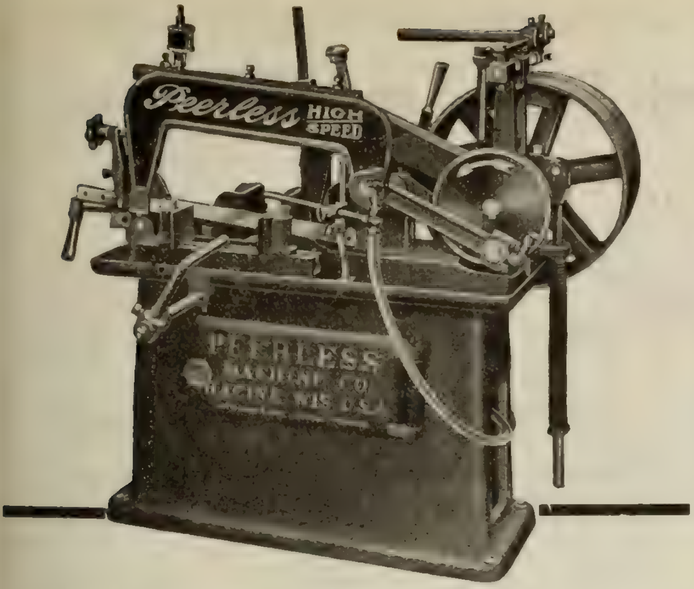
The Chasers in an **H & G Automatic, Self-Opening Die Head** are set and held in place by a steel cam. That cam once adjusted, locks; there is no stoppage or changing in size.

The quick release not only issues the cutting of the thread to a given point every time, but permits cutting right up to a shoulder when required.

Simple, Strong and Compact.

Our booklet tells more. Drop a card for it.

Eastern Machine Screw Corp.
New Haven, Conn.



"100% Better, Faster and More Reliable

than any Sawing Machine we have ever used; we have had almost all makes of Sawing Machines manufactured."

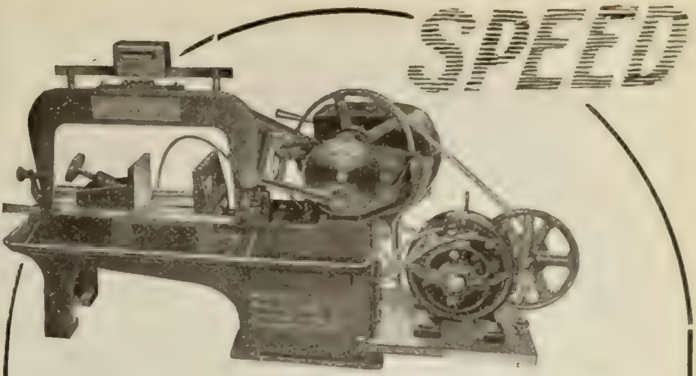
Just what a customer in Toledo, Ohio, reports after a thirty days' trial.

You don't have to take anybody's word for it, try it out under your own conditions. You are under no obligations if it fails—remember we also pay the freight both ways.

Not only 100% more production, but saves 100% floor space. These problems have handicapped many manufacturers for some time. They can now readily be solved by the Peerless High Speed Heavy Duty Metal Cutting Saw.

Write us for complete description and references. Some of these machines may be working in your vicinity.

Peerless Machine Co., 1607 Racine St., Racine, Wis.



and a clean, straight cut

If you're interested in speed and accuracy you'll be interested in the

Racine Metal Cutter

It goes through angle irons, channels, I-beams, die blocks, pipe, tubing, heavy bars, etc., in a way that wins the enthusiastic endorsement of all users. It is in use in many Canadian shops. One Canadian Steel Company purchased 120 Racine Metal Cutters and has effected a saving of $11,019.50, full particulars of which will be given interested parties.

Write for list of Canadian users, and specifications.

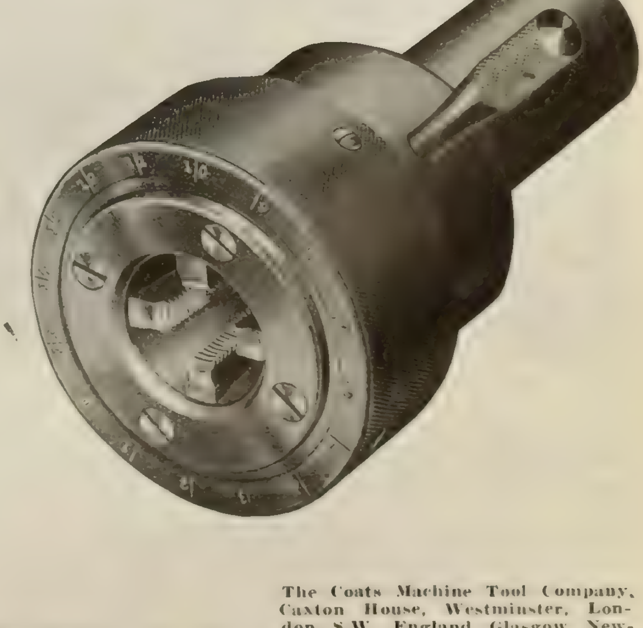
Racine Tool & Machine Co.

15 Melbourne Ave., Racine, Wisconsin, U.S.A.

MURCHEY TAPS AND DIES

Very extensively used on 6-inch, 8-inch and 9.2-inch shells

MAKERS ARE finding that Murchey Collapsing Taps and Automatic Self-Opening Dies are paying propositions on this kind of work. We can tap any size hole from 1 inch to 12 inches. All chasers used on shell work absolutely guaranteed to be made of the highest grade of high-speed steel. Get the benefit of our experience and the experience of some of the biggest shell manufacturers in the country. Let us tell you about the savings. Send blueprints. Write to-day for catalog.



Murchey Machine & Tool Company
DETROIT 75 PORTER STREET MICHIGAN

The Coats Machine Tool Company, Caxton House, Westminster, London, S.W., England, Glasgow, Newcastle-on-Tyne, and Fenwick, Freres & Company, 15 Rue Fenelon, Paris, France.

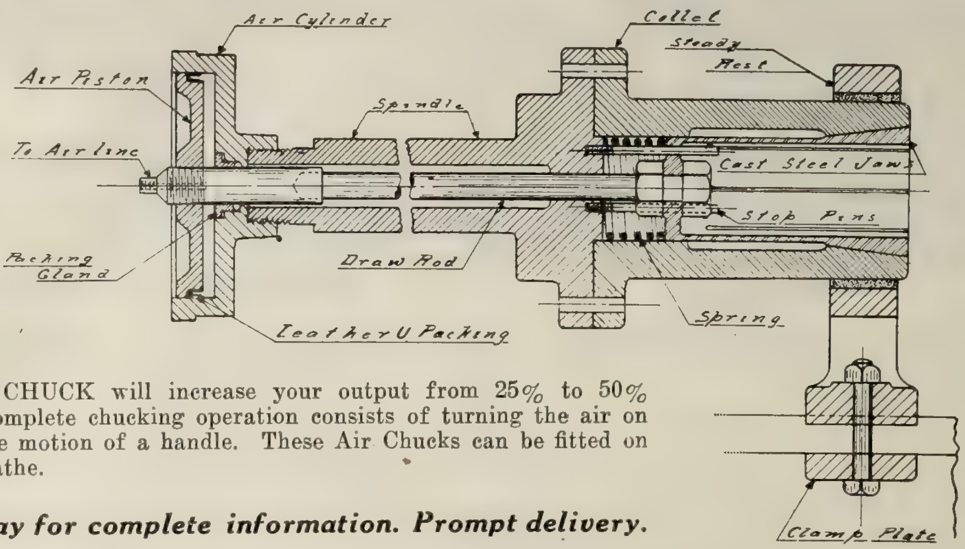
Get Out Your Watch and Time Your Chucking

With most screw chucks you have to use brute force or the hammer to tighten, and even then your shell is not always rigid.

H.E.W. AIR COLLET CHUCK IS RIGID

Saves Time

Saves Money



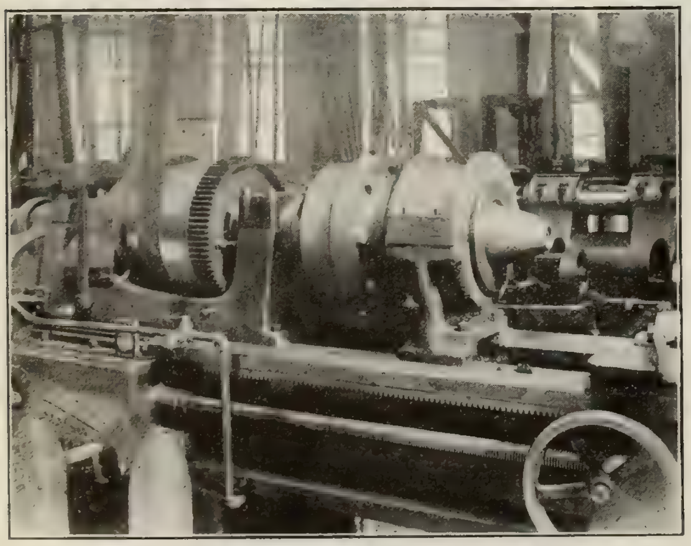
H.E.W. AIR CHUCK will increase your output from 25% to 50% because the complete chucking operation consists of turning the air on and off, by the motion of a handle. These Air Chucks can be fitted on almost any Lathe.

Write to-day for complete information. Prompt delivery.

HYDE ENGINEERING WORKS

P.O. BOX 1164

27 William St., MONTREAL



Cut shows Chuck on nosing operation. This is one of over two hundred in this Canadian plant.

This chuck is *built on the duplicate part system. It is simple, effective and fool-proof.*

It grips the shell in a predetermined position. The jaws will not slip on the shell. It has shell interior and exterior adjustable stops.

A trial on one of your lathes will convince you that this is THE Chuck for shell work.

A Big Efficiency Unit in Your Shell Plant

A. J. LAVOIE'S

LOW PRESSURE

Compressed Air Chuck

This chuck can be applied to any make of lathe, without alteration to the machine, and will increase production from 25% to 75%. It grips and releases the shell while in motion—no need to stop your machine.

It is a single unit combination attached to the face plate of lathe, supported by an additional heavy duty bearing, thus making a heavy duty lathe out of a light machine. A small lever operates the chuck. Will operate with a pressure of 60 lbs. per sq. in.

MANUFACTURED BY

The Montreal General Tool Co.

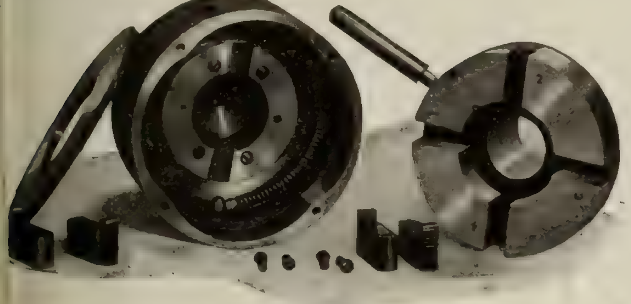
673-5 Notre Dame Street, Maisonneuve, Montreal, P.Q

Also manufacturers of shell tools, and special machine attachments of all kinds made to order.

The "IDEAL" Die for Shrapnel

Quick, accurate work in threading Fuse Plugs for Shrapnel Shells is essential if you would make maximum profits. Your ield is unlimited and your output gov-rns your income. **Why not give the special type "C" Ideal Die a hard trial at this work and see if it will not boost production for you?**

Let the "IDEAL" cut the threads that bind you to low production. They will fit your machines. Circular on request.



"IDEAL" is a *different* die. The head revolves around a stationary cam, thereby utilizing the belt power or cutting strain as opening power. Chasers are supported directly back of cutting strain, which will remove any tendency to bell out and cause taper threads.

The Ideal Tool & Mfg. Company

BEAVER FALLS PA., U.S.A.
A. M. ELLICOTT CO., MONTREAL, QUEBEC
Distributors for Province of Quebec and Ottawa

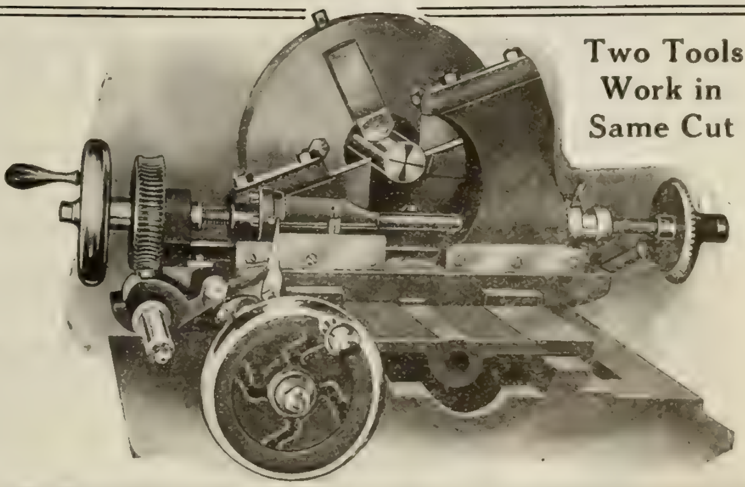
Double-Quick Cutting-Off

THE HURLBUT-ROGERS CUTTING-OFF AND CENTERING MACHINE has the advantage of two cutting tools.

Each tool is rigidly supported in a stationary block at an angle which permits a strong shearing cut.

WITH THIS MACHINE PRODUCTION CAN BE NEARLY DOUBLED, and the utmost accuracy maintained under the hardest of work.

Read full details. Write for catalogue.



Two Tools Work in Same Cut

Hurlbut-Rogers Machinery Company

South Sudbury, Mass., U. S. A.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow, Newcastle-on-Tyne. H. W. Petrie, Toronto, Canada.

VICTOR Collapsible TAPS

Use these wonderfully big time savers.

Remarkably Strong and Durable

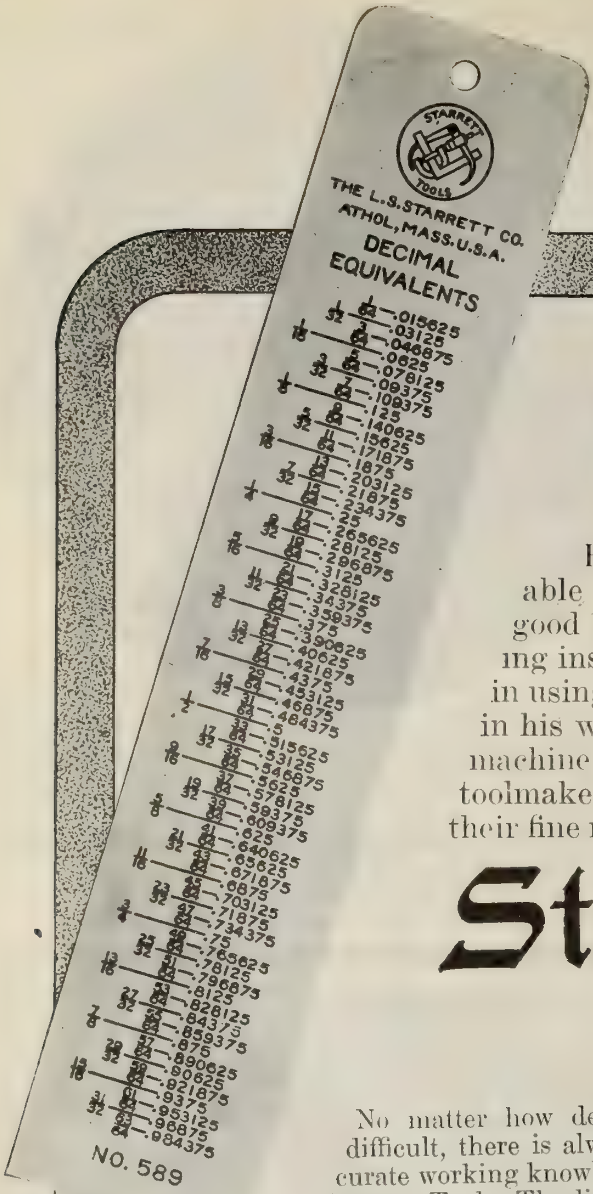
THESE TOOLS ARE EXTENSIVELY USED FOR THREADING SHELLS AND OTHER WORK WHERE CLEAN CUT, ACCURATE THREADS ARE ESSENTIAL.

VICTOR TAPS are made with few parts, have machine steel body, high-speed steel chasers and are simple, strong, durable tools. A set screw adjustment from the front end maintains accuracy, automatic trip prevents spoiled work and there is ample adjustment to allow for wear.

Victor Tool Company

Waynesboro, Pa., U.S.A.

If any advertisement interests you, tear it out now and place with letters to be answered.



THE L.S. STARRETT CO.
ATHOL, MASS. U.S.A.
DECIMAL
EQUIVALENTS

1/64	.015625
1/32	.03125
3/64	.046875
1/16	.0625
5/64	.078125
3/32	.09375
7/64	.109375
1/8	.125
9/64	.140625
5/32	.15625
11/64	.171875
3/16	.1875
13/64	.203125
7/32	.21875
15/64	.234375
1/4	.25
17/64	.265625
9/32	.28125
19/64	.296875
5/16	.3125
21/64	.328125
11/32	.34375
23/64	.359375
3/8	.375
25/64	.390625
13/32	.40625
27/64	.421875
7/16	.4375
29/64	.453125
15/32	.46875
31/64	.484375
1/2	.5
33/64	.515625
17/32	.53125
35/64	.546875
9/16	.5625
37/64	.578125
19/32	.59375
39/64	.609375
5/8	.625
41/64	.640625
21/32	.65625
43/64	.671875
11/16	.6875
45/64	.703125
23/32	.71875
47/64	.734375
3/4	.75
49/64	.765625
25/32	.78125
51/64	.796875
13/16	.8125
53/64	.828125
27/32	.84375
55/64	.859375
7/8	.875
57/64	.890625
29/32	.90625
59/64	.921875
15/16	.9375
61/64	.953125
31/32	.96875
63/64	.984375

NO. 589

Convenient and Durable Tables

Even an expert workman is unable to accomplish much without good machines and accurate measuring instruments. Part of his skill lies in using the instruments to guide him in his work at the bench or with a machine tool. The country's ablest toolmakers and machinists rely for their fine measurements on

Starrett Tools

No matter how delicate the job, nor how difficult, there is always a way to get an accurate working knowledge by the aid of some Starrett Tool. The line includes:

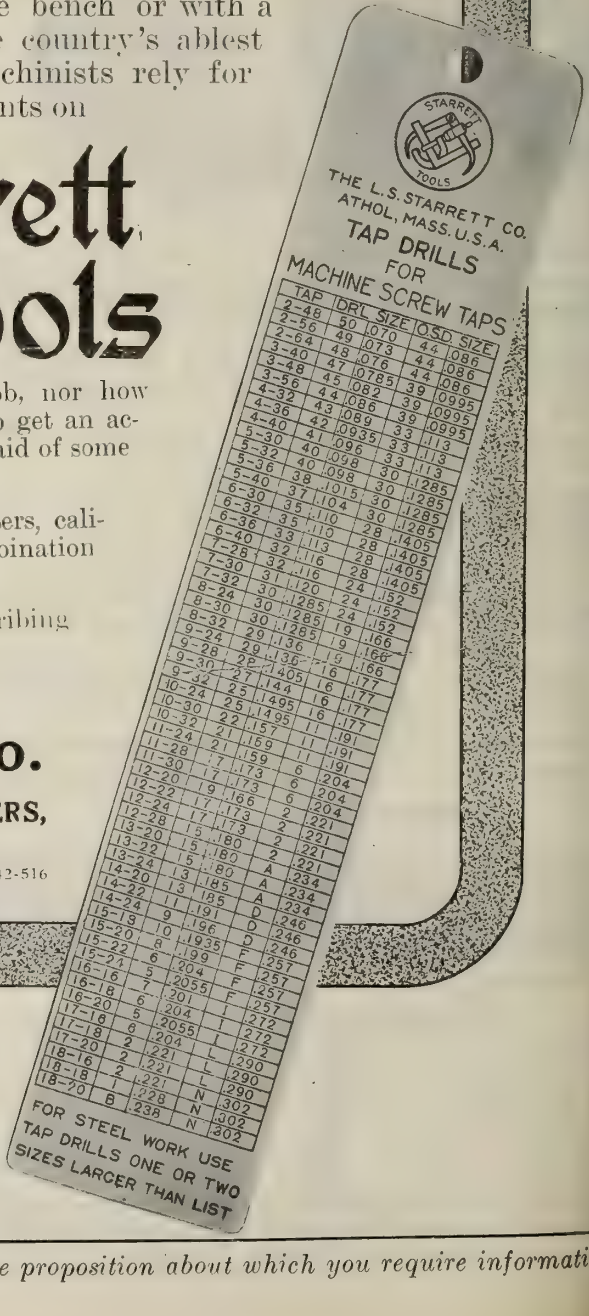
Rules, squares and levels, micrometers, calipers and dividers, surface edges, combination sets, depth and height gages, etc

Send for free catalog No. 21:3 describing the whole line.

The L. S. Starrett Co.

The WORLD'S GREATEST TOOL MAKERS,
Athol, Mass.

42-516



THE L.S. STARRETT CO.
ATHOL, MASS. U.S.A.
TAP DRILLS
FOR
MACHINE SCREW TAPS

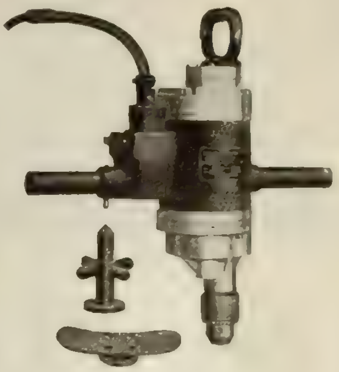
TAP	DR'L SIZE		O.S.D. SIZE	
2-48	50	.070	44	.086
2-56	49	.073	44	.086
2-64	48	.076	44	.086
3-40	47	.0785	39	.0995
3-48	45	.082	39	.0995
3-56	44	.086	39	.0995
4-32	43	.089	33	.113
4-36	42	.0935	33	.113
4-40	41	.096	33	.113
5-30	40	.098	30	.1285
5-32	40	.098	30	.1285
5-36	38	.1015	30	.1285
5-40	37	.104	30	.1285
6-30	35	.110	28	.1405
6-32	35	.110	28	.1405
6-36	33	.113	28	.1405
6-40	32	.116	28	.1405
7-28	32	.116	24	.152
7-30	31	.120	24	.152
7-32	30	.1285	24	.152
8-24	30	.1285	19	.166
8-30	30	.1285	19	.166
8-32	29	.136	19	.166
9-24	29	.136	16	.177
9-28	28	.1405	16	.177
9-30	27	.144	16	.177
9-32	25	.1495	16	.177
10-24	25	.1495	11	.191
10-30	22	.157	11	.191
10-32	21	.159	11	.191
11-24	21	.159	6	.204
11-28	17	.173	6	.204
11-30	17	.173	6	.204
12-20	19	.166	2	.221
12-22	17	.173	2	.221
12-24	17	.173	2	.221
12-28	15	.180	2	.221
13-20	15	.180	A	.234
13-22	15	.180	A	.234
13-24	13	.185	A	.234
14-20	13	.185	D	.246
14-22	11	.191	D	.246
14-24	9	.196	D	.246
15-19	10	.1935	F	.257
15-20	8	.199	F	.257
15-22	6	.204	F	.257
15-24	5	.2055	F	.257
16-16	7	.201	I	.272
16-18	6	.204	I	.272
16-20	5	.2055	I	.272
17-16	6	.204	L	.290
17-18	2	.221	L	.290
17-20	2	.221	L	.290
18-16	2	.221	N	.302
18-18	1	.228	N	.302
18-20	B	.238	N	.302

FOR STEEL WORK USE
TAP DRILLS ONE OR TWO
SIZES LARGER THAN LIST

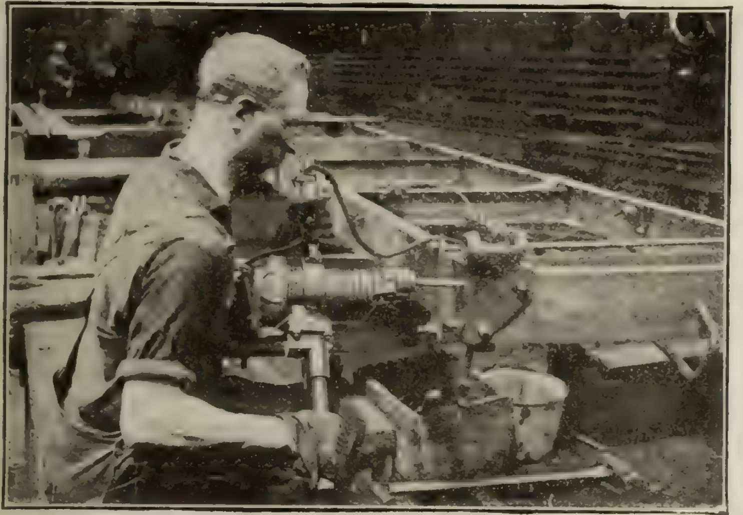
If you have to drill holes

you can effect a saving of time by using

Van Dorn Portable Electric Drills



You cannot afford to be without these "hard service" tools—the tools that stand up under work—that send other makes to the scrap heap.



Van Dorn Electric Tools are built to stay on the job continuously, and they do.

They pay for themselves many times over.

Tell us what your work is and we will quote you on a tool that will stay out of the repair shop.

Ask us for illustrated catalog.

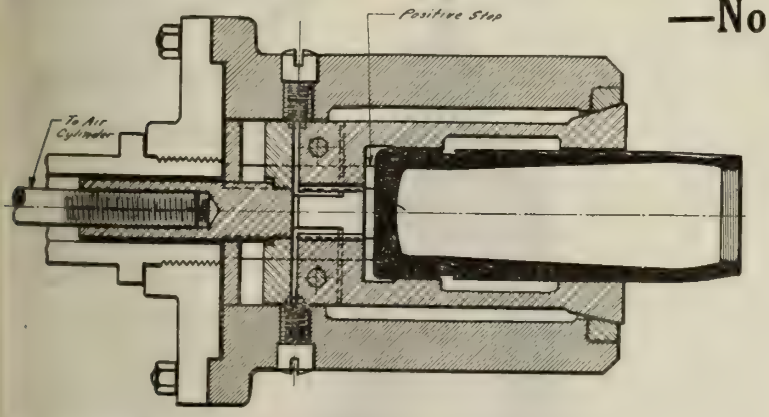
R. E. T. Pringle, Ltd.

Manufacturers' Agents

OFFICES:

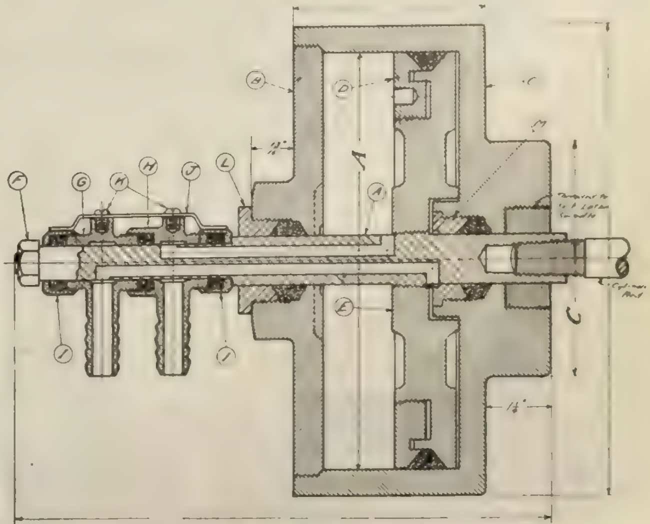
Tyrrell Bldg., 95 King St. E., Toronto

809 Unity Bldg. - Montreal, Que.
3402 Osler Ave. - Vancouver, B.C.



—No Time Consuming and Production Delaying Adjustments Here

M. E. C. Hinge Collet Chucks, operated by compressed air, are opened and closed in one-tenth the usual time. They hold the job in a positive rigid grip without the slightest need for adjustment; no wrench is required and the operator does not leave the front of the machine.



M. E. C. Air Cylinders
Embody every strong feature consistent with modern requirements. Construction of piston permits adjustment, preventing unnecessary loss of air.

No Manufacturer who is desirous of increasing production can fford to be without

M. E. C. TOOLS

We are anxious to have you demonstrate in your own plant just what M. E. C. Tools will accomplish for you.

Manufacturers Equipment Company

75-179 North Jefferson St., CHICAGO, ILL.

oreign Agents: C. W. Burton Griffiths & Co., Ludgate Square, Ludgate Hill, London, England.
anadian Agents: A. R. Williams Machinery Co., Ltd., Winnipeg, Man.;

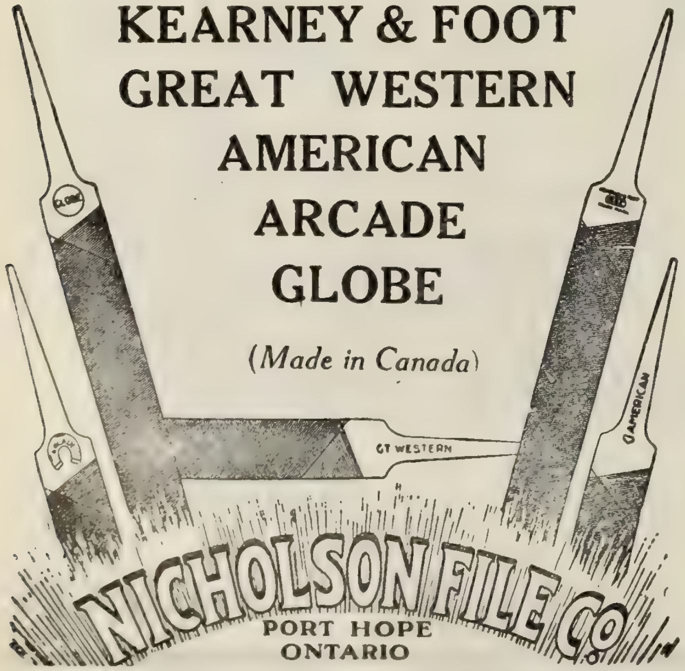
The "Famous Five" Files

are cut from special steel, made to our own formulas, which formulas have proven best after years of investigation and practical experience.

The "heat treatment" of the steel differs for various grades of Files, and the teeth are especially adapted to the kind of work they are intended for.

Among the "Famous Five" there is an exact type of File for your grade of work. Specify it when you order.

The "Famous Five" Are:

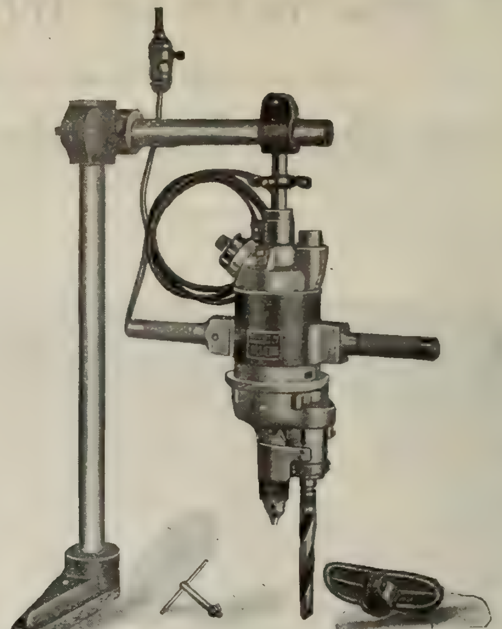


KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(Made in Canada)

NICHOLSON FILE CO.
PORT HOPE
ONTARIO

Stow Two Speed Two Spindle Drill

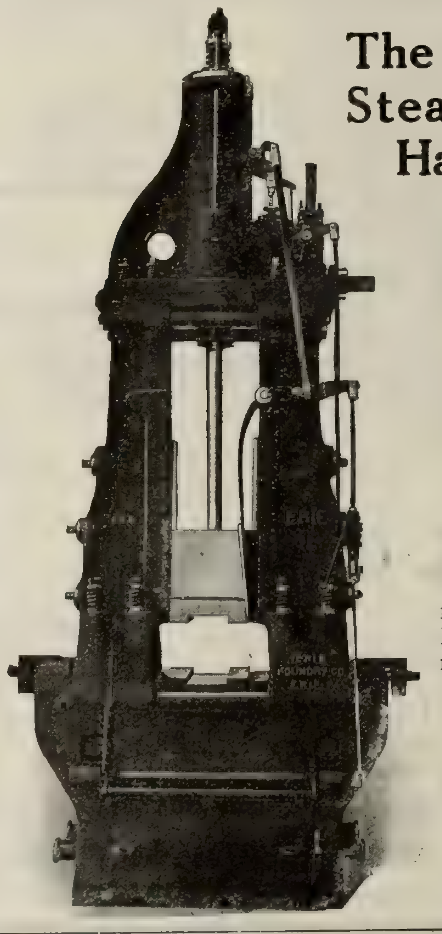


The only tool of its kind on the market. Fills a long-felt want. Will cut your cost.

We make drills of every size.

STOW MFG. CO., Binghamton, N.Y., U.S.A.
London, England, Stock: 85 Queen Victoria Street
Oldest Portable Tool Manufacturers in America.

The "ERIE" Steam Drop Hammer



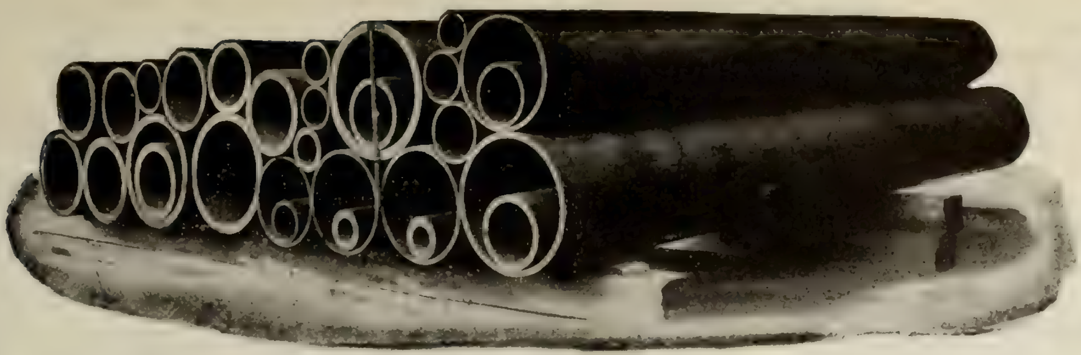
is the last word in Hammer construction. Ask any user.

A list will be supplied upon request.

We also build Trimming Presses.

Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

Erie Foundry Co.
ERIE, PA.



READY TO SAVE YOU TIME

Why waste time turning and boring tubular shapes from solid stock? You wouldn't forge or machine merchant bars, because it wouldn't pay. And it doesn't pay to bore out bushings, or collars, or lathe-spindles, or several hundred other tubular articles, because Shelby Seamless Steel Tubing can be procured in almost countless sizes and thicknesses, hard, medium, or soft, and in almost any length, READY for use, and cheaper than you can make an equivalent form in your own shop.

The WORKABILITY of Shelby Cold Drawn Tubing is remarkable: it is surprisingly tough and ductile, otherwise it could not be drawn cold. It is capable of many different anneals, and can be case-hardened. It machines readily, takes an excellent polish, can be brass or copper-plated, nickeled or oxidized, and withal is made in so many different sizes and thicknesses that it is simply old-fashioned and wasteful to neglect its many advantages.

Examine the range of sizes shown in this small group; think of the wasted labor in attempting to duplicate sections of these in a machine-shop and finally compare prices which we quote on application.

We have the ONLY STOCK in Canada of

SHELBY SEAMLESS STEEL TUBING

Over 350 sizes—⅛ to 5½ inches O.D.

Wire your order—we will Ship the Same Day.
Send for Price List and Descriptive Catalogue.

LYMAN TUBE & SUPPLY CO., Limited

MONTREAL
323 St. James Street

TORONTO
33 Melinda Street

CUT GEARS

CUT GEARS

This Shop Specializes in Good Cut Gears

Note our Shop Capacities:—

Spur Gears up to	91 ins. diam.
Bevel Gears up to	62 ins. diam.
Worm Gears up to	108 ins. diam.
Helical or Herringbone up to	36 ins. diam.
Racks	up to 10 ft. length

Write for Quotations.

Hamilton Gear & Machine Co.

COR. CONCORD & VAN HORNE **TORONTO**

—laces a 6-inch Belt in THREE minutes

CLIPPER Belt Lacer

Laces any width or thickness. You don't have to remove belt from shaft, as this small 19-lb. machine is carried to the belt and the work done on the floor.

Saves man-time, machine-time, and money, and you get a better joint.

Adapted to all makes of belting.

33,000 now in use all over the world.

Sent on 30 days' free trial. Here's your opportunity to prove for yourself, on your own plant — that the "Clipper" is the **only** belt lacer you can afford to use.

FOR SALE BY ALL LEADING SUPPLY HOUSES IN CANADA.

Clipper Belt Lacer Company

1 Front Ave., Grand Rapids, Mich.

Type 2 One Way

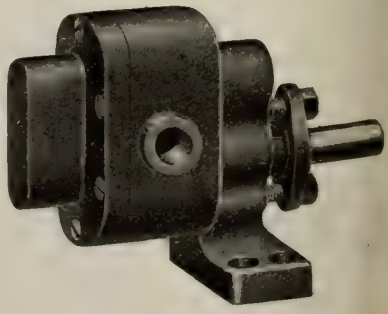
A Tip

Here's a tip for the progressive foreman or manager.

Roper Circulating Pumps will give you a simpler, cheaper and more effective way for delivering lubricant on machine tools. They eliminate separate relief valves and the piping that goes with them.

The pumps shown are for machines which run in one direction only. We also make a reversing pump for machines where tools operate with the spindle running in both directions.

Full particulars, sizes and prices are given in our bulletin. May we send you a copy?



Type 1 One Way

C. F. Roper & Co.

Hopedale, Mass.

"Made on Honor"

LEVIATHAN AND ANACONDA
ELEVATING
TRANSMITTING
CONVEYING
BELTING

This is our obligation. Hold us to it. We guarantee at least dollar for dollar service compared with any other belt you have ever used—actually.

Leviathan and Anaconda

may be depended upon to give you considerably more than this in Service, with an additional saving in time and attention.

Let us help you solve your belting problems.

Main Belting Co. of Canada
Limited
10½ St. Peter St., Montreal

WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE

To the Shell Manufacturer:

Use

Economic Shell Washer

If you wish to wash your shells quickly and cheaply; it will remove all grease, oil, lead, etc., and makes the shells easy to lacquer.

Made in Canada by

Canadian Economic Lubricant Company, Limited, Montreal

CHAPMAN

DOUBLE BALL BEARINGS

Chapman Double Ball Bearings fit any adjustable hanger and the change can be made with but little delay to you.

Used in over 2,000 Canadian Factories. They have other good points too. Ask us to send full details.

The ordinary line shafting consumes from 15 to 60 % of power developed—

But the line shafting that's equipped with Chapman Double Ball Bearing will save 75 per cent of the friction loads making an average total saving of power from 15 to 30 per cent.

The Chapman Double Ball Bearing Company of Canada, Ltd.
339-351 Sorauren Ave., TORONTO, Canada

TRANSMISSION BALL BEARING CO., Inc.
32 Wells St., Buffalo, N. Y.

"W. & B." Drop FORGINGS

¶ We make a specialty of the highest grade Drop Forgings. Our exceptional capacity and equipment insure accurate forgings and prompt delivery.

The
Whitman & Barnes Manufacturing Co.
Established 1854
St. Catharines, Ontario

Send us Blue Prints on Special Forgings, three pounds and under in weight, and permit us to estimate on your requirements.

Montreal Machinery & Supplies, Limited

504 McGill Bldg., **MONTREAL, QUE.** 211 McGill Street

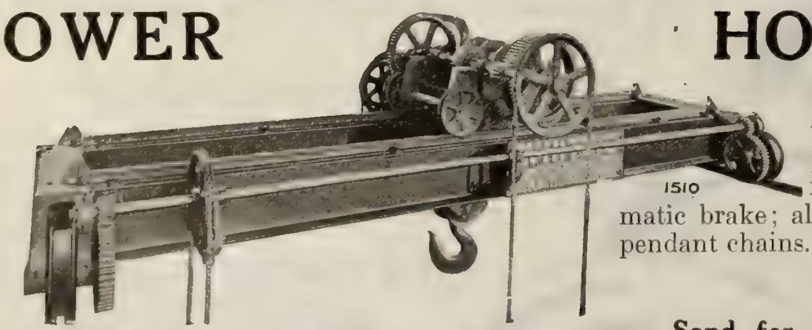
CONSULT US FOR REQUIREMENTS OF

Machinery, Machine Tools, Factory & Mill Supplies

We make a specialty of designing and equipping complete munition plants. Our facilities in this connection will make our service of value to you,

WATCH OUR ADVERTISEMENT FOR FURTHER ANNOUNCEMENTS.

POWER HOUSE CRANES

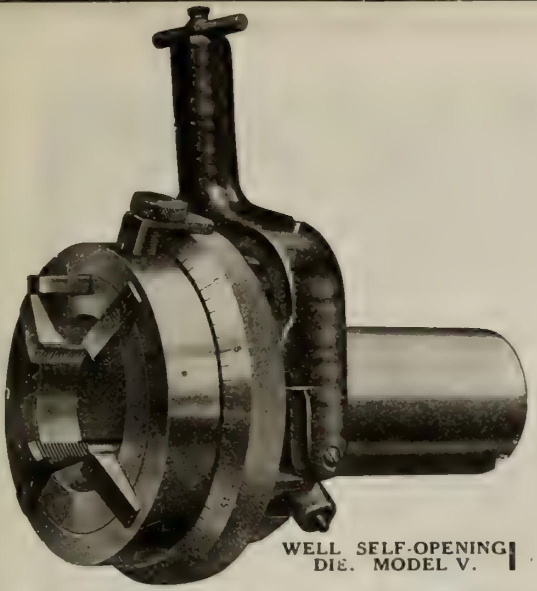


Our "Rope-Drum Hoist" crane illustrated here is especially useful in power houses, a large number being in service today. Two speeds; automatic brake; all movements operated from floor by pendant chains.

Complete Foundry Equipments
CRANES OF ALL TYPES

Send for crane Catalog No. 110.

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U. S. A.
CHICAGO SUBURB.



WELL SELF-OPENING DIE. MODEL V.

A large Stock of these Dies in stock for Immediate Shipment

Our line includes taps, dies, screw plates, gauges, reamers, threading machines, etc

Send for our general catalog — contains tables, of valuable information for producers of screw threads.

Wells Bros. Co. of Canada, Ltd.

GALT, ONTARIO

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conditions incident to the application of power rise up to hinder; but the

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is daily becoming a more important feature in the operation of all machine shops. With its increasing importance comes also a better understanding of the necessity for the **right** grinding wheel. For instance, 46 grain Vitrified Alundum wheels, grade K to L, can now be regularly recommended for twist drill grinding, while one of the most popular wheels for gear cutter grinding is Alundum 3446-K.

The subject of Tool Room Grinding has been treated in the recent issues of "Grits and Grinds"—may we send you the back copies?

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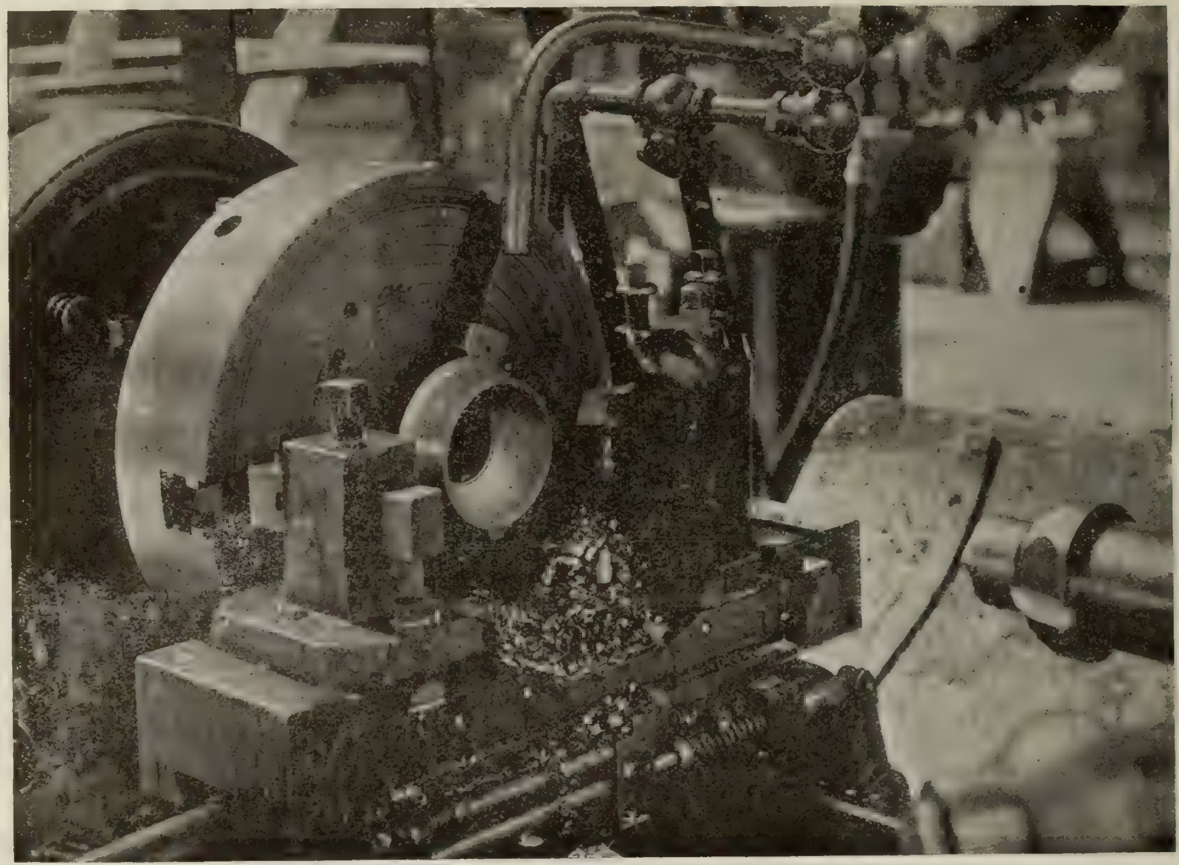

Manufacturing Plant Equipment

4—Small Tools

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Machining the 4.5 in. Mark V. Howitzer Shell

Staff Article

Shell production in a variety size and type continues to monopolize the activities of Canadian metal-working plants, large and small, and indications are not lacking that for many months to come this state of affairs is likely to prevail. Experience in the field has, as was to be expected, led to developments in projectile design, and this in turn has given increased opportunity and scope for the exercise of greater operative skill and ingenuity.

ALTHOUGH 4.5 in. high explosive shells have been manufactured in this country for over a year, the methods now in use at the various plants are not in all cases the same as originally adopted. During the intervening period experience has taught many lessons, and methods of manufacture have consequently improved. The necessity of increased production has been the chief inspiration for greater effort and inventive genius. New ideas have been evolved, and many of the operations simplified. Since the manufacture of 18-pdr. high explosive shells was abandoned, many plants have been changed over to the production of 4.5 in., while others have been specially equipped for producing this type of shell. The plant which is the subject of this article comes within the latter category.

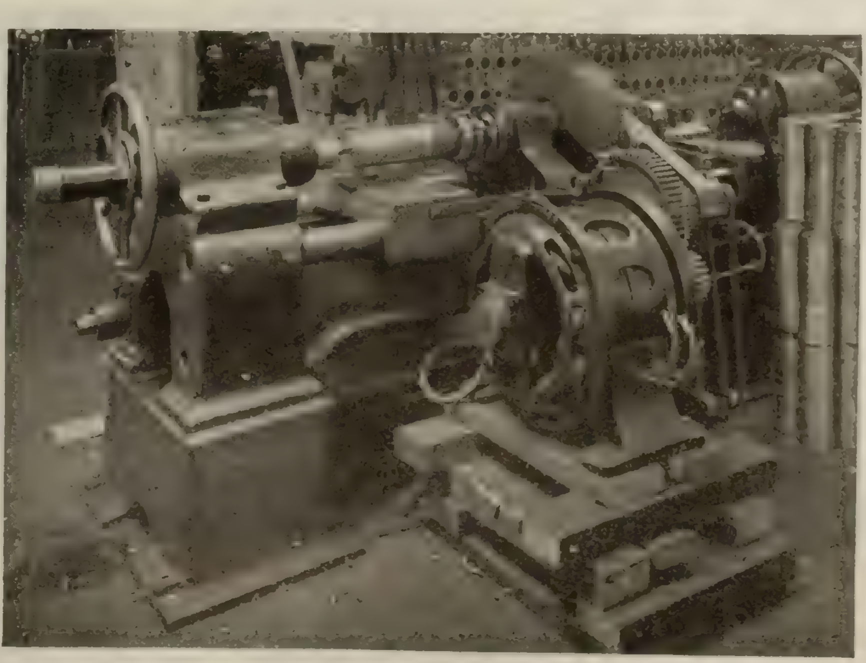
The 4.5 inch high explosive or howitzer shell is made from a forging 4.8 inches diameter and not less than 13¾ ins. long. The steel billet from which the forging is formed is also 4.8 ins. diameters, but only 11½ ins. long, and weighing 49 pounds. The forging is, of course, hollow and the sides parallel. The weight of the finished shell is 35 pounds, including the bursting charge (T.N.T.) of 4 pounds. As in all shells, the finished weight must be within fine limits, the latitude allowed on the 4.5 in. shell being plus or minus 9 drams. This being the case, great care has to be exercised during all operations involving the removal of metal, and this calls for careful inspection in order to catch any error at the completion of each operation. A good method adopted in order to simplify the weight adjustment, and one which is used at this plant, is to leave the base, during the earlier operations, a little in excess of the high limit, so that any extra weight can be removed from the base if the walls of the shell happen to be too heavy. Comparatively little metal has, however, to be removed from the base, and enough to ensure the weight being within the prescribed limits.

Cutting Off and Centering

The first operation consists of cutting off the open end of the forging to an appropriate length, this being followed by facing up the base. Both of these operations consist of roughing cuts done on the same type of machine, and do not call for special mention. Three cutting-off machines are installed for the purpose, two being of Martin Pump & Machine Co., Toronto, make, and one by John H. Hall & Son, Brantford, Ont. Centering the base is done at the third operation. This centre is retained in the shell through all the various operations until the base recess is formed. This is done to ensure that the walls of the shell are concentric, a feature in the manufacture that has to be carefully watched. The centering operation is done on a vertical drill fitted with a jig holding the forging steady and locating the countersink drill in the correct position. The jig has a vertical mandril for holding the forging, while on the top is a hinged plate, which rests on the base of forging, having a hole for guiding the drill.

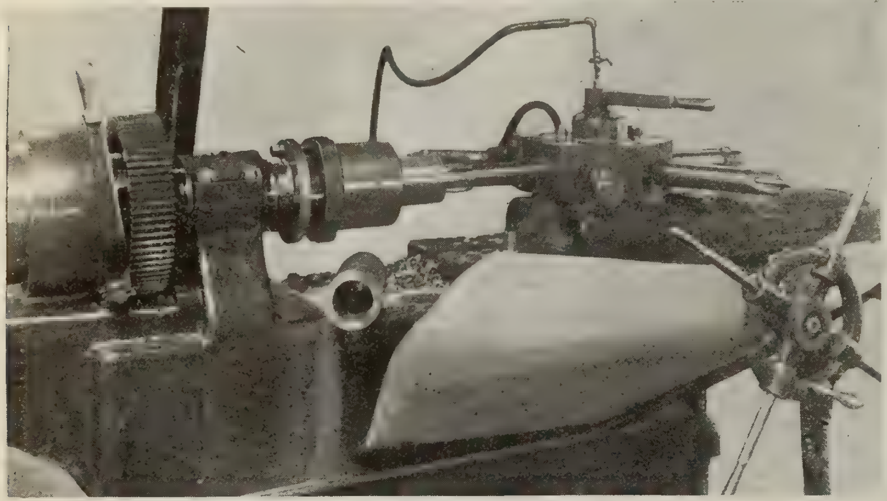
Rough Turning Outside Diameter

The fourth operation is rough turning the outside diameter of forging. For this work two lathes by the Dunlap Mfg. Co., Columbus, Ohio, are installed, and also a special single purpose lathe supplied by the Dominion Machinery Co., Toronto. In the former lathes, the forging is held on an expanding



ROUGH TURNING SHELL BODY ON "DOMINION DUPLEX LATHE.

mandril fitted with a draw-back mechanism operated by a hand wheel. The base is held by the centre in the tailstock. One complete roughing cut is made, followed by another cut from the base for rather more than half the length of the shell. The body of the rough turned shell has now two diameters, the half of the shell next the base having enough metal left for a finishing cut at a later stage, while the other half of the shell is left somewhat larger so as to have a safe margin of stock to allow for any variation on the profile of the nose after nosing-in. The single purpose lathe mentioned above has a central headstock and two tailstocks, one on either side. At each side of the headstock is a clutch and chuck permitting either half of the lathe to operate independently of the other. The chuck is of special design, and has a square slot for driving the expanding mandril. The mandril consists of a series of rollers, which ride up on friction blocks inside the fixture, when it is revolved in one direction. When in operation, the tendency is for the rollers to be forced out, thus holding the shell firm. The lathe is motor-driven.



BOTTOMING AND BORING INSIDE DIAMETER OF SHELL.

Inside Bore Roughing and Finishing

Inside boring is the next operation, one "Davis" turret lathe and four boring machines, built by the Martin Pump & Machine Co., being installed for this purpose. Each machine has a three-jaw sleeve chuck fitted with a tightening device operated by a push rod in the headstock spindle by means of a hand wheel. The turret holds five tools. The first tool rough bores the straight part of shell, while the second is the first bottoming tool which roughs the inside of base. The third is the finish bottoming tool, while the fourth reams the bore, finishing the inside operations. The fifth tool faces up nose end of shell, the cut being regulated by a bar which comes up against the bottom of bore and so controls depth of cut.

Rough Facing Base and Hogging Nose

The base is now rough turned to a definite thickness in relation to the bottom of bore. This is done on a facing lathe built by the Martin Pump & Machine Co. The shell is held on an expanding mandril, while a carrier also helps to support the shell. The tool holder is a simple mechanism made for the purpose, and is mounted on a cross slide. At the seventh operation, the corner of the nose outside is turned off or hogged to facilitate the nosing-in operation. A machine similar to the above, and made by the same firm, is used. In this case the shell is held in a collet chuck built in the headstock. This type of chuck was designed and made by the Martin Pump & Machine Co., and is fitted to a number of machines which that same firm installed at this plant. The chuck is really part of the headstock and consists of a steel sleeve, parallel inside for holding the shell, but having the front part tapered on the outside. This part of the sleeve has a series of narrow slots which allow it to grip the shell when pushed forward into the circular cone-shaped casting attached to the lathe head. The push rod which forces the sleeve forward by means of a circular steel plate is operated by a hand-wheel at the end of the headstock.

Heating and Nosing-in

What might be termed the first series of operations have now been completed, and the shell is now ready for nosing-in. The shells are heated in a "Mecol" oil-fired furnace, built by the Mechanical Engineering Co., Montreal. Five shells can be heated at one time, about half the shell only being heated. The shells are placed in the holes, nose first, and remain there about one minute, when they are taken out, one at a time, and carried to the nosing press alongside. Draft for the furnace is supplied by a blower.

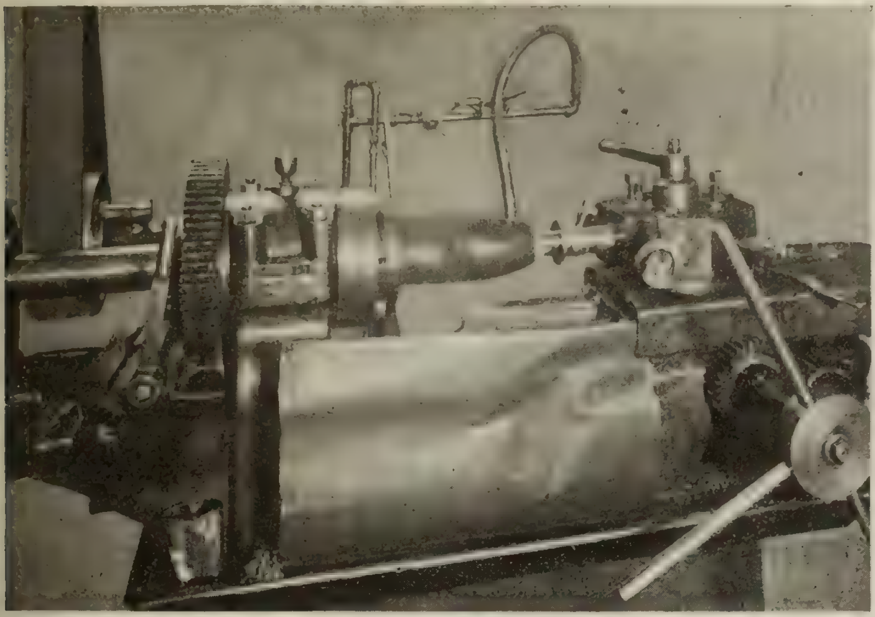
The hydraulic press was built by the William R. Perrin Co., Toronto, the power being obtained from a belt-driven vertical triplex pump supplied by the same firm. The die for closing in the nose is located in the top of the press, the shell being placed on the table above the ram and forced into the die. At the conclusion of this operation, the shell is placed nose down in powdered asbestos so that it may cool gradually, and not be too hard for the machining operations which follow.

Boring and Reaming Nose

After nosing-in, the shell is brought back to the machine shop for the next operation—the tenth—which consists of boring and reaming the nose preparatory to threading. A Martin Pump & Machine Co. turret lathe is used for this operation, the machine being equipped with a

"MECOL" FURNACE FOR HEATING SHELLS PREVIOUS TO NOSING-IN OPERATION.

collet chuck of the same type as has already been described. The tools are in the turret and the operations are performed in the following order:—Face nose with a cutter at the base of a gauge bar; bore nose with an ordinary boring bar and tool; rough ream, and finish ream.



SHELL NOSE THREADING AND FUSE SEAT FORMING ON "MARTIN" TURRET LATHE.

Inside Profile

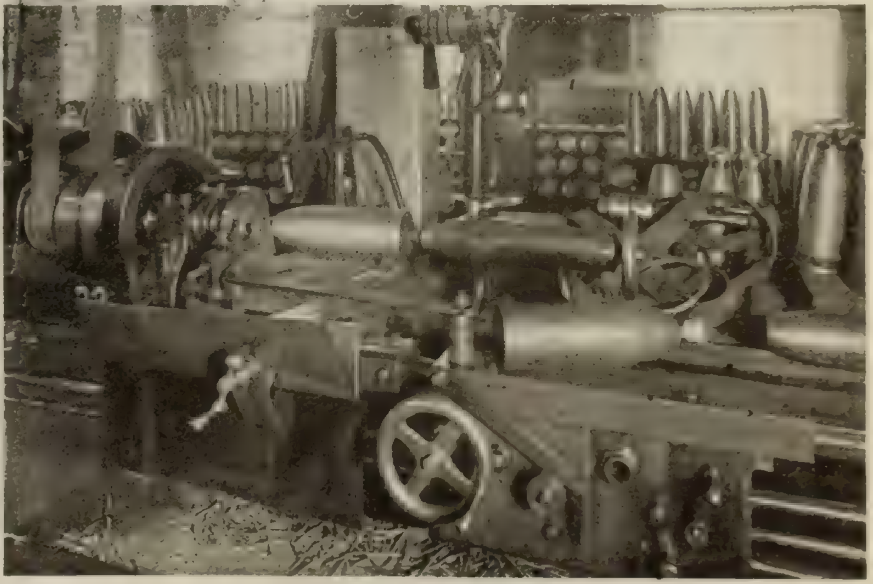
The eleventh operation consists of forming the inside profile, which is that part of the nose at the back of the thread. The profiling is done on a similar machine to that in the previous operation and made by the same firm. The turret, however, is removed, a bracket mounted on the saddle for holding the tool being substituted. The tool or cutter is of such a shape so as to form the correct profile. It is fixed to a bar and fed through into the nose by hand, and brought in contact with the inside of shell. The shell is next taken to an adjoining machine to have the nose threads cut.

Threading Nose and Forming Bevel

The twelfth operation is threading the nose and forming the bevel or fuse seat. This operation is done on a Martin Pump & Machine Co. turret lathe fitted with their standard collet chuck. The turret has four tools—a reamer, a cutter for forming the bevel, and two "Murchey" collapsible taps. The reamer is not always used, as the hole has been reamed at an earlier stage. As a general rule, the bevel is first formed, followed by the first tapping, the second tap being run through afterwards.

Finish Turning Outside Diameter

The thirteenth operation is finish turning the outside diameter, including the outside profile. For this operation there are installed two engine lathes built by the Hamilton Machine Tool Co., Hamilton, Ohio, each lathe being fitted with a profiling fixture mounted on the carriage. A threaded centre with a square box which fits in the chuck is screwed into the shell nose, while the base is carried in the tailstock centre. The profiling fixture which carries the tool post is in the form of a quadrant, and is mounted pivoted to it at the back. The fixture is operated by means of the carriage and a bar attached to the first carriage and apron of the second carriage which is driven by the feed screw along the front of the lathe. The tool starts cutting at the nose end and travels in a curve to conform with the desired profile. The first carriage is stationary, while the second travelling along draws the fixture holding the tool part until it comes up against a stop. At this stage both carriages travel in unison, and the tool, therefore, moves in a direction parallel to the horizontal axis, finishing the straight part of the shell after the profile has been completed.



FINISH TURNING OUTSIDE DIAMETER OF SHELL ON "HAMILTON" ENGINE LATHE.

Rectifying and Trimming Base

At this stage of manufacture, the shells are carefully inspected and gauged for correct inside profile threads, etc. Sometimes slight errors are detected, which can be easily corrected, the operation being called rectifying. This is done on a Hamilton Machine Tool Co. engine lathe fitted with a turret containing a set of tools of the same type as have already been employed. After being gauged again, the shells move along to the next operation.

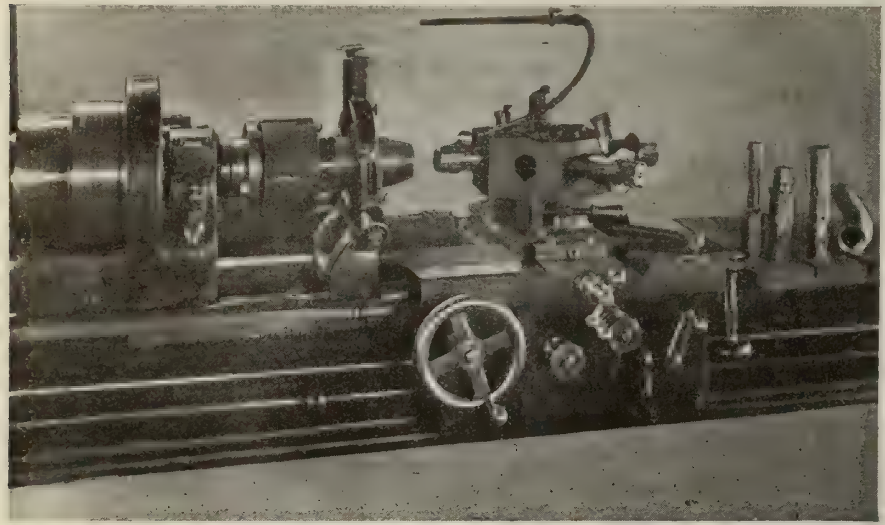
Facing or trimming the base to weight has already been referred to. The operation is performed on a Martin facing lathe, the same type of machine as used for facing up the base at the sixth operation.

Grooving and Waving

The fifteenth operation is cutting the groove for the copper band, waving and undercutting. Two machines are installed for this purpose, both fitted with a Martin waving attachment as shown in the illustration. The attachment is equipped with the usual three tools, grooving, undercutting, and waving, used in the order named. The waving tool is operated by a cam on the face of the chuck by means of a bar through the attachment. The bar is adjustable to locate the tool in the correct position; there is also a spring to keep the roller up against the cam. The attachment has a gauge to locate the grooving tool in the correct position in relation to the base of shell. The shell is held in the machine the same way as in the outside finishing operation. Three waves are cut for the 4.5 in. shell.

Machining and Threading Base Recess

There now follows a series of operations on the base which form a distinctive feature in the production of the smaller sizes of high explosive shells. These operations consist of roughing out the base recess, undercutting, threading, screwing in the base plate, and facing up the base. The first thing to be done is to form the recess on a Martin turret lathe. The shell is held in a collet cluck and is supported at the base end by a carrier. In the turret are two end mills for roughing and finishing the recess respectively.



RECTIFYING OPERATION ON INSIDE PROFILE, NOSE BEVEL, AND THREAD; HAMILTON ENGINE LATHE.

The next and seventeenth operation is to undercut the base recess preparatory to threading. This is done on a milling machine designed for this particular purpose and built by the Martin Pump & Machine Co. This machine is very similar to the one in which the threading operation is done, the chief difference being in the form of cutter used. The shell is carried in a sleeve on the head, and revolves once, slowly, while the undercutting is being done. The cutter has an independent drive and forms two undercuts, one at the bottom of the recess and one at the edge. The undercutting is done to facilitate the threading operation.

At the next operation, the threads in the base recess are milled in a Holden-Morgan Co. milling machine. The shell is held in the hollow spindle which makes one slow revolution, being operated by worm and wheel driven from the countershaft above. The milling cutter is held in a bracket and has an independent drive. When this operation has been completed the shell is taken out to another machine to have the bottom of recess faced up, making the nineteenth operation.

A machine somewhat similar to the one just described is used for this operation, but is of simpler design and has no milling attachment. The shell is held in a hollow spindle, but has no feeding arrangement as in the case of the milling machine. In place of the milling attachment is an ordinary facing tool in a tool post on the cross slide. The next operation is to drill the grub screw hole in a vertical drill press, the hole afterwards being hand-tapped on a bench adjoining the drill. The shell is now inspected, particular attention being paid to the base recess before the base plate is screwed in.

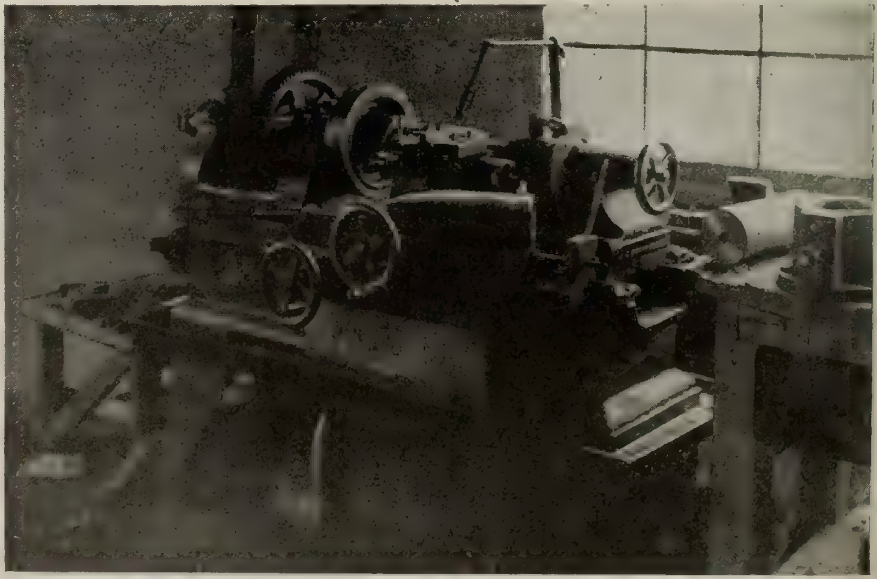
Before being screwed into the base recess, the base plates are painted with a special composition or cement. The machine , used for this operation is mounted on a table, the shell being securely held in a vise. By means of a train of gear wheels the operator can exert considerable twisting force which screws the base plate home and then twists off the square end of plate. This saves one operation, as in some shops the square end is cut off either on a saw or in a milling machine.

The twenty-second operation consists of riveting or peining the base plate. The machine used is a power hammer supplied by the High Speed Hammer Co., Rochester, N.Y. The shell is placed nose down over a vertical spindle on the table, swung under the hammer and turned slowly by the operator while the hammer is operating. The hammer strikes on the outside edge of the base plate, thus securing it firmly in the base recess.

The shell is next taken over to a machine to have the base faced up and finished. The machine used is a Martin facing lathe. Two cuts are taken, roughing and finishing. The series of operations on the base being now completed, the shell is again inspected, after which the necessary markings are stamped on the base and outside diameter. The waves are also nicked with a cold chisel and the nose tapped.

Copper Band Pressing On and Turning

The twenty-sixth operation is pressing on the copper band into the groove already prepared for it. The copper band is placed in the groove and the shell inserted in the hydraulic banding press. The press was built by William R. Perrin & Co., as was also the triplex pump supplying the necessary pressure. The shell is placed nose down on a bracket to which a weight is attached to assist the operator in placing the base of shell in the die which is in the top of the press. The pressure is applied



GROOVING, WAVING AND UNDERCUTTING EQUIPMENT FOR COPPER BAND GROOVE; "MARTIN" MECHANISM.

three or four times, the shell being turned to ensure equal distribution of pressure on the band.

The copper band is now finish-turned on a machine built by the Martin Pump & Machine Co. The shell is held at the base by a chuck fitted with a drawback tightening arrangement, while the nose is carried in a cup-holder on the tailstock, the cup-holder being supported by a carrier. On the cross slide are mounted a roughing tool located under the work, a forming tool at the front, and a finishing tool on a fixture at the back. The forming tool travels at right angles to and rough turns the copper band. The forming tool then does its work followed by the finishing tool at the back. The finishing tool is fed by a hand lever, and travels down and past the copper band, just shaving it.

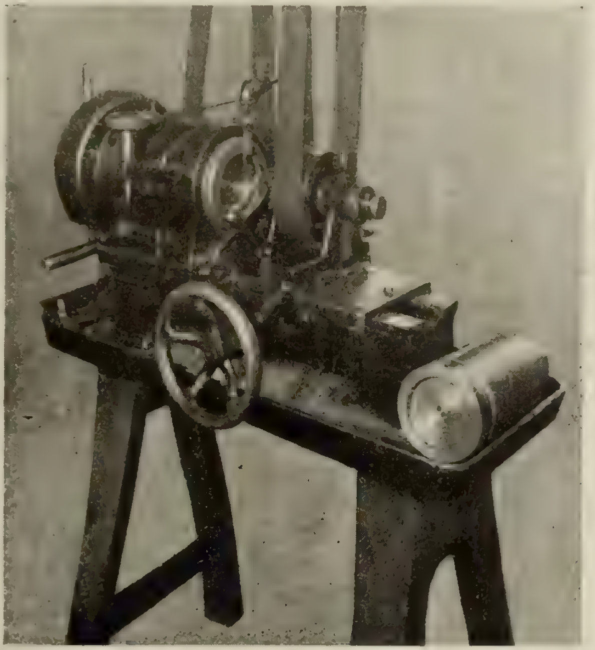
Base Plates

A subsidiary operation consisting of machining the base plates is done on a Martin milling machine designed for the purpose. The turning tools are arried in tool posts on the front of cross slide, while the milling cutter is carried in a fixture on the back of cross slide and has an independent drive. The first operation is to rough and finish the face of base plate. Both tools are in the same tool post, the roughing tool preceding the finishing tool, being set ahead of its. The outside diameter of base plate is turned in two cuts. The milling fixture is now brought into operation for forming the threads on the outside diameter of base plate. An arm attached to the fixture carries a chaser nut which is swung over and engages with the threads on the end of main spindle, this arrangement allowing for the required number of threads being cut on the base plate. The speed of the main spindle is reduced so as to make one revolution while the threads are being cut. The milling cutter is operated by an independent belt.

Varnishing and Painting

After the copper band has been turned the shell is washed to remove all grease, etc., then inspected and taken over to be varnished. For the varnishing process a heavy-body air-drying varnish is used, supplied by The Sherwin-Williams Co. No baking is necessary, but the shells are sometimes warmed before being treated to assist the drying, an electrically heated oven being used. After the varnish has been applied, the shells are placed in wooden racks, nose down, to drain and dry, the time varying according to climatic conditions.

The shells now undergo the final inspection and are then painted. A sample of varnish is also taken and tested. The painting is done on a table fitted up with an arrangement for holding the shell and rotating it. A vertical spindle, with a cup on the end, comes up through the table, the spindle being driven from the line shaft. The shell is placed nose down on the cup and while it revolves the paint is applied by means of a brush. Only one coat of paint is required and the color is yellow ochre. When dry, the plug is screwed into the nose and the shells packed, two in a box, for shipping.



"HOLDEN-MORGAN" SHELL BASE RECESS THREAD MILLING EQUIPMENT.

MUNITION WORKERS' WOES — GLASGOW GIRL'S EXPERIENCE

"MANY women are going in for munitions," I read—a fact that somehow reminded me of Queen Anne's decease—"especially shell-making, where they make big money, $100 a week."

That last clause was news to me, and probably to many others. After some abstruse calculations worked out with a wet towel round my head, strong coffee, and a big bill to the Electric Light Company, I found that $100 a week figured out at about five thousand a year. That was the job for me, I decided, and began to see visions and dream dreams of rolling up to my daily toil in a Studebaker or a Rolls-Royce.

"I forthwith made my application, and was told I must sign on for six months.

"Is that all!" I exclaimed, greatly disappointed; "I thought it was for the duration of the war and six months after."

Dreams of a Motor Car

Six months of munitions, even at $100 a week, would scarcely run to a Rolls-Royce, upholstered in grey suede, plated fittings, and a silver flower-holder. The flower scheme would be mauve or purple, to look well against the grey suede.

Then I was informed that at the expiration of that term—if the war held good—I could sign on for another six months, and so on, ad libitum infinitum. With that I was forced to be content.

The next step was my credentials . I had to get an obliging friend to rake up the records of the past to prove that I was a bona fide born British subject, without a taint of Germanism in my make-up. I next received a card for a huge emporium, where they turn out uniforms of all descriptions, from a humble boiler-suit to the full dress rig of an admiral or general. After having my measurements taken I was hustled into a khaki overall that fitted where it touched.

"This is much too large," I said; "it will require a great deal of alteration."

"Oh, no; that fits you beautifully," was the bland answer.. "You see, you have to allow for shrinkage in washing."

From that onwards I found myself caught in the meshes of the mystery of the age—the insurance problem; and my struggles at disentanglement were as futile as a lamb among the folds of a boa constrictor.

Learning the Trade

My first day in a machine-shop was memorable for one of the most excruciating headaches ever experienced. The roar and rattle of machinery was deafening, and I marvelled at the ease with which the girls talked and understood each other, without even raising their voices. Several spoke to me. I knew they spoke, for I saw their lips moving; but not being versed in lip language I had to make negative gestures in dumb show.

The general mode of teaching in large munition factories is to place the novice beside an experienced worker, where, by using her eyes and the verbal mark of interrogation to some purpose, she is supposed to lose her novitiate in a week Think of it, ye would-be munitionists! We are to acquire in a week a working knowledge of engineering—superficial though it may be—that takes a man five years' apprenticeship to master. As I looked at the seeming hopeless conglomeration of levers, cranks and spindles, I thought a lifetime seemed all to short to master the intricacies of a machine, but as the days passed a sort of cosmos gradually evolved out of the chaos. Each crank and lever had its allotted work to do, and when one began to understand the reasons for the various parts of this steel medley the intricacies vanished and one's interest was aroused.

Tragedy and Comedy

At the end of a week I was put on to a machine of my own, and then my troubles began. I soon proved the well-worn fact that it is one thing watching another work a machine, but quite a different matter when you come to do the job yourself. I was at the process called "fine-boring." The first—and what seemed the simplest part of that process—is hammering the shell into the chuck. As an offstart, I didn't hammer it in tight enough, consequently jammed my shell and had to get the mechanic to bang it out. My next attempt was not much better, for I hammered a finger as well as the shell, and was assisted to the ambulance room.

Another little matter that seemed simplicity personified under the hand of the experienced worker, was the manipulation of the water tap. On these machines an adjustable pipe is fixed, for a flow of water must constantly play on the shell, otherwise the cutters would get red hot. For the first few days I drenched myself and everyone else within hailing distance. That stream of water squirted in every direction but on the shell, and became more obstreperous the more I wanted it to behave.

A great naval personage, resplendent in brass buttons, epaulets, and a monocle, was being shown over the works by the manager. As ill-luck would have it, he stopped beside my machine. I got nervous; the stream of water got cranky; and the great naval personage got it full in the eye! Some others of my woes are, however, too tragic, and we will mercifully veil the grim tale of ruined shells, smashed cutters, and wrecked machines.

No doubt the mechanics could tell some amusing yarns of the woman munition worker. After some weeks experience, I was one day congratulating myself on being at last perfectly proficient. The machine was working beautifully, and the shells were turning out A1. Unfortunately it was too good to last. Something seemed to go wrong. I was "bottoming" a shell, and pressed and hauled the handwheel till the perspiration came trickling off me, and splashed on the machine; yet I didn't make the least impression.

In a frantic flurry, I ran for a mechanic. When he came up, a slow grin overspread his face as he drawled sarcastically, "Do you not think it would be a good plan if you started your machine?"

I had forgotten to pull the starting lever, and my machine was not working

$1.75 to $12.25

"My first pay was $1.75. A dollar and seventy-five cents for the hardest week I ever wrought! As I stumbled home, a weary, wan, and wild-eyed wreck, I thought of my beautiful dream-car, and laughed a bitter cynical laugh; but then, I reflected, I am only at the learning stage, and practice is all that is required for proficiency. Gradually I improved, and soon learned the art of picking my shells. If by chance I lifted a bad one I quietly put it back, and let someone else risk a broken cutter; for a bad or hard shell is ruinous to the cutter, and requires an experienced hand to bore and polish successfully.

I have now almost completed my six months' hard labor. The most I have ever earned is $12.25 for a week's work. With another six months' practice I might manage $13.35, or, by a stroke of good luck, $14.60, but I know it is outside the bounds of possibility to squeeze out a cent more. Therefore, I have only one thing to live for, and that is revenge.

First, however, I must find that descendant of Ananias who gave forth to the world the imagined creations of a fevered brain, under the guise of truth, and when I find him—

I have not yet decided on the particular mode of torture I will use to make him eat his words.

* * *

BOARD OF TRADE IRON AND STEEL INDUSTRIES COMMITTEE

THE British Board of Trade has appointed a committee to consider the position after the war of the iron and steel industries. The committee is composed of the following gentlemen: Mr. G. Scoby Smith (chairman), Sir Hugh Bell, Bart.; Mr. Archibald Colville, Mr. John Hodge, M.P.; Mr. James Gavin, Mr. George Mure Ritchie, Mr. Henry Summers, Mr. Benjamin Talbot, Mr. John King, and Mr. John E. Davison.

In order to carry out its investigations the committee desires to elicit exact and detailed information from a number of representative and individual firms, and from industrial, commercial, and labor organizations, with respect to:—

(1) The extent and area of trade, and capital normally employed.

(2) The dependency upon resources external to this country for supplies of material and plant.

(3) Labor relations, labor restrictions (if any), and comparative conditions in the industry.

(4) British methods of conducting foreign business contrasted with foreign methods of conducting export business.

(5) The effects of manufacturing and commercial co-operation upon trade at home and abroad.

(6) The extent to which British industry is adversely affected whether as regards (a) the retention of business hitherto or previously secured, or (b) its capacity for expansion, by the existence of foreign tariffs, preferential arrangements, bounties, subsidies, or special facilities granted by foreign governments, railways, or trade combinations, to their manufacturers or exporters; and what is the remedy.

(7) Terms of payment and of credit.

(8) Technical education, skill, and nature of employees.

(9) The effect, if any, of wayleaves, and mining or other royalties upon the industry, either as regards home or export trade.

(10) The effect, if any, of railway and shipping rates upon the industry, as regards home or export trade.

(11) General information.

The recommendations of the committee must depend for their effectiveness upon the co-operation of all who are interested in the British iron and steel industries. The committee, therefore, invites the active support and assistance not only of individuals, but also of industrial organizations of whatever character. The committee suggests that the various trade organizations should submit either through their secretaries or through small committees, a general statement of their views together with suggestions which in their opinions might suitably be supported by the presence of a deputation representative of the organization as a whole. The committee will be glad to receive statements supported by verbal evidence from representative firms and from individuals whose depositions, in the opinion of the committee, will be valuable to their work. It will also welcome the assistance of import and export merchants who are interested in the handling of the products of the iron and steel industries at home and abroad.

* * *

TRADING AFTER THE WAR has been discussed by the Johannesburg Chamber of Commerce, and the result is a comprehensive series of suggestions in support of Imperial tariff preferences, the establishment of Government assistance of key industries, differential charges against all enemy shipping at South African ports, the refusal of trading licenses to enemy subjects or to agents of enemy firms, the exclusion of enemy trading journals, advertisements, and price lists, and reciprocal tariff relations with other countries, without, however placing them on an equality in the British Empire.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data and Ideas Evolved from Actual Practical Application and Experience

MACHINING A BLIND HOLE HAVING THREAD LIMITATIONS

By F. Scriber.

It sometimes happens that work which is in itself comparatively easy to machine may be lifted out of the ordinary class by having some special condition attached to its manufacturue. Such a condition is evident in the part illustrated by Fig. 1 where the operations to be performed are plain turning, boring, tapping, milling and drilling operations, but as the hole through the work is closed at one end and the thread must start in correct relation to the drilled bosses the fixtures used for machining this piece are quite interesting.

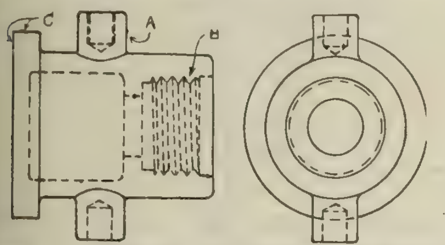


FIG. 1. SKETCH OF PIECE SHOWING BOSSES FROM WHICH THREAD MUST POSITIONED.

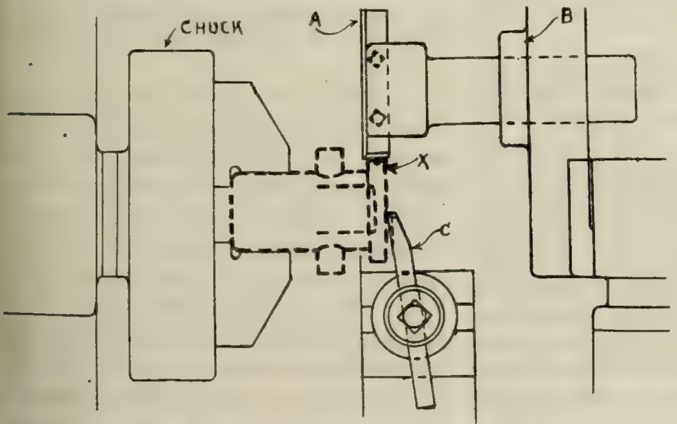


FIG. 2. TURNING AND FACING CLOSED END OF PIECE.

Bosses Control Threading

Referring to Fig. 1, which shows the work which is to be machined, it will be noticed that there are two bosses A. In assembling these pieces with their units the position of the thread B in relation to these bosses is an important consideration, and this must be borne in mind throughout the complete tooling arrangement. The work on this piece is carried out in four operations, namely, turning and facing the closed end C, milling the bosses, boring, tapping and facing the open end, and drilling the holes in the two bosses.

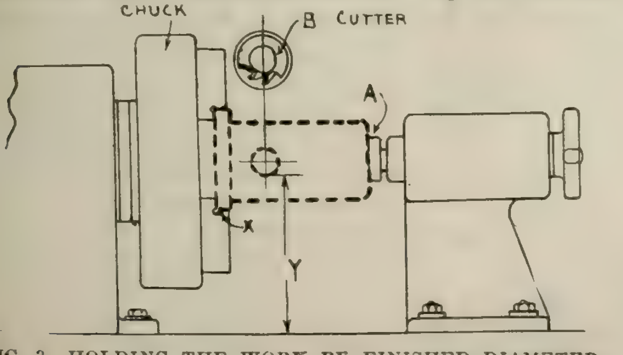


FIG. 3. HOLDING THE WORK BY FINISHED DIAMETER WHILE MILLING BOSSES.

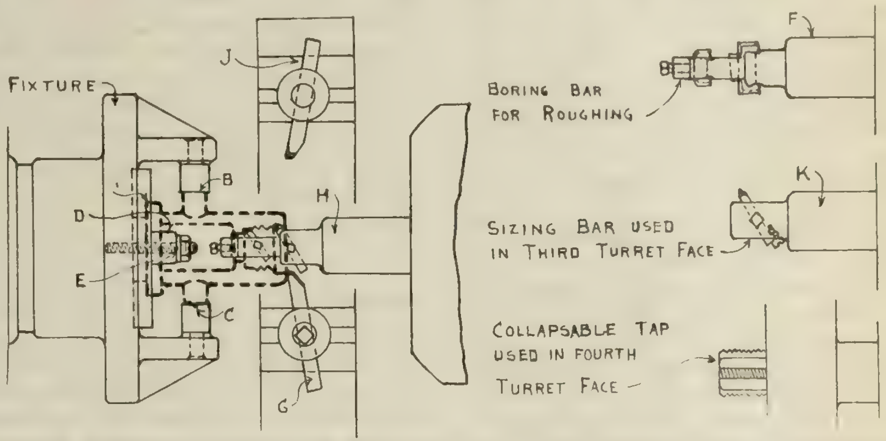

FIXTURE
J
B
D
E
C
G
H
F
BORING BAR FOR ROUGHING
K
SIZING BAR USED IN THIRD TURRET FACE
COLLAPSABLE TAP USED IN FOURTH TURRET FACE

FIG. 4. METHOD OF HOLDING WORK WHILE MACHINING AND THREADING OPEN END. AT THE RIGHT ARE SHOWN THE VARIOUS TOOLS USED.

The first operation — turning and facing the closed end—is completed as shown by Fig. 2. At this operation the work is gripped on the rough diameter in a three-jawed chuck, and the diameter X is turned with tool A, which is held by suitable holder B to the turret of the machine, while the end is faced by the tool C held in a cross-slide. This is completed by taking the usual roughing and finishing chips, using the tools held on front of cross-slide and on one turret face for roughing, while the tools held on the rear of cross-slide and second turret face are used for finishing.

The next operation, which must precede the boring, etc., is milling the bosses, and in this respect care must be exercised to have the bosses directly opposite each other when milling them. Referring to Fig. 3, the work is held by the finished diameter X in a soft jaw chuck and a test rod is used to determine when both bosses are an equal distance from the table, as indicated by the dimension line Y. When the bosses are located in a horizontal position by this method the pad A held in the tailstock of the milling machine is brought up to support the end of the work, and one boss is faced off by the use of a milling cutter B.

Following this, the work is indexed half a revolution and the other boss is milled. The tools for this operation, as is obvious, were all standard, such as the index head and tailstock centre for the milling machine, and likewise tools for the first operation were standard, as furnished with the machine.

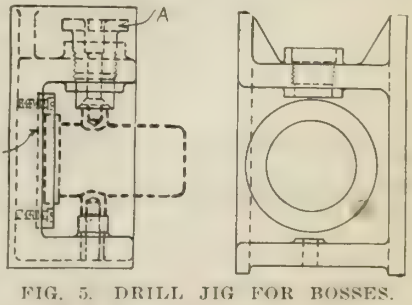


FIG. 5. DRILL JIG FOR BOSSES.

Fixtures and Tools for Threading

The tools for the third operation, Fig. 4, are the most interesting, as at this time the thread is cut. Referring to the above illustration, the work is held by a special spindle nose fixture locating at A from the end and finished diameter, and at B and C from the bosses for radial location. The work is securely held in position by clamps D, one at each side these being tightened by screws E. To machine this end, four turret faces and the front and rear blocks on the cross-slide are used to hold the tools, the cuts to be made being rough bore hole, using bar F and two flat cutters, rough face end with tool G in front cross-slide, finish bore holes, including hole to be threaded, using bar H and three single point cutters finish face end with tool J on rear cross-slide block. In the hole of the third turret face a short bar K, containing one cutter, is held for size boring the end of hole, while in the hole of the fourth turret face the tap, which is of the collapsible type, is held. This tap is located in the turret hole so as to start the thread in correct relation to the bosses.

For drilling the bosses, reference is made to Fig. 5, which shows a simple jig that locates the work from the bosses by means of a screw bushing A, while the closed end of the work is held in the ring B. This jig is constructed so it may be turned over, so the bosses may be drilled without disturbing the work, thus making certain that the holes are drilled opposite.

◆

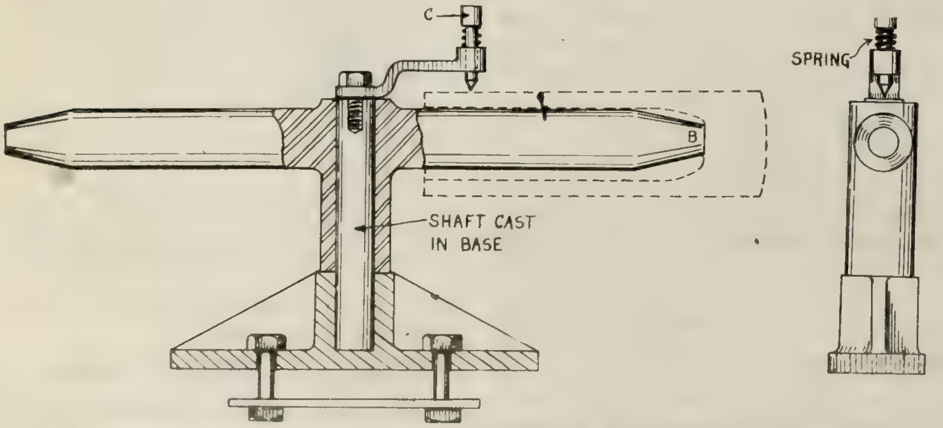
HANDLING RIG FOR SHELL CUTTING OFF MACHINE.

by John L. Watts

THE operation of cutting off the open end of the 4.5 in. shell in a cutting off machine has been expedited by the use of the rig shown herewith.

The placing of the forging in the chuck of the cutting off machine and the removing of the forging after cutting off is very tiresome on account of the weight of the forging. Also one's fingers are apt to be jammed if care is not exercised. This rig was designed to overcome this difficulty and does it successfully.

The equipment is intended to be bolted on the bed of the cutting off machine with end of the carrying arm as close to the chuck as it can conveniently be placed and be able to swing around with a shell forging on it.



DEVICE FOR MARKING AND HANDLING SHELLS IN CUTTING-OFF MACHINE.

Now assuming we have a shell in the machine and the cut started, we place another shell on the arm B and strike the center punch C, which is so placed as to mark the shell at the point at which it is desired to cut it off, care being taken to ensure that the shell is against the end of the arm. When the machine has cut off the shell in the clutch, this finished shell can be easily slid onto the empty arm, the whole thing is then revolved a half turn which brings the other shell on arm B into a position from which it can be slid along the arm into the chuck. While this 2nd shell is being cut off the 1st shell is removed and replaced with a 3rd one which can be marked ready to put in when the 2nd shell is cut off.

◆

MAKING THE SHOP-LADDER SAFE

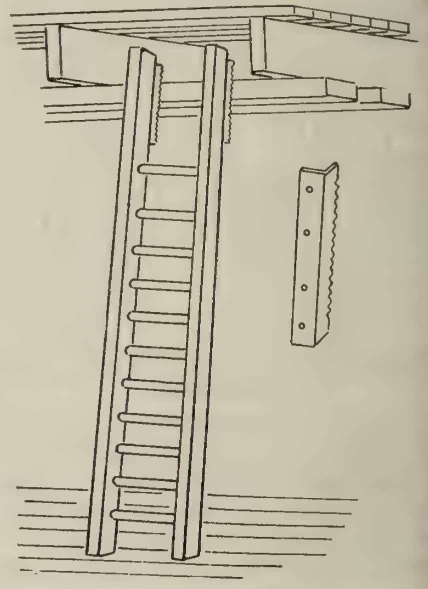
by A. D. I.

AMONG the many kinds of industrial accidents that occur in factories, none are perhaps so common and have such serious and fatal consequences, as those due to slipping shop-ladders. While a great deal of study has been given to render these safe, most of this attention has been given in providing means in having the feet of the ladder properly equipped with rubber or steel-pointed shoes.

Watch the Top

It never occurs to anyone that the top of the ladder, where so many exertions take place by workmen in doing overhead work, requires suitable equipment of some kind to prevent ladder from swaying from side to side. For as everyone knows who has had occasion to use one, a ladder, whenever placed against a stringer will seldom remain in position while one is standing on it, and workmen, are obliged to take hold of a stringer with one hand in order to hold the ladder steady, by which they are greatly handicapped in handling tools, etc.

In the accompanying illustration, is shown an easily made simple attachment, that can be fastened to the top of any shop-ladder, which will prevent them from swaying sideways, and also from slipping outward at the feet as usually happens. Referring to the sketch, two short strips of 1¼ in. angle-iron, having several teeth notched in on one side, are screwed in at the back of the ladder at the top as shown. When the ladder is placed against a stringer, the teeth become imbedded in the wood, causing the ladder to hold firm when so placed. There is little possibility for the ladder moving, and workmen can freely use both hands when working overhead.



SAFETY DEVICE FOR TOP END OF SHOP LADDERS.

Shop ladders are nearly always standing upright against walls and beams, owing to the less room they take up. As is well known these are often jarred against belts and pulleys and have to be constantly watched. In the adoption of this attachment this will hereafter be unnecessary, and also ladder accidents will be greatly checked, and less frequent than they are now.

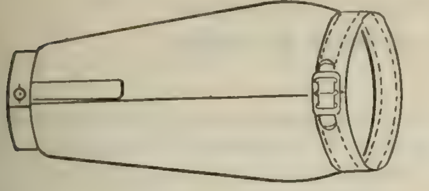
◆

A SLEEVE HOLDER KINK

by J. Wright

DRAFTSMEN and others who are in the habit of wearing sleeves in their work, have always experienced trouble in keeping these held up on the arms, for as soon as the elastic contained inside the band around the top of the sleeve becomes stretched a little, the sleeve becomes loose and is constantly slipping down.

In the enclosed sketch, is shown a useful kink, wherein this trouble is overcome. A pair of adjustable sleeve-holders or armlet-elastics are placed inside the sleeve band, having the buckles protruding out as shown. When the sleeve becomes loose, it is only necessary to take up on the elastic by pulling the ends through the buckles.



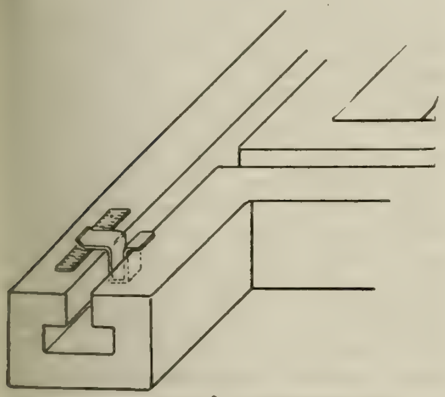
USEFUL IDEA FOR HOLDING SLEEVES.

A SCALE-CLIP

by E. V. A.

WHEN it is necessary to have in constant use a scale for measuring turned work on a lathe, it is the practice of lathe hands and machinists to lay the scale on the machine carriage in order to have it handy when needed. Very often the scale falls in the tee-slot or drops off into the drip-pan under the machine, and considerable time is wasted in searching for it.

In the accompanying sketch is shown a handy scale-clip that can be fastened in the opening in the tee-slot in the lathe-carriage. It is made from a piece of flat sheet steel, bent and tempered in the shape as shown. As seen, the scale is slipped under the clip, each time it is laid down, and always remains in position where it can be picked up quickly.



SCALE-CLIP FOR LATHE HANDS.

ESTIMATING METAL TEMPERATURES BY COLORS

THOUGH the use of pyrometers in foundry work has greatly increased of late years, there are certain conditions under which they cannot be applied and it is then necessary for the foundryman to be guided by the eye. The following tables, given in the Foundry Trade Journal will be found useful as a general guide to the relation between temperature and appearance.

	Deg. C.	Deg. F.
First visible red	525	977
Dull red heat	700	1,292
Turning to cherry	800	1,472
Actual cherry red	900	1,652
Bright cherry red	1,000	1,832
Dull orange	1,100	2,021
Bright orange	1,200	2,192
Bright orange	1,200	2,192
White heat	1,300	2,372
Bright white heat	1,400	2,552
Dazzling white heat	1,500	2,732

Tempering and Hardening Tools

	Deg. C.
Light straw	220 to 230
Dark straw	240
Yellowish brown	255
Reddish brown	265
Purple	275
Violet	285
Cornflower blue	295
Pale blue	310 to 315
Sea-green or grey	330

TOOL TREATMENT IN RAILWAY SHOPS

EXPERIENCE in the locomotive workshops of the Illinois Central Railway has shown that the best results with taps, dies and other tools made from 1.10 per cent. carbon steel are obtained by heating them between 1,350 and 1,600 deg., according to their size. The 0.9 per cent. carbon steel which is used for mandrels, beading tools, etc., is heated between 1,400 and 1,625 deg., and the foreman blacksmith, who has charge of the work states that in hardening the tools he finds it more satisfactory to dip them on a declining temperature; that is to say they are heated slightly above the required temperature and then allowed to cool down again before dipping.

In dipping spiral reamers, they are rotated slowly in a direction opposite to that of the spiral, and this, it is claimed, prevents warping. The long taps and reamers are packed in charcoal in an iran tube brought up to a red heat in an oil furnace and soaked at the proper temperature in the electric furnace. It takes from 1 to 1½ hours to bring the furnaces up to working temperature, which might be considered a disadvantage were it not for the fact that the gradually risng heat can be utilizing in drawing the temper on some of the tools hardened the previous day.

The temperatures at which the furnace is used ranged between 1,350 and 1,625 deg. Fah., according to the size of the tool being treated and the grade of the steel. In handling this grade of steel it is necessary not to permit soaking heats; that is, as soon as the steel has been brought up to the required temperature it should be removed from the furnace. A certain amount of air is allowed to enter the furnace while treating the steel, as it has been found that a reducing atmosphere will produce soft spots on the tool.

ANTI-SLIP LADDER FOR TILE OR WOOD FLOOR

By J. E. Noble.

MAKE two hooks, as shown at A and B, Fig. 1, and fasten them to the ladder ends tightly with screw nails. When using the ladder on a rough wooden floor pull down the hooks and tap the point into the wood with the heel of your boot, and the ladder will be then absolutely safe.

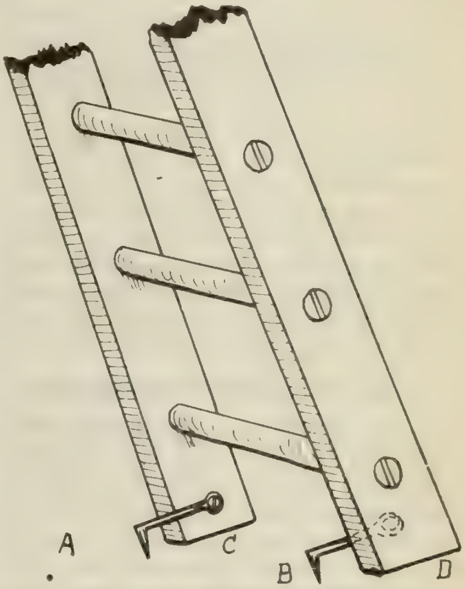


FIG. 1. ANTI-SLIP LADDER.

For using a ladder on tile, polished wood, or any other smooth floor, nail a piece of sheet rubber (a piece of old auto tire or rubber fire hose will answer) on the bottom of the ladder legs at C and D, shown at E, Fig. 2. The two ideas can be used in combination on one ladder, if desired.

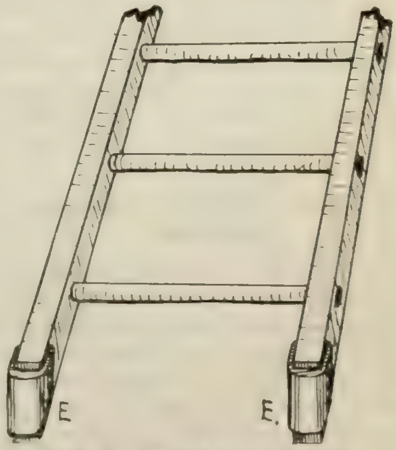


FIG. 2. ANTI-SLIP LADDER.

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

MACHINES AND THE NEW MECHANIC

By R. I. N.

"WHAT is to be the status of the machine industry when peace is restored, and normal conditions again prevail?" It may probably be premature to dwell upon, but some considerations might not be out of place, regarding a few of the possibilities that may confront us at the expiration of present hostilities, in view of the fact that the unprecedented activities of the past two years have effected many changes, the extent of which will not be fully realized until the present crisis has been passed and our minds and bodies are permitted to resume their normal state of mental and physical action.

Factors of the Coming Adjusutment

The necessity of concentrated effort towards a common goal has so occupied the attention of every conscientious person that the train of thought has been kept on the main line, often allowing the side tracks to be overlooked, if not entirely forgotten. The favorable progress of events however, might well be considered as a good reason to review the equipment that will eventually be utilized for pre-war pursuits.

Two of the outstanding factors in the problem of post-war adaptation, will be the volume of machinery on the market and the new "mechanics" which abnormal conditions have produced. While both, at present, are apparently unknown quantities, their respective values can be more readily calculated in relation to the duration of war activities.

Machines Depreciate, Operators Appreciate

It is quite obvious, owing to the special nature of the various operations of munitions manufacture and their confinement to certain tools, which are constantly being forced to their maximum capacity—that the value of the machines will depreciate much more rapidly than under ordinary conditions. On the other hand, the training that the army of shell workers are receiving at the present time, will fit large numbers for positions in the ranks of the "skilled" mechanics, when the country settles down to more peaceful pursuits. What effect these conditions will subsequently have on the iron trade industry is as yet, a matter of conjecture; but with such an overflow of men, who for the past two years have been doing work that has called for keen judgment, accurate and sensitive manipulation of precision tools, it is safe to assume that the machine trade especially, will have to face a situation without precedent. The possibility of certain radical developments in methods of manufacture, may to some extent offset the changing conditions, but the future alone can reveal the ultimate solution.

Loss of Skilled Help

During the incipient period of munitions making in this country manufacturers were called upon to utilize, to a great extent, their existing equipment, and the additional machinery then available was generally of standard design, the successful operation of which required a reasonable amount of skilled labor. Experienced mechanics at that time were becoming scarce, owing to the heavy enlistments for oversea's service, which included men for British munition plants in addition to those for army purposes. The result of this drain upon the trained workmen, was the immediate necessity of initiating the so called unskilled element into the "secrets" of the trade, in order that no obstacles should arise to prevent a continuous output of shells.

As the ever increasing need of unrestricted production was impressed upon the industrial interests here in Canada, firms already working on shells enlarged their plants and added to their equipment. Other establishments brought themselves into line, until the greater number of the leading engineering concerns—and many of the lesser firms—had entered into the work with such enthusiasm, that the ultimate results not only surprised those directly concerned, but proved of such a remarkable character, as to receive the praise and commendation of those in the old land, who had been making munitions for many years.

Development of Mechanical Thought

The advent of this industry, on such an enormous scale, appeared to be the signal for the release of the latent energies of numerous mechanical men who were rapidly transformed into an active force, the power of which has been reflected in the large number of special machines, attachments, devices etc., that have been designed and constructed for increasing the output, and decreasing the cost of production.

While the developments that have taken place in special machinery, for rapid and economical shell production, have been very remarkable, it is probably the changing status of the human factor that will eventually be a contender for first position, in the notable changes brought about as a result of the war and its various activities. It might be said, without exaggeration, that nearly fifty per cent. of those men now working on the manufacture of shells, had little or no knowledge of the operation of metal working machinery, before their entry to a munitions plant. Bakers who had been "loafers" all their lives, were required to work to the closest specifications; hair splitting barbers had to cut to gauge sizes instead of simply appearance; carpenters, accustomed to working to about one-eighth of an inch or more, were compelled to confine their measurements to much finer limits; in fact men who, in many respects were pratically ignorant of even fairly accurate dimensions, were quickly initiated to the stage where thousandths of an inch, over or under a specified standard, might mean the scrapping of a shell. Many of the best workmen in shell plants to-day, are men who have had no previous experience in machine shop work, but have readily adapted themselves to existing conditions, with such characteristic ability, that their present capacity as mechanical prodigies is truly remarkable.

Personal Aspects of Future Help

It might be said that the average man's energies, under present conditions are being confined to one, or probably two particular operations, and his future value as a mechanic would be insufficient for him to command attention under normal conditions. This may be true respecting many of the more intricate branches of the machine tool industry, such as variety job work, tool construction, jig making, die work, etc., where considerable fundamental knowledge is absolutely essential; but in the case of volume production, where quantity is the issue, these men, who have received a thorough training in the manipulation of special tools and close limit gauges, will be in a position to enter any of these manufacturng establishments with the utmost confidence.

Will Breaking In Be Necessary

It might be well therefore, for manufacturers and others to consider this phase of what promises to be a unique situation, as it is a well known fact that large sums of money are spent yearly in breaking in new men to certain lines of industry. While many of these erstwhile shell makers may be experienced enough to profitably fill a position as a machine operator on repetition work, it would be highly undesirable to engage offhand an "experienced mechanic" for various classes of machine tool work, where a fair knowledge of elementary principles is absolutely indispensable.

CRITICISING OLD EMPLOYEES

by J. E. C.

IT is a well-known fact, that workmen who have grown old in the service of a company where they are still employed, often come in for a great deal of criticism. Every mechanic or writer who has any suggestion to make for rapid-production methods, greater efficiency etc., seldom fails to put along side his suggestion, some hint of discharging all old workmen, and, if they had their way, they would relegate them to some sort of "industrial boneyard'.' Some things have been said and written about old employees that has been unfair and greatly exaggerated.

Some of the faults attributed to them, may to a certain extent be true, but no one who has had experience in dealing with shop-help, would be willing to accept a statement that the older workmen have a monopoly on all the faults often ascribed to them.

Retention Due to Value

A little investigation concerning aged employees in machine-shops will disclose many interesting and truthful facts, not generally or willingly conceded to them. While a few no doubt are past their "years of usefulness," so-called, a great many of them are still retained for reasons other than charity or sentiment, as a great many are inclined to think.

A few cases are here cited of old employees, who are still "making good" in a long established concern of machine manufacturers where they are still employed. The first of these to be mentioned, is a workman now 79 years of age, whose term of service in this particular factory is nearing the half century mark. His work consists in testing machines. He is an excellent workman, and a mechanic of the first order. Besides his regular work, he can easily turn his hand to pattern-making and similar jobs. He is also something of a genius, as nearly all the improvements made in this factory in the past thirty years have come from him, and he is still capable of developing ideas.

A Versatile Octogenarian

Another employee, 80 years old, is still an expert in filing and fitting. His work includes that of fitting heavy cross-slides, cutting spiral grooves in crank shaft boxes, fitting and driving fly-wheels keys and other work connected with engine-beds. He is handy in laying-out and cutting sheet-metal work, he can also do general blacksmithing, hardening and tempering tools etc.

The next aged employee is one who has reached his three score years and ten, and has a long record behind him of faithful service in this factory. He is an all-round drill-press hand, and can do a variety of drill work either with or without jigs, and knows all the "kinks" and "knacks" in this line, that the average machinists do not possess. He can easily scale a ladder, lace up and put on belts, take down and put up shafting and do any overhead work. He can splice a rope and tie any kind of knot. In work of jacking up and taking off heavy castings from planer beds etc., he renders timely and profitable aid, because he knows "the how" in doing work of this description such as blocking up, etc. He long ago learned the rudiments of "safety first," and has been several times the means of preventing many younger workmen from injuring themselves.

Always on the Job.

It is seen from this short list of aged employees, that the reasons for still keeping them in employment, are entirely commercial, for each of them produces in his labor more than an equivalent in wages received. One other reason might also be attributed to their retention, and that is, that whenever and wherever any of their respective services are required, they are always "on the job" to undertake them. Faithful in the smallest tasks, and doing each of these to the best of their ability. And it can not be said of them, that they are always eyeing the boss, or watching the clock on the wall.

Younger workmen should learn to forbear with those few, whose weight of years sometimes make them appear peevish and cross. Older workmen, it is well-known, have shown a similar tolerance towards many of the younger help, namely in their immatured judgments and inexperience. Old age should be respected in machine shops, as well as elsewhere.

MACHINISTS' INSTRUCTION COURSE—IX.

By J. Davies.

WHEN the tapered portion of a shaft is short and abrupt, it can be turned most conveniently by means of the compound rest, the setting of which can be done in a number of ways, in addition to the one just described. The base of the compound rest is usually of circular form and graduated with degrees, so that it can readily be set to any desired angle.

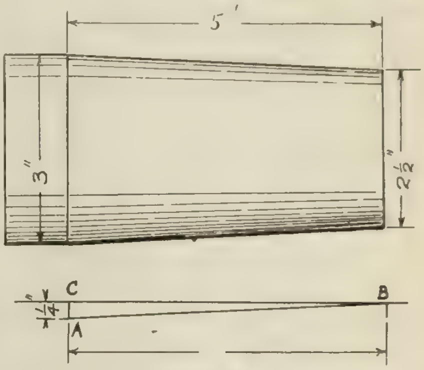


FIG. 32.

Taper Turning With Compound Rest

If the angle of the job is given, it is a simple matter to set over the compound rest half the amount of the total taper. When the angle in degrees of a taper is not known it may be found by laying off the dimensions on a piece of drawing paper or tin. Make a horizontal line AB, Fig. 32, equal to length of taper, then a vertical line, AC, equal to half the difference of the diameter. Complete the triangle and measure with a protractor, or transfer the angle with a bevel, placing the stock of the bevel against the face plate or side of the carriage if it is machined, and the blade against the cross slide, as shown in Fig. 33. This is a convenient method for boring taper holes. If the drawing is correctly executed, you can transfer the angle direct from the drawing with sufficient accuracy to take a roughing cut.

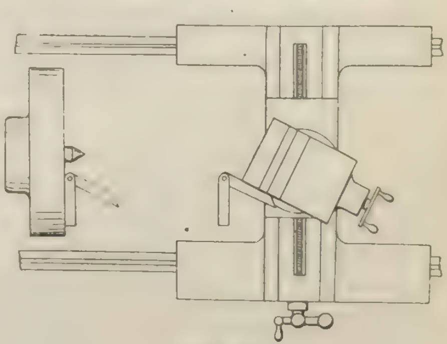


FIG. 33.

Another method is to get a piece of galvanized iron or tin and make a circle equal in diameter to the base of the compound rest, then make a horizontal line equal in length to the taper required, measuring from the centre of the circle.

At the end of the horizontal line measure off the amount of the taper and complete the triangle, Fig. 34. To apply this, measure the width of the angle from the centre line with dividers, where the angle cuts the base circle, put one point of the dividers on the stationary zero mark of the rest and swing the rest around until the movable zero mark coincides with the other point of the dividers. Don't throw this template away because the diameter of the base is always the same for the one lathe and a large number of tapers can be marked off on the same template and kept for reference.

Using the Taper Attachment

Many modern lathes are fitted with a taper attachment, which is a device for moving the tool in or out as it travels along the work. The graduations on this type of attachment usually indicate a taper of ⅛ in. per ft., so that to set the attachment for a taper of ⅝ in. per ft., it would set the attachment over 5 marks.

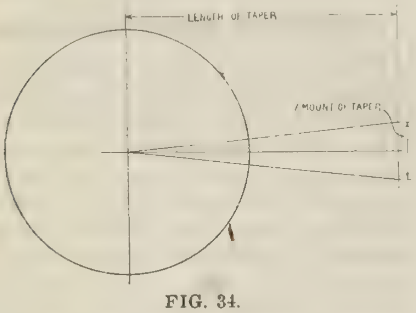


FIG. 34.

It has several advantages over the other methods of turning a taper; for instance, when the taper is once set it will turn the same taper on any piece regardless of the length, while the lathe centres are always in line and make a better job. When changing from straight work to taper, it is advisable to start the cut an inch or so beyond the end of the work and move the carriage up by hand to take out any lost motion there may be in the slide.

Height of Tools

No matter what method is used in turning taper, it is important to set the tool exactly level with the centre, and this can be done quite readily by using the mark on the tailstock. If the tool is set on the centre of the work and a cut taken off, and then the tool taken out and not put back at the same height, the taper of the work will be altered. If we should put the tool a little high it will take more off the large end, as will be seen by reference to diagram, Fig. 35, in which AB represents the path of the tool when correctly set at the centre, the small circle being the diameter of the small end of taper, and the large end the diameter of the large end of taper. Supposing the tool is raised above the centres to the line CD, it is seen that owing to the flatter surface of the large end, it is much nearer to the tool than the small end, looking along the line CD, which is now the path of the tool, so that it would alter the taper by taking more of the large end.

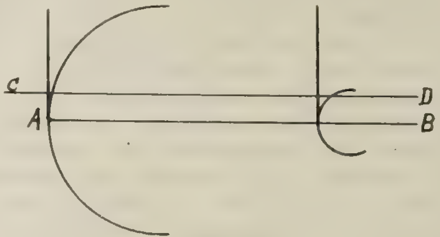


FIG. 35.

This fact can sometimes be used to advantage—the job in hand might be the least bit big at the large end, so, instead of moving the taper attachment raise the tool a little to take a little more off the big end.

Fitting a Tapered Piece

After roughing out a tapered piece it should be tried in the place it is intended to fit, taking care to leave it sufficiently above size to allow for fitting the taper. If one end is much too small it can be detected by rocking the work in the hole. After fitting till there is no perceptible play in the hole make a series of marks along the length of the taper with chalk or Prussian blue, place the work in the hole and give it a turn round by hand. The marks will be rubbed off the high spots and the taper attachment should be adjusted until the marks show a full bearing along the surface of the taper.

After fitting the taper satisfactorily, measure carefully how much further the taper needs to go into the hole to be in its right place. Suppose Fig. 36 is fitted correctly into the hole, but it requires to go ½ in. further in to be in its right place; measure with the calipers very carefully the diameter of the taper at the small end of the shaft, then take off a little cut and test with the calipers until the work is the same size as the calipers ½ in. from the end. By this means, after getting the taper a good fit, you can get it the correct siz at the next trial. It is better to err a little on the full size, as you can ther give it a rub or two with a file, but i too small there is no remedy.

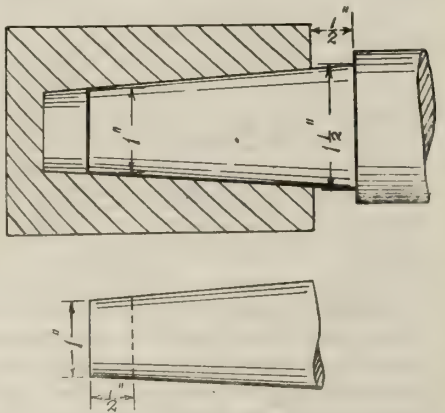


FIG. 36.

Filing and Polishing

Don't leave any more stock for filin on lathe work generally than is neces sary to remove the tool marks; in fact if you can get a good smooth finishin cut it is best not to file it at all.

The best files for lathe work are mil files. These are single cut files that ar not so liable to collect the filings int little balls called catspaws, that chok up the teeth, as is the case with doubl cut files. Look out for these catspaw or they will scratch the work at ever stroke of the file. Clean the file wel with a file card; rubbing on chalk als helps to keep it clean.

To keep the work round and true, fil with a long steady stroke, aiming to a low the work to make a number of rev lutions for each stroke of the file. If tl work should need polishing, very usef polishing sticks can easily be made a shown in Fig. 37. It is simply tw pieces of wood with a hole cut out th size of the shaft, and fastened together the back with a leather hinge. Polis either with emery cloth, or emery pow der and oil, run the lathe at top spee and ease back the centres while polis ing, because the heat generated in po ishing may cause the job to expand ar run out of true or twist the end of tl centre.

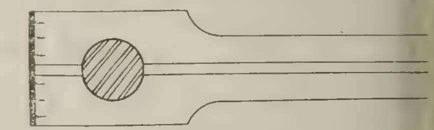


FIG. 37.

Using the Steady Head

Sometimes if the job is a very lo one, it will have to be supported with steady head to prevent it chattering ar springing away from the tool, but b fore using the steady head you mu have a true spot to put it on. Turn place near the centre if possible by u ing a narrow tool and fine feed, setti the tool well above the centre. If y cannot turn a true spot in the desir position on account of the shaft bei so slender, turn one as near to it possible, put on the steady head a turn another spot until you get t steady head in the right place.

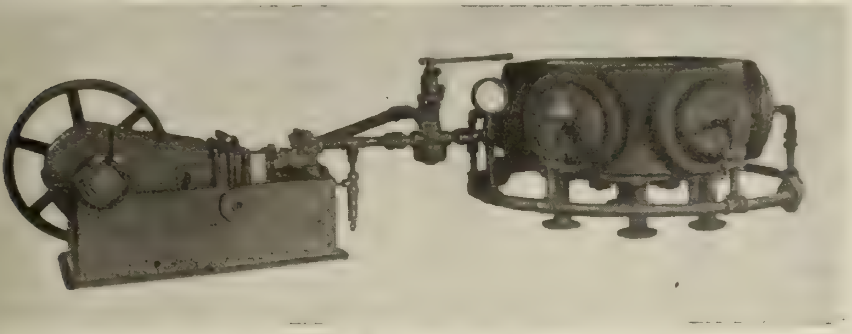
Make sure that the spot turned f the steady head runs perfectly true the work will not be true when finish To adjust the jaws of the steady he without springing the work close ea jaw on the work until they will j grip a strip of paper or a thin feel then close each jaw the least bit m and adjust for a running fit.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

HYDRAULIC BANDING EQUIPMENT WITH HORIZONTAL TRIPLEX PUMP

A COMPLETE unit for shell banding work, consisting of press, pump and operating value, is shown in the accompanying illustration. The press, which is capable of exerting a total pressure of 950 tons when working at a maximum of 3,500 lbs. per sq. in., is suitable for banding shells from 6 in. to 12 in. size. It is constructed with 6 semi-steel rams, having a diameter of 11 in. and bearings 9 in. long. The rams are fitted with chrome leather U packing, and have a movement of ½ in. each, or more if necessary. The return of the rams is effected by means of heavy steel springs acting on levers which provide adjustment for tension.



BANDING PRESS FOR 12-IN. SHELLS WITH HORIZONTAL TRIPLEX HYDRAULIC PUMP.

All parts of the press subject to severe stresses, including cylinders are alloy steel castings on forgings. The dies are of forged chrome nickel steel, hardened, and can be removed by loosening two nuts without disturbing any part of the press.

The cylinders are removable and have a hydraulic inlet of 1¼ in. pipe, the distributing ring being 2 n. pipe. The weight of this press is 9,500 lbs. and it can also be operated from an accumulator if desired .

The pump illustrated is of the triple type, having three plungers of 3 in. stroke, and of diameter to suit the pressure, made of hardened and ground tool steel for use with oil, or of Tobin bronze for use with water. Removable poppet valves permit easy inspection of discharge or suction.

Alloy steel is employed for the cam shaft, which is carried in split phosphor bronze bearings mounted in a semi-steel enclosed self-oiling base. Connecting rods are of forged steel, with babbited cam bearings 5½ in. dia. x 2in. wide, while the solid crosshead is fitted with adjustable phosphor bronze bearings. Pump bodies are of hydraulic bronze tested to 50 per cent. over load.

The pump is fitted with driving pulley 30 in. dia. x 6 in. face running at 180 revs. per min. and weighs 3,300 lbs.

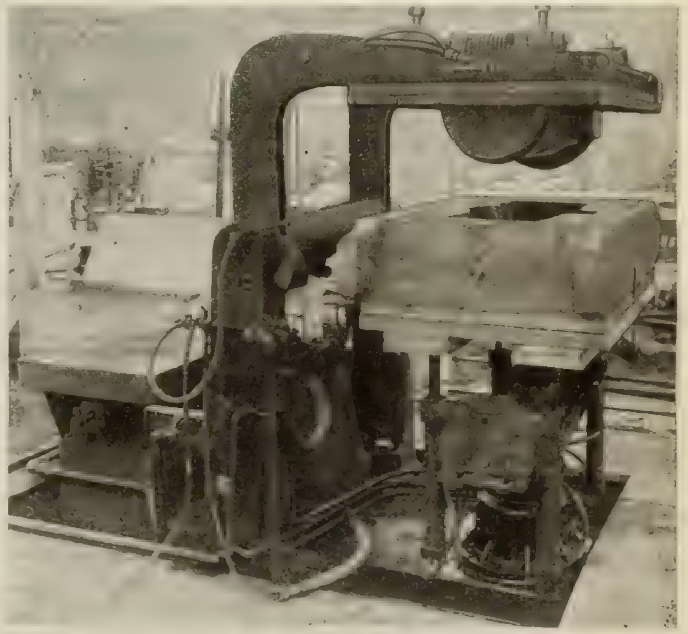
The complete equipment is product of the Metalwood Mfg. Co., Detroit, Mich.

NEW JOLT ROLL-OVER DRAW MOULDING MACHINE

THE accompanying illustration shows a new jolt roll-over draw moulding machine which was exhibited at the recent convention of the American Foundrymen's Association in Cleveland. by the builders. the E. H. Mumford Co., Elizabeth, N.J. A large range of work can be performed in the machine which can take a 37 x 48 in. flask and has a 16-in. draw. The machine is operated in the following manner:—

The pattern board is placed directly on the jolt rammer table by means of a positive spring locking device, thus doing away with the usual floating plate arrangement. After the flash is filled it is rammed up by the jolt machine which is a standard Mumford machine having 10-in cylinder, and capacity to ram half moulds weighing 3,700 lbs. at 80 lbs. air pressure. When the ramming process is complete the mould is clamped to the pattern board, and the rock-over valve is opened. As soon as the arms start upward in the rolling over operation, they are automatically locked to the pattern board by means of sliding pins. This takes place as soon as the arms move upward ¼ in., so all danger of the pattern board slipping is absolutely eliminated. The rolling over operation is accomplished by means of a 16 in. air cylinder acting in both directions on a crank.

When the mould is rolled over it hangs suspended by the arms over the levelling and pattern drawing davice. This device consists of the Mumford fluid pressure plunger, an apparatus which has been thoroughly tested out in the Mumford Split Pattern Machines where it is also used for drawing the pattern. In operation the draw plunger raises up the leveling device to a height of 16 in., the maximum draft, when a stud opens a pop valve reelasing four leveling pins which rise independently of each other until they strike the bottom board of the flask. As they are independent of each other any inequality in the surface of the board is automatically taken up, and the pins being 22 in. in length, no adjustment is necessary for shallow or deep flasks; considerable saving of time is also effected where work of varied depths is being run. When the pins have come to rest under the bottom board they are locked by means of an air clamp from the operating position. This clamp exerts a pressure of three tons



JOLT ROLL-OVER DRAW MACHINE.

on each separate pin, thus assuring a rigid rest for the flask. Hand levers for locking the pattern board to the arms, and also for locking the leveling device, have been entirely done away with. The operator need not move from the valve position to complete every operation.

When the flask has been leveled by the above means, the pattern is then drawn through oil by means of the fluid pressure plunger before mentioned. This device insures a steady even draft under all conditions, as the oil in the cylinder has to pass through a very small hole in order to let the plunger down. The machine is operated by means of only five valves in all, and these are placed in consecutive order so that passing from one operation to the next is easily indicated by their position.

* * *

STEAM TURBINE DRIVEN INDUCED DRAFT FANS

THE high degree of perfection now obtainable in high-speed reduction gears is resulting in the adoption of steam turbines as the motive power for such items of boiler house equipment as induced draft fans. The simplicity and reliability of steam turbines renders them very suitable for boiler-room service, but until high-speed gears were commercially available, their relatively high speed had prevented the extensive use of steam turbines for the fans referred to, as such fans on account of the large volumes handled are usually of relatively slow speed.

Two recent installations of turbine-driven fans are shown in Figs. 1 and 2, the turbines being built by the Terry Steam Turbine Co., Hartford, Conn., and the fans by the Green Fuel Economiser Co., Beacon, N.Y. These fans are driven through herring-bone reduction gears, the unit in Fig. 2 having a ratio of 6.78 to 1, with a maximum pinion speed of 3,630 revs. per min. Fans for this class of work require from 25 to 50 horse-power, and give a draft of from 2 in. to 5 in.

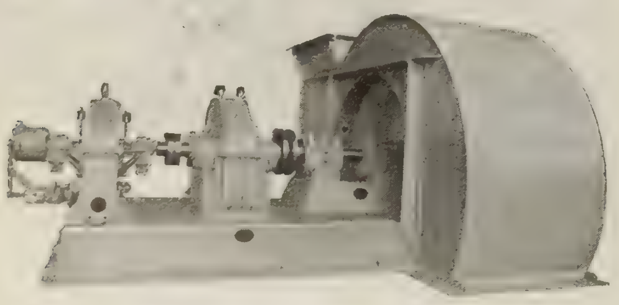


FIG. 1. STEAM TURBINE-DRIVEN INDUCED DRAFT FAN WITH GEAR REDUCTION.

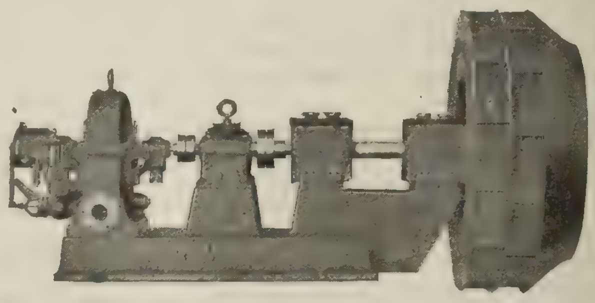


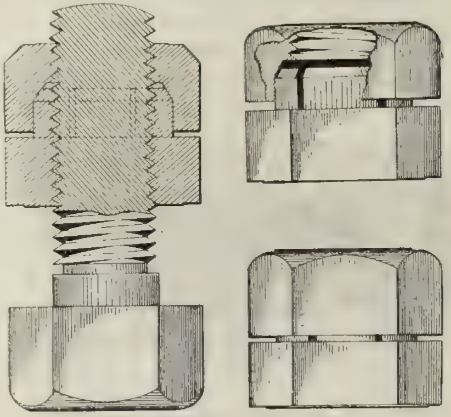
FIG. 2. FAN WITH CASING REMOVED, SHOWING CONSTRUCTION OF IMPELLER.

On account of the warm location the bearings of both fan and turbine are water cooled. The turbines are of the Terry helical flow type in which the steam is passed repeatedly through a single row of moving buckets, this design permitting the use of a wheel made from a single steel forging with buckets milled from the solid.

* * *

NEW TYPE LOCK NUT

A LOCK NUT in which the dead and not the moving member is locked has been developed by the Western Screw & Lock Nut Co., San Francisco, Cal. With this nut no washers are required and the nut can be locked at any point on the bolt, an arrangement which makes it possible to take care of oscillating or pulsating movements. The bolt and nut can be used over and over several times, it is claimed, without damaging the threads. It is possible also to fit a United States standard nut tightly on a bolt having a V-thread, and it is also possible to make a nut tight on a loose fit bolt.



NEW TYPE LOCK NUT

The lock nut consists of two members. The lower, which is the nut proper, is similar in form to a regular hexagon nut and has four flexible finger members projecting from its upper surface. When the upper or locking member is screwed down, these fingers are compressed and the nut is frozen, as it were, to the bolt. The locking action is secured by turning the locking member firmly. When locked in place this member is counted on to help carry the load. One of the features of the lower member is a number of threads which provide capacity to carry the load. The nut is released with an ordinary wrench, and when the locking member is released it will of course move as one of the ordinary type.

A recent test of the holding power of one of these nuts was made by bolting two pieces of $3/4$ x $1\frac{1}{2}$-in, bar steel together with a $3/4$-in. lock nut and one of the ordinary type placed 6 in. apart. The steel bars were suspended on heavy springs and an air hammer delivered 500 blows per minute with a force of 25 lbs. midway between the two bolts. It is stated that the ordinary nut was jarred off in a short time, thus leaving the strain on the other bolt. After 9 hours of continuous jarring at this rate the lock nut was still gripping firmly.

* * *

SHELL NOSE DRIVING MACHINE

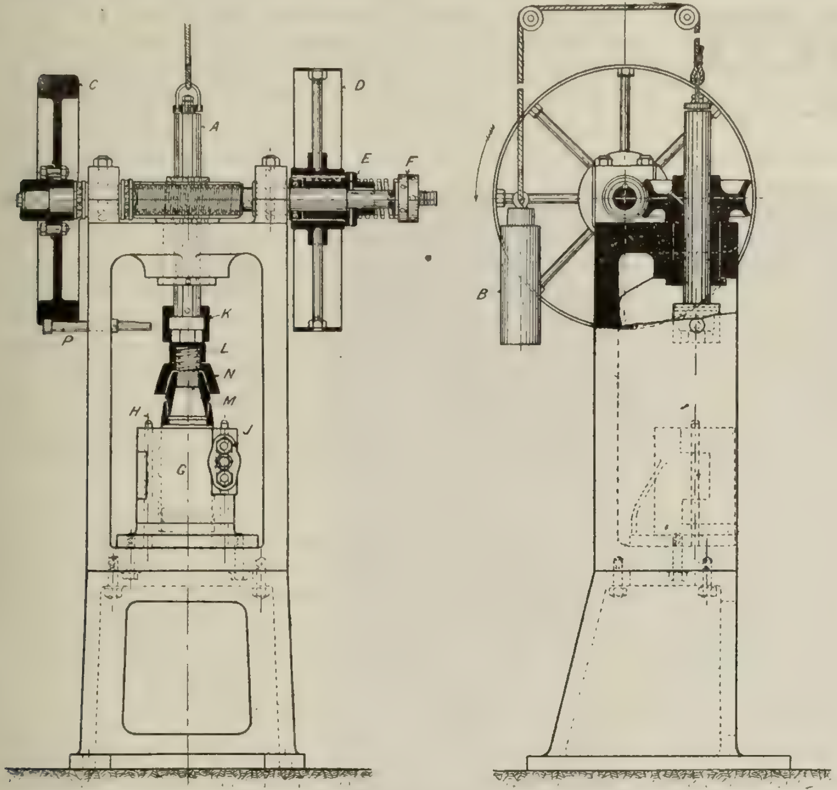
THE accompanying line cut illustrates a machine of British manufacture which has been designed for the purpose of driving on the threaded nose pieces of shells. The compact arrangement calls for comment as also the method of using a fly-wheel for imparting the final jerk which insures perfect tightneess.

The machine consists of a vertical box-shaped frame on top of which is mounted a pulley driven drive shaft carrying a worm which engages with a worm gear carried in the upper part of the frame. Through the worm gear passes the splined shaft A, counterbalanced by weight B. On one end of the drive shaft is secured the fly wheel C, while on the other end is mounted the belt pulley D which drives the shaft through the medium of a spring controlled dog clutch.

The boss of the pulley has beveled clutch teeth formed on it which engage similar teeth on the sliding sleeve E, which in turn is keyed to the shaft and kept engaged with the pulley by means of a helical spring which can be adjusted by nuts F.

According to the pressure of the spring the beveled clutch teeth will disengage at any predetermined resistance, at which point the stored-up energy in fly wheel C comes into play and spends itself in exerting a final effort on the tightened nose piece.

The shell is held in a hinged vise G of a type familiar to shell makers, while the method of driving the nose piece by shaft A is as follows: A hexagonal box coupling K is fixed to the end of shaft A, and engages with the upper end of the blind nut L, the bottom end of which is tapped with a ½ in. pitch right hand square thread. The stud M has its upper end threaded to suit the ½ in. pitch thread, and its lower end is threaded to suit the nose-piece, while passing freely over the stud M is a cup shaped washer N, which is recessed to fit the profile of the nose-piece.



BELT DRIVEN MACHINE FOR TIGHTENING SHELL NOSE-PIECES.

When using the device, the stud M is screwed home within the blind nut L, and washer N slipped over the stud M which is then screwed into the nose-piece after which the shell is placed in the vise, with the nut L engaging coupling K. The driving power of shaft A is now imparted to the nose-piece through the friction of washer N against the nose.

To release the coupling, the nut L is turned back by hand which is readily done, due to the coarse pitch of its thread, compared with the thread in the nose-piece. The stop P holds the shaft A clear of the work while the shell is being adjusted. The makers of this machine are Pollock & Macnab, Ltd., Bredbury, Lancs.

THE WAR AND MERCHANT SHIPPING

ONE thousand eight hundred and twenty ships, with an aggregate gross tonnage of approximately 3,328,584, have been sunk by belligerent nations during the twenty-seven months of war ending November 1, according to figures compiled from cable despatches and mail advices published in New York on November 1, by the Journal of Commerce. The losses during October were larger than for any one of the preceding five months, according to the statistics, amounting to 127 vessels of a total of 227,116 tons gross. The October rate of destruction was considerably in excess of the monthly average throughout the war period. Norway lost the largest number of ships —56, according to the statistics, but their gross tonnage was only 57,333, as compared with Great Britain's total loss of 115,546 gross tons of 38 vessels destroyed.

ZINC MINE DEVELOPMENT IN CAPE BRETON

WHAT is stated to be a very rich zinc deposit is now being opened up by Toronto interests in Cape Breton, about 30 miles north-west of North Sydney, in the heart of the Nova Scotia mining district. Surface showings are rich, and it would appear that an extensive zinc and copper producing mine will be developed as a result of the extensive plan of operations now being prepared.

The main vein on the property is 60 feet wide, and has been opened up for a distance of two miles. The ore is almost solid metal, assay returns showing 34 per cent. zinc, 2½ to 4½ per cent. copper, 10 per cent. lead, 1 pennyweight gold and 10 ounces silver. It is characterized by mining engineers, who have recently made an examination, as one of the most spectacular showings in Canada. A second vein, 15 feet wide, has been traced for 1,000 feet, and carries 34 per cent. zinc, 3 per cent. copper and 2 per cent. lead.

BRITAIN BECOMING INDEPENDENT OF FOREIGN STEEL

DR. ADDISON, one of the chief officials of the British Ministry of Munitions, told a party of journalists visiting Woolwich Arsenal on November 2, that he calculated Great Britain would be entirely independent of foreign steel supplies by March, 1917. During the Somme offensive the expenditure on armaments was about ten times the weekly rate on what it was in the month of January, but there are more filled shells in France now than there were at the beginning of the war. With special reference to the steel supply, Dr. Addison said the more Britain was dependent upon neutral countries the more was she waging war at a disadvantage. One of the advantages of making things at home was to save vast sums of money apart altogether from what was lost on exchange. He gave an interesting forecast, which was that as Britain was providing an extension of steel works at a probable saving of something like six millions a year, she would have provided a programme satisfactorily developed to be entirely independent of foreign steel supplies by March next.

SOME DEMONSTRATION!

A LAWYER tells this story of himself and his efforts to correct the manners of his office boy. One morning the young autocrat came into the office, and tossing his cap at a hook, exclaimed:—

"Say, Mr. Jones, there's a ball game down at the park to-day, and I'm going."

The lawyer thought he would teach him a lesson.

"Harry," he said, "that isn't the way to ask a favor. Now, you come over here and sit down, and I'll show you how to do it."

The boy took the office chair, and his employer picked up the cap and stepped outside. He then opened the door softly, and, holding the cap in his hand, said quietly to the boy in the chair:—

"Please, sir, there is a ball game at the park to-day. If you could spare me, I would like to get away for the afternoon."

Whereupon the boy replied:—

"Why, certainly, Harry; and here is 50 cents to pay your way in."—*N. Y. Times.*

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LABOR DILUTION IN METAL-WORKING PLANTS MAKING GOOD

THE employment of female labor in our metal-working industries continues to expand at a satisfactory rate, both as regards numbers of operatives, and individual plants taking advantage of their services. Equally satisfactory are the results being achieved in the matters of product quality and quantity output, so much so that firms who were at one time skeptical of the wisdom of even experimenting with the proposition are now actively preparing to adopt it in generous measure. What has already been accomplished, is, we believe, little criterion of what may be expected within say the next six months or even less. The accompanying data relative to female labor in metal-working industries in Great Britain provides something in the nature of an eye-opener, and in equal degree an inspiration to our plant executives whose energies are being concentrated in the like direction:

According to the president of the Institution of Automobile Engineers, in some of the National factories set up by the Ministry of Munitions the female labor amounts to as much as 95 per cent. of the total. Nor, he says, has dilution only been applied to those classes of work in which repetition by the million or by the thousand takes place. It has been found that very many other classes of work can be done after but short training, by men previously reckoned unskilled, and particularly by women. In engineering shops, women are already doing drilling, boring, shaping, slotting, key-seating, milling, surface grinding, universal grinding, tool-setting, fitting, skilled assembling, and erecting. They are, moreover, making equal progress in such industries as wood-working, aeroplane-building, boiler-making, laboratory work, optical work, and instrument making, as well as in nearly all branches of ordnance, small arms, shell and explosive work.

They have also successfully taken up such occupations as driving overhead traveling cranes, shipyard and building cranes, motor testing, inspecting and testing materials of all descriptions, involving the use of micrometers, verniers, surface gauges, and other measuring instruments, including the slide-rule. So wide, in fact, has the scope of female labor become that a well-known member of the Institution of Automobile Engineers, who has taken a leading part in the dilution campaign, recently stated it to be his firm conviction that, given two more years of war, he could build a battleship, from keel to aerial in all its complex detail and ready for trial, entirely by female labor. Some development!

POST WAR PROBLEM PLANS

IN all discussions of the post war problems that Canada will be called upon to solve, least, if any prominence, is given the possibility of her future development being retarded through lack of co-operation by labor. This is perhaps the most promising feature of the present and future outlook, more or less harsh restrictive measures by trade unions being neither meantime operative nor projected. That considerable importance is attached to the labor outlook in Great Britain is evidenced by the anxiety of manufacturers there to associate themselves in the establishment of a mutual trust and forward effort movement with the representatives of labor.

Just as the institutions and laws of Britain have served as models and patterns in the development of world civili-emergency wares at present. The great essentials of in-examined for landmarks and sign posts whereby the expanding activities of budding nations such as ours may emulate to some extent the achievements of her, the Mother of Nations. Towards the present rather than the past, however, must our attention be directed so that the keen and mature experience available may be advantageously appropriated.

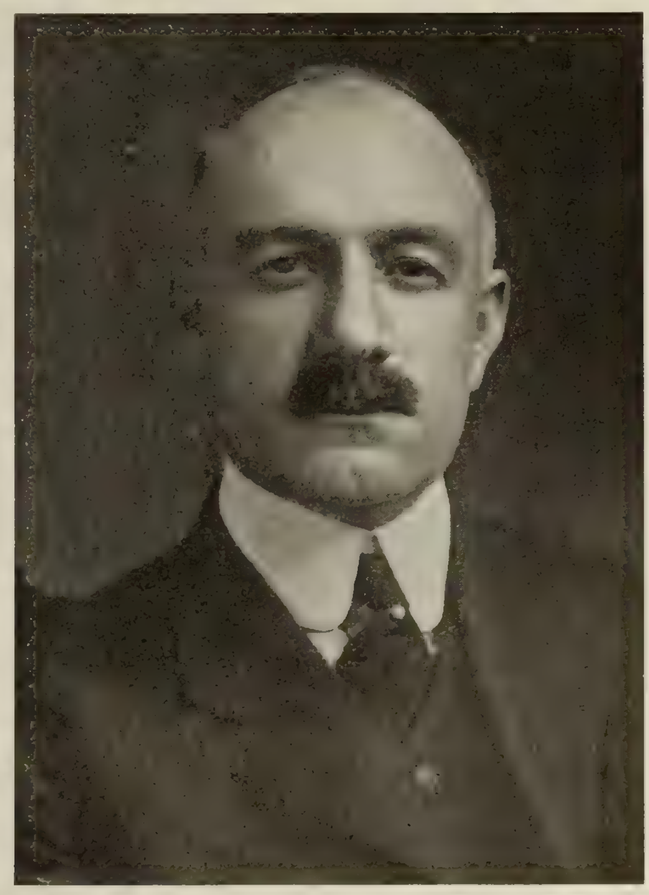
Perhaps the most outstanding feature of the present movement in Britain is the united and whole-hearted manner in which all public bodies, institutes, associations and industrial undertakings are endeavoring to find a solution for the problem of post-war industrial settlement. At a recent conference held at the Mansion House, the Lord Mayor of London moved the following resolution: "That this meeting expresses its appreciation of the great national service being rendered by the munition workers of the country, whose patriotic support of our fighting forces on land and sea is hastening the achievement of final victory, and expresses the hope that permanent remunerative employment will be secured in the vigorous economic development of the engineering industry after the war." The earnestness with which such matters are now regarded is apparent from the fact that presidents and members of more than a score of Institutions, Associations, Universities, Municipal Authorities and Public Companies attended, representing an approximate engineering capitalization of $2,000,000,000.

In order to prevent public demand from drifting back to former foreign channels, it is necessary to realize that the public be educated to the real facts of the situation and be brought to see that self-support, charity notwithstanding, begins at home. Producers must be prepared to devote at least as much energy to the output of staple lines in the future as they are devoting to the output of emergency wares at present. The great essentials of industrial and commercial success are what to make and where to sell, and a proper appreciation of such constitutes the starting point for achievement.

The development of natural sources of wealth is without question the most desirable direction in which Canada can build up a worth-while material prosperity. In his inaugural address as President of the Royal Canadian Institute, a few days ago, Professor J. C. McLennan pointed out that the three chief sources of wealth of this Dominion are agricultural lands, electrical power and mineral deposits. To develop these in the fullest measure, and to the extent which present and pending events indicate as being necessary to meet future world demands—is the work which lies before us, and our engineering industries with their new born sense of fitness and capacity for accomplishment are expected to "blaze the trail."

INDUSTRIAL NOTABILITIES

HENRY DUFF REID, vice-president and treasurer, Reid-Newfoundland Co., railway and steamship owners, St. John's Dry Docks, was born in New South Wales, Australia, Jan. 29, 1869, the son of Sir Robert G. and Harriet (Duff) Reid. In 1873 he came to Canada, receiving in course his education in various Ontario Public Schools. His association with Newfoundland, dates from the year 1890. Prominent among his business experiences and official appointments are the following: Spent three years farming with his father in Northern Minnesota; assisted father and brother in building railways, Cape Breton, N.S., for a short time; his firm undertaking the construction of Hall's Bay Railway and the extension to Port aux Basques, in 1890, and completing same in 1897. He became director, secretary, and assistant general manager of The Reid-Newfoundland Co. formed in 1901, and became vice-president and treasurer on Sir R. G. Reid's death in 1908.



HENRY DUFF REID.

Mr. Reid married Jessie Patterson, daughter of John Patterson, Scotland, Nov. 4, 1894, by whom he has two daughters. His Clubs are: City; St. John's; Golf and Country (life member); Royal Automobile (London, England); his society, A. F. & A. M.; his recreations, golf motoring, fishing, hunting, curling. In politics he is neutral, and in religion, Presbyterian. His address is "Devon Place," St. John's, Newfoundland.

—Photo, courtesy International Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh		$21 45
Lake Superior, charcoal, Chicago		23 75
Standard low phos., Philadelphia		41 00
Bessemer, Pittsburgh		26 95
Basic, Valley furnace		23 95
	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton	$32 25	$31 00
Victoria	32 25	31 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.40
Steel bars, base, Toronto	3.50
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.35
Steel bars, base, Montreal	3.50
Twisted reinforcing bars, base	3.55
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.50
Small shapes	3.85
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.35
Bars, 2 in. and up	3.75
Strucural shapes	3.35
Plates	4.00

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$31 00
Electrolytic copper	31 00	31 00
Castings, copper	30 00	30 00
Tin	45 00	46 00
Spelter	13 00	14 00
Lead	9 00	9 00
Antimony	15 00	18 00
Aluminum	70 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$5 00	$4 75
Heads	5 35	5 00
Tank plates, 3-16 in.	5 25	5 00

WROUGHT PIPE

Prices in effect Nov. 4, 1916.

Buttweld

Per 100 feet	Black	Galv.
⅛ in.	$ 3.50	$ 5 00
¼ in. and ⅜ in.	3 18	5 31
½ in.	4 08	5 65
¾ in.	4 95	7 07
1 in.	7 31	10 46
1¼ in.	9 89	14 15
1½ in.	11 83	16 91
2 in.	15 91	22 76
2½ in.	25 16	35 98
3 in.	32 90	47 05
3½ in.	39 56	56 50
4 in.	46 87	67 04

Lapweld

2 in.	$18 13	$24 61
2½ in.	26 91	37 15
3 in.	35 19	48 58
3½ in.	42 32	58 42
4 in.	50 14	69 22
4½ in.	63 50	87 00
5 in.	74 00	101 40
6 in.	96 00	131 50
7 in.	128 50	172 60
8 in. x 25 lbs. per ft.	135 00	181 30
8 in. x 25 lbs. per ft.	155 50	208 80
9 in.	186 30	250 10
10 in. x 32 lbs. per ft.	172 80	232 00
10 in. x 40 lbs. per ft.	222 50	298 70

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$20 00	$19 50
Copper, crucible	23 00	23 00
Copper, heavy	23 00	23 00
Copper wire	23 00	23 00
No. 1 machine compos'n	18 50	18 00
No. 1 compos'n turnings	15 00	15 00
New brass clippings	15 00	15 00
No. 1 brass turnings	13 00	12 00
Steel, low phos.	14 00	14 00
Heavy melting steel	10 00	12 00
Boiler plate	12 00	10 50
Rails	13 75	15 00
Axles, wrought iron	19 00	19 00
Tires, steel	12 00	11 00
Rails	13 75	13 00
Shafting	16 75	16 00
Malleable scrap	10 25	11 00
Pipe, wrought	10 50	9 00
Stove plate	10 25	10 50
Heavy lead	7 00	7 00
Tea lead	5 50	5 25
Scrap zinc	7 50	7 75
Aluminum	35 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	45
Stove bolts	60
Plate washers	25
Machine bolts, ⅜ and less	30
Machine bolts, 7-16 and over	25
Blank bolts	30
Bolt ends	25
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts, hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	35
Boiler rivets, base ¾-in. and larger	$5.25
Structural rivets, as above	5.15
Wood screws, flat, bright	77½
Wood screws, O. & R., bright	72½
Wood screws, flat, brass	45
Wood screws, O. & R., brass	42½
Wood screws, flat, bronze	37½
Wood screws, O. & R., bronze	35

MILLED PRODUCTS

	Per Cent.
Set screws	40
Sq. & Hex. Head Cap Screws	30
Rd. & Fil. Head Cap Screws	15
Flat & But. Hd. Cap Screws plus	15
Fin. & semi-fin. nuts up to 1 in.	30
Fin. & semi-fin., nuts over 1 in.	25
Studs	15
Taper pins	45
Coupling bolts plus	15
Planer head bolts, without fillet	15
Planer head bolts, with fillet	net
Planer head bolt nuts, up to 1 in.	30
Planer head bolt nuts, over 1 in.	25
Planer bolt washers plus	10
Hollow set screws list plus	40
Collar screws list plus	20
Thumb screws	20
Thumb nuts	70
Patch bolts add	65
Cold pressed nuts to 1½ in. add	$3.50
Cold pressed nuts over 1½ in. add	$2.00

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$50 00
Open-hearth billets, Pittsburgh	50 00
O. H. sheet bars, Pittsburgh	50 00
Forging billets, Pittsburgh	73 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$4 15	$4.10
Cut nails	3 70	3 70
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs		$4 10

MISCELLANEOUS

Solder, guaranteed	0.29½
Solder, strictly	0.27½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Motor gasoline, single bbls., gal.	0.31
Benzine, single bbls., per gal.	030½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	1.00
Linseed oil, boiled, single bbls.	1.03
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	8 00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.12
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes	35
S.S. drills, 1/16 in. and larger	50
Standard drills to 1½ in.	50
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	20
3-fluted drills over 1½ in.	10
Bit stock	50
Ratchet drills	20
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	25
Sockets	30
Sleeves	40
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, Black, No. 28	$4 15	$4 30
Sheets, black, No. 10	5 25	5 20
Canada plates, dull, 52 sheets	4 75	4 75
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 45	7 35
Gorbal's Best, No. 28	7 75	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 25	6 50
Premier, 10¾ oz.	6 50	6 75

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch.	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65
Kearney & Foot, Arcade	65
J. Barton Smith, Eagle	65
McClelland, Globe	65
Black Diamond	65
Delta Files	65
Nicholson	55
Globe	60
Vulcan	65
Disston	..

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$30 00	....
1¼ in.	30 00	....
1½ in.	30 00	23 00
1¾ in.	29 00	20 00
2 in.	31 00	19 00
2¾ in.	33 00	.....
2½ in.	37 00	25 00
3 in.	39 00	28 50
3¼ in.	45 00	32 00
3½ in.	46 00	33 00
4 in.	60 00	44 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.45
Royalite, per gal.	.13½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Imperial quenching oil	.38½
Petroleum fuel oil	.12

WIRE ROPE

Ist Grade, 6 Strands

	Per 100 lbs.
Galvanized, 24 wires, ⅜in.	$ 9.20
Galvanized, 24 wires, 1 in.	26.45
Black, 19 wires, ⅜ in.	7.60
Black, 19 wires, 1 in.	23.45

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	40%
Standard	40 & 10%
Cut leather lacing, No. 1	$1.30
Leather in sides	1.10

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke.	
Connelsville Foundry Coke	....
Yough Steam Lump Coal	....
Pittsburgh Steam Lump Coal	....
Best Slack	....

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.16
Peerless	.16
Grand	.15
Superior	.15
X L C R	.14
Atlas	.14
X Empire	.13
Ideal	.13
X press	.12
COLORED	
Lion	.10¼
Standard	.9¼
No. 1	.9¼
Popular	.8¼
Keen	.7¼
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.39 to .41
Tin	.49 to .56
Zinc	.18 to .20

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.35
Emery in kegs, American.	.06
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.35 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.17
Cobalt sulphate	.70
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.12
Nickel carbonate	.35
Nickel sulphate	.17
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.55
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.41
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Que., Nov. 6, 1916.—The abnormal condition prevailing throughout the steel industry is still the dominating factor in industrial circles and receives continual emphasis daily. The scarcity of labor, while not so pronounced as a few weeks ago, is nevertheless sufficient to curtail the maximum possible production.

Pig Iron

The situation in pig iron continues to reflect the pressure under which the steel industry is still working, further advances in many grades being reported. Local dealers are now quoting $31.25 for Victoria, an advance of $1 per ton.

Steel

The demands on producers for shell requirements are so insistent that mills are unable to satisfy the urgent needs of other lines. The increased demand for domestic steel, that is expected to follow the slackening of shell requirements, will prevent any marked decline for some little time. The Pittsburg quotation on sheet bars is now $52 a ton, an advance of $2. Fair-sized business is reported in steel rails. Plates are still active, but the supply is not sufficient to meet requirements. Following the advances that have been prevalent in the States, local dealers have revised their quotations on plates. Sizes ¼-inch to ½-inch are now $5, an advance of 25c per hundred. Heads show an advance of 35c, being quoted at $5.35. Tank plates, 3-16 inch, are $5.25. The market in sheets is very active, but production is somewhat delayed, owing to the scarcity of raw material. An advance of $3 per ton has recently been placed on black sheets, Pittsburg; the price being now $3.75 per hundred. Tin mill black, Pittsburg, is now $4, an advance of $10 per ton. Tin plate shows a similar advance, the current quotation being $6.50. Should the heavy demand for wire products continue, a further advance is anticipated. No definite delivery can be given on iron or steel bars. The Chicago quotation on steel bars is higher, the price of 2.889c being an advance of $2 per ton. Wrought iron pipe and boiler tubes are very active, local dealers having revised their lists on the latter; prices now range from $30 for 1 inch to $60 for 4-inch tubes. A feature of the situation is the high cost of coke, furnace spot being now $7.25, and foundry $8.50 for immediate delivery.

Metals

The general market continues to retain its strong position. Recent activity in copper has added to the strength of this metal. Tin is quiet but firm. Spelter is showing steady improvement, with an undertone of further activity. Lead is quiet, but retains its usual strength. Antimony is dull, and aluminum is quiet, but strong.

Copper.—The recent activity has added strength to the market, slight advances being reported from New York, and the tendency is for still higher prices. The London situation is well maintained, with standard spot showing a slight decline. New York prices have advanced ⅛c on prime lake and ¼c on electrolytic and castings; present quotations being 25⅝c for lake, 29c for electrolytic, and 27⅝c for castings. Dealers here report a very steady market, with prices firm and unchanged at 31c for lake and electrolytic and 30c for castings.

Tin.—Available metal is at present rather scarce, but the visible supply is apparently sufficient to maintain a steady market. Both London and New York have weakened in their latest quotations; the latter having declined ⅛c. lowering the quotation to 41¾c per lb. The local market is unchanged, with prices firm at 45c per pound.

Spelter.—The steady demand is beginning to reduce the supply on the market, and the present undertone points to higher prices. Galvanizers are showing increased interest, and inquiries from these sources are showing improvement. London quotations are a little easier, while New York reports an advance of ⅜c; the current price being 10¾c per lb. The local situation remains unchanged, with prices strong at 13c per lb.

Lead.—The market is very quiet, but firm. Owing to the evident scarcity of nearby metal, the dullness of the present situation has had little effect and prices are being well maintained. Dealers here report prices unchanged at 9c per lb.

Antimony.—Indications point to easier prices, although present quotations are holding firm. New York is still quoting 13¼c; and local dealers are asking 15c on a quiet market.

Aluminum.—The market is not active, but local quotations have again returned to 70c, being an advance of 1c on the week.

Machine Tools and Supplies

While the demand for machine tools is gradually resuming more normal proportions, there is still sufficient business passing to keep builders interested. Standard equipment is still in demand, but the bulk of the inquiries and orders are for special equipment. Owing to the high cost of labor and raw materials, prices on manufactured equipment are well maintained. The continued advance in steel and semi-finished products will probably have an early effect on many of the smaller tools, such as taps, dies, drills, etc.

Scrap

Old materials have continued very firm, and much activity is reported in all lines, more especially in old coppers. Local dealers are quoting higher on light copper, this week's price of 20c showing an advance of 1c per lb. The demand for lead is quite heavy, and prices are stronger by ½c per lb.; heavy lead is now 7c, and tea lead is 5½c. All other scrap is firm at last week's prices.

Toronto, Ont., Nov. 7.—An interesting feature to note is the renewed activity in the machine tool business. The demand for machine tools for shell plants although comparatively good for some time had been gradually falling off, due of course to the fact that practically all the shops were well equipped and only required occasionally an extra machine or so to increase production or as a replacement. The munitions industry now having more nearly got into its stride, the output is rapidly increasing and more orders are being placed for shells. The situation at present seems to be that there is no limit to the orders so long as the output reaches a volume saisfactory to the British Government. Notwithstanding the large number of plants engaged on munitions, new firms are still coming into the arena and the older concerns are extending their plants. This expansion means a bigger demand for machine tools and is the reason for the revival in this important industry.

Steel

The withdrawal of prices in Canada by the U.S. Steel Corporation in their products is the latest development in the steel trade. Not that this makes any material change in the situation, but it is further evidence of the tight conditions which prevail in the steel market all over this continent. The shortage of steel is steadily becoming more acute and may at no distant date assume serious proportions. With the output of shells increasing, the demand for steel for this purpose becomes proportionately greater. The Imperial Munitions Board has the first call on all steel produced and the result is that other branches of the trade suffer. Steel rails for instance are badly wanted but cannot be rolled in large enough tonnages to meet the demand owing to the urgent need for steel for munitions. Prices, although they reached record levels some months ago are still climbing and the mills are getting further behind on deliveries. The demand for ship plates is getting heavier and extraordinary prices are being paid to get quick delivery. Minimum prices quoted are for delivery at mill convenience which would be at least twelve months, the mills being fairly swamped with orders. Lap welded tubes have advanced in the States, so higher prices may be expected here. Wrought pipe has also advanced, affecting lapweld only, owing to the higher prices of raw material. Wire products including wire nails have advanced 15c. All wire products being affected. Plain wire is now $4.40 per 100 lbs. and wire nails $4.10 per keg. The possibility of higher prices on iron bars would affect nuts, bolts and rivets.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

As was anticipated, prices on galvanized sheets have reacted and are now advancing. Prices of black sheets are going steadily upward which is affecting galvanized material. The leading interest in the States recently advanced the price of galvanized sheets $10 per ton; the affect of this is now being felt in this market. "Premier" No. 28 U.S. gauge are now quoted at $6.50, and "Premier" 10¾ oz. at $6.75 per 100 lbs. Black sheets No. 28, gauge are quoted at $4.30, and No. 10, at $5.20 per 100 lbs. The mills are practically sold up on black sheets for the first quarter of 1917.

The steel market in the U.S. is growing stronger and a further advance in finished steel prices is expected soon. Steel companies are getting many orders offered to them, as has been the case for months, which they are not able to accept. The situation is so tight that the principal concern of buyers is to get their orders placed at any price and to hasten deliveries. Export enquiries continue in heavy volume particularly for billets, bars, rails and structural shapes. Chicago warehouse prices have advanced, steel bars being now 3.35c, shapes 3.35c and plates 4c per lb.

Pig Iron

All quotations on domestic pig iron have been withdrawn until further notice pending an upward revision of prices. Pig iron is now being quoted at $27 per ton in Buffalo, N.Y., which is an indication of what local prices will be. The pig iron market is in an excited condition in the States and prices continue to advance. At Buffalo for the first time in years the stocks of pig iron are practically cleaned out and prices are more or less nominal. The serious shortage of coke, labor and cars all go to make up the present strained situation with little or no sign of relief in sight. Grey forge is now quoted at $21.45; Bessemer $26.95; basic $23.95 per ton all f.o.b. Pittsburgh, with high silicon pig $25 to $27, and foundry grades $24 to $26 per ton Buffalo.

Scrap

The market for scrap material is firm and generally steady at unchanged prices. Steel turnings and borings however, are weak as the supply is greater than the consumption. The offerings of this material are heavy but the demand is light. Heavy melting steel continues active and in good demand at unchanged prices, while there is also a good demand for scrap copper.

Coal and Coke

A serious situation has developed in the coal trade owing to shortage and consequent advance in prices. It appears that the comparative scarcity of miners in the coal mining districts in the States has caused a decrease in output and the unusually heavy demand particularly in New England has resulted in a shortage of supply for Canada. With regard to hard coal, if the present shortage becomes more acute, prices will advance. The situation is more serious in soft-coal, supplies are scarce and prices are already advancing. The prices in the current market quotations have been withdrawn pending a return to more stable conditions. The market is very unsettled and prices entirely nominal. The extraordinary prices of coke now prevailing are due principally to car and labor shortages.

Machine Tools

Renewed activity continues in the machine tool market as a result of orders recently placed for shrapnel shells and fuses. Local machinery houses report a brisk demand for screw machines, bench millers and small high speed drills, manufacturers stocks having been practically cleaned out. There had not been a very heavy demand previously for this class of equipment, so dealers had little difficulty in filling orders. The capacity of some of the plants working on 6 in. shells is being doubled and extensions in other plants are frequent, with the result that there has been and still is, a good volume of business passing in machine tools. The recent call for more 18 pounder high explosive shells, a size not now being made here, will create a demand for suitable tools such as were employed when these shells were being produced a year ago. For some time American builders of standard types of machine tools had been getting these made in outside plants owing to the big rush of business. They are now making all their tools again with the result that the quality of the product has improved but deliveries are slower. Canadian machine tool builders are very busy and have all the business they can take care of for months. Prices are still high and in some lines are advancing. In the U.S., machine tool builders in the East have advanced prices 10 per cent. on planers, shapers and radial drills, while one firm has made an increase of 25 per cent. on boring and turning mills. Advances on several machines have also been made by manufacturers in the Middle West. There is little change in the situation as regards deliveries. Milling machines can be obtained in about six months. Small lathes, radial drills and some machines of lighter type are fairly easy to obtain, but deliveries on heavy equipment, such as heavy lathes and planers run into eight or nine months.

Supplies

There is practically no change in the situation. Business continues good and prices are very firm with a decided upward tendency. Stocks on some lines of supplies are low on account of slow deliveries.

Metals

The metal markets continue steady and in most cases firm, antimony being the only metal to show any indication of weakness. The copper situation is still the principal feature of interest and higher prices are looked for. The demand for copper is very heavy and few producers hold any metal for the first quarter of 1917. Tin advanced sharply a few days ago in London but local prices have not been affected as yet. The spelter situation has improved and quotations are holding firm with producers still disinclined to sell freely. Antimony is easy and business quiet, while aluminum is firm at unchanged prices.

Copper.—The export and domestic demand for copper continues heavy, and some sellers have disposed of all their production up to July 1917, while few have any metal for sale until after the first quarter. Some sellers report that the volume of business is only limited by the amount of copper available. Consumers are taking copper wherever they can secure it regardless of price. The market is thus very strong and a further advance would not be surprising. Local quotations are firm at 31c per pound for lake and electrolytic, and 30c for castings copper.

Tin.—Although tin advanced recently in London, the reason not being explained, the local market is unchanged. The situation in New York appears to be somewhat complicated and the increase in the visible supply has not depressed the market as is usually the case. Permits to ship tin from London to New York are still difficult to obtain. Local quotations are firm at 46c per pound.

Spelter.—The market continues strong and producers are reported to be still disinclined to sell freely, believing that prices will go higher as the price of ore has advanced about $7.50 per ton, thus increasing the cost of producing spelter. Prices are firm locally and unchanged at 14c per pound.

Lead.—Quotations are firm but the market continues quiet, although there are indications of more activity in the near future. The leading interest continues to quote 7c New York. Lead is unchanged at 9c per pound.

Antimony.—The market is easier and business dull. Quotations are unchanged at 18c per pound.

Aluminum.—The demand is rather quiet but the market is steady at unchanged quotations. Local price 68c per pound.

Pig Iron Advance

As we go to press, word has been received that "Hamilton" pig iron has advanced $2 per ton.

SHIPPING AND WAR

IT is no longer a novelty to learn of ships earning their first cost from one year's freights. In the past two years freights have doubled, trebled and in certain instances increased ten-fold over the figures which obtained at the outbreak of the war. While high cost of labor and materials, reflected in operating costs, have had an influence in increasing freight rates, the three main causes are the requisitioning, especially by the British Government, of merchant vessels for war purposes, the internment of ships of the Central Powers, and the decrease in tonnage due to the submarine campaign. Over fifty per cent. of British registered tonnage has at some time or other been devoted to the military needs of the Allies. It is estimated that during the war period, the steam tonnage on Lloyd's Register as of July, 1914, has been reduced from 24,809,000 tons of 13,158,000 tons. In other words, making due allowance for new tonnage added, the depletion through Government requisitions, internment and war losses, has cut the available tonnage practically in two. The tremendous demand for cargo space has put into commission, on a very profitable basis, vessels which prior to the war could hardly pay their keep. This movement, while applying generally to neutral shipping is specially marked in the United States and the Scandinavian countries.

LACHINE CANAL DURING OCTOBER

LESS than one-fourth of the wheat came through the Lachine Canal during the month, which ended recently, than came through in October, 1915. The 1,399,038 bushels of wheat which came in lake boats and barges during October seems a small amount as compared with the 5,635,688 bushels taken through the canal in the same month last year. The only other decreases among the grains were in corn and flaxseed, neither of which came down at all, while last year in October the total was 68,081 bushels of corn and 41,602 bushels of flaxseed. Oats and barley, however, show the following splendid increases as between October in 1915 and 1916 respectively: Oats, 475,759 bushels and 1,238,902 bushels, increase 763,143 bushels, and barley, 211,115 and 474,018, increase 262,903 bushels. The total of all grains brought down the canal is half the amount carried last year for October, as follows: October, 1915, 6,432,245 bushels; October, 1916, 3,111,958 bushels; decrease, 3,320,287 bushels.

Less Produce Carried

The total grain brought down during the season up to October 31, amounted to 22,405,114 bushels, being 13,280,174 bushels less than the amount brought down during the same period last year. Just as during other months of this season, there is almost as great an advance in the amount of coal brought down as there is a decrease in the amount of grain. The number of tons carried last month was 224,646, as against 128,779 for October, 1915.

Eggs, cheese, butter and apples have been carried in much smaller quantity. decrease in apples and butter being nothing short of astonishing. As for flour, none was carried at all, as compared with 49,800 sacks a year ago. The comparative statistics for the Octobers of 1915 and 1916 respectively are as follows: Cases of eggs, 341 and 256; packages of butter, 317 and 123; boxes of cheese, 31,423 and 29,065, and barrels of apples, 14,067 and 2,650, a decrease of 11,417 barrels.

During the month there were fewer trips, less tonnage operated, fewer passengers carried, and less cargo tonnage than in October, 1915. The statistics for the two months follow: Number of trips, 1,123 and 977; tonnage operated, 573,729 and 500,204; passengers carried, 757 and 697; cargo tonnage, 487,905 and 431,992; and number of trips light, 455 and 391.

⁂

TRADE OF NEWFOUNDLAND

THE imports into Newfoundland in 1915 were valued at $12,350,786, representing a decrease of $2,842,940, compared with the imports of 1914. This decrease was shared in by practically every country exporting goods to Newfoundland. The imports from the United States decreased from $5,796,906 to $4,943,752; from Canada from $4,861,047 to $4,509,827; from the United Kingdom from $3,826,529 to $2,311,945; from British West Indies from $222,801 to $214,202; from Spain from $113,541 to $83,215, and from Germany from $59,145 to $10,343.

The decrease in the imports into Newfoundland of $2,842,940, from 1914 to 1915, but principally due to the decreased importations of the following articles: Beef, salted in barrels, $652,642 to $465,140; boots and shoes, $216,571 to $132,188; blankets, quilts, carpeting, etc., $478,977 to $268,078; clothing, $337,204 to $207,296; coal: $1,005,762 to $719,189; cotton fabrics, $331,131 to $231,206; groceries, $230,601 to $168,966; hardware, $370,135 to $212,124; hemp and coir yarn, $250,959 to $149,057; machinery, $769,737 to $414,811; medicines, $187,412 to $87,837; oxen, cows and horses, $166,570 to $95,468; paints, $147,979 to $92,314; pork, $822,191 to $642,911; railway materials, $287,368 to $137,297; and tweeds, cloths, doeskins, etc., $187,444 to $85,913. Articles for the army and navy, and flour were the only items to show substantial gains, these increasing from $15,478 to $219,555, and flour from $1,823,551 to $2,168,573.

⁂

CONSERVATION OF PULP WOOD

THE disappearance of the wood pulp supply in Canada during the next twenty-five years, if conservation measures were not adopted, was prophesied at a recent session of the Dominions Royal Commission by Ellwood Wilson, an expert on the paper industry. Three things were essential to the protection of the pulp industry—the adoption of a scientific scheme of reforestation, a proper system of fire protection, such as has been adopted in British Columbia, and also a system that would do away with the dangerous disposal of waste that now prevails in the forests. During the past thirty-five years thirty per cent. of the pulp wood lands of Canada had been burned over and rendered useless for generations to come.

Carl Riordon explained how the long haul to Europe with its consequent high freight rates made it almost impossible for Canadian paper or pulp manufacturers to compete with the manufacturers of pulp in Europe, who are located principally in Sweden and Norway. When the war was over it was expected, with the higher taxes that would prevail in Europe, the higher cost of production and the higher cost of capital, that the price of the European pulp would increase materially, giving the Canadian a new field.

⁂

INCREASED VALUE OF CANADIAN FISHERIES

CANADA possesses the most extensive fisheries in the world, and the waters in and around Canada contain the principal commercial food fishes in greater abundance than the waters of any other part of the world. Apart from salmon, all the lobsters, herring, mackerel and sardines, nearly all the haddock, and many of the cod, hake and pollock landed in Canada are taken from within our territorial waters. There is a coast line of 5,000 miles on the Atlantic side, 7,000 miles on the Pacific, and 220,000 square miles of fresh water, stocked with many species of excellent food fishes.

During the fiscal year ended March 31, 1916, the total marketed value of all kinds of fish, fish products and marine animals taken by Canadian fishermen was $35,860,000, being an increase of $4,596,000 over the 1915 figures. British Columbia was responsible for $3,023,000 of the year's increase. Salmon was the chief product, representing a value of $11,262,000; lobster came next with $4,506,000; cod, $4,489,000; herring, $2,,906,000; halibut, $2,261,000; haddock, $1,232,000; sardines, $1,229,000; whitefish, $1,048,000. Oysters had a value of $147,628.

The production by provinces, according to the Government records, is as follows:—

Province.	Value Produced.	Increase.
British Columbia	$14,538,320	$3,023,234
Nova Scotia	9,166,851	1,436,660
New Brunswick	4,737,145	*202,998
Ontario	3,341,182	585,891
Quebec	2,076,851	152,421
Prince Edward Island .	933,682	*327,984
Manitoba	742,925	*106,497
Saskatchewan	165,888	33,871
Alberta	94,134	7,414
Yukon	63,730	*5,952
Totals	$35,860,708	$4,596,077

*Decrease.

⁂

TRADE INQUIRIES

THE following inquiries relating to Canadian trade have been received by the Department of Trade and Commerce, Ottawa.

1173. Representation —. A civil engineer who has had wide experience in the construction of municipal waterworks, gas works and sewers in Canada the United Kingdom and South Africa would like to make arrangements with a Canadian manufacturing concern to represent them as a commercial traveller in England, France, Belgium, Serbia, Russia or elsewhere.

1284. Machinery—Ore-Crushing.—A Johannesburg firm makes inquiry for machinery suitable for crushing and fibreizing asbestos. Sample of their worst raw fibre is on file with the Department at Ottawa.

1220. Cobalt and Nickel Ores.—A London manufacturing company asks to be placed in direct touch with Canadian producers of both cobalt and nickel ores.

1224. Representative.—An engineer who has held very important positions in charge of municipal construction work, such as water-works, gas-works, sewers, street improvements, etc., in the United Kingdom, South Africa and Canada, desires to act as a representative of a Canadian manufacturing firm or a combination of Canadian manufacturers during the reconstruction period after the war.

1231. Iron Wire, Galvanized Barbed Wire, Wire Nails, etc.—A Leeds firm is open to buy carload lots of galvanized barbed wire, galvanized fencing strand wire, and wire nails and are also interested in galvanized staples and iron wire.

1429. Engineering Supplies. — An Orange Free State firm of engineering specialists in refrigerator plants and pumping machinery requests catalogues and all other particulars in above lines and valves, joistings, boring drills, pumps, cylinders, pulleys and piping.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

New Glasgow, N.S.—The Eastern Car Co., are installing a drop forging plant and an electric furnace.

Hawkesbury, Ont. — The Riordon Paper Co., propose extending their boiler and pumping plant here.

Regina, Sask.—Fire on Oct. 29, destroyed the electric light plant at Grand Coulee, a few miles west of here.

Niagara Falls, Ont.—The Canadian Aloxite Co., have commenced the erection of an addition to their plant to cost about $30,000.

St. John's, Que.—Fire recently damaged the St. John's Machine & Tool Co. plant, the loss being about $12,000, only partly covered by insurance.

Port Arthur, Ont.—The Fegles-Bellows Co., who propose to erect a factory near the site of the Conley Frog and Switch plant, request the immediate construction of a bridge over the McIntyre river at that point. They are going ahead with their construction earlier than was intended.

Port Colborne, Ont.—The International Nickel Co., has completed the surveys for its refinery at Port Colborne, and is now beginning excavation work in order to have the foundation completed before frost sets in. The company has set aside five million dollars for this plant. The Foundation Co., Montreal have the contract for the foundation.

Halifax, N.S.—H. R. Mallison of the Halifax Electric Tramway Co., announced recently that the company proposed spending $1,500,000 on the extension and improvement of gas mains, electric power facilities and tramway extensions. The hydro-electric development in the Gaspereaux will probably be proceeded with soon. The gas plant will have a capacity twice greater than the present one. Upon the extension of the plant and mains one hundred thousand dollars will be spent.

Renfrew, Ont.—Power development works have been commenced by M. J. O'Brien of Renfrew at Calabogie village, situated at the foot of Lake Calabogie, an expansion of the Madawaska River. It is the intention to build dams and erect a power-house for the generations of 5,000 h.p. which will be transmitted either partly or wholly to Renfrew, a distance of twenty miles. A dam twenty-eight feet in height will be built on the site of an old mill of the pioneers, and beside it will be the power-house. The total cost of the whole development will approximate half a million dollars.

Municipal

Calgary, Alta.—It is proposed to submit a by-law to the ratepayers to authorize the installation of a water filtration plant.

Port Colborne, Ont. — A by-law has been passed here granting fixed assessment for a number of years to the International Nickel Co. for its refining plant.

General Industrial

Fort William, Ont.—The Barnet & McQueen Co., are the contractors for the extension to the Ogilvie Milling Co. elevation here.

Valleyfield, Que. — The Gold Lion Brewery was practically destroyed by fire on Oct. 31. The blaze is supposed to have originated in the engine-rooms. The damage is estimated at about $150,000.

New Incorporations

The New Westminster Foundry Co., of New Westminster, B. C. has been inorporated with a capital of $10,000.

The Universal Smokeless Heat Generator Co. of Victoria, B. C. has been incorporated with a capital of $50,000.

Foundry Products, Ltd., has been incorporated at Ottawa, with a capital of $500,000, to carry on business as iron founders and steel makers, etc., at Calgary, Alta. The incorporators are: Daniel L. Redman, Charles W. Coole, and Peter D. McAlpine, all of Calgary, Alta.

Dominion Fire Brick & Clay Products, Ltd., has been incorporated at Ottawa, with a capital of $500,000, to manufacture fire brick and clay products of all kinds at Moose Jaw, Sask. The incorporators are: H. G. Love, A. Hitchcock and Edward C. Mathews, all of Moose Jaw.

The Shell Bar Grate Co. has been incorporated at Toronto, with a capital of $40,000, to manufacture a patent boiler grate and to carry on business as iron founders and mechanical engineers at Tôronto. The incorporators are: J. Max Bullen, Harold L. Steele and Wendell Osborne, all of Toronto.

The Sterling Engine Works, Ltd., has been incorporated at Ottawa, with a capital of $25,000, to manufacture steam and gasoline engines, and boilers, etc., at Winnipeg, Man. The incorporators are: Vincent C. Maddock, William J. Leaney and Garnet Coulter, all of Winnipeg.

The Dominion Crucible Co. has been incorporated at Ottawa, with a capital of $200,000, to manufacture crucibles, graphite, clay and refractory materials, with head office in Montreal. Incorporators are: F. G. Bush, G. R. Drennan, and H. W. Jackson, all of Montreal.

The Kingston Smelting Co. has been incorporated at Toronto, with a capital of $30,000, to carry on the business of mining and smelting ores at Kingston, Ont. The incorporators are: Alexander McKinnon, J. L. Whiting and David Murray, all of Kingston, Ont.

Contracts Awarded

Oshawa, Ont.—The Toms Contractin Co., Toronto, has been awarded contracts for additions to the plant of th Chevrolet Motor Co., Oshawa.

Toronto, Ont—A contract has bee awarded by the Board of Control t Drummond, McCall & Co., Toronto, fo six valves.

Assiniboia, Sask.—The Town Counci have let the following contracts for th construction of a waterworks system One internal combustion engine, Bovin Co. of Canada, Ltd., Lindsay, Ont.; generator, switchboard, and other apparatus, Canadian Westinghouse Co. pumps, motors, piping, and air compressor, James Ballantyne & Co.; on pneumatic storage tank, Canadian Allis Chalmers, Ltd.; poles, wire, and lin material, Northern Electric Co.; abou 17,500 feet of cast iron or steel pipe an specials, Canada Iron Foundries; hydrants, gate valves, and boxes, T. McAvity & Sons.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department of Trade and Commerce, Ottawa, is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL
Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE
Valparaiso, British Consul General.

COLOMBIA
Bagota, British Consul General.

ECUADOR
Quito, British Consul General.
Guayquil, British Consul.

EGYPT
Alexandria, British Consul General.

FRANCE
Havre, British Consul General.
Marseilles, British Consul General.

INDIA
Calcutta, Director General of Commercial Intelligence.

ITALY
Genoa, British Consul General.
Milan, British Consul.

MEXICO
Mexico, British Consul General.

NETHERLANDS
Amsterdam, British Consul.

PANAMA
Colon, British Consul.
Panama, British Vice-Consul.

PERU
Lima, British Vice-Consul.

PORTUGAL
Lisbon, British Consul.

RUSSIA
Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN
Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN
Stockholm, British Consul.

SWITZERLAND
Geneva, British Consul.

URUGUAY
Monte Video, British Vice-Consul.

VENEZUELA
Caracas, British Vice-Consul.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC
H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALIA
J. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES
E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA
J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA
Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE
Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN
G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND
Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA
C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya, Ploshch 9, Petrograd.
L. D. Wilgress, Canadian Government Commercial Agent, Bukhgolza Ulitza No. 4. Omsk, Siberia.

NEWFOUNDLAND
W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND
W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA
W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM
Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

AUSTRALIA, B. Millin, Sydney, N.S.W.

BRITISH WEST INDIES
Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.
R. H. Curry, Nassau, Bahamas.

NORWAY AND DENMARK.
C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM
W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

Tenders

Weir, Que.—Tenders for furnishing all labor and materials and constructing a steel bridge and appurtenances to be erected over the Rouge River (Rivington Bridge), addressed to the undersigned, will be received by the Municipal Council of Harrington until December 2, 1916. All tenders shall be in accordance with the plans and the specifications prepared by the engineer of the Department of Public Works and Labor, and which may be seen at the office of the undersigned, Pierre Cantin, treasurer, P.O. Box 44, Weir, Que.

Ottawa, Ont.—Tenders, addressed to J. W. Pugsley, secretary of the Department of Railways and Canals, Ottawa, Ont., will be received up to November 15 for the construction of a reinforced concrete elevator with a capacity of 500,000 bushels. Plans, specifications and blank form of contract may be seen at the office of the following:—Chief engineer, Department of Railways and Canals, Ottawa; railways, Moncton, N.B., general superintendent, Winnipeg, Man.; resident engineer, Fort William, Ont.; John S. Metcalfe Co., engineers, Montreal, Que. Contractors who wish to obtain plans and specifications temporarily for their own use may obtain same on depositing a certified bank cheque for $100.

Marine

St. Catherines, Ont.—A serious accident occurred on the Welland Canal on Nov. 5 when the steamer J. H. Shrigley of Sarnia carried away both foot gates of lock 7, flooding the country in the vicinity.

New Glasgow, N. S.—The Nova Scotia Steel and Coal Co. have decided to enlarge their shipbuilding activities by building a second ocean going vessel, and one about 25 per cent. larger than that now under construction.

Kingston, Ont.—The steamer John F. Thom, belonging to the Thom Transportation Co. of Quebec, which recently went aground on the westerly end of Corrigan's Island, near Waddington, will be left in its present position until Spring.

Brantford, Ont.—With a view to the improvement of the Port Dover harbor Government officials paid a visit there on Saturday and gathered data to prepare plans for its deepening. Chief Engineer Stephen, of the Windsor office of the Department of Public Works; Martin N. Todd, general manager of the Lake Erie and Northern Railway, accompanied by Senator McCall, of Simcoe, comprised the party.

Victoria, B.C.—The first and most important section of Victoria's greater harbor scheme is now practically complete. The huge breakwater, which is constructed of granite and reinforced concrete 2,500 feet to seaward, has reached such a stage that within four weeks the contracting firm, Sir John Jackson, Ltd., will have completed the undertaking. The contract has been under way for the past three and a half years, initial operations being started in April, 1913, and continuous progress has been maintained. When the entire scheme is completed, Victoria will have one of the finest harbors, equipped with the finest facilities for handling large ships on the entire coast. Rapid progress is being made by the firm of Grant Smith & McDonnell in the construction of the two concrete piers sheltered by the breakwater. The whole of the fifty-two reinforced concrete caissons required for the contract have been completed and, with the exception of one, all have been sunk in position on the site. At low water the outline of the piers can be clearly distinguished.

Railways—Bridges

Russian Railroad Construction. — Foley, Welsh & Stewart, Canadian railroad builders, have their men at work on the contract for 3,000 miles of railroad in European Russia which they recently secured. Preliminary surveys are being made, and it is thought that by spring the actual construction will have begun.

Railroad Contracts Pending.—Railroad construction contracts, totalling 28,000 miles in Russia and China, are pending, and even that amount is said to represent only a small part of the future development in this respect. A conservative estimate places the railroad construction in Asiatic China and Russia at from 60,000 to 70,000 miles in the next decade.

Personal

W. M. Neal has been appointed acting superintendent C.P.R. car service, vice H. J. Humphreys, transferred.

Lionel L. Gisborne, formerly assistant waterworks engineer at Ottawa, has been appointed manager of the Toronto office of the General Supply Co., of Canada. The office is located at 38 Toronto Street.

E. R. Wood, Toronto, has complete charge of the institution of the Canadian Aviation school being established in Toronto by the Imperial Munitions Board. **Lord Innes-Ker** represents the British Government.

H. P. Hoag, superintendent of Goold, Shapely & Muir Co., Brantford, Ont., has resigned to go to a munition factory in Toronto. He was given a chest of silver by the employees as a token of regard.

Senator Wilson, of Montreal, and **C. S. Wilcox** and **Paul J. Myler**, of Hamilton, have been elected to the board of North American Pulp & Paper Co. This concern controls three pulp and paper mills in Canada and the United States, and has extensive limits in Canada.

E. P. Mathewson has been appointed to the position of general manager of the British American Nickel Corporation's plant at Sudbury, Ont., Mr. Mathewson was formerly manager of the reduction works of the Anaconda Copper Co.

William T. Banfield has finished his engagement as production manager with the International Arms & Fuse Co., Bloomfield, N.J., and has returned to Toronto to resume his former duties as a member of the firm of Banfield & Sons, engineers.

J. S. Dennis, assistant to the president of the C.P.R., who for many years, has been in Calgary as head of the company's Department of Natural Resources, has been transferred to Montreal. Mr. Dennis, it is understood, will retain his connection with the Department of Natural Resources in an advisory capacity, but the administration of the department will be turned over to **P. L. Naismith**, who has been manager for some years. Mr. Dennis comes to Montreal as assistant to Lord Shaughnessy, to take up special duties, among which are the important questions of colonization and the development of the resources of the Dominion adjacent to the company's system.

Trade Gossip

The Reliance Mfg. Co. has increased its capital stock to $500,000.

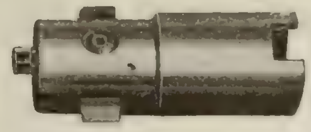
Montreal, Que.—Vickers, Ltd., have an order for two 7,000-ton steamers for Norwegian owners.

The National Iron Works Ltd., Toronto have been awarded a contract by the Toronto Board of Control for cast iron pipe .

Heavy Ore Shipments.—An increase of more than 11,000,000 tons to shipments of iron ore from Duluth, Minn., is shown in reports for the season ended Nov. 1, as compared with the rcords of the corresponding period last year. Up to Nov. 1, 1915, shipments amounted to

Rough Bore, Straight Diameter.

Rough Bore, Inside Radius.


Finish Bore, Straight Diameter.

Finish Bore, Inside Radius.

8" Shells

50% Boring Economy!

9.2" Shells

High-salaried men are employed to keep the cost of production down, but in this case a boy could see the advantages to be obtained through these boring heads.

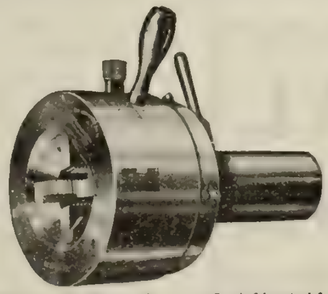
25% to 50% reduction is obtained only by the use of Davis Boring Heads. These consist of 16 sizes and 26 different styles, and embrace every operation from a shell of the smallest calibre to 8" and 9.2". (The quality of work produced is limited, and that limit is highest quality.)

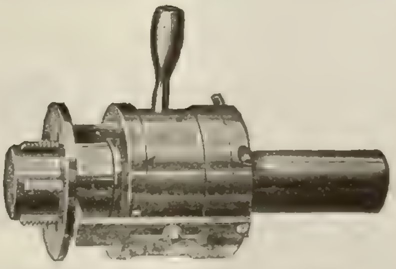
Davis Boring Heads are constructed of high-speed steel and are the result of years of scientific knowledge of boring-tool requirements and the experience obtained by the "pioneering" days.

WRITE FOR PARTICULARS.

The heads illustrated here are used for operations on 8" and 9.2" shells. The heads are all equipped with micrometer adjustments. This enables more speed to be put to the operation, leaving the adjusting of the cutters to the micrometer.

The A. R. Williams
Machinery Co., Limited
64-66 Front St. W., Toronto


Geometric Self-opening and Adjustable Screw-cutting Die Head.


Geometric Adjustable Collapsing Tap.

Long Life and Good Work

A Shop Foreman Writes—

> *"Fifty Geometric Die Heads and Collapsing Taps in our plant. Long life and good work the reason."*

Where one Geometric Screw-Cutting Tool enters, others follow. If you want to know real thread-cutting satisfaction, let a Geometric in.

Whether it is an outside thread, or an inside thread, of whatever diameter, length, pitch or form, a Geometric Screw-cutting tool will produce it. Whatever the make of your Screw Machine, a Geometric will fit it.

Let us know the class of thread-cutting that you have to do, and we will describe, for your consideration, the tool best suited to produce it.

THE GEOMETRIC TOOL CO., New Haven, Conn., U.S.A.

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Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

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METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS
372 Pape Avenue, Toronto, Can.

29,345,174 tons, while during the 1916 season 40,608,767 tons have gone forward.

Canadian Allis-Chalmers Ltd., Toronto, have been awarded a contract for pumping equipment for the town of St. Marys, Ont.

The Lyman Tube & Supply Co., 33 Melinda Street, Toronto have appointed H. E. Breuls their city salesmon. Mr. Breuls is specializing on chain drives.

Charles C. Kawin Co., chemists and metallurgists, have extended their office and laboratory accommodation in the Kent Building, Toronto, in order to take care of increasing business.

The John Bertram & Sons Co., Dundas, Ont., will open a sales office in the C.P.R. Bldg., Toronto about Dec. 1. They will carry in stock a full line of Pratt & Whitney small tools. John Ferguson of their headquarters staff will be in charge.

The Lyman Tube and Supply Co., 323 St. James St., Montreal have opened a New York office for the purpose of purchasing machinery and other equipment for the benefit of their customers and so that material can be shipped from stock. K. E. Gury, formerly with the Driggs Ordinance Co. will be in charge of the New York office, located at 2606 Equitable Bldg.

The Normac Machine Co., St. Catherines, Ont., have equipped a factory for the manufacture of taps, dies, jigs, gauges, fixtures and all kinds of tools. The members of the new firm are J. H. McCoy and S. A. Norton. Both are men of long experience, Mr. McCoy being formerly connected with the National Cash Register Co. and Mr. Norton with the Whitman & Barnes Co.

Kingston, Ont.—The repair work on the North American smelter, which was recently taken over by the Kingston Smelting Co., is being rushed to completion, and it is expected that the plant will be in operation in three or four weeks. The capacity of the smelter will be about twenty tons a day. The company has not found it necessary to install any new machinery, the old equipment being thoroughly adequate for the work required of it when put into a state of repair. The company intend to smelt lead concentrates into lead, for which there is a splendid market in Canada.

Britain's Output of Munitions.—H. E. Morgan, one of the directors of the Labor Supply Department of the Imperial Ministry of Munitions, is at present in Ottawa, giving to the Imperial Munitions Board, the benefit of his knowledge and experience of labor problems in the munition factories of Great Britain. He says that the output which

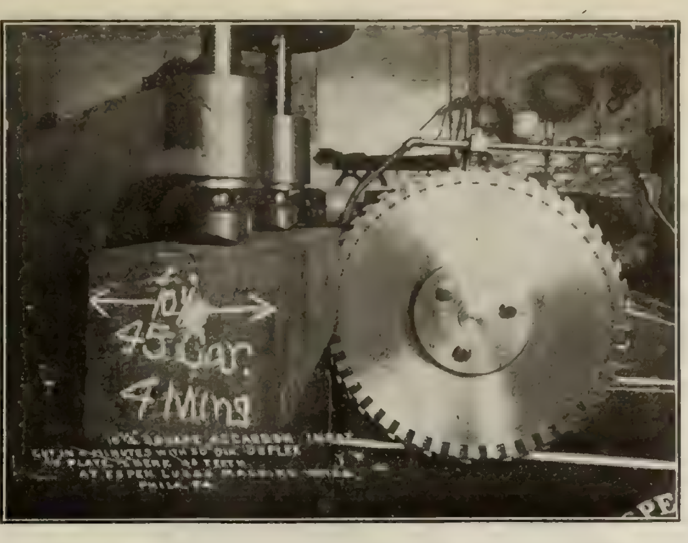
$5 a ton for steel billets, which are now held at $50 a ton, Pittsburg. The present outlook may portend still higher in 1914-15 took twelve whole months to produce can now be obtained from British sources in from four days to three weeks, depending upon the class of product. The total number of war workers in 1914 was under 200,000, to-day it is 2,500,000.

Power Hack Saws and Grinder.—The Perfect Machine Co., Galt, Ont., have issued a catalogue dealing with an interesting line of power hack saws, grinders, lathes and drills. The various types of machine are illustrated accompanied by a specification of each and their principal constructional features.

Pulp Wood May Be Scarce.—The disappearance of pulp wood in Canada during the next twenty-five years, if conservation measures are not adopted, was prophesied before the Dominions' Royal Commission at its session in Montreal on Oct. 31, by Ellwood Wilson, an expert on the paper industry. Mr. Wilson stated that there were three things indispensable to the progress on the pulp industry in this country; one was the adoption of a scientific scheme of reforestation; another a proper fire protection system such as they have in British Columbia, and also a system of avoiding wastage.

Serious Coal Shortage.—According to a statement issued on Nov. 1, at Wilkesbarre, Pa., by the Anthracite Bureau of information, which is maintained by mining companies in the hard coal fields, the production of anthracite from April 1 to September 30, this year, was 2,075,000 tons less than in the corresponding months of 1915. This decrease, the statement says, has been due almost entirely to the shortage in the labor supply. During this period there has been no time when there was a surplus of coal on the market. Officials of the Mine Workers' Union are blamed New York office for the purpose of purmands for anthracite.

Twist Drill Manufacture.—I am convinced, says Seymour Bingham, in the "Ironmonger," that Britain will never rise to the occasion to make jobbers' drills to compete with the Germans; firstly, because the trade unions will prevent British makers employing female labor; and, secondly, because failing this, male labor will make the drills too dear to compete. I am so convinced of this that I am putting down a drill works here (Italy), where I can secure cheap female labor and cheap hydro-electric power, and where taxes (compared with Great Britain) are low. In addition, the Italian Government will allow entry of all my plant duty free in order to encourage new industries.



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Let us demonstrate what a saving can be made by installing a
HUNTER "DUPLEX" Inserted Tooth Blade
Write for information
HUNTER SAW & MACHINE CO., Pittsburgh, Pa., U.S.A.

We are qualified Tool, Die, Jig, Gauge and Fixture Makers.
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Forgings Cranks, Connecting-Rods, Valves and any other special work
MACHINE HANDLE FORGINGS
Blue finish, ready for use.
Write for prices to
ST. CLAIR BROS., Galt, Ont., Can.

Steel Castings

We are now in a position to make immediate delivery on all kinds of steel castings, 100 lbs. and heavier.

Send us your next order.

Dominion Steel Foundry Co., Ltd.
Hamilton, Ont.

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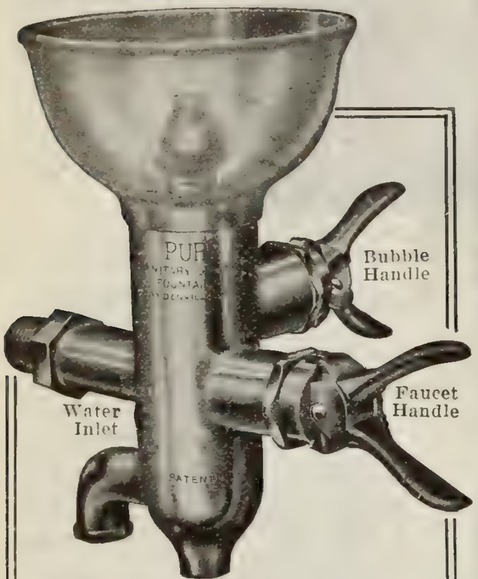
In Safety First and always.
In providing for the Health of my Fellow Workmen.
In Light and Air and sanitary Working Conditions.
In clean, fresh drinking water for everybody.
In the Safety, Economy and Man-betterment.

PURO SANITARY DRINKING FOUNTAIN

(MADE IN CANADA)



The loss of a man through impure drinking water is a crime that "the front office" must bear.

An ugly statement, isn't it? But true, absolutely.

When a man comes to work in your factory he puts his health in your keeping.

Are you willing to take chances on such a trust?

Impure drinking conditions are responsible for more tragedies than any machine ever built.

Apply the "Safety First" Principles to your water supply: don't deny your men a clean, fresh drink of water.

Conserve their health and they will improve your profits: make yourself as worthy of the name of "employer."

Install the Gold Medal winner Puro in your plant, office and shop alike.

The only Sanitary Drinking Fountain that is safe, sanitary, simple, automatic in control and easily attached.

Let us tell you just what it will cost you to

"PURO-FY"

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

"HAWK'D"
CHROME
VANADIUM
STEEL

Will Give You Exceptional

Shell Forging Production

WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

There are many cases where each punch has turned out over 2,000 shells.

It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

Hawkridge Brothers Company
303 Congress St., BOSTON, MASS.
U. S. A.

There's the Farmer

PROSPEROUS and thrifty, yet withal a spender. A motor car, if he feels like it. A good barn, a disposition towards pedigreed stock, good implements, and a buyer of man-saving machines.

Then there's his family—all with ready money all the year round, thanks to better marketing methods and facilities.

This farmer and his family read farm papers—pay good money for such a paper—because they want its help, direction and information.

And they most certainly read the advertisements with deep attention in

The FARMER'S MAGAZINE

Half of Canada's population is rural, and farmers have a greater purchasing capacity than the average town or city family. Go after the farmer's trade through his own medium.

N.B.—Objectionable advertising not accepted. Both editorial and advertising columns are closely censored to keep them clean and decent.

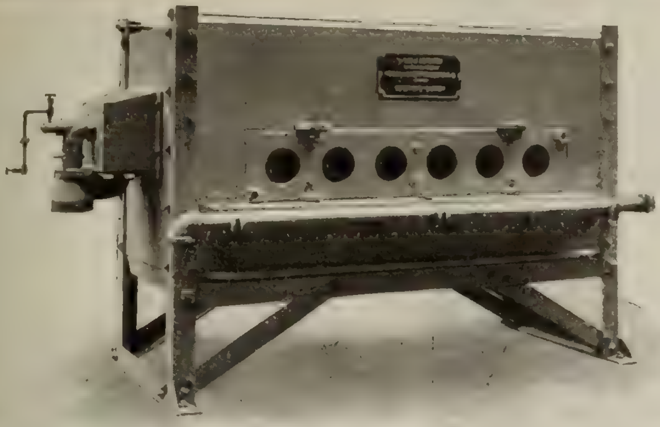
Published by
The MacLean Publishing Co., Ltd., 143-153 University Ave., Toronto

Ironworks in Norway.—In Norway
scheme is being elaborated for the ere
tion of an ironworks with a minimu
annual output of 50,000 tons. It is to
built in the vicinity of water-pow
works and within 300 kilometres of Na
vik, the Norwegian port of shipment
Lapland iron ore. It is intended to i
stal a coke plant which is to be suppli
with foreign coal, as well as a by-pr
ducts recovery plant and steel work
with foundry and rolling mills. T
coal ,about 125,000 tons a year) is to
obtained from England. The capit
will be about $4,250,000.

Orders for Rails Are Unfilled.—De
pite the fact that the Dominion Gover
ment has permitted the Canadian ra
ways to import rails free of all duty e
cept the war tax the imports of ra
have been so far very small. The Go
ernment's action was taken as a mea
of relieving what was represented as
serious shortage of steel, due to the fa
that Canadian mills were so largely e
larged in the manufacture of war mu
tions. The railways wanted rails
order to move the crop, especially fro
some of the more recently settled di
tricts, and the Government authoriz
the importation of rails without the pa
ment of the regular duty. The railwa
placed large orders in the United Stat
but these orders have for the most pa
remained unfilled. One company whi
had on hand a quantity of second-ha
rails, released them for a military pu
pose, and has been unable to repla
them.

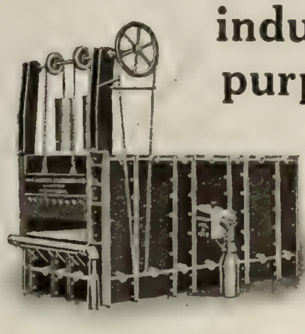
Will Make Paper from Wood Chips.-
Advices from Washington, D.C., sta
that as the result of studies which ha
been made at the Forest Products Lab
ratory on methods of handling wo
chips suitable for paper pulp, it is a
nounced that Wisconsin paper co
panies are now negotiating with the ra
roads for shipment to their factories
experimental trainloads of chips
Western woods adapted to paper ma
ing. Previous investigations by t
Forest Service have demonstrated th
good grades of paper can be made fro
a number of Western woods. The e
perts now estimate that some of the
woods, when cut into chips and dri
and baled, can be delivered to the mil
in Wisconsin at a very small advan
over the cost of chips made from loc
timber. In Wisconsin alone, it is state
there is an annual market for ov
300,000 cords of pulpwood.

Steel at New High Record.—Prices
steel in the United States, eight leadi
steel products being used for the pu
pose, averaged a new record high lev
last week. The estimate is $63.75
gross ton, which compares with $63
week ago and with $63.42 a fortnig
ago. The increase in the average w
brought about mainly by the advance



"Mecol" Furnaces

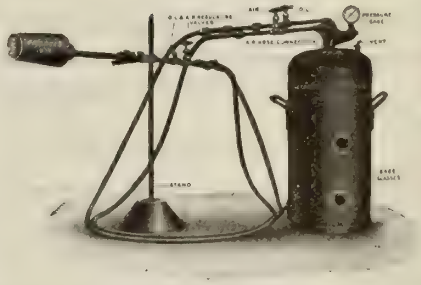
Designed and Built in Canada for all industrial purposes



What the use of Oil instead of Coal-fired Furnaces means to you—

A Clean Workshop without Smoke or Soot.
Only half the furnace space necessary.
Less than half first cost of furnaces.
No chimneys or flues required.
Instantaneous and perfect control of temperature.
Higher temperatures obtained.
No heaters, coal or ash handlers required.
No coal or ash piles.
Less waste of fuel and less time required to bring furnaces up to working heat.
No waste of fuel after work is done, as supply is shut off instantly.
Write for full particulars.

MECHANICAL ENGINEERING COMPANY, LIMITED
55 Cote St., Montreal, Que., Canada
Phone, Main 3585. Cable address "Mecol."



Building Up Light-Weight Shells
ONE ONLY OF ITS NUMEROUS USES

THE SCHOOP METAL SPRAYING PROCESS

Solves one of the greatest problems heretofore confronting the structural engineer, because it produces on iron or steel a permanent coating not susceptible to corrosion.
Carbons can be coated with copper, etc.

For full information write for booklet "D".

The Metals Coating Co. of Canada, Limited
Versailles Building, 90 St. James Street, MONTREAL, CANADA

Preparedness—

THE watchword of the day. Start now and be ready for the big business that is coming.

SPECIAL machinery and equipment is our forte. We ask the opportunity of having our engineers solve your problems.

LYMBURNER, LIMITED
360 St. Paul St.
MONTREAL, CANADA

Steel Shell Forgings or Billets of any size or weight will move any distance or about curves upon our specially constructed Gravity Carriers and Incline or Horizontal power devices. No labor required.

Canadian Mathews Gravity Carrier Co., Toronto, Ont.

"Barnes-made"
SPRINGS

are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

Write for booklet No. 7-T.

Established 1857.
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U.S.A.

Man'f'rs of "Barnes-made" Products
Springs, Screw Machine Products, Cold Rolled Steel and Wire

HAVE YOU

read pages 70 to 71 ? Turn to them now and see for yourself whether or not they are of interest.

Canadian Machinery
Classified Advertising Section

MacKinnon, Holmes & Company, Limited

Design, manufacture and erect all classes of Steel Work.

Specialties:-

Bridges
Oil and Water Tanks
Penstocks
Coal and Coke Bins
Smoke Flues & Stacks.

Prompt deliveries assured.

Designs and Estimates from Head Office at

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QUANTITY PRODUCER

This tool is used in shops where parts are keyseated by thousands. It is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. Shops large and small can use the tool, and it is readily attached to a drilling machine for which it is designed. The tool keyseats in places where Keyseating Machine, Planer and Shaper can't reach. The right tool to use for keyseating interchangeable parts. There is no limit to the variety of work possible to be keyseated.

NATIONAL MACHINE TOOL CO.
2270-2272 Spring Grove Avenue, Cincinnati, Ohio, U.S.A.
Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria.

Kindly mention this paper when writing advertisers.

prices, and perhaps 1917 contracts from abroad will be met with $15 a ton more than was paid a few months ago. For instance, the Carbon Steel Co. of Pittsburg has received at rising prices an order from Italy for $3,000,000 in rounds and another order from the United States Government for $1,000,000 of deck plates for one of the battleships now building.

Catalogues

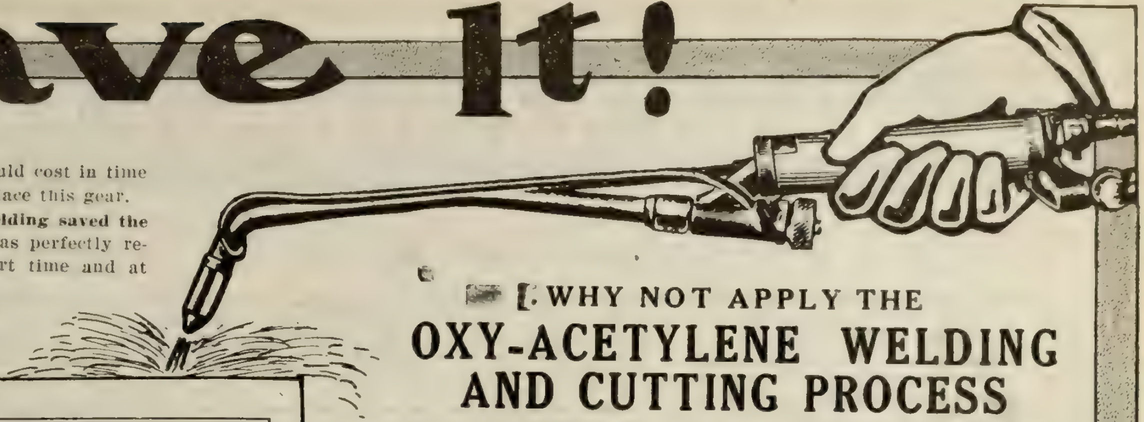
Engineers' Vise—A leaflet illustrating and describing the "Greyhound" engineers 'vise and a combined lathe, planing, shaping and fluting machine, made by Joseph Appleyard, Bradford, Yorks, England.

Turret Lathes. — The International Machine Tool Co., Indianapolis, Ind., have issued a bulletin illustrating and describing the "Libby" heavy duty lathe designed for use in railroad shops. The illustrations include several sketches showing typical samples of work done on this lathe and the time taken for the operation. The bulletin also contains a table giving a record of work done on the "Libby" lathe, being a copy of a railroad monthly cost sheet.

The Schoop Process Bulletin describing the "Schoop" metal spraying process, issued by the Metals Coating Company of Canada Ltd., Montreal. The bulletin first deals with the problem of corrosion, and the development and application of the "Schoop" process. Then follows matter relating to the construction of the spraying pistol, its mechanical details and method of operation all being described fully and accompanied by illustrations. The concluding pages illustrate and describe the "Gravitas" apparatus, devised for spraying zinc. A data sheet is included with the bulletin giving a detail cost of using the pistol with various metals.

Thos. W. Ward Ltd., Sheffield, England, have mailed us a copy of their "Albion" machinery catalogue which is issued monthly and contains a list of machinery in stock. The catalogue is arranged in two sections, the first section contains list of new and second hand machinery including machine tools of all kinds, electrical apparatus, steam, gas and oil engines, pumps, etc. The second section is devoted more particularly to second-hand boilers, tanks, tubing and rails, etc. Reference is made in the catalogue to other departments of the firm's business including scrap metals of all kinds, pig iron etc. It is stated that these materials are dealt with in large quantities and are purchased in a large number of markets.

Save It!



Think what it would cost in time and money to replace this gear. **Oxy-Acetylene Welding saved the day.** The gear was perfectly reclaimed in a short time and at low cost.

WHY NOT APPLY THE

OXY-ACETYLENE WELDING AND CUTTING PROCESS

for your REPAIRS and in your MANUFACTURE?

It saves you money, delays and trouble. It brings you money. We manufacture Welding and Cutting Plants Portable and Stationary.
"CLAUDE" OXYGEN—made from liquid air. The most efficient absolutely sold in purest form—full measure —at low price.
We also supply **PURE DISSOLVED ACETYLENE.**
Put your name and address on this coupon and mail it to us. **Full particulars will be sent at once.**

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Factories the World over: 26 Boler St., WEST TORONTO; Maisonneuve, MONTREAL; 325 William Ave., WINNIPEG.

L'Air Liquide Society, Maisonneuve,
MONTREAL, P.Q.

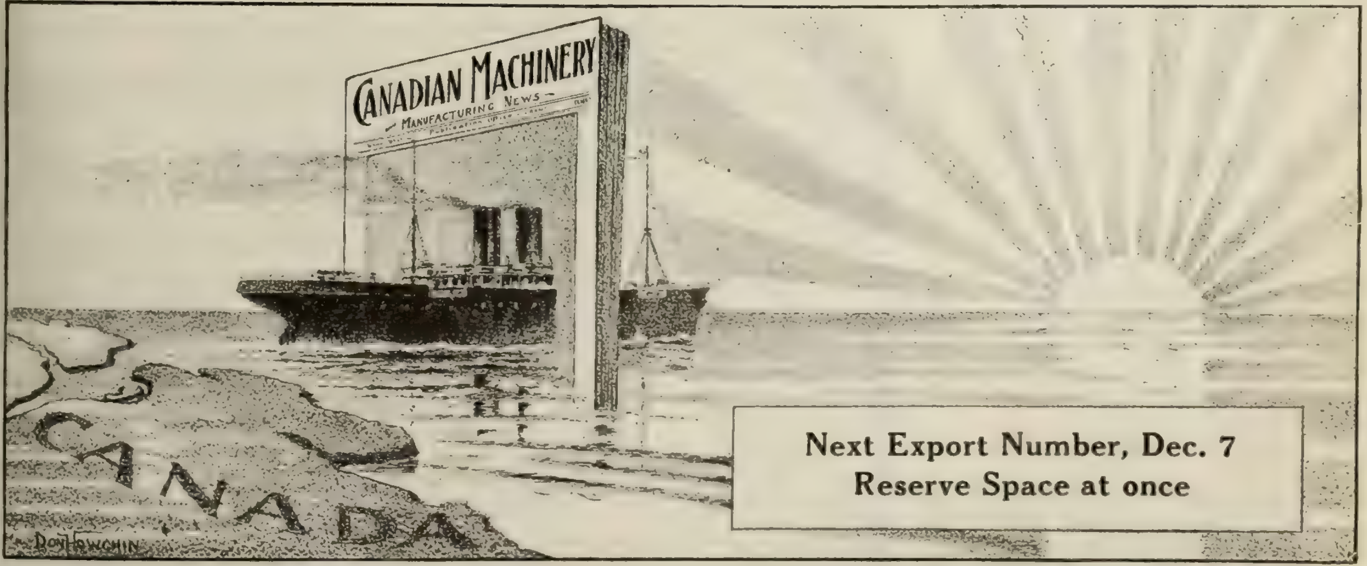
Gentlemen,—Will you please send, without obligation to me, postpaid, your New Booklet?

Name ....

Address .... Date ....

Province .... C.M

Business ....



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Classified Advertising Section

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FOR SALE

HEAVY DROP HAMMER FOR SALE. Metallic Roofing Co., Toronto. (21)

16 H.P. IDEAL GAS ENGINE — ALSO quantity of pulleys. Chipman & Millman, Brantford, Ont. (16)

6½ H.P. WESTINGHOUSE AND 1/3 H.P. Toronto & Hamilton Electric Co. 60-cycle motors, in first-class order. Geo. H. Lees & Co., Hamilton. (17)

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 227, Canadian Machinery. (15)

FOR SALE—TWO C.M.C. TURRETS—SPEcially built for inside boring for 6" shells; almost new. These are offered for sale subject to special terms as to delivery, and at price to be arranged. Taylor-Forbes Co., Ltd., Guelph. (19)

ONE REED TURRET LATHE, 8′ BED, swing, 28"; 4 2" holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 241, Canadian Machinery.

FOR SALE — HOT SAW AND MILLING machine, Ajax. New; never used. Address Canadian Warren Axe & Tool Co., St. Catharines. Ont.

FOR SALE—45 H.P. GAS PRODUCER AND engine, complete. Good condition. For particulars write Canadian Warren Axe & Tool Co., Ltd., St. Catharines, Ont.

BRASS RODS, 1¼, 1½, 1¾ UP TO TEN FT. Brass tubings, 2⅜ o.d., with ¼ wall; all lengths to ten feet. Louis Lovitz, 186 Markham St., Toronto. Telephone College 5711. (17)

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

For Sale Cheap

1—Box Girder Type Overhead Hand Power Crane, 48′ 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.

1—12" Single "I" Beam Overhead Hand Power Crane, 30′ 10" span, 3 tons capacity; complete, less the Hoist.

1—Brantford (Gas) Bake Oven and 4 Racks.

1—Linderman 2-Spindle Boring Machine.

1—26" Drill, London Machine Tool Company.

1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

11—New 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.

30—Used 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.

M. BEATTY & SONS
Limited
Welland, Ont.

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 226 Canadian Machinery. (15)

FOR SALE—TWELVE H.P. GAS OR GASOline Engine. Goold, Shapley & Muir Ideal. In first-class condition. Cheap. Stedman Brothers, Ltd., Brantford, Ont. (21)

FOR SALE—FIVE THOUSAND FEET OF 1" black piping. Newell Mfg. Co., Prescott, Ont. (18)

BUSINESS FOR SALE — MACHINE SHOP with a good, steady run of work and always busy. A good opening for a young man to get into business. Owner has other interests. Box 224, Canadian Machinery. (13)

WE CAN GIVE EARLY DELIVERY ON difficult fixture cutting, also on gauges and jigs. We have a large shop and the finest equipment. Apply Box 235, Canadian Machinery.

FOR SALE — IMMEDIATE SHIPMENT — New Heavy Duty Shell Boring Lathe for manufacture of 6" High Explosive Shells. Write for complete specification. Wm. Hamilton Co., Ltd., Peterboro, Ont. (20)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

FOR SALE.—ONE BROWN-BOGGS MARKing Machine, suitable for 6" Mark XVI. or Mark III. English Shells. Only object in selling is that other methods of marking have been adopted. Price on application. Taylor-Forbes Co., Ltd., Guelph. (14)

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

GAP LATHE — LONDON TOOL CO. — swings 41" in the gap, 26" over shears, 20 ft. bed, rod and screw feed, compound rest, steady rest, countershaft, 2 face plates, 4-jaw chuck, weight about 10,000 lbs. This tool has been very little used, and is in excellent condition. Bargain for quick sale. Winnipeg Machinery Exchange, Sutherland & Gladstone Sts., Winnipeg, Man. (17)

WE HAVE FOR SALE THE FOLLOWING equipment: Complete nickel and copper plating plant, including direct connected dynamo and motor; one second operation cast iron plug machine, and two first operation cast iron plug machines manufactured by the Brown Engineering Corporation; 2 16-inch turret lathes; 1 38-inch engine lathe, 20-foot bed. The above outfit will be sold en bloc or separate. Apply direct to Foundry & Machine Co., Ltd., Montreal. (12)

FOR SALE—McDOUGALL ENGINE LATHE. 20" swing, 10′ bed; never been used. Baker Keyseater No. 2, good as new. Boring Mill, 2 bars, will bore up to 30" dia. Boston Forge Blower, 27", good condition. Crescent Swing Cut-off Saw, almost new. 7½ H.P. Westinghouse D.C. Motor, in good order. Gurney Platform Scale, 2,000 lb., 16" wheels. Mandrills, Couplings, Hangers, Post Boxes, Pulleys, Belting, Cap Screws, Bolts, etc. Special prices on above, write for particulars. Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (14)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

SITUATIONS WANTED

TOOL MAKER IN CHARGE DESIRES change. Competent to take charge of machine shop or tool room. Good references. Box 225, Canadian Machinery. (17)

PRODUCTION MANAGER, YOUNG MAN, 10 years' experience, interested in high-grade permanent position, capable either installing or maintaining and improving efficient production system covering all manufacturing details from design to shipping platform. Box 240, Canadian Machinery. (23)

SITUATIONS VACANT

WANTED—NIGHT SUPERINTENDENT TO take charge of factory making 4.5 sockets. Apply Box 237, Canadian Machinery.

FOREMAN TOOL-MAKER WANTED — TO take charge of tool room in plant manufacturing 4.5 sockets and other munition work. Apply Box 236, Canadian Machinery.

WANTED — EXPERIENCED STEEL works draftsman for Nova Scotia. Give full particulars, including salary, permanency. Apply Box 234, Canadian Machinery. (17)

ALL-ROUND MACHINISTS WANTED FOR tool-room; highest wages paid. A. R. Ormsby Co., Limited, 48 Abell Strett, Toronto. (21)

WANTED — MANAGER MACHINE TOOL department. Must have full knowledge of general miscellaneous machinery, especially for munition plants. Position affords every opportunity for advancement. Please state experience and salary expected. Apply to Box 239, Canadian Machinery. (20)

WANTED — SUPERINTENDENT FOR 18-pdr. shrapnel shell factory equipped and now turning out 1,200 shells per day; must have good executive ability and able to produce results; liberal salary to right man. State fully past experience and record, and salary expected. Address Box 238, Canadian Machinery. (19)

WANTED — MANAGER MACHINE TOOL department. Must have full knowledge of general miscellaneous machinery, especially for munition plants. Position affords every opportunity for advancement. Please state experience and salary expected. Apply to Box 239, Canadian Machinery. (18)

WANTED

WANTED TO MANUFACTURE A FEW lines of metal products, sheet metal preferred. We have complete equipment for high-class work. Give complete description and rating in first letter. Apply Box 221, Canadian Machinery. (17)

WANTED—12" BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Aplly Box 218, Canadian Machinery.

WANTED — THREE TURRET LATHES suitable for steel sockets, also Thread Millers suitable for milling outside thread of sockets. Give price and particulars to Steel Furnishing Co., New Glasgow, N.S. (19)

Machine Tools For Sale
In Stock for Immediate Delivery

LATHES

1 16 24 x 8 Sebastian Gap Lathe.
1 13 x 6 Barnes.
1 16 x 6 Canedy Otto (new).
2 16 x 6 Style A Hamilton (new).

TURRET LATHES

2 2 x 24 Hartness Flat Turret Lathes, chucking equipment.

BENCH LATHES

A variety of new and used bench lathes with collets.

BENCH MILLER

1 Sloan & Chace (new).

HAND MILLING MACHINES

1 No. 2 Garvin (new).
1 No. 1 Standard (new).

DISC GRINDERS

2 No. 6 x 20" Ring Diamond Disc Grinder with compound table micrometer adjustment.
2 No. 6 x 14' Ring Diamond Grinder with table, same as above.

GRINDERS

2 No. 1 Cutter and Reamer Grinders (new).
2 7 x 32 Norton Plain Grinders.
2 10 x 24 Norton Plain Grinders.
2 16 x 36 Bridgeport Plain Grinders.

DRILL PRESSES

1—4 spindle Barr.
1 3 spindle Avey.

SHAPERS

1 16" G. & E., B.G.
1 14" G & E. Plain.
1 Double Head Traveling Head. Bement Niles.

SCREW MACHINES

2 No. 2 B & O (new).
1 1 inch Pierce (new).
2 1½" B & O (new).
1 No. 4 Foster.

MILLING MACHINE

1 No. 3 B & S Plain Motor Drive.

COLD ROLLED STEEL

We have an extremely large stock of new round, flat, square and hexagon in our Rochester warehouse. Write for quotations on immediate deliveries.

STRONG & HERY CO.
225 State St. Rochester, N.

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

Second-Hand MACHINERY

If you want second-hand equipment of any sort, advertise for it in our Classified Advertising Section—you'll get results.

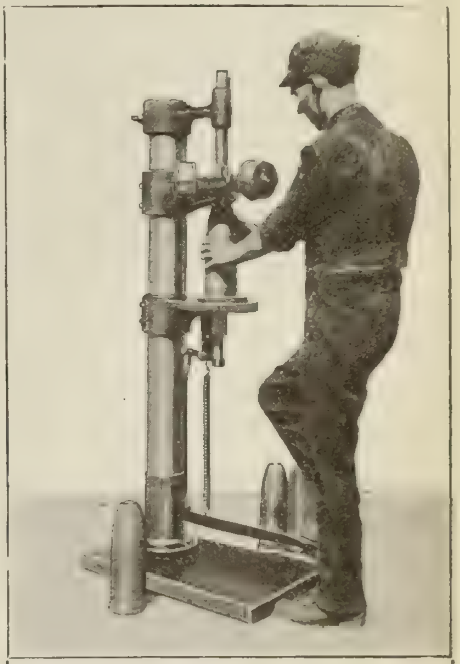
CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue
TORONTO - ONTARIO

MONARCH
Milling Machine
(Made in Canada)

For Milling the three slots in the nose of

Mark 7 Shells

Adjustable to take any size shell from 4.5 to 9.2 inclusive.



ONE MOVEMENT of foot lever clamps the shell and feeds the three cutters in to the right depth.

CAPACITY ON 4.5—6 to 8 shells per minute. Actual cutting time is simply — "zip" and the three slots are finished.

THE MACHINE is complete with High Speed Cutters and drive pulleys which should run at about 550 revolutions per minute. It can be driven by three 2-inch belts, either from overhead counter or line shaft. The clamping device does not interfere with copper band, and altogether it will be found to be a very satisfactory tool—CONVENIENT and ACCURATE.

For further particulars address

H. W. PETRIE, LTD.
FRONT STREET WEST, TORONTO
Sole Selling Agents for Canada

A MAN was wanted as Tool-room Foreman. He was found by a condensed ad. in

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto

FAIRBANKS-MORSE
New and Used Machinery

In Stock at Toronto

1—⅞" 4-spindle National Acme Automatic; used.
2—No. 3 1" Foster Hand Screw Machines.
4—No. 4 1½" Smurr & Kamen Turret Lathes.
1—10" x 5' Seneca Falls Lathe; used.
2—18" x 8' Springfield Lathes; new.
5—20" x 9', 19 16" x 7', 3 16" x 9' Fairbanks-Morse Lathes; new.
2—No. 1 Racine Hacksaws; new.
1—No. 304A Oster Pipe Machine; new.
1—20" x 8' Hendey Lathe; used.
1—Gisholt 16" Special Lathe, type C, 6½ bore.
1—Walcott 20" x 8' Engine Lathe.
5—Barnes 18" x 8' Engine Lathes; new.
7—Potter & Johnson No. 6A Automatics; used.

In Stock at Montreal

3—Gisholt 16" Turret Lathes; new.
2—Gisholt 25" Turret Lathes; new.
Waving and Grooving Machines, 6" shells; new.
1—Hendey 16" Lathe; used.
2—American 16" x 6' Tool Room Lathes; new.
1—Rivett Precision Lathe; used.
1—Brown & Sharpe No. 1½ Universal Mill; used. used.
1—Valley City No. 1½ Universal Mill; used.
2—Ford-Smith 20" Wet Tool Grinders; new.
1—Wilmarth & Morman Drill Grinder; new.
3—20" Back-geared Drills; new.
1—25" Sliding Head Drill; new.
1—Banfield Plug Miller, 6" shells; new.

This is only a partial list of our stock of Machine Tools.

CFM

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

NEW YORK STOCK

Ten No. 60½ Bliss Geared Reducing Presses, rack and pinion movement, adjustable stroke 4" to 42", weight 12,500 lbs. Modern type; used 6 months.
Toledo Double Crank Back-geared Forging Press, weight 28,000 lbs.; 27½" between uprights; bolster space 36" x 36"; shaft 8" diameter.
No. 27K Bliss Knuckle Joint Press; weight 77,000 lbs.
Consolidated Geared Arch Press; weight, 11,000 lbs.
No. 2 Bliss Straight-sided Double Crank Press.
PG-6 Ferracute Geared Punching Press; weight 12,000 lbs.
No. 4 Farrell Punch Press, 1½" stroke.
No. 1 Bliss Straight-sided Press, 8" stroke.
No. 3 Manville Stamping Press, 1" stroke.
No. 69 Bliss Inclinable Press.
Farrell Double Crank Geared Press, 2" stroke; weight 9,000 lbs.
No. 2 Brown & Sharpe Surface Grinder.
Springfield Surface Grinder, table 17" x 50".
Saxon Surface Grinder, table 8" x 18".
Whitney Surface Grinder, table 6" x 12".
12" x 72" Norton Plain Cylindrical Grinder.
New 10" x 24" Norton Plain Cylindrical Grinder.
No. 2 Falkenau Plain Cylindrical Grinder.
Three No. 1½ Landis Internal Grinders.
No. 1 Brown & Sharpe Internal Grinder.
No. 6A Bryant Hole and Face Grinder.
No. 3 Brown & Sharpe Universal Cutter and Reamer Grinder.
Two No. 1 Cincinnati Universal Cutter and Tool Grinders.
No. 2 Garvin Cutter and Reamer Grinder.
10" x 7' Brown Roll Grinder.
No. 1½ Cincinnati Universal Milling Machine.
Ingersoll Slab Milling Machine, adjustable rail, three heads; weight 55,000 lbs.
Newton Duplex Slab Milling Machine, table 121" long.
12" Newton Slab Milling Machine.
76" Newton Vertical Milling Machine; weight 20,000 lbs.
Detrick & Harvey Milling, Drilling and Boring Machine.
Four No. 12 Brown & Sharpe Plain Milling Machines.
60" x 60" x 16' Enterprise Planer.
44" x 44" x 16' Niles Planer, two heads.
44" x 42" x 17' Betts Planer, two heads.
36" x 36" x 12' Chandler Heavy Duty Planer, very massive tool; weight 35,000 lbs.
36" x 36" x 12' Niles Planer.
36" x 34" x 10' New Haven Planer.
32" x 32" x 8' Cincinnati Planer, two heads on rail.
30" x 30" x 12' Detrick & Harvey Open-side Planer, three heads.
26" x 26" x 8' Gray Planer.
9" Bement--Miles Geared Head Double-end Cutting-off Machine.
Six 4" Hurlbut-Rogers Cut-off Machines.
1½" Hurlbut-Rogers Cutting-off Machine.
10' Betts Vertical Boring Mill, two heads, chasing attachment.
66" Betts Vertical Boring Mill, two heads.
60" Binsse Horizontal Boring Mill, 3¼" bar.
60" Bement Vertical Boring Mill.
50" Bement-Miles Car Wheel Boring Mill.
36" Niles Vertical Boring Mill, two heads.
No. 1 Barrett Horizontal Cylinder Boring Machine, 3¼" bar.

New York Machinery Exchange

Offices: 50 Church St., NEW YORK

MACHINE SHOPS AND WAREHOUSES:

222-234 Culver Avenue **63-83 Pollock Avenue**
JERSEY CITY

QUALITY FIRST
DOMINION MACHINERY CO.
TORONTO

Grasp This Opportunity

OUR STOCK MUST BE CLEARED IN THIRTY DAYS TO MAKE ROOM FOR OUR NEW WAREHOUSE. OUR MOTOR PRICES CAN'T BE BEATEN.

All Second-Hand Tools Guaranteed

1-14 x 6 New Tool-room Lathe, Hendey-Norton type, with oil pan and pump, taper attachment, draw-in collet, relieving attachment.
1—20 x 10 London Engine Lathe, hollow spindle, compound rest.
1—16 x 8 McGregor-Gourley Engine Lathe, hollow spindle, compound rest.
1—16 x 6 Bertram Engine Lathe, hollow spindle, compound rest.
1—Plain Miller with Dividing Head.
1—New Cincinnati Plain Miller, single pulley drive.
1—No. 1 Wilmarth & Morman Universal Tool Grinder.
1—Dominion Universal Tool Grinder.
1—24" Cincinnati Back-geared Shaper.
1—20" Ohio Shaper; new.
1—9.2 Copper Band Machine.
1—6" Cut-off Machine.
1—5" Hack-saw.
1—34" Barnes Sliding Head Drill.
1—20" Barnes Drill, wheel, lever and power feeds.
1—20" Davis Back-geared Drill.
1—14" Reed Drill.
1—14" Barr Drill.

Dominion Machinery Company

Toronto, Ontario, Canada

FACTORY: **14 Darling Avenue**
OFFICE: **110 Church Street**

Immediate Delivery

NEW STEAM ENGINES

Two 5 x 6 Vertical steam engines, 8 horse	**$105.00**	**each**
Two 6 x 6 Vertical steam engines, 10 horse	**125.00**	**"**
One 7 x 8 Vertical steam engine, 15 horse	**175.00**	
One 8 x 8 Vertical steam engine, 20 horse	**200.00**	
Two 4 x 6 Horizontal steam engines, 6 horse, with base	**100.00**	**"**
One 5 x 6 Horizontal steam engine, 8 horse, with base	**125.00**	
Five 6 x 6 Horizontal steam engines, 10 horse, with base	**135.00**	**"**
Five 6 stroke engines, with base, 10-15 H.P.	**150.00**	**"**
Two 6 x 6 Automatic, with base, 12-20 H.P.	**250.00**	**"**
Two 7 x 6 Automatics, with base, 15-25 H.P.	**275.00**	**"**
One 8 x 8 Automatic, with base, 20-42 H.P.	**500.00**	
One 10 x 10 Automatic, with base, 39-82 H.P.	**700.00**	
One 11 x 10 Automatic, with base, 47-85 H.P.	**725.00**	

YOUNG, CORLEY & DOLAN, Inc.

115 Broadway, NEW YORK CITY
Telephone: Rector 7866

(tf)

For Sale—48″ Engine Lathe

48″ Enterprise compound rest engine lathe with power cross feed, gears, steady rest, faceplate, wrenches and countershaft; bed 24′ long. Ready for immediate shipment, $1350.00.

Clark Machinery Co., **Cleveland, Ohio**

Baird's Machine Tools

Lathes

2—14″ Walcott with taper attachment
1—14″ Carroll & Jamison
2—18″ Walcott Engine Lathes
2—20″ Walcott Engine Lathes
1—20″ Bradford Engine Lathe with Q.C. Gear
1—10″ x 4½′ Imperial with compound rest
1—17″ Street Bros. Engine Lathe
1—3″ Gridley Automatic Turret Lathe

Milling Machines

2—U.S. Hand Milling Machines
2—Standard Hand Milling Machines
1—No. 2 Plain, High Power, all-geared Cincinnati Miller
1—Farwell Q.C. Hand Miller
1—No. 0 Rockford Plain Miller

Woodworking Machinery

2—36″ Crescent Band Saws
1—No. 2 Crescent Combination Saw Table
1—No. 63—16″ Jointer with safety head
1—18″ Crescent Planer
1—6½′ Crescent Swing Saw
1—12″ Porter Jointer
1—32″ Fay & Egan Band Saw

Miscellaneous

4—Gas Furnaces
1—No. 8 Hinz Furnace
1—6 H.P. Lambert Gasoline Engine
1—½ H.P. D.C. Motor with switchboard
1—¼ H.P. D.C. Geared Motor
1—Automatic Tapping Machine
1—6″ Loew Victor Pipe Machine
1—Hurlbut & Rogers Cutting-off Machine
1—No. 5 Pagborn Sand Blast Outfit complete
3—Summerfield Coil Winding Machines
1—No. 2 Bliss double seaming machine
1—Large Safe
1—Foot Power Sprue Cutter
1—Oliver Sawing, Filing and Lapping Machine

W. J. BAIRD MACHINERY CO.

54-56 Jefferson Avenue **Detroit, Michigan**

MACHINE TOOLS

LATHES.

1—68 x 20 Fifield, face plate drive, triple geared.
1—30 x 27 Reed, heavy type, with taper attachment.
1—18 x 36 x 10 Niles Extension Bed Lathe.
1—22 x 14 Engine Lathe, C.R., H.S.
1—28 x 15 Engine Lathe, C.R., H.S.
1—20″ LeBlond Heavy Duty, with turret.
1—18 x 8 Jones & Lamson Engine Lathe.
2—16 x 6 Barnes Engine Lathes.
1—16 x 8 Cincinnati Engine Lathe.
1—16 x 6 Walcott Engine Lathe.
1—16 x 6 Reed Engine Lathe.
1—16 x 8 Porter Engine Lathe.
1—14 x 5 Lodge & Shipley Engine Lathe.

MILLING MACHINES.

1—No. 1½ B. & S. Universal with vertical attachment.
1—No. 3½ Fox, Plain.
1—No. 3 Chicago Hand Miller.
2—No. 12 P. & W. L.T. Millers.
4—No. 13 P. & W. L.T. Millers.
1—No. 3-H. B. & B. Vertical Miller.
1—Warner & Swasey Profiler.

GRINDERS.

1—No. 1 B. & S. Universal, with all attachments.
1—No. 1 Landis Universal.
2—12 x 36 Landis, plain, geared head.
1—No. 5 Springfield Oscillating Surface Grinder.
1—No. 2 Gardner Disc Grinder.
1—No. 34 Gardner Double Spindle Disc Grinder.
3—Webster Perks Heavy Grinders.

PLANERS.

1—Pond, 62″ (widened pattern type), 9′ bed.
1—36 x 26 x 10 Industrial Planer, 1 rail head and 1 side head.
1—34 x 10′ Badger, S.H.

TURRET LATHES.

1—No. 6 Foster Friction Geared Hand Screw Machine.
1—No. 4 W. & S. Friction Geared Hand Screw Machine.
1—No. 4 Smurr & Kaven Friction Geared Hand Screw Machine.
1—14″ B. & O. Chucking Machine.
1—No. 5 Pearson Hand Screw Machine.
1—1 x 8 Pierce Hand Screw Machine (new).
1—2″ Cleveland Automatic Screw Machine (model A).
2—2″ Cleveland Jigger Feed Screw Machines.
1—⅝″ Cleveland Automatic Screw Machine (model A).

AIR COMPRESSORS.

Steam.

1—12 x 12 x 12¼ x 12 Ingersoll-Rand, Class M.F.I.
1—16 x 18 x 12 D. A. Union S.L. 2 S. Air Compressor.

Belt.

3—10 x 10 Bury Hor., Belt-Driven (182 C.F.).
1—10 x 10 Curtis Vertical, D.C., with base (160 C.F.).
1—8 x 8 Ingersoll Sergent Horizontal (100 C.F.).
1—8 x 8 Chicago Pneumatic Horizontal (110 C.F.).
1—10 x 6 Bury Horizontal.

DRILLS AND SLOTTERS.

1—24″ Niles Geared Slotter.
1—28″ Prentiss, B.G., P.F., W. & L.F.
2—20″ Rockford, B.G., P.F., W. & L.F.
3—20″ Buffalo (new), W. & L.F.
1—17-Spindle Moline.
1—5-Spindle Barnes.

PUNCH PRESSES.

1—No. 64 Toledo, S.S., B.G.
1—No. 95 Consolidated Press.
2—Briscoe S.S., 7″ stroke.
2—1200 lb. B. & S. Roll Board Hammers.
1—800-lb. B. & S. Roll Board Hammer.

We carry a large line of Boilers, Pumps, Engines, Motors, Generators, etc.

Riverside Machinery Depot
Detroit, Mich.

FOR SALE

GRINDING MACHINES

1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10″ x 36″ Landis Plain Grinder (new).
1 10″ x 20″ Landis Plain Grinder.
2 12″ x 24″ Modern Plain Grinders (nearly new).
1 14″ x 50″ Norton Plain Grinder (nearly new).
2 18″ - 30″ x 96″ Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16″ x 66″ Landis Crank Shaft Grinder (18 months old).
2 14″ Swing Special Internal Grinders, capacity ½″ to 14″ dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES

58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13″ Gisholt Semi-Automatic (12 mos. old).
20 21″ Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES

1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72″ table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES

1 8-spindle Bausch Multiple, 1″ capacity.
1 12″ Spindle Garden ½″ capacity.
6 Barnes 24″ 2-spindle All Gear Drive (new).
1 24″ Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26″ Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14″ swing, ¾″ capacity.
2 Peerless 20″ (new).
1 20″ Mechanics (new).
1 20″ Buffalo (new).
1 28″ Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25″ Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾″ x 14″ flute, 21″ over all (new).

RADIAL DRILLS

1 36″ Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES

38 16″ x 8′ Fairbanks-Morse (new).
1 18″ - 36″ x 8′ Fay & Scott Extension Gap (fine condition).
1 30″ x 12′ LeBlond.
1 12″ x 6′ American.
1 28″ x 14′ Fifield.
1 14″ x 4′ Blaisdell.
1 No. 4½ Barnes.
1 54″ x 21′ Detrick & Harvey.
1 26″ x 10′ Bradford.

MARKING MACHINES

2 Noble & Westbrook No. 1 (new).

PROFILERS

1 No. 3H Becker (new).

PLANERS

1 30″ x 30″ x 10′ Ohio with two heads (new).
1 44″ x 44″ x 12′ L W Pond with three heads.
1 40″ x 40″ x 12′ New Haven, with one or two heads.
1 36″ x 36″ x 12′ Sellers widened to 72″.

AUTOMATIC GEAR CUTTERS

1 No. 3 Brown & Sharpe 26″ (old machine).
1 36″ x 4″ Fellows Gear Shaper (fine condition).
1 18″ Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES

1 4″ Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20″ inserted tooth blades (new).

BELT LACING MACHINES

1 12″ Jackson (new).

KEY SEATERS

1 No. 1 Catlin (new).

SCREW MACHINES

1 No. 3 Stecher (new).
1 1″ x 8″ Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅝″ capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2″ x 24″ Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼″ capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES

1 No. 3 La Pointe (nearly new).

BOLT CUTTERS

1 2″ Landis Double Head (nearly new).

BORING AND TURNING MACHINES

1 4′ Bickford Boring & Turning Mill (nearly new).
1 20″ swing 4-Spindle Moline Vertical Boring Machine with 18″ x 36″ table.

BULLDOZERS

1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES

1 Large Filing and Sawing Machine with 12″ stroke.

PUNCHES AND SHEARS

1 No. 3 Walsh Punch Press.
1 Moser 1½″ stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8″ throat capacity ¼″ x ¼″.
1 27½″ throat lever punch ½″ capacity 1¼″ stroke.
1 Thompson Bevel Shear ½″ capacity.

PIPE MACHINES

1 6″ Saunders.

SHAPERS

1 14″ Hendey Geared Friction.
1 20″ Hendey Geared Friction.

TAPPING MACHINES

1 Garvin No. 1 Automatic (new).
4 Geometric High Speed Tapping Devices, style N (new).
4 Murchey 2″ collapsible taps (new).

THREAD ROLLING MACHINES

1 Waterbury Farrell ⅜″ capacity (nearly new).

THREADING MACHINES

5 Special Threading Machines for threading 3″ steel shells (nearly new).

SPOT WELDERS

1 No. 3 Toledo Type 14-A 220 volts 60 cycles (nearly new).

Write us what you want new or second-hand.

32 North Clinton Street, Chicago **W. F. Davis Machine Tool Co.** **403 Singer Building, New York City**

High-Grade

MACHINE TOOLS

The list below is a small portion of our present stock. Write for complete lists.

2—18″ x 10′ Rahn Mayer H.S., C.R.
18″ x 10′ Cincinnati H.S., C.R.
9—17″ x 8′ New National Quick Change.
14″ x 10′ Prentice Taper Attachment.
13″ x 7½′ Carroll Jamieson, New.
2″ x 24″ Jones & Lamson.
1″ x 8″ New Pierce Screw Machine.
¼″ x 5′ Bridgeport Turrett.
¼″ Hartford Auto Screw Mch., with slotting attachment.
36″ Baker Bros. tapping and boring drill.
36″ Currie & Snyder sliding head drill.
No. 2 M. U. Garvin New Miller.
No. 210 Heald Wet Ring Grinder.
48″ x 48″ x 11′ 6″ Sellers Planer, 4 heads
42″ x 42″ x 10′ Fitchburg Planer, 2 heads.
22″ x 22″ x 6′ Powell Planer.
18″ x 18″ x 5′ Pond Planer.
12–26″ x 48″ x 14′ new style McCabe double spindle heavy pattern new lathes.
32″ x 16′ New Rahn Larmon D.B.G.
32″ x 12′ New Rahn Larmon D.B.G.
24″ x 10′ New Carroll Jamieson.
20″ x 8′ Prentice H.S., C.R., T.A.
3- 19″ x 8′ New Sidney D.B.G. swing 21″.
3- 19″ x 8′ New Sidney D.B.G. Quick Change, swing 21″.
3—17″ x 8′ New Sidney D.B.G. Quick Change, swing 19″.
20″ Cincinnati B.G. Shaper.
16″ New Steptoe Shaper.

FRANK TOOMEY, INC.

127-131 North Third St., PHILADELPHIA, PA., U.S.A.

NEW MACHINERY

6—12 x 6 Seneca Falls Lathes, quick change gears; in stock.
10—16 x 6 Canedy-Otto Lathes; October delivery.
3—18 x 8 Cisco Lathes, quick-change gear; in stock.
1—13 x 5 South Bend Lathe; in stock.
1-14 x 6 Carroll-Jamieson Lathe, Q.C.G., taper attachment, relieving attachment, draw-in collets, pan bed; November delivery.
2-1½ American Plain Milling Machines; October delivery.
3-No. 1 Dow Milling Machines, plain; October delivery.
3-No. 1 Bickford Hand Milling Machines; stock.
2—No. 1 Standard Hand Milling Machines; stock.
1—No. 24 Heavy Oesterlein Plain Milling Machine; stock.
1—No. 1½ Valley City Universal Milling Machine; October delivery.
1-No. 1½ Valley City Plain Milling Machine; October delivery.
1—No. 3 Kempsmith Plain Milling Machine; October delivery.
1—No. 34 Heavy Oesterlein Plain Milling Machine; October delivery.
10—No. 6 Standard Universal Tool and Cutter Grinders; stock.
3—No. 1 Wilmarth & Morman Surface Grinders; stock.
1-Style W. P. L. Wilmarth & Morman Drill Grinder; stock.
1—20″ Ohio Back-geared Shaper; stock.
2 No. 1 Wilmarth & Morman Universal Grinders.
1-No. 2 Wilmarth & Morman Surface Grinder.
1 28″ Smith & Mills Triple-Geared Shaper.
2-32″ Smith & Mills Triple Geared Shapers.
2-16″ Smith & Mills Back Geared Shapers.

We also have a full line of Rebuilt Machines.
Write for Complete List.

Special 9 3 x 26 Jones & Lamson All Geared Head Turret Machines with bar equipment. Used, but guaranteed perfect condition.
7 2 x 24 Jones & Lamson Turret Lathes, with chucking equipment. Same condition as above.

Simmons Machine Co., Inc.

903 Singer Building
NEW YORK CITY

989 Broadway
ALBANY, N.Y.

Used Machinery for Immediate Delivery

BORING MILLS.

51" Bullard, one swivel and one fixed head, arranged for motor drive and equipped with motor.
52" Niles Car Wheel Boring Mill.

DRILLS

22" Aurora, S.H., B.G., P.F.
24" Hamilton, B.G., P.F.
32" Hamilton, S.H., B.G., P.F.
32" Hoefer, S.H., B.G., P.F.
34" Barnes, S.H., B.G., P.F.
2½' Dreses Radial.
3½' Industrial Radial.
12 spindle Multiple.
No. 30 C Baush, 12 spindles.

GEAR CUTTERS

24" x 7" G. & E., for spur.
30" x 9" G. & E., spur and bevel.
36" Walcott, for spur.

GRINDERS

No. 5 Diamond Water Tool.
14" x 20" B. & S. Universal.
Gisholt Tool Grinder.

LATHES

12" x 5' Davis, C.R.
14" x 6' LeBlond, C.R., taper.
14" x 6' Porter, C.R.
14" x 6' Rockford, C.R.
14" x 6' Fairbanks, C.R., taper.
15" x 6' Goddard, C.R., taper.
16" x 6' Prentice, C.R.
16" x 6' Sebastian, C.R.
16" x 6' Walcott, C.R.
16" x 8' Lodge & Shipley Pat. Head, C.R., Q.C.G.
16" x 10' Greaves & Klusman, C.R .
17" x 10' Blaisdell, C.R.
18" x 6' Bradford, C.R. taper.
18" x 8' Lodge & Shipley, Pat. Head, C.R. taper.
18" x 8' Bradford, C.R. with turret.
18" x 12' Greaves & Klusman, C.R.
20" x 10' Flather, C.R.
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H. F. GADSBY writes on "Conserving the Conservatives"—a political article that both Liberals and Conservatives will find good reading : : : Peter McArthur, farmer-author, begins a series of stories in the November Number with "The Witch of Atlas"—extremely good : : : Robert W. Service has another "At the Front" poem—"Fleurette," strong yet tender : : : H. M. Tandy, a Canadian writer of fine ability, has a story, "Straw-Stack Strategy"—fine! : : : Serial stories by Arthur Stringer and Arthur E. McFarlane.

CONTRIBUTORS:

Arthur Stringer
Arthur E. McFarlane
Robert W. Service
Peter McArthur
Betty Thornley
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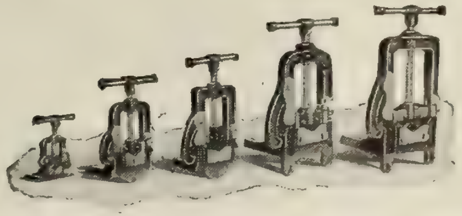

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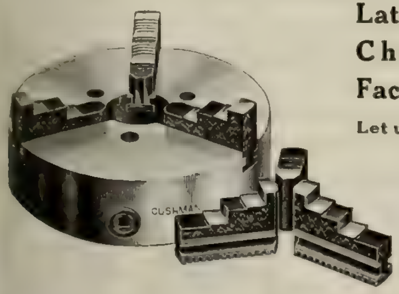

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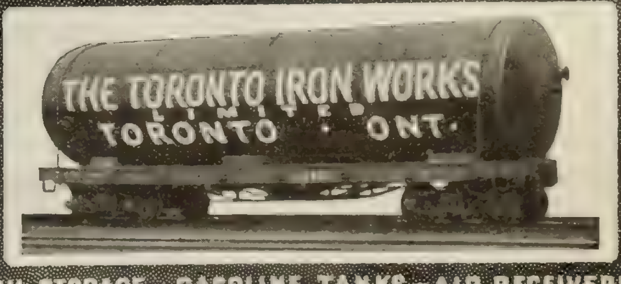

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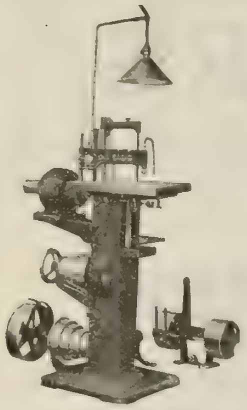

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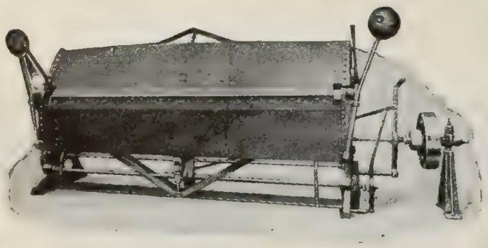

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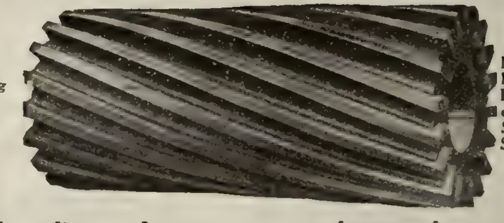

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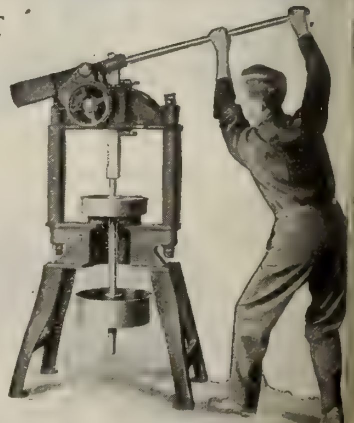

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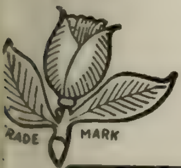

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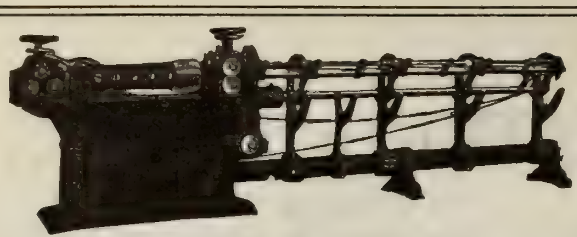

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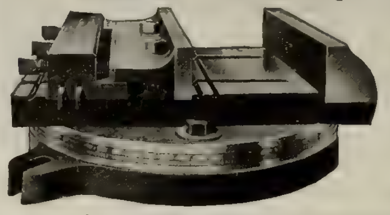

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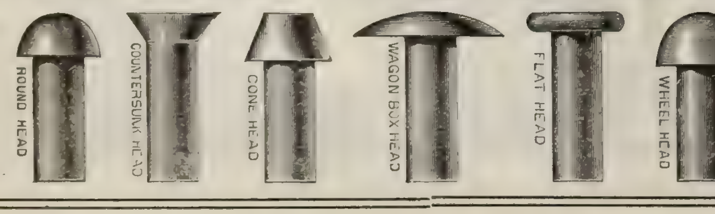

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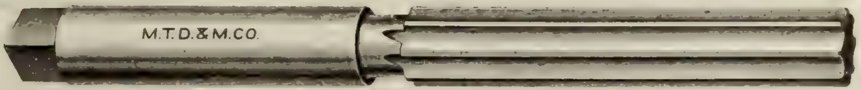

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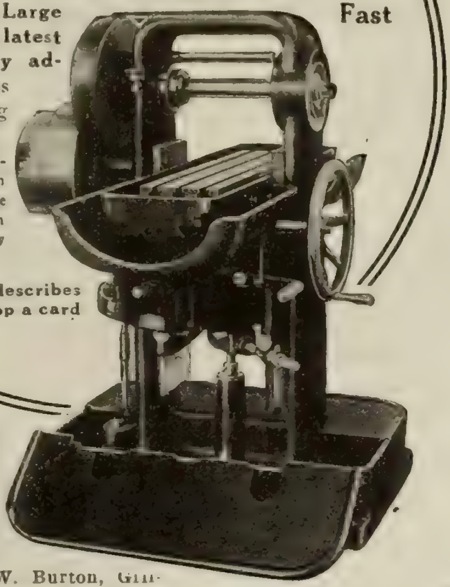

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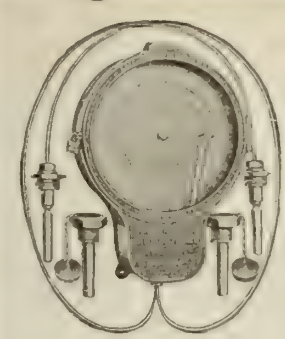

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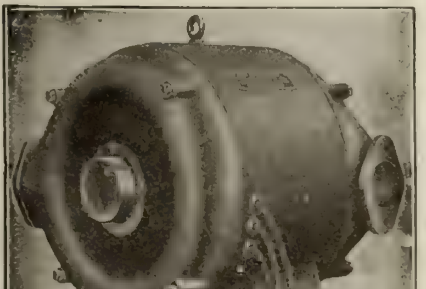

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J. G. Blount Co., Everett, Mass.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Jenckes Mach. Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

LATHES, SINGLE PURPOSE
Bertram, John, & Sons Co., Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal, Que.
Hepburn, John T., Ltd., Toronto.
Himoff Machine Co., Inc., New York, N.Y
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Roelofson Mach. & Tool Co., Toronto, Can.
Root & Van Dervoort Engr. Co., East Moline, Ill.

LATHES, SCREW CUTTING
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Davenport Locomotive Works, Davenport, Iowa.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Gisholt Mach. Co., Madison, Wis.
Hepburn, John T., Ltd., Toronto, Ont.
Niles-Bement-Bond Co., New York.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

LATHES, SPINNING
Bawden Mach. Co., Toronto, Ont.
Bliss, E. W., Co., Brookln, N.Y.
Toledo Mach. & Tool Co., Toledo.

LATHES, TURRET AND SPEED
John Bertram & Sons Co., Dundas.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Hepburn, John T., Ltd., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

LEATHER STRAPPING
Graton & Knight Mfg. Co., Worcester, Mass.

LIFTS, PNEUMATIC
Whiting Foundry Equipment Co., Harvey, Ill.

LINK BELTING
Can. Fairbanks-Morse Co., Montreal.
Graton & Knight Mfg. Co., Montreal.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LIQUID AIR
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.
Lyman Tube & Supply Co., Montreal, Que.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Canada.

LOCOMOTIVE EQUIPMENT
Davenport Locomotive Works, Davenport, Iowa.

LOCOMOTIVES
Davenport Locomotive Works, Davenport, Iowa.

LUBRICANTS
Can. Economic Lubricant Co., Montreal.
Cataract Refining & Mfg. Co., Toronto.

LUBRICATORS.
Bowser & Co., Inc., S. F., Toronto.
Cincinnati Lubricant Pump Co., Cincinnati.
Roper, C. F., & Co., Hopedale, Mass.

MACHINERY DEALERS
Baird Machy. Co., W. J., Detroit, Mich.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Fales, C. E., Machy. Co., Detroit, Mich.
Garlock-Machinery, Toronto.
Foss & Hill Machy. Co., Montreal.
New York Machinery Exchange, New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
Stocker, H. A., Machinery Co., Chicago, Ill.
A. R. Williams Machy. Co., Toronto.

MACHINERY GUARDS (SEE GUARDS)

MACHINERY REPAIRS
Sumbling Mach. Co., W. H., Toronto, Ont.

MACHINISTS' SCALES, SMALL TOOLS AND SUPPLIES
Can. Fairbanks-Morse Co., Montreal.
Frank H. Scott, Montreal.
J. H. Williams & Co., Brooklyn, N.Y.

MANDRELS
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Stone Tool & Supply Co., J. R., Detroit, Mich.

MARKING DEVICES
Matthews, Jas. H., & Co., Pittsburg, Pa.
Pritchard-Andrews Co. of Canada, Ottawa, Ont.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Noble & Westbrook Mfg. Co., Hartford, Conn
Perrin, Wm. R., Toronto.

MEASURING TAPES AND RULES
James Chesterman & Co., Ltd., Sheffield, Eng.

METALLURGISTS
Can. Inspection & Testing Lab., Montreal, Que.
Toronto Testing Laboratory, Ltd., Toronto.

METALS
Canada Metal Co., Toronto, Ont.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.

MILLING ATTACHMENTS
John Bertram & Sons Co., Dundas.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Hendey Mach. Co., Torrington, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Brown & Sharpe Mfg. Co., Providence.
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Gooley & Edlund, Cortland, N.Y.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio
A. R. Williams Machy. Co., Toronto.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Chicago, Ill.
Hendey Machine Co., Torrington.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Cook, Asa S., Co., Hartford, Conn.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Tabor Mfg. Co., Philadelphia, Pa.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Cumming & Son, J. W., New Glasgow, Canada.
Jenckes Mach. Co., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke.
Marsh & Henthorn, Belleville, Ont.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Jenckes Mach. Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
New Britain Mach. Co., New Britain, Conn.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Lachapelle, J. D., & Co., Montreal, Que.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
R. E. T. Pringle, Ltd., Toronto, Ont.
Wickes Brothers, Saginaw, Mich.
A. R. Williams Machy. Co., Toronto.

MOTORS, PNEUMATIC
Cleveland Pneumatic Tool Co. of Canada, Toronto.

MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.

NAME PLATES, BRONZE, ETCHED AND STAMPED
Matthews, Jas. H. & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Can.

NIPPLE THREADING MACHINES
John H. Hall & Sons, Ltd., Brantford, Ont.
Landis Machine Co., Waynesboro, Pa.

NITROGEN
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.

NOZZLES, SPRAY
Can. Blower & Forge Co., Kitchener, Ont.

NUTS, SEMI-FINISH AND FINISHED
Galt Machine Screw Co., Galt, Ont.

NUT BURRING MACHINES
National Machy. Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

NUT MACHINES (HOT)
National Machy. Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

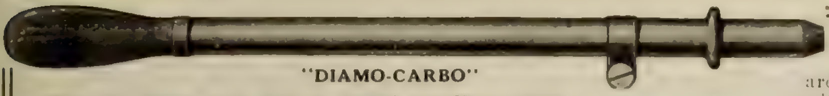
NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machy. Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.
Victor Tool Co., Waynesboro, Pa.

NUT TAPPERS
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machy Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

OIL GROOVING MACHINES
National Mach. Tool Co., Cincinnati, O.

OIL SEPARATORS
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
Smart-Turner Machine Co., Hamilton.

OIL STONES
Aikenhead Hardware Co., Toronto, Ont.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.



"DIAMO-CARBO"

You can make your dull or coated grinding wheels like new in efficiency by dressing them with

DESMOND-STEPHAN GRINDING WHEEL DRESSERS

and you will eliminate delayed production and lost time, due to the loss of their cutting properties.

Insist upon having your dealer supply you with one of our tools for trial. If he cannot, write us, and we will send any of them on approval.

The Canadian Desmond-Stephan Mfg. Company
HAMILTON, ONTARIO

Our **"Diamo-Carbo"** Dressers are the economical **substitute for the Black Diamond Dressers. They** are so low priced that each grinding stand may be provided with its own dresser.

Our **"Sherman-Huntington"** Dressers are for use on large and coarse wheels upon which the Diamond cannot be used. It is the most satisfactory Dresser ever designed.

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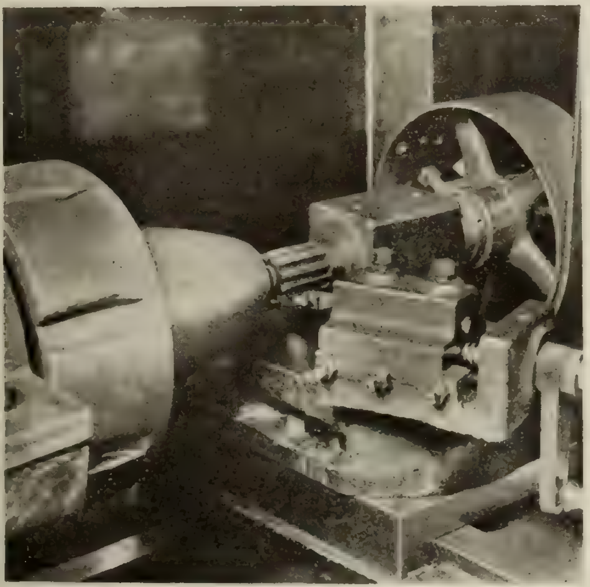
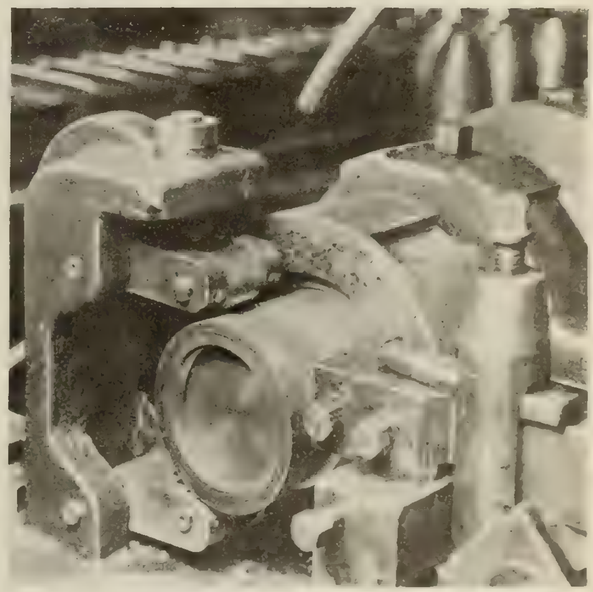


The only correct time to perform the seating operation is to do it in the same fixture with the milling operation This fixture will fit any engine lathes, and costs only $120.00, including milling, cutter and seating tool. The angle of seating can never vary.



Most of the British Shells may now be knurled. This fixture is quick in operation and most accurate. The cost is only $100.00, and it can be used as an attachment to almost any lathe.

We have all gauges for both Mark V and Mark VII Shells, consisting of plug, length, outside diameter, form, thread and seating gauges.

Our Nosing Die Outfit is the best for the Mark VII shell. Leading manufacturers, such as P. L. Robertson Co., Milton; Wilford & Co., Lindsay; Manitoba Engines, Ltd., Brandon; Canadian Westinghouse, Hamilton; Vancouver Engineering Works; Vulcan Iron Works; Otis Fenson Elevator, etc., are using our dies.

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OSCILLATING VALVE GRINDERS (PNEUMATIC)

Cleveland Pneumatic Tool Co. of Canada, Toronto.

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Oven Equipment & Mfg. Co., New Haven, Conn
Whiting Foundry Equipment Co., Harvey, Ill.

OVEN TRUCKS, STEEL

Oven Equipment & Mfg. Co., New Haven, Conn
Whiting Foundry Equipment Co., Harvey, Ill.

OVENS FOR DRYING, TEMPER AND UNDER TRUCKS

Oven Equipment & Mfg. Co., New Haven, Conn

OXY-ACETYLENE WELDING AND CUTTING

Carter Welding Co., Toronto.
Coleman Fare Box Co., Toronto, Ont.
Toronto Welding Co., Toronto, Ont.

OXY-ACETYLENE WELDING AND CUTTING PLANTS

Carter Welding Co., Toronto, Ont.
Lachapelle, J. D., & Co., Montreal, Que.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Indianapolis, Ind.

OXYGEN (SEE ACETYLENE)

PACKINGS, LEATHER, HYDRAULICS, ETC.

Graton & Knight Mfg. Co., Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.

PANS, LATHE

Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

PAPER MILL MACHINERY

Bertrams, Ltd., Edinburgh, Scotland.

PATTERN SHOP EQUIPMENT

Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

PATENT SOLICITORS

Baboock & Sons, Montreal.
Budden, Hanbury, A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Ross Thomson & Co., Ottawa, Ont.

PATTERNS

Galt Malleable Iron Co., Galt.

PERFORATED METALS AND ORNAMENTAL IRON GOODS

Canada Wire & Iron Goods Co., Hamilton.

PIG IRON

Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PIPE CUTTING AND THREADING MACHINES

Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
H. W. Petrie, Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.

PIPE CUTTERS, ROLLING

Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
John H. Hall & Sons, Ltd., Brantford, Ont.
H. W. Petrie, Ltd., Montreal.

PIPE, RIVETED STEEL

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto.

PLANER JACKS

Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY

John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Oliver Machy. Co., Grand Rapids, Mich.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio
A. R. Williams Machy. Co., Toronto.

PLANING MILL EXHAUSTERS

Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Niles-Bement-Pond Co., New York.

PLIERS

Aikenhead Hardware Co., Toronto, Ont.
Canadian Billings & Spencer, Ltd., Welland.

PLUG MILLERS

PRESSES, ARBOR

Banfield, Edwin J., Toronto.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
Atlas Press Co., Kalamazoo, Mich.

PRESSES, BROACHING, FORGING AND FLANGING

Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, CAM, TOGGLE, EYELET

Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo, O.

PRESSES FOR SHELLS

Atlas Press Co., Kalamazoo, Mich.
Charles F. Elmes Eng. Works, Chicago.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER

Lymburner, Ltd., Montreal.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, DROP AND FORGING

W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago, Ill.
Can. Fairbanks-Morse Co., Montreal.
Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Niles-Bement-Pond Co., New York.
Wm. R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

PRESSES, HYDRAULIC

Bawden Machine Co., Toronto, Ont.
John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, HYDRAULIC DIE STAMPING

Hydraulic Press Mfg. Co., Mount Gilead, O.

PRESSES, PNEUMATIC

Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, POWER

Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, BALING

Hydraulic Press Mfg. Co., Mount Gilead, O.
William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT

Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

PRESSES, SCREW

Barnes, W. F. & John. Co., Rockford, Ill.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING

Erie Foundry Co., Erie, Pa.

PRESSURE REGULATORS

Can. Fairbanks-Morse Co., Montreal.

PROPELLERS

Ontario Specialties, Ltd., Ottawa, Can.

PULLEYS

American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Dodge Mfg. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Ltd., Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PULLEY MACHINERY, DRILLING AND TAPPING

Can. Fairbanks-Morse Co., Montreal.
Wells Bros. Co. of Canada, Galt, Ont.

PUMPS, AIR

Bawden Machine Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL

Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Darling Bros., Ltd., Montreal, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

PUMPS, HIGH PRESSURE

Charles F. Elmes Eng. Works, Chicago.
Darling Bros., Ltd., Montreal, Que.
Hydraulic Press Mfg. Co., Mount Gilead, O.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

PUMPS, ALL KINDS

Bawden Machine Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PUMPS, HYDRAULIC

Charles F. Elmes Eng. Works, Chicago, Ill.
Darling Brothers, Montreal.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto.

PUMPS, LUBRICANT AND OIL

Cincinnati Lubricant Pump Co., Cincinnati, Ohio
Roper, C. F., Co., Hopedale, Mass.

PUMP LEATHERS

Graton & Knight Mfg. Co., Montreal.

PUNCHES AND DIES

W. H. Banfield & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER

John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

PUNCHES, PNEUMATIC

Jno. F. Allen Co., New York.

PUNCHING MACHINES, HORIZONTAL

Bertrams, Ltd., Edinburgh, Scotland.
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Wickes Brothers, Saginaw, Mich.

PYROMETERS

Shore Instrument & Mfg. Co., New York City.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES

John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS (SEE GUARDS)

RAIL BENDERS

Niles-Bement-Pond Co., New York.

RAILROAD TOOLS

Can. Fairbanks-Morse Co., Montreal
Cumming & Son, J. W., New Glasgow, Canada.
Niles-Bement-Pond Co., New York.

RAILS, STEEL

Cumming & Son, J. W., New Glasgow, Canada.

RATCHETS

Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMER FLUTING MACHINES

Garvin Machine Co., New York.

REAMERS, ADJUSTABLE

Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedford
Pratt & Whitney Co., Dundas, Ont.
Stenotype Co., Indianapolis, Ind.
Whitman & Barnes Mfg. Co., St. Catharines, Ont

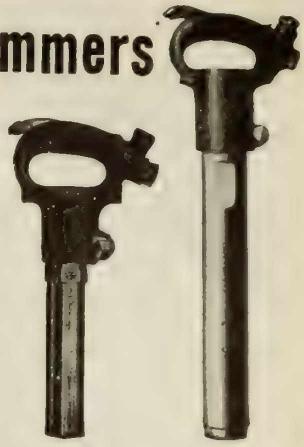
REAMERS, BRIDGE, EXPANDING AND HIGH SPEED

Aikenhead Hardware Co., Toronto, Ont.
Boker & Co., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McKenna Bros. Brass Co., Pittsburgh.
R. E. T. Pringle, Ltd., Toronto, Ont.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE

Boker & Co., H., Montreal, Que.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford
Pratt & Whitney Co., Dundas, Ont.

Cleveland Riveting and Chipping Hammers



Fitted with either Inside or Outside Throttle Lever as preferred. They are made in several different sizes and weights for all classes of work.
The Riveting Hammers have a range in rivets from ¼ inch to 1½ inches.

CLEVELAND CORNER DRILL For Close Quarter Drilling

The Body of the Cleveland Corner Drill is in one piece with cylinders and valve chambers cast integral which insures absolute alignment of working parts.

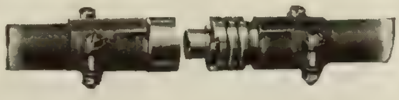
The Driving Crank is mounted upon Annular Ball Bearings which reduce friction to a minimum. Made in two sizes, Nos. 38 and 49, with Nos. 3 and 4 Morse Taper Sockets.

Either size machine will drill or ream within 1⅛ inch of side wall or corner.

IN STOCK:—Sand Rammers, Bench and Floor, Portable Emery Grinders, Air Drills, etc.

BOWES AUTOMATIC AIR HOSE COUPLINGS

Over 1,000,000 in general use



¶ They are instantly connected or disconnected.

¶ They are absolutely tight under all pressures.

¶ They are interchangeable in all sizes commonly used.

¶ They quickly pay for themselves by stopping costly leaks.

Cleveland Pneumatic Tool Co. of Canada, Ltd., 84 Chestnut St., Toronto, Ont.

Thor

*One Thor—
More Thors*

New Pistol Grip Chipping Calking and Flue Beading Hammers

Single Valve

No Vibration

Shipped on Trial Free

More Power, Speed, Durability and Economy

Independent Pneumatic Tool Co.

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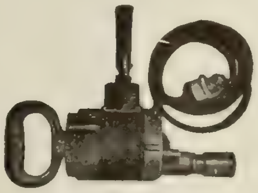
Save Time, Labor and Money

They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.



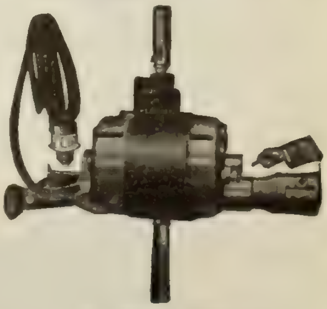
3 SIZES

3-16 inch,	W.G.T.	6 lbs.
¼ inch,	W.G.T.	9 lbs.
⅜ inch,	W.G.T.	12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



½ inch—2 SPEED.
Speed, 400-750 R.P.M.

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Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver.

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H. W. Petrie, Toronto.
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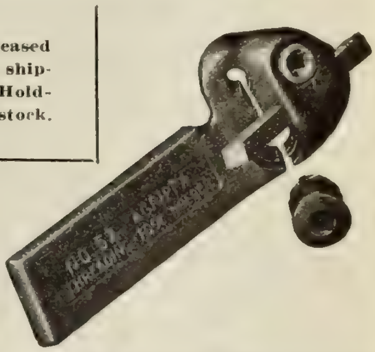

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45 RICHARDS STREET BROOKLYN, N.Y. CITY
THE WRENCH PEOPLE

A Wonderful Combination in Riveting

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One rivet per second.

Uniformity—

Each rivet headed with same degree of tightness or looseness as desired.

Finish—

Perfectly formed rivet heads, highly polished surface. No hammer or tool marks shown.

Grant Noiseless Rivet Spinning Machines are the only machines built that will accomplish the above.

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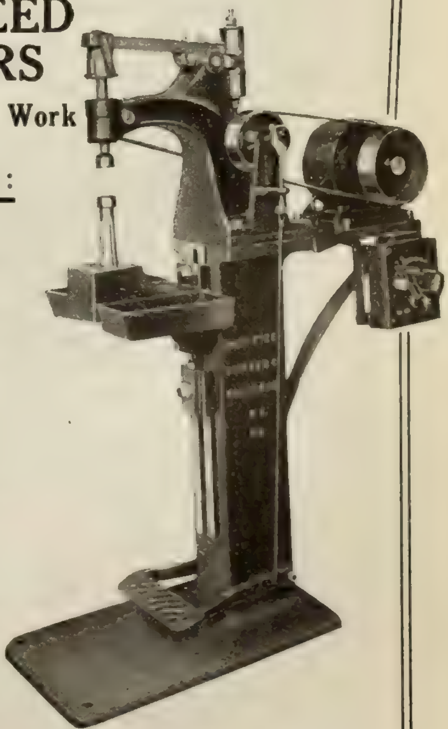
For High Speed Work



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Economy in floor space, elimination of weight and a guaranteed saving of from 15% to 20% on any class of work. The life of the machine is practically indefinite as phosphor bronze bushings are used throughout.

No riveting too intricate for us; no riveting which our machine cannot accomplish.

Send for our **High Speed Hammer Book.**

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CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

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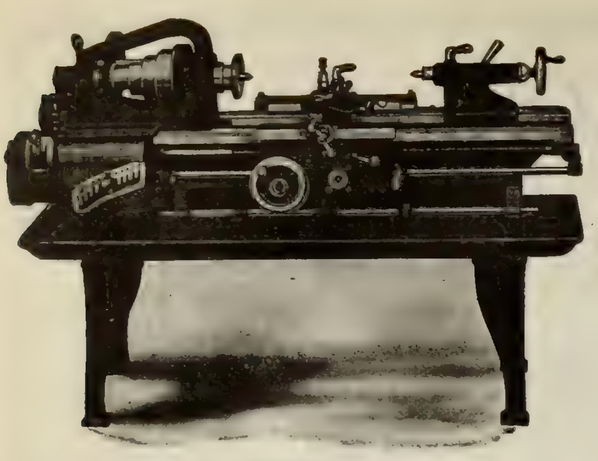

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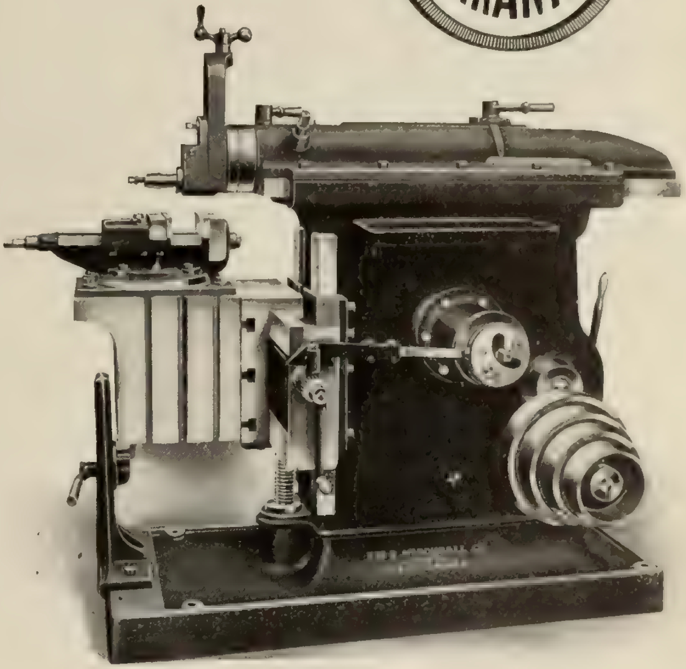

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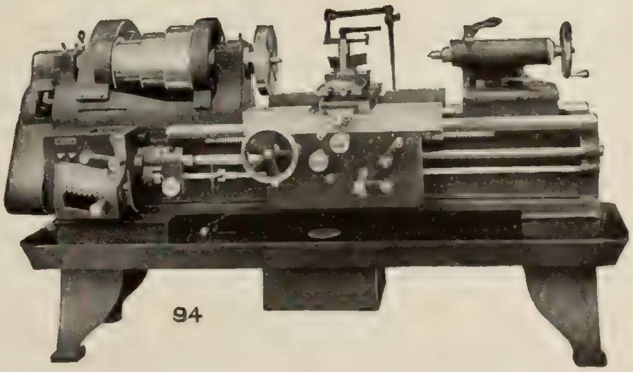

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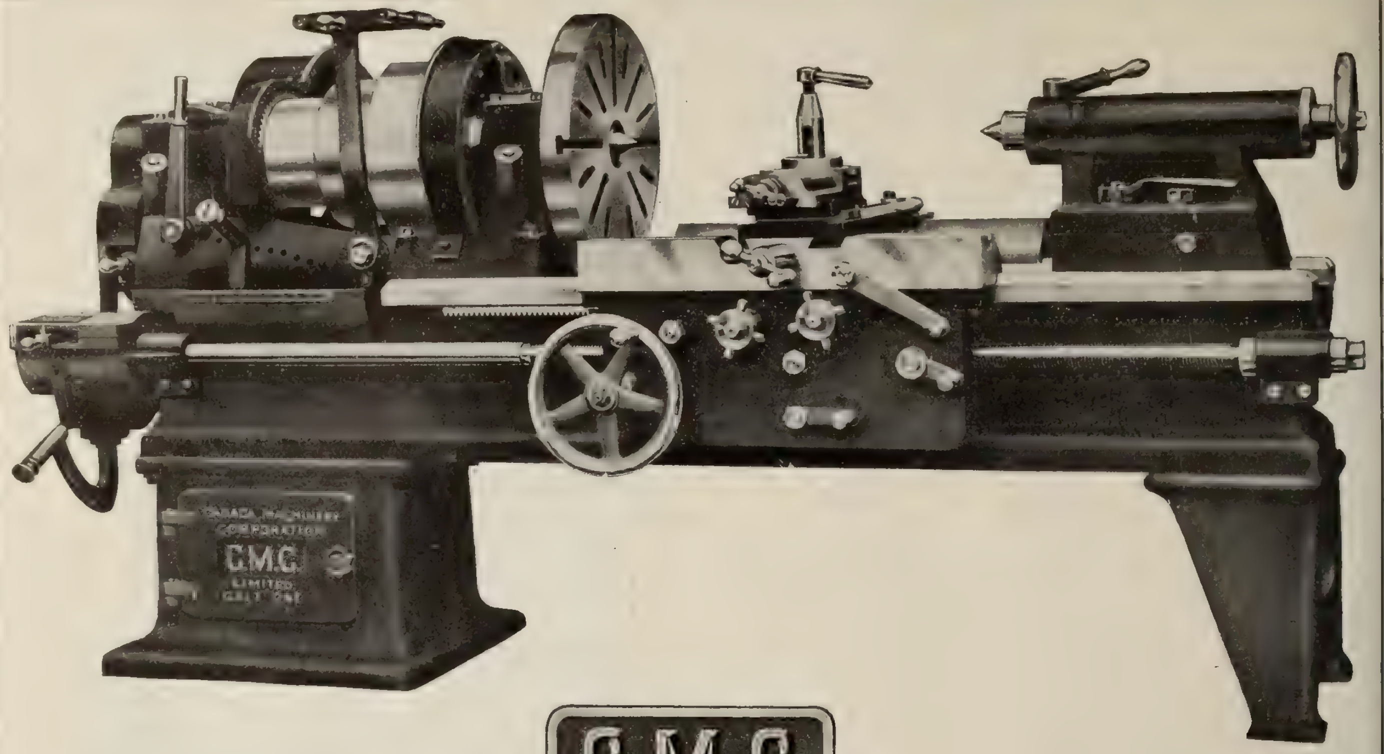

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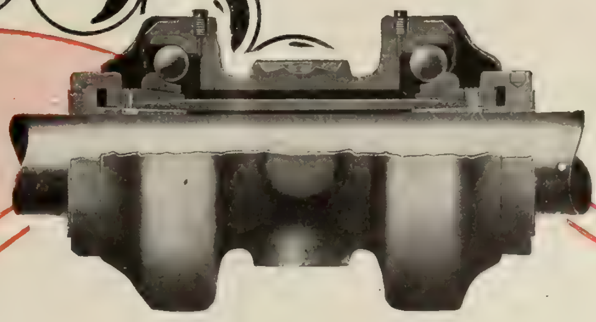

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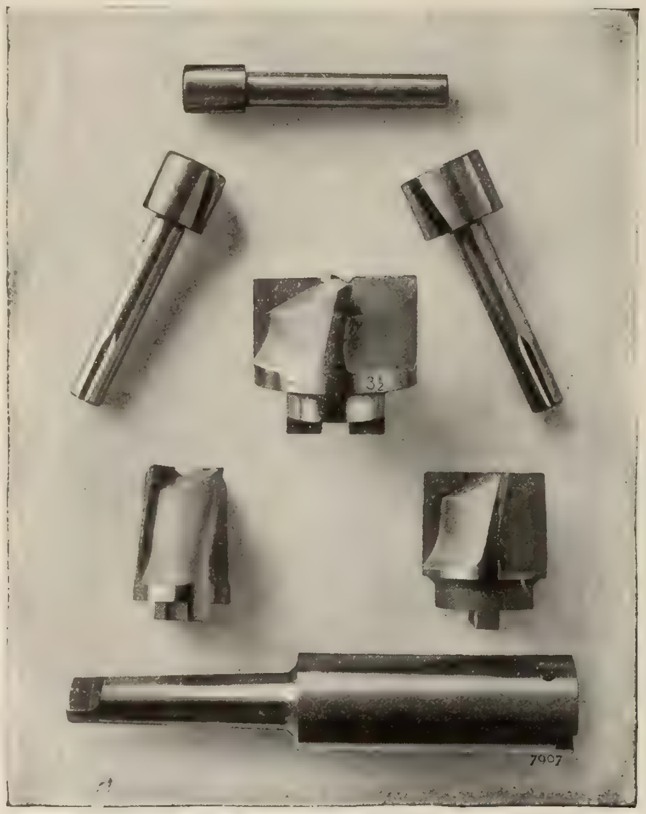

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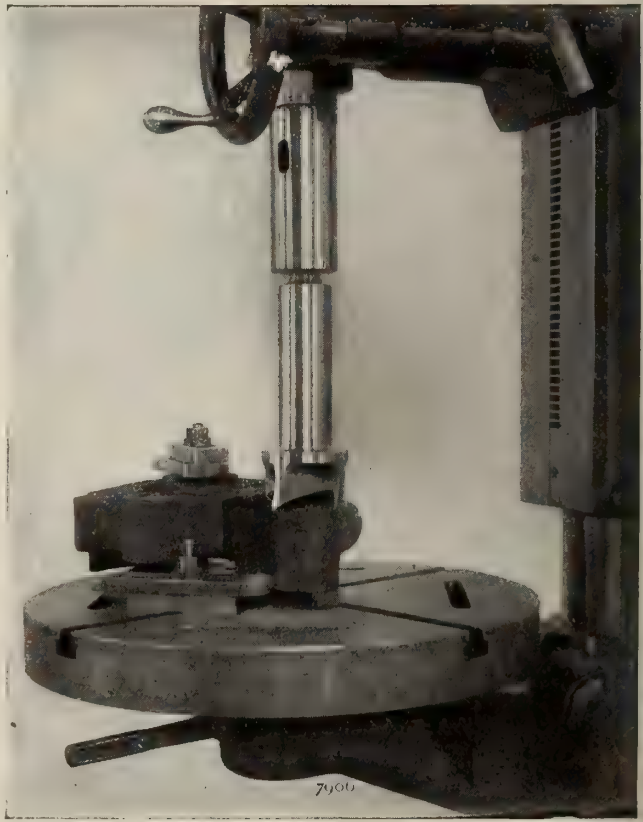

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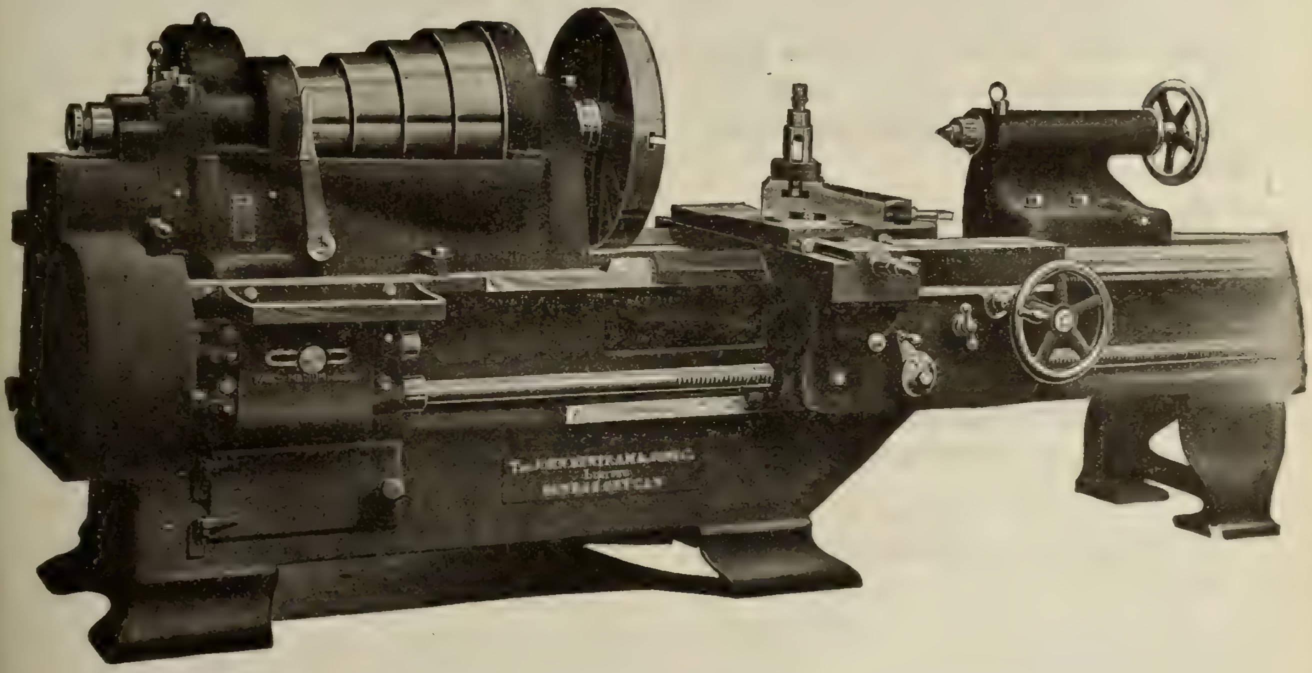

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The Publisher's Page

TORONTO November 16, 1916

Going Up!

THE tendency nowadays is to go up. About the only thing that's going down is our common hand into our common pocket and that constantly, although perhaps reluctantly.

The bakers are busy explaining just why the price of bread has taken a sudden desire to break all records for standing high jump. The milk dealers, too, have most plausible reasons for skimming an extra two or three cents off a more or less long-suffering public.

The coal barons keep the people in hot water most of the time in well-founded anticipation of another rise in the price of fuel.

On every hand we feel and see or rightly suspect an upward move—at the grocer's, at the druggist's, at the shoe shop, at the dry goods store and at the haberdashery.

This, of course, is inevitable, even if it is uncomfortable. It is the result of over-demand and under-supply, and some juggling. We must expect it and most of us meet the situation with more or less cheerfulness.

The publisher has been hit as hard as any and a lot harder than some. The price of paper, ink, and other supplies entering into the production of a journal like CANADIAN MACHINERY has gone blissfully up and up, quite regardless of the protests or pleadings of the much be-squeezed publisher. Labor, too, has greatly increased in cost. Many printers have joined the colors and a trained printer cannot be replaced in a day, or for that matter in months or years.

CANADIAN MACHINERY, among other high-class Canadian papers, was recently compelled to increase its subscription price. On a percentage basis the increase was somewhat high, perhaps, but from a dollars and cents standpoint it really amounted to very little. At the new rate a copy of CANADIAN MACHINERY (averaging over 100 pages) cost the reader but five and three-quarter cents!

Nevertheless an increase is an increase, and the manner in which our subscribers received our announcement was very gratifying indeed, and we take this opportunity of thanking them for their very cheerful response.

It will be interesting to know that our circulation has steadily increased during the last two years, slowly on account of the demands of the war, but none the less surely, and rather more noticeably since our subscription price was advanced.

All luxuries are not useful and a necessary thing is generally recognized as no luxury at all. In this day of strict economy it is encouraging to note that the technical journal is regarded as a necessary thing and one to be desired at any price.

CANADIAN MACHINERY
and Manufacturing News
143-153 University Avenue, Toronto

Quality Service

Courtesy in Business

* * *

Fittingly framed and hanging in the Offices of one of the most important Public Service Corporations on this North American Continent is the following

'Did you say Please and Thank you?'

Broad minded men direct the destiny of that Corporation, men who know that public or private enterprises to be lastingly successful must operate for the public good.

Quality and Service are the two important factors in our business life today, but Courtesy is the door through which they must enter.

We are large producers of Hamilton Pig Iron and our output of Open Hearth Steel Blooms and Billets, Iron and Steel Bars of all shapes and size runs into enormous tonnage.

The products of our mills include practically everything that can be manufactured from Iron and Steel and these we distribute to thousands of satisfied customers.

Our business is an extensive one and a successful one. The World is our market: but our prosperity and success in the future, as in the past, depend upon the continued confidence, co-operation and good-will of the people we serve.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG

Marvellous Cutting Tools—

are those made of

STELLITE

MADE IN CANADA
STELLITE

HIGH SPEED *TOOL METAL*

NOT A STEEL. CONTAINS NO IRON

It is an alloy so hard and tough that it will perform every operation at a higher speed than is possible with the best high-speed steel tool.

No metal too hard, no work too heavy.

Run steel tools till they're red hot and they burn up—they lose their temper.

Stellite Tools cut well when red hot because heat does not affect them. They have no temper.

It needs only a trial to convince you that speeds, cuts and heats that are disastrous to High-Speed Steel Tools are "Child's Play" for tools made of Stellite.

It will pay you to put it to the test right now.

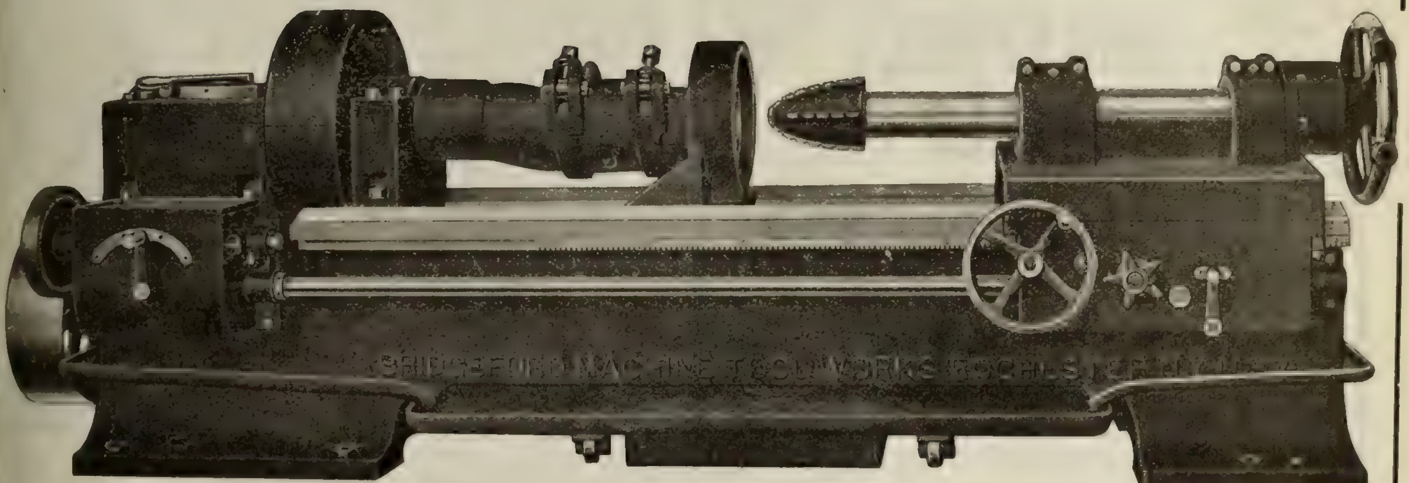
Made in Canada by
THE DELORO MINING AND REDUCTION CO., LIMITED
DELORO, ONTARIO

The Canadian B. K. Morton Co., Limited

SOLE SELLING AGENTS FOR CANADA AND NEWFOUNDLAND
49 Common St., MONTREAL, QUE. 86 Richmond St. East, TORONTO, ONT.

Bridgeford—

for big returns on the investment



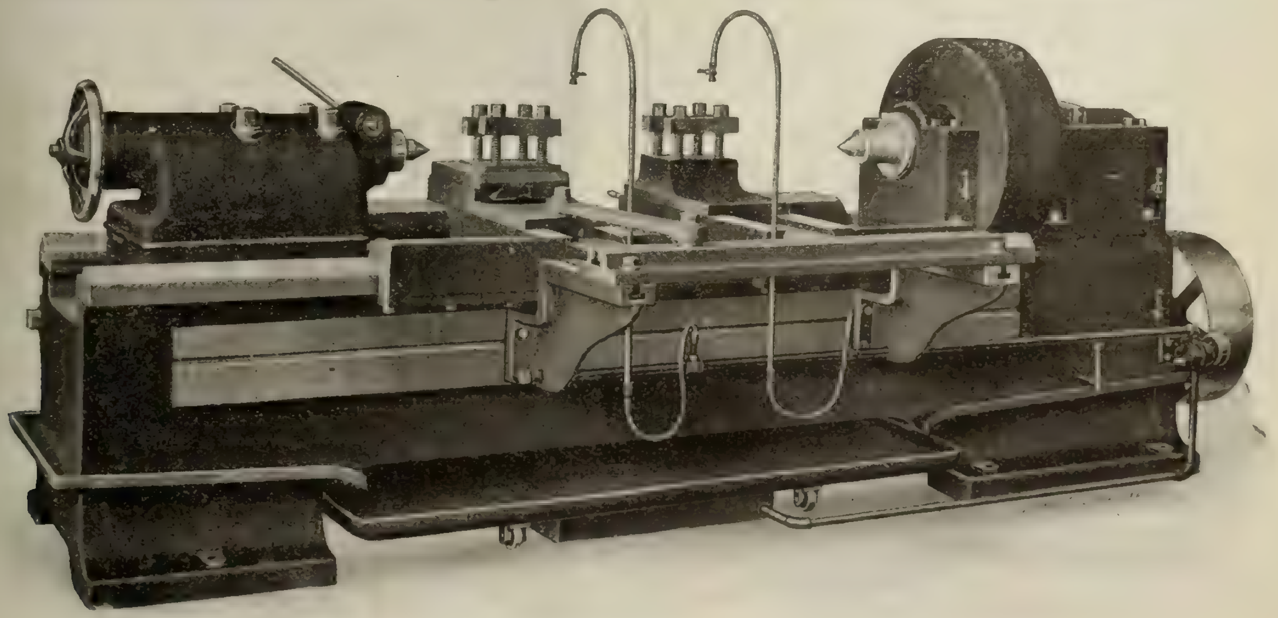
BORING LATHE For 8", 9.2 and Larger Shells.

Marvellous for strength, accuracy and production.

A machine of the heavy, low-swing type, having specially designed carriage with auxiliary hand feed for internal profile.

Carries a 5½" steel bar with male taper, allowing for light design of cutter heads; three speed changes—automobile style. All speed gearing is steel, hardened, running in oil bath.

Regular equipment includes water attachment, pump, pan and piping, pot chuck, boring bar and steady rest — everything except cutter heads.



Our Heavy Duty Plain Turning Machine Arranged for Shell Turning.

For Increased Production "Use a Bridgeford"

BRIDGEFORD MACHINE TOOL WORKS

HEAVY LATHE SPECIALISTS FOR 20 YEARS

237 MILL STREET
ROCHESTER, N.Y.

STEEL

for

SHRAPNEL

SHELLS

AND SHELL BLANKS

Only Company in Canada producing steel ingots by the "HARMET" Liquid Process.

REASONS WHY THESE INGOTS ARE SUPERIOR TO THE ORDINARY KIND:

1. Prevention of cracks, due to shrinkage; of internal stresses and resulting cracks and fissures.
2. Early cessation in the crystallization of the metal, and the production of fine crystallization of the metal, without cleavage planes.
3. Lessening of segregation, i.e., reduction of tendency to carbon and other impurities to concentrate in the central and upper parts of the ingot.
4. Prevention of "Pipes" or interior cavities, and thus preservation of absolute solidity in the ingot.
5. Improvement in physical properties.
6. Reduction in waste of ingot.

WE CAN SUPPLY FORGINGS OF ALL SHAPES AND SIZES MADE OF ORDINARY OR "HARMET" FLUID COMPRESSED OPEN-HEARTH STEEL ON THE SHORTEST NOTICE.

Nova Scotia Steel and Coal Company

Limited

Head Office:
NEW GLASGOW,
N.S.

Western Sales Office,
Room 14 Windsor Hotel,
MONTREAL

WOLFRAM
MADE IN THE U.S.A.
TRADE MARK
HIGH SPEED STEEL

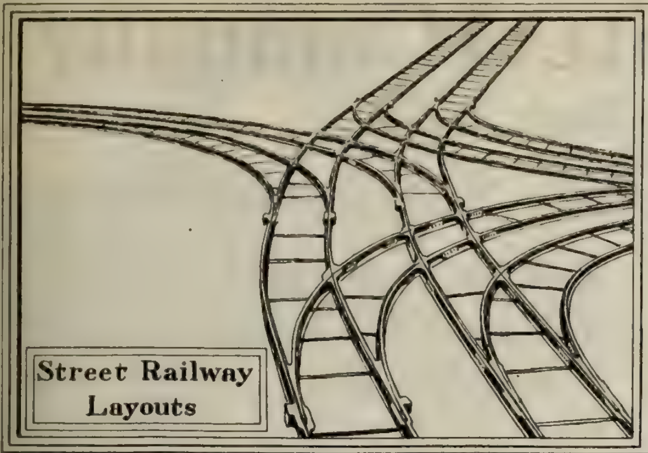
Wolfram Cobalt High-Speed Steel, BEST FOR TURNIN SHRAPNEL. Vulcan Hot Piercing Steel, FOR ALL KINDS O HOT WORK. Vulcan Regal No. 2 Steel, FOR BRASS FINISH INGS. Vulcan Special "W" Steel, For Special Taps and Die Vulcan Non-Shrinkable Steel, For Intricate Dies. Vulcan Specia Vanadium Steel Does Twice the Work of Regular Carbon Steel

VULCAN CRUCIBLE STEEL COMPAN
ALIQUIPPA, PA.

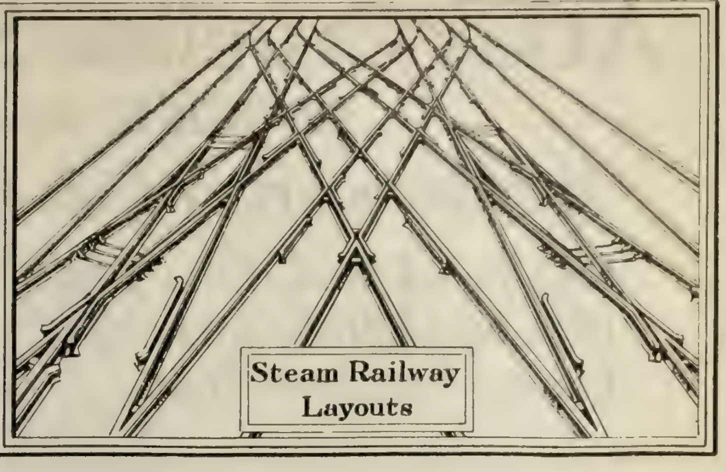
Red Cut
Superior
High Speed
Steel

Quality First
THE BEST FOR MACHINING
ALL HARD MATERIALS
Are you tools made of Red Cut?
Send for folder

**VANADIUM-ALLOYS
STEEL COMPANY**
PITTSBURGH, PA.
Works at Latrobe, Pa.



Street Railway Layouts



Steam Railway Layouts

Switches, Frogs and Every Description of Trackwork.
Solid Manganese Steel Construction. Cast Iron and Cast Steel
bound Construction with Manganese Steel Inserts.

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

ECONOMY

Rapid production is dependent on the use of

Economical Tools and Steel.

It is safer NOT to specify High Speed Steel but

Demand "TYR," the Economy Steel.

(MADE IN CANADA)

Armstrong, Whitworth of Canada,
Limited
OFFICES: 22 Victoria Square, Montreal, P. Q.
Dominion Bank Building, Toronto, Ont.
WORKS: Longueuil, P. Q.

Thread Millers

THREAD MILLER

Our Service Department would be pleased to co-operate with you regarding those threads. You know, to do threads perfectly you must have a mechanically perfect machine. This Thread Miller is unrivalled in its quality and popularity.

Let us get together.

The A. R. WILLIAMS Machinery Co. Limited
64-66 Front Street West Toronto

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX	Carbon Tool Steel
High Speed Steel, Atlas LX	"Deward" Oil Tempering, Non-Shrinking
Chrome Vanadium Steel	

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

YOUNG, CORLEY AND DOLAN, Inc.

115 BROADWAY, NEW YORK CITY, U.S.A.

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO., LIMITED, SHEFFIELD, ENGLAND

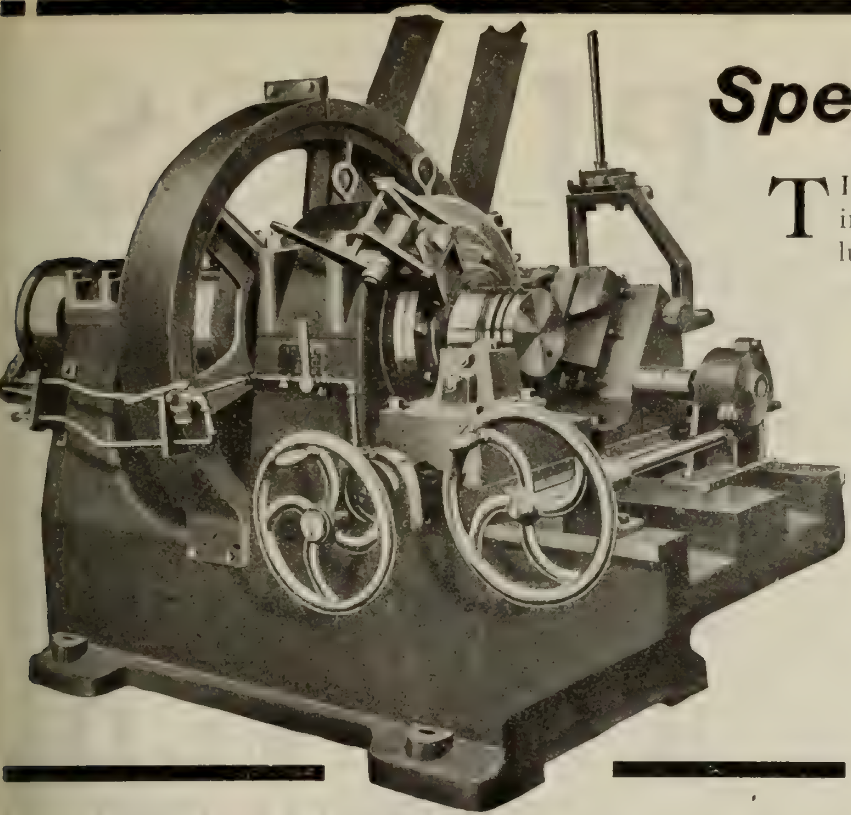
Sole Agents for Canada:

H. BOKER & CO., Inc.

(Formerly Hermann Boker & Co.)

332 St. James Street, Montreal, P.Q.

Established 1837 Incorporated 1914



Speed—Accuracy

THE two most important factors in shell-making. The former is desirable, the latter absolutely necessary. Both are assured by the use of *Jenckes Single Purpose Lathes for Shell Work.*

Illustration shows the latest addition to this famous line—a Banding Lathe for 8" shells. Note the liberal proportions, the general appearance of sturdiness. They mean an extra measure of long and efficient service.

These machines are also manufactured for 18 pdr., 4.5", 5", 6", 8", 9.2", 12" and 14" shells; are tooled when required for the mm. sizes corresponding to Russian and French ammunition.

THE JENCKES MACHINE COMPANY, LIMITED

WORKS: Sherbrooke, Que.
St. Catharines, Ont.

SALES OFFICES:

727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

PIG IRON

"Victoria" Foundry and Malleable, made by The Canadian Furnace Co., Port Colborne, Ont., Canada

M·A
HANNA
&Co

M.A.HANNA&Co. Sales Agents:
CLEVELAND, O., U.S.A.

JAMES McKAY COMPANY, PITTSBURGH, PENNA., U.S.A.
Manufacturers of

SHELL FORGINGS

We have the Equipment and Experience and can execute orders for

Nose Sockets Base Plates Adapter Plates

For any size Shells. Can execute orders promptly.

SPECIAL FORGINGS—We can make any forging that can be made under Drop Hammers.
CHAINS AND ACCESSORY FORGINGS—We have a complete line.

Address our Representative: JOHN A. BUCHANAN, King Edward Hotel, Toronto

BASE PLUGS

Machined to Government Specification

Have in stock for immediate shipment machined plugs for 4.5", 5" and 6" High Explosive Shells.

Capacity 3,000 per day. Write for prices.

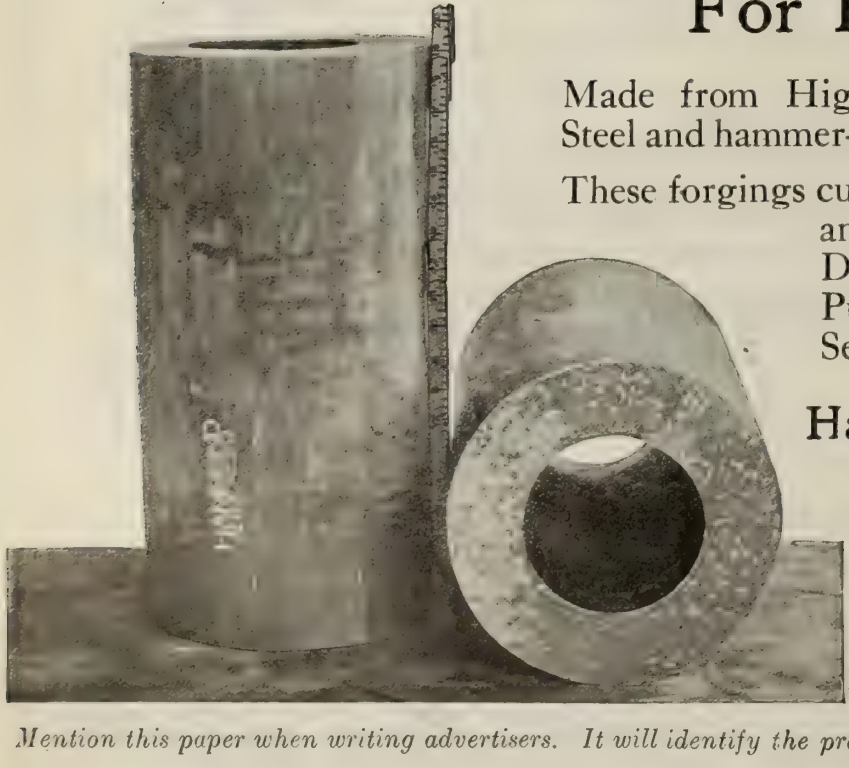
EDWIN J. BANFIELD

STAIR BLDG. ∴ TORONTO, ONT.

Manufacturer of Plug Milling Machines for All Sizes of Shells

Special Vanadium Steel Piercing Die Forgings

For Hot or Cold Work



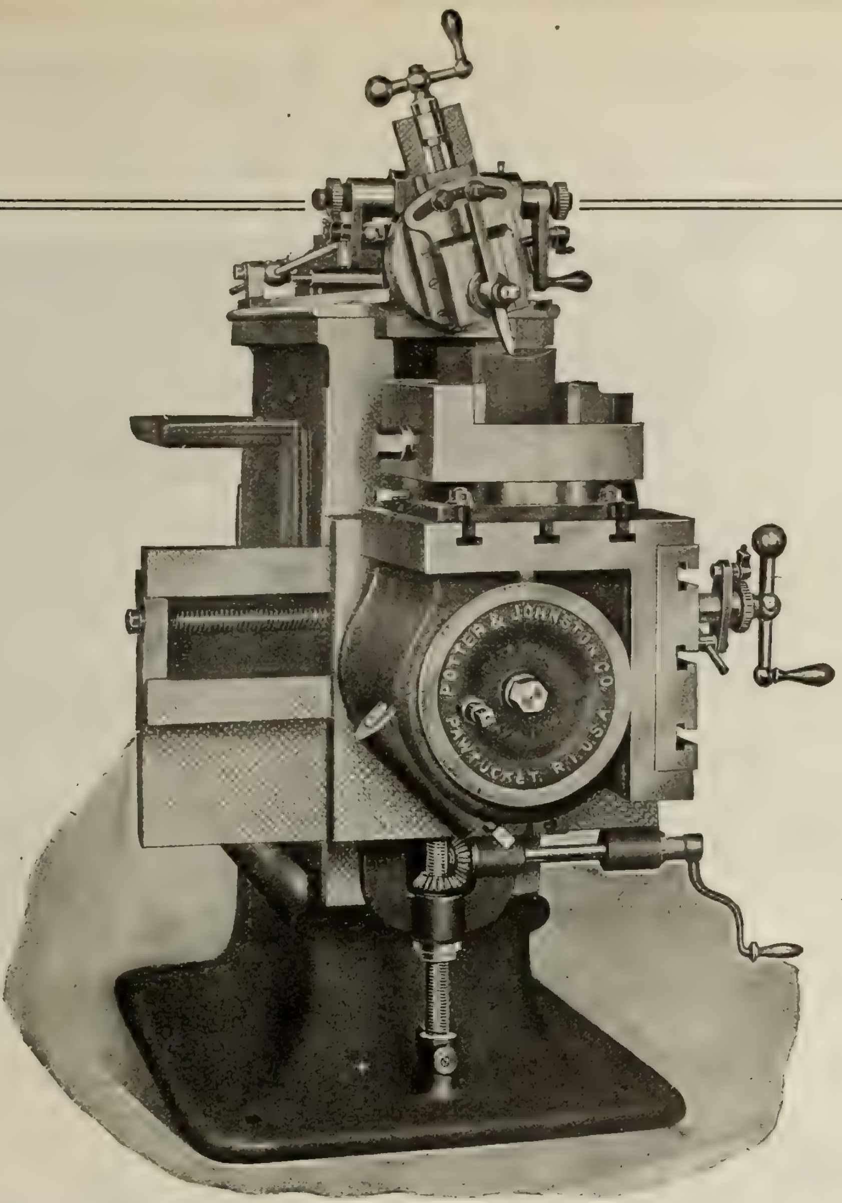
Made from High-Grade Special Vanadium Too
Steel and hammer-forged in any size.

These forgings cut down your machining costs 100%
and give you a tougher, more durabl
Die than you have ever had.
Punches made to match the dies
Send us your Blue Prints.

Hammond Steel & Forging
Co., Inc.

SYRACUSE, N.Y., U.S.A.

Fine Tool Steels, Specialists in Manufacture of Hig
Grade Hammered Forgings, Hammered Alloy Steels
Weldless Rings—Special Shapes, Die Blocks



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

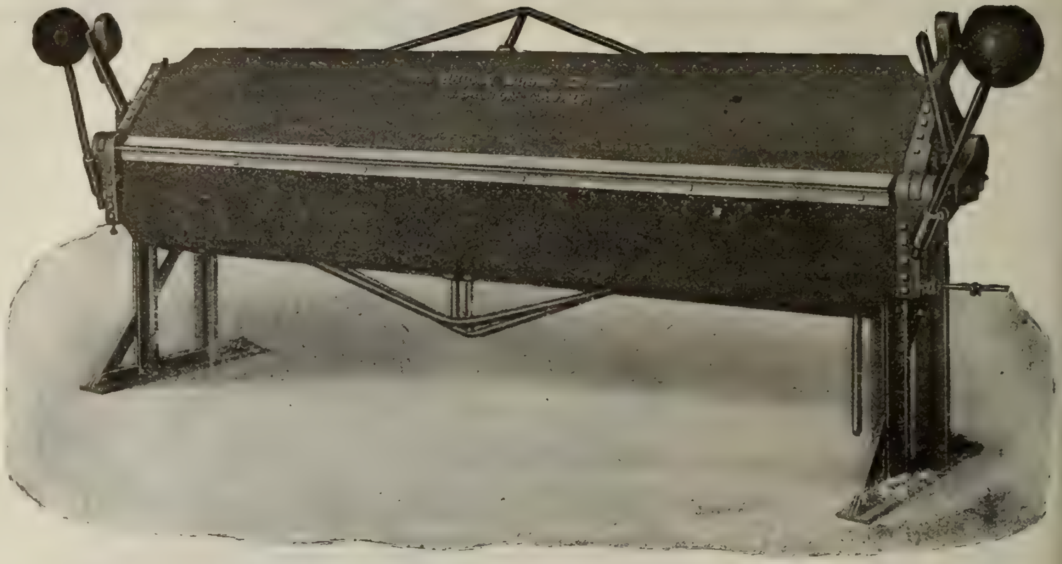
Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

A GOOD INVESTMENT

A "B.B." STEEL BRAKE

FOR a Cheap Brake the "B.B." Steel Plate Machine is the best investment you can make. It is especially designed for rapid forming of sheets, and is suitable for a large variety of work, such as can be accomplished on an ordinary Cornice Brake. We can furnish these Brakes for bending all sizes and gauges of metal.

Write for Catalogue if Interested.



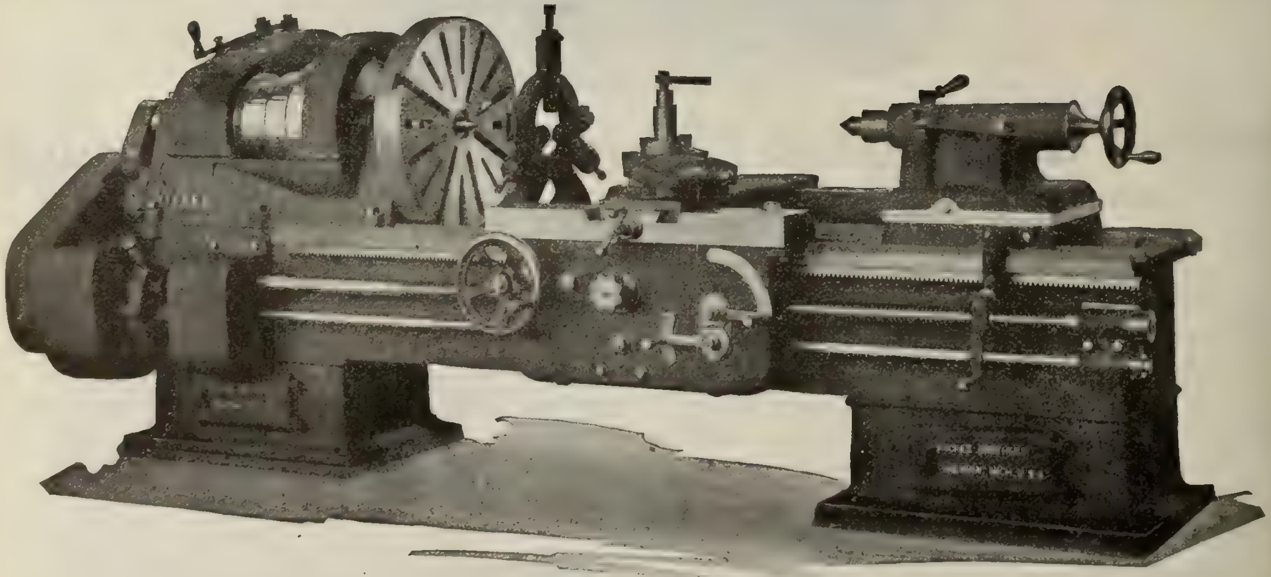
"ALWAYS, EVERYWHERE, SPECIFY 'B.B.' QUALITY."

The Brown-Boggs Co., Limited, Hamilton, Canada

Tinsmiths' Tools, Sheet Metal Working Machinery, Dies, etc.

Western Representatives: MESSRS. BISSETT & WEBB, LIMITED, WINNIPEG AND EDMONTON

Wickes Heavy Duty Engine Lathe



The Wickes 26" Heavy Duty Lathe.

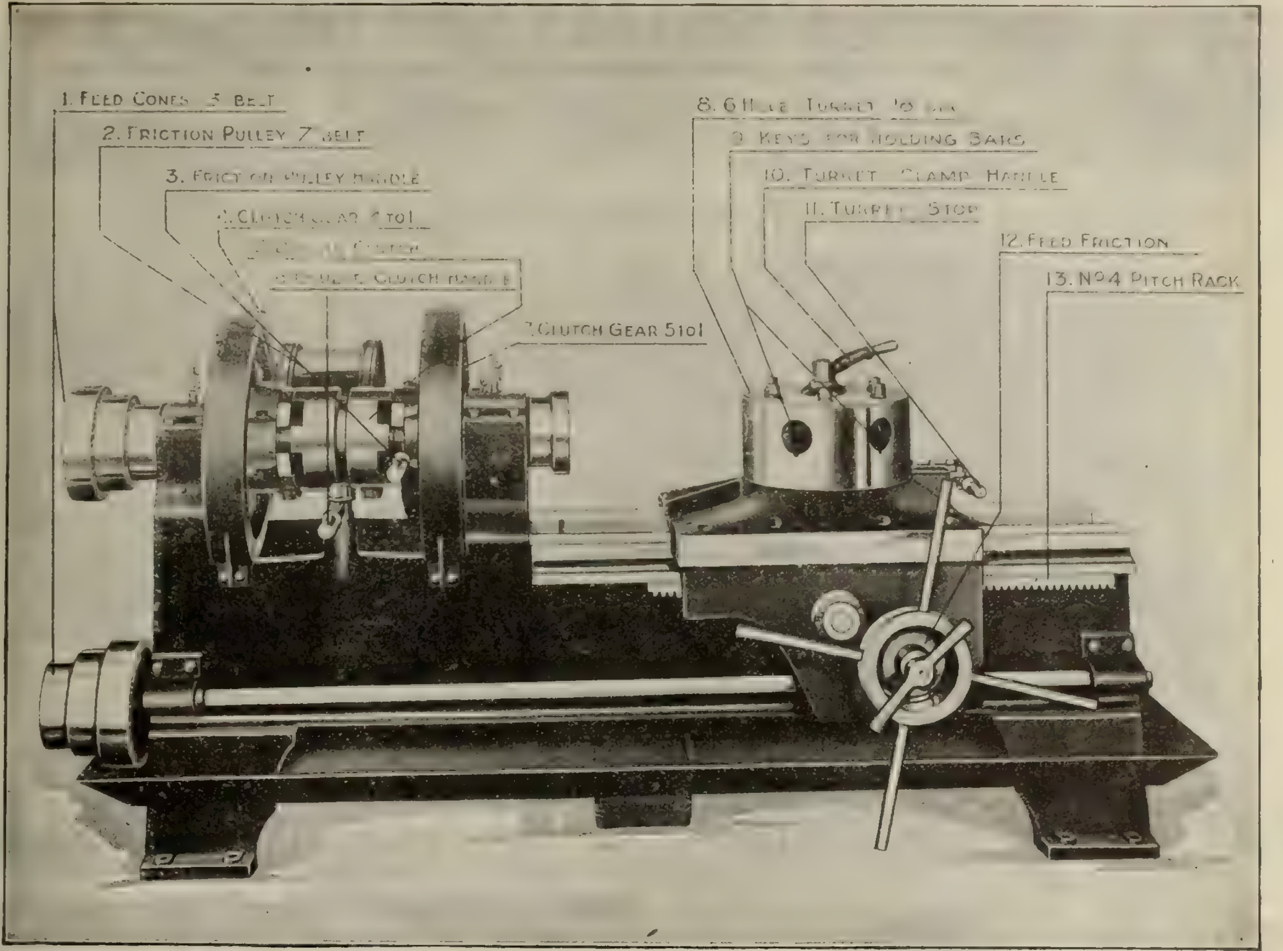
Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.

This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.

Let us tell you about this lathe and our 20", 32", also our 17" Rapid Production Lathe for Automobile and other work.

We can make prompt shipment.

WICKES BROTHERS **Saginaw, Michigan**


1. Feed Cones 3" Belt
2. Friction Pulley 7" Belt
3. Friction Pulley Handle
4. Clutch Gear 4 to 1
5. [illegible] Clutch
6. Double Clutch Handle
7. Clutch Gear 5 to 1
8. 6 Hole Turret 18 In.
9. Keys for Holding Bars
10. Turret Clamp Handle
11. Turret Stop
12. Feed Friction
13. No 4 Pitch Rack

SPECIAL SHELL LATHE

For boring and turning shells from 9.2 down. Above cut shows bed turret for boring operations. We have them in stock for both boring and turning.

Among other good features, note the following:—

No. 1—3" belt on feed.	Note Sheet Steel Oil Pan.
" 2—7" belt and 75 H.P. friction.	No countershaft required.
" 8—18" turret.	Bronze bearings throughout.
" 9—Keys for boring bars.	Sight feed oilers.
" 12—External Feed friction.	Hardened and ground thrust collars.
" 13—Four-pitch rack.	An overplus of strength throughout.
Note ratio of gearing.	Workmanship guaranteed.

This lathe will give you satisfaction.

Immediate Shipment From Stock

(Subject to Prior Sale)

The Foundry & Machine Co., Limited

1167 Carriere Road
Montreal, Canada

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO.
LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

WE HAVE AT TORONTO FOR IMMEDIATE DELIVERY:

New **Davis 6" Cutting-off Machines,** fully equipped, size of hole in spindle 6⅞".
New **Giddings & Lewis** 18" x 8' Heavy Duty Engine Lathes, 3-step Cone, Double Back Gears, regular equipment.
New Heavy Duty Lathes for turning 8" and 9.2" Shells.
Thor pneumatic hammers and drills.
Appleton Grinder—Challenge No. 1—slightly used.

Special 16,000 lb. 40" Boring Lathes for 6" Projectiles.
Immediate Delivery—Special Price—Write for Cuts, etc.
Good Delivery now on Lodge & Shipley 24" Lathes.
Ask for information about machines for any operation on 3", 4.5", 5", 6", 8" or 9.2" Projectiles.—Our Experience is at Your Service.

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds

Tycos
FERY RADIATION
PYROMETERS
Eliminate Guesswork from the Manufacture of All Products requiring extremely high Temperatures * * * *

We Manufacture - Thermometers and Instruments covering every Temperature requirement in Metallurgy and Chemistry

Canadian Office
201 Royal Bank
Bldg. TORONTO

A Catalog Cheerfully Sent Upon Application

The Taylor-Cambridge Division
Taylor Instrument Companies
Rochester, N.Y.

PRACTICALITY

AFTER fifteen years' study of the Miner's and Lumberman's wants, we know just what is and what is not required in tools for them.

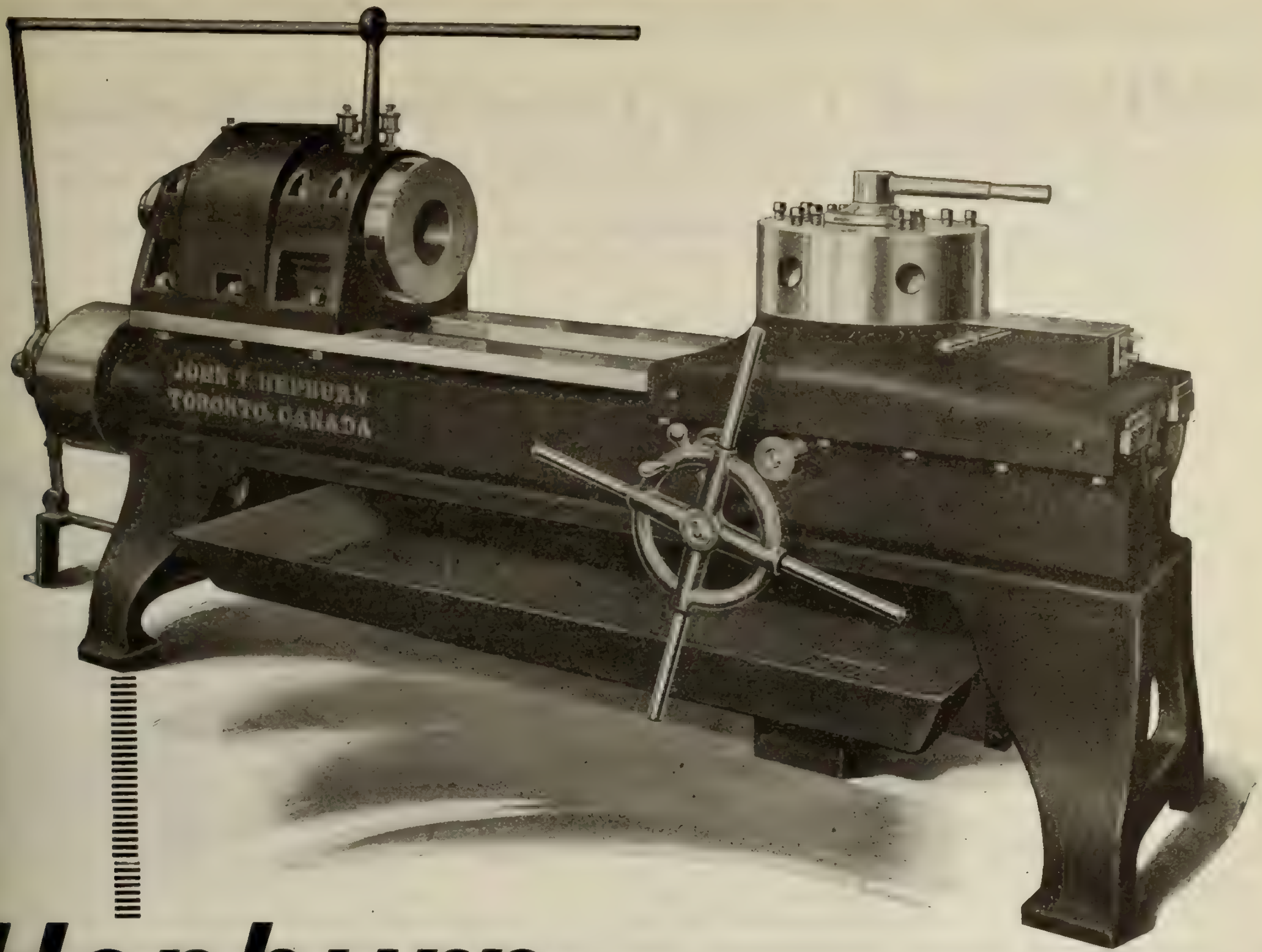
Practicality has been the keynote of our organization. Experience has aided us in eliminating all unnecessary parts and in perfecting the design of our tools.

The use of best material and finest workmanship enable us to manufacture tools that are unexcelled.

We make a complete line.

Write us for prices.

J. W. CUMMING & SON, LTD.
NEW GLASGOW, - - CANADA
Wood or Steel, let Cummings make it.



Hepburn—

Heavy Duty Shell Lathes

When we made the first Hepburn Shell Lathe we had harder work selling it than we have selling Hepburn Lathes to-day. At first firms with munitions orders had not much or any experience with lathes for shell-making; and often cheap, light lathes, made to sell easily were purchased.

Later, however, the

Hepburn Lathe—

remarkable for Speed, Accuracy, Power Strength, Rigidity and Simplicity—came into its own; it was recognized to be worth its cost, for it actually saved its cost—and this very soon—in operation.

To-day the sturdy Hepburn Heavy-duty Shell Lathe is found in many factories holding its place of favor by reason of its uniformly perfect performance.

If you are in the market for a Lathe for shell-making ask us for specifications of the Lathe illustrated and other Lathes.

We make turning and turret lathes up to and including 9.2"

John T. Hepburn, Limited

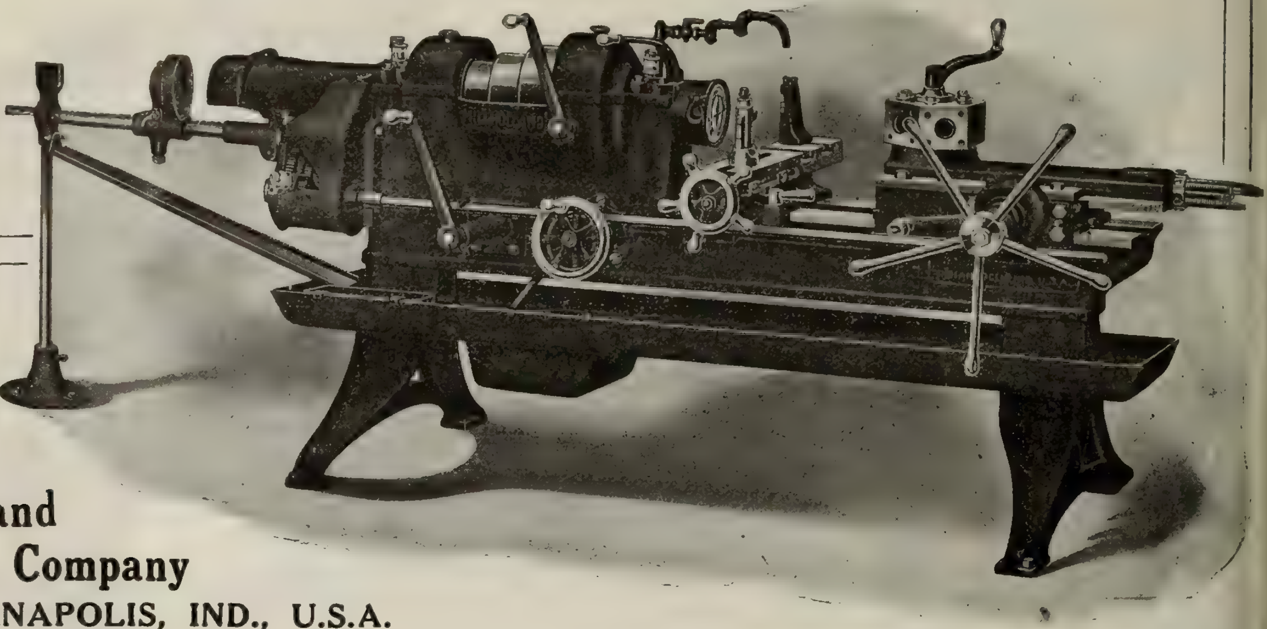
18 to 60 Van Horne Street - Toronto, Canada

Millholland 1⅝ x 10 Turret Screw Machine

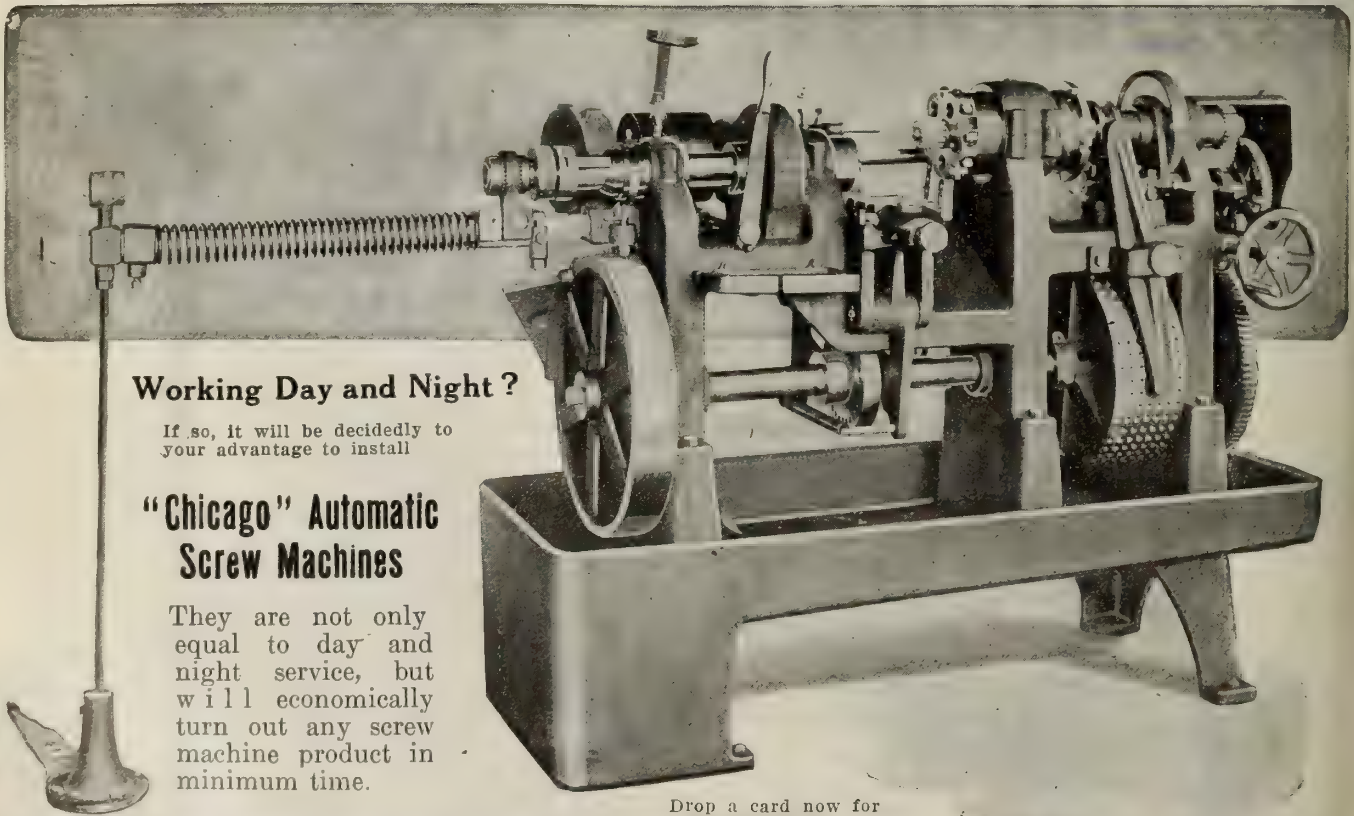
The combined result of two generations of engineering and mechanical experience. While, as a whole, it is no radical departure from established lines of the turret lathe, it has many original features, and with these features are combined well-known devices.

Safety, rigidity, convenience, production and durability are the ideas behind every step in their construction.

Your request will get you full details and specifications by early mail. Make it.



**W. K.
Millholland
Machine Company**
INDIANAPOLIS, IND., U.S.A.



Working Day and Night?

If so, it will be decidedly to your advantage to install

"Chicago" Automatic Screw Machines

They are not only equal to day and night service, but will economically turn out any screw machine product in minimum time.

READY FOR OPERATION IN YOUR PLANT IN LESS THAN SIX WEEKS from the time your order reaches us.

Drop a card now for specifications.

The John MacNab Machinery Co., 90 West Street NEW YORK.
European Representative: John MacNab, Hyde, England.

THREE REASONS

FOR

CELFOR

HIGH SPEED DRILLS

Specialization

We make just one line—High-Speed-Tools. For years our entire energy and all the facilities of our plant have been devoted to one line. As a result we have forged ahead and beyond in the manufacture of drills of quality, design and general efficiency, All are made by the forged and twisted process.

Delivery

An ample supply of steel makes possible our present production of drills, which greatly exceeds any record ever attained. We have in stock or in process of manufacture every tool of every size shown in our catalog. This means almost immediate delivery—from stock or very soon after your order is received.

Service

It is our constant aim to give you service when you buy and service after you receive the tools. Repeat orders are the secret of a successful business. They are only secured by the rendition of service and by quality of product. Our modern plant and efficient organization assure the former—a trial proves the latter.

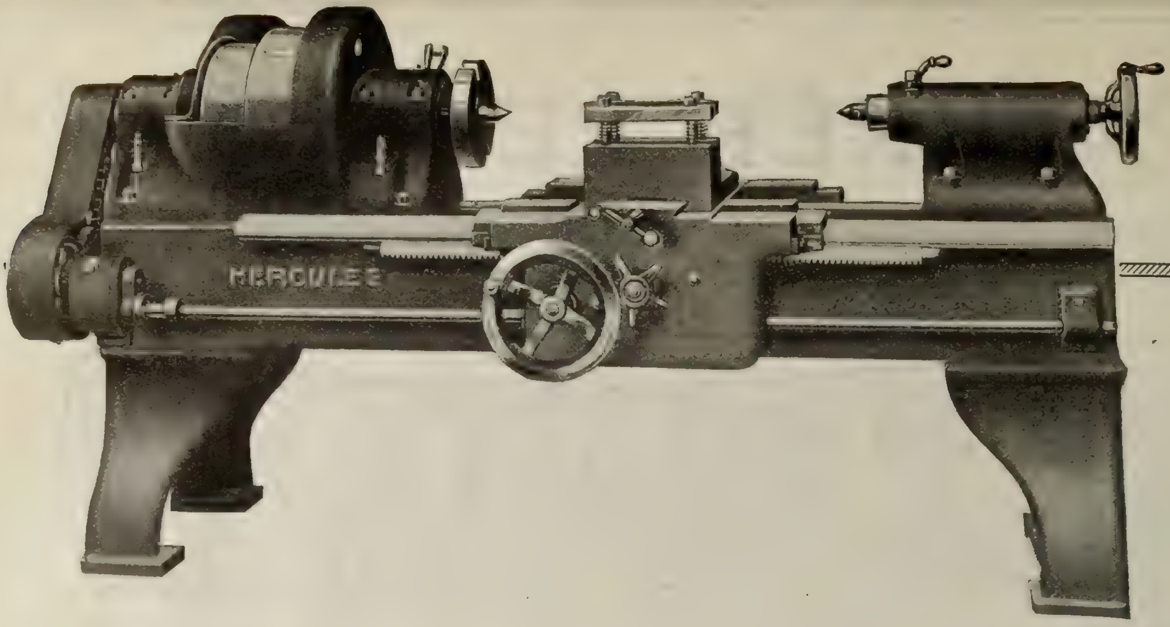
Celfor
TOOL
COMPANY
Catalog
15

If you are interested in obtaining *Holes That Cost Less,* send for catalog No. 15.

CELFOR TOOL CO.

BUCHANAN, MICH.

Agents—Canada: Rudel-Belnap Machinery Co., Montreal and Toronto.
Great Britain: Coats Machine Tool Company, Caxton House, London.
Japan: Andrews & George, Tokyo.



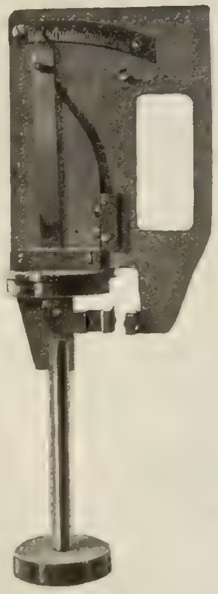
There's Nothing Fancy About the "Hercules," but—

when it comes to turning—well, just watch it. When you have a tough job of straight or taper turning the very absence of frills and special attachments is a decided advantage. That's the idea behind a "Hercules"—a lathe that can handle work requiring sheer strength and power. Its extreme simplicity avoids confusion in operation and facilitates quick handling. When you realize that the majority of lathe work is plain turning, there are possibilities in the "Hercules" well worth considering. Early deliveries. Write us now.

Investigate our Turret Screw Machines

Himoff Machine Co., 128 Mott St., New York City

Gauges, Tools, Fixtures, Jigs, Dies



We will assume all your problems connected with the design of the complete system of Limit Gauges, necessary for successful manufacturing.

Your inquiry will receive prompt attention. Consult us at once.

Slocum, Avram & Slocum
Laboratories, Inc.
531 West 21st Street, New York, N.Y,

Production of Rare Quality at Lowest Labor Costs

SEMI STEEL BEVEL GEAR
STEEL BEVEL PINION
SEMI STEEL BACK GEARS
ALL HARDENED STEEL FEED GEARS
FLAT BEARING UNDER TABLE

There is unusual strength, accuracy, speed, convenience and range in

AURORA

Drilling Machines

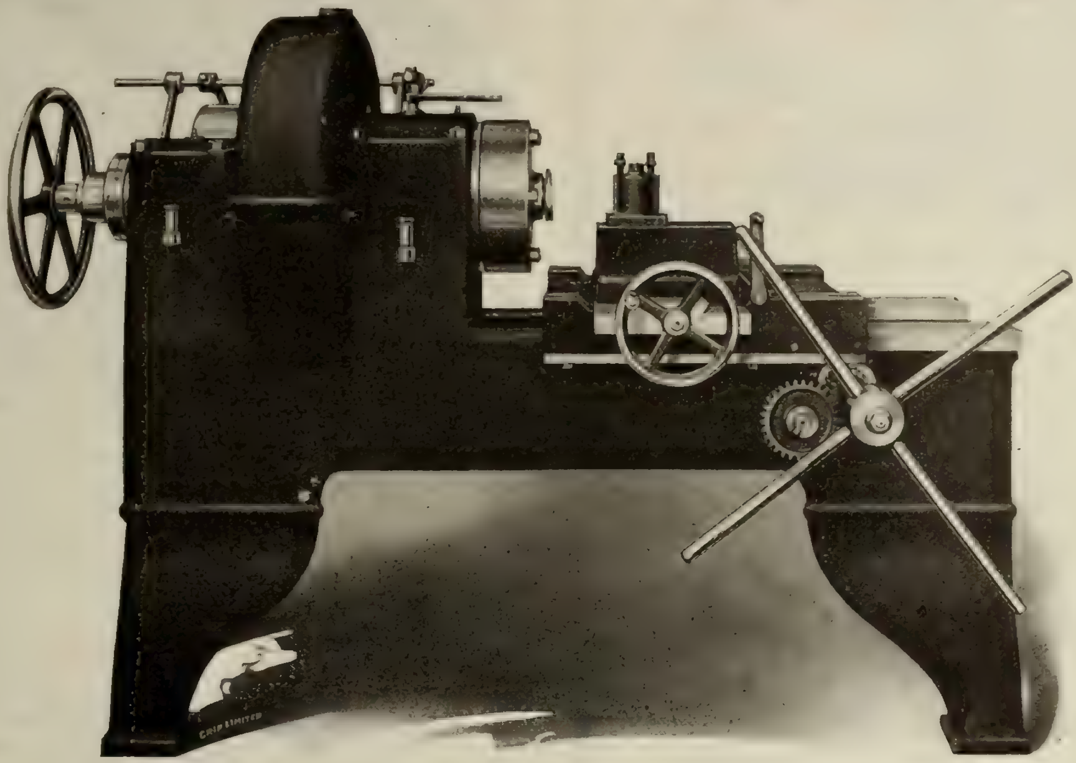
You can use them to great advantage on **HIGH EXPLOSIVE SHELLS** or any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

Drop a line for full particulars and specifications.

Stationary Head Sizes 20"—21"
Sliding Head Sizes 22"—44"

The Aurora Tool Works, Aurora, Indiana

Bawden Hollow Spindle Lathe for 6" Shells



Front Bearing Bronze 12″ long 9″ diam., Rear Bearing Bronze 10″ long 5″ diam. Pulley, 16″ diam., 4½″ face T & L on Mach. Gear ratio 10 to 1. Collet Chuck.

Machines Furnished for Following Operations:

Machining Base Plug. Machining Base Plug with Power Cross Feed
Base Recessing Machine. Base Recessing Machine with Tool.
Base Finishing Machine. Base Finishing Machine with Power Cross Feed
Machine for Nose Operation after heating, with 6-hole Turret.
Machine for Nose Operation after heating, with 6-hole Turret with Swinging Tool Post and Profile for rectifying profile of nose after heating.
Waving Machine.

AIR CHUCK FURNISHED EXTRA
Two Speed Friction Counter Shaft Furnished Extra.

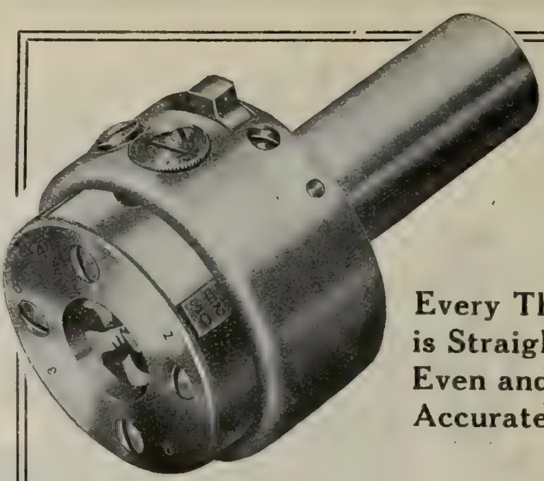
The Bawden Machine Co., Limited
TORONTO, CANADA

Preparedness—

THE watchword of the day. Start now and be ready for the big business that is coming.

SPECIAL machinery and equipment is our forte. We ask the opportunity of having our engineers solve your problems.

LYMBURNER, LIMITED
360 St. Paul St.
MONTREAL, CANADA



Every Thread is Straight, Even and Accurate

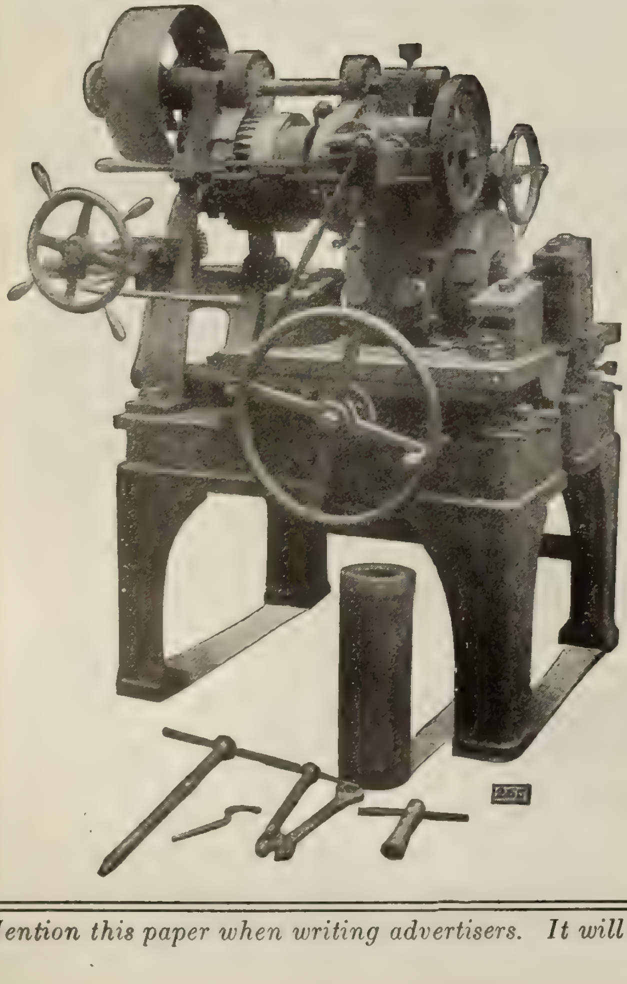
The Chasers in an **H & G Automatic, Self-Opening Die Head** are set and held in place by a steel cam. That cam once adjusted, locks; there is no stoppage or changing in size.

The quick release not only issues the cutting of the thread to a given point every time, but permits cutting right up to a shoulder when required.

Simple, Strong and Compact.

Our booklet tells more. Drop a card for it.

Eastern Machine Screw Corp.
New Haven, Conn.



CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

Peerless HIGH SPEED
PEERLESS MACHINE CO. RACINE, WIS. U.S.A.

"100% Better, Faster and More Reliable

than any Sawing Machine we have ever used; we have had almost all makes of Sawing Machines manufactured."

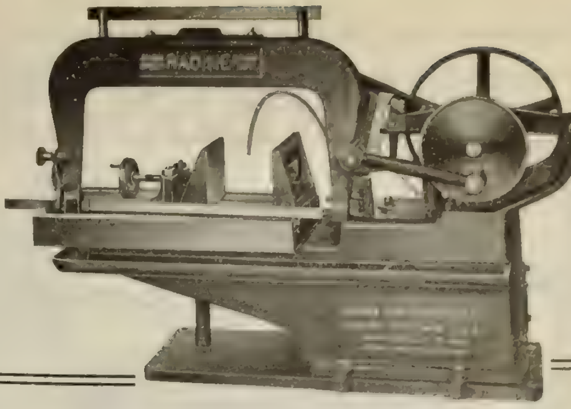
Just what a customer in Toledo, Ohio, reports after a thirty days' trial.

You don't have to take anybody's word for it, try it out under your own conditions. You are under no obligations if it fails—remember we also pay the freight both ways.

Not only 100% more production, but saves 100% floor space. These problems have handicapped many manufacturers for some time. They can now readily be solved by the Peerless High Speed Heavy Duty Metal Cutting Saw.

Write us for complete description and references. Some of these machines may be working in your vicinity.

Peerless Machine Co., 1607 Racine St., Racine, Wis.



ONE BLADE on this machine does what SIX of the same kind will do on any other

The Racine Metal Cutting Machines are exceedingly easy on the blade, BUT THEY FAIRLY EAT THE METAL.

One reason for the greater blade life is the **Positive** Automatic Lifting Device which lifts the blade clear of the work on the non-cutting return stroke.

Another reason is the Saw Frame Guide which positively prevents springing, and insures greater accuracy and there are many other reasons that we will be pleased to put before you.

The Racine is a metal cutting machine that will effect an immense economy in your plant.

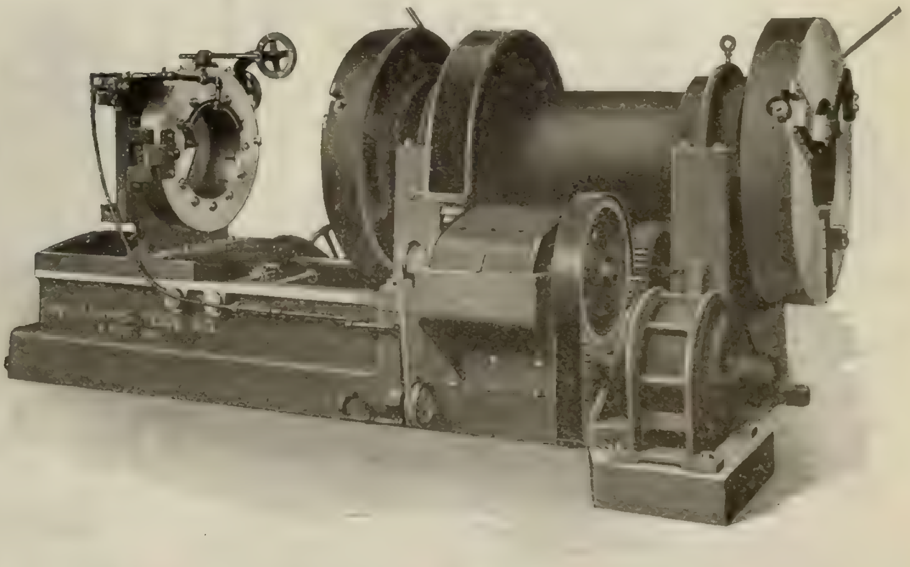
Many Canadian plants are on our list of users. One Canadian Steel Company is using **120 Racine machines** and has saved $11,019.00—particulars of saving will be **sent on request.**

Racine Tool & Machine Company

15 Melbourne Ave., Racine, Wisconsin. U.S.A.

WILLIAMS PIPE MACHINES

Received Highest Award at Panama Exposition



The Following Letter Explains Why:

Williams Tool Co., Erie, Pa.: Rochester, N.Y., 12-3-14.

Gentlemen:—We are so pleased with our No. 3 Pipe Machine, and it is doing such splendid work for us at a minimum of expense that we are now considering the advisability of displacing two smaller machines for one of your No. 1½ or No. 2 motor drive.

The machines which we would displace, if we make a change, are belt drive, are (names of two of the oldest and best known machines on the market) equipped with nipple holders, extra dies, etc. Both of these machines are still in fairly good condition. On what basis could we make an exchange with you?

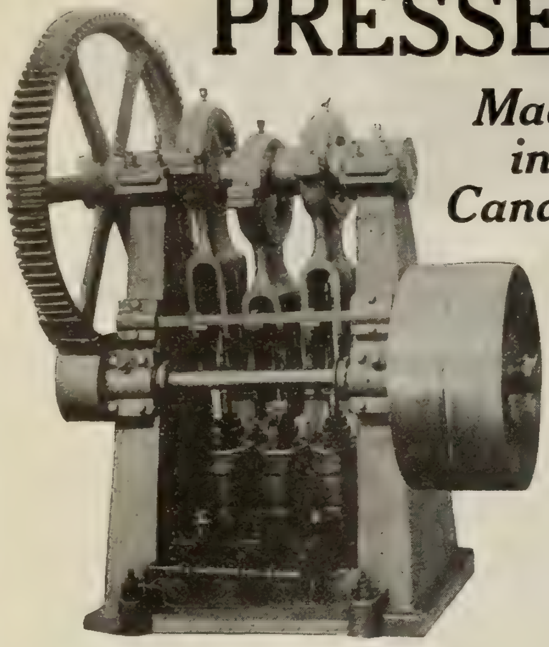
Yours very truly, SAMUEL SLOAN & CO.

WILLIAMS TOOL CO. - - - ERIE, PA.

If any advertisement interests you, tear it out now and place with letters to be answered.

PRESSES

Made in Canada



Hydraulic Presses, Pumps and Accumulators for all purposes.

WRITE FOR PRICES AND DELIVERIES

WILLIAM R. PERRIN, Limited
TORONTO, CANADA

HYDRAULIC MG MACHINERY

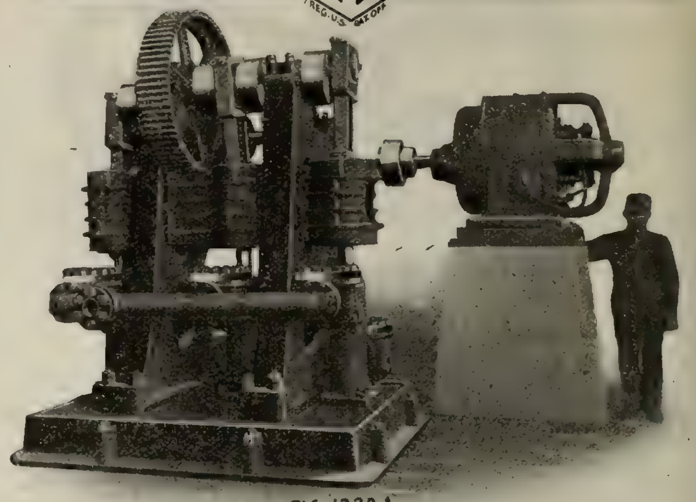


FIG. 1330 A

Hydraulic Pump Strength

The success of your hydraulic press equipment depends in a large measure upon the strength of the hydraulic pumps and valves. “Mount G” High Pressure Hydraulic Pumps and Valves will give you dependable strength day in and day out, no matter what your requirements may be. Let us tell you about them to-day.

The Hydraulic Press Mfg. Co.

89 Lincoln Avenue
Mount Gilead Ohio
U.S.A.

Canadian Agents:
A. R. Williams Machinery Co., Ltd., Toronto, Ont. and St. Johns, N.B.; Canadian Fairbanks-Morse Co., Toronto and Montreal; McLean & Barker, Southam Bldg., Montreal; Canadian Equipment and Supply Co., Edmonton, Alberta

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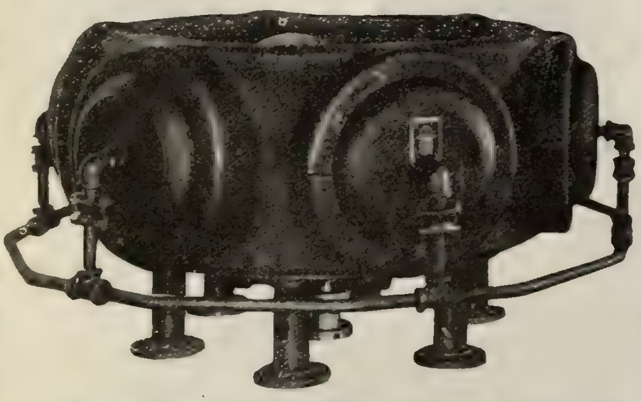
For 6″ to 12″ Shells



“Metalwood” Banding Press

Has a remarkably sturdy construction. It stands up to the most severe service and constant use.

While the price of this press is somewhat higher than others on the market, customers who have used both unhesitatingly prefer our machine, even to the point of discarding other types.

Rams—6—Semi steel 11″ diameter. Move of each ram ½″ or more if necessary. All rams returned by levers on plate with heavy Vanadium Steel Spring. Cylinder—Removable, of alloy steel.

Hydraulic inlet to cylinder 1¼ pipe. Distributing ring 2″.

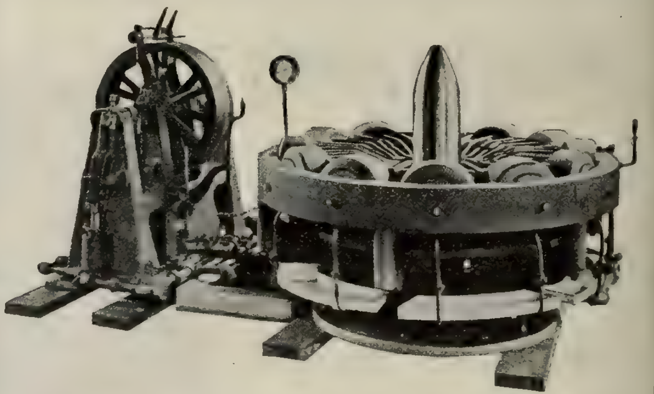
All pipe, seamless steel tubing; all fittings, drop-forged steel. All parts under strain, alloy steel castings or forgings.

Dies 6, forged chrome nickel steel, hardened and removable, without disturbing any part of press by loosening 2 nuts.

Weight 9,500 lbs.

Can be operated either from accumulator or pump.

Metalwood Manufacturing Co.
Leib and Wight Sts., DETROIT, MICH.



The New “West” Banding Press

For 9.2″ and 8″ shells

12 Cylinders; Ample Power; Ample Strength; Reasonable Price.

NO ACCUMULATOR REQUIRED.

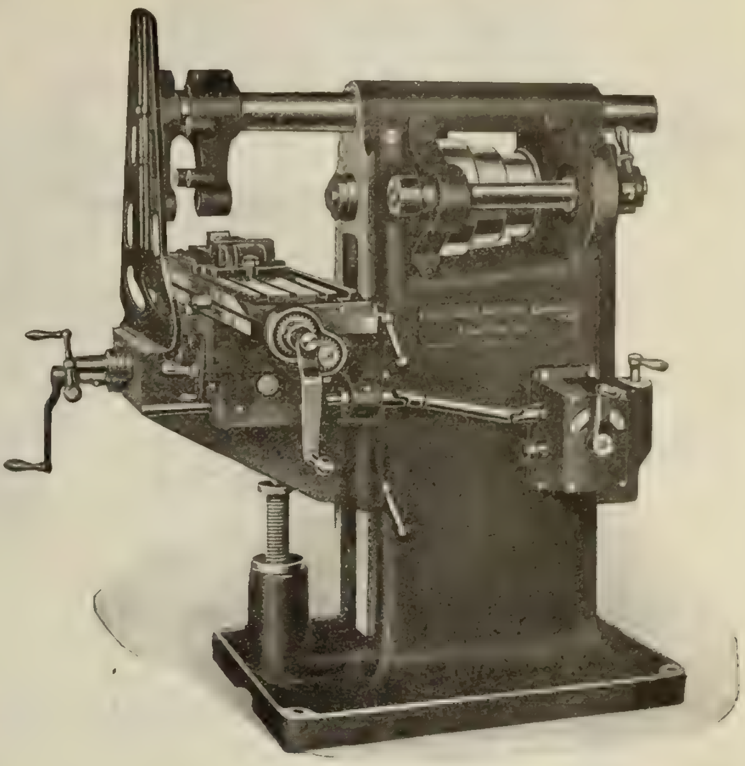
The West Tire Setter Co.
255 Mill Street, Rochester, N.Y.

The Ford-Smith Machine Company

Ford-Smith

27" x 19" x 7½"

Milling Machines



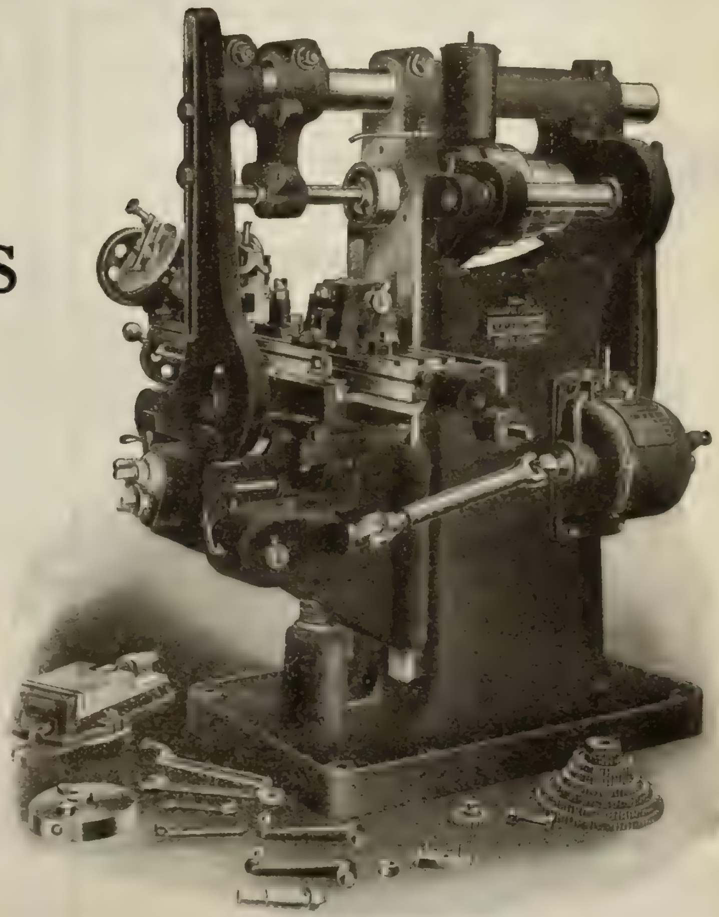
We can make interesting deliveries on these machines, either through our regular dealers or direct from our plant.

Our Catalog illustrates various features exclusive with Ford-Smith Millers and will be gladly forwarded on request.

THE FORD-SMITH MACHINE COMPANY, LIMITED
HAMILTON CANADA

KEMPSMITH

UNIVERSAL MILLING MACHINES



Are built in three standard sizes. They embody every worth-while feature to be found on a tool room Milling Machine

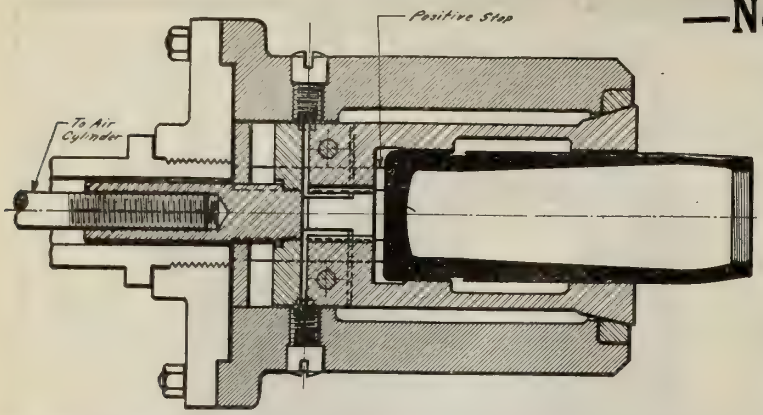
We call especial attention to the Dividing Head which is part of the regular equipment of every Universal Miller.

The Kempsmith Dividing Head is compact and rigid, unusually convenient in operation and so constructed as to maintain its accuracy under heavy service.

We publish a thirty-two page book elaborately illustrating and describing this Dividing Head. A copy will be sent free on request. Just ask for "Dividing Head Book."

Kempsmith Manufacturing Co.
MILWAUKEE, U. S. A.

Agents:—Foss & Hill Machinery Co., Montreal
General Supply Company, Toronto and Ottawa
Western Supply and Equipment Co., Calgary



—No Time Consuming and Production Delaying Adjustments Here

M. E. C. Hinge Collet Chucks, operated by compressed air, are opened and closed in one-tenth the usual time. They hold the job in a positive rigid grip without the slightest need for adjustment; no wrench is required and the operator does not leave the front of the machine.

No Manufacturer who is desirous of increasing production can afford to be without

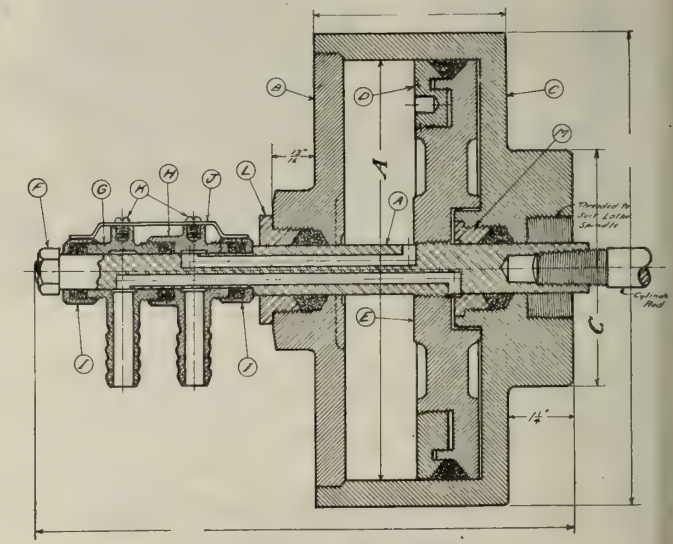
M. E. C. TOOLS

We are anxious to have you demonstrate in your own plant just what M. E. C. Tools will accomplish for you.

Manufacturers Equipment Company

175-179 North Jefferson St., CHICAGO, ILL.

Foreign Agents: C. W. Burton Griffiths & Co., Ludgate Square, Ludgate Hill, London, England.
Canadian Agents: A. R. Williams Machinery Co., Ltd., Winnipeg, Man.;



M. E. C. Air Cylinders
Embody every strong feature consistent with modern requirements. Construction of piston permits adjustment, preventing unnecessary loss of air.

You can drive high speed drills up to 2½" diameter

with the new box-column type

Heavy Duty "Rockford" Drilling Machine

This Rockford machine tool meets the most exacting requirements.

It is **STRONG, RIGID, ACCURATE AND FAST,** with individual features. Built in three styles.

ROCKFORD DRILLING MACHINE CO.
ROCKFORD, ILL., U. S. A.

Rockford Machines Cut Costs.

The BARNES DRILLS

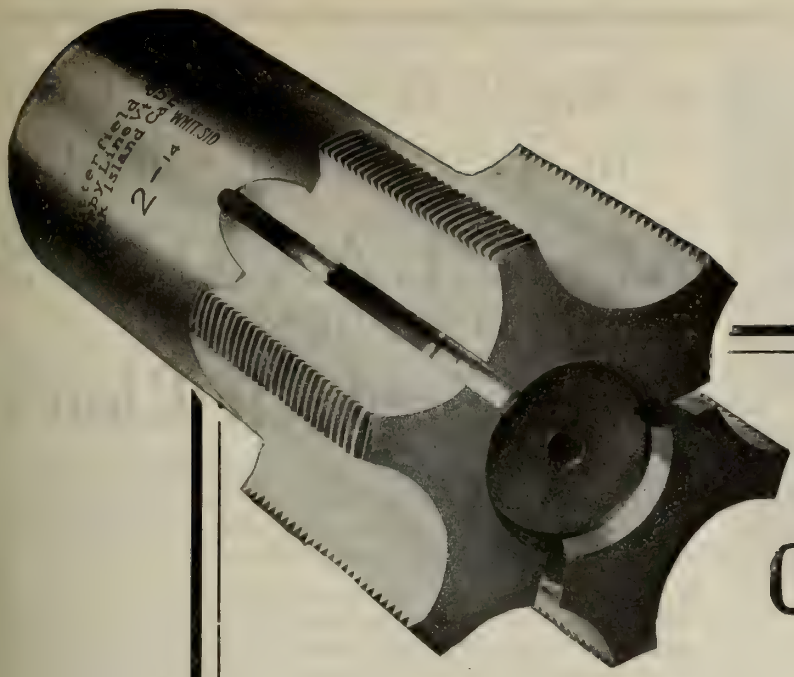
TRADE W.F. & J.B. MARK

Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

W. F. & JOHN BARNES CO.
104 Ruby Street - ROCKFORD, ILL.
Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal



ON TIME!

These Butterfield High-Power Tools will help you get out your rush work on time. They are built to stand up under the heavy strain of exceptional production. Look at them! See their strength! Their compact, rigid design. We have developed this line of Taps especially for shrapnel and shell work.

The name "Butterfield" on your taps, dies and reamers is a guarantee of quality—a mark of superiority. We build into every one the experience of thirty-five years devoted to the manufacture of high-grade tools.

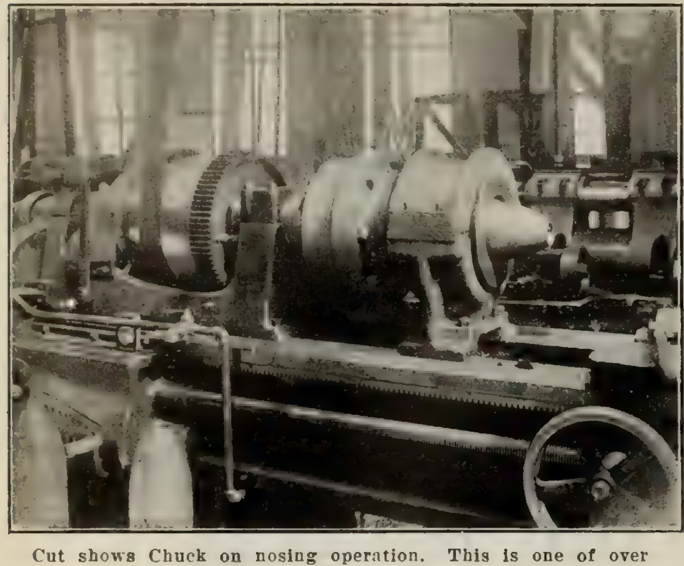
That is what makes Butterfield quality. We have a new catalog. Let us send you a copy.

Butterfield & Co., Inc.

Rock Island,
QUEBEC

Toronto Office:
1505 Traders Bank Bldg.,
Phone Main 1382.
H. A. Harrison, Mgr.

Butterfield & Co
Derby Line, Vt. U.S.A.
Rock Island, Canada
WHIT.STD
2-14



Cut shows Chuck on nosing operation. This is one of over two hundred in this Canadian plant.

This chuck is *built on the duplicate part system. It is simple, effective and fool-proof.*

It grips the shell in a predetermined position. The jaws will not slip on the shell. It has shell interior and exterior adjustable stops.

A trial on one of your lathes will convince you that this is THE Chuck for shell work.

A Big Efficiency Unit in Your Shell Plant

A. J. LAVOIE'S

LOW PRESSURE

Compressed Air Chuck

This chuck can be applied to any make of lathe, without alteration to the machine, and will increase production from 25% to 75%. It grips and releases the shell while in motion—no need to stop your machine.

It is a single unit combination attached to the face plate of lathe, supported by an additional heavy duty bearing, thus making a heavy duty lathe out of a light machine. A small lever operates the chuck. Will operate with a pressure of 60 lbs. per sq. in.

MANUFACTURED BY

The Montreal General Tool Co.
673-5 Notre Dame Street, Maisonneuve, Montreal, P.Q.

Also manufacturers of shell tools, and special machine attachments of all kinds made to order.

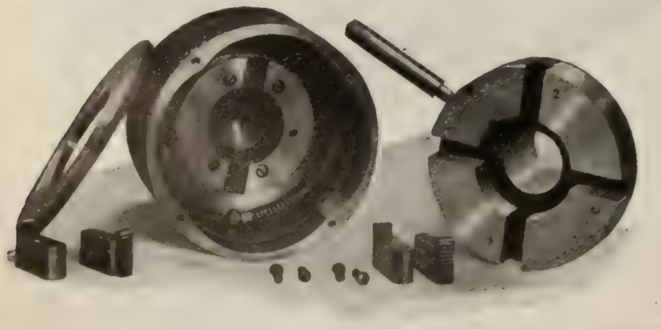
The "IDEAL" Die

for

Shrapnel

Quick, accurate work in threading Fuse Plugs for Shrapnel Shells is essential if you would make maximum profits. Your field is unlimited and your output governs your income. **Why not give the special type "C" Ideal Die a hard trial at this work and see if it will not boost production for you?**

Let the "IDEAL" cut the threads that bind you to low production. They will fit your machines. Circular on request.



"IDEAL" is a *different* die. The head revolves around a stationary cam thereby utilizing the belt power or cutting strain as opening power. Chasers are supported directly back of cutting strain, which will remove any tendency to bell out and cause taper threads.

The Ideal Tool & Mfg. Company
BEAVER FALLS PA., U.S.A.
A. M. ELLICOTT CO., MONTREAL, QUEBEC
Distributors for Province of Quebec and Ottawa

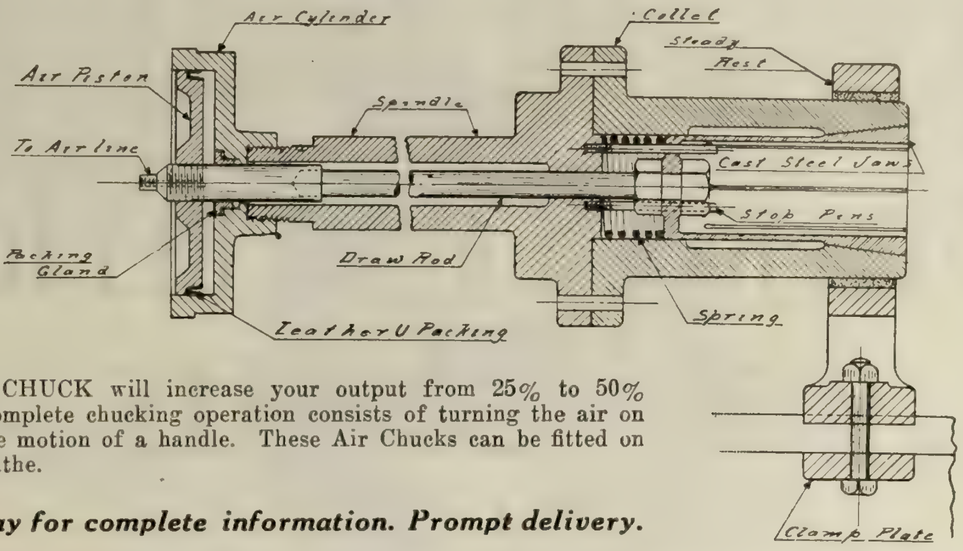
Get Out Your Watch and Time Your Chucking

With most screw chucks you have to use brute force or the hammer to tighten, and even then your shell is not always rigid.

H.E.W. AIR COLLET CHUCK IS RIGID

Saves Time

Saves Money



H.E.W. AIR CHUCK will increase your output from 25% to 50% because the complete chucking operation consists of turning the air on and off, by the motion of a handle. These Air Chucks can be fitted on almost any Lathe.

Write to-day for complete information. Prompt delivery.

HYDE ENGINEERING WORKS

P.O. BOX 1164

27 William St., MONTREAL

Do Away With Friction Losses in Chucks

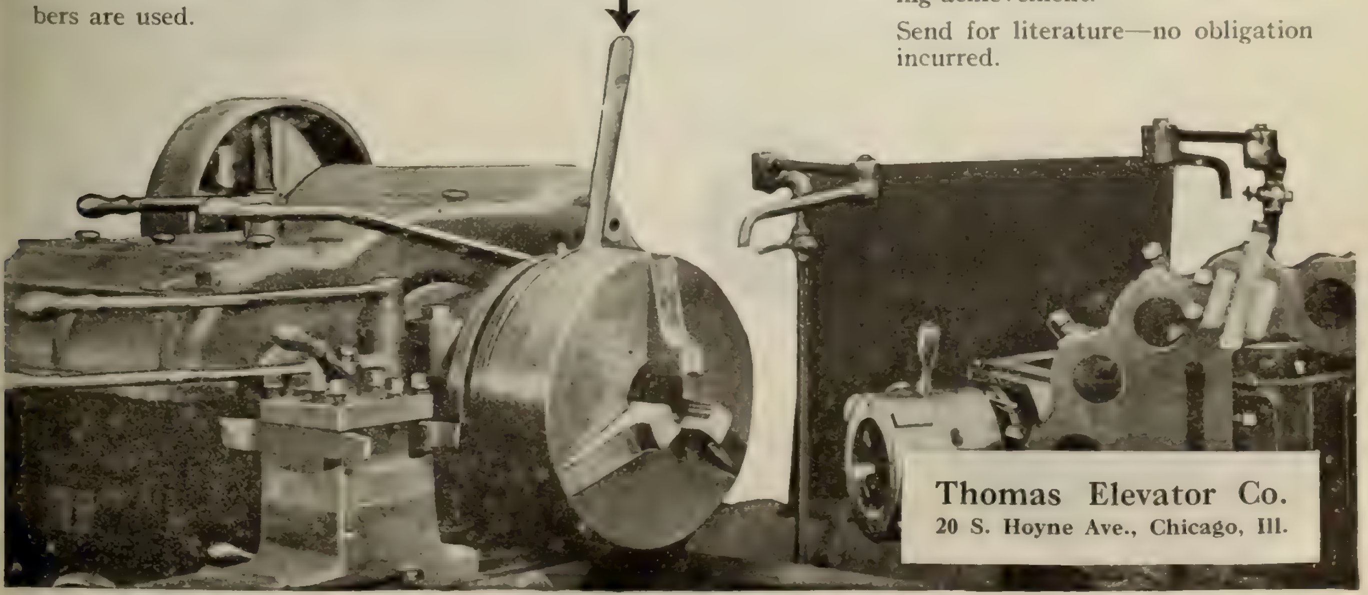
by using

Barker Wrenchless Chucks

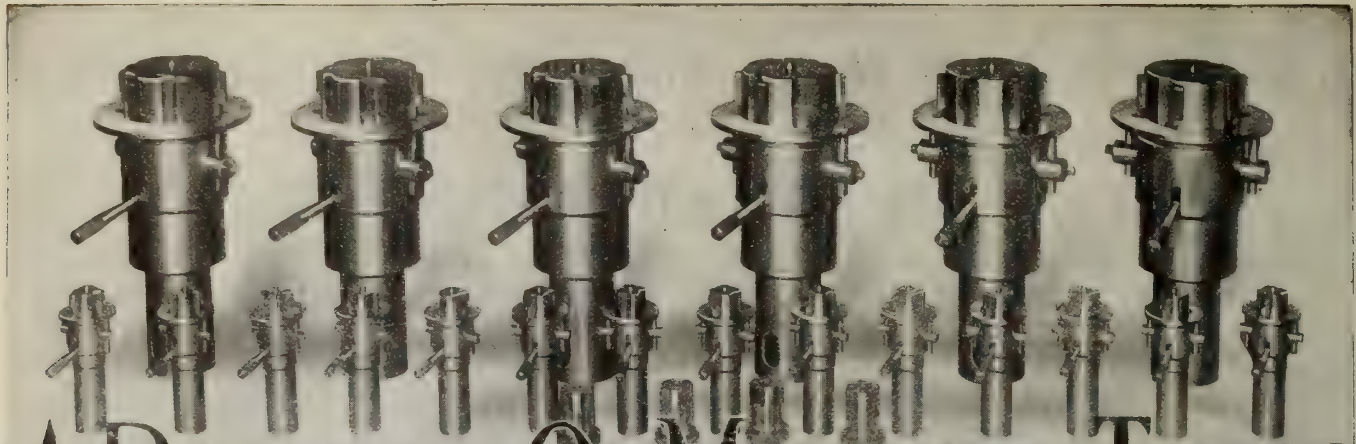
In transmitting the movement from the cam to the jaws of a Barker Wrenchless Chuck a leverage principle is involved which eliminates to a large extent the tremendous frictional loss incurred in chucks where scrolls or similar wedging members are used.

Operating mechanism combined with the chuck proper forms a single unit—no time lost in mounting—quick acting—opened and closed while the machine is in motion—these and many other vital points on this new but established departure in chucks may rightfully be considered a striking achievement.

Send for literature—no obligation incurred.



Thomas Elevator Co.
20 S. Hoyne Ave., Chicago, Ill.



A BATTERY OF MURCHEY TOOLS

FOR 9.2 SHELLS

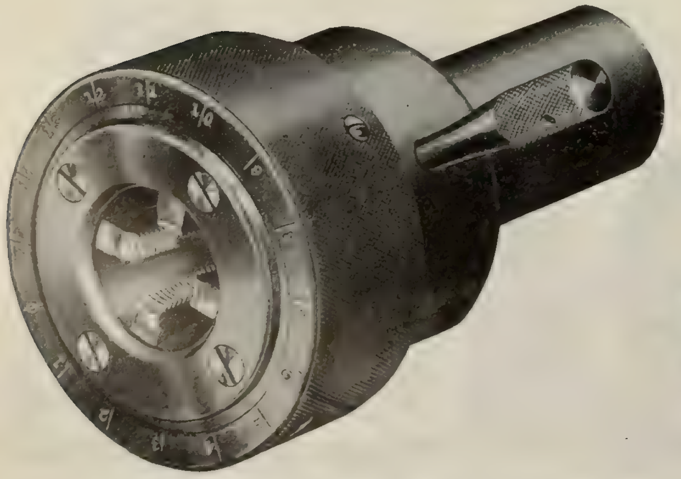
This shipment went to a concern which is undoubtedly the biggest manufacturer of these Shells in the country. The lot includes—Six 6.68, 8-pitch taps for base. Fourteen 2-inch taps for nose. Four hand sizing taps with pilot.

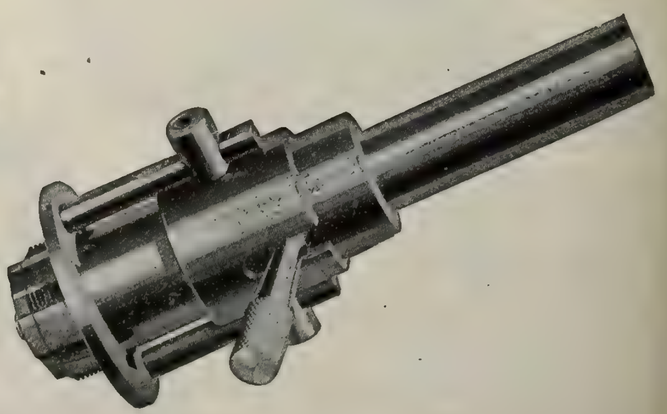
Shell makers have found out that it pays to use Murchey Taps. Let us take this proposition up with you.

MURCHEY TOOLS

are famous for the way they stand up under hard service. They keep the work *in the Lathe,* where it belongs, and handle threading and tapping operations in half the time. You'll find Murchey Tools extremely simple and convenient to operate. They are designed to give results and to stand up while they are doing it. Get in touch with us. Send us your blueprints.

Murchey Machine & Tool Company
Detroit, 75 Porter Street Michigan
The Coats Machine Tool Company, Ltd., Caxton House Westminster, London, S.W. England, Glasgow, Newcastle-on-Tyne and Fenwick Freres & Company, 15 Rue Fenelon, Paris, France.



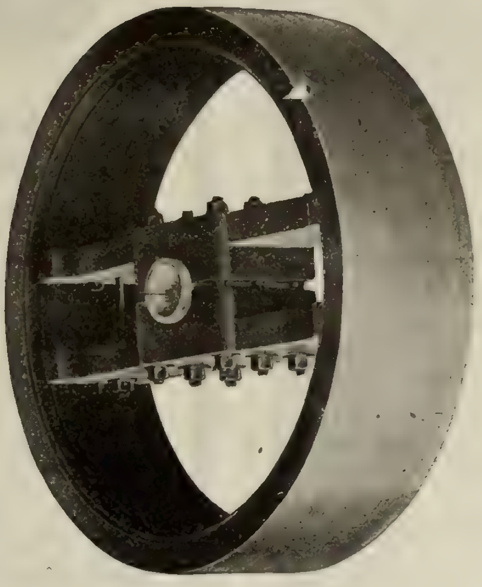


PULLEYS

No Keys

No Set Screws

In Perfect Balance



Lighter

Stronger

Better Belt Surface

The Dodge Standard Wood Split Pulley

The Wood Split Pulley is better than either cast iron split pulleys or steel split pulleys for the following reasons—

The wood pulley is lighter, stronger, better balanced, and provides a very much better belt surface. It costs 33 1-3% less money and provides 50% more returns in horse-power value. It may be run at very much higher speeds with no danger of bursting—also it may be had quicker and in a greater range of sizes.

It costs less to get—less to put on—and less to keep.

We make approximately 300 Dodge pulleys every day—everybody uses them.

There are more Dodge pulleys making ammunition than any other kind—you can get them quick.

Every pulley is thoroughly nailed. Every pulley is guaranteed for Double Belts.

We are Canada's greatest pulley makers.

If you have not our Books, write us.

DODGE MANUFACTURING COMPANY

Toronto - - Montreal

There's one to every 33rd man

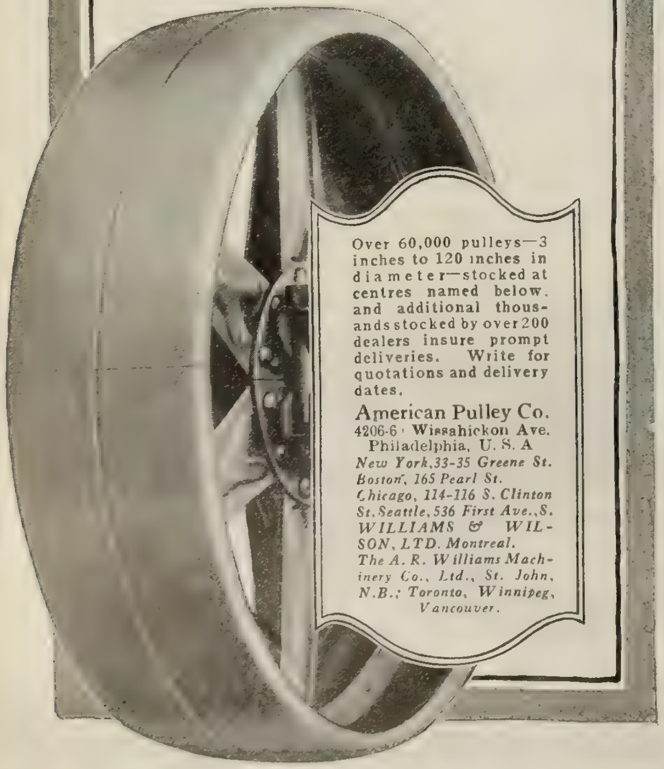
People do not always realize just what it means when we tell them that we have marketed about three million American Steel Split Pulleys.

The significance of these figures lies in the tremendously widespread use of this pulley.

When you compare that part of the population of the country *interested* in steel pulleys, with the total population, it looks like a mighty small factor—but when you consider that this small portion of all the people in the United States has bought so many "AMERICANS" that there is one to every 33rd person in the country, you will get some idea as to the magnitude of this business.

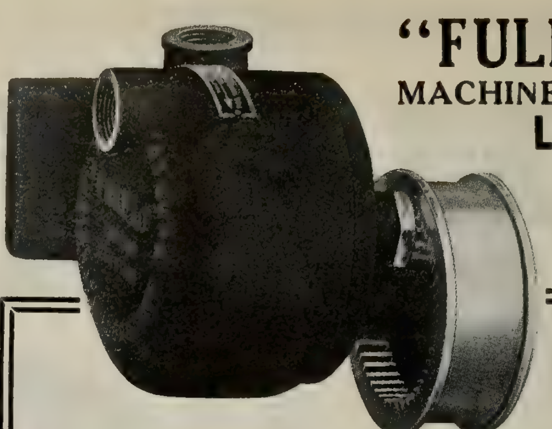
Definite points of merit, definite superiority in service, definite increase in value per dollar—these are some of the reasons why there is one "AMERICAN" Pulley to every 33rd man.

AMERICAN STEEL SPLIT PULLEY



Over 60,000 pulleys—3 inches to 120 inches in diameter—stocked at centres named below, and additional thousands stocked by over 200 dealers insure prompt deliveries. Write for quotations and delivery dates.

American Pulley Co.
4206-6 Wissahickon Ave.
Philadelphia, U. S. A
New York, 33-35 Greene St.
Boston, 165 Pearl St.
Chicago, 114-116 S. Clinton St. Seattle, 536 First Ave., S.
WILLIAMS & WILSON, LTD. Montreal.
The A. R. Williams Machinery Co., Ltd., St. John, N.B.; Toronto, Winnipeg, Vancouver.



"FULFLO" MACHINE TOOL Lubricant PUMP

You can drive your machines faster

but your cutting tools won't stand it — the speed burns them up.

A cutting tool will stand up to higher speed and heavier feeds, providing it is kept cool.

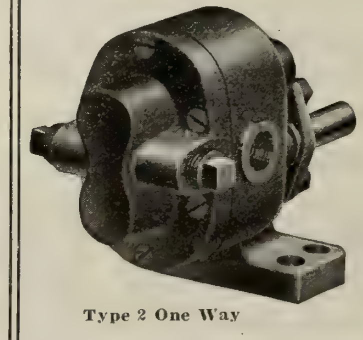
The "FULFLO" Machine Tool Lubricant Pump supplies a good "HEAVY" stream of compound sufficient to carry away all the heat.

No gears or other close-fitting parts to be affected by the grit, dirt, or small chips that are always present in the coolant. No clogging.

The only working part is the impellor. Since no check valve, reverse valve or any other kind of valve is present in the pump or pipe, other than the stop cock, the usual valve troubles are eliminated.

Easily attached to any machine. **Insist that the new machines you buy be equipped with the "FULFLO."**

The Cincinnati Lubricant Pump Co.
126 Opera Place Cincinnati, U.S.A.



Type 2 One Way

A Tip

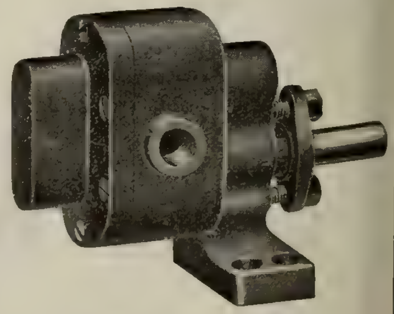
Here's a tip for the progressive foreman or manager.

Roper Circulating Pumps will give you a simpler, cheaper and more effective way for delivering lubricant on machine tools. They eliminate separate relief valves and the piping that goes with them.

The pumps shown are for machines which run in one direction only. We also make a reversing pump for machines where tools operate with the spindle running in both directions.

Full particulars, sizes and prices are given in our bulletin. May we send you a copy?

C. F. Roper & Co.
Hopedale, Mass.



Type 1 One Way

Where a belt is subjected to extreme conditions of

LEVIATHAN AND ANACONDA
ELEVATING
TRANSMITTING
CONVEYING
BELTING

DUST, HEAT, ACID, MOISTURE

the durability of Leviathan-Anaconda belts, combined with their lower cost, places them in a class apart.

Let us help you solve your belting problems.

Main Belting Co. of Canada
Limited
10½ St. Peter St., Montreal

WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE

ECONOMIC WATER OIL

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the **COST** of your **CUTTING MIXTURE** BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with **30 to 50** gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be **satisfactory**, but will produce very **ECONOMIC RESULTS.**

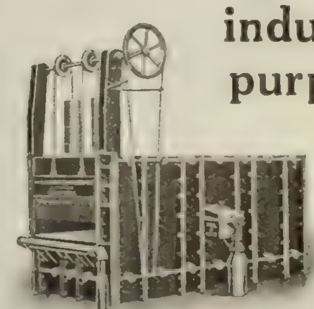
One TRIAL ORDER will prove our STATEMENT.

Made in Canada

Canadian Economic Lubricant Co.
LIMITED
1040-1042 Durocher St. MONTREAL

"Mecol" Furnaces

Designed and Built in Canada for all industrial purposes



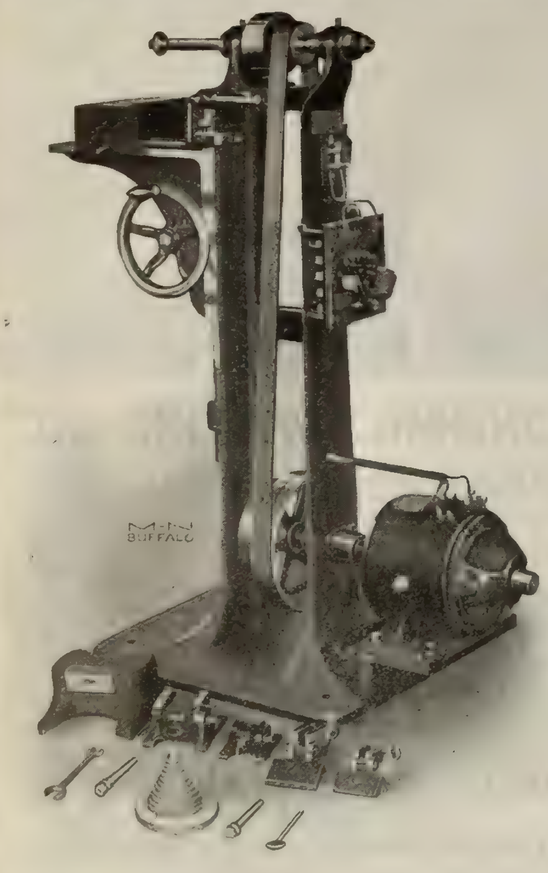
What the use of Oil instead of Coal-fired Furnaces means to you—

A Clean Workshop without Smoke or Soot.
Only half the furnace space necessary.
Less than half first cost of furnaces.
No chimneys or flues required.
Instantaneous and perfect control of temperature.
Higher temperatures obtained.
No heaters, coal or ash handlers required.
No coal or ash piles.
Less waste of fuel and less time required to bring furnaces up to working heat.
No waste of fuel after work is done, as supply is shut off instantly.

Write for full particulars.

MECHANICAL ENGINEERING COMPANY, LIMITED
55 Cote St., Montreal, Que., Canada
Phone, Main 3585. Cable address "Mecol."

"MODERN" CHASER GRINDER



ARE YOU USING THREADING DIES?

Where Self-opening Dies are used, in fact, where any thread cutting is done, the MODERN CHASER GRINDER, Belt-Driven or a complete Self-Contained Motor-Driven Unit, as illustrated, is a necessity.

Those who value accuracy and correctness in gauge of thread will find, by using the MODERN CHASER GRINDER, that each Chaser will do its portion of duty, being ground true to the axis of the head, and that the life of the Chasers, as well as that of the Die Head, will be greatly prolonged.

PROMPT DELIVERIES.
Bulletins upon request.

MODERN TOOL COMPANY

Main Office and Works :
State and Peach Streets : : Erie, Penna.
New York Office—2 Rector Street. Chicago Office—32 N. Clinton Street.
Detroit Office—246 Gladstone Avenue.
F. WESLEY PARKER, *Resident Engineer and Export Agent,*
2 Rector Street, New York.

The "Steno" Duplex Surface Grinder

This Two-in-one Grinder

brings savings in
Floor Space
Initial Investment
Upkeep.

No interference between the two operators.

THE STENOTYPE COMPANY, INDIANAPOLIS, INDIANA, U.S.A.
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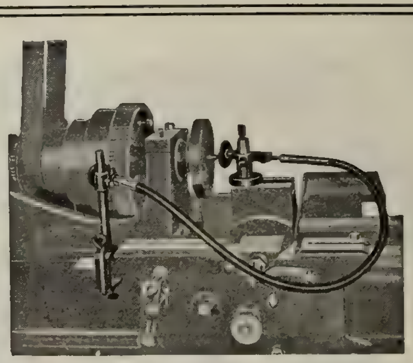

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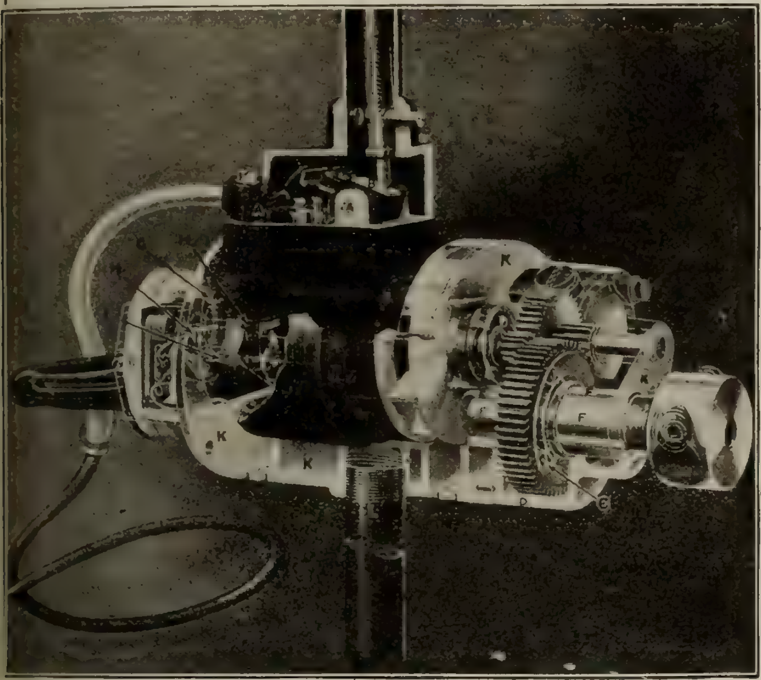

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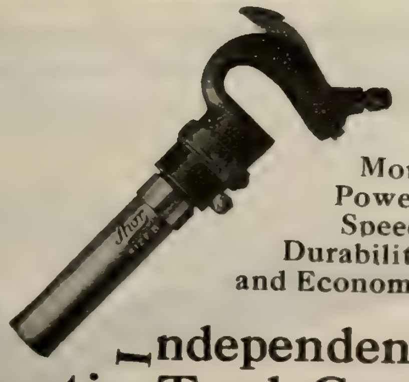

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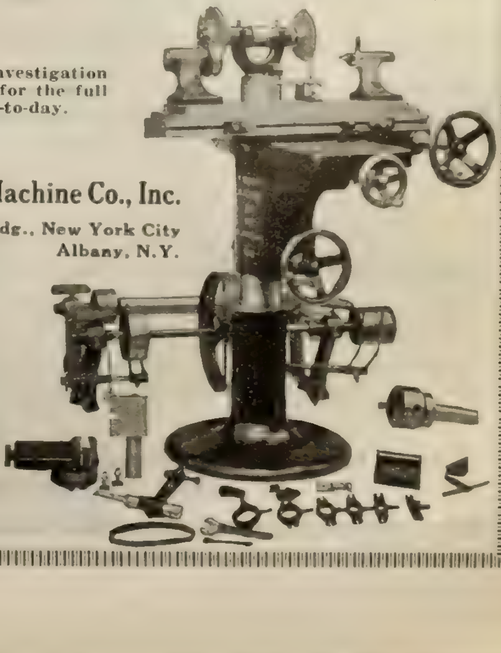

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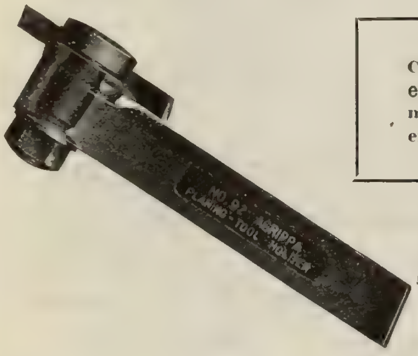

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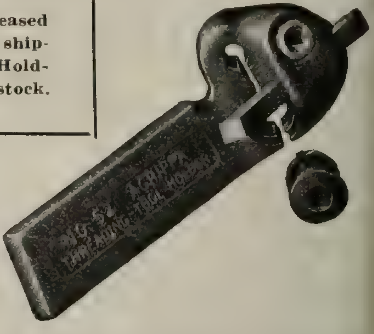

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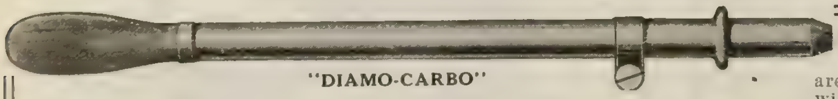

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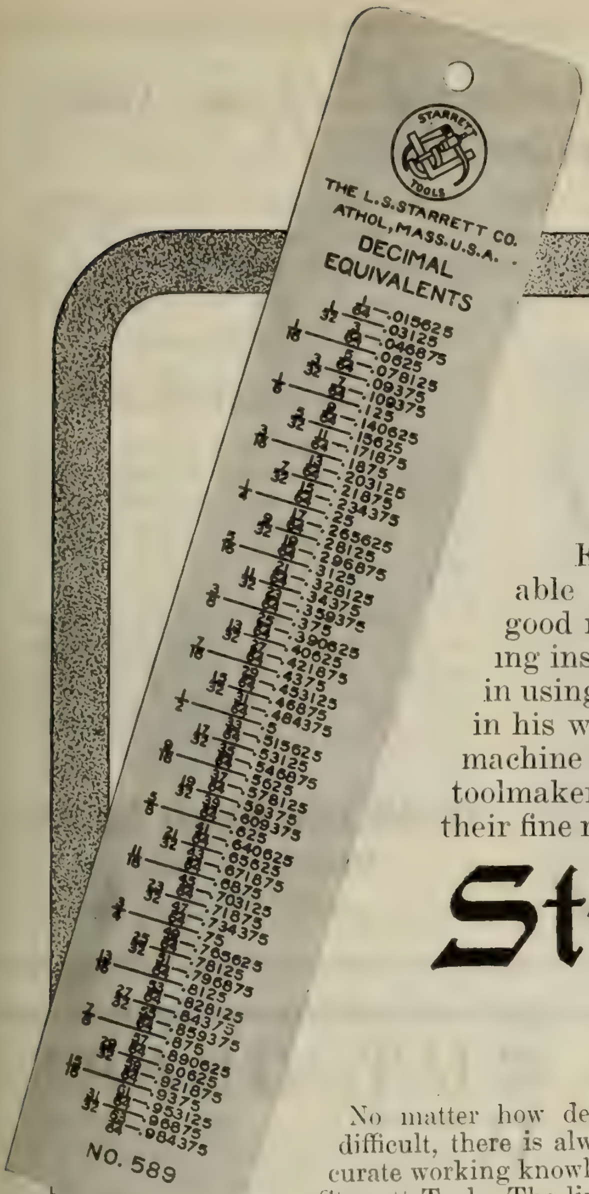
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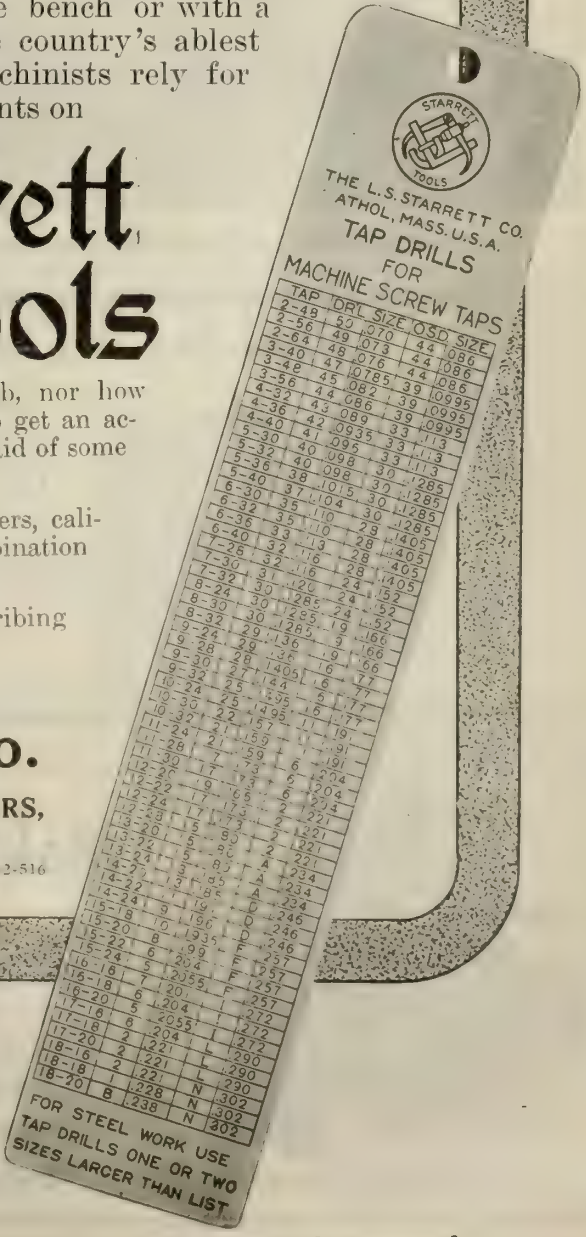
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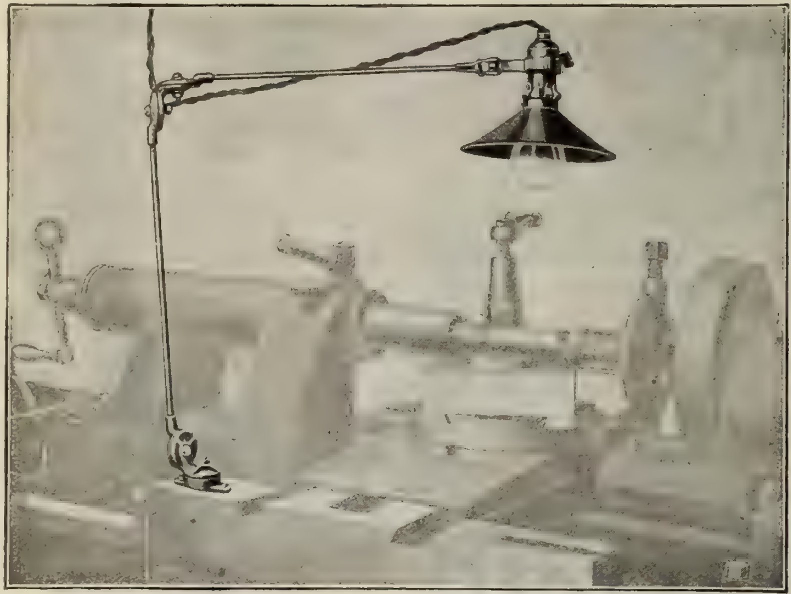

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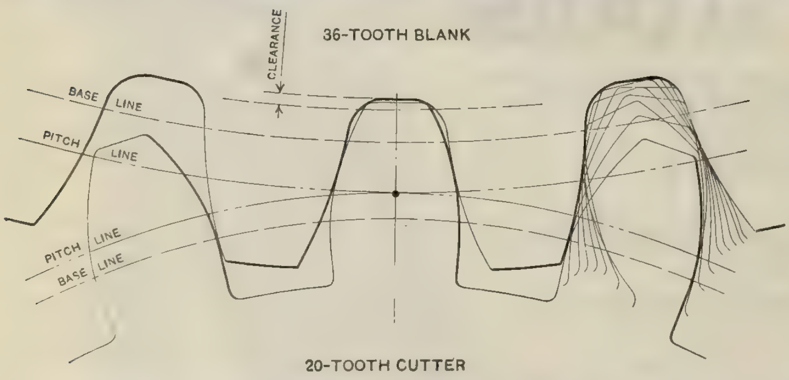

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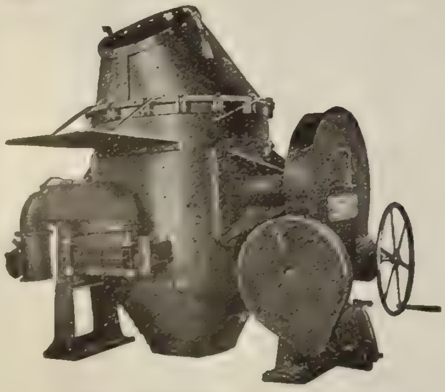

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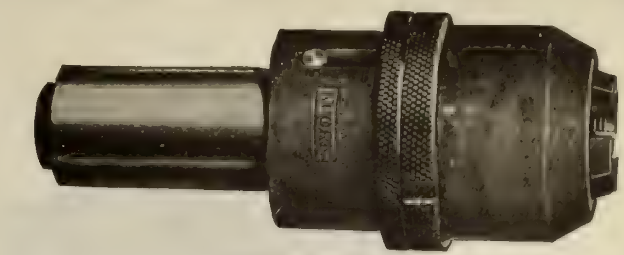

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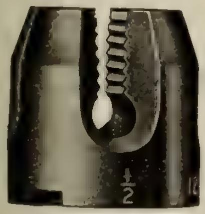

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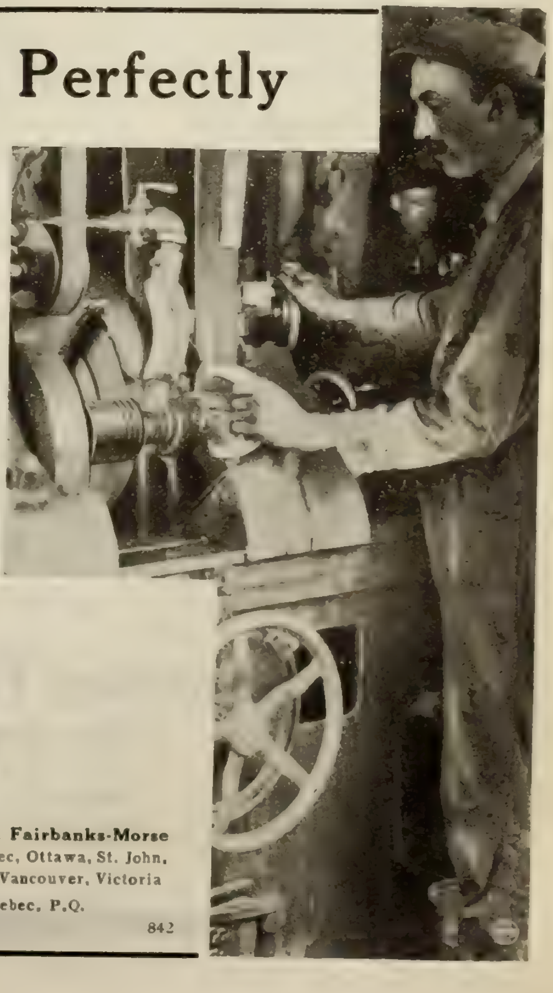

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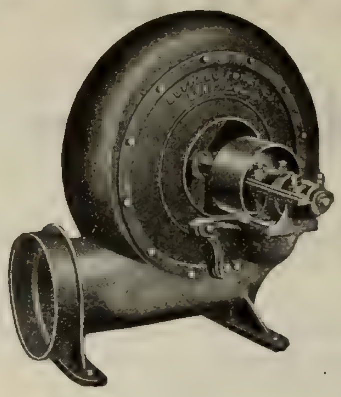

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Principles and Apparatus Employed in Testing Limit Gauges*

By R. T. Glazebrook, C.B., F.R.S.**

Perhaps no finer evidence of the value of the National Physical Laboratory in England can be offered than the work of which this paper is at best an outline only. The enormous number of gauges required for munitions production was only possible as a result of training given to numerous skilled toolmakers at this institution. The value of properly made gauges will be still more appreciated in the future and increased demands on the Laboratory resources for testing precision apparatus by engineering firms are confidently predicted.

THE fundamental idea of limit gauging—that the dimensions of a piece of work should lie between certain definite values, and that the engineer should possess some means of measurement which would enable him readily to tell if this was the case—is probably quite old. Its importance, owing to the growth of repetition work and the demand for interchangeability, has increased greatly of late; during the past two years the growth has been enormous.

Engineering Standards Committee Work

The work of the Engineering Standards Committee in this, as in many other branches of engineering industry, has been of the utmost value, and it is to the reports of that committee we turn for much of the information on the subject. It is impossible to speak on this subject without reference to the two men whom we have recently lost whose labours did so much to promote the cause of standardisation. Sir H. F. Donaldson was chairman of the Committee on Gauges from its commencement. He threw himself into the work with all the energy of which he was capable; his tact and experience steered the committee over many shoals, his knowledge was of the greatest value, and his fairness and courtesy endeared him to all his colleagues. In all he did he was most ably supported by Mr. Leslie Robertson. Only the men who have been intimately acquainted with Mr. Robertson's work for the Standards Committee can realize the greatness of his loss and the difficulty of finding one to fill his place.

Report No. 27, dated June 1906, deals with British Standard Systems for Limit Gauges (Running Fits), and was the result of much careful inquiry and discussion. From it is taken the following definition:—

"Limit Gauges.—Gauges for ensuring that any given dimension is within the tolerance laid down for the class of work to be produced. In the case of cylindrical work these gauges may be either double male gauges, one end of which must enter, and the other end of which must not enter the hole to which it is applied, or they may be either two-ring or two-gap gauges, one of which must pass over, and one of which must not pass over the plug or male piece to which they are applied. The committee have in view three classes of limit gauges, viz.:—

"(a)—Standard Limit Gauges made in accordance with the recommendations contained in this report, and with the greatest possible accuracy, for depositing with the National Physical Laboratory, for purposes of reference.

"(b)—Reference Limit Gauges, being copies of the foregoing standard limit gauges for use by manufacturers and others for checking their own shop gauges. They should be verified, and their accuracy certified by the authority in whose custody the standard limit gauges are deposited.

"(c)—Shop Limit Gauges. — The gauges actually used in the shop and checked against the reference limit gauges."

To this list it is desirable to add "Check Gauges," i.e., gauges designed to check readily the dimensions of gauges in use either as reference gauges or as shop gauges. These are usually the inverse of the gauges they are employed to check, i.e., for a hole, the check gauge is a plug and vice versa.

I propose to say something about these various classes of gauges, their use, the permissible limits of accuracy, and the methods of measuring or otherwise determining their dimensions; but before proceeding to this three other terms in common use need definition. these are:—

Tolerance.—A difference in dimensions prescribed in order to tolerate unavoidable imperfections of workmanship.

Allowance.—A difference of dimensions prescribed in order to allow of various qualities of fit.

Clearance.—A difference in dimension or in the shape of the surface prescribed in order that two surfaces or parts of surfaces may be clear of one another.

In dealing with gauges we may subdivide them usefully into three groups:

1—Gauges for plain cylindrical work.
2—Screw gauges.
3.—Form and position gauges.

Introduction of Standardisation.

Years ago Sir Joseph Whitworth embarked on the standardisation of certain gauges for plain and screwed surfaces, and the use of Whitworth gauges has been of enormous value to engineering science, but these gauges are not, and had not at the time the committee began its work, been used as limit gauges in the true sense; consequently interchangeability was not secured. Sir Joseph aimed at standards which should be true dimensions, and he made no effort—at that time it did not appear necessary—to specify plus or minus limits for each class of work. Accordingly, at the outset the committee were faced with the necessity of inquiring what should be the limits on the work in order that interchangeability may be secured, and what gauges are required for this purpose.

Cylindrical Work and Gauges

In dealing with the work it is clear that the tolerances and allowances must depend on its nature and the class of fit aimed at; different allowances are necessary for running fits, push fits, force fits, etc. In the year 1906 the data available to determine these were small. Accordingly, arrangements were made by which Mr. Attwell of the National Physical Laboratory visited the workshops of many of the leading manufacturers of the country, and, by their kindness, carried out the accurate measurement of plain cylindrical shafts and holes from 2 to 12 inches in diameter. The results are contained in the tables and plates of a long report (No. 25) dated July 1906. Certain firms—notably Messrs. Armstrong, Whitworth—had already adopted a system of limits for their own use, and information on these was also before the committee.

As a result, the committee were able to draw up a definite series of recommendations with regard to running fits, though before reaching a final decision another difficulty had to be faced. Are the dimensions of the shaft or of the hole to be made the basis of the work? With an inch shaft, for example, is the shaft to be made as nearly 1 inch as possible with only the necessary tolerance and the whole of the allowance, to secure the running fit to be made in the hole which is, therefore, of necessity larger than one inch by the amount of this allowance; or is the reverse course to be adopted? In the end the committee adopted the view that wherever possible the shaft should be the element more nearly approaching the true dimensions, and allowance be made on the whole according to the kind of fit required. The tolerances on the shaft are negative, so that it may never exceed its nominal dimensions. A minimum allowance, obtained by making the hole of larger than nominal size, is specified, and this cannot be encroached upon by either element; above this a positive tolerance is allowed on the hole. For example, in the case of a 5 in. shaft and hole of first-class work, the tolerance on the shaft is .002. Thus it must lie between 5.000 ins. and 4. 98. The allowance is also .002, so that the minimum diameter of the hole is 5.002 ins. On this there is a tolerance of .002 again, hence the hole may have a maximum diameter of 5.004 ins.

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*Presented at the meeting of the British Association at Newcastle, September, 1916.

**Head of the National Physical Laboratory, Teddington.

Shaft Gauges

This system the commitee call the shaft basis; they note, however, that the system may be reversed, the hole being taken as basis, and the allowances applied to the shaft, the minimum diameter of the hole being its nominal size.

It will be noted that, with a view to reducing the number of gauges required, the scheme has been arranged so that the maximum diameter of the hole for first-class work is the minimum for second-class work, and so on. Assuming now agreement has been reached as to the allowances and tolerances on the work, what as to the gauges?

For a shaft we require two gauges — two rings or snap gauges as may be preferred — one corresponding to the maximum or high dimension, the other to the minimum or low dimension, and as perfect workmanship is impossible these gauges must be subject to tolerances; what is to be said as to the sign and amount of the tolerances? Here a distinction has to be noted. So long as the work is within the limits allowed, interchangeability is secured, and will pass inspection. In fairness, however, to the manufacturer, all work up to the limits should pass; the inspection gauges should not demand narrower limits than the production drawings. Accordingly the tolerances on a high inspection gauge must be positive, those on a low inspection gauge negative.

This is a point which the gauge maker should carefully attend to. He knows, may be, that the nominal size of a certain high gauge is 2.00 in. with a tolerance of 0.0005 in.; he should try then to make his gauge 2.00025 in. In many cases the attempt is made to produce the gauges as nearly as possible 2.000 in., and some are made a trifle too small; they are rejected necessarily; had their aim been to arrive at 2.00025 in., probably all would have got through when tested.

So far, then, we have found that for an inspection gauge the tolerance is positive on the high gauge, negative on the low, but in the workshop gauge, as will be seen, the reverse is the case. These are given out by the manufacturer to the workman to enable him to make work which will pass the inspector. Clearly then for safety he will arrange that the limits to which the man works are rather narrower than those to which the work will be inspected. A high gauge will be a trifle too small, a low gauge slightly too large; the tolerance on the high gauge is negative, that on the low gauge is positive.

As to the tolerances permissible, these depend on the class of work dealt with, and for inspection gauges amounts of the order of one-tenth of the tolerances on the work are not unusual. Thus, for the 5 in. shaft of first-class work already referred to, the high gauge would lie between 5.000 in. and 5.0002 in., the low gauge between 4.998 in. and 4.9978 in. These, of course, are close limits. For a workshop gauge the tolerances, as well as being of opposite sign, may wisely be large in amount; the result of this is to contract somewhat the limits within which the workman has to work, but to increase the chance that his work will pass. Moreover, the "Go" gauges wear, and a ring or a plug may easily in time become too large or too small respectively if when new they are very close to their nominal sizes.

In our original classification of gauges, reference gauges were mentioned. These clearly include both reference inspection gauges and reference shop gauges; they are retained for the purpose of standardizing the other gauges.

Cylindrical Gauges Measurement and Testing

We turn now to the measurement and testing of cylindrical gauges, For the purpose of merely testing a gauge to see if it is correct, two check gauges---a "Go" and a "Not-go"---may be used, and in some cases must be used. The difference between these will be equal to the tolerance on the gauge they are used to check and their own tolerances will be much smaller, but for cylindrical gauges in most cases check gauges are not necessary, and indeed are not desirable; the difficulties arising from inaccuracy of manufacture and wear are too serious. Besides, rejection by a check gauge gives no intimation of the error to the manufacturer, and thus it is unsatisfactory to him. Thus cylindrical plug gauges are preferably checked by some form of accurate micrometer or measuring machine. To describe such machines in detail would fill a paper by itself; it must suffice to mention one or two leading points.

Cylindrical Plug Testing Machines

The original Whitworth form depends on the use of a feeler, a bar which is passed down between the jaw of the machine and the gauge under test, and while high accuracy can be attained by practice the results are slow and depend on the skill of the observer. In another form, the plunger presses against a a spring, and tilts a delicate level. The micrometer is turned until the bubble is central, thus securing that the pressure applied to the gauge is always the same; the importance of this is very great. It has been found useful at the National Physical Laboratory to replace the level by a tilting mirror; the machine is in adjustment when a ray of light reflected from the mirror occupies a definite position of a suitably-placed scale.

There was submitted a photograph of a large machine, built to the laboratory design, by Messrs Armstrong Whitworth, in which this device is used It is employed to measure large cylindrical gauges, and was built for the measurement of the coils of some of the standard electrical apparatus.

Another photo submitted to the meeting was an instrument in regular use for testing smaller cylindrical gauges. A vertical plunger pressed downwards by a spring actuates a light lever moving over a scale; below is a horizontal platform with a slow vertical motion. A standard gauge of the required dimension is placed on the platform which is raised until the upper end of the gauge pressing on the plunger brings the lever to the centre of the scale; the standard is then removed, and its place taken by the gauge under test The difference between this and the standard is given by the position of the pointer on the scale. In another instrument of this class, the motion of a diaphragm raises or depresses a column of liquid in a fine tube.

All these methods demand the employment of accurate standards of a large variety of lengths. Such are afforded by the now well-known Johanssen gauges. By means of these, length gauges differing in length by one or more thousandths of an inch can be built up with an accuracy amply sufficient for checking gauges to under the one ten-thousandth, and most of the test work at the National Pysical Laboratory is now done by the aid of these gauges.

To discuss the problem how the Johanssen gauges are checked would carry us too far into detailed considera tion of such work, while how to make them is a secret many would wish to share with Mr. Johanssen.

The checking of ring gauges or of snap gauges is a more difficult problem. For many purposes check gauges are used—a "Go' and a "Not-go" plug the external diameters of which can be accurately measured, and indeed for small rings this is the only method. For larger gauges there are various forms of internal calipers available but these do not lend themselves readily to high accuracy. A method which has been found convenient at the laboratary is to build up a "Go" and "Not-go" internal diameter gauge, by means of a series of Johanssen gauges with two plain cylinders of known diameter, one at each end of the series. When once such a diameter gauge has been put together, the checking of a series of rings of the same diameter becomes a simple matter.

Screw Gauges

The problem of the standardization of screw limit gauges is a very difficult one; a screw surface is a complex form and to satisfy oneself that in all its dimensions it lies within certain limits involves much careful work. The following definitions are taken from the report of the Engineering Standards Committee on British Standard Systems for Limit Gauges for Screw Threads.

Effective Diameter.—The effective diameter of a screw having a single thread is the length of a line drawn through the axis and at right angles to it, measured between the points where the line cuts the slopes of the thread.

Core Diameter.—The core diameter is twice the minimum radius of a screw, measured at right angles to the axis.

Full Diameter.—The full diameter is twice the maximum radius of a screw, measured at right angles to the axis.

Crest.—The crest is the prominent part of the thread, whether of the male screw or of the female screw.

Root.—The root is the bottom of the groove of the thread whether of the male screw or of the female screw.

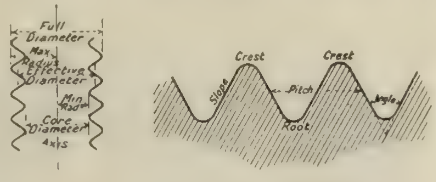
Slope of Thread.—The slope of thread is the straight part of the thread which connects the crests and roots.

Angle of Thread.—The angle of thread is the angle between the slopes, measured in the axial plane.

Pitch.—The pitch is the distance in inches measured along a line parallel to the axis of the screw between the point where it cuts any thread of the screw and the point at which it next meets the corresponding part of the same thread. The reciprocal of the pitch measures the number of turns per inch or millimetre, as the case may be. See Figs. 1 and 2.

In the Whitworth thread standardized by the committee there are seven elements, and error in any one of these may be sufficient to cause a gauge to reject work which ought to pass, or vice versa. These elements are as defined already:—Full (or major) diameter; Core (or minor) diameter; Effective (or pitch) diameter; Pitch; Angle; Form at Crest; Form at Root. Of these, the most important and the most difficult to control are the pitch and the effective diameter.

In the Whitworth thread the attempt is made to obtain contact over the whole surface of the screw. While possibly for some purposes this is desirable, it adds greatly to the difficulties of both construction and gauging, and there is much to be said for a system which allows definite clearances at crest and root. Four of the above seven elements—the two first and the two last—then become unimportant, and we are left to concentrate on the effective diameter, the pitch, and the angle of the thread. If the screw bears along its slopes it is doing its work satisfactorily, and in most cases the fact that there is clearance at crest and root is immaterial. Before proceeding further, it is important to notice that errors in pitch and effective diameter are closely connected.



FIGS. 1 AND 2.

Suppose the full and dotted outline, Fig. 3, to represent a ring and a plug screw of similar form, but of slightly different pitch. Let the maximum relative displacement of any two threads engaged be 2a. Then the extreme threads will be displaced axially by + a and — a respectively. A glance at the diagram shows that in this case the parts will not go together unless the axial displacement is accompanied by a radial displacement which, allowing for the angle of the thread, is about equal to 2a. This is doubled on the diameter, so that as a rough rule it may be taken that any error in pitch has to be compensated by an error of twice the amount in effective diameter.

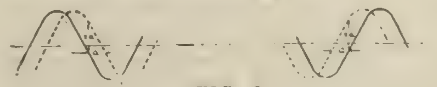


FIG. 3.

Thus we can compensate for an error p in pitch on a thread of which t in. are engaged by allowing a reduction of effective diameter of 2 p t in the plug, or an increase of the same amount in the ring. Some reductions in the full and core diameters are also required, but in consequence of the curves at crest and root these are small and need only rarely be taken into consideration. Reducing the effective diameter of a plug, or increasing that of a ring screw, has the effect of reducing the thickness of the corresponding thread at that point; the thread is made thin. Thus, in order to compensate pitch errors, makers have a tendency to make their screws thin; they claim an allowance on effective diameter which makes up for the error tolerated on pitch.

The Engineering Standards Committee, in their Report No. 38, stated that they have had two separate matters to decide upon:—

(1) To lay down tolerances on full, core, and effective diameters to cover the wear of tools and unavoidable imperfection of workmanship, and to prescribe minimum allowances in order that bolts and nuts may be assembled freely.

(2) To decide what errors in pitch could be permitted in ordinary practice, having regard to the allowances in effective diameter which they entail, and as a result they recommended a series of tolerances for the two threads considered—British Standard Whitworth and British Standard Fine.

The report also gives formulae for the tolerances on pitch and the allowances on effective diameter required to compensate them, and tables setting out the tolerances on the various elements.

Turning now to the question of providing limit gauges for such threads, we are met with many difficulties. The committee, after a discussion of these, summarized their recommendations thus:—

For Bolts

1.—"Go" and "Not Go" gauge of the "Taylor" type for pitch and effective diameter.

2.—"Go" and "Not Go" double gap gauge for full diameter.

3.—"Go" and "Not Go" double gap gauge for core diameter.

For Nuts

1.—"Go" Standard Bolt, correct in all particulars, and made to the minimum diameters allowable.

2.—"Not Go" single thread gauge for full diameter.

3.—"Not Go" single thread gauge for effective diameter.

4.—"Not Go" cylindrical gauge for core diameter.

Taylor Three Point Gauge

We shall see shortly what is meant by the "Taylor" type of gauge. For bolts, the three "Go" gauges recommended may be, and usually are, replaced by single "Go" ring gauge, a ring screw of correct form and dimensions. Such a gauge is difficult to construct and verify with accuracy; hence Mr. Taylor suggested for pitch and effective diameter a three-point gauge.

The three conical points, Fig. 4 accurately ground to an angle of 55° and truncated so as to clear the root of the thread, are described as follows:—Two are fixed on the lower jaw of the gauge, so that the distance between them is an exact number of threads representing twice the length of the screw contained in a standard nut of corresponding diameter. The third is fixed on the upper jaw midway between the two points on the lower jaw, and the three points are set to a standard male gauge having correct pitch and maximum effective diameter given in column 7 of table 1 or 3 of the report. Opposite the single point is fixed the flat face "a," which is adjusted so that the small cylinder "c" (of such a diameter that it will touch the thread about half way down its depth), will just enter the thread of a bolt made to the minimum effective diameter. Then in testing, if the bolt enters the gauge, and the "Not Go" cylinder refuses to enter the thread, the bolt is within the limits for pitch and effective diameter laid down in the tables, while any error in pitch which may be present will be duly compensated by a reduction in the effective diameter.

Using Ring Thread Gauges

With this gauge a "Go" and "Not go" ring gauge is used for the full diameter, and a "Go" and "Not go" snap gauge for the core diameter. With a complete ring gauge for the "Go" gauge, "Not go" gauges are required if the checking is to be complete for the full, core, and effective diameters. In practice it is generally considered sufficient to use a "Go" ring and a "Not go" full diameter gauge, though this opens the door to the employment of thin threads. It should be remarked here that a "Not go" screw ring is a useless and misleading gauge; it is difficult and costly to construct; it may tell you no doubt that the screw is wrong and ought to be rejected, but it affords no information as to what element in its form causes the rejection.

Up to the present no firm has undertaken the manufacture of the three-point pitch and effective diameter gauges, and they have not come into general use; they suffer also from the disadvantage that the wear is taken on the points, and even if these are properly hardened the life cannot be long.

It is easier to gauge a hole, for in this case the gauges are plugs. A complete plug gauge is required as a "Go" gauge, and, to be strict, three "Not go" gauges for the core, full and effective diameters. For the core the "Not go" gauge is a simple plain plug of appropriate size. For the full and effective diameters we use two screw gauges, each having a single turn of the thread; the first has a very thin deep thread, cut away on the slopes and at the root so as to bear only on its crest, while the second is cut away at the crest and root, and bears on the slopes; the diameters are in each case of appropriate size, and the screw is rejected if either gauge enters appreciably. If a "Not go" core diameter gauge only is used, holes with thin threads, in which the effective diameter, and probably the full diameters are too large, will be accepted.

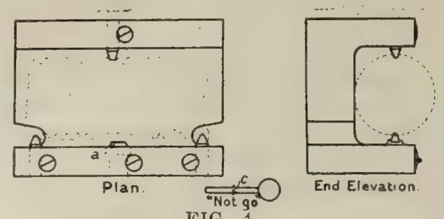


FIG. 4.

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INDUSTRIAL CONSIDERATIONS AFTER THE WAR

IN the course of his presidential address to the members of the Manchester Association of Engineers recently, F. W. Reed, M.I. Mech. E., reviewed some of the economic problems of the engineering industry which will have to be faced at the conclusion of the war. He said we were well acquainted with the organization and productive capacity of the great neutral power of the New World; will it be less or more powerful in industrial competition with the great influx of gold to it from, in part, our unpreparedness? The complete industrial organization of the chief central enemy Power stands by the war revealed; will that organization cease to exist with peace, or will it be intensified into greater perfection and activity? We shall be secure only in the latter belief. Already we had warnings that these countries are making strenuous preparations for capturing foreign trade after the war—le us be prepared. In most of our establishments general work had been displaced by the making of machinery for the manufacture of munitions, whilst in others both the shops and machinery have had to be adapted to the making of shell and other war material.

Plant Equipment Readjustment

One of the problems which will come with peace will be the readjustment of these establishments to pre-war conditions; therefore, the Government and all concerned will do well to give the methods to be adopted their most earnest consideration. The men as they became released from military duties, and who so desire, must be reinstated in their former occupations. At the same time there will be a number who will not return to the trade; apart from casualties there will be some who will no longer desire to return to their former trade, and some others shall remain in the army for the time being; in any case, we shall be depleted of a number of skilled workers.

Mr. Reed said that there would be a demand upon our industries with the cessation of war there could be little doubt. The making up of leeway in civil requirements, the work of reparation and renewals until devastation had been obliterated, would still tax our energies to an extent little, if any, less than we were experiencing in the call for war material. There could be little doubt of our labor capacity for meeting that demand, providing it was organized on the best lines for economical production. The sudden change over of our manufacturing resources to civil work would be a task of considerable magnitude. A great quantity of additional machinery and new works which had been forced into existence by the war would be available, and could, no doubt, be largely utilized for civil work. Owing to the high-pressure conditions and the little opportunity to make good wear and tear of the past two years, considerable repairs would be necessary, so that a very liberal allowance for depreciation was imperative, not only to put our machinery in order, but to cover the cost of the unduly large number of machines which will have reached the stage beyond repair.

Restricted Output-Labor Dilution

Amongst the important problems that would arise after the war would be the questions of restriction of output and the dilution of labor, which even now are deserving of serious consideration. For the purposes of the war, trade unions had agreed with the Government to withdraw their rules bearing upon these vital questions on the understanding that they would be reinstated on the return of peace conditions. As a set-off to these conditions the employers were called upon to make considerable sacrifices in the way of handing over to the Government any extra profits above a certain limit which might be earned through their extra endeavors and running their works, in many cases continuously. If labor insisted that these rules shall be restored, the Government will have to comply; that was the present agreement, which cannot be departed from without the consent of organized labor. Whether it will be to their ultimate interest to insist on this restoration was a very important matter for their consideration, and both employers and labor must realize that the conditions of industry will be changed and both will have to meet the situation in a new spirit. Labor will do well to consider whether, after all, its own interests, and the interests of the nation had been served well in the past, or would be in the future, by their late policy.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data
and Ideas Evolved from Actual Practical Application and Experience

EXPERIMENTAL WORK ON 4.5, MARK VII. SHELLS

By H. G. Evans.

ONE of the difficulties experienced in the manufacture of this shell was in getting the proper amount of stock on the inside of the nose below the undercut. Numerous experiments were conducted with this end in view, one of which consisted of driving a punch down through he nose after it was pressed in the regu-ir way. In conducting this test a number of shells were turned with a parallel diameter of 4 9-16 in. and having the outside of the nose beveled for a distance of $\frac{1}{2}$ in., being then nosed in as far as possible, but leaving just enough to barely clean up on the outside. Section A. in Fig. 1, shows the outline of wall obtained by this operation, while section B. shows a shell of the same dimensions after nosing and punching, from which it will be seen that the latter operation provides ample stock to form shoulder.

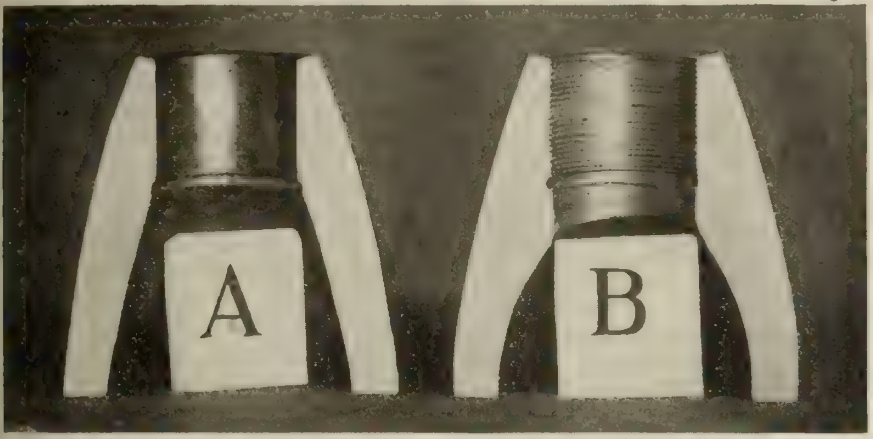
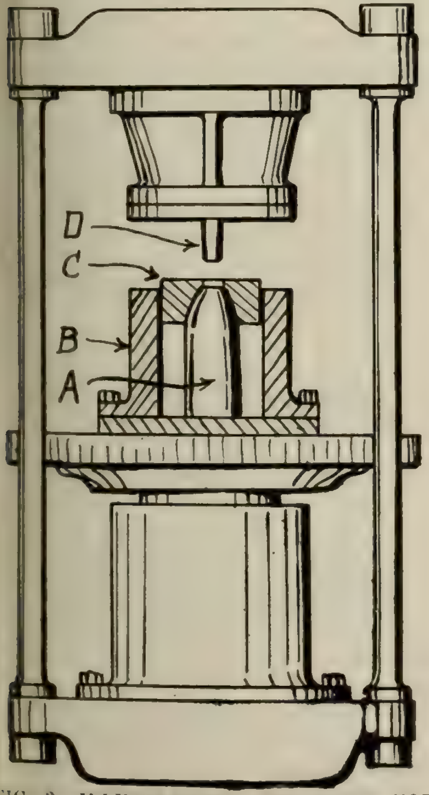


FIG. 1. SHOWING THE VARYING SECTIONS OF SHELL NOSE OBTAINED.



IG. 2. ILLUSTRATING APPARATUS FOR UPSETTING SHELL NOSE.

The temporary apparatus employed for the combined nosing and punching operation is shown in sketch, Fig. 2, a vertical four-column hydraulic press being employed. The shell A is placed inside of a cylindrical casting B, which guides the die block C, the hole in which is formed to fit shell so as to keep it from swelling when the punch D is forced in. In performing the operation a set of clamps were used to hold die block C down to platen so that weight of descending parts would strip the shell off the punch. Such a procedure was not satisfactory, as the punch remained fast in the shell.

To carry out this method of nosing successfully would require either a bulldozer or hydraulic press with pull back cylinder. The latter method would seem most desirable, a supplementary cylinder with pull back being mounted on top of the main press, so that after the shell was driven home into nosing die, the punch would be driven down through the hole in the die and into nose of shell, while the main cylinder holds shell firmly in place.

The punch used was $4\frac{3}{8}$ in. long, tapering from $1\frac{7}{8}$ in. to $1\frac{5}{8}$ in., but this amount of draw was not sufficient to release punch with the inadequate apparatus used for the experiments.

METHOD AND FIXTURES FOR MACHINING CENTERED TEE

By F. Scriber.

THE method of machining the centered tee illustrated by Fig. 1, is an example of simplicity and good judgment where the cost of machining must be held within moderate limits. This is realized when it is considered that although the method of handling is odd, only one special fixture is necessary and this is for the turret lathes, illustrated by Fig. 4.

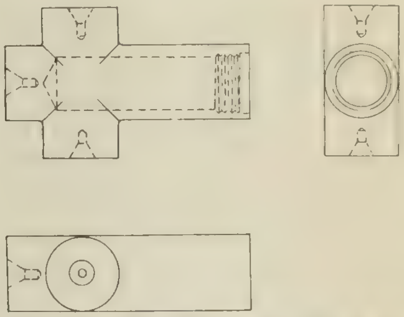


FIG. 1. CENTERED TEE WHICH IS TO BE MACHINED.

Referring to Fig. 1, the work which contains three centre holes and one drilled hole, is first handled by locating the centres of the various bosses by means of the standard centering device illustrated by Fig. 2. This device is a bench fixture, and is also used for centering many classes of work by placing one end of the work in the bell mouth of the base casting, when by letting the upper slid-

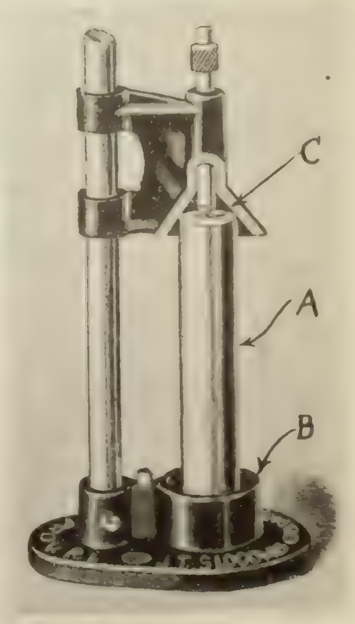


FIG. 2. STANDARD FIXTURE USED FOR CENTERING.

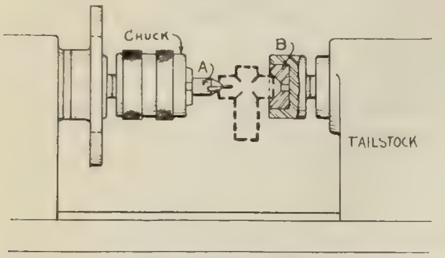


FIG. 3. ARRANGEMENT OF SPEED LATHE FOR CENTERING.

ing member drop over the work the centre may be prick-punched as shown in the illustration. After prick punching all the bosses in the centre the three short bosses are centered by means of an arrangement similar to that shown in Fig. 3. This consists of a speed lathe, the chuck of which holds a combination drill and a countersink, A, while the tailstock is equipped with a bell mouthed centre, B. In use the work is held as shown and the tailstock spindle is advanced in the usual manner to make the cut, while, by holding the work by hand to prevent it from turning, the centre is drilled. The final operation on this piece is a turret lathe job which consists of drilling the hole, etc., and by referring to Fig. 4, the method of tooling will be readily apparent. In holding the work for drilling full use is made of the centre holes in the short bosses, as the work is gripped between two pointed screws, A. and B., in a spindle nose fixture, C, using a spring pin D, to locate the work central, as the screws A and B are adjusted in or out until the spring pin, D, fills the hole, X, at all points; in this position the spring pin is clamped by the screw, E, thus holding the boss to be drilled in line with the spindle of the machine.

The screws, A and B, are now tightened to hold the work securely in place while the hole is spotted, using drill F in first turret hole. Following this, the in first turret hole. Following this, the G, and is counterbored, using cutter H, held in holder, J, in second turret hole, following which the hole is reamed using a floating reamer, K, in third turret hole, while the fourth turret hole contains a tap for cutting the thread. In connection with this illustration, it will be noticed the spindle nose fixture has a guard, L, which swings over and protects the operator from getting caught in the screws, thus making a safe and simple fixture of cheap design.

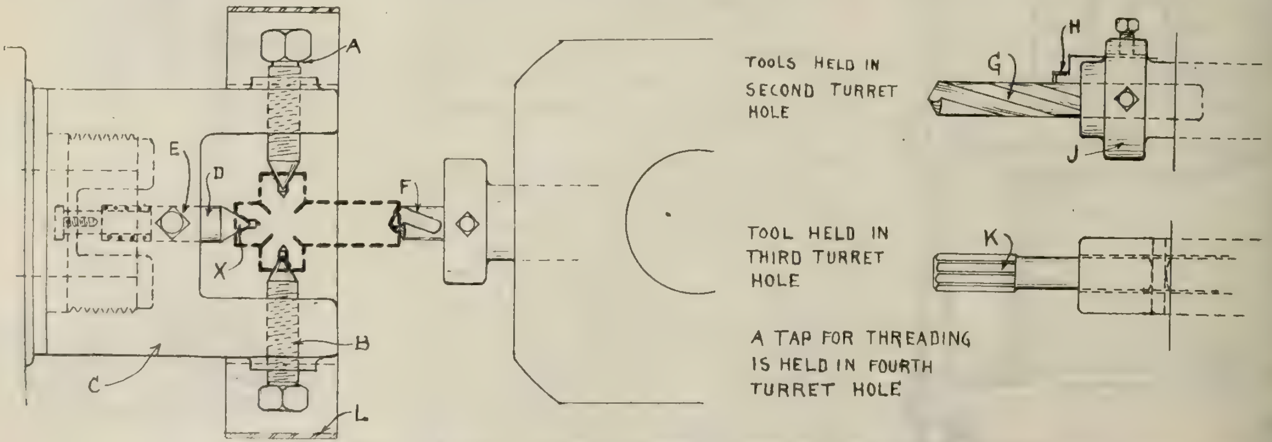

A
E
D
F
X
C
B
L
TOOLS HELD IN SECOND TURRET HOLE
H
G
J
TOOL HELD IN THIRD TURRET HOLE
K
A TAP FOR THREADING IS HELD IN FOURTH TURRET HOLE

FIG. 4. METHOD OF TOOLING UP TURRET LATHE FOR MACHINING HOLE.

* * *

LITTLE KNOWN FACTS ABOUT GRINDING—FORM GRINDING

By Howard W. Dunbar.

IT IS not necessary that the face of the grinding wheel always be straight as it is possible by the use of special truing fixtures and devices to shape the face of the wheel in a manner which makes it possible to grind forms in various kinds of work.

In form grinding, as in form milling, it is essential that the shape be continuous and uniform. It is impossible, of course, to grind under-cuts or varying shapes in a given form. Not every shape can be ground, any more than can every round piece of work be finished by the grinding process. Sharp corners should be avoided, not because of the inability of the truing device to shape a sharp corner, but rather because the small particles of grain and bond of the wheel which go to form the corner will not stand up and grind long enough to maintain such a shape. This follows because there is so much work required of so few particles of wheel that naturally they wear out and break away very quickly.

Still another factor which must be considered in form grinding, is the varying depth of wheel face of the shape which is being ground. The wheel acts differently, of course, all along the form, depending on the distance that the cutting particles are from the centre of the wheel, since irregular shapes in the face of the wheel cause the wheel to vary in diameter all along the width of the form, and if this variation in these diameters amounts to enough to vary the peripheral speed of the wheel materially at various points in the form, the wheel acts differently, and a uniform finish or rate of production cannot be maintained.

The limitation in form grinding is therefore governed by three things: The capacity of the attachment in producing varying shapes, the physical possibility of the grinding wheel to maintain a given form, and the depth of the hills and valleys in the face of the wheel, caused by the form, which affect the pheripheral speed of the cutting particles.

Frequent Truing Necessary

The wheel must be trued frequently on form grinding to maintain the shape, especially where there are abrupt changes in the contour, such as sharp corners, small radii or deep cuts. Long sweeping curves or shapes which blend well into each other maintain their form more uniformly and for a greater length of time than do the more irregular shapes with sharp corners and angles. There are probably a great many machining operations now performed by other processes which could be readily accomplished by form grinding, effecting a saving in cost and producing a more accurate job with a finer degree of finish. The use of the grinding machine for this class of work is increasing as people come to realize the possibilities in shaping work which requires accurac and good finish.

Flat work ground on a surface grinding machine can be formed just as well as round work on a cylindrical grinding machine. The only difference in thes two methods of grinding is in the manner of handling the work. On the surface grinding machine the work is move under the wheel on a reciprocatin table; on the cylindrical grinding ma chine the table cannot be moved, an the wheel with the shape formed in i must be fed straight into the work.

One illustration of the usefulness o the formed wheel in producing shape parts is in the crowning of pulleys. Th crown can be made accurate within .00 in. on either diameter at the edges o the pulley, and the height of the crow be less than if turned.— *Grits & Grind*

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

THE ENGINEER AND HIS ADVERTISING—I.*

By Chas. B. Penwarden.

THE modern engineer is a philanthropist. I have come to that conclusion after many weary hours of wandering through the advertising pages of British engineering trade journals. Another discovery I have made is that the profession which is obviously one of the most punctilious and exact is the one profession which totally ignores its own teachings when dealing with the publicity for which it annually pays away a very large sum of money—hundreds of thousands of dollars.

Keeping One's Name Before Public

It is a common saying among men in certain businesses that advertising may be all right for the man next door or in the next street, or on the next floor, but so far as they are concerned they have done certain things for so many years and they see no sound reason for changing. They are well known, and it is but a matter of keeping their name well to the front. Some of them have this disease so bad that while they would scorn to be associated with the name of a pill in twenty feet letters upon a wall, yet they commit a far greater offence by having their name in three-inch letters in the trade papers, being presumably under the impression that all its readers are badly troubled with myopia.

I have said that the modern engineer is a philanthropist because I cannot understand, from an examination of his advertisements, how he can expect the money he pays for space to do very much else than keep his trade papers in a more or less flourishing condition. Sometimes, in conversation with engineers, I have been conscious of a fleeting impression that all this good money is spent more as a concession to a custom than for any other reason, but there happens to be a sufficient leavening of wide-seeing men who believe in getting full value from the space they buy, and so I am forced to the conclusion that the vast majority of engineers buy space but attach very little value to it—so small a value, in fact, that they think it scarcely worth bothering with.

What Investigation Shows

Careful calculation has shown that not one-half of one per cent. of the firms who use space in engineering papers have any definite idea of what to do with the space, and in the case of the minority it is plain to see the mark of the trained hand. It is interesting to pick out those advertisements which are calculated to result in increased business and to note the ingenuity displayed in working up the various points of value in selling, but the numbers of specimens of this high-class work are so very limited that it leaves one altogether puzzled to understand why large and reputedly go-ahead firms lag drearily in the backwaters of the modern publicity stream. They remind me of people who have hired a motor boat and have no idea how to start and attend to the engine.

There is another point about engineers' advertising—in fact, there are several, which I shall have to demolish before I can begin reconstruction—which always puzzles me, and that is the very prevalent idea that engineers are not as other men. Engineers themselves do not say this. It is just the impression conveyed by their manner and ideas where publicity is concerned. I have yet to learn that engineers eat, drink, sleep, marry or die in any way different to any other people, that their amusements are of any different character, that they talk or keep silent, go to church, chapel, or golf, in any way peculiar to themselves, or that they breathe faster or slower, walk backwards, or do anything in any way whatever different from the average human being. Yet many have solemnly told me that a specific thing might do for or appeal to any other business on earth except the engineering, and in so expressing their opinions manage to convey the impression that—thank God, engineers are not as other men!

This is not done in an offensive way; quite the contrary. In business I like dealing with engineers, as I always find them more courteous and considerate than men engaged in many other lines of which I have had experience, and I attribute the fact largely to the higher standard of education which is necessary for any degree of attainment to be reached in this particular profession. This fact makes it the more difficult to understand why engineers' advertising is worse than that of any other business. I have tried to find out why this should be so, and I have come to the conclusion that, generally speaking, the engineer of to-day, from an advertising standpoint, is from fifteen to twenty years behind the times. Anybody can prove this by comparing the advertisements which appeared twenty years ago with those which are now appearing. Many other businesses have gone ahead with the times, but the engineer has stood still—which is just the sort of thing one would imagine an engineer would not do.

Too Limited Advertising Appropriations

There is, however, in my opinion, a reason for this which has no connection with engineering at all, and it is that a great deal of the tremendous progress which has been made in advertising is due to professional advertising men who have made the business of advertising what it is to-day. While many industries have been benefited by this special work, the engineering profession has suffered on account of the limited appropriation which has been allotted. This limited appropriation is, in most cases, unavoidable because of the restricted field. From the advertising man's point of view it is easy to see that, working as he usually does upon a 10 per cent. basis, businesses and industries likely to need the spending of $100,000 a year upwards offer more attractions than those which scarcely ever rise above $10,000 or $15,000 a year. This means that there is less competition among the best men, and so the engineers' advertising is left, largely, to the mercies of a general utility man, helped occasionally by the manager or managing director and sometimes by the board of directors. The result is seen in the typographical and etymological horrors which are perpetuated in each succeeding issue of the trade papers.

Now, if an engineer were to ask me what I knew about engineering I should promptly answer "Nothing." Therefore, am I a dependable critic, not of engineering, but of the attempts of the engineers to sell their products.

If I asked an engineer what he knew about human nature, he might answer "Nothing," and he might answer—something else, but the fact would remain that he would be condemned either way—by his advertising.

Why Engineers Seek Publicity

If we analyse the reasons why engineers spend money in publicity we should probably arrive at the following conclusions, or some of them:—

1.—Because he believes in supporting his trade papers.

2.—Because others in the same line do it.

3.—Because he has been canvassed by various representatives, and does it in order to get a little peace.

4.—Because he wants the business.

As no good purpose is served by discussing the first three, we are reduced to No. 4.

We believe that the average engineer

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*From Herbert's Monthly.

spends money in advertising because he wants more business.

On the one hand, we have the section which screams its message at us like a Cheap Jack at a fair, and on the other, we have the dignified person akin to the poor old lady reduced in circumstances who tried to make a living by selling fish, and who wrapped her wares up so that nobody should see them, and then whispered "Fish! Fish!" to herself in an agony of apprehension lest anyone should hear her. Both of these methods are the direct result of ignorance of the proper functions of advertising. The use of ink on paper is but a method for conveying a message to those who can be reached by no other means at so cheap a rate. Advertising should be salesmanship in print. When we realize that, we realize in a flash all the shortcomings of engineers' advertising. It is advertising inasmuch as its appearance suggests something to be sold, but it is not salesmanship because it does not sell—except by accident; and the reason that it does not sell is because it is not constructed to sell.

Effective Advertising

To be effective, an advertisement must possess the power to shift money from the pocket of one person to the pocket of another; and in order to accomplish this the advertising must talk; and before it can talk it must find something to talk about, and the place to find that something is in the goods.

Now, if two firms make an article exactly alike, both equally dependable, of similar workmanship and of identical design, who will sell the most? Obviously the firm whose selling organization is most effective. It may be done socially; it may be done by less worthy methods; the name may do it, and it may not; influence may help, and probably does; but these methods are not wrongfully described as archaic, because it will be proved eventually that the firm which talks the longer, more sensibly and clearly, explains more, finds and gives reasons for the preference being given to its goods, and persists, will in the long run, caeteris paribus, be the winner. This when the two articles are of equal merit. When one has an advantage there is all the more reason why that advantage should be pressed by right advertising methods.

There is another obsession prevailing amongst engineers which proves that they have not advanced along the high road of publicity to the same extent that they have advanced along other roads, and that is found in the prevailing tendency to compare American advertising methods with their own to the detriment of the latter. In this connection the following extract from *The Electrical Times* of June 22nd will be of distinct interest and value:—

"Englishmen are occupied with Germany and its preparations for crushing our trade after the war. That is a very proper occupation: we wish it every success. Germany will ultimately rally from the knock-out; her future must be watched; but it is remarkable that very little attention is being paid to America. At present the United States are satisfied with their profits, as they have reason to be, in all conscience; they are fabulous, but what is to happen when their industries grow hungry? Current engineering literature from America evokes our admiration. Here is the General Electric's domestic magazine, for instance, weighing 1 lb. and packed with such a wealth of technical information in its 567 pages as no one technical pournal in Britain could afford to produce.

"Wealth bubbles over; it oozes from every American pore. The latest *Electrical World* weighs well over 2 lbs. and costs 18 cents to post, but it was sent out to English station engineers. Let any reader take a glance at the plutocratic pages of such publications as these; let him note the lordly manner in which the American firm advertises in them; and then let him say whether beaten Germany, crouching for a spring at our throat, but ham-strung by financial disaster, is really the force which is destined to baulk our foreign enterprise of the next few years. We do not believe for one moment that our American cousins are out for anything but dollars, they have no ulterior object such as Germany had; they prefer to see us survive and prosper; but even as bedfellows their sheer mass of adipose tissue may leave us without any blanket and give us the worst cold we ever had in our lives."

American Advertising Methods Instructive

These are words which every engineer would do well to take to heart. The same arguments used against American publicity methods by engineers to-day were used by most other advertisers ten or fifteen years ago. That a good deal can be learned by a study of American engineering advertising is easily proved by a perusal of American engineering journals. There will be found very little clap-trap or vague assertions in these journals to-day; not so much, in fact, as is to be seen in some British publications. The reason for this difference in interest and attraction is due to a better understanding by the American engineer of how to make most directly the point of contact with the reader.

What does the manufacturer of electric lamp reflectors sell? Reflectors?

Certainly not. He is selling the better control of light rays, better conditions for workpeople, reduced current consumption, better and more accurate work, and so on.

What does the manufacturer of an electric motor sell? Electric motors?

Not if his selling is along the right lines. He is selling cleanliness, money-saving, freedom from rattling belts, forests of pulleys, simplicity of operation, and many other items of a similar character according to circumstances.

No goods are sold for what they are, but for what they will accomplish. What would be the use of building or buying engines unless something had to be driven or pulled? Nobody would want them to look at. Battleships are not built for fun, but for defence. Bridges are not built for pastime, but for convenience; and so on through the whole gamut of the engineering industry; but nobody would ever think so, to read most of the engineering advertising which is the direct cause of such prodigal waste of good money. To considerably improve the advertising is not a difficult matter. Most of it consists in simply answering one interrogation—"Why?"

All factory managers should insist upon the immediate installation of the Binco ventilating system.

Why?

Because, etc., etc.

All workers on lathes and similar machines should be protected from glaring lights by a Justit patent reflector.

Why?

Because, etc., etc.

Why should we not use the Justso reflector?

Because, etc., etc.

Essence of Good Advertising

Good advertising consists in answering the unasked questions of the reader. It means thinking ahead. For everything there is a reason. Give the reasons and you answer the unasked questions.

Back of every man's mind is antagonism to advertising. This antagonism i neutralized by the appeal to the weaknesses or to the strength of the reader Antagonism subdued, curiosity awakens Satisfy that curiosity and you create interest. Maintain interest, and from i confidence will emerge. Handle it intelligently and that confidence will in tur create business, and back will come you money from the advertising.

Apply the test to your own advertising. Does it create any desire in you t spend money? Would you buy the good if you were not an advertiser? Or, i you had to buy, would you buy fro your own firm because of the advertising?

Here's another test. Suppose you advertising is costing you $2,500 a year Would you pay that $2,500 to a representative to walk around and repeat t potential customers the same things a you say in your advertisements?

If either of these simple tests fail yo cannot be getting all the value fro your advertising expenditure that is possible.

CONTEMPORARY WAR ARTICLES

Embracing Information and Data Drawn from a Variety of Sources Relative to and Arising from the Prosecution of this Many-Sided European War

WOMEN AS SHELL MAKERS

DURING the past few days I have been privileged, says the Sheffield correspondent of the *Engineer*, London, England, in a recent issue, to pay a special visit to several of the big munition works in this district, and whilst, of course, little of what I say must be re-recorded, this may be said that there need be no anxiety about the rate at which shells of all sizes are being made. If no general movement is made toward the reinstatement of one day's rest in seven, it will not be because the production of war material is behind. Nothing of that kind is lagging. The various shell "shops"—factories they are—seem to have got into their stride; and it is a stride!

Munitions Plants a Revelation

Simply to pass through the works is a revelation. The armament works are charged by some people with losing time at the beginning of the war. They are losing none now. Not that I, for one, ever believed they were guilty of doing so. They could not run before the Government, and in the very early days of the war the Government appeared to be of the number who failed fully to apprehend that we were entering a long period of hostilities, for which we were by no means adequately prepared. The great armament firms simply waited for the signal from the Government to launch out upon a policy of works expansion in the interests of war output, and if that signal had been given sooner the task in which every munition works is now deeply involved would have been begun earlier.

However, the actual part played by e armament firms will be better under- ood when the smoke of war has clear- d and the country is able to review the hole circumstances in an atmosphere f calm philosophy. Then these firms ll have nothing to reproach themselves ith. What struck me most during my sit to the works was the increasing rt which is being taken by women and 's in the duty of making shells. At e place an official assured me, with an that seemed reminiscent of the old ejudice against female labor in such aces, that there were only about half dozen women workers on the prem- es; but then it happened to be a place ere the output is, generally speaking, r too heavy in character for women to ndle, and quite exceptional.

What Women Can Do

On the other hand, I saw some shops half filled with women and others with only a very small percentage of men. In the latter I noticed a curious thing—the women wore distinguishing caps, khaki, blue and red. In that fact there is more than just meets the eye, and a little explanation would not, perhaps, involve the revealing of any secrets. The women wearing khaki caps are plain shell turners. So long as their lathes are in order and everything works smoothly they are quite competent to go on adding to the production of ammunition for the men at the front. Those in blue caps are broadly called bench hands, as being much more skilled in the handling of the tools, while the red-capped women have passed a kind of examination in taking down and setting up the machines. This examination is, I believe, quite a severe test for them. Every piece of the lathe has to be laid on the ground and then picked out as it is required for setting up, and in order to ascertain whether or not the candidate for a red cap has the requisite intelligent knowledge of what is required of her, pieces from other machines are sometimes introduced amongst the actual pieces, and unless she detects these she fails to pass the inspection, and has to try again later on. The examinations, I hear, are working out very favorably for the women, who in some cases have entirely outshone men who have undergone a similar training. The management of one particular place was very loud in its praises of the work women are thus doing, declaring that they took a real intelligent interest in their work, with the result that, if anything went wrong with a lathe, they could tell at once where the trouble was and could remedy it.

Male Operator Attitude

I had a curious little experience, however. Wondering what the attitude of the ordinary skilled fitter—the mere man, was towards the red-caps, I questioned one. "Oh," he replied, "they do it like parrot work. They'll do just what they see you do, but why they have to do it, and what is really the matter, they don't know. They do all right with someone to supervise them, but they're not like us chaps, as knows what's what as soon as we look at it." All of which sentiments may possibly arise from a little professional jealousy; but, whatever view the ordinary fitter may take, he works well and loyally with the women just now in the interests of the great national need, leaving the question of delicate readjustments of industrial conditions to look after itself for the time being. There will, of course, be many difficulties beside that one to face after the war, but it is needless to worry about them at present.

Bad Timekeeping Less Serious

One director mentioned to me, with a shrug of the shoulders, that although his firm had not yet had recourse to the Tribunal, so far as the women workers are concerned, they had just seriously warned some of them that such a step would be taken if they did not improve their time-keeping. "Are they learning the tricks of some of the men?" I asked, meaning the slackers. "Yes," he replied, "they are learning the tricks of some of the men and adding to them all the tricks they seemed to know previously. When they get into the habit of bad time-keeping they are worse than the men. However, I think after the warning I have given them some improvement may be looked for. Personally, I am just passing into the third stage of my experience. At first I was enthusiastic about the employment of women as shell turners, then I became despondent about being ever able to make them really useful in that direction; now I am gradually returning to the condition of enthusiasm, and am in hopes that this time there will be permanent justification for it."

Women Workers' Welfare

One thing I should like to mention before passing from the subject, and that is the very admirable arrangements made on all hands for the comfort and accommodation of these women workers. Everywhere one sees splendidly equipped canteens coming into existence, and the old temporary arrangements done away with. Recently I was invited to inspect one of these canteens—of which, I believe, Vickers were the pioneers—at Cammell Lairds. The kitchen arrangements were perfect, the accommodation generally was most complete, the place was well lighted, warmed, and ventilated, and there were seats and tables for 400 at one sitting. This building, which was fitted with electric light, was only one of the firm's provisions for the welfare of the female employees. At some places the canteens will accommodate even larger numbers, and one which I have inspected just recently will seat no fewer than 2,000 at once.

The necessity for these innovations will, I fancy, revolutionize the whole idea of working conditions after the war, and the sort of thing that is now being done for women will be extended to much greater lengths than before for men and lads. It will probably prove to be one of the many lessons derived from the war conditions, and may help very materially to improve, where it is required, the relations between capital and labor, and by viewing matters from each other's point of vantage, assist in a clearer recognition of mutual interests. There are some difficult problems ahead for the two sides to face, and anything that will assist in smoothing the way for their amicable and permanent settlement should not be neglected.

What Employers Think

That, obviously, is a big subject, and one that cannot be lost sight of, though some are inclined to shelve it. The Master Cutler (Mr. W. H. Ellis, managing director of John Brown & Co.,) says that in Sheffield employers and workmen feel as strongly as anywhere what their rights are, and are prepared to urge them with all the arguments they possibly can, but that they never embark on strife without exhausting every argument that can be used. That, he says, has been their policy in the last few years, and they are determined that it shall continue, because it has given Sheffield a good and creditable name in the country and has established a feeling that if any work is placed in the city there is not likely to be any serious upheaval as between employers and employed. Mr. Ellis adds the hope that in ten years from the termination of the war he will be able to repeat those words. Everyone will endorse the hope, and everyone knows that, if only common sense prevails, it will be realized.

* * *

THE EVOLUTION OF THE "TANKS"

THE statements in the British House of Commons by the Secretary of State for War on Thursday, October 12, and by Dr. Macnamara, Parliamentary Secretary of the Admiralty, on Wednesday, October 18, in answer to a question by Captain Burgoyne, are probably the communications promised some time ago regarding the evolution of the "tanks" to be made with the view of giving credit where this was due.

It was made clear that E. H. Tennyson D'Eyncourt, C.B., the Director of Naval Construction, is entitled to full credit for designing this "formidable weapon of warfare." It would seem that a suggestion was made by several officers of the Royal Naval Air Service, as a result of experience in Flanders, to Winston Churchill, when the latter was first Lord of the Admiralty, in favour of the use of some armoured vehicle capable of traversing the irregular ground of "no man's land," of straddling over trenches and breaking down obstacles, and of scattering destruction from the guns within it, while being itself reasonably protected against gun fire.

Mr. Churchill, with that characteristic freedom of mind for the reception of new ideas, and courage for putting the potentialities of all such proposals to the test, gave heed to the suggestion, but in mechanics an idea is one thing; the evolution of the details of design to carry the idea into practical effect is quite another. The history of invention shows a great store of ideas incapable of application, as well as a rich record of long-entertained ideas successfully applied. The suggestion of caterpillar wheels is old, and has long been applied for the traction of guns over moderately irregular ground.

Foreign Claims Get Quietus

Many proposals for movable forts with such caterpillar wheels have been put forward from time to time, and we are amused to find that some of the suggestions by Americans have actually been published as illustrative of the system adopted in the "tanks" of the British Army now in use in France. The Americans claim that these are their invention, and, in fact, that they were manufactured in the United States. Germany also lays claim to the origination of the ideas. In connection with the question asked by Colonel Griffiths in the House of commons on the 12th inst., as to whether the "tanks" were entirely of British material, it is of interest to point out that everything was of British design and manufacture.

While it is not permissible to enter into any details regarding the wonderful engineering features in the design of the "tanks," it will be found that the ingenuity displayed in securing the long wheel based on the caterpillar chain principle is exceedingly novel and worthy of the highest tradition of British inventive ingenuity. When Mr. Churchill instructed Tennyson D'Eyncourt to prepare the design, the great limitations of former proposals were freely recognised, and there can be no doubt that the then First Lord of the Admiralty rendered great service in the masterful encouragement which he gave to the Director of Naval Construction.

During the preparation of the design and experiments Mr. D'Eyncourt suggested the appointment of a small Admiralty Committee, which should consult with representatives of the War Office as to the military conditions to be fulfilled. This Mr. Churchill at once agreed to making the Director of Naval Construction the chairman of the committee, whilst the secretary was Lieutenant (now Lieut.-Colonel) A. G. Stern, whose practical business ability, as Lloyd George said, had been invaluable in securing the manufacture on a considerable scale of this weapon of war. Colonel Swinton also, according to the Secretary of State for War, has been a most enthusiastic supporter of the idea, and the fact that it was carried through with such zeal was very largely due to the enthusiasm which he threw into the work.

All through the evolutionary stage, Mr. Churchill, the First Lord of the Admiralty, took a very active part, stimulating all concerned, and when the proposal for representatives from other Departments was made, Lloyd George gave the scheme his unstinted support. Mr. Balfour, when he went to the Admiralty as First Lord, equally supported the work of design and experiment. The other officers mentioned by Dr. Macnamara as assisting in the work were:—Commodore Sueter, Wing-Commander W. Briggs, Squadron-Commander T. G. Hetherington, W. O. Tritton (managing director of W. Foster & Co. Lieutenant W. G. Wilson, R.N.A.S (now Major Wilson, M.G.C.), P. Dale Bussell (Contract Department, Admiralty), Lieutenant A. G. Stern, R.N.A.S (now Lieut.-Colonel Stern, M.G.C.) Captain Symes, M.G.C., and F. Skeens Acting Assistant Constructor.

First Tank Enterprise

It was as far back as the summer o last year that the first "tank" wa ordered to be made from Tennyson D Eyncourt's design. The results of th trials were very satisfactory. The lat Lord Kitchener, as well as the Lord Commissioners of the Admiralty an Lloyd George, were particularly please with its attainments. When the Arm authorities became convinced of th utility of the machine on the battlefiel it was decided to build a number o such landships from the same design It was at this time very properly decided that the supervision of construction should be under the control of th Ministry of Munitions, and a committe of that Department was appointed t carry out the work. Lieut.-Colon Stern, who had before acted as secretary of the Director of Naval Construction's Committee, was made chairma of the new committee, while Colon Swinton took over direction of personnel. At the request of the Ministry o Munitions, and with the approval of th Admiralty, Tennyson D'Eyncourt continued as a member of this committe and was, and is still, chief technical adviser, and no doubt has worked out further developments of the "tank."

When it is possible to disclose the details of the design, it will no doubt b seen that in most of these details ther is great originality, and that nav architectural experience has in this, a in other repects, greatly assisted th army in the field. The secrecy with which the operations have been carried out merit high tribute, not only to those immediately engaged in the designing work, but also to the workers who have been employed in construction. Although Lloyd George could not enter into any details as to his association with the idea, it is only fair to say that that vigour which has ever actuated him was an important factor in the carrying through of the work of constructing the "tanks" which have been so invaluable, and promise to continue to be invaluable, at the front.—Engineering.

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THE L.33 ZEPPELIN

ACCORDING to *The Times*, the Zeppelin which came down on September 24, in Essex, England, has a framework or skeleton composed of a series of longitudinal lattice-work girders running from end to end and connected at intervals by circular lattice-work ties, the whole structure being bound together and stiffened by means of a system of wires provided with arrangements which enabled them to be tightened up. The material used is an alloy of aluminum, resembling, but, it is said, inferior in quality to, that known as duralumin. At the largest point the framework has a diameter of 72 ft., and is of stream-line form, the bow being sensibly blunter than the stern, which, indeed, tapers off to a sharp point. The length of the vessel appears to have been 650 ft. or 680 ft., and the weight complete, with engines, fuel, guns and ammunition, is calculated at 50 tons. The hydrogen capacity was 2,000,000 cub. ft., and there were 24 ballonets, extending the whole length of the ship. The airship was built last July, and its cost is estimated by the Admiralty authorities at about a quarter of a million.

To enable the crew, which consisted of 2 men, to move from one part of the ship to another, a cat-walk ran along the keel, enclosed in an arched passage. It consisted of a narrow footway, 9 in. in width and made of wood—one of the very few examples of wood construction used—and provision for ventilation was made in the shape of shafts rising to the top of the ship. In all there were four gondolas—one forward, two amidships, and one aft. The forward one constituted, as it were the navigating bridge. It was divided into three parts. The first was set apart for the commander, and in it were concentrated the controls of the horizontal and vertical rudders at the stern (where also there were four stabilising fins to prevent rolling), the engine-room telegraphs, and the switches for the electrical release of the bombs. These last, of which 60 were carried, were arranged amidships, and the sliding door which was opened to allow them to fall can still be seen moving freely on its bearings.

Behind the commander's room in the forward gondola was a cabin for the wireless operator, measuring perhaps 6 ft. by 4 ft., and behind that again an engine-room containing a 240-h.p. Maybach-Mercedes engine having six vertical cylinders. Behind the engine was a clutch, a brake, and a reducing gear, through which the power was transmitted to a propeller shaft; a generator for the wireless installation was placed in front. One similar engine was carried in each of the gondolas amidships, and three in the aft gondola, all the engines having wireless generators attached. There were thus six engines, with an aggregate power of 1,440 h.p., and six propellers. Of the latter, three were worked from the aft gondola, one being placed in the centre at a point distant from the tail about one-fifth of the length of the ship, and the other two one on each side; two were driven from the side gondolas amidships, and the sixth was in connection with the forward gondola.

To reduce air resistance a stream-line form was given to the propeller stays by the aid of a thin two or three-ply wooden casing shaped in the proper way. The amount of petrol carried was 2,000 gallons, and the speed is supposed to have been about 60 miles an hour in a still atmosphere. The armament, apart from the bombs, consisted of nine quick-firing guns. Of these, two larger than the others, were mounted on the roof, two were in the forward gondola, one each in the amidships gondolas, two in the aft gondola, and one in the tail. The lightness of the construction is shown by the fact that the huge tail, still containing the remains of the gun platform, can easily be rolled over by one man.

* * *

GERMANY OUSTED FROM AUSTRALIAN METAL INDUSTRY

THE attack on the German metal octopus, which was first made by Prime Minister Hughes, of Australia, has excited considerable interest all over the world. It is not too much to say that the manner in which the campaign was instituted, carried out, and pushed in spite of tremendous obstacles to a successful conclusion, first revealed the strength of the Australian Prime Minister, and no doubt introduced him to the world at large. Following quickly upon the heels of the unmasking of Germany's position, came in rapid succession a number of Parliamentary Acts which took completely the metal industry out of the hands of Germany, and it is not too much to say that as far as Britain is concerned, never again will Germany control the metal market of the world. Some of the Parliamentary Laws put through the Australian National Parliament may be briefly stated:—

Cancellation of all mineral and metal contracts with enemy companies and firms by the Commonwealth Government of Australia. This Act has been lately adopted by the British Government.

Dissolution of the Lead Convention controlled by Germany, which determined the output and price to producer and consumer of all Australian lead.

Dissolution of the Zinc Combine, by which Germany controlled the world's spelter market, price and output, and manipulated the market so as best to serve Germany.

Complete destruction of the gigantic Aaron Hirsch and other German Trusts which controlled the copper industry in Australia.

Destruction of all enemy agencies controlling tin, molybdenite, wolfram, and other metals.

In connection with the German control over lead, zinc and copper, it cannot be too strongly stated that it was complete, and affected not only the producer and the consumers in Britain and elsewhere, but by fixing the world's price for the metals, and limiting the output it directly controlled and affected employment and wages.

England was slow to follow the lead set by Australia, but eventually did so, thus making a uniform metal policy all over the British Empire. The ground having thus been cleared and the German influence rooted out completely, the work of constructing the whole matter on a purely Australian, and British foundation has been entered upon promptly and systematically.

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NICKEL COMMISSION PREPARING REPORT

THE report of the Ontario Nickel Commission will, it is expected, be submitted to the Legislature at the next session. The members of the commission have practically completed their investigations and are now engaged in the preparation of the report.

While the labors of the commission are associated in the public mind largely in connection with means of refining nickel in Ontario and controlling the export of the unrefined nickel, by no means the least important part of its work has had to do with the shaping up of a comprehensive policy of mining taxation applied to all Ontario's great mineral resources. If this part of the report is ready in time Hon. G. Howard Ferguson may be able to bring down the promised tax legislation at the coming session. Meanwhile the plant being established at Port Colborne on Lake Erie for the refining of Ontario nickel by the International Nickel Co., is under way.

PROGRESS IN NEW EQUIPMENT

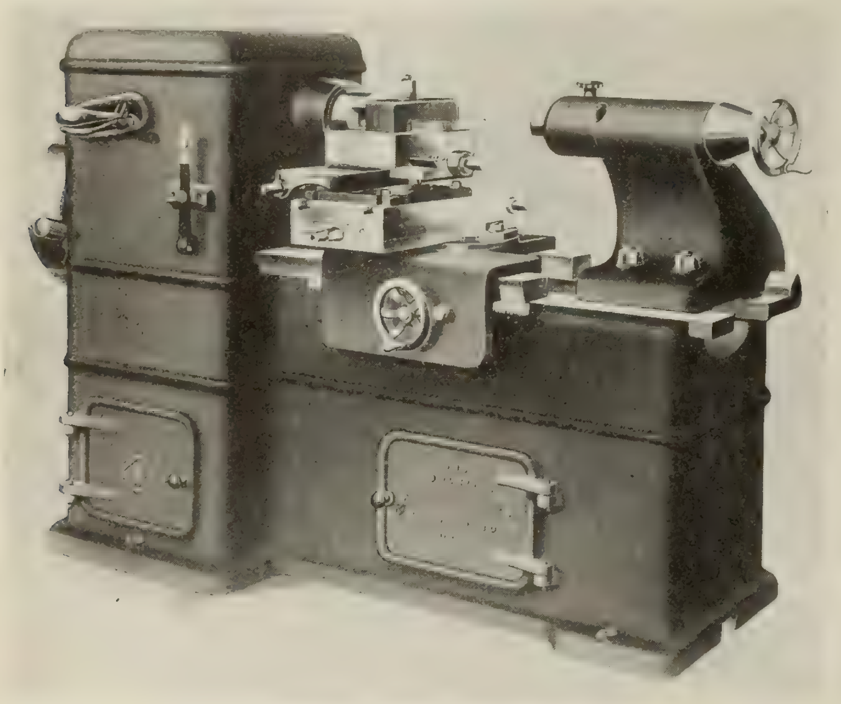
A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

CUTTER RELIEVING MACHINE

THE Cleveland Milling Machine Co., Cleveland, O., is now building a cutter relieving machine which is illustrated and described herewith. It has been developed for the special purpose of relieving formed cutters up to 13½ in. in diameter with any number of teeth from 1 to 28 inclusive, and any even number of teeth from 28 to 42 inclusive, giving straight, side or end relief on all cutters which come within the capacity of the machine. It will be noted from the illustration that box-type construction has been adopted for all large members including the base, bed, headstock and tailstock in which metal is generously distributed in both the walls and webs to provide ample strength.

Power is provided by a 14-in. pulley which carries a 3-in. belt and runs at 460 revs. per min. From this pulley the drive is through a set of reverse gears to a tumbler pinion, from which five selective spindle speeds are obtained, the drive being transmitted through a worm-wheel of large diameter which is mounted directly upon the spindle. The machine can be started, stopped or reversed by manipulating a single hand lever. The spindle is machined from a high-carbon steel forging and is 3½ in. in diameter at the largest point. It runs in solid tapered phosphor-bronze bear- compensating for wear. The taper hole in the spindle is No. 10 B. & S., and the spindle is bored to accommodate a 1-in. draw bolt.

The tailstock spindle is 2½ in. in diameter and is bored No. 10 B. & S. taper; it has a maximum adjustment of 7 in. by means of hand-wheel. Alignings which are provided with means of ment of the tailstock is maintained through one 90-degree V-way at the back of the bed, the flat bearing at the front being 2 in. wide by 15 in. in length. The tailstock may be locked in any desired position by two clamping bolts located in front of the tailstock. The rear carriage bearing is 3 in. in width and the front bearing 6 in. in width; the carriage is gibbed longitudinally to the front bearing and the apron is cast integral with the carriage. The carriage is provided with a maximum longitudinal adjustment of 13 in., which is obtained by operating a hand-wheel. Each complete single turn of this wheel gives a longitudinal carriage movement of 1 in.



CUTTER RELIEVING MACHINE.

A single throw cam giving relief from zero to ¾ in. is carried by a cam slide swivel plate which is adjustable to any degree which is desired. Tapered gibs are provided for taking up wear on all slides. The forming tool may be quickly positioned in the proper relation to the cutter by means of a double adjustable toolpost which his graduated t 0.001 in. Provision is also made fo bringing the cutter to be relieved in th proper relation to the form tool without loosening the cutter on the arbo or loosening the change gears on th end of the machine. Corrugated adjustable wedges on top of the toolpos provide for adjusting the amount o stock that is ground off the forming too from ¾ to ¼ in. If desired, this cutter relieving machine may be motor driven, in which case a 3 horse-powe constant speed motor is employed, whic is mounted on top of the headstock. Th weight of the machine is approximatel 7,000 lbs.

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HEAVY DUTY MANUFACTURING LATHE

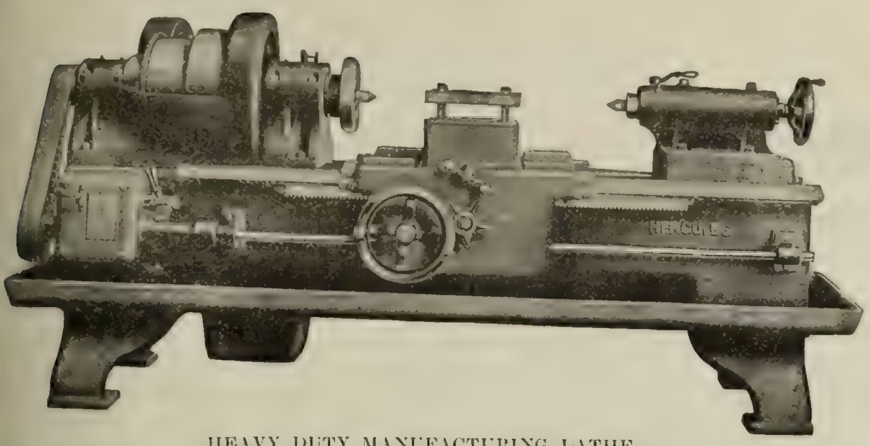
THE advantages and economies of th single purpose manufacturing lathe having been convincingly demonstrated i the manufacture of shells, it was but matter of time before refined designs this type of machine would be availabl for use in general machine work. Th increasing tendency in modern shops t confine thread cutting to one machin is constantly widening the field of th simple lathe and in the accompanyin illustration is shown the Hercules heav duty manufacturing lathe which is th refined development of a machine or ginally developed with the single idea turning shells rapidly.

While capable of swinging 21 in. ov the vees, the machine possesses th weight and proportions of the avera 24 in. lathe, with correspondingly i creased rigidity, and lessened cost manufacture.

The headstock spindle is a fifty poi carbon steel forging, ground on all bea ing surfaces, and furnished when r quired with a 2¼ in. hole. The bea ings are of the chain oiling type, a are provided with sight feed oilers sho ing the amount of oil in the bearing Spindle thrust is taken by a harden steel washer against the rear bearin adjustment being made by a nut at t rear. A large diameter two-step co pulley capacity of high speed too while five changes of feed are provid through a feed change box actuated chain drive from the tail of spindle.

A splined shaft and worm gear op ate the longitudinal travel of the sa dle by rack and pinion, all gears bei steel forgings with front and rear bea ings, and a friction cone is embodied the system to eliminate breakages. An adjustable collar on the splined shaft operates a knock off for stopping the movement of carriage.

The tailstock casting is of the extension barrel type providing clearance over the carriage bridge when turning short work, and is clamped in position with four bolts. The spindle is fitted with a No. 5 Morse taper and is clamped by a plug binder which does not affect alignment.


HEAVY DUTY MANUFACTURING LATHE.

The bed is capable of withstanding the most severe twisting strains as a result of being closely cross-ribbed with box type sections. It is made of semi-steel and has a large vee in front for guiding the carriage, while the headstock and tailstock are guided by the rear vee.

The standard length of bed is 8 ft.; wing over spindle, 21 in.; over vees, 11 n.; front spindle bearing, 5 in. x 9 in., ear, 4 in. x 8 in., distance between centres, 38 in.; cone pulleys, 14 in. and 17 n. dia. for 5-in. belt; tailstock spindle, 3½ in. dia. x 6 in. travel, and No. 5 orse taper, five feeds per revolution, rom .02 in. to .10 in.: net weight, 4,750 s.

The makers of this machine are the Iimoff Machine Co., 128 Mott street, ew York.

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HACK SAW BLADE GRINDER

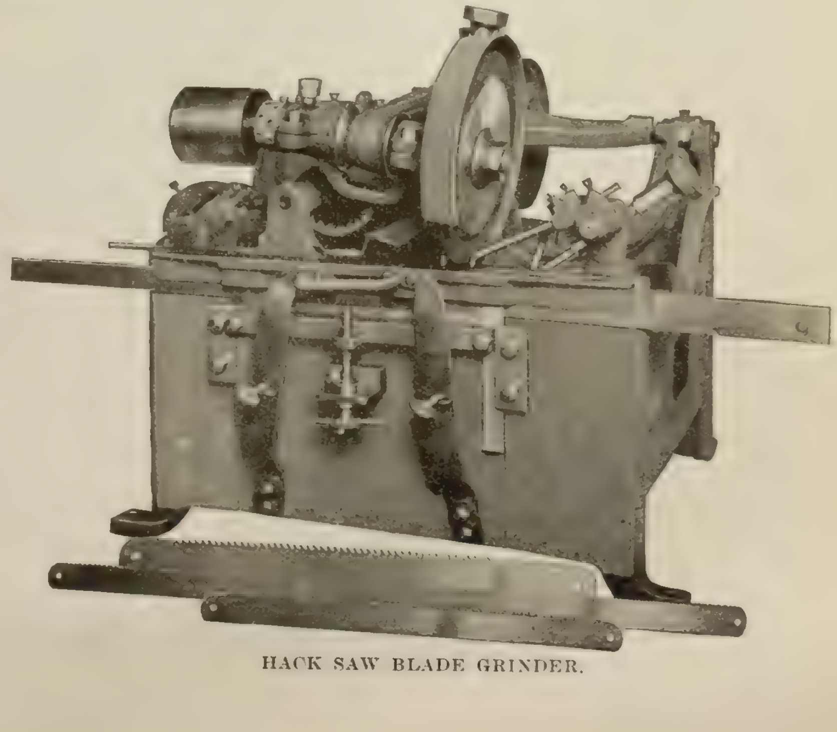
I is now possible to effect considerable onomy in the use of hack saw blades re-sharpening them on specially de- ned grinding machines. The compar- vely short life of hack saw blades and e inability to use them more than once parts interest to the machine shown the accompanying illustration, by ans of which used blades may be used er again eight or ten times.

The machine is full automatic, blades the same width and number of teeth r inch being fed through without opping it or changing adjustments; the standard capacity ranges up to 36- i long x 2 in. wide, with pitch as fine a 33 per in. The solid iron frame is in o piece. Main drive shaft runs on high grade babbitt, while the bearings of the grinding wheel are of bronze, all wearing parts being of steel. Work holding vise is of spring type with steel guides and tension screws with lock nuts.

Extending across the back of the machine is the main drive shaft from which a belt drive extends to the wheel shaft at the front end of a swinging arm, the rear end of which is supported between hardened steel pivots mounted in a segmental member. This allows the grinding wheelhead to be set at such an angle as to allow the edge or corner only of the grinding wheel to come in contact with the face of the tooth, and the opposite edge or corner on the back of the tooth; the wear on the wheel due to this arrangement keeps it always dressed to a knife edge. Two adjustments control the depth of the grinding and the amount ground off the back of the teeth.

The movement or feed of the blade is controlled by a slotted eccentric at the left of the machine, driven by worm gearing from the main drive shaft, suitable scales on the eccentric allowing rapid adjustment. The proper combination of the various adjustments enables the grinding wheel to be so perfectly timed that when the wheel has traveled all the way down the face of the tooth, the cam comes into action and raises the wheel as it travels up over the back of the tooth.

The blade is positively fed through the machine by a double pawl positive feed movement, which continues feeding even where teeth are broken out of the blade. In actual work, fifty to sixty-five teeth per min. are finished, and one wheel will resharpen 200 to 300 blades, when taking an average cut on 18 in. blades. The belt driven machine as illustrated weighs 188 lbs., occupies a space of 22 in. x 24 in., and is built by the Wardwell Mfg. Co., Cleveland, O.


HACK SAW BLADE GRINDER.

* * *

SOME CLASS TO UNCLE

LITTLE JIMMY came to Toronto from his Northern Ontario home where colored folks are hardly ever seen. One day when he was out walking with his Uncle Bob, there happened to pass a colored woman, and, as a result, the following conversation took place:-

"Say, Uncle, why did that woman black her face?" said Jimmy.

"Why, she hasn't blacked her face—that's her natural color," said Uncle.

"Is she black like that all over?" asked Jimmy.

"Why, yes."

"Gosh, Uncle, you know everything, don't you?"

* * *

The British Munition Co., Montreal, has let a contract to the Atlas Construction Co., Montreal, for the erection of an addition to its plant.

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EXHIBITION OF ENEMY PRODUCTS AT TORONTO

WHILE it is meantime impossible to fully estimate results likely to accrue from the two-week period during which samples of enemy products were on exhibition in Toronto, there is little doubt that some useful missionary work has been done in the matter of directing the attention of our manufacturers to the value of export business, and in bringing vividly before them the wide variety of trade openings available in overseas markets. To what extent steps will be taken by Canadian industries to share in the different offerings remains to be seen, nevertheless in view of the intelligent interest aroused, and notwithstanding such immediate disabilities as high production cost comparatively, and lack of our own merchant marine, definite, even if slow and modest, progress may be expected. Not a few manufacturers visiting the Exhibition and who had been exercising themselves with regard to the possibilities of doing business in foreign markets expressed their intention of taking up the proposition seriously as a result of what they had seen. Others again were able to appropriate ideas from different exhibits which would help them to modify existing production methods, and thereby more effectually embrace home market opportunities, if not those abroad. Many samples of exhibits were loaned to manufacturers for further investigation.

The total attendance at the local Exhibition was 2,620, making the third highest in point of numbers of all the cities visited in the United Kingdom and Canada. The various attendances to date are as follows: Manchester, 3,491; Birmingham, 3,341; Toronto, 2,620; Glasgow, 2,014; Montreal, 1,714; Sheffield, 1,203; Dublin, 1,173; Leeds, 1,149; Liverpool, 1,079; and Nottingham, 1,050. Leicester and Bristol were both under the thousand mark. The attendance at Toronto included, of course, visitors from outside towns, such as Hamilton, Guelph, Kitchener, Galt, London, Peterborough, etc. In the totals of all of the cities named, the surrounding districts are of course also included. A circular entitled, "Questions for Canadian Manufacturers" was distributed at the Exhibition on behalf of the Department of Trade and Commerce, Ottawa, the response to which has so far been quite gratifying. A considerable number of the circulars have already been filled in and returned to Ottawa for attention. A week's stay in London, Ont., commencing Nov. 20, followed by a like period in St. John, N.B., completes the programme so far as Canada is concerned. With the evidence before it that a display of exceedingly cheap, varied class and flimsy natured products merited a keen and widespread interest on the recent occasion, it behooves our Department of Trade and Commerce to immediately plan for an even larger display, and that of more substantial enemy products in the near future, bearing in mind particularly the lines through which Germany cemented her hold on our own home market.

CANADIAN MUNITIONS OUTPUT BEING ACCELERATED

A RECENT statement issued by the Imperial Munitions Board expresses the view that our metal-working plants are exerting themselves to the fullest extent possible to meet the demand for both quantity and quality shell output irrespective of size and type. It is further of interest to note that not only are delivery dates called for on completed contracts several months removed from this period of writing, but to those firms showing special dispatch in performance, the largest slices of renewal orders have been promised. In the comparatively early stages of shell-making in Canada, we were understood to have "struck a stride" that would be hard to beat either by ourselves or our confreres in the industry. That we have got rid of that idea, our meantime capacity and accomplishment amply demonstrate, and this notwithstanding such disabilities as male labor shortage.

While the receipt and installation of the necessary manufacturing equipment is not now subject to what might be termed the almost interminable delays of the early stages, we are disposed to think that in many branches of the industry the "labor dilution"—the accession of female operators to the ranks of producers, is beginning to show a marked effect on the total output. It is the policy of the Munitions Board to develop this feature, which, in addition to its being at once a compensator and stimulator of recruiting for overseas service, is doubtless inspired by the all-round success of the "dilution" movement in Great Britain.

The hearty response which Canada has given to the financing of Britain's munitions orders is being reflected in the prodigality of the latter, and at least while the war lasts the reciprocal relationship may be expected to continue operative.

IS A CANADIAN SHIPBUILDING COMBINE COMING?

FOLLOWING hard on the change of management of the Davie Shipbuilding & Repair Co., Levis, Que., comes advice that control of the Western Drydock & Shipbuilding Co., Port Arthur, Ont., has been secured by Canadian interests. In view of the foregoing we should not be surprised to find in the very near future other well-known plants of a like nature undergoing a change of personnel in their administration, and losing their identity except as to location in one gigantic merger. It is generally believed that the Canada Steamship Lines management are behind the movement towards a consolidation of the various interests. Such a programme will, we believe, contribute materially to both the development of our shipbuilding industry and the creation of a worth-while Canadian Merchant Marine.

INDUSTRIAL NOTABILITIES

THOMAS AHEARN, Electrical Engineer, Ottawa, Ont.; president, Ottawa Investment Co.; president Ottawa Land Association; president, Ottawa Car Mfg. Co.; president, Ottawa Gas Co.; president, Ottawa Electric Co.; president, Ottawa Light, Heat & Power Co.; president, Ottawa Electric Railway Co.; president, Ottawa Traction Co.; president, The Capital Mica Co.; director, Canadian Westinghouse Co.; director, Bell Telephone Co. of Canada; vice-president, Ahearn & Soper, Ltd.; vice-president, The Wallace Realty Co. and the Ottawa Building Co., was born at Ottawa, June 24, 1855, son of John and Honora (Power) Ahearn. He was educated in the Public Schools, Ottawa. Originally a telegraph operator at Ottawa and New York, and later (1880) manager, Bell Telephone Co., Ottawa, he, in 1882, entered into partnership with W. Y. Soper under firm name of Ahearn & Soper, electrical engineers and contractors; some of the largest electric works in Canada have since been built and equipped by them.

THOMAS AHEARN.

Mr. Ahearn was one of the founders, Chaudiere Electric Light & Power Co. in 1886; this concern being merged in Ottawa Electric Co., 1895, and, with the Ottawa Gas Co., absorbed by the Ottawa Light, Heat & Power Co. He was also one of the founders and is president of the Ottawa Electric Railway Co., the pioneer venture of its kind in Canada. He is a member, American Institute of Electrical Engineers; Old Time Telegraphers and Pioneer Telephone Associations; Governor, St. Luke's Hospital, etc., etc. His clubs are: Rideau; Ottawa Golf; Ottawa Hunt; Ottawa Country and Laurentian; traveling is, however, his favorite pastime. His residence is "Buena Vista," Laurier Ave., Ottawa, Ont.

—Photo, courtesy International Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$23 95
Lake Superior, charcoal, Chicago	25 75
Standard low phos., Philadelphia	44 00
Bessemer, Pittsburgh	27 95
Basic, Valley furnace	23 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton	$32 25	$31 00
Victoria	32 25	31 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.40
Steel bars, base, Toronto	3.50
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.35
Steel bars, base, Montreal	3.50
Twisted reinforcing bars, base	3.55
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.50
Small shapes	3.85
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.35
Bars, 2 in. and up	3.75
Strucural shapes	3.35
Plates	4.00

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$31 00	$31 00
Electrolytic copper	31 00	31 00
Castings, copper	30 00	30 00
Tin	45 00	46 00
Spelter	14 00	14 00
Lead	9 00	9 00
Antimony	15 00	18 00
Aluminum	70 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$5 00	$4 75
Heads	5 35	5 00
Tank plates, 3-16 in.	5 25	5 00

WROUGHT PIPE

Prices in effect Nov. 10, 1916.

Buttweld

Per 100 feet.	Black	Galv.
⅛ in.	$ 3 50	$ 5 00
¼ in. and ⅜ in.	3 24	5 57
½ in.	4 17	5 74
¾ in.	5 06	7 19
1 in.	7 48	10 63
1¼ in.	10 12	14 38
1½ in.	12 10	17 19
2 in.	16 28	23 13
2½ in.	25 74	36 56
3 in.	33 66	47 81
3½ in.	42 32	59 34
4 in.	50 14	70 31

Lapweld

2 in.	$18 87	$25 35
2½ in.	28 08	38 32
3 in.	36 72	50 11
3½ in.	46 00	63 02
4 in.	54 50	74 67
4½ in.	63 50	87 00
5 in.	74 00	101 40
6 in.	96 00	131 50
7 in.	128 50	172 60
8 in. x 25 lbs. per ft.	135 00	181 30
8 in. x 25 lbs. per ft.	155 50	208 80
9 in.	186 30	250 10
10 in. x 32 lbs. per ft.	172 80	232 00
10 in. x 40 lbs. per ft.	222 50	298 70

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light.	$20 00	$20 00
Copper, crucible	23 00	23 50
Copper, heavy	23 00	23 50
Copper wire	23 00	23 50
No. 1 machine compos'n	18 50	18 00
No. 1 compos'n turnings	15 00	16 00
New brass clippings	15 00	16 00
No. 1 brass turnings	13 00	13 00
Steel, low phos.	14 00	14 00
Heavy melting steel	11 00	12 00
Boiler plate	12 00	10 50
Rails	14 75	15 00
Axles, wrought iron	19 00	19 00
Tires, steel	12 00	11 00
Rails	13 75	13 00
Shafting	16 75	16 00
Malleable scrap	10 25	11 00
Pipe, wrought	10 50	9 00
Stove plate	10 25	11 50
Heavy lead	7 00	7 00
Tea lead	5 50	5 25
Scrap zinc	7 50	7 75
Aluminum	35 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	45
Stove bolts	60
Plate washers	25
Machine bolts, ⅜ and less	30
Machine bolts, 7-16 and over	25
Blank bolts	30
Bolt ends	25
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts, hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	35
Boiler rivets, base ¾-in. and larger	$5.25
Structural rivets, as above	5.15
Wood screws, flat, bright	77½
Wood screws, O. & R., bright	72½
Wood screws, flat, brass	45
Wood screws, O. & R., brass	42½
Wood screws, flat, bronze	37½
Wood screws, O. & R., bronze	35

MILLED PRODUCTS

	Per Cent.
Set screws	40
Sq. & Hex. Head Cap Screws	30
Rd. & Fil. Head Cap Screws	15
Flat & But. Hd. Cap Screws	plus 15
Fin. & semi-fin. nuts up to 1 in.	30
Fin. & semi-fin., nuts over 1 in.	25
Studs	15
Taper pins	45
Coupling bolts	plus 15
Planer head bolts, without fillet	15
Planer head bolts, with fillet	net
Planer head bolt nuts, up to 1 in.	30
Planer head bolt nuts, over 1 in.	25
Planer bolt washers	plus 10
Hollow set screws	list plus 40
Collar screws	list plus 20
Thumb screws	20
Thumb nuts	70
Patch bolts	add 65
Cold pressed nuts to 1½ in.	add $3.50
Cold pressed nuts over 1½ in.	add $2.00

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$50 00
Open-hearth billets, Pittsburgh	50 00
O. H. sheet bars, Pittsburgh	50 00
Forging billets, Pittsburgh	73 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$4 15	$4.10
Cut nails	3 70	3 70
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs		$4 10

MISCELLANEOUS

Solder, guaranteed	0.30
Solder, strictly	0.28
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Gasoline, per gal., bulk	0.26½
Benzine, per gal, bulk	0.25½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	1.12
Linseed oil, boiled, single bbls.	1.15
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	8 00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.12
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes	35
S.S. drills, 1/16 in. and larger	50
Standard drills to 1½ in.	50
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	20
3-fluted drills over 1½ in.	10
Bit stock	50
Ratchet drills	20
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	25
Sockets	30
Sleeves	40
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, Black, No. 28	$4 15	$4 30
Sheets, black, No. 10	5 25	5 20
Canada plates, dull, 52 sheets	4 75	4 75
Canada Plates, all bright	6 30	6 50
Apollc brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 45	7 35
Gorbal's Best, No. 28	7 75	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 25	6 50
Premier, 10¾ oz.	6 50	6 75

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B B

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65
Kearney & Foot, Arcade	65
J. Barton Smith, Eagle	65
McClelland, Globe	65
Black Diamond	65
Delta Files	65
Nicholson	55
Globe	60
Vulcan	65
Disston	..

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$30 00	....
1¼ in.	30 00	....
1½ in.	30 00	23 00
1¾ in.	29 00	20 00
2 in.	31 00	19 00
2¾ in.	33 00	.....
2½ in.	37 00	25 00
3 in.	39 00	28 50
3¼ in.	45 00	32 00
3½ in.	46 00	33 00
4 in.	60 00	44 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.23
Royalite, per gal., bulk	.10½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Union thread cutting oil antiseptic	.70
Acme cutting oil, antiseptic	.39½
Imperial quenching oil	.39½
Petroleum fuel oil	.12¾

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30-10%
Standard	40%
Cut leather lacing, No. 1	$1.40
Leather in sides	1.20

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke.	
Connelsville Foundry Coke	....
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	....
Best Slack	....

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.17
Peerless	.17
Grand	.16
Superior	.16
X L C R	.15
Atlas	.15
X Empire	.14
Ideal	.14
X press	.13
COLORED	
Lion	.12¼
Standard	.10¾
No. 1	.10¾
Popular	.9¾
Keen	.8¾
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48	to	.52
Cobalt	1.75	to	2.00
Copper	.39	to	.41
Tin	.49	to	.56
Zinc	.18	to	.20

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 in.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt			2.10
Polishing wheels, bullneck.			1.35
Emery in kegs, American.			.06
Pumice, ground			.05
Emery glue	.15	to	.20
Tripoli composition	.04	to	.06
Crocus composition	.06	to	.08
Emery composition	.08	to	.09
Rouge, silver	.35	to	.50
Rouge, nickel and brass	.15	to	.25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3½ lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.17
Cobalt sulphate	.70
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.12
Nickel carbonate	.35
Nickel sulphate	.17
Potassium carbonate	.75
Potassium sulphide (substitute).	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.55
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.41
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents

Montreal, Que., Nov. 13, 1916.—Industrial conditions are still featured by the continued advance of all classes of commodities, pig iron taking pride of place; and, as this may be taken as the foundation of the metal industries, it is evident that further advances in steel and steel products will follow in course. The output of munitions is constantly being increased; while plant extensions are also being made and equipment installed to handle the additional business offering. In some instances, shortage of raw materials is affecting production, and this may become more pronounced as the winter season develops, owing to the shortage of cars and difficulties of transportation. The labor scarcity is not so pressing, although some of the plants in outlying districts are still seeking additional help.

Pig Iron

The outstanding feature of the present steel situation is the rapid advance in pig iron prices during the past few weeks. American quotations on foundry iron show an advance for the week of from $1.50 to $4 per ton. Bessemer has advanced $2 per ton, and is now quoted at $29.95 Pittsburg. Composite pig iron is now $25.135, being an advance on the week of $2.825 per ton.

Steel

While steel prices in many lines are soaring beyond all previous records, it is anticipated that still higher figures will yet be attained. The feature of the market, and one that will have considerable bearing on early future prices, is the constant advance in basic and Bessemer pig, which have undergone a record rise in the past few weeks. In addition to abnormal conditions in pig iron, ferro-alloys are also advancing, a recent rise of $2 per ton on ferro-silicon soon to become general. Pittsburg quotations on billets and sheet bars have again advanced, and are now quoted at $55, the rise for the week being $5 and $3 respectively. Even at these prices it is very difficult to place orders with the mills. Plates are still in great demand, car orders being quite heavy. Shipbuilding plates are also being contracted for the last half of next year. American sheet quotations are higher, Pittsburg price on black being now $4, and advance of $5 per ton. A stronger market has also developed on galvanized, the current quotation of $5.50 Pittsburg, being an advance of ½c per pound. A general advance of $3 per ton on wire products went into effect last week, the Pittsburg prices now being: Plain wire, $2.80; galvanized wire, $3.50; wire nails, $2.85; painted barb wire, $3, and galvanized barb wire, $3.70. Local dealers have not yet advanced prices, but may do so shortly. The coke market, which has been under great tension for some weeks, is showing slight signs of easing up, although prices are still high.

Metals

With the exception of copper, the general situation is unchanged. During the past week copper was subjected to a sharp advance, through scarcity of nearby metal. Tin is quiet, but very strong. Spelter has a stronger undertone. Lead is dull, but firm. Antimony is unsteady and easier. Aluminum is strong and unchanged.

Copper.—The nervous trend of the market, following the developments of the past week, is reflected in a sharp advance on price quotations. In addition to the apparent scarcity of nearby metal, the reported inquiry from British sources for considerable tonnage has temporarily upset the market, which under existing conditions, generally results in an advance of prices. While the situation is undoubtedly stronger, it is not anticipated that present prices will hold, and a partial return to those of a week ago is expected. Producers are booked far in advance, and are not taking an active part in making market quotations. London reports a strong market on advancing prices, electro having advanced £5 during the week. The result of the recent tension on the New

York market was an advance of 1⅝c on lake, 3c on electrolytic, and 1⅝c on castings; the nominal price being now 30¼c, 32c, and 29¼c respectively. Dealers here are quoting last week's prices; but anticipate an advance should strength be maintained abroad.

Tin.—The market is quiet, but very firm, with an undertone of early activity. The situation here is governed largely by conditions abroad, and the stronger British market is based on actual conditions and entirely free from speculation. With prices advancing, sellers are not seeking future business, but an early active buying movement is expected. The London advance to £185 is equivalent to approximately one cent per pound. New York is quoting 43¼c, an advance of 1½c per pound. Local conditions are unchanged, the market being firm at 45c per pound.

Spelter.—The market is quiet, but developing a stronger tendency, with producers reluctant in making sales owing to the belief that prices will show further advances. London reports a stronger market, and New York quotations show an advance of ⅝c per pound, the nominal quotation on prompt metal being 11⅜c per pound. The market here is fairly active, the present quotation of 14c being one cent higher than last week.

Lead.—Despite the dullness that prevails at present, the market retains a firm position and prices are well maintained. Future inquiry is light, but producers are showing no anxiety, as they are well sold ahead. Even should the quiet spell continue, it is not expected that quotations would be easily effected. London and New York are both firm, with prices unchanged. Leading interests here report a steady market, with prices firm at 9c per pound.

Antimony.—With the market very quiet, an easier tendency is developing, but producers are inclined to think that the situation will show improvement in the near future, and are, therefore, inclined to refrain from forcing sales. New York prices are slightly easier; the quotation of 13⅛c being a decline of ⅛c per pound. The local market is unchanged, with prices steady at 15c per pound.

Aluminum.—The situation is unchanged, and the market is very firm. Prices are strong and well maintained. Dealers here are quoting 70c per pound.

Machine Tools and Supplies

Conditions throughout the machine tool industry are unchanged. The general demand is fair, particularly on single lots and specials. The abnormal cost of present equipment is a considerable deterrent to additional purchases, as users of machinery are just taking sufficient to meet their most urgent needs. In some instances manufacturers are experiencing difficulty in obtaining enough help to keep the machines they now have operating continuously. Light standard tools are easily obtained, but indefinite delivery still features some of the heavier equipment. Supplies are still in heavy demand, and prices are high, with an advancing tendency.

Scrap

The upward tendency in raw materials is naturally affecting the scrap situation, and this market is, therefore, very strong, and higher quotations are becoming general. Heavy melting steel is in good demand, and prices here have advanced to 11c, which is one cent above last week. Rails show a similar advance, the present quotation being 14¾c per pound. American prices have advanced in many lines, and dealers here think the local market will soon respond.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Toronto, Ont., Nov. 14.—A statement recently issued by the Imperial Munitions Board indicates that there are enough orders for shells on hand to keep the munitions plants busy until the end of June, 1917. There will be no shortage of steel or other materials as the Board has made arrangements for the necessary supplies. The manufacture of component parts is now well established and smaller quantities of these parts will in future be purchased in the States. The situation in the munitions industry has improved considerably during the past few months and the output has increased materially.

Steel

Conditions in the steel trade show no improvement and the situation is gradually getting tighter, with no relief in sight. Although operating at full capacity the mills are still unable to take care of the heavy demand and deliveries are consequently getting further behind. With the munitions industry developing, output is increasing and the demand for steel for shells is proportionately greater. Prices are very firm and further advances on a number of steel products may be looked for in the near future. Another advance on wrought pipe has been announced affecting both buttweld and lapweld, black and galvanized. Higher prices on bolts, screws, and rivets are expected owing to the high cost and scarcity of steel. Prices on boiler tubes are very firm and will doubtless advance shortly. Many makers are sold up on locomotive and merchant tubes for the first half of 1917, while on seamless steel tubing they are sold up for all of next year. Prices of boiler and ship plates are going up in the U.S. market and the demand for this material is as insistent as ever. A further advance on plates locally is therefore inevitable. The leading interest in the States has advanced prices on wire products $3 per ton, so higher prices may be expected in this market.

Quite recently the American Sheet & Tin Plate Co., and also some independent mills, advanced prices on all grades of sheets $2 to $3 per ton. Practically all the more important mills have sold nearly their entire output for the first half of 1917. Under these conditions prices of black sheets will make a further advance. The output of sheets is heavy but is restricted somewhat by the shortage in steel and labor. The galvanized sheet market is much firmer due to the increase in cost of black sheets and also because of high spelter. Galvanized sheets will advance again.

An indication of the trend in the steel market is the report of the U.S. Steel Corporation which shows unfilled orders for the month ending Oct. 31, totalling 10,015,260 tons, an increase of 492,676, tons over the preceding month. The unfilled tonnage for October constitutes a record. The steel output of the United States in 1916 is already far in excess of any previous year and the total for this year will probably be double that of four or five years ago.. Even so, a serious scarcity of many important products exists now, and mills are refusing more business than they are accepting for some classes of steel.

Pig Iron

Pig iron prices are at the highest level of the last ten years, and indications point to further advances. A curious feature is the way in which the pig iron market has come forward after being comparatively quiet for over a year while steel prices were advancing. The pig iron market during the past two or three weeks has been a runaway affair. The cost of producing pig iron is increasing owing to the higher cost of iron ore, equivalent to $2 a ton additional to the cost of pig iron. Labor costs and coke have advanced while supplies are also on a higher basis. Prices have again advanced in Buffalo. No. 2 foundry iron has sold at $28 furnace, Bessemer at $29, and basic at $27.50, Buffalo furnace. The above is an indication of what may be expected in the local market. Grey forge, Pittsburgh, has advanced again, being quoted at $23.95; Bessemer, Pittsburgh at $27.95; Basic, valley furnace $23.00; Lake Superior charcoal iron, Chicago $25.75, and standard low phosphorous, Philadelphia, $43 to $45 per ton. Prices of domestic pig irons are unchanged for the present but higher prices are expected any time.

Scrap

The market for scrap metals is firmer and shows every sign of going higher in the near future. The situation in the scrap market is improving and it looks as if prices would come more in line with those ruling on other products. The market for steel turnings has broadened out as this material can now be exported. The price for steel turnings is now $6.70 per ton, and supplies are heavy. Stove plate scrap is higher at $11. per ton, while No. 1 machinery cast iron scrap is firm at $15. per ton. All copper, brass and composition scraps have advanced 1c per lb.

Coal and Coke

The situation in the coal trade is still acute and there is no relief in sight. Shortage of labor at the mines is the primary cause of the scarcity of coal, and shortage of cars has also something to do with it. The price of hard coal advanced 50c recently and is now $9 per ton, while soft coal is selling around $8.50 per ton.

Machine Tools

The increased activity in the machine tool market continues and some attractive business has been booked by local machinery houses, during the week. The bulk of the business has been for machine tools for making fuses while there has also been a good demand for heavy tools for general machine shop work, such as lathes, universal grinders, millers ,and drills. Fewer enquiries are being received for heavy lathes for the large shells. The market for machines for making fuses, such as screw machines, bench millers and small high speed drills, has been practically cleaned up and deliveries on this class of equipment now run into February. Makers of tool room equipment have advised the trade of an advance of approximately 10 per cent. A number of firms making 4.5 in. shells are changing their plants to suit the new Mark VII. shell, and are buying new tools and fixtures. Plants making 6 in., shells are also being changed over to make the new nosed-in type of shell instead of the socket type.

The situation as regards deliveries does not show any material change. Precision tools, or small lathes of precision type, are very scarce, as are also small automatic gear cutting machines; deliveries running into nine months. Small high speed, ball bearing, drills can be obtained in from one to two weeks. Deliveries on heavy gear cutting machinery and tools for railroad shops run into about six months. Some standard drill makers are booked up eight to nine months ahead while makers of milling machines are quoting prices which are subject to an advance of 10 per cent. up to time of delivery. In other words the cost of the machine would be the price ruling at time of delivery which ranges from four to six months.

Supplies

Prices on machine shop supplies generally continue very firm and some lines have advanced. Makers of leather belting have raised their prices, the new discounts being as follows:—Extra heavy single and double, 30 and 10 per cent., standard 40 per cent. Cut leather No. 1 is now $1.40 and leather insides $1.20 per pound. Cotton waste has advanced, the range being from ¾c to 1¼c per pound according to quality. An advance of 10 per cent. on gasoline and refined oil storage tanks is expected in the near future. Soldering irons have advanced and are now quoted at 61c per lb., base.

Gasoline and Oils

Prices of oil and gasoline have been revised to suit a new method of selling, gasoline being now sold in bulk with an extra charge for barrels or cans. The new price for gasoline is 26½c, and for benzine 25½c per gallon in bulk. There has also been a change in some lighting oils and cutting compounds. Castor oil is lower at 23c per pound, while "Royalite" is also lower at 10½c per gallon in bulk. Fuel oil is a shade higher at 12¾c per pound. An antiseptic cutting oil has been placed on the market in two grades, one selling at 70c and another at 39½c per gallon.

Metals

The principal feature of the metal markets is the continued strength of copper due to heavy demand and great scarcity of nearby metal. With regard to other metals, prices have been well maintained and the situation generally is unchanged. Business locally is very good, principally on account of the heavy demand for munitions but ordinary business is keeping up well. The local market is unusually steady and outlook favorable.

Copper.—The fact that there is very little copper to be had for at least three or four months has created a nervous market and there is an indication that prices will advance in the very near future. The present high prices and shortage of copper are due to the fact that consumption is even in excess of production which is enormous, as two billion pounds of copper will be produced in the United States and Canada during 1916. There is not much metal remaining unsold this side of March, and big foreign enquiries, especially one from France for 200,000,000 pounds, are still unplaced, and will tend to further strengthen the market. The situation is unparalleled and is getting more acute every month. Local prices are nominal and unchanged, lake and electrolytic being quoted at 31c and castings at 30c per pound.

Tin.—There is only a fair demand for tin at the present time, but the market is strong at unchanged prices. The market in London advanced a few days ago but the local market has not been affected as yet. Local price 46c per pound.

Spelter.—The spelter situation is improving and the market more active. Dealers are still not anxious to sell believing that prices will go higher. They report that consumers are pressing the covering of requirements. Local quotations are firm and unchanged at 14c per pound.

Lead.—The market is fairly active but there is no pronounced change in the situation. Producers are awaiting a revival in the demand. The leading interest continues to quote 7c New York. Local price 9c per pound, firm.

Antimony.—A little firmer tone has been noticed in the market and a fair amount of business has been done recently. Antimony is unchanged at 18c per pound, steady.

Aluminum.—The market is steady and quiet with no change in the situation. Local quotation 68c per pound.

Solders.—The market is stronger and prices have advanced ½c per pound. Guaranteed is now quoted at 30c and strictly is 28c per pound.

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Pulp and Paper in B. C.—The development of the pulp and paper industry on the Pacific Coast has shown very marked advances during the past year, says a Prince Rupert despatch. In addition to the big outfits at Mill Creek and Powell River, which have more than doubled their capacity during that time two other big outfits at Swanson Bay and Ocean Falls are making ready for production. Nearer Prince Rupert another mill is likely to be constructed and in Prince Rupert itself a big plant is projected. Besides that a project is under way for the development of the Queen Charlotte Island pulp areas. This will be handled by a mill on the islands but all these mills are likely to make their base at Prince Rupert.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department of Trade and Commerce, Ottawa, is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL

Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE

Valparaiso, British Consul General.

COLOMBIA

Bagota, British Consul General.

ECUADOR

Quito, British Consul General.
Guayquil, British Consul.

EGYPT

Alexandria, British Consul General.

FRANCE

Havre, British Consul General.
Marseilles, British Consul General.

INDIA

Calcutta, Director General of Commercial Intelligence.

ITALY

Genoa, British Consul General.
Milan, British Consul.

MEXICO

Mexico, British Consul General.

NETHERLANDS

Amsterdam, British Consul.

PANAMA

Colon, British Consul.
Panama, British Vice-Consul.

PERU

Lima, British Vice-Consul.

PORTUGAL

Lisbon, British Consul.

RUSSIA

Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN

Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN

Stockholm, British Consul.

SWITZERLAND

Geneva, British Consul.

URUGUAY

Monte Video, British Vice-Consul.

VENEZUELA

Caracas, British Vice-Consul.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALIA

J. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya, Ploshch 9, Petrograd.

L. D. Wilgress, Canadian Government Commercial Agent, Bukhgolza Ulitza No. 4, Omsk, Siberia.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

AUSTRALIA, B. Millin, Sydney, N.S.W.

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.
R. H. Curry, Nassau, Bahamas.

NORWAY AND DENMARK.

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

WORLD'S PAPER AND PULP SUPPLY

INDICATIONS are not wanting that paper and pulp interests in Canada are well started on a campaign to make her after the war the chief source of the world's paper and pulp supply. We have been slow to take advantage of our large pulp wood and cheap and efficient water supplies, with the result that we now find ourselves many years behind the times in number of paper plants However, in the last ten months the unusually large demand for newsprint has put new activity in the Canadian market, and new construction and additions are under way which will increase output by about 30 per cent.

By January 1, 1917, new machines put in operation will increase Canada's output by from 75 to 100 tons daily. Canadian production of newsprint is now a little less than one-half that of the United States, although it has an advantage in cost of manufacture of from 10 per cent. to 15 per cent. per ton, and a bulk of this production, or about one-fourth of the annual requirements of the United States, comes from Canada.

It is evidently the intention of Canadian paper and pulp makers to control the British market after the war, ousting both the German and Scandinavian interests, who have been foremost in British paper trade heretofore. German paper mills shipped thousands of tons of newsprint and other paper products to Britain before the war at prices well below the price of British mills, this being made possible by large combinations under government subsidy. The business between Germany and Great Britain after the war is not likely to be renewed, and the large profits now being realized by Canadian paper companies will place them in position to successfully carry on a campaign for export trade to Great Britain and her Colonies.

DUTY ON SHIP MATERIALS

THE DOMINION GOVERNMENT has given Canadian shipbuilders permission to build ships for owners under neutral flags under certain safeguards. The Government has also passed an Order-in-Council relative to the duty on materials imported for building such ships.

This Order-in-Council passed a few days ago provides "that a drawback not exceeding 90% of the Customs duty paid may be made by the Minister of Customs on materials used in the original construction of ships and vessels measuring over 500 tons gross tonnage built in Canada, when such ships or vessels are authorized by Order-in-Council to be exported for registry outside Canada, or are British registered in Canada, and are constructed so as to obtain a class in Lloyd's, Bureau Veritas, British Corporation, or other recognized classification satisfactory to the Minister of Customs, provided that the drawback payable under this section shall be in lieu of any drawback based on a specific rate per registered ton. "The claimant for the drawback must be the builder of the ship or vessel."

The payment of this duty, even where there was to be a drawback, meant that there would be a large amount of money tied up. The builders would still have been under the necessity of putting up this duty, which on a vessel of 8,000 tons would amount to about $80,000. The Government would have held this till the vessel was completed, and would then have returned it. The Government has been induced to remove this obstacle by providing that this ninety-nine per cent. need not be paid into its hands where the construction takes place under the eye of a Government Customs officer in charge of the works. All liable articles are to be placed under the control of this official until they are embodied in the vessels.

EMPLOYMENT BUREAU TO BE OPENED

PREMIER HEARST announced on Nov. 8, that the Provincial Government of Ontario through Dr. W. A. Riddell, its recently appointed Superintendent of the Trades and Labor branch is about to open a Public Employment Bureau in Toronto to meet the need of the Department of Labor of the Imperial Munitions Board, Mark H. Irish, the director has been studying the labor conditions in munitions plants, and has reached the conclusion that the increased output asked for by the Imperial authorities cannot be had except by a careful dilution of the male labor now employed. Moreover, although the supply of women labor at the moment greatly exceeds the demand, the munitions manufacturers are willing to provide the requisite accommodation for women wherever the work they are doing can be done by women. It is, therefore, expected that within the next three or four months many more women will be employed making munitions than at present.

The bureau about to be opened in Toronto and others which may be opened, while intended in particular to assist in the special work above referred to, will act also as general employment bureau, and thus help to some extent to meet the present abnormal labor conditions. The present step is an indication of the willingness of the Government to meet the emergency now existing without waiting for the development of a complete provincial system of employment bureau.

CANADA'S OCTOBER TRADE

THE Dominion revenue for October totalled $18,158,128, an increase of $3,717,795 over October of last year. The increase in customs revenue, due to continued increase in imports, accounts for the growing revenue from taxation. Although expenditure for the month on current account amounted to only $7,803,405, a decrease of $2,272,576 as compared with the preceding October, the cost of war jumped to nearly twenty-three millions for the month, and the debt increase amounted to $15,503,713. Canada's national debt is now just four millions under the seven hundred million mark, and in the past twelve months has been $203,000,000.

The cost of war for the first seven months of the current fiscal year has been $127,487,147, or more than eighteen millions per month, to say nothing of expenditure incurred by the War Office on Canadian account and left until after the war to be entered up.

For the seven months, revenue has been $121,747,808, an increase of $34,063.960, as compared with the corresponding seven months of last year. The Consolidated Fund expenditure has been $57,561,116, an increase of $1,213,513 in ordinary expenses of administration

GERMAN SLIMNESS

THE following example of German slimness furnished by a correspondent of a British contemporary from his own personal knowledge is interesting because of the light is sheds on German business methods and enterprise:—A German traveller working for a British firm secured orders beyond the output of the factory, with the result that the firm could only deliver part of requirements of their customers. Having a list of the customers and a knowledge of the demand, he went for a holiday to his own country, and, on the evidence at his disposal, obtained the necessary funds to erect and equip works for the production of the same articles on a larger and more economical scale than the British firm. The arrangement was made with a German bank, the new works being under its control until the outlay was recovered. He retired from the British firm as soon as he was in a position to enter into competition with them, which he did with remarkable success. Had the British firm been in a position to raise funds in order to increase its works and output more speedily, and had it suspected the duplicity of its traveller, it might have developed an important and thriving industry; but as the next move of the German was to secure control of the supplies of raw material for the production of the articles in question, the industry in Britain speedily declined.

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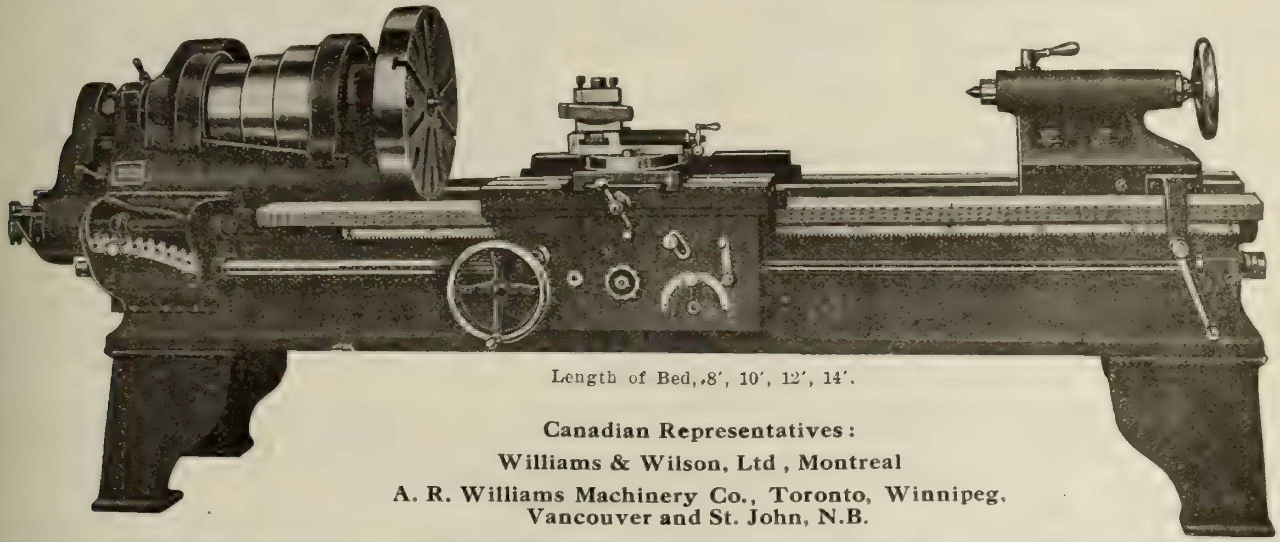

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DOMINION FOREIGN TRADE INCREASE

CANADA'S foreign trade has reached very high figures in bulk, but still higher when viewed from a per capita standpoint. In July the value of the exports was equal to $28 per head, as compared with an average of about $11.50 for four years preceding March 31, 1914. This extraordinary result is due to the fact that Canada has resources for which the war has created very extraordinary demands. Take for instance, the one item of copper. In 1913 the value of the exported product was $9,911,000, which before 1916 was the record year. For the twelve months ending March last the value of the exported product was $14,670,000. It is true that the price of copper was very much higher in the latter than in the former year, but the increase did not account for the larger aggregate value. The quantity of copper exported increased from 83 millions in 1913 to 111 millions in 1916. Nickel exported in 1916 was valued at $7,714,000, as compared with a little more than five millions in any previous year.

Other fundamental necessities of which war in Europe created a shortage, such as wheat, flour, and other manufactured products, were sent out of the country in very much greater volume than at any previous time. When, therefore, we look into the kind of goods that we have during the past two years sent out of the country it will be found that they are derived from domestic resources. Trade, however, embraces both what we buy and what we sell. Purchases quite recently have been on a slightly higher scale than normal in, say, the last ten years, but not so much as to be a factor in sending up to very high limits the per capita trade. In the last fiscal year our total exports of merchandise amounted to $780,000,000, as compared with a previous high record of $461,000,000. On the other hand, our total imports of merchandise in 1916 was 508 millions, as compared with 670 millions in 1913. It cannot be charged, therefore, that our trade is very largely affected by excessive purchases abroad for the purpose of re-export. Increased volume of trade is due to larger demands made upon Canada for things made by domestic labor out of native raw material.

The great rise in our exports dates from the time the phenomenal crop of 1915 began to find its way to the markets of the world. About the same time the steel and other manufacturing plants in the Dominion began to turn out war material in larger quantities. As in Britain and elsewhere delay occurred in answering the urgent call for shells and guns. Men and plants were not equipped for making munitions of war, and in consequence there had to be done much experimenting, which took time and involved risk and capital. After the experimental stage had been passed and accuracy of specification and product had been obtained, the volume of output increased very decidedly. In 1914 the monthly exports of manufactured goods averaged $5,700,000; in 1915, $12,600,000, and in the first six months of the present calendar year, $34,000,000.

Until the war ends the volume of manufactured goods exported will in all probability be maintained. There are, however, bankers and others who hold the belief that before many months are over the Allies will be manufacturing most of the ammunition they require nearer to the scene of operations, which would effect economy in transportation and in such efficiency, as greater concentration of effort would give. If such developments do arise it will have a tendency to decrease the volume of manufactured goods sent from Canada. There is no possibility, however, of the demand for our food products, our copper, nickel, coal and steel falling off so long as the war lasts, and for an indefinite period following the war, hence we may look for continued high levels in the volume of our exports.

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NEED ASSISTANCE OF MANUFACTURERS

THAT the Department of Trade and Commerce cannot make the proposed Dominion Trade Conference a success without the hearty co-operation of the manufacturers of the Dominion, was the recent statement of Sir George E. Foster, in reply to a question about the future of the conference.

He stated that the meeting will be called as soon as preparations which are essential to its success shall have been completed.

"It was never intended to be a talking exhibition, but rather a conference attended by representatives of every great industry to discuss conditions when peace comes, and to determine what can be done to aid each individual industry.

"It will strive for co-operation and team work among all productive industries; the transport and financial equipment of the country. This, it will be observed, necessitates a great deal of spade work which is now being carried on. It is not to be expected that any department can do this work of itself. It must be undertaken heartily and thoroughly by the great interests themselves. They have the practical experience and the knowledge.

"The call to action which I issued sets that forth very clearly. I may say, however, that indications are being daily revealed showing that the business and productive interests of Canada are more or less alive to the situation, and are disposed to give it thought and attention."

TRAINING MUNITIONS INSPECTORS

THE suggestion of Col. Guthrie from Ottawa to consult with the principals of the Toronto and Montreal Technical Schools have developed into something more than was at first thought. The plan of the Imperial Munitions Board is not, as at first thought, to merely establish training classes for returned soldiers in munition making, but classes for those who are already holding the positions of inspectors.

At the present time, of course, there are classes for men and women, but these will be of a much more technical nature, and further advanced as they are a "finishing school" for those who have been acting as inspectors. Two experts from England are being brought out by the Imperial Munitions Board, and they will instruct.

The two centres for these instructions are Toronto and Montreal. The classes will start at first with twenty or so students. Then, as soon as they have qualified they will turn out and teach others.

Two large rooms and a smaller one with a blackboard are in readiness at the Toronto Technical School now, so that there is not likely to be any delay at that centre at least. In all likelihood the Board of Education will grant the use of the rooms gratis in return for the supply of teachers and materials by the Munitions Board. These classes are to start at once.

◆

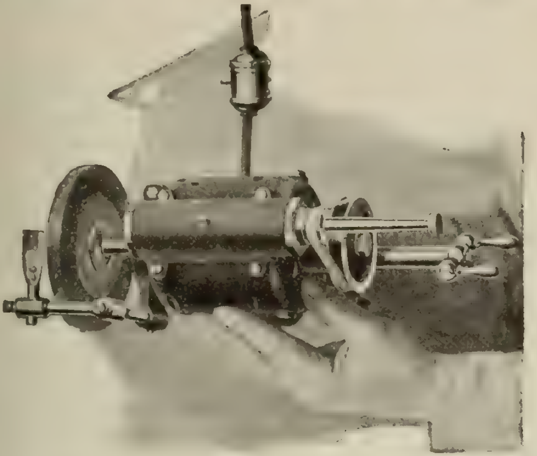
SHELL ORDERS ENOUGH TO LAST UNTIL JULY, 1917

ACCORDING to a statement made by the Imperial Munitions Board the Canadian manufacturing concerns who are at work on munitions will be kept busy on the basis of present orders in hand until June 30 next. Some orders expire on December 31, and others on March 31. Firms which make the best record in the matter of deliveries are likely to receive the biggest share of the renewed orders.

All necessary raw materials to maintain the deliveries required are contracted for well ahead, and the Board is in a good position in regard to the necessary supply of steel. No uneasiness is caused by the reported shortage in the States, because the Board made large purchases of steel during the spring and summer months. The policy adopted some time ago whereby Canadian manufacturers would supply fuses, primers, brass discs, cartridge cases, and other component parts of shells is now well established and smaller quantities of these supplies are being received from the United States. Many of these parts will in future be secured extensively in Canada.

The Board states that the Canadian manufacturers are doing their best to carry out the manufacture of shells with the greatest possible expedition.

Aikenhead's DUMORE GRINDER



The DUMORE Portable Grinder. The only small grinder giving wheels the correct surface speed. Speed. 30,000 R. P. M.

Weighs only 17 pounds

Can be set up in a moment in any Lathe, Shaper or Milling Machine

Does all kinds of Grinding and does each kind right :: :: :: :: ::

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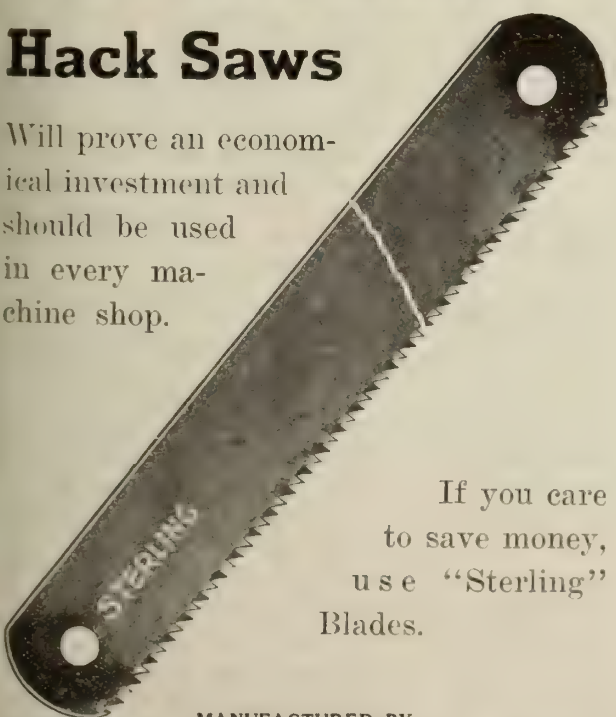

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If you care to save money, use "Sterling" Blades.

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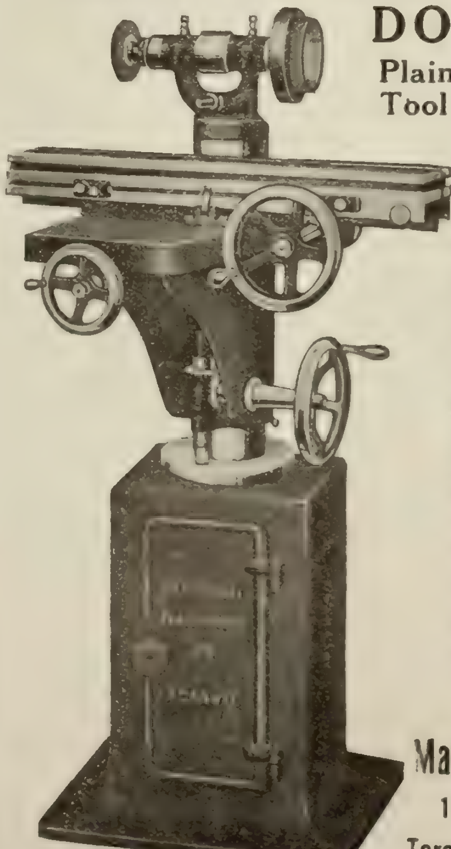

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Grinder Head is fitted with Ball Bearings.

Head and Tail Stocks are designed to handle heavier tools than is usual on a machine of this size.

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INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Leamington, Ont.—John A. Campbell is in the market for a 50 to 100-h.p. gas engine.

St. Catherines, Ont. — The Metal Drawing Co., will build a foundry at their plant here.

Montreal, Que.—The Canada Stove Co., will build an extension to their factory at St. Laurent near here.

Toronto, Ont.—W. H. Banfield & Sons will extend their factory on Pape Avenue, at a cost of about $10,000.

Toronto, Ont.—The Hamilton Gear & Machine Co. has commenced the erection of an addition to its plant to cost $7,500.

Galt, Ont.—The Perfect Machinery Co. has commenced the erection of a foundry. It will be L-shape, 24 x 60 ft., and 20 x 26 ft., of concrete and brick.

New Glasgow, N.S.—The Steel Furnishing Co. is in the market for three turret lathes, suitable for steel sockets and three millers suitable for milling outside thread of sockets.

Shelburne, N.S. — Owing to the development in the shipbuilding industry here and demand for marine oil engines, it is proposed to establish a plant for making gasoline engines.

Deseronto, Ont.—Work is being rushed as fast as possible on the new building of the Dominion Hardwoods, Ltd., here. The Dominion Bridge Co. are erecting the overhead steel work of the engine and boiler-rooms.

Ingersoll, Ont.—That a large plant for the manufacture of automobile tires will be located here was announced the other day. The proposed plant, when equipped will it is stated, cost about $200,000. The company will have a capitalization of $1,000,000.

The International Nickel Co. has completed the survey for its refinery at Port Colborne, Ont., and begun excavation work with a view to having the foundation completed before the winter sets in. If this is accomplished, it is expected that the plant will be in operation within a year. It will be built in units so that it can be quadrupled in capacity should it be found necessary. The first unit will employ 300 men. A number of new technical processes will be introduced. The company has set aside $5,000,000 to cover the cost.

Niagara Falls, Ont.—Sir Adam Beck announced recently that the right of way for the canal to be constructed between Lake Erie and the Niagara Gorge to create a new fall at which power will be generated under the scheme known as the Chippawa development, has been acquired, and that work will be undertaken as early as possible next spring. The contracts will be let during the winter.

South Vancouver, B.C.—As a result of action decided upon by the City Council, it is more than probable that two important new industries will be established in the municipality in the near future. The larger of the two industries will be a rolling mill to cost $150,000, capable of turning out 30 tons of steel per day, promoted by David Milne, a Victoria capitalist, and G. R. Kennedy of Medicine Hat; and the other the Dominion Glazed Pipe Co., at present established on Front Street, and seeking a site suitable for the expansion of its business, which the company is confident will soon take place.

Municipal

Sault Ste. Marie, Ont.—The Town Council propose installing two centrifugal pumps, each having a capacity of five million gallons.

Owen Sound, Ont.—A by-law is contemplated to raise $15,000 by way of a loan to the Keenan Woodenware Co., to enable them to enlarge their business to include the manufacture of refrigerators.

New Toronto, Ont.—A by-law will be submitted to the ratepayers on Nov. 25 to raise $15,000 for the purpose of installing an incinerator or garbage disposal plant, and purchasing a site therefor. George D. Scott, Village Clerk.

Ford, Ont.—The Town Council contemplate installing a new sewage system at a cost of $113,915. A by-law will be submitted to the ratepayers in January. Aird, Murray & Lowes, of Toronto, who are the engineers, have prepared plans for the new system.

Bracebridge, Ont.—A by-law will be voted on by the ratepayers, guaranteeing bonds of the Beacon Match Co., to the extent of $15,000 and granting the company fixed assessment for ten years.

Whitby, Ont.—On Dec. 4 the ratepayers will vote on a by-law to raise $100,000 as a guarantee of bonds for a new tractor industry to be established by certain American interests.

North Bay, Ont.—Two industrial by-laws will be submitted to the ratepayers for their verdict on December 11. The North Bay Toy Co. are asking the town for a free site and building, the cost not to exceed $15,000, and the Dominion Rubber Cloak Co., of Toronto, are asking for a bonus of $5,000 and a loan of $15,000 in order to establish a business here.

General Industrial

Toronto, Ont.—The Ideal Bread Co. will erect an additional storey to their factory on Dovercourt Road at a cost of $15,000.

Guelph, Ont.—The Munder Tungsten Lamp Co. will build an addition to their factory, to cost about $12,000.

Kitchener, Ont.—The Consolidated Felt Co. will build an extension to their factory, to cost about $20,000.

Barrie, Ont.—Fire on November 6 damaged the Barrie Carriage Co. factory. The loss is estimated at $3,000.

Owen Sound, Ont.—Fire, which damaged the kiln section of the Owen Sound Fruit Co. evaporator plant here on Nov 6, was caused by an overheated furnace The loss will amount to about $700, with no insurance.

Contracts Awarded

Brantford, Ont.—P. H. Secord & Son. have been awarded a contract for a $15,000 addition to the Galt Brass Works.

New Toronto, Ont. — The genera contract for the erection of an incinerator for the Town Council has been le to Reed Products Co., Toronto. Approximate cost, $10,000.

Toronto, Ont.—The Hydro-Electri Commission has awarded a contract t the Canadian Bridge Co. for 1,000 ton of steel for towers on the Toronto-Dundas line, this amounting to over $100,000. The Commission is also giving contract for $40,000 to $50,000 on th Etobicoke Station.

New Incorporations

The Brampton Pulp & Paper Co. have been incorporated at Ottawa with a capital of $9,000,000 to carry on a pulp and paper business with head office at Montreal. Incorpators are Errol Languedoc, Ralp E. Allan and William Taylor, all of Montreal.

The Bermuda Bunkering Co. has been incorporated at Ottawa with a capital of $30,000 to deal in coal and operate ships and docks, with head office at Toronto. Incorporators W. W. Perry, Kenneth McKenzie and Charles H. C. Leggatt, all of Toronto.

Dominion Porcelain Corporation has been incorporated at Ottawa with a capital of $150,000 to manufacture porcelain and clay products of all kinds at Preston, Ont. The incorporators are Gideon Grant, Mervil MacDonald and Bruce Williams, all of Toronto.

Elipse Plating & Sales Co. has been incorporated at Ottawa with a capital of $50,000 to carry on business of electroplaters and manufacturers of electrical supplies at Ottawa, Ont. Incorporators are John Dorning, Philip M. Grimes and F. D. Hogg, all of Ottawa.

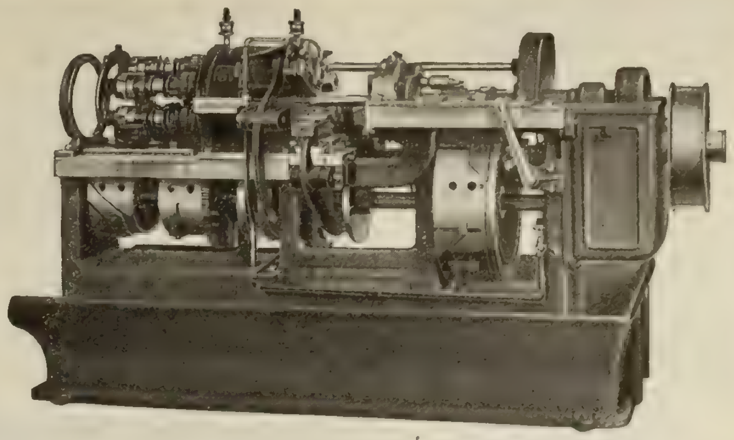
Dominion Boiler & Foundry Ltd. has been incorporated at Ottawa with a capital of $200,000 to manufacture boilers and furnaces of all kinds at Montreal East, Que. Incorporators are Charles W. Webb, J. H. Charbonneau and Victor Pelletier, all of Montreal.

The Packard Fuse Co. has been incorporated at Toronto with a capital of $200,000, to manufacture machinery, tools and munitions at St. Catharines, Ont. Incorporators, Ralph B. Hamilton, George C. Rough and Francis T. Wyman, all of St. Catharines.

The Samara Pulp Co. has been incorporated at Ottawa with a capital of $25,000 to manufacture pulp and pulp products of all kinds The head office is at Montreal and the incorporators are Arthur R. Holden, Pierre A. Badeaux and Ernest G. Bennett, all of Montreal.

The Hamilton Steel Wheel Co. has been incorporated at Ottawa with a capital of $2,000,000 to manufacture steel wheels for railway carriages and locomotives, etc., at Hamilton, Ont. The incorporators are John R. Marshall, George A. Young and A. H. Johnson, all of Hamilton.

The Dodge Manufacturing Co. has been incorporated at Ottawa with a capital of $500,000 to engage in the business of engineers, founders, and a general engineering business by taking over the business of the Dodge Manufacturinug Co., Toronto. The incorporators are Charles F.



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WHY SIX SPINDLES?

RATHER ASK — "why not six spindles?" — as the greater number of spindles in the "New Britain" Automatic does not materially add complexity.

For some jobs, essentially simple in character, this number of spindles may seem unnecessarily great—until it is considered that in most cases the full spindle capacity of the machine may be taken advantage of by subdivision of the longer operations, the net results being greater production per machine and lower cost per piece.

The saving in rehandling of pieces requiring a variety of operations beyond the capacity of a four-spindle machine is of obvious advantage. Moreover, some work which may be undertaken on a four-spindle machine can be handled by the "New Britain" Six-Spindle Automatic in a much simpler manner, without complicated set-up and excessive attention.

Are you not rehandling some pieces which a "New Britain" would finish complete? An investigation might prove profitable.

The New Britain Machine Company
—Automatic Screw and Chucking Machines—
New Britain, Conn., U.S.A.

The Great Business of Selling

MULTIPLYING users of your product, commodity or service—this is your great business. The more, the merrier.

The factor of multiplication is advertising. Nothing else can get you new users in the shortest possible time at lowest cost.

Use magazines for long-living publicity effects.

Use them for Economy's sake.

Use them for Prestige.

In Canada, the one conspicuous magazine is

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Price list and full particulars on request.

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Phone Adelaide 2841
Canadian Agents for
The Davis-Bournonville Apparatus.

Page 70 contains something of interest
Turn to it!

Wheaton, William G. Thurston and James Shand, all of Toronto.

The Dominion Thresher Co. has been incorporated at Toronto with a capital of $40,000 to manufacture agricultural machinery and traction engines at New Hamburg, Ont. Incorporators, T. W. Kingswood, and William A. Bailey, of London, Ont., also William R. Miller, of Hamilton, Ont.

Personal

C. H. Withers has been appointed manager of the Escher Wyss Co. head Canadian office at 12 Coristine Building, Montreal.

Col. Thomas Cantley, president of the Nova Scotia Steel & Coal Co., expects to sail this week for the Old Country on a business trip.

Arthur H. Chadwick, director and manager of the Canadian Chadwick Metal Co., of Hamilton, Ont., died on November 8, aged 50.

F. B. Zercher, of Montreal, has been appointed master car builder, G. T. R. Western Lines. Mr. Zercher, who succeeds A. Copony, resigned, is well known in railway circles in Eastern Canada. He will make his headquarters at Elsdon, Chicago. The appointment dates from November 1.

Norman S. Thrasher, purchasing agent of the Wellman-Seaver-Morgan Co., Cleveland, O., has accepted the position of purchasing agent of the Western Dry Dock & Shipbuilding Co., Port Arthur, Ont. Mr. Thrasher was formerly purchasing agent of the American Ship Building Co., Cleveland, O.

James Chase Wallace, former president of the American Ship Building Co., died on Oct. 31, at his home, in Lakewood, O., after an illness extending over several months. Mr. Wallace was born May 23, 1865, a son of the late Robert Wallace, who was one of Cleveland's pioneer ship builders. The younger Wallace followed in his father's footsteps and devoted his life to the building and operating of ships. With his father he organized the Cleveland Ship Building Co., and afterward effected the organization of the American Ship Building Co. Mr. Wallace began his business career in 1881 by starting his three years' service as a machinist. When the Cleveland Ship Building Co. was formed in 1887, he was placed in charge of the drafting room. In 1890 he was named assistant superintendent of the company and in 1893 he was chosen vice-president and general manager. When the American Ship Building Co. was formed in 1899, it taking over the plant of the Cleveland Ship Building Co., Mr. Wallace was named vice-president and general manager of the new concern. This position he held until early in October, 1904, when he was chosen president of the American Ship Building Co., in succession to A. B. Wolvin. He retained the presidency until Sept. 23, 1914, when Edward Smith, since deceased, was elected.

Trade Gossip

The Shawinigan Electro Metals Co. has increased its capital stock to $1,000,000.

The Dominion Copper Products Co., of Montreal, have taken over the old tinplate mill at Morrisburg, Ont., and will start operations in about six weeks. The mill has been lying idle for some years.

U.S. Steel Orders.—Unfilled orders of the U.S. Steel Corporation for the month ending Oct. 31 last were 10,015,260 tons, breaking all previous records. The figures showed an increase of 492,676 over those of the preceding month.

The British American Nickel Co. is making preparations for the erection of a refinery, probably in the Sudbury, Ont., district. The company has secured E. P. Matheson as general manager. E. R. Wood and James P. Dunn, London, Ont., are interested in the company.

The Carter Welding Co., of Toronto have removed their office, works and demonstration plant from 561 King street, West to 9 and 11 Sheppard Street. The company have installed a modern and well-equipped welding and cutting plant.

The Exhibition of Enemy Samples, which closed recently in Toronto, will open in London, Ont., on Monday, Nov. 20, and close on Saturday, Nov. 25. H. Kershaw will be in charge, and his address during the exhibition period will be care the Secretary Board of Trade, London, Ont.

A. R. Roberts, 727 Traders Bank Bldg., Toronto, has secured the agency for the Cement Gun Co., and will handle their product throughout Canada, except in the provinces of British Columbia and Alberta. Mr. Roberts is also sales representative of the Chapman Valve Mfg. Co., Indian Orchard, Mass.

Ore Shipments Large.—More than eleven million tons of iron ore have been shipped from the docks of the five companies at the American head of the lakes during the season up to November 1 than during the corresponding period last year. Up to November 1, last year, 29,345,174 tons were shipped, while during the same period of 1916, 40,608,767 tons have gone forward.

Port Arthur, Ont.—James Whalen, of Port Arthur, and John Burnham, of Chicago, by an investment of $1,500,000 have secured exclusive control of the Western Dry Dock & Shipbuilding Co. plant here. They have contracts for several boats, also assurances that the plant can be kept going at full capacity for a long time to come. They expect to turn out twelve boats in 1917.

Machine Tool Equipment Aboard Ship.—The value of the machine tool and repair equipment on the United States repair ship Prometheus is said to be nearly $80,000. There are over fifty machine tools, including lathes up to 72-in. swing, vertical boring mill with table 6 ft. diameter, a radial drill of 48-in. capacity, and other tools, all of which are driven individually by electric motors.

Australian Ships Load at Montreal.—The Australian Government, according to a report to the Trade and Commerce Department, Ottawa, has now in its service a fleet of 35 cargo steamers, some of which have already loaded at Montreal for Australian ports. In addition, five large sailing ships are being operated under Government control. The earnings of these ships are said to be satisfactory. The vessels will be overhauled in Australia and used in the transportation of wheat and other commodities.

Francis Hankin & Co., Montreal, have been awarded a contract for water meters by the city of Montreal, valued at $25,702. The meters range in sizes from 2 in. to 8 in., and will be placed in lines supplying the harbor front fire protection system. The fire hydrants in the system are all connected beyond the meters and it was therefore essential that a minimum loss of pressure should be caused through the meters. This British-made meter known as the "Helix," showed a loss of about 4¾ lbs. only and this feature decided the contract in its favor.

Rubber Trade Control.—Great Britain controls the rubber production of the world to-day. In 1893 she laid the foundation for it by encouraging rubber plantations in Ceylon, Sumatra, the Malay States and Java. Brazil then produced the world's supply, but to-day Britain's fostered plantations dominate the output, and the British Government say when and where rubber shall go. Thus, Germany is prevented from obtaining any, as none can enter neutral countries except with the consent of the British Consul in that country. Incidentally, Great Britain's control of the rubber market has reduced the price from three dollars a pound to about 67 cents, and rubber has been placed within the grasp of all.

Hudson Bay Railway.—The Hudson Bay line will be finished in 1917, according to the contractors; but recent

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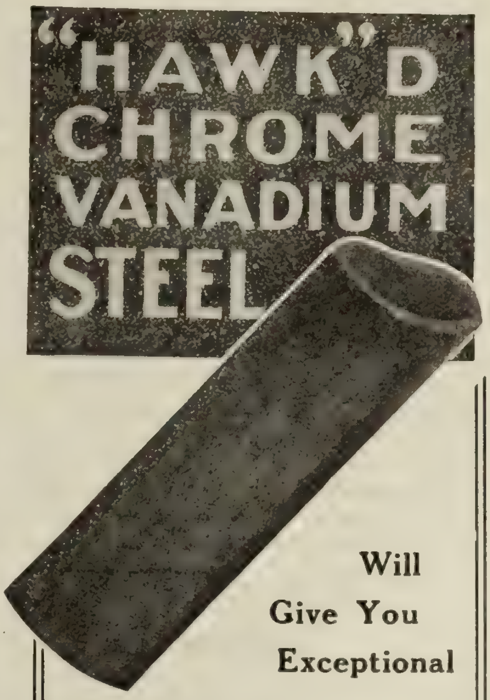

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Shell Forging Production

WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

There are many cases where each punch has turned out over 2,000 shells.

It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

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Water Inlet
Faucet Handle

Saving or Wasting?

The manner in which you handle the drinking water problem in your plant may seem to be a small matter to you—but investigate. The results will be surprising.

The old-time faucet is costly. Running hour after hour, day after day, its ceaseless flow is costing you money, yet without any better service.

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It will give every employee a safe, saner draught of bubbling water free from the contamination of the common drinking cup.

In a word, it is the only sanitary Drinking Fountain that is really safe, sanitary, simple, automatic in control, and easy to attach.

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This tool is used in shops where parts are keyseated by thousands. It is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. Shops large and small can use the tool, and it is readily attached to a drilling machine for which it is designed. The tool keyseats in places where Keyseating Machine, Planer and Shaper can't reach. The right tool to use for keyseating interchangeable parts. There is no limit to the variety of work possible to be keyseated.
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2270-2272 Spring Grove Avenue, Cincinnati, Ohio, U.S.A.
Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria.

investigations, insisting that the Straits are only open about two months in the year, are calculated to dampen the ardor of those who claimed that the Straits were navigable for four or five months. Even the two months, always show, it is stated, floating bergs, which would render navigation difficult, and compel the building of a special kind of boat to resist the onslaught of floating bergs. The prospect is not too encouraging; but the line is to be finished, in any case. About 90 miles of track have been laid this past season. Labor has been scarce, which accounts for the rather slight record of work.

Russia's Iron and Steel Output.—Russia's production of pig iron, semi-finished and finished steel in the last two years, according to *L'Economiste Européen* of Sept. 29,1916, was as follows in net tons:—

	1914.	1915
Pig iron	4,769,300	4,062,100
Semi-finished steel	5,308,800	4,539,100
Finished steel ..	4,334,100	3,599,500

Central Russia is credited with over 70 per cent. of the total pig-iron output, the Ural region coming second. Central Russia also leads in semi-finished and finished steel, making 60 per cent. of the total semi-finished steel, while the Ural region made 20 per cent. In 1914 Poland produced 269,500 tons of pig iron, 389,900 tons of semi-finished steel and 313,000 tons of finished steel.

Tenders

Weir, Que.—Tenders for furnishing all labor and materials and constructing a steel bridge and appurtenances to be erected over the Rouge River (Rivington Bridge), addressed to the undersigned, will be received by the Municipal Council of Harrington until December 2, 1916. All tenders shall be in accordance with the plans and the specifications prepared by the engineer of the Department of Public Works and Labor, and which may be seen at the office of the undersigned. Pierre Cantin, treasurer, P.O. Box 44, Weir, Que.

Marine

Vancouver, B.C.—It is reported to be not improbable that in the near future a shipbuilding yard on a somewhat extensive scale will be laid down on the south side of False Creek, Vancouver. Already plans have been drawn, and it is anticipated that a start will be made just as soon as these can be put into shape and a sufficient number of workmen engaged to go ahead. The firm interested in the scheme is that of Messrs. John Coughlan & Sons, the well-known steel manufacturers who have a big steel plant on Beatty Street, Vancouver.

St. John, N.B.—Arrangements are being perfected to care for a much larger business the coming winter than last. The Government Railway has promised to add to the trackage on the harbor front, and it has also contracted for the deepening of available berths. Among the steamship enterprises suggested has been that of a 25-knot an hour all British steamer service to cross the Atlantic in three and a half days from a port on the west coast of Ireland to St. John or other maritime port. This suggestion has been made to the Dominion's Royal Commission by the representatives of an English shipbuilding firm.

Refrigeration

Toronto, Ont.—Gunns, Ltd., are building an extension to their abattoir to cost $3,500.

Toronto, Ont.—The William Davies Co. have been granted a permit for a cold storage building at Front and Cypress Streets, to cost $100,000.

Wood-Working

Lachute, Que.—Fire recently destroyed the E. Charboneau & Co. sash and door factory. The loss is estimated at $15,000.

Railways—Bridges

Ottawa, Ont.—Notice has been given of an application to Parliament for a charter to the Peace River, Mackenzie and Copper Mine River Railway Co. of Canada to extend from Sawbridge, on the Edmonton, Dunvegan and British Columbia Railway to Bells Rock, on the Great Slave River.

Building Notes

Hamilton, Ont.—The Canadian Westinghouse Co. propose erecting a new office building next year.

Galt, Ont.—Drs. W. S. McKay and W. S. Dakin will build a three-storey store and office building on Water Street at an estimated cost of $15,000.

Hamilton, Ont.—The two new wings to be added by the Military Hospitals Commission to Hamilton's new sanitarium on the mountain will be of slow burning construction, costing $50,000.

Catalogues

Belt Sewing Machine—Bulletin illustrating and describing a wire belt sewing machine made by Joseph Appleyard, Bradford, Yorks, England. Each type of machine for sewing various sizes of belts is illustrated and described, the principal dimensions and shipping weight being given for each size. One page contains a number of illustrations showing the different classes and thicknesses of machine belting which these machines will sew. A large number of testimonials are included from users in various parts of the world.

Lagonda Boiler Tube Cleaners is the title of a very attractive catalogue L-9, just off the press, issued by the Lagonda Mfg. Co., Springfield, Ohio. The catalogue comprises 36 pages illustrating and describing the different sizes and types of "Lagonda" boiler tube cleaners for removing various kinds of boiler scale from all sizes and types of tubes. Several pages are devoted to cleaners for special uses such as economizers, evaporators, condenser tubes etc. The catalogue also deals with other boiler room specialties such as multiple strainers, grease extractors, automatic cut-off valves, automatic lubricaters, and reseating machines. A comprehensive description is given of each specialty accompanied by illustrations. A complete list of tube cleaner repair parts, is included with illustrations. A copy of this catalogue will be gladly sent to any engineer interested, upon request.

Nonpareil High Pressure covering for heated surfaces is the title of an interesting and attractive publication recently issued by the Armstrong Cork Co., Pittsburgh, Pa. The booklet contains 4 pages and deals fully with the subject of insulation for high pressure and superheated steam lines, boilers, breechings, feed water heaters, etc. An intersting feature is a list of comparative ests made at the company's Beaver Falls factory, as a result of which they ave been able to fix definitely the heat osses from various sizes of pipe both overed and uncovered. These losses re given in B.T.U. per lineal foot, per egree difference in temperature for wenty-four hours and are tabulated. n the following pages are tables which how in a general way, the most econoical thickness of "Nonpareil" high ressure covering to use, based on diferent steam costs. A complete set of ecifications is also included dealing ith the correct installation of these arious thicknesses of covering. The ooklet is fully illustrated and is exptionally well gotten up. It contains great deal of interesting and useful formation. Copies may be had on reest by interesting readers.

Steel Castings

We are in a position to make immediate delivery of all kinds of steel castings, 100 lbs. and heavier.

Send us your next order.

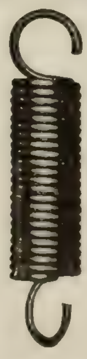
Dominion Steel Foundry Co., Ltd.
Hamilton, Ont.

We are qualified Tool, Die, Jig, Gauge and Fixture Makers.

WRITE US.

Windsor Machine & Tool Works.
WINDSOR, ONT.

MORTON MANUFACTURING CO.
PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R R SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE AND WORKS: MUSKEGON HEIGHTS U S A



"Barnes-made"
SPRINGS

are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

Write for booklet No. 7-T.

Established 1857.
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U.S.A.

Man'frs of "Barnes-made" Products
Springs, Screw Machine Products Cold Rolled Steel and Wire

METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS
372 Pape Avenue, Toronto, Can.

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Display rates on application.

FOR SALE

HEAVY DROP HAMMER FOR SALE. Metallic Roofing Co., Toronto. (21)

16 H.P. IDEAL GAS ENGINE — ALSO quantity of pulleys. Chipman & Millman, Brantford, Ont. (16)

FOR SALE—TWO BAKER DRILLS NO. 310, with pumps; almost new. 1 Colburn drill No. 14, with pumps; standard. Alton Foundry Co., Alton, Ont. (22)

6½ H.P. WESTINGHOUSE AND 1/3 H.P. Toronto & Hamilton Electric Co. 60-cycle motors, in first-class order. Geo. H. Lees & Co., Hamilton. (17)

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 227, Canadian Machinery. (15)

FOR SALE—TWO C.M.C. TURRETS—SPECIALLY built for inside boring for 6" shells; almost new. These are offered for sale subject to special terms as to delivery, and at price to be arranged. Taylor-Forbes Co., Ltd., Guelph. (19)

ONE REED TURRET LATHE, 8' BED, swing, 28"; 4 2" holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 241, Canadian Machinery.

FOR SALE — HOT SAW AND MILLING machine, Ajax. New; never used. Address Canadian Warren Axe & Tool Co., St. Catharines. Ont.

FOR SALE—45 H.P. GAS PRODUCER AND engine, complete. Good condition. For particulars write Canadian Warren Axe & Tool Co., Ltd., St. Catharines, Ont.

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

For Sale Cheap

- 1—Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.
- 1—12" Single "I" Beam Overhead Hand Power Crane, 30' 10" span, 3 tons capacity; complete, less the Hoist.
- 1—Brantford (Gas) Bake Oven and 4 Racks.
- 1—Linderman 2-Spindle Boring Machine.
- 1—26" Drill, London Machine Tool Company.
- 1—Bowser 40 Gal. Varnish or Oil Pump and Tank.
- 11—New 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.
- 30—Used 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.

M. BEATTY & SONS
Limited
Welland, Ont.

BRASS RODS, 1¼, 1½, 1¾ UP TO TEN FT. Brass tubings, 2⅜ o.d., with ¼ wall; all lengths to ten feet. Louis Lovitz, 186 Markham St., Toronto. Telephone College 5711. (17)

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 226 Canadian Machinery. (15)

FOR SALE—TWELVE H.P. GAS OR GASOLINE Engine. Goold, Shapley & Muir Ideal. In first-class condition. Cheap. Stedman Brothers, Ltd., Brantford, Ont. (21)

FOR SALE—FIVE THOUSAND FEET OF 1" black piping. Newell Mfg. Co., Prescott, Ont. (18)

BUSINESS FOR SALE — MACHINE SHOP with a good, steady run of work and always busy. A good opening for a young man to get into business. Owner has other interests. Box 224, Canadian Machinery. (13)

WE CAN GIVE EARLY DELIVERY ON difficult fixture cutting, also on gauges and jigs. We have a large shop and the finest equipment. Apply Box 235, Canadian Machinery.

FOR SALE — IMMEDIATE SHIPMENT — New Heavy Duty Shell Boring Lathe for manufacture of 6" High Explosive Shells. Write for complete specification. Wm. Hamilton Co., Ltd., Peterboro, Ont. (20)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

FOR SALE—1 40 H.P. ROBB, ARMSTRONG high-speed engine; 1 4 x 1 Marsh deep well steam pump, and 1 Barton generator, 80 lamp capacity, with switch-board. All in good order and cheap for quick sale. Richards-Wilcox Canadian Co., Ltd., London. (20)

FOR SALE.—ONE BROWN-BOGGS MARKING Machine, suitable for 6" Mark XVI. or Mark III. English Shells. Only object in selling is that other methods of marking have been adopted. Price on application. Taylor-Forbes Co., Ltd., Guelph. (14)

FOR SALE—BOILER REPAIR AND SHEET iron works. Fine opening, one of the best in Canada, for a good man. Only repair shop in county. Equipment alone will list at nearly $2,000. Will sell for $1,200. Write for particulars. Box 213, Canadian Machinery.

GAP LATHE — LONDON TOOL CO. — swings 41" in the gap, 26" over shears, 20 ft. bed, rod and screw feed, compound rest, steady rest, countershaft, 2 face plates, 4-jaw chuck, weight about 10,000 lbs. This tool has been very little used, and is in excellent condition. Bargain for quick sale. Winnipeg Machinery Exchange, Sutherland & Gladstone Sts., Winnipeg, Man. (17)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

PATENTS

NOTICE IS HEREBY GIVEN THAT SWIFT & Company has obtained for Canada Patent No. 168736, in connection with a branding tool device, and the firm of Patterson & Heward, of Toronto, Ontario, is manufacturing this article and is prepared to supply the same to any person who may wish to purchase the same at a reasonable price. Any person, firm or corporation desiring to purchase this article will kindly communicate with Patterson & Heward, Toronto, Ontario. (21)

SITUATIONS WANTED

TOOL MAKER IN CHARGE DESIRES change. Competent to take charge of machine shop or tool room. Good references. Box 225, Canadian Machinery. (17)

PRODUCTION MANAGER, YOUNG MAN, 10 years' experience, interested in high-grade permanent position, capable either installing or maintaining and improving efficient production system covering all manufacturing details from design to shipping platform. Box 240, Canadian Machinery. (23)

SITUATIONS VACANT

WANTED—NIGHT SUPERINTENDENT TO take charge of factory making 4.5 sockets. Apply Box 237, Canadian Machinery.

FOREMAN TOOL-MAKER WANTED — TO take charge of tool room in plant manufacturing 4.5 sockets and other munition work. Apply Box 236, Canadian Machinery.

WANTED — EXPERIENCED STEEL works draftsman for Nova Scotia. Give full particulars, including salary, permanency. Apply Box 234, Canadian Machinery. (17)

ALL-ROUND MACHINISTS WANTED FOR tool-room; highest wages paid. A. R. Ormsby Co., Limited, 48 Abell Strett, Toronto. (21)

WANTED SUPERINTENDENT FOR FACTORY machining 4.5 shells. To one who has had successful experience, and can produce results a liberal proposition will be made. Apply Box 242 Canadian Machinery. (20)

SPLENDID OPPORTUNITY FOR YOUNG man about twenty-one, well educated and with some mechanical knowledge, who desires to learn the machinery business. Apply in first instance with full particulars as to experience, etc., to Box 243 Canadian Machinery.

WANTED — MANAGER MACHINE TOOL department. Must have full knowledge of general miscellaneous machinery, especially for munition plants. Position affords every opportunity for advancement. Please state experience and salary expected. Apply to Box 239, Canadian Machinery. (20)

WANTED — SUPERINTENDENT FOR 18-pdr. shrapnel shell factory equipped and now turning out 1,200 shells per day; must have good executive ability and able to produce results; liberal salary to right man. State fully past experience and record, and salary expected. Address Box 238, Canadian Machinery. (19)

WANTED

WANTED — BORING MILL, 30" TO 42" table; state make, condition, time used, lowest price, and send cut to Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (21)

WANTED TO MANUFACTURE A FEW lines of metal products, sheet metal preferred. We have complete equipment for high-class work. Give complete description and rating in first letter. Apply Box 221, Canadian Machinery. (17)

WANTED—12" BAR ROLLING MILL TWO or three high with steam drive. One three-ton Steam Hammer. One half-ton Steam Hammer. One pair Rolling Mill Shears. With full particulars and lowest price. Aplly Box 218, Canadian Machinery.

WANTED — THREE TURRET LATHES suitable for steel sockets. also Thread Millers suitable for milling outside thread of sockets. Give price and particulars to Steel Furnishing Co., New Glasgow, N.S. (19)

For Sale--Warner & Swasey Turret Lathes--From Stock

Ten (10) 16" No. 2. Geared Friction Head Universal Turret Lathes, only used a few months—equal to new.

Williams & Wilson Limited

320 St. James St.
Montreal, P.Q.

Immediate Delivery

NEW STEAM ENGINES

Two 5 x 6 Vertical steam engines, 8 horse	$105.00	each
Two 6 x 6 Vertical steam engines, 10 horse	125.00	"
One 7 x 8 Vertical steam engine, 15 horse	175.00	
One 8 x 8 Vertical steam engine, 20 horse	200.00	
Two 4 x 6 Horizontal steam engines, 6 horse, with base	100.00	"
One 5 x 6 Horizontal steam engine, 8 horse, with base	125.00	
Five 6 x 6 Horizontal steam engines, 10 horse, with base	135.00	"
Five 6 stroke engines, with base, 10-15 H.P.	150.00	"
Two 6 x 6 Automatic, with base, 12-20 H.P.	250.00	"
Two 7 x 6 Automatics, with base, 15-25 H.P.	275.00	"
One 8 x 8 Automatic, with base, 20-42 H.P.	500.00	
One 10 x 10 Automatic, with base, 39-82 H.P.	700.00	
One 11 x 10 Automatic, with base, 47-85 H.P.	725.00	

Young, Corley & Dolan, Inc.
115 Broadway, NEW YORK CITY
Telephone: Rector 7866

(tf)

A MAN was wanted as Tool-room Foreman. He was found by a condensed ad. in

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto

FAIRBANKS-MORSE New and Used Machinery

In Stock at Toronto

1--7/8" 4-spindle National Acme Automatic; used.
2—No. 3 1" Foster Hand Screw Machines.
4 -No. 4 1½" Smurr & Kamen Turret Lathes.
1 -10" x 5' Seneca Falls Lathe; used.
2 -18" x 8' Springfield Lathes; new.
5—20" x 9', 19 16" x 7', 3 16" x 9' Fairbanks-Morse Lathes; new.
2 -No. 1 Racine Hacksaws; new.
1 -No. 304A Oster Pipe Machine; new.
1 -20" x 8' Hendey Lathe; used.
1 -Gisholt 16" Special Lathe, type C, 6½ bore.
1 -Walcott 20" x 8' Engine Lathe.
5 -Barnes 18" x 8' Engine Lathes; new.
7 -Potter & Johnson No. 6A Automatics; used.

In Stock at Montreal

3—Gisholt 16" Turret Lathes; new.
2 -Gisholt 25" Turret Lathes; new.
Waving and Grooving Machines, 6" shells, new.
1 -Hendey 16" Lathe; used.
2 -American 16" x 6' Tool Room Lathes; new.
1—Rivett Precision Lathe; used.
1—Brown & Sharpe No. 1½ Universal Mill; used. used.
1—Valley City No. 1½ Universal Mill; used.
2 -Ford Smith 20" Wet Tool Grinders; new.
1 -Wilmarth & Morman Drill Grinder; new.
3 -2" Back-geared Drills; new.
1 -25" Sliding Head Drill; new.
1—Banfield Plug Miller, 6" shells; new.

This is only a partial list of our stock of Machine Tools.

CFM

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

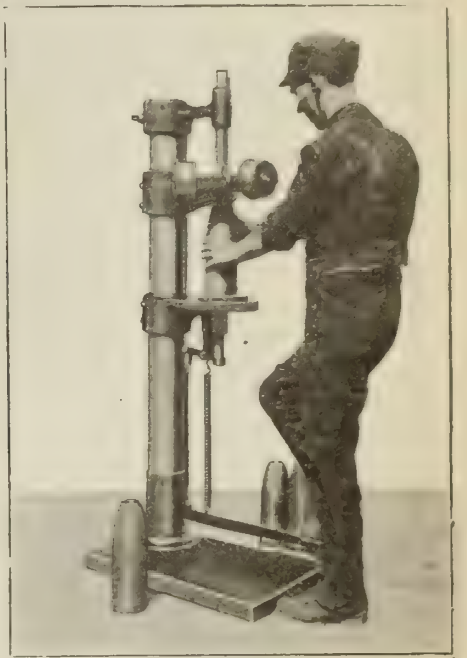
MONARCH Milling Machine

(Made in Canada)

For Milling the three slots in the nose of

Mark 7 Shells

Adjustable to take any size shell from 4.5 to 9.2 inclusive.



ONE MOVEMENT of foot lever clamps the shell and feeds the three cutters in to the right depth.

CAPACITY ON 4.5—6 to 8 shells per minute. Actual cutting time is simply — "zip" and the three slots are finished.

THE MACHINE is complete with High Speed Cutters and drive pulleys which should run at about 550 revolutions per minute. It can be driven by three 2-inch belts, either from overhead counter or line shaft. The clamping device does not interfere with copper band, and altogether it will be found to be a very satisfactory tool—CONVENIENT and ACCURATE.

For further particulars address

H. W. PETRIE, LTD.
FRONT STREET WEST, TORONTO
Sole Selling Agents for Canada

NEW YORK STOCK PRESSES

Ten No. 60½ Bliss Geared Reducing Presses, rack and pinion movement, adjustable stroke 4" to 42", weight 12,500 lbs. each. Modern type; used 6 months.

Toledo Double Crank Back-geared Forging Press, weight 28,000 lbs.; 27½" between uprights; bolster space 36" x 36"; shaft 8" diameter.

No. 27K Bliss Knuckle Joint Press; weight 77,000 lbs.

Consolidated Geared Arch Press; weight 11,000 lbs.

No. 2 new Bliss Straight-sided Double Crank Press.

PG-6 Ferracute Geared Punching Press; weight 12,000 lbs.

No. 4 Farrel Punch Press, 1½" stroke.

No. 1 Bliss Straight-sided Press, 8" stroke.

No. 3 Manville Stamping Press, 1" stroke.

No. 69 Bliss Inclinable Press.

Farrell Double Crank Geared Press, 2" stroke; weight 9,000 lbs.

Brush Knuckle Joint Press.

Fowler Press, 1¼" stroke.

Bliss Pillar Press, 1½" stroke.

PUNCHES — SHEARS — ROLLS.

Sellers & Co. Double Angle Shear, capacity 8" x 8" x 1"; weight 41,000 lbs.

Hilles & Jones Double Angle Shear, capacity 6" x 6" x ½".

Pels Beam Shear "T-40"; weight 9,150 lbs.

Waterbury-Farrel Rotary Slitting Shear, 18" throat.

Lennox Rotary Splitting Shear, split 16 ft. plates; capacity ¾"; weight 9,600 lbs.

Lennox Rotary Splitting Shear, split 12 ft. plates; capacity ¾"; weight 9,000 lbs.

Size "D" Long & Allstatter Bar Iron Shear, 3½" stroke; weight 30,000 lbs.

Bement Plate Iron Shear, 26" throat.

No. 4 Niles Single End Punch and Shear, 31" throat.

Heinss Double End Punch and Shear, throats 12" and 21", stroke 1½".

Bass Double End Punch and Shear, 20" throats, punch 1¼" in ¾", shear ⅝" plate.

Reade Cleveland Combined Punch and Shear, 28" throat, 1½" stroke.

Bement Punch, 31" throat, capacity 2" in 1".

Kling Bros. Punch, throat 24", capacity 1¼" in ¾".

Cockburn Punch, 2" stroke, capacity 1" in 1".

Hayes Crimping Machine, 8' 8" between housing.

12 ft. Hilles & Jones Ship Plate Bending Rolls.

8 ft. Niles Plate Bending Rolls.

8 ft. Kling Boiler Plate Rolls.

10 ft., extension to 16 ft. Niles Vertical Boring Mill, two heads.

10 ft. Betts Vertical Boring Mill, two heads, chasing attachment.

66" Betts Vertical Boring Mill, two heads.

60" Niles Vertical Boring and Turning Mill, two heads.

60" Baush Vertical Boring Mill, two heads.

No. 1 Barrett Horizontal Boring Mill, 3¾" bar.

No. 2 Rockford Horizontal Boring Mill, 2 1-16" bar.

5 ft. Bement Vertical Boring Mill.

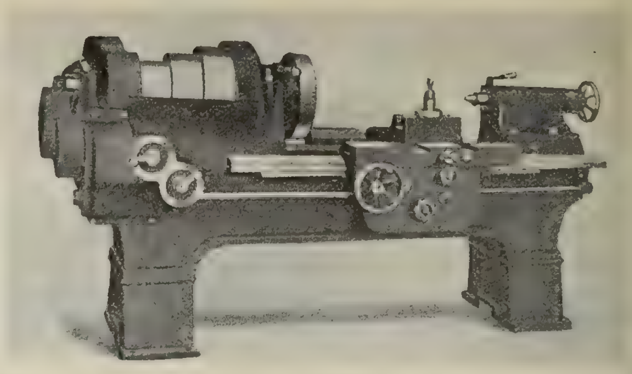
50" Bement-Miles Car Wheel Boring Mill.

New York Machinery Exchange

Offices: 50 Church St., NEW YORK

MACHINE SHOPS AND WAREHOUSES:

222-234 Culver Avenue 63-83 Pollock Avenue
JERSEY CITY



For Immediate Delivery

5 Heavy Duty, double back geared manufacturing lathes.

Machinery Department

Wm. Pattison Tool & Supply Co.
CLEVELAND, OHIO

USED MACHINE TOOLS ALL KINDS

THE MOTCH AND MERRYWEATHER MACHINERY Co
CLEVELAND OHIO

EACH PIECE OVERHAULED GUARANTEED

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

Kindly mention this paper when writing advertiser

FOR SALE

1 No. 1 Acme Chucking Turret Lathe, with power feed, back-geared, swings 16", hole in spindle 1 1-16"; excellent condition.

1 No. 3 Foster Geared Friction Head Turret Lathe with automatic chuck and wire feed, hole in spindle 1 9-16"; practically new.

1- Copper and Nickel Plating Plant with piping, 2 rheostats, one 280 amp. dynamo and countershafts.

1 Only 5-C Modern Die Head.

This equipment can be inspected at

THE GRAY MANUFACTURING & MACHINE COMPANY, LIMITED
686 St. Clarens Avenue - Toronto
(23)

Six to Eight Pages a Week —and Growing!

LESS than a year ago the Classified Section of CANADIAN MACHINERY consisted of less than two pages. It now runs from six to eight pages every week. It is one of the most important and carefully read departments of each issue. It is the weekly meeting-place of buyer and seller, employer and employee; *it satisfies the natural curiosity to know what's wanted and what's offered;* it pulls results.

If you have equipment of no further use to you; if you want to buy second-hand machinery; if you want an employee or a new job—

Advertisell It

in the Classified Advertising Section of CANADIAN MACHINERY and get what you want.

CANADIAN MACHINERY reaches both shop men and business men. Vacancies and "positions wanted" are quite as successfully advertised as machinery and machine shop equipment. The reason—it covers the whole field

Describe fully your wants, or what you have for sale —it doesn't cost much and it pays big.

RATES FOR CLASSIFIED ADVERTISING

First insertion—Two cents per word.
Subsequent insertions—One cent per word.
Count five words for box number. Minimum order one dollar.

Canadian Machinery & Manufacturing News
143 University Avenue Toronto, Ontario

MACHINE TOOLS

LATHES.

1—68 x 20 Fifield, face plate drive, triple geared.
1—30 x 27 Reed, heavy type, with taper attachment.
1—18 x 36 x 10 Niles Extension Bed Lathe.
1—22 x 14 Engine Lathe, C.R., H.S.
1—28 x 15 Engine Lathe, C.R., H.S.
1 20" LeBlond Heavy Duty, with turret.
1—18 x 8 Jones & Lamson Engine Lathe.
2—16 x 6 Barnes Engine Lathes.
1—16 x 8 Cincinnati Engine Lathe.
1—16 x 6 Walcott Engine Lathe.
1—16 x 6 Reed Engine Lathe.
1—16 x 8 Porter Engine Lathe.
1—14 x 5 Lodge & Shipley Engine Lathe.

MILLING MACHINES.

1—No. 1½ B. & S. Universal with vertical attachment.
1—No. 3½ Fox, Plain.
1—No. 3 Chicago Hand Miller.
2—No. 12 P. & W. L.T. Millers.
4—No. 13 P. & W. L.T. Millers.
1—No. 3-H. B. & B. Vertical Miller.
1—Warner & Swasey Profiler.

GRINDERS.

1—No. 1 B. & S. Universal, with all attachments.
1—No. 1 Landis Universal.
2—12 x 36 Landis, plain, geared head.
1—No. 5 Springfield Oscillating Surface Grinder.
1—No. 2 Gardner Disc Grinder.
1—No. 34 Gardner Double Spindle Disc Grinder.
3—Webster Perks Heavy Grinders.

PLANERS.

1—Pond, 62" (widened pattern type), 9' bed.
1—36 x 26 x 10 Industrial Planer, 1 rail head and 1 side head.
1—34 x 10'-Badger, S.H.

TURRET LATHES.

1—No. 6 Foster Friction Geared Hand Screw Machine.
1—No. 4 W. & S. Friction Geared Hand Screw Machine.
1—No. 4 Smurr & Kaven Friction Geared Hand Screw Machine.
1 -14" B. & O. Chucking Machine.
1—No. 5 Pearson Hand Screw Machine.
1—1 x 8 Pierce Hand Screw Machine (new).
1—2" Cleveland Automatic Screw Machine (model A).
2—2" Cleveland Jigger Feed Screw Machines.
1—⅝" Cleveland Automatic Screw Machine (model A).

AIR COMPRESSORS.

Steam.

1—12 x 12 x 12¼ x 12 Ingersoll-Rand, Class M.F.I.
1—16 x 18 x 12 D. A. Union S.L. 2 S. Air Compressor.

Belt.

3—10 x 10 Bury Hor., Belt-Driven (182 C.F.).
1—10 x 10 Curtis Vertical, D.C., with base (160 C.F.).
1—8 x 8 Ingersoll Sergent Horizontal (100 C.F.).
1—8 x 8 Chicago Pneumatic Horizontal (110 C.F.).
1—10 x 6 Bury Horizontal.

DRILLS AND SLOTTERS.

1—24" Niles Geared Slotter.
1—28" Prentiss, B.G., P.F., W. & L.F.
2—20" Rockford, B.G., P.F., W. & L.F.
3—20" Buffalo (new), W. & L.F.
1—17-Spindle Moline.
1—5-Spindle Barnes.

PUNCH PRESSES.

1—No. 64 Toledo, S.S., B.G.
1—No. 95 Consolidated Press.
2—Briscoe S.S., 7" stroke.
2—1200-lb. B. & S. Roll Board Hammers.
1—800-lb. B. & S. Roll Board Hammer.

We carry a large line of Boilers, Pumps, Engines, Motors, Generators, etc.

Riverside Machinery Depot
Detroit, Mich.

FOR SALE

GRINDING MACHINES
1 Wilmarth & Morman Universal Tool and Cutter Grinder (new).
2 Wells No. 190 Universal Tool and Cutter Grinder (new).
1 Wilmarth & Morman Style B-X Universal Cutter and Drill Grinder (new).
1 10" x 36" Landis Plain Grinder (new).
1 10" x 20" Landis Plain Grinder.
2 12" x 24" Modern Plain Grinders (nearly new).
1 14" x 50" Norton Plain Grinder (nearly new).
2 18" - 30" x 96" Norton Gap Grinders (nearly new).
2 Landis Internal Grinders with No. 75 Heald Heads (nearly new).
1 No. 70 Heald Internal Grinder.
2 No. 60 Heald Cylinder Grinders (nearly new).
1 16" x 66" Landis Crank Shaft Grinder (18 months old).
2 14" Swing Special Internal Grinders, capacity ½" to 14" dia. straight or taper.
1 New Yankee, style L, Drill Grinder (new).
1 No. 6M Besley Double Disc Grinder.
1 No. 300 Safety Emery Wheel Ring Wheel Grinder.

TURRET LATHES
58 Potter & Johnson No. 6-A Automatic (new).
8 Potter & Johnson No. 5-A Automatic (nearly new).
12 13" Gisholt Semi-Automatic (12 mos. old).
20 21" Gisholt Semi-Automatic (12 mos. old).
5 J & L two spindle (new).
1 J & L 2 x 24 with bar equipment, motor driven (fine condition).

MILLING MACHINES
1 No. 3 Garvin Universal (new).
1 No. 8 Becker Duplex (new).
1 No. 2 Rockford Hand Miller.
3 No. 0 Bristol Hand Millers.
1 Newton Duplex with 72" table feed.
1 No. 3½ Becker Vertical with Dividing Head.
1 Small Duplex Miller.
1 No. 4 Hendey type Lincoln Miller (nearly new).

DRILLING MACHINES
1 8-spindle Bausch Multiple, 1" capacity.
1 12" Spindle Garden ½" capacity.
6 Barnes 24" 2-spindle All Gear Drive (new).
1 24" Hoefer Sliding Head (new).
4 Henry & Wright No. 1 style K (nearly new).
12 Colburn Heavy Duty, size D-2 (new).
27 Colburn Heavy Duty, size D-4 (new).
1 26" Rockford Sliding Head (fine condition).
3 4-spindle Dwight slate, 14" swing, ¾" capacity.
2 Peerless 20" (new).
1 20" Mechanics (new).
1 20" Buffalo (new).
1 28" Hamilton Sliding Head.
11 Burke No. 1 Bench (new).
1 25" Kern Sliding Head with Tapping attachment.
362 Paragon High Speed Drills, 1¾" x 14" flute, 21" over all (new).

RADIAL DRILLS
1 36" Dreses, with quick return tapping attachment (fine condition).

ENGINE LATHES
38 16" x 8' Fairbanks-Morse (new).
1 18" - 36" x 8' Fay & Scott Extension Gap (fine condition).
1 30" x 12' LeBlond.
1 12" x 6' American.
1 28" x 14' Fifield.
1 14" x 4' Blaisdell.
1 No. 4½ Barnes.
1 54" x 21' Detrick & Harvey.
1 26" x 10' Bradford.

MARKING MACHINES
2 Noble & Westbrook No. 1 (new).

PROFILERS
1 No. 3H Becker (new).

PLANERS
1 30" x 30" x 10' Ohio with two heads (new).
1 44" x 44" x 12' L W Pond with three heads.
1 40" x 40" x 12' New Haven, with one or two heads.
1 36" x 36" x 12' Sellers widened to 72".

AUTOMATIC GEAR CUTTERS
1 No. 3 Brown & Sharpe 26" (old machine).
1 36" x 4" Fellows Gear Shaper (fine condition).
1 18" Schuchart & Schutte Tooth Rounder (nearly new).

CUTTING OFF MACHINES
1 4" Hurlbut-Rogers Cone Drive (fine condition).
18 Newton No. 500 Gold Saw Machines with 20" inserted tooth blades (new).

BELT LACING MACHINES
1 12" Jackson (new).

KEY SEATERS
1 No. 1 Catlin (new).

SCREW MACHINES
1 No. 3 Stecher (new).
1 1" x 8" Pierce (new).
3 No. 2 Southworth (nearly new).
4 No. 2 Warner & Swasey, with power feed turret (nearly new).
4 No. 54 1⅜" capacity National-Acme (used two years).
1 No. 4 B. & O. power feed turret, friction back gears.
1 No. 4½ B. & O., power feed turret, friction back gears.
1 2" x 24" Jones & Lamson Motor Driven (fine condition).
1 No. 6 Warner & Swasey 2¼" capacity back geared but no power feed to turret (nearly new).

BROACHING MACHINES
1 No. 3 La Pointe (nearly new).

BOLT CUTTERS
1 2" Landis Double Head (nearly new).

BORING AND TURNING MACHINES
1 4' Bickford Boring & Turning Mill (nearly new).
1 20" swing 4-Spindle Moline Vertical Boring Machine with 18" x 36" table.

BULLDOZERS
1 No. 4 Williams White (old).
1 No. 1 Williams White.

FILING AND SAWING MACHINES
1 Large Filing and Sawing Machine with 12" stroke.

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1 No. 3 Walsh Punch Press.
1 Moser 1½" stroke Punch Press with Automatic Feed.
1 No. 17 Williams White Double End 8" throat capacity ¼" x ¼".
1 27½" throat lever punch ½" capacity 1¼" stroke.
1 Thompson Bevel Shear ½" capacity.

PIPE MACHINES
1 6" Saunders.

SHAPERS
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34" Barnes, S.H., B.G., P.F.
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12 spindle Multiple.
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20" x 10' Flather, C.R.
21" x 12' New Haven, C.R.
24" x 16' Schumacher & Boye, C.R.
30" x 14' Reed, C.R.
32" x 16' Blaisdell, C.R.
36" x 12' American, C.R.
36" x 28' American, C.R.

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No. 12 B. & S., plain.
No. 2 Cincinnati, plain.
No. 3 Brown & Sharpe, plain.
No. 4 LeBlond, plain.
No. 13 P. & W., Lincoln.
No. 4 Becker Vertical.

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22" x 22" x 6' Gray, one head.
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36" x 36" x 12' Cincinnati, two heads.
36" x 36" x 16' Sellers, one head.
39" x 39" x 12' New Haven, one head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.

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Contents:

The Girl of Big Loon Post—a short serial story by George Van Schaik.

From Stephen Leacock is "Abdul Aziz Has His"—a follow-up to his "Germany From Within," one of the best things Leacock ever wrote. It tells the story of Leacock's visit, disguised as an English Governess, to the Yildiz Kiosk.

A story, "The Pride of Pauline," by Sir Gilbert Parker. A story of the Canadian North-west—a typical Parker story.

Robert W. Service's contribution is 'The Ballad of Jean Desprez''—a very stirring story of the war, with a mighty swing to it.

Two exceptionally good Christmas stories—much above the average. One is "The Blue Water Prodigal," by A. C. Allenson, a story that combines humor and sentiment with a patriotic setting. The second story is by Alan Sullivan, a story of missionary life—"The Soul of Nanook"—an admirably written thing.

H. F. Gadsby has an article dealing with the problems facing Canadian statesmen, under the heading: "Peaches and Lemons." Gadsby gives some straight-from-the-shoulder talk from a purely non-partisan standpoint.

A sketch of the Hon. W. M. Martin, the new Premier of Saskatchewan, by Norman Lambert, under the heading: "The Man Who Brings Back the Ball."

Add to the foregoing the fine Review of Reviews Department; the regular Business Outlook Article, and the Department—"Information for Investors," and you have a magazine worth fifteen cents of any Canadian's money—a magazine for a true Canadian. **Better for a Canadian than any other magazine, no matter how or where produced.**

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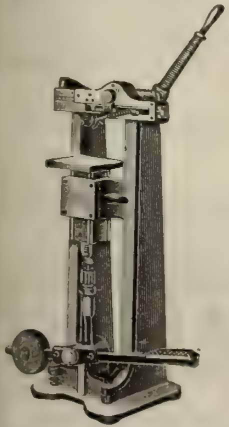

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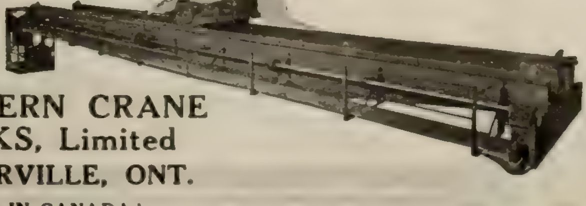

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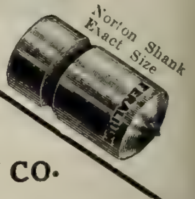

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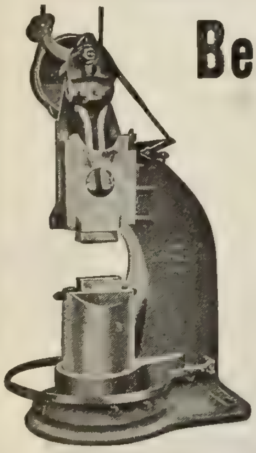

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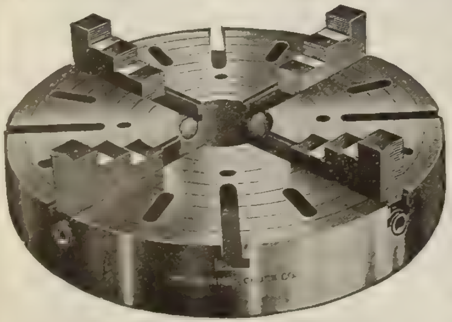

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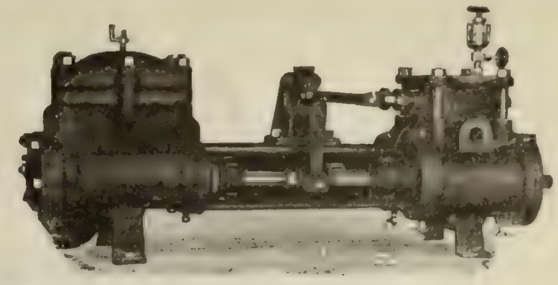

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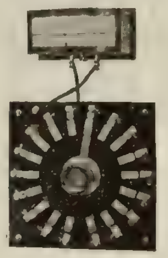

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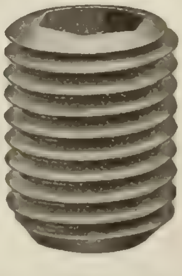

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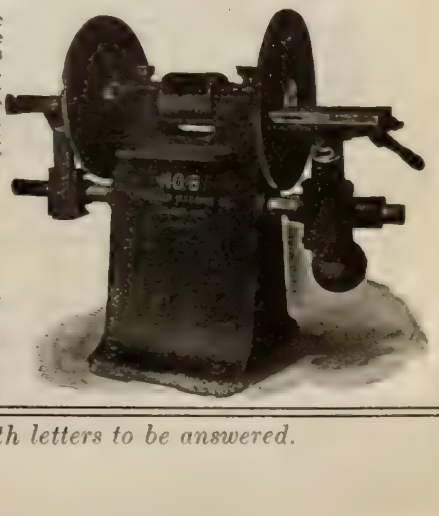

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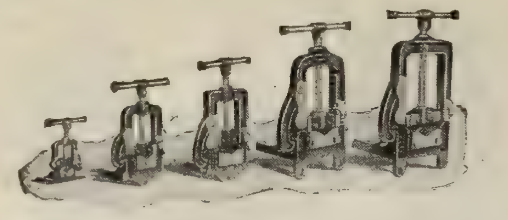

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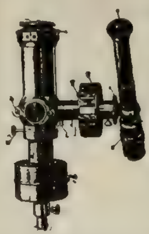

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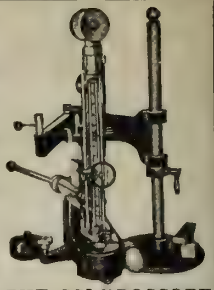

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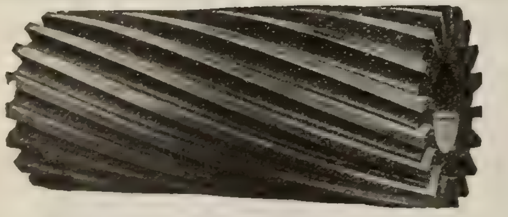

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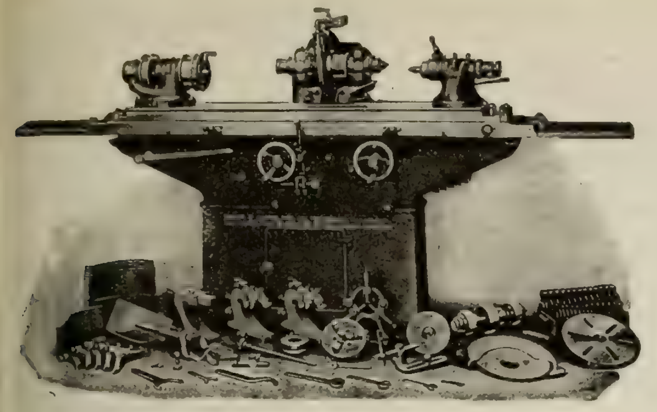

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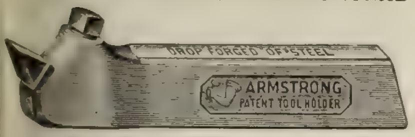

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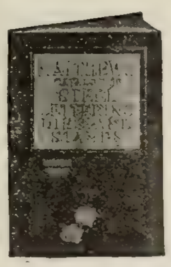

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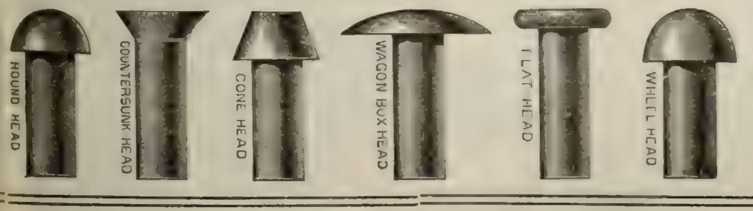

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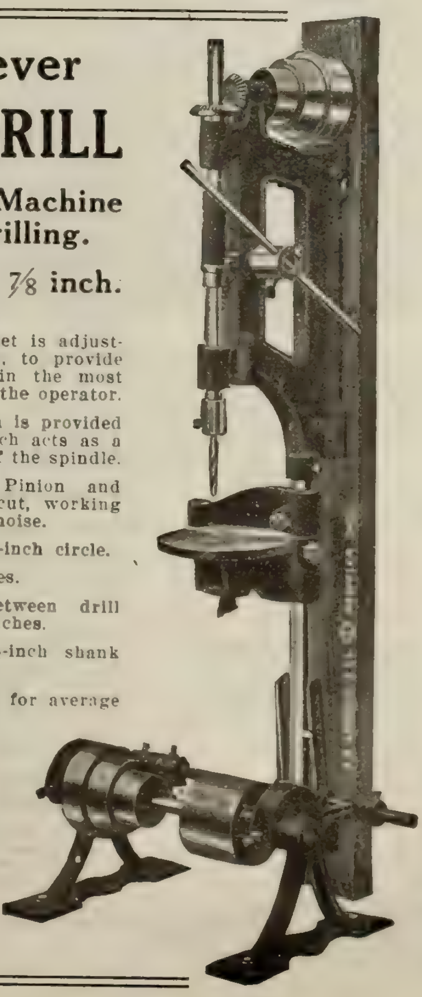

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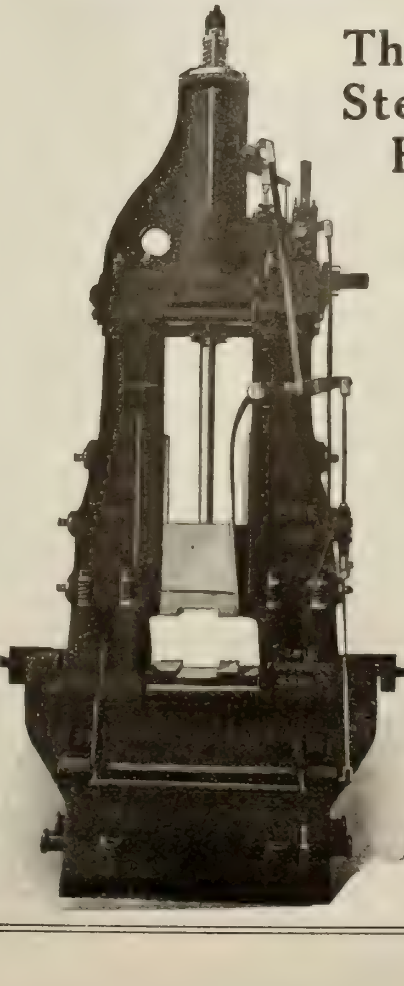

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Niles-Bement-Pond Co., New York.
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Whitman & Barnes Mfg. Co., St. Catharines, On

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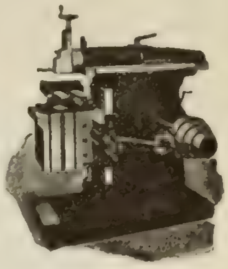

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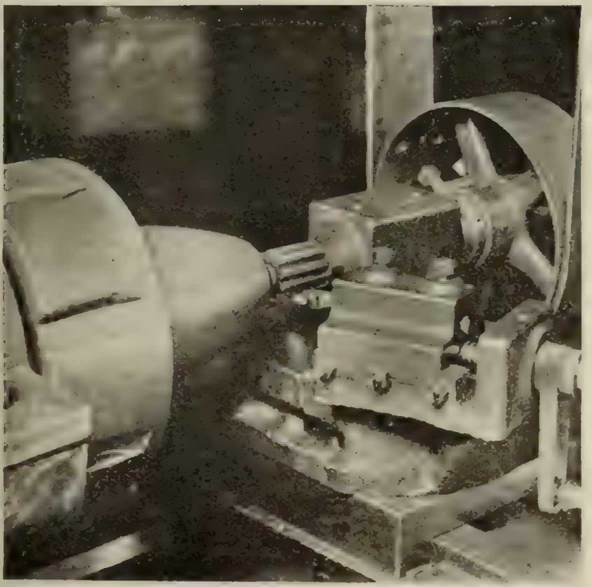

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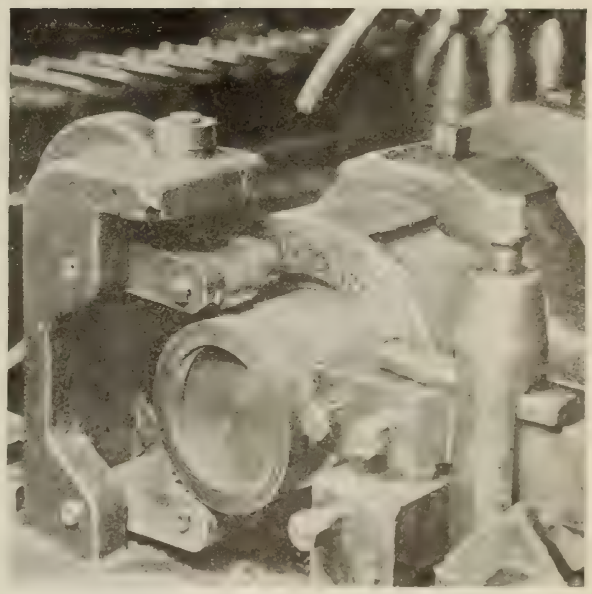

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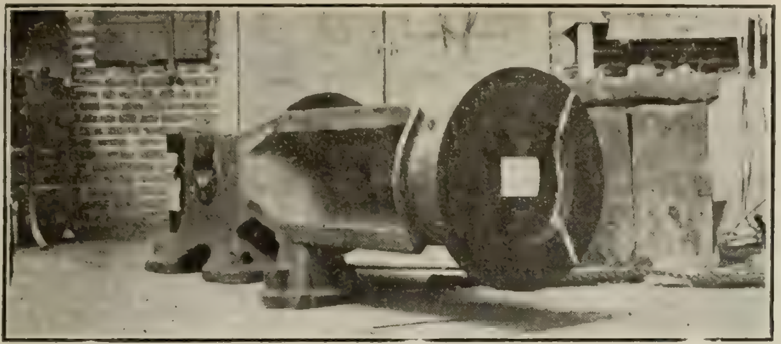

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New Britain Mach. Co., New Britain, Conn.

PAPER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

PATENT SOLICITORS
Babcock & Sons, Montreal.
Budden, Hanbury, A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Ross Thomsen & Co., Ottawa, Ont.

PATTERNS
Galt Malleable Iron Co., Galt.

PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton.

PIG IRON
Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PIPE CUTTING AND THREADING MACHINES
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
H. W. Petrie, Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.

PIPE CUTTERS, ROLLING
Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
John H. Hall & Sons, Ltd., Brantford, Ont.
H. W. Petrie, Ltd., Montreal.

PIPE, RIVETED STEEL
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto.

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Oliver Machy. Co., Grand Rapids, Mich.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Niles-Bement-Pond Co. New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio
A. R. Williams Machy. Co., Toronto.

PLANING MILL EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Niles-Bement-Pond Co., New York.

PLIERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Billings & Spencer, Ltd., Welland.

PLUG MILLERS

PRESSES, ARBOR
Banfield, Edwin J., Toronto.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
Atlas Press Co., Kalamazoo, Mich.

PRESSES, BROACHING, FORGING AND FLANGING
Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo, O.

PRESSES FOR SHELLS
Atlas Press Co., Kalamazoo, Mich.
Charles F. Elmes Eng. Works, Chicago.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER
Lymburner, Ltd., Montreal.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, DROP AND FORGING
W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago, Ill.
Can. Fairbanks-Morse Co., Montreal.
Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Niles-Bement-Pond Co. New York.
Wm. R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

PRESSES, HYDRAULIC
Bawden Machine Co., Toronto, Ont.
John Bertram & Sons Co. Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill
Dominion Machy. Co., Toronto, Ont
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, HYDRAULIC DIE STAMPING
Hydraulic Press Mfg. Co., Mount Gilead, O.

PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, BALING
Hydraulic Press Mfg. Co., Mount Gilead, O.
William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT
Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

PRESSES, SCREW
Barnes, W. F. & John, Co., Rockford, Ill.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Erie Foundry Co., Eric, Pa.

PRESSURE REGULATORS
Can. Fairbanks-Morse Co., Montreal.

PROPELLERS
Ontario Specialties, Ltd., Ottawa, Can.

PULLEYS
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Dodge Mfg. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Ltd., Toronto
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PULLEY MACHINERY, DRILLING AND TAPPING
Can. Fairbanks-Morse Co., Montreal.
Wells Bros. Co. of Canada, Galt, Ont.

PUMPS, AIR
Bawden Machine Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Darling Bros., Ltd., Montreal, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

PUMPS, HIGH PRESSURE
Charles F. Elmes Eng. Works, Chicago.
Darling Bros., Ltd., Montreal, Que.
Hydraulic Press Mfg. Co., Mount Gilead, O.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

PUMPS, ALL KINDS
Bawden Machine Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PUMPS, HYDRAULIC
Charles F. Elmes Eng. Works, Chicago, Ill
Darling Brothers, Montreal.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto

PUMPS, LUBRICANT AND OIL
Cincinnati Lubricant Pump Co., Cincinnati, Ohi
Roper, C. F., Co., Hopedale, Mass.

PUMP LEATHERS
Graton & Knight Mfg. Co., Montreal.

PUNCHES AND DIES
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co. New York.

PUNCHES, PNEUMATIC
Jno. F. Allen Co., New York.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co. New York.
Wickes Brothers, Saginaw, Mich.

PYROMETERS
Shore Instrument & Mfg. Co., New York City.
Thwing Instrument Co. Philadelphia, Pa.

QUARTERING MACHINES
John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS (SEE GUARDS)

RAIL BENDERS
Niles-Bement-Pond Co., New York.

RAILROAD TOOLS
Can. Fairbanks-Morse Co., Montreal
Cumming & Son, J. W., New Glasgow, Canada.
Niles-Bement-Pond Co., New York.

RAILS, STEEL
Cumming & Son, J. W., New Glasgow, Canada.

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMERS, ADJUSTABLE
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedfor
Pratt & Whitney Co., Dundas, Ont.
Stenotype Co., Indianapolis, Ind.
Whitman & Barnes Mfg. Co., St. Catharines, On

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Aikenhead Hardware Co., Toronto, Ont.
Boker & Co., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McKenna Bros. Brass Co., Pittsburgh.
R. E. T. Pringle, Ltd., Toronto, Ont.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Boker & Co., H., Montreal, Que.
Morse Twist Drill & Machine Co., New Bedford
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford
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Oxy-Acetylene Welding and Cutting

Illustration shows operator welding the corners on steel truck frames, using the Prest-O-Lite Process.

Welding Speeds Up Production

By welding the corners of the frames of a series of trucks, a number of welds are made without moving the welding outfit. When one pile is completed, the apparatus is quickly and easily moved to another pile similarly arranged.

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PROCESS

Employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene (ready made carbide gas) is backed by Prest-O-Lite Service, which provides dry, purified gas, insuring better welds, quicker work, and lower cost, and also avoids the large initial outlay and heavy depreciation incurred in making crude **acetylene in a carbide generator.**

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A. B. Jardine & Co., Hespeler, Ont
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont

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RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Lachapelle, J. D., & Co., Montreal, Que.

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Can. Blower & Forge Co., Kitchener, Ont.
Cook, Asa S., Co., Hartford, Conn.
National Machinery Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

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Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
Jno. F. Allen Co., New York.
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.

RIVETING MACHINES, ELASTIC ROTARY BLOW
Grant Mfg & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.

ROLLS, BENDING AND STRAIGHTENING
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.
Wickes Brothers, Saginaw, Mich.

ROLLS, CRUSHING
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
L. S. Starrett Co., Athol, Mass

SAND BLASTS
Curtis Pneumatic Machinery Co., St. Louis, Mo
Gray Mfg. & Machy. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt. & Son, Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Wickes Brothers, Saginaw, Mich.
A. R. Williams Machy. Co., Toronto.

SAWS, CIRCULAR METAL
H. A. Drury Co., Montreal.
Hunter Saw & Machine Co., Pittsburg, Pa.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)

SAWS, INSERTED TOOTH
Tabor Mfg. Co., Philadelphia, Pa.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

SCREW MACHINE PRODUCTS
Eastern Mach. Screw Corp., New Haven, Conn.
Milholland, W. K., Co., Indianapolis.

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Bawden Machine Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler.
Milholland, W. K., Co., Indianapolis, Ind.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Stenotype Co., Indianapolis, Ind.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

SCREW MACHINES, MULTIPLE SPINDLE
New Britain Machine Co., New Britain, Conn.
Windsor Machine Co., Windsor, Vt.

SCREWS
Galt Machine Screw Co., Galt, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
Wells Bros. Co. of Canada, Galt, Ont.

SCREW SLOTTERS
Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY
Baird Machy. Co., W. J., Detroit, Mich.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
New York Machinery Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Simmons Machine Co., Albany, N.Y.
H. A. Stocker Co., Chicago, Ill.

SET SCREWS, SAFETY
Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Hendey Machine Co., Torrington, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.

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Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Dodge Mfg. Co., Toronto, Ont.
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Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
A. R. Williams Machy Co., Toronto.

SHARPENING STONES
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

SHAVINGS, SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

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John Bertram & Sons Co., Dundas.
Bertrams, Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo.
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National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

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John F. Allen Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada.

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Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Peck, Stow & Wilcox, Cleveland, O.
Steel Bending Brake Works, Ltd., Chatham, Ont

SHEET METAL STAMPINGS
Dominion Forge & Stpg. Co., Walkerville, Ont.

SHELL BANDING MACHINES, HYDRAULIC
Chapman Double Ball-Bearing Co., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Lymburner, Ltd., Montreal
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Wm. R., Toronto.
West Tire Setter Co., Rochester, N.Y.

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Can. Blower & Forge Co., Kitchener, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.

SHRAPNEL SHELL MARKER
Brown-Boggs Co., Hamilton, Ont.
Noble & Westbrook Mfg. Co., Hartford, Conn.

SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.

SILVER SOLDER
Geo. H. Lees & Co., Hamilton, Ont.

SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

SLOTTERS
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.

SMOKESTACKS.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke, Que.

SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
J. H. Williams & Co., Brooklyn, N.Y.

SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Can.

SOLDERS
Aikenhead Hardware Co., Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.

SPECIAL MACHINERY
Armstrong Bros., Toronto.
Baird Machine Co., Bridgeport, Conn.
Banfield, Edwin J., Toronto.
Banfield, W. H., & Sons, Toronto.
Bertram, John, & Sons Co., Dundas.
Baird Machine Co., Bridgeport, Conn.
Bawden Machine Co., Toronto, Ont.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Brown Engineering Corp., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
Grant Mfg. & Machy. Co., Bridgeport, Conn
John H. Hall & Sons, Brantford.
Himoff Machine Co., New York, N.Y
Jardine, A. B. & Co., Hespeler.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
D. McKenzie Machinery Co., Guelph, Ont
Root & Van Dervoort Engr. Co., East Moline, Ill
Smart-Turner Machine Co., Hamilton, Ont.
Webber Bros. Mach. Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.

SPIKE MACHINES
The Smart-Turner Machine Co., Hamilton.

SPIRAL CONVEYORS
Can. Matthews Gravity Carrier Co., Toronto, Ont.

SPRING COILERS
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn

SPRINGS, MACHINERY
Barnes, Wallace, Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Jas. Steele, Ltd., Guelph, Ont.

SPROCKETS, CHAIN
Grant Gear Works, Boston, Mass.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.

SPROCKET WHEELS, CAST
Perrin, Wm. R., Toronto.

STAIRS, IRON
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Canada.

STAMPINGS
Dom. Forge & Stpg. Co., Walkerville, Ont.

STAMPING MACHINERY
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.

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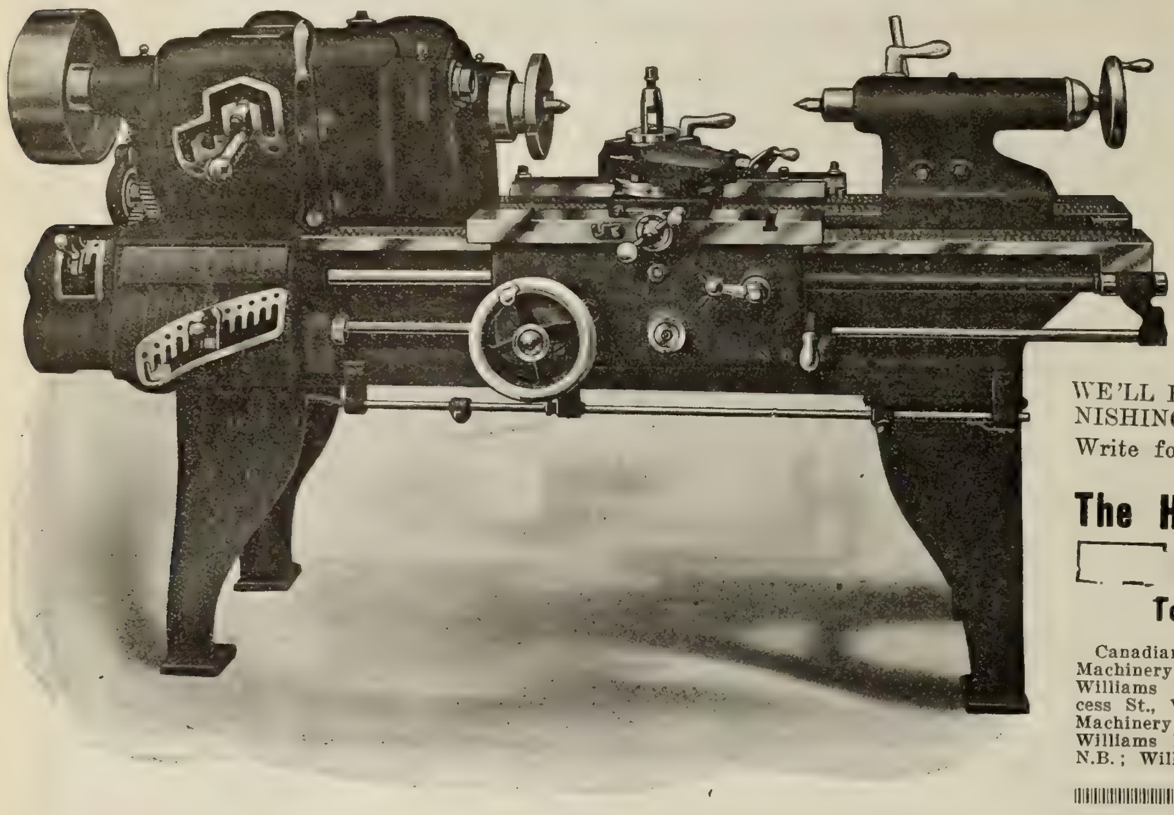

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McDougall Shapers

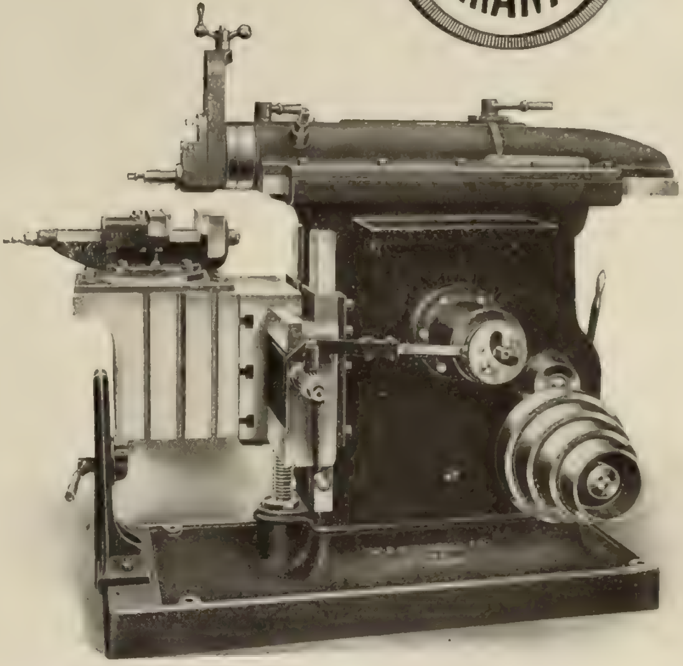
ARE-MAC-DEE IS A GUARANTEE

These are up-to-date Shapers, designed for modern shop production.

They are plain in design, yet embody all essential features necessary for efficient work.

Every adjustment is convenient for the operator and fine for the most accurate work.

Let us have your inquiry.



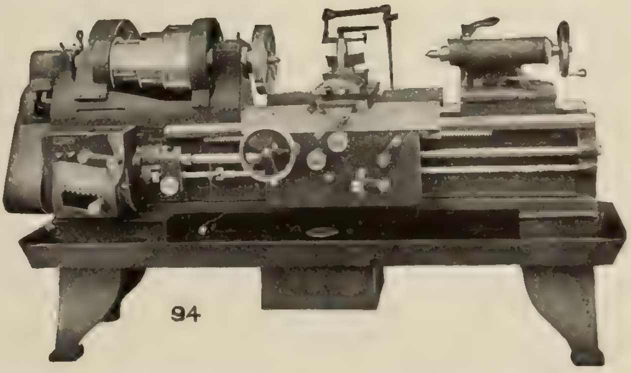
The R. McDougall Company Limited

Manufacturers

GALT, ONTARIO, CANADA

The Canadian Fairbanks-Morse Company, Limited
Sales Agents

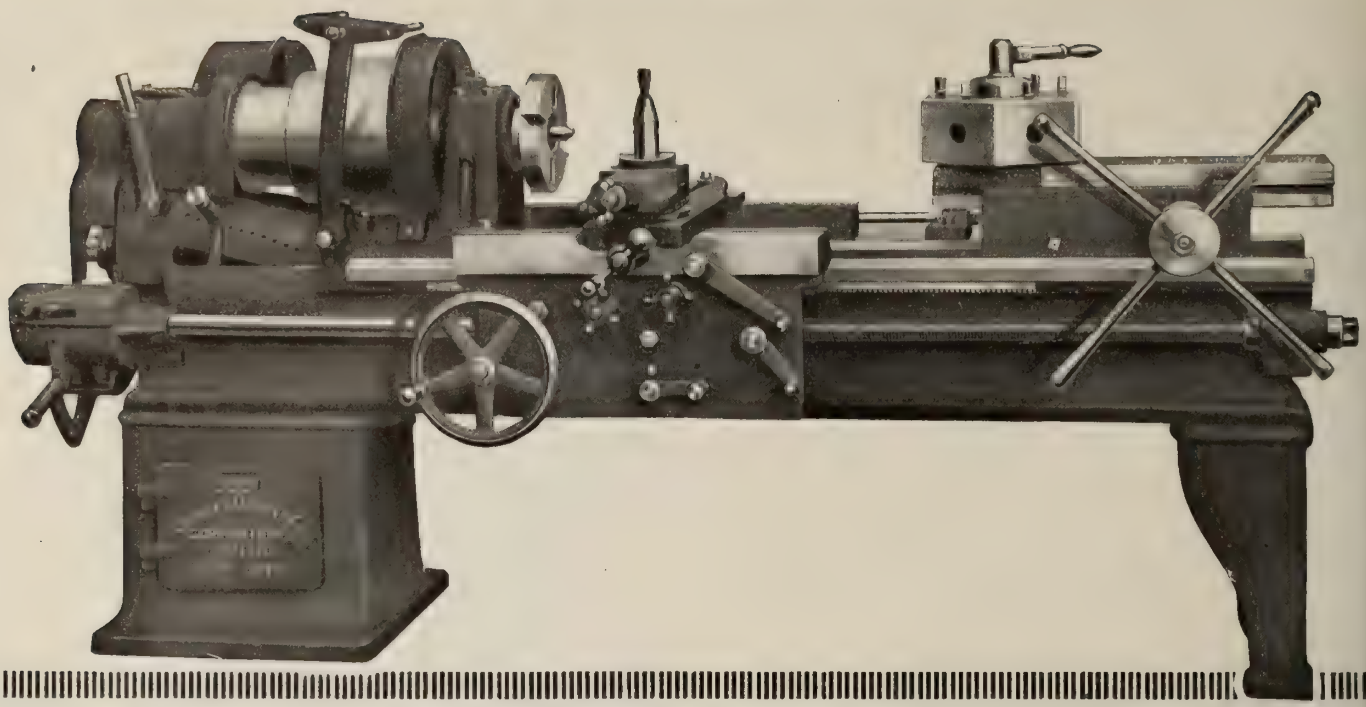
In Stock for Immediate Delivery



1 No. 2 Kempsmith Universal Milling Machine, with dividing head, vise, etc.
1 No. 2 Brown & Sharpe Plain Milling Machine.
1 No. 1 Standard Hand Milling Machine with arbor and vise.
1 No. 180 Brown & Boggs Power Press.
1 No. 200 Brown & Boggs Power Press.
2 14" Smith & Mills Plain Crank Shapers.
[illegible] 16" Smith & Mills Back-geared Crank Shapers.
1 28" Smith & Mills Triple-geared Crank Shaper.
1 [illegible]" Ohio Heavy Type Back-geared Crank Shaper.
1 20" Ohio Heavy Type Back-geared Crank Shaper.
1 Garvin Hand-feed Surface Grinder, 9" x 7" x 6", table 15" x 5".
1 Style BX Wilmarth & Morman Combination Cutter, Reamer and Drill Grinder.
1 Style B Point Wilmarth & Morman Drill Grinder.
[illegible] 18" x 8' Mueller Quick-change Gear Lathes.
1 18½" x 8' Cincinnati Quick-change Gear Lathe, 3-step cone, double back gear.
1 16½ x 6 Cincinnati Quick-change Gear Lathe, 3-step cone, double back gear.
1 13" x 5" Lancaster Std. Lathe, for tool room work.
1 16" x 8' South Bend Std. Lathe.
1 14" x 6' South Bend Std. Lathe.
1 24 x 8 Blakeslee Single Purpose Heavy Duty Lathe.
2 24 x 8 Roulsted Heavy Type Lathes with turret.
2 Martin Turret Lathes for boring 6" Shells.
1 [illegible]' x 14' Conradson Turret Lathe, 3-step cone.
1 16 x 8 Prentice All-geared Turret Lathe.
1 18 x 10 Lodge & Davis Quick-change Gear Lathe.
1 18 x 10 American Quick-change Gear Lathe.
1 20 x 8 Walcott Quick-change Gear Lathe, 3-step cone.
2 20 x 10 Sidney Engine Lathes, quick-change gear, 3-step cone, double back gear.

THE FOSS & HILL MACHINERY CO.

305 ST. JAMES STREET - - - - MONTREAL, QUE.



20" Quick Change Engine Lathe with Turret on Bed

THE utility of a strong, accurate turret has been amply demonstrated. Our turrets are built from the highest class material by experienced mechanics to great accuracy and insure users the maximum service.

We are prepared to furnish this type of turret on all sizes of our lathes and when specified for new lathes we can also furnish power feed for same.

C.M.C.

MACHINE
TOOLS
ARE
RIGID,
POWERFUL
AND
ACCURATE

■

CANADA MACHINERY CORPORATION
LIMITED

GALT, ONTARIO

BUILDERS OF MACHINE TOOLS AND WOODWORKING MACHINERY

For convenience of the Trade, we have opened Showrooms in Toronto, at Brock Avenue Subway, where a full line of our Machinery can be inspected.

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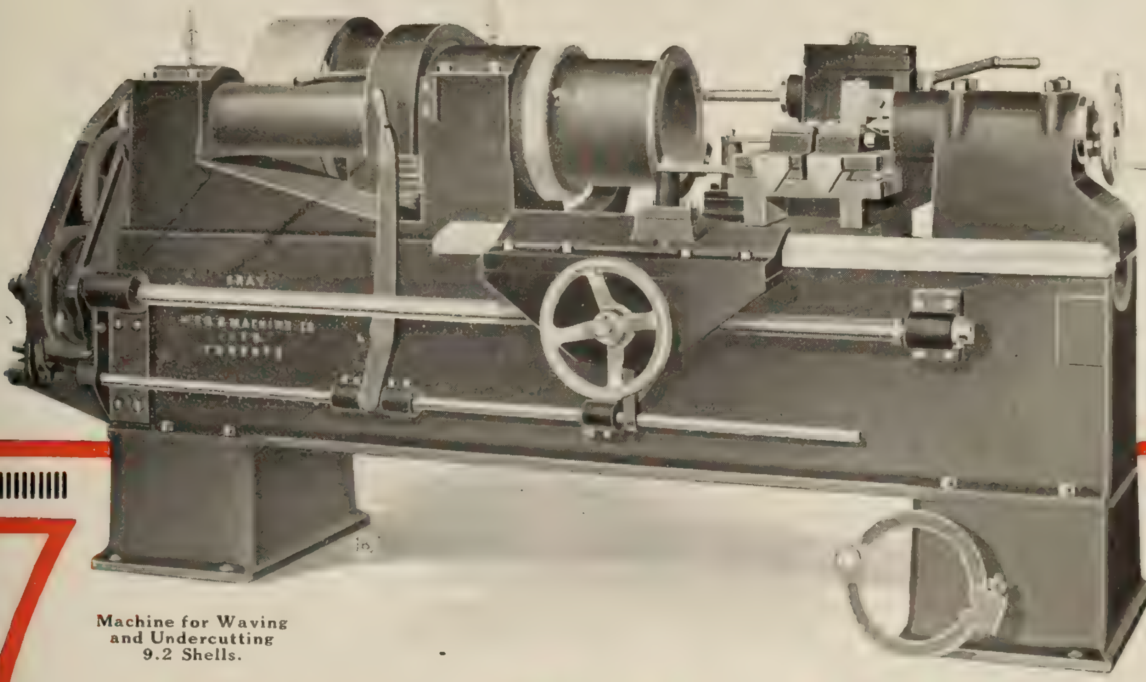
CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied field. Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XVI—No. 21 Publication Office: Toronto, November 23, 1916 Subscription Price $3.00 per Year



Machine for Waving and Undercutting 9.2 Shells.

Heavy Duty Lathes

Equipped for various operations on Shells and ready to use.

Designed and built for heavy duty and continuous service.

Thread Millers

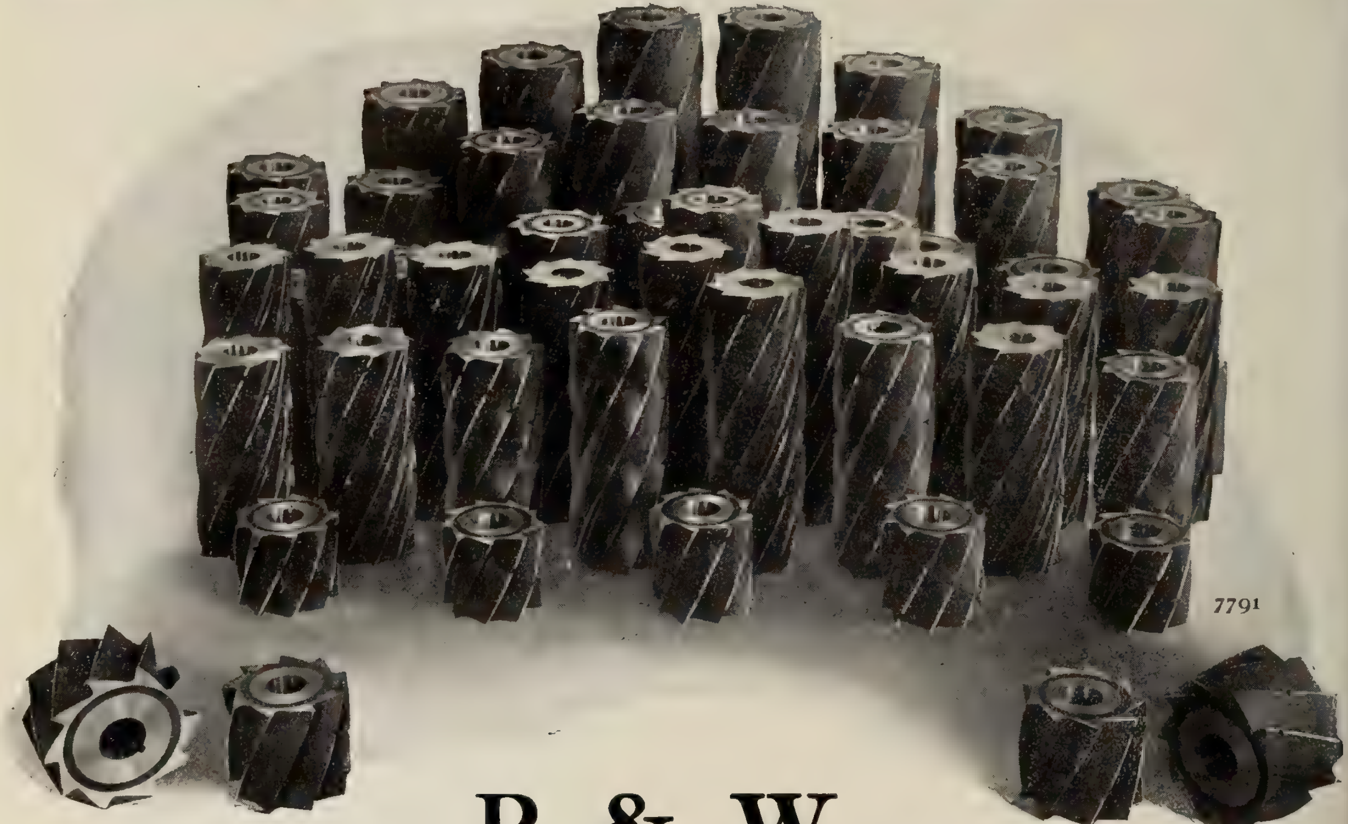
For all size Shells from 3-inch to 12-inch.

Unequalled for High Production and Ease of Chucking Shells.

PROMPT DELIVERIES.

The Gray Mfg. & Machine Co., Limited
TORONTO - - CANADA

The Answer to Your
Heavy Duty Cutter Problem



P. & W.

Coarse-Tooth High-Speed Milling Cutters

We are prepared to furnish promptly coarse-tooth milling cutters of High Speed Steel adapted primarily to the heavier class of milling.

Long Life. Such cutters have the advantage of long life as the large teeth permit of more grindings. It will also be seen that less time is required to sharpen.

Increased Production. The ample chip room insures a remarkably free cutting action and will increase production by a high percentage with less power required to drive.

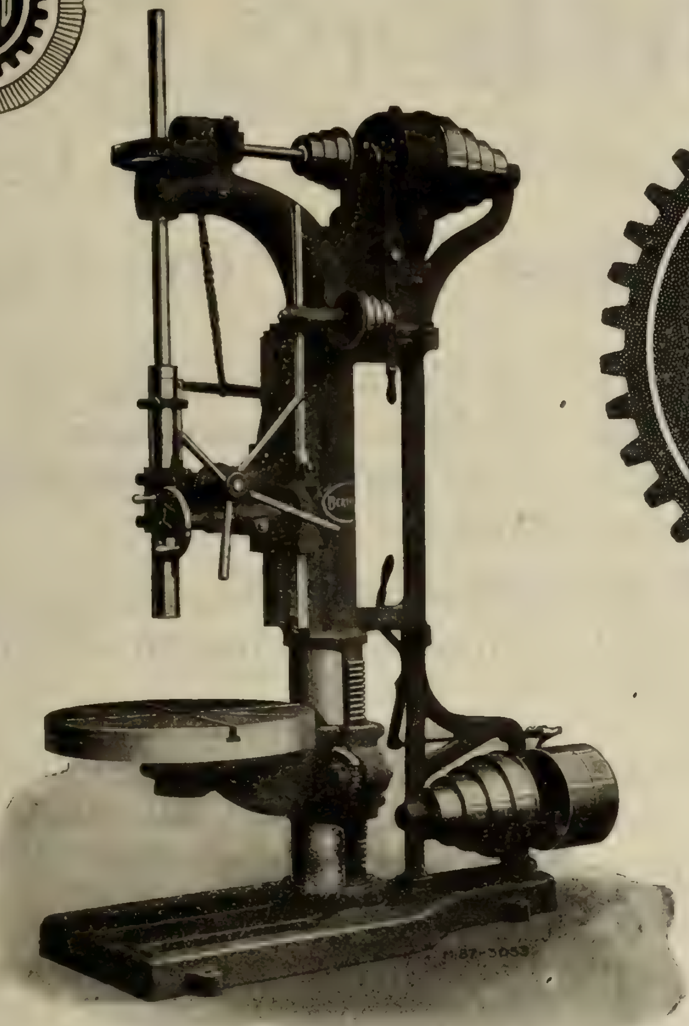
Strong Teeth. The teeth being larger are exceptionally strong and will easily stand the heaviest feeds without breaking.

Place a trial order with our nearest store.

Pratt & Whitney Company of Canada, Limited

DUNDAS **Ontario**	**MONTREAL** **723 Drummond Bldg.**	**WINNIPEG** **1205 McArthur Bldg.**	**VANCOUVER** **B.C. Equipment Co.**

JB&SCo



Bertram MACHINE TOOLS

Locomotive and
Car Shop Equipment

Structural and
Bridge
Shop Machinery

Repair Shop
Machinery

General Machine
Shop Equipment

30-inch Vertical Drilling Machine

Photographs and full particulars gladly mailed upon request.

WRITE US NOW

We'll be pleased to submit photographs and full details on any line or lines in which you are interested.

The John Bertram & Sons Company Limited

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

JB&SCo

The Publisher's Page

TORONTO November 23, 1916

The Advertiser Must Have the Goods

THE Lion was telling the Leopard why he roared in the jungle when going about hunting. "Doing business openly and with plenty of advertising," the Lion said, "is what made my reputation. I got my characterization as 'King of Beasts' by blowing my horn. Always let the other fellow know you are around, and they will respect and fear you."

A Rabbit, hiding and shivering in a clump of pampas grass, overheard this conversation, and all the next day he pondered upon it. He decided it was better to have the other animals fear him than to live in constant fear. So the Rabbit filled his lungs with a great breath and tried to roar like a Lion.

A Coyote, learning of the Rabbit's whereabouts by his roar, hopped on to the Rabbit and ate him up.

If you haven't got the goods, there is no use to advertise it.—*Judge.*

The above, written in jest, contains a very serious truth. A man who attempts to advertise [illegible] sell a product which is no g[illegible] to be jumped on by a [illegible] uratively speak[illegible] right or [illegible] die of sh[illegible]

We try to [illegible] the advertising pages of CANADIAN MACHINERY as clean as the editorial section. Very little censoring is needed in this enlightened age. Manufacturers who are wise enough to advertise are wise enough to do so truthfully, realizing that a modest claim relating to facts is more effective than a lot of highly-colored bragging. Manufacturers do not put more into their advertising than they do into their products. It is a source of satisfaction to the reader to know this. It gives a feeling of security.

CANADIAN MACHINERY
and Manufacturing News
143-153 University Avenue, Toronto

Quality Service

Courtesy in Business

* * *

Fittingly framed and hanging in the Offices of one of the most important Public Service Corporations on this North American Continent is the following

> **'Did you say Please and Thank you?'**

Broad minded men direct the destiny of that Corporation, men who know that public or private enterprises to be lastingly successful must operate for the public good.

Quality and Service are the two important factors in our business life today, but Courtesy is the door through which they must enter.

We are large producers of Hamilton Pig Iron and our output of Open Hearth Steel Blooms and Billets, Iron and Steel Bars of all shapes and size runs into enormous tonnage.

The products of our mills include practically everything that can be manufactured from Iron and Steel and these we distribute to thousands of satisfied customers.

Our business is an extensive one and a successful one. The World is our market: but our prosperity and success in the future, as in the past, depend upon the continued confidence, co-operation and good-will of the people we serve.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO, LIMITED, SHEFFIELD, ENGLAND

Sole Agents for Canada:

H. BOKER & CO., Inc.

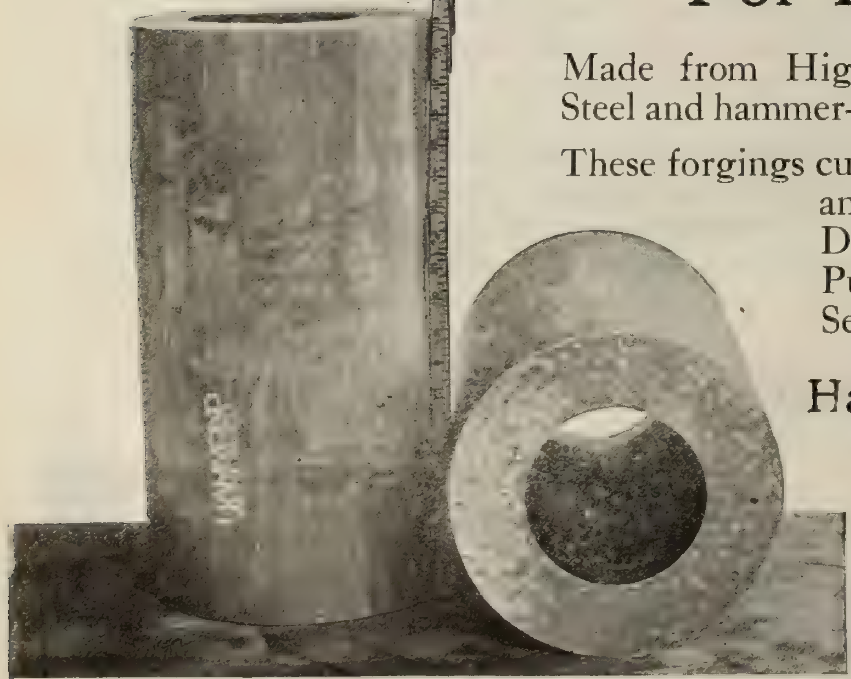
(Formerly Hermann Boker & Co.)

332 St. James Street, Montreal, P.Q.

Established 1837 Incorporated 1914

Special Vanadium Steel Piercing Die Forgings

For Hot or Cold Work



Made from High-Grade Special Vanadium Too
Steel and hammer-forged in any size.

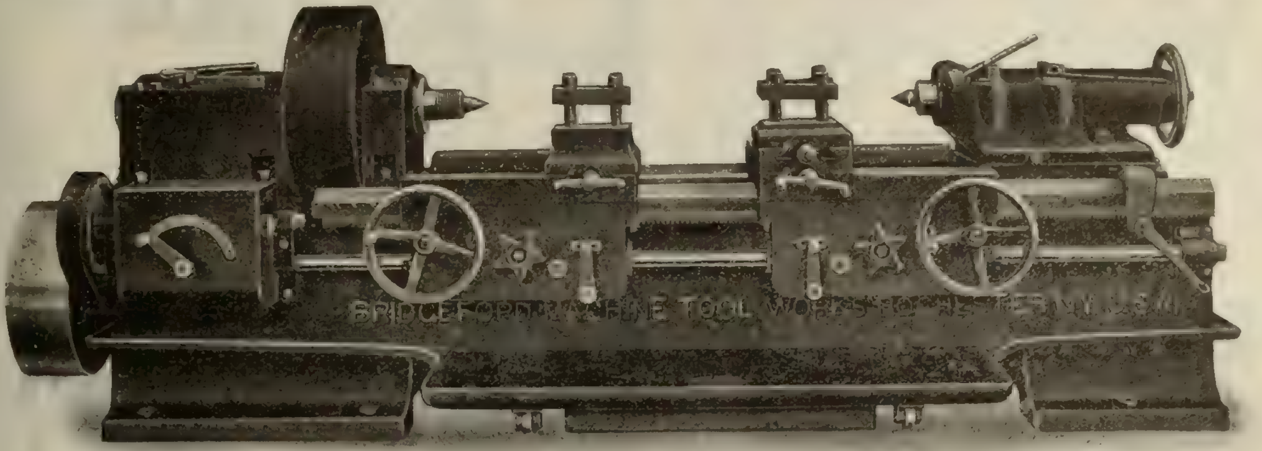
These forgings cut down your machining costs 100
and give you a tougher, more durabl
Die than you have ever had.
Punches made to match the die
Send us your Blue Prints.

Hammond Steel & Forgin
Co., Inc.

SYRACUSE, N.Y., U.S.A.

**Fine Tool Steels, Specialists in Manufacture of Hig
Grade Hammered Forgings, Hammered Alloy Steel
Weldless Rings—Special Shapes, Die Blocks**

"BRIDGEFORD" 27-inch HEAVY DUTY LATHE



FOR ROUGH-TURNING 8", 9.2" or 12" SHELLS

The powerful drive and convenience of operation insure a maximum output.

The simplicity of design and construction and the elimination of all complicated mechanism enable a practically inexperienced operator to quickly become proficient in the operation of the machine, obtaining maximum results.

Power is transmitted through 8″ double belt. Driving gear is semi-steel, 6½″ face. Four feed changes, three speed changes. All instantaneous. All speed and feed gearing run in oil, and apron is so arranged that gearing can be run in oil bath if desired.

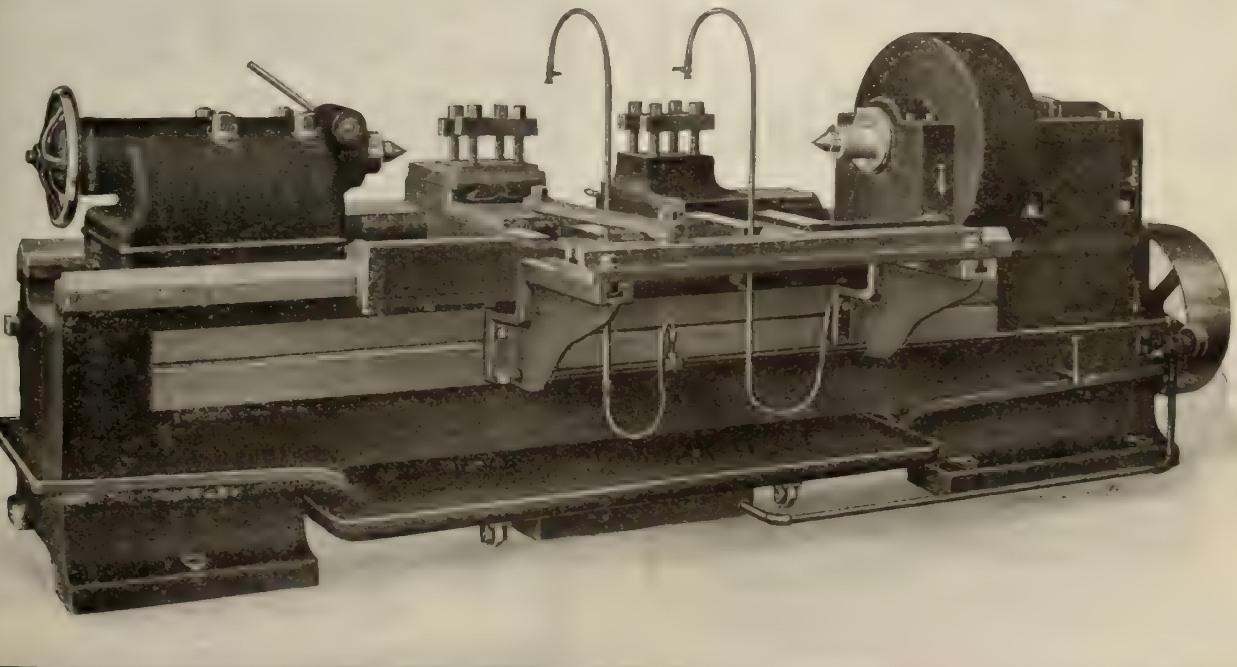
Leading shell manufacturers have from 70 to 120 of these machines in daily operation, giving remarkably satisfactory results.

Owing to greatly increased facilities, we can make early deliveries on Bridgeford Lathes. Write us.

BRIDGEFORD MACHINE TOOL WORKS

HEAVY LATHE SPECIALISTS FOR 20 YEARS

237 MILL STREET
ROCHESTER, N.Y.



STEEL

for
SHRAPNEL
SHELLS
AND SHELL BLANKS

Only Company in Canada producing steel ingots by the "HARMET" Liquid Process.

REASONS WHY THESE INGOTS ARE SUPERIOR TO THE ORDINARY KIND:

1. Prevention of cracks, due to shrinkage; of internal stresses and resulting cracks and fissures.
2. Early cessation in the crystallization of the metal, and the production of fine crystallization of the metal, without cleavage planes.
3. Lessening of segregation, i.e., reduction of tendency to carbon and other impurities to concentrate in the central and upper parts of the ingot.
4. Prevention of "Pipes" or interior cavities, and thus preservation of absolute solidity in the ingot.
5. Improvement in physical properties.
6. Reduction in waste of ingot.

WE CAN SUPPLY FORGINGS OF ALL SHAPES AND SIZES MADE OF ORDINARY OR "HARMET" FLUID COMPRESSED OPEN-HEARTH STEEL ON THE SHORTEST NOTICE.

Nova Scotia Steel and Coal Company
Limited
Head Office:
NEW GLASGOW,
N.S.
Western Sales Office,
Room 14 Windsor Hotel,
MONTREAL

EXTRA
Die Steel

is produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

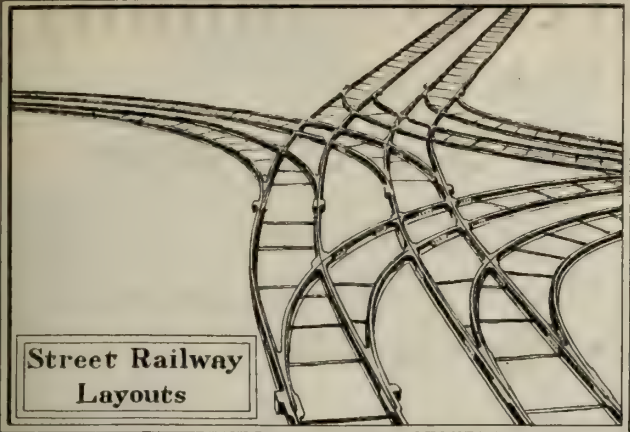
You get extra service from "EXTRA" DIE STEEL. A trial is convincing.

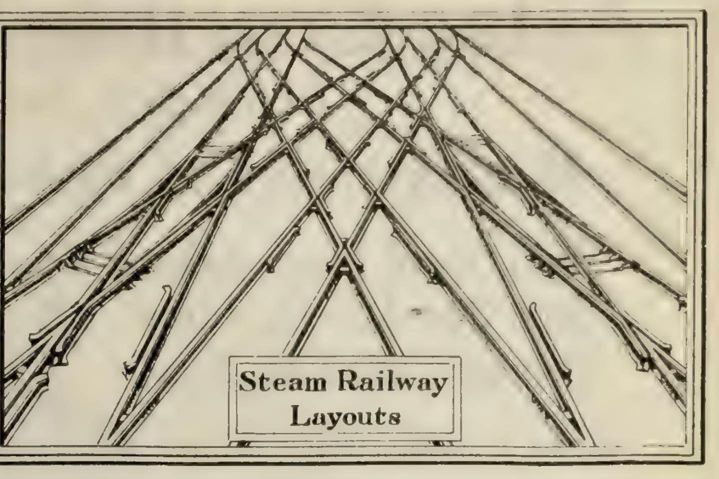
H.A. DRURY COMPANY LIMITED
STEEL
MONTREAL TORONTO NEW YORK

Manufactured By SANDERSON BROTHERS & NEWBOULD, Limited
SHEFFIELD, ENGLAND

Red Cut Superior High Speed Steel

Quality First
THE BEST FOR MACHINING
ALL HARD MATERIALS
Are your tools made of Red Cut?
Send for folder
VANADIUM-ALLOYS STEEL COMPANY
PITTSBURGH, PA.
Works at Latrobe, Pa.





Switches, Frogs and Every Description of Trackwork.
Solid Manganese Steel Construction. Cast Iron and Cast Steel bound Construction with Manganese Steel Inserts.

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

WHITING CRANES

Cut shows type "E" Service Jib Cranes fitted with chain blocks and air hoists in Big Four shops, Indianapolis, Ind. Just the thing for serving planers and machine tools.

Any Span or Capacity

SEND FOR CATALOG 110

Complete Foundry Equipments

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB.

Cranes of All Kinds

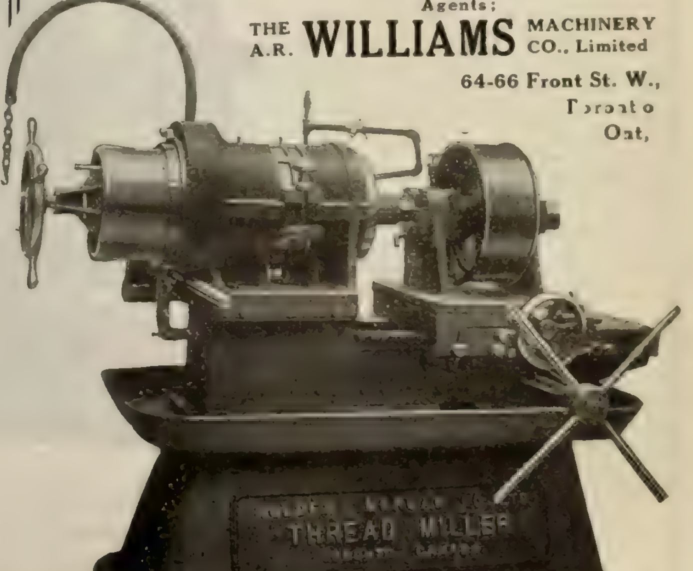
Thread Millers

HOLDEN MORGAN THREAD MILLERS—combining the perfection of finished product with the speed, efficiency and strength which ensures popularity and long usage.

We have equipped a large number of shops with these thread millers, thus overcoming one of the greatest difficulties that confront the shell manufacturer—correct and accurate milling of threads in nose and base of shells.

Let our Service Department help you solve all your problems.

Agents;
THE A.R. WILLIAMS MACHINERY CO., Limited
64-66 Front St. W.,
Toronto
Ont,



Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX
High Speed Steel, Atlas LX
Chrome Vanadium Steel

Carbon Tool Steel
"Deward" Oil Tempering,
Non-Shrinking

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

Sold by

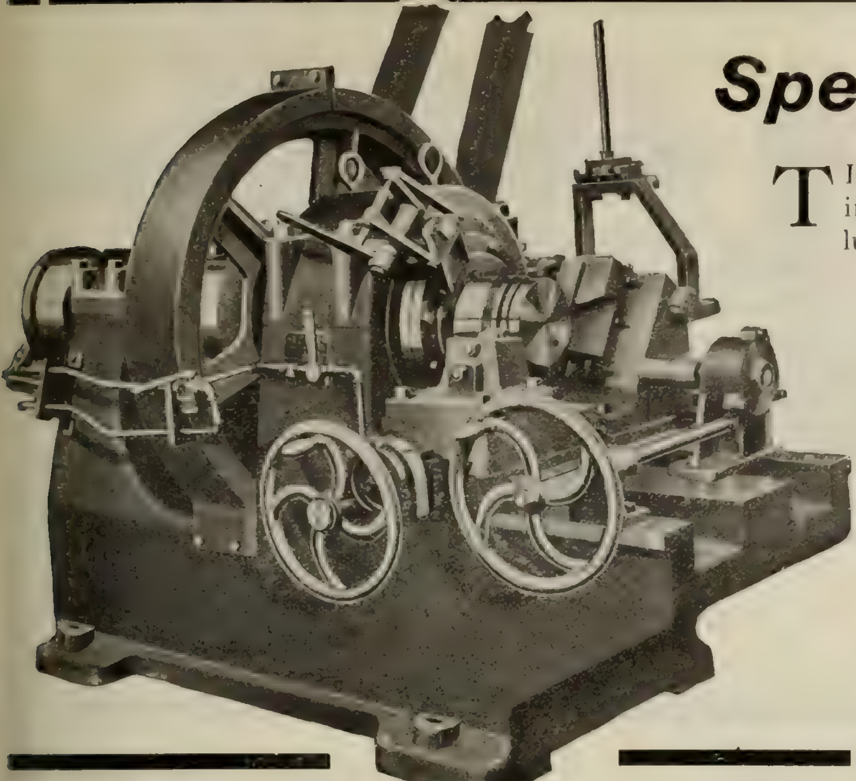
YOUNG, CORLEY AND DOLAN, Inc.

115 BROADWAY, NEW YORK CITY, U.S.A.

ARMSTRONG, WHITWORTH OF CANADA, LIMITED
22 VICTORIA SQ. MONTREAL P.Q.
"T.Y.R."
Highspeed Steel
(Made in Canada)
Works: LONGUEUIL, Que.
DOMINION BANK BLD'G TORONTO

Immediate shipment of all standard sizes and shell-turning sizes can be made from stock.

MADE IN CANADA



Speed—Accuracy

THE two most important factors in shell-making. The former is desirable, the latter absolutely necessary. Both are assured by the use of *Jenckes Single Purpose Lathes for Shell Work.*

Illustration shows the latest addition to this famous line—a Banding Lathe for 8" shells. Note the liberal proportions, the general appearance of sturdiness. They mean an extra measure of long and efficient service.

These machines are also manufactured for 18 pdr., 4.5", 5", 6", 8", 9.2", 12" and 14" shells; are tooled when required for the mm. sizes corresponding to Russian and French ammunition.

THE JENCKES MACHINE COMPANY, LIMITED

**WORKS: Sherbrooke, Que.
St. Catharines, Ont.**

SALES OFFICES:

727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

PIG IRON

M·A
HANNA
&Co.

"Victoria" Foundry and Malleable, made by The Canadian Furnace Co., Port Colborne, Ont., Canada

M.A.HANNA&Co. **Sales Agents: CLEVELAND, O., U.S.A.**

JAMES McKAY COMPANY, PITTSBURGH, PENNA., U.S.A.
Manufacturers of

SHELL FORGINGS

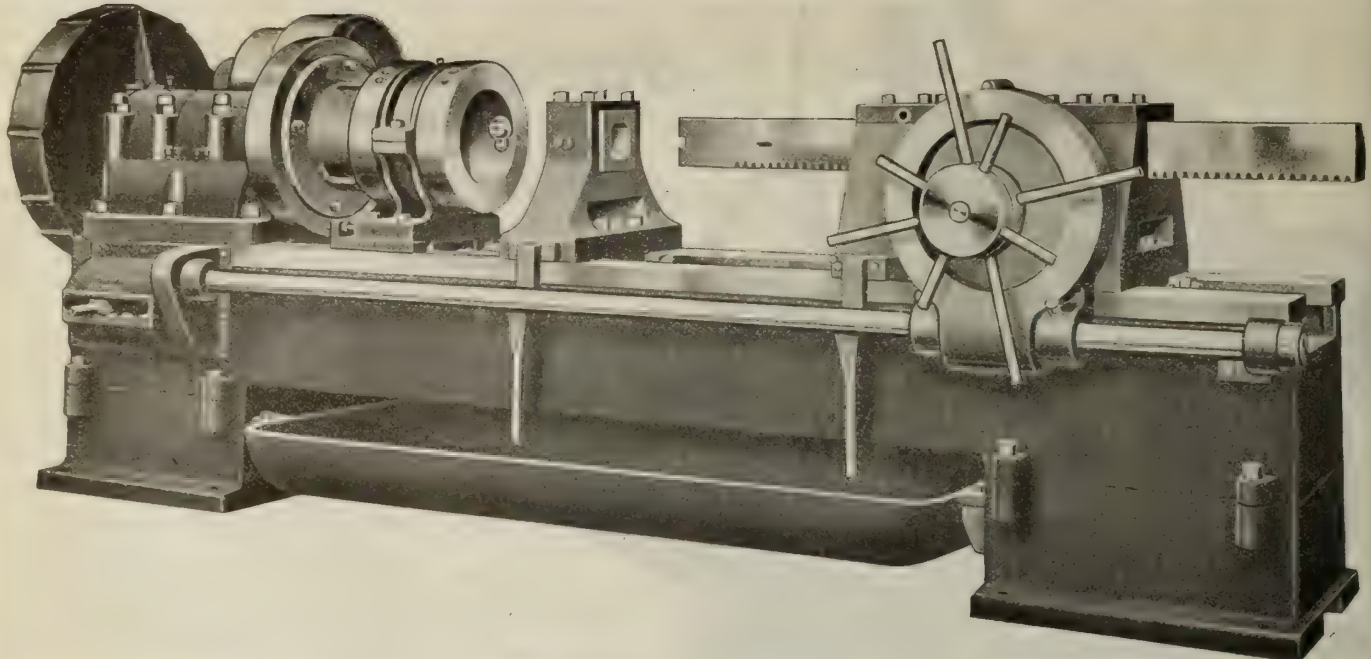
We have the Equipment and Experience and can execute orders for

Nose Sockets Base Plates Adapter Plates

For any size Shells. Can execute orders promptly.

**SPECIAL FORGINGS—We can make any forging that can be made under Drop Hammers.
CHAINS AND ACCESSORY FORGINGS—We have a complete line.**

Address our Representative: **JOHN A. BUCHANAN, King Edward Hotel, Toronto**



Connecticut 9.2″ Shell Lathe

After a scientific and mechanical study of lathes and their relation to 9.2″ shell boring and turning operations, we designed and built the "Connecticut."

A study of the machine will reveal to you how it is proportionately strengthened. Therein lies its hidden strength; no part is strained more than another. The stresses are made just so much stronger that the machine is a smooth-running, speedy and accurate unit.

The illustration is a 26″ High Duty Lathe with pot chuck and boring tailstock. The same headstock is also used for turning operations, with carriage in place of steady-rest, and screw tailstock in place of the rack-feed.

Diameter of Spindle, 6 in.	***2-Speed Countershaft.***
2-Step Cone.	***5½ in. Square Boring Rack.***

WRITE FOR PARTICULARS

W. & B. DOUGLAS, Inc., Manufacturers

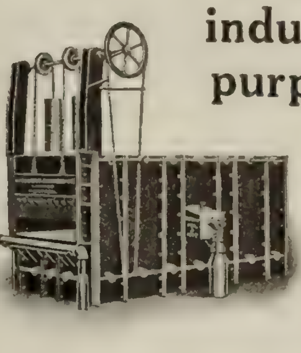
Agents:
Canadian Fairbanks-Morse
Co., Limited - Toronto

MIDDLETOWN
Connecticut - - U.S.A.

Agents:
Williams & Wilson
Limited, Montreal

"Mecol" Furnaces

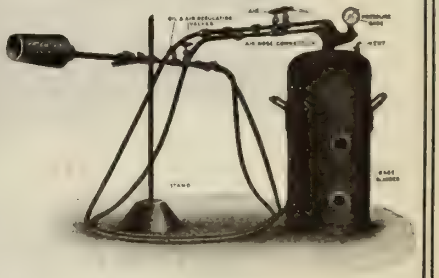
Designed and Built in Canada for all industrial purposes



What the use of Oil instead of Coal-fired Furnaces means to you—

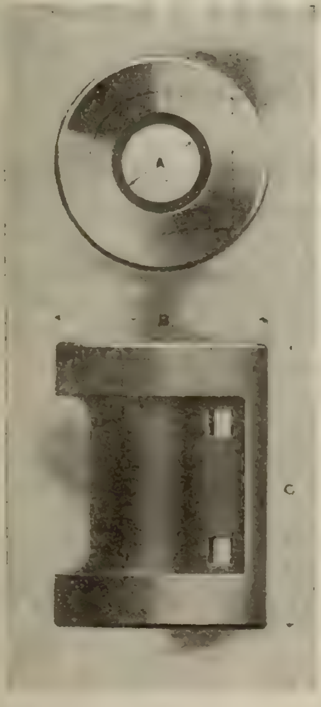
A Clean Workshop without Smoke or Soot.
Only half the furnace space necessary.
Less than half first cost of furnaces.
No chimneys or flues required.
Instantaneous and perfect control of temperature.
Higher temperatures obtained.
No heaters, coal or ash handlers required.
No coal or ash piles.
Less waste of fuel and less time required to bring furnaces up to working heat.
No waste of fuel after work is done, as supply is shut off instantly.

Write for full particulars.



MECHANICAL ENGINEERING COMPANY, LIMITED
55 Cote St., Montreal, Que., Canada
Phone. Main 3585. Cable address "Mecol."

Mining Machinery Parts



Two-key Tappet

Shoes and Dies, Tappets, Bosses, Cams and Stamp Heads

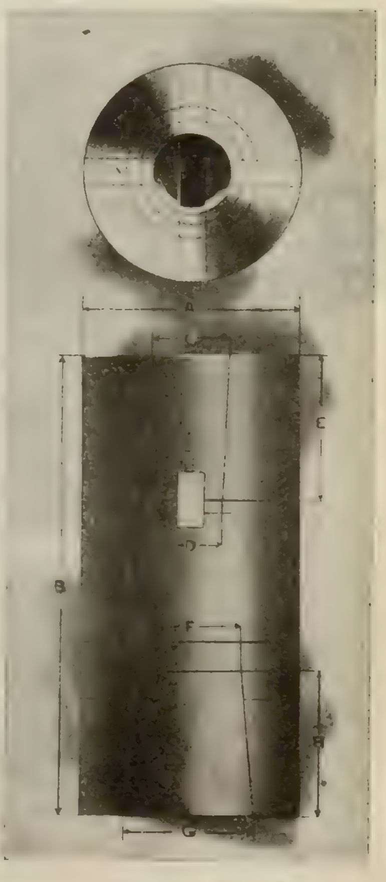
Also Manufacturers of Lining Plates for Ball and Tube Mills Concaves and Heads for Gyratory Crushers.

Machine Moulded Gears

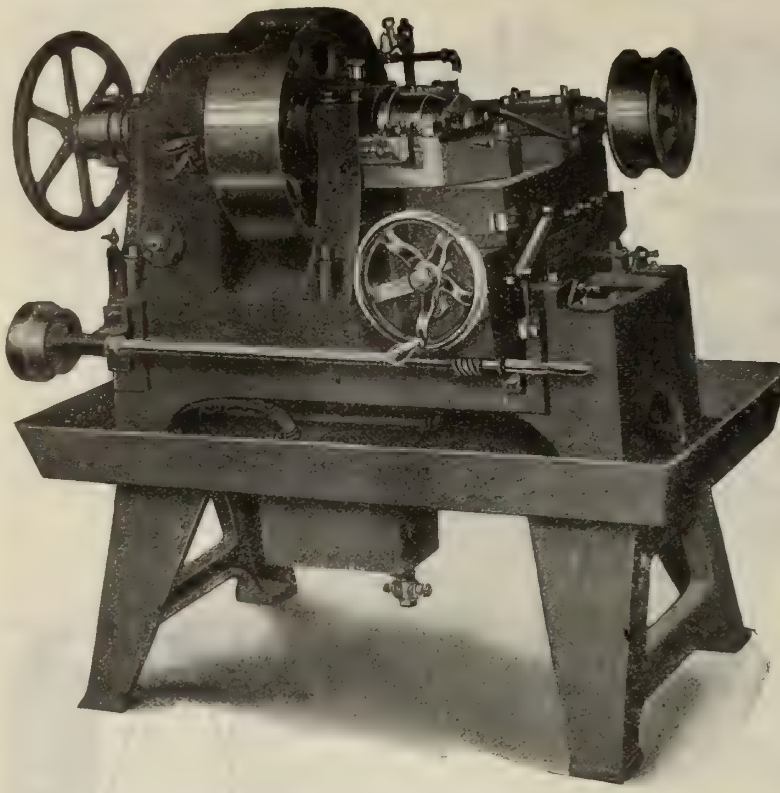
Any size up to 18 feet in diameter.
No patterns needed.

Send Us Your Specifications, We Do the Rest. Write—

Hull Iron & Steel Foundries, Limited
HULL, P.Q.



Stamp Head



For Turning, Facing and Milling the thread on Gas Check Plugs for 6-inch High Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling. driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells, Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

These machines are tooled up for finishing plain machined plugs if desired.

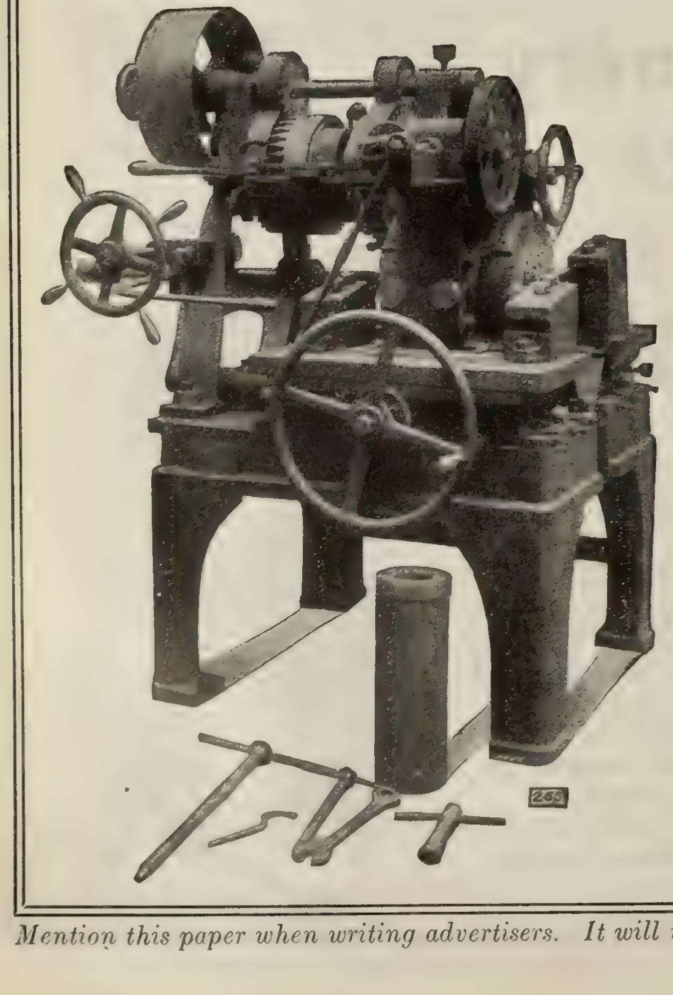
Write for prices and deliveries.

Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield

STAIR BUILDING, TORONTO, ONT.



CUTTING-OFF MACHINES

Quick Delivery

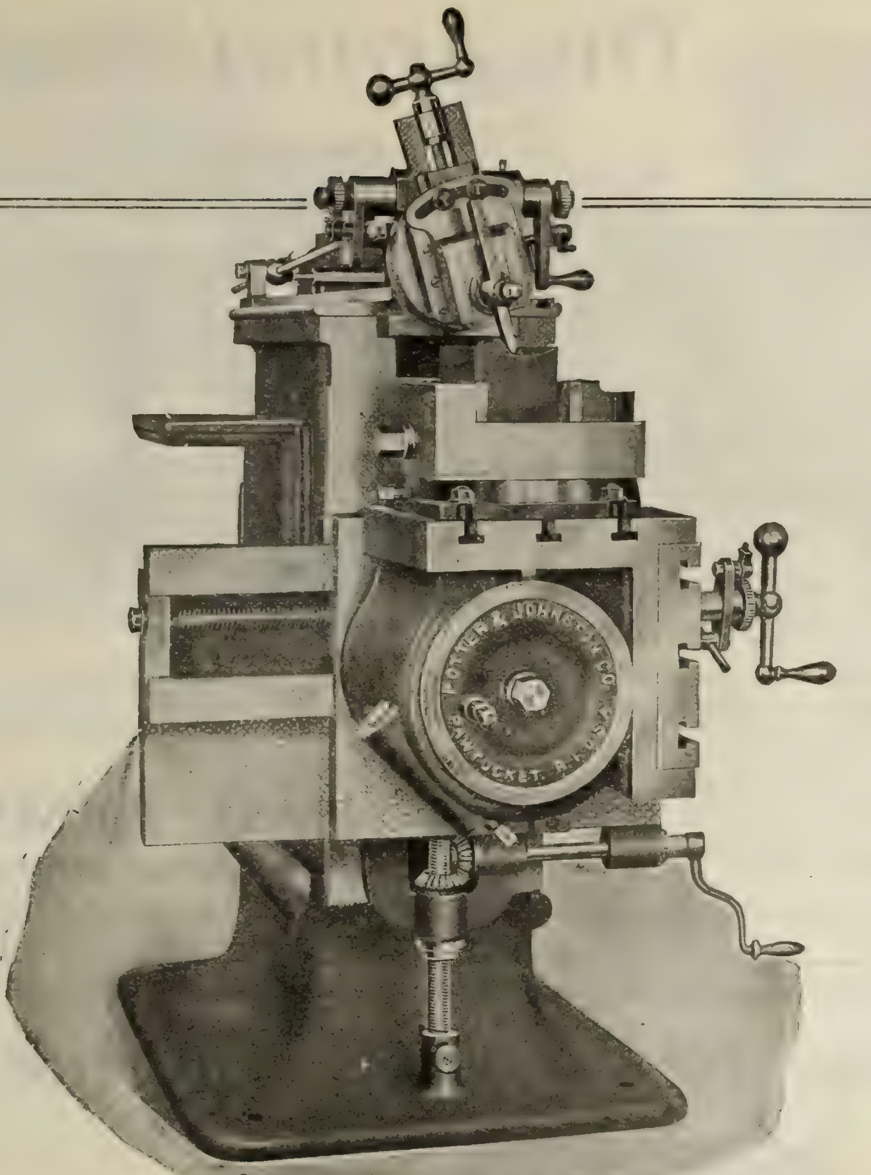
For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE

Wm. Kennedy & Sons
LIMITED

OWEN SOUND, CANADA



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

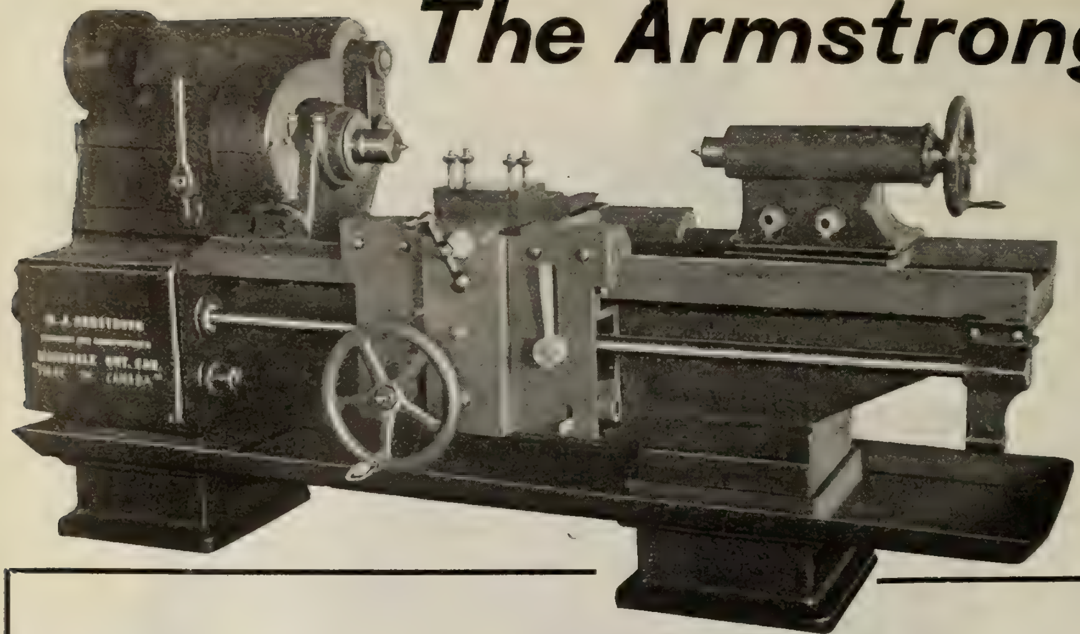
WRITE FOR PRICES AND DELIVERIES

Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

The Armstrong Lathe



An
exceptionall
strong, heav
machine too
adaptable t
YOU
requirement

When completely equipped is a general purpose lathe, but fitted out for munition work as necessitated. Built in two sizes.

20-in. swing x 8 ft. bed for 6-in. shells, weight approximately 6,000 lbs.

32-in. swing x 12 ft. bed for all large calibre shells, weight approximately 16,000 lbs.

Send for complete specifications.

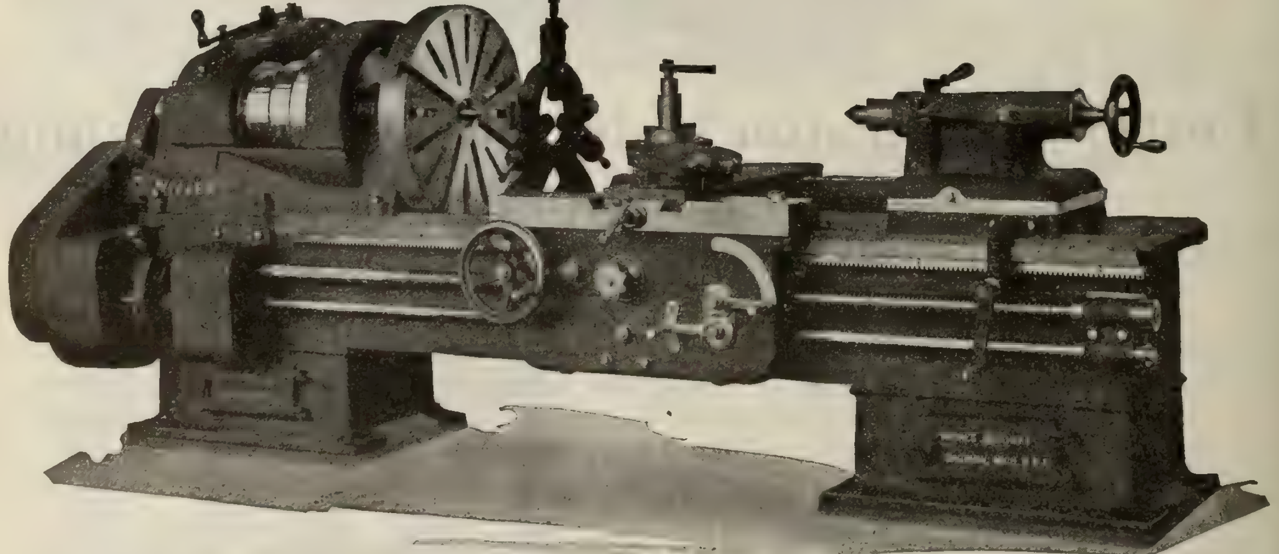
We also manufacture a complete line of cranes in all sizes and capacities.

H. J. ARMSTRONG

Engineer and Manufacturer

MARKDALE, ONT.

Wickes Heavy Duty Engine Lathe



The Wickes 26" Heavy Duty Lathe.

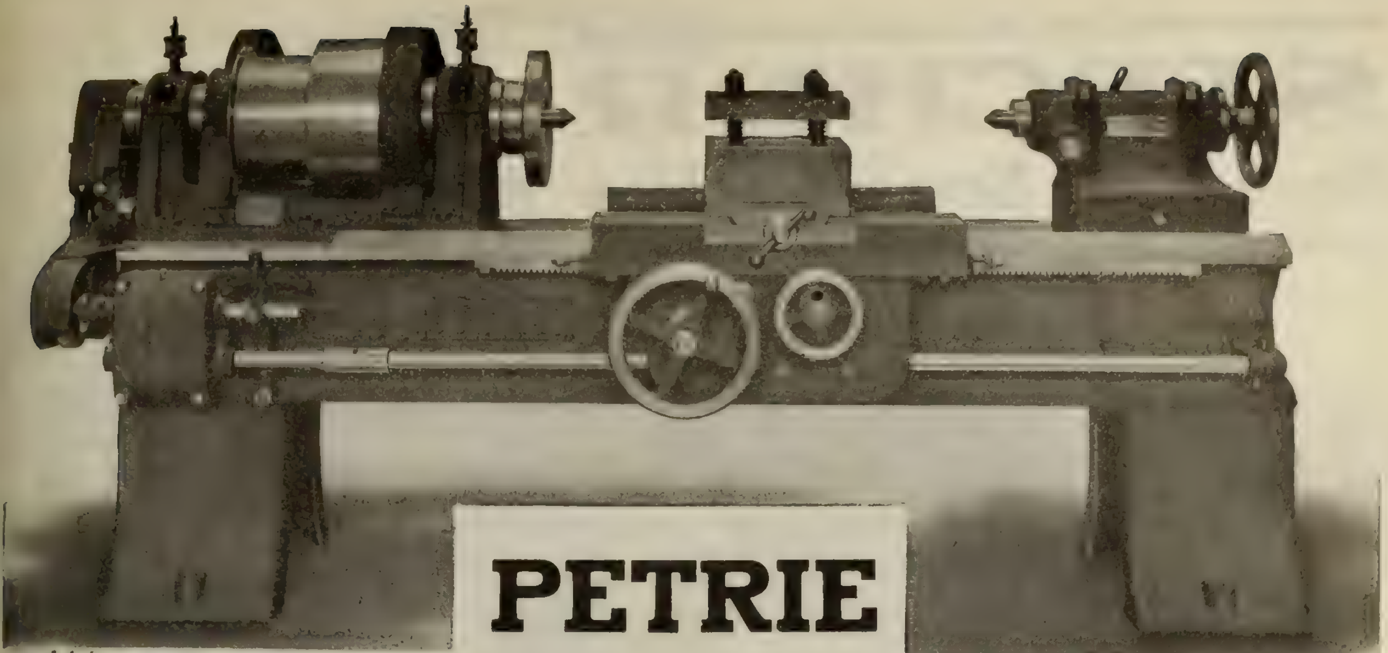
Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.

This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.

Let us tell you about this lathe and our 20", 32", also our 17" Rapid Production Lathe for Automobile and other work.

We can make prompt shipment.

WICKES BROTHERS **Saginaw, Michigan**



PETRIE

20-inch Heavy Duty Manufacturing Lathe

DESIGNED AND BUILT ESPECIALLY FOR MACHINING HIGH EXPLOSIVE AND SHRAPNEL SHELLS UP TO AND INCLUDING 8-INCH. USED AND ENDORSED BY SOME OF THE LARGEST AND MOST SUCCESSFUL SHELL MANUFACTURERS.

DESCRIPTION

HEADSTOCK—All Headstock journals are provided with well lubricated, renewable bronze bearings.
Alternate heat treated steel and bronze washers take the end thrust and a simple adjustment is provided to take up wear.
All gears are covered with neat and substantial cast iron guards that may be quickly removed when desired.
BED—The Bed is of deep construction and width to give the greatest rigidity under heavy cuts.
The shears are made extremely massive and the bed walls extra thick, providing the necessary mass of metal to absorb the vibration and shocks incident to heavy turning at high speeds.
Heavy box girths tie the front and rear walls of the bed together at close intervals.
Improved type wide angle V on front shear to take thrust of cutting tool.
The rear bearing of carriage on bed is flat instead of V-shaped.
At the rear of the bed planed pads are provided for attaching Taper and Forming Attachments.
CARRIAGE—The bridge is very wide and extraordinarily deep; it will not spring under the heaviest cuts.
The carriage is gibbed to the bed at the rear on the outside and will not lift under any conditions.
APRON—The apron is of heavy double plate type affording a support or bearing to both ends of all shafts.
Apron is tongued and grooved to the carriage, also bolted and dowelled.
The feed friction has a greatly increased diameter and will pull the heaviest feeds and cuts without slipping.
For engaging the friction a hand wheel several inches in diameter is provided and seats the friction firmly with very small effort on the part of the operator.
All studs in apron revolve and simple but adequate oiling facilities are provided.
FEEDS—Positive Gear drive through headstock spindle steel gears in gear box, three rates of feed are provided for through sliding key type. Feeds per revolution of spindle being ⅛ in., 1-16 in. and 1-32 in.
All gears in the feed train are fully guarded.
TAILSTOCK—The tailstock is a massive casting, rigidly braced internally, and is provided with a long nose, making it unnecessary to extend the tailstock spindle for ordinary work.
It is clamped to the bed by four large locking bolts operated at the top of the barrel.
A simple binder locks the tailstock spindle in correct alignment, this clamp is located at the extreme front end where it grips the spindle with the utmost rigidity and absolutely does away with distortion of any kind.
The screw is unusually large to resist any buckling tendency.
Suitable screws are provided for setting over for Taper Work.
EQUIPMENT—Unless otherwise specified Lathes are furnished with 8 ft. bed, one driving plate, hand cross feed, heavy duty plain rest, necessary wrenches, and two speed tight and loose countershaft.
Forming attachment, turret tool post, hand or power feed bed turret, oil pan, pump, and connections can be furnished as extras when desired.

DIMENSIONS

Swing over bed	20 in.	Width of Tool Slide	12 in.
Swing over carriage	11 in.	Diameter of Headstock Cones	11 in. and 14 in.
Length of Bed Standard	8 ft.	Belt Width	6 in.
Distance between centres 8 ft. bed	40 in.	Number of Feed Changes	3
Width of bed overall	19½ in.	Feeds per Revolutions of spindle	⅛ in., 1-16 in., 1-32 in.
Height from floor to centres	40 in.	Speed of Countershaft	110 R.P.M.
Dimensions of front spindle bearing	4 15-16 in. x 6¾ in.	Size of Tight and Loose Pulleys	16 in. x 6¼ in.
Dimensions of rear spindle bearing	4 in. x 5½ in.	Ratio of Back Gearing	6.7 to 1
Diameter Nose of spindle	4 in.	Face of Back Gears	2¾ in. and 2¼ in.
Hole through spindle	1 5-16 in.	Length of Carriage Bearing	30 in.
Diameter Tailstock spindle	2⅜ in	Width of Carriage Bridge	12 in.
Travel of Tailstock spindle	6 in.	Number of Spindle Speeds with Two-Speed Countershaft	8
Morse Taper- Centres	No. 5	Weight Approximately, 8 ft. Bed	5,200 lbs.

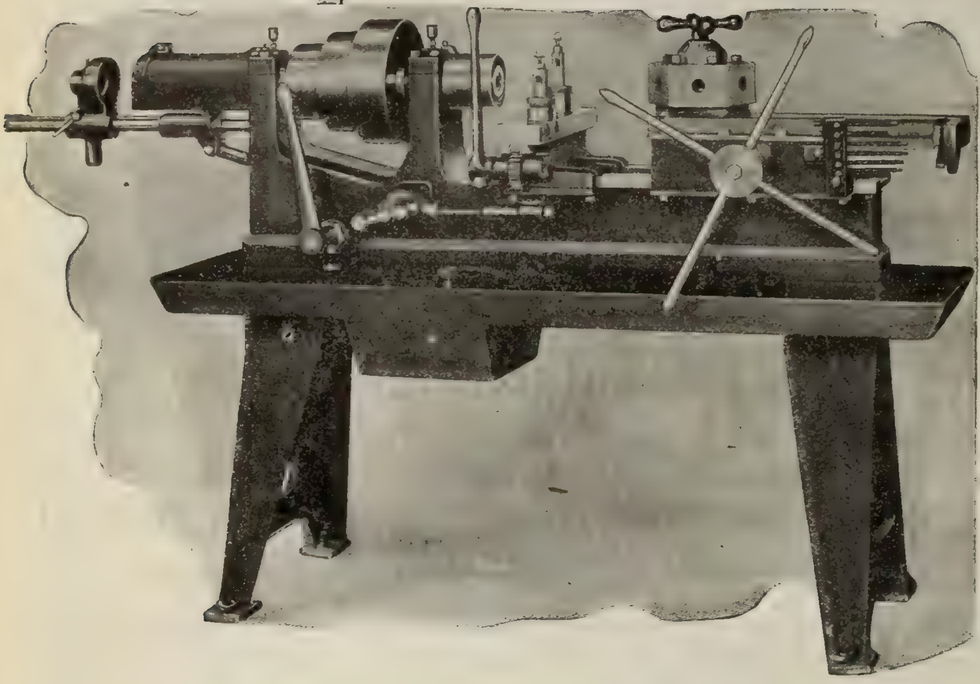
A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.

STECHER

No. 3 Hand Screw Machine



A Revolution in Screw Machine Design and Efficiency

THIS machine is designed with a view to obtaining the greatest rigidity and largest wearing surfaces. All useless adjustments, such as taper gibs in headstock boxes and gibs under saddle, have been eliminated, as they are just so many extra parts to jar loose and an excuse for the operator to throw the machine out of alignment.

Turret, independent adjustable stops and saddle have special advantages—learn about them by sending for circular to-day.

Our No. 4 B Hand Screw Machine is now in successful use in Canadian shops.

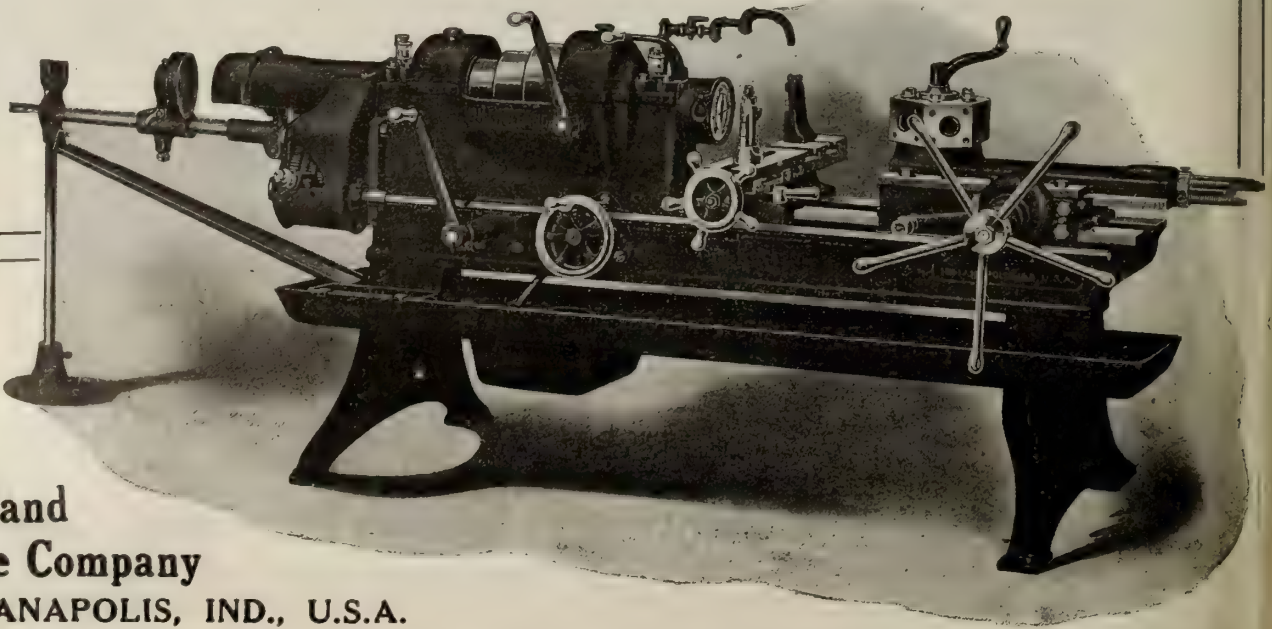
The Chas. Stecher C
1574 Crossing Street, Chicago, Ill.

Millholland 1⅝ x 10 Turret Screw Machine

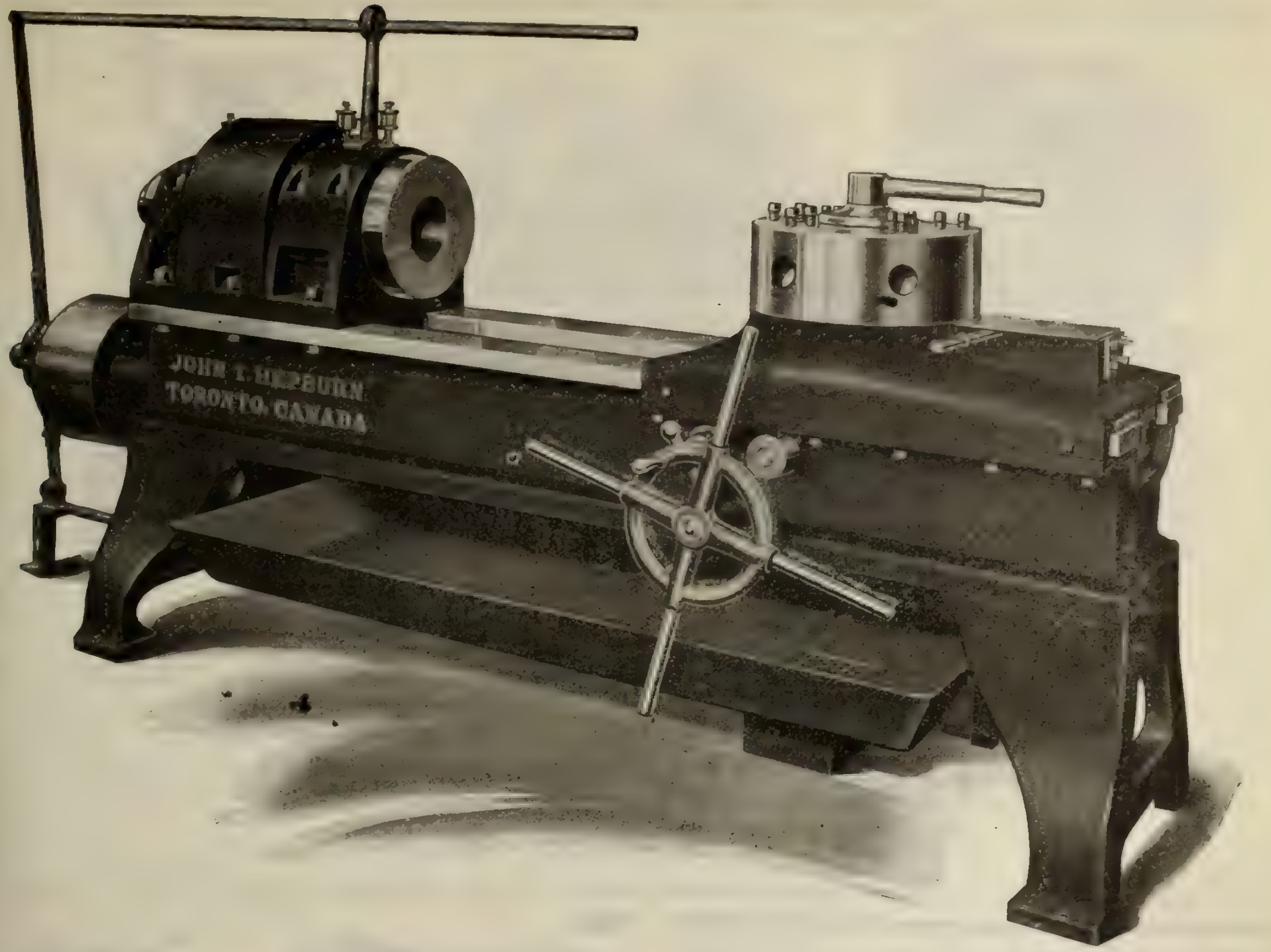
The combined result of two generations of engineering and mechanical experience. While, as a whole, it is no radical departure from established lines of the turret lathe, it has many **original features**, and with these features are combined well-known devices.

Safety, rigidity, convenience, production and durability are the ideas behind every step in their construction.

Your request will get you full details and specifications by early mail. Make it.



W. K.
Millholland
Machine Company
INDIANAPOLIS, IND., U.S.A.



FIRST AND LAST COSTS !

When you install a Hepburn Heavy Duty Lathe, this first cost is the last cost. But it has happened to our knowledge, that a munition contractor has installed a lathe at a cost more or less heavy, and has required before many months passed to replace it with another lathe—that is, two costs have been incurred, where one alone was necessary, and the profit on many thousands of shells was wiped out just because the wrong lathe was installed.

A Hepburn Lathe has no black marks against it. It is distinguished for

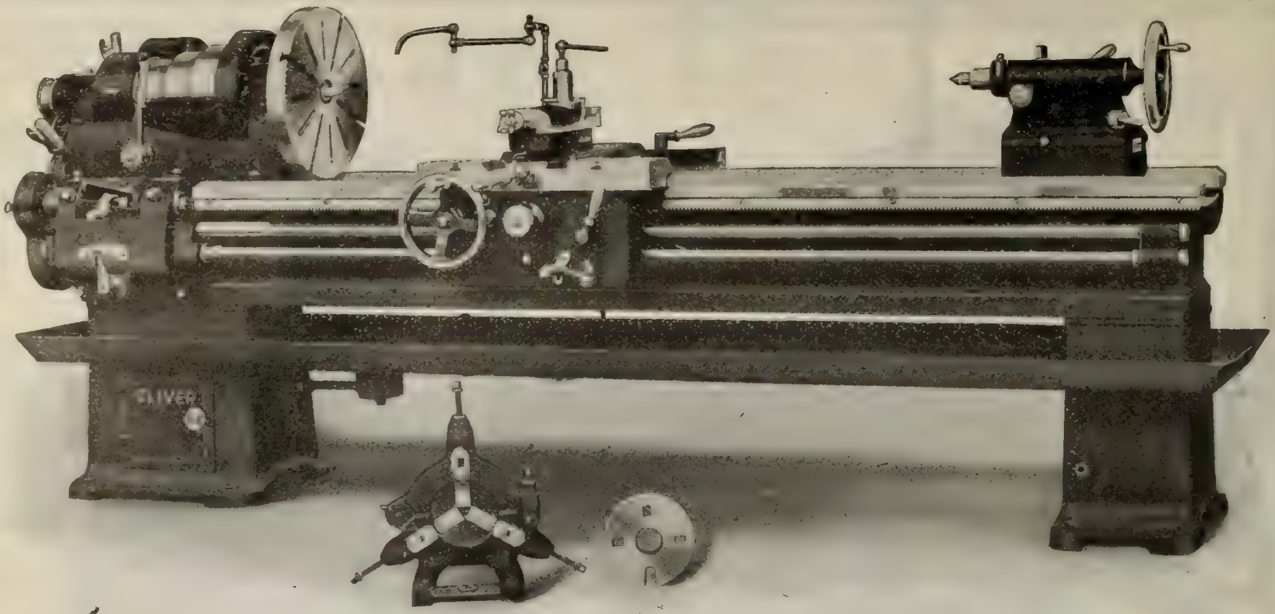
SPEED, ACCURACY, POWER, STRENGTH, RIGIDITY and SIMPLICITY

Investigate it and its record in operations.

The Hepburn has nothing to fear by investigation.

N. B. WE CAN SHIP PROMPTLY. Also keep this in mind, we have turning and turret lathes up to and including 9.2".

JOHN T. HEPBURN
LIMITED
18-60 VAN HORNE ST., TORONTO



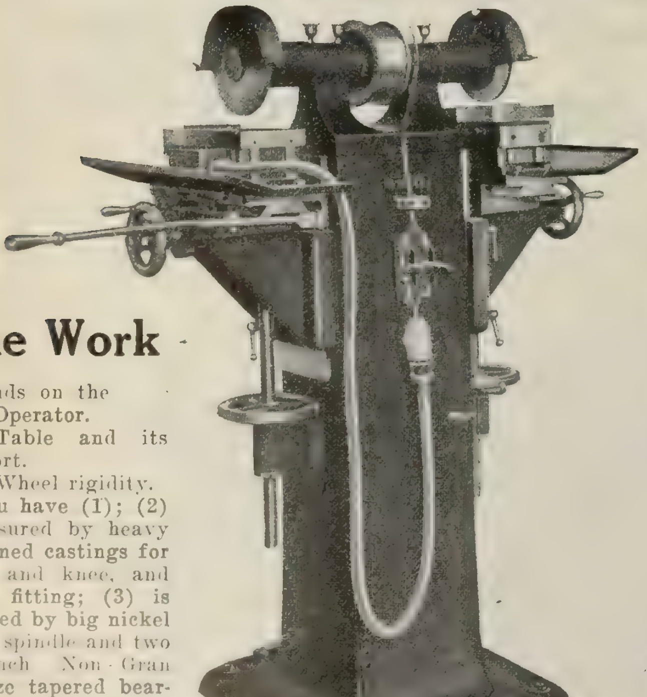
"Oliver" 18-inch Heavy-Duty Engine Lathe, 10-foot bed.

ENGINE LATHES
TURRET LATHES
SCREW MACHINES

DOMINION MACHINERY CO., TORONTO
Agents for Ontario

OLIVER MACHINERY CO.
GRAND RAPIDS, MICH.

The "Steno" Duplex Surface Grinder



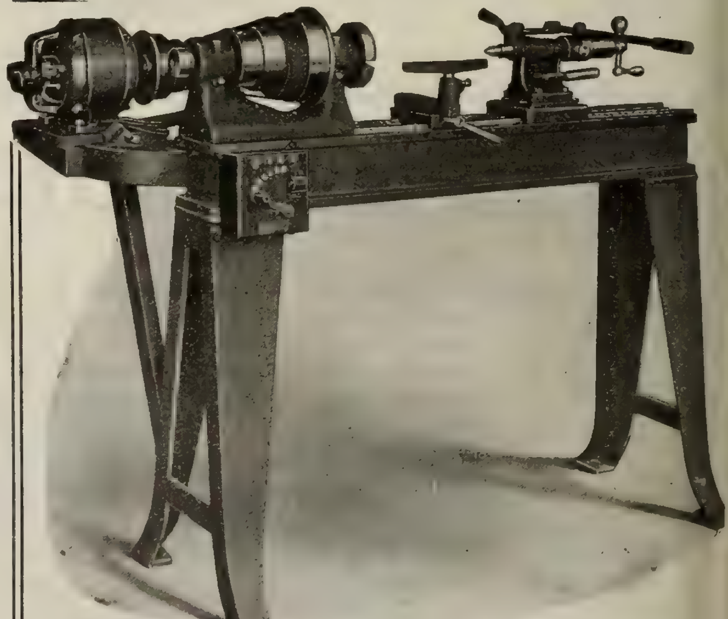
Fine Work

depends on the
1. Operator.
2. Table and its support.
3. Wheel rigidity.

You have (1); (2) is assured by heavy seasoned castings for base and knee, and good fitting; (3) is secured by big nickel steel spindle and two 6 inch Non-Gran bronze tapered bearings.

No interference between operators.

THE STENOTYPE COMPANY, INDIANAPOLIS, INDIANA, U.S.A.
Manufacturers of the "STENO" Duplex Surface Grinder, the "STENO" 1" x 7" Turret Hand Screw Machine and "STENO" Milling Cutters, Reamers, Fixtures, Jigs and Gauges.



Motor Driven Speed Lathe

This style of motor drive employs a constant speed motor mounted on a plate having an extension arm to support a bearing for the outer end of the motor shaft. The motor plate is fitted to a slide on a shelf which is securely fastened to the back of the lathe bed. The motor plate is moved by means of a screw which tightens or loosens the belt. A four-step cone pulley on the motor shaft is belted to a four-step cone pulley on the spindle. This gives the same speed variation as when a countershaft is used, and by means of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is crossed-braced and all clamping levers are above the ways.

J. G. BLOUNT CO. - Everett, Mass., U.S.A.

Boro-Carbone *Electrolon*

"ABRASIVE" GRINDING WHEELS

FOR ALL CLASSES OF GRINDING

BORO-CARBONE

Has no
Superior for
Grinding
SHELLS,
Steel and
Materials of
High Tensile
Strength

QUALITY
UNIFORM

SUPPLY
DEPENDABLE

ELECTROLON

Is most
Efficient for
Grinding
Cast Iron
Brass, Bronze, and
Materials of
Low Tensile
Strength

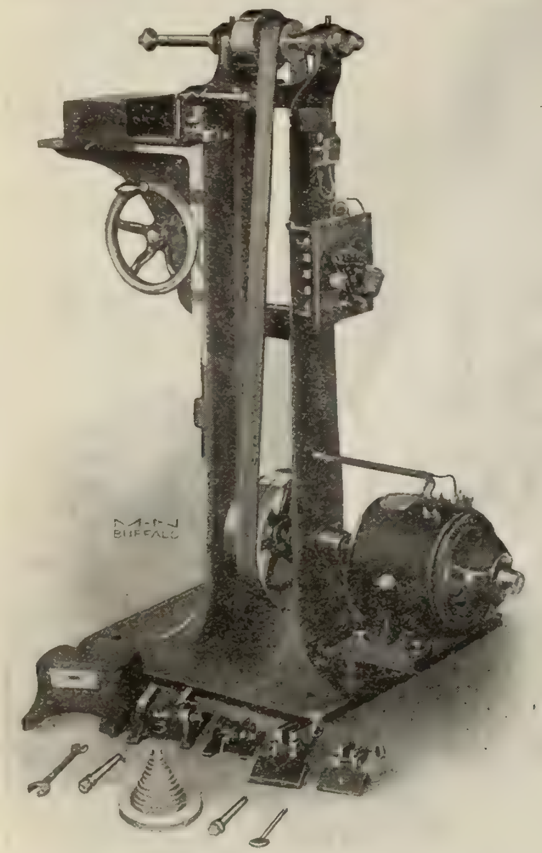
Manufactured by
ABRASIVE COMPANY
PHILADELPHIA, U.S.A.

The Canadian B. K. Morton Co., Limited

EXCLUSIVE AGENTS FOR ONTARIO, QUEBEC and NEW BRUNSWICK

49 Common St., MONTREAL, QUE. 86 Richmond St. East, TORONTO, ONT.

"MODERN" CHASER GRINDER



ARE YOU USING THREADING DIES?

Where Self-opening Dies are used, in fact, where any thread cutting is done, the MODERN CHASER GRINDER, Belt-Driven or a complete Self-Contained Motor-Driven Unit, as illustrated, is a necessity.

Those who value accuracy and correctness in gauge of thread will find, by using the MODERN CHASER GRINDER, that each Chaser will do its portion of duty, being ground true to the axis of the head, and that the life of the Chasers, as well as that of the Die Head, will be greatly prolonged.

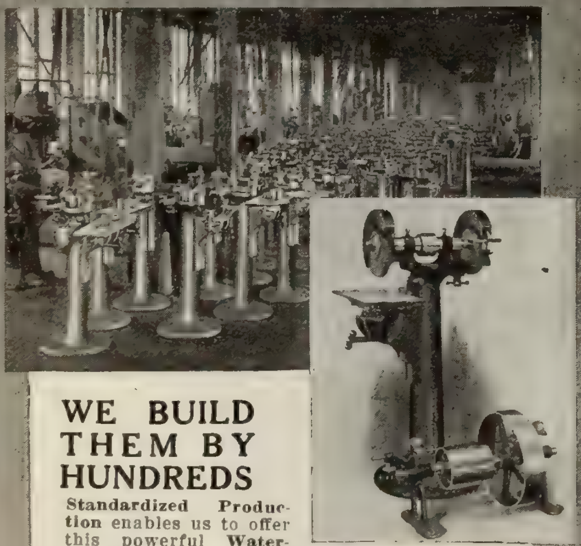
PROMPT DELIVERIES.
Bulletins upon request.

MODERN TOOL COMPANY

Main Office and Works :
State and Peach Streets : : Erie, Penna.

New York Office—2 Rector Street. Chicago Office—32 N. Clinton Street.
Detroit Office—246 Gladstone Avenue.

F. WESLEY PARKER, *Resident Engineer and Export Agent,*
2 Rector Street, New York.



WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful Waterbury Grinder at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only $60 Complete

The Blake & Johnson Co., Waterbury, Conn.

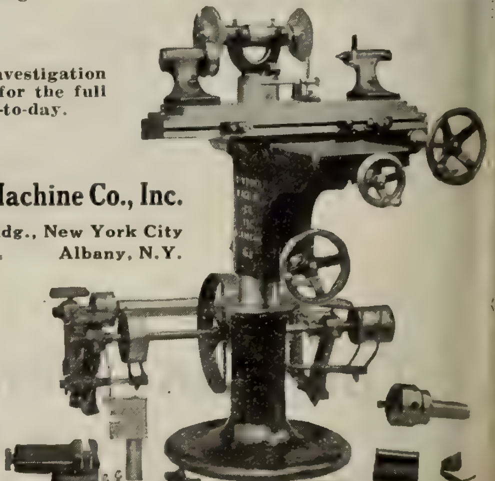
Assuming that you want a grinder that is better than the average—

A grinder with massive table, micrometer adjustments, very long knee and gibs, and extra heavy head- and tailstock—it will pay you to investigate the

Standard No. 6 Universal Grinding Machine

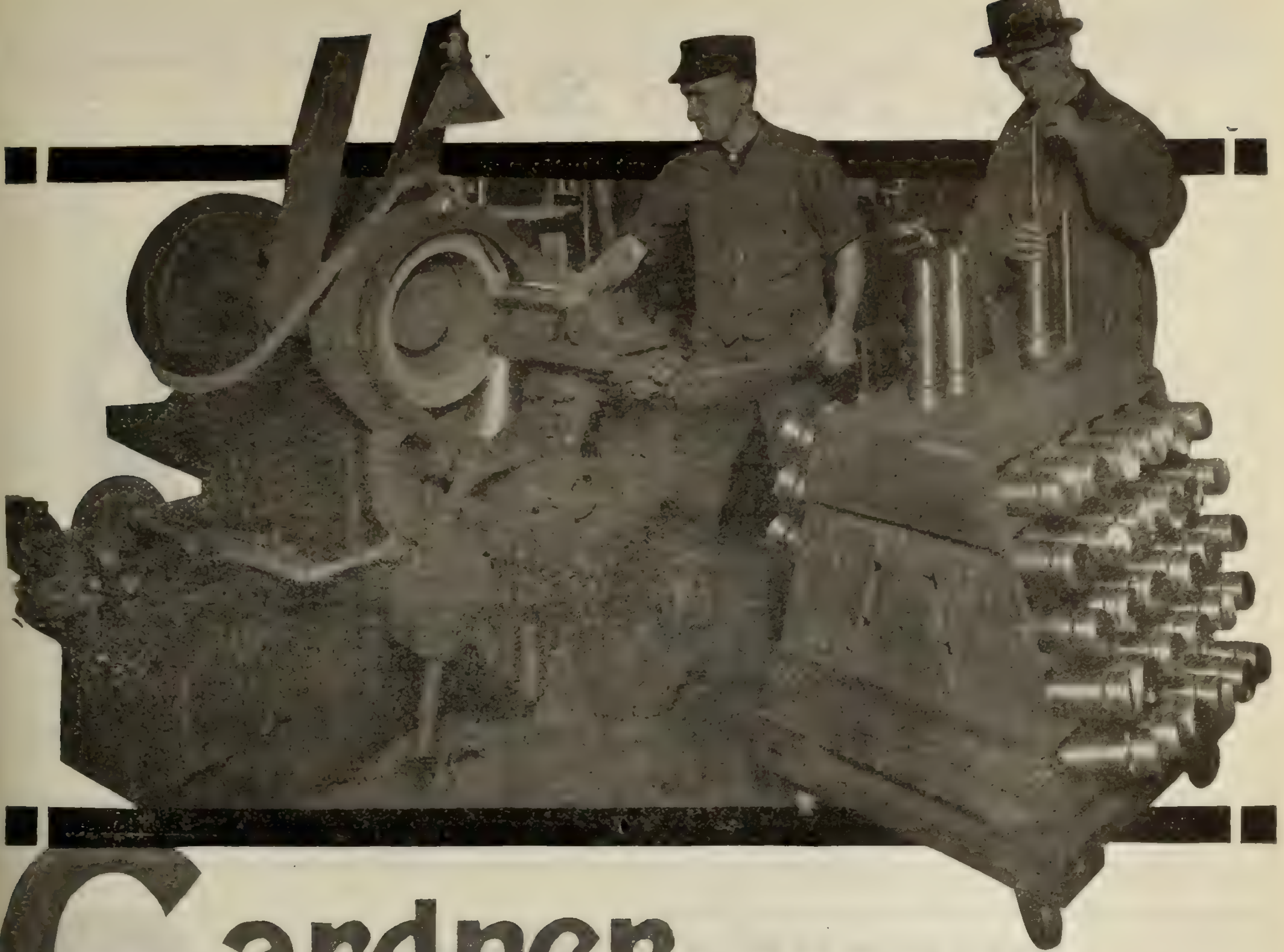
In addition, you'll find that the headstock is fitted with large bearing for chuck spindle and with special bronze bearings of navy specifications, spindle is tapped and tapered, bored to take wheel arbors and bearings are 1 in. in dia. and 2¾ in. long, and an exceptionally simple and sturdy countershaft with self-lubricating bearings.

Start the investigation by sending for the full details—to-day.



Simmons Machine Co., Inc.

1001 Singer Bldg., New York City
981 Broadway, Albany, N.Y.



Gardner Grinders

Illustration shows a grinder developed especially for removing the hub or centre projection from the ends of shells. This machine is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates. We build a much more powerful grinder to be used for these same operations on 6-inch shells.

Features:

High-grade Babbitt Bearings and Lever Feed.

Rapid clamping of Shell into "V" fixture.

Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.

Can be equipped and operated at both ends for double output.

Output, according to size of projection to be removed from 40 to 100 per hour. Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever-feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments. Weight, 4,500 lbs.

For further particulars write:

The Gardner Machine Company, Beloit, Wis., U.S.A.

A New Thing in Shell Gauges

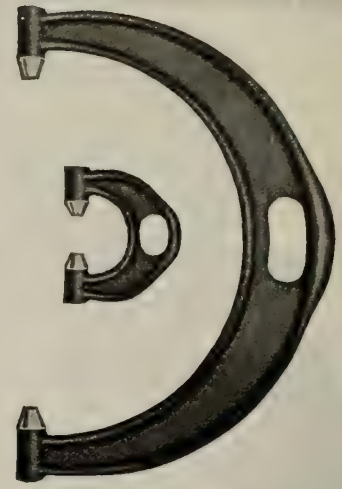
A snap gauge for calipering all outside diameters, with absolute accuracy.

Can be furnished suitable for waving, grooving, rough or finish turning—all sizes of shells, from 9.2″ down.

Note the improvement on this gauge for holding.

In ordering, specify diameter and part to be calipered.

Immediate shipment can be made from stock.



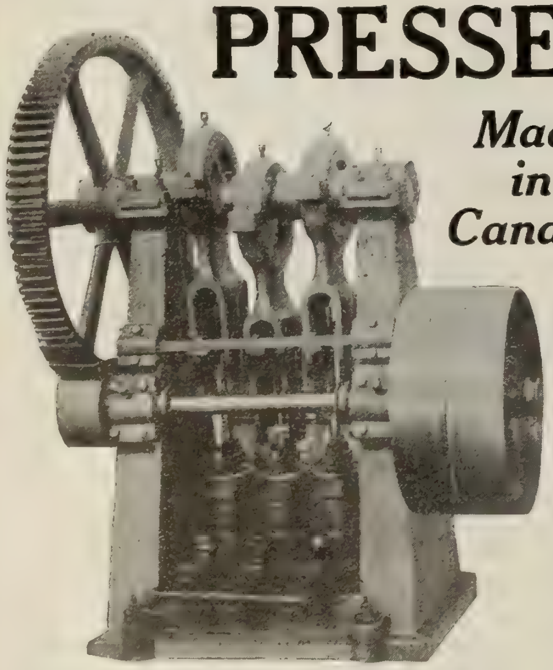
Note the hole for handling when using.

Save the Operators' Fingers

The Foundry & Machine Co., Limited
1167 Carriere Road
MONTREAL, CANADA

PRESSES

Made in Canada



Hydraulic Presses, Pumps and Accumulators for all purposes.

WRITE FOR PRICES AND DELIVERIES

WILLIAM R. PERRIN, Limited
TORONTO, CANADA

Elmes High Pressure Fittings

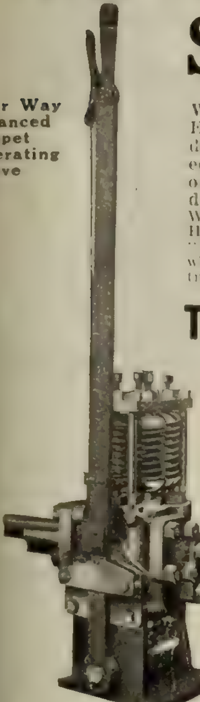
The reason for the popularity of our fittings is the exceptional strength embodied in its make-up. Each tee, elbow, and flange union are all tested to considerably more than their specified strain maximum. This fact, together with the excellent quality forged steel material, gives these fittings a distinctive quality that will live up to and beyond our claims. 6,000 lbs. to 8,000 lbs. pressure.

Investigate these. Price? We will surprise you. Write for our catalogue.

Chas. F. Elmes Engineering Works
217 N. Morgan St. - Chicago, U. S. A.

MG HYDRAULIC MACHINERY

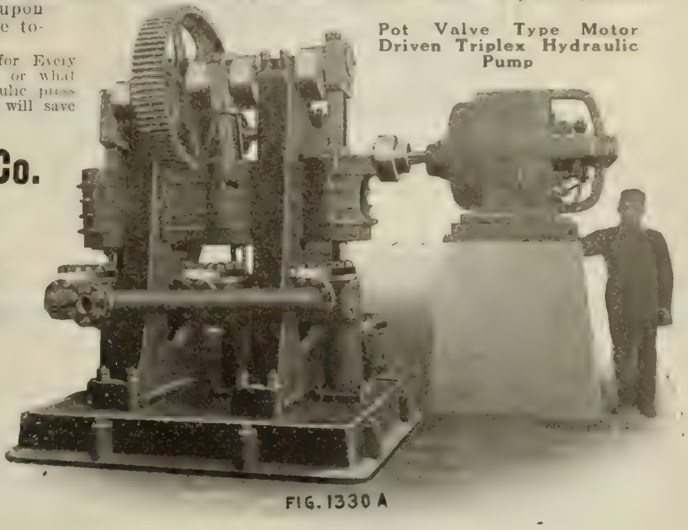
Selected for Their Reliability



Four Way Balanced Poppet Operating Valve

Whenever the question of reliability is considered, **"Mount Gilead" Hydraulic Pumps, Valves and Fittings** are selected. Everywhere by their reliability they are adding strength to hydraulic press installations, increasing their output by delivering and controlling the pressure in proper proportions. If you want good everyday service from your hydraulic equipment—delay no longer, but ask us for details upon our pump equipment for your requirements. Write today.

We are also designers and builders of Hydraulic Presses for Every High Pressure Purpose. No matter where you are located or what "Your Pressing Needs" may be, we have a design of hydraulic press which will do your work in the best possible way—one that will save time, labor and repair bills. Write us.



Pot Valve Type Motor Driven Triplex Hydraulic Pump

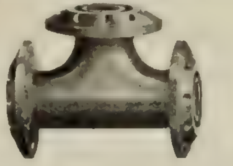
FIG. 1330 A

The Hydraulic Press Mfg. Co.

89 Lincoln Ave., Mount Gilead, O., U.S.A.

Canadian Agents:

Eastern Office: Room 1105-R, 39-41 Cortlandt St., New York City. Canadian Agents: A. R. Williams Machinery Co., Ltd., Toronto, Ont. and St. Johns, N.B.; Canadian Fairbanks-Morse Co., Toronto and Montreal; McLean & Barker, Southam Bldg., Montreal; Canadian Equipment & Supply Co., Edmonton, Alberta.

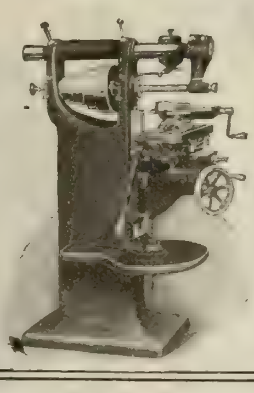


Hydraulic Long Radius Tee with Flanged Connections

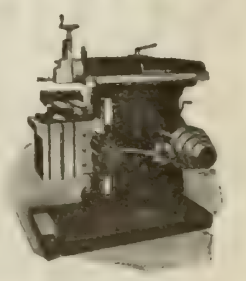
"FOR YOUR PRESSING NEEDS" MG

Increased Production Means Increased Profits

Large Millers for large work —STEPTOE MILLERS for small work.



Large Planers for large work —STEPTOE SHAPERS for small work.



Will result in increased production; less money invested in machinery, and increased profit.

THE JOHN STEPTOE COMPANY
CUMMINSVILLE, CINCINNATI, OHIO, U.S.A.

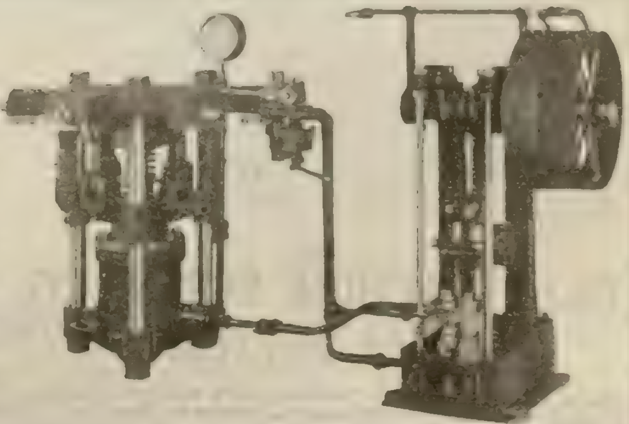
A very rapid worker—

In fact the operation of this press is so rapid that it is impossible for human operators to handle the work to and from as quickly as it completes its operations. It is impossible to utilize its full capacity.

"Metalwood" Horizontal Banding Press for Shells from 3 to 5 in.

Press is combination of Hydraulic and toggle with means of adjustment both for amount of pressure applied and stroke. Has six concentric dies coming to a common centre forming a complete circle when closed to required diameter of band.

All working parts are fully enclosed, at the same time easily accessible for changing of dies. Toggles are arranged with adjustment so that pressure delivered on dies can be varied to suit the pressure or pressures applied on hydraulic cylinder. 2,500 lb. approximate pressure required, developing 120 tons on 9" ram.



Metalwood Manufacturing Co.

Leib and Wight Sts., DETROIT, MICH.

GARLOCK-WALKER MACHINERY CO.
LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

WE HAVE AT TORONTO FOR IMMEDIATE DELIVERY:

New **Davis 6" Cutting-off Machines,** fully equipped, size of hole in spindle 6⅞".
New **Giddings & Lewis** 18" x 8' Heavy Duty Engine Lathes, 3-step Cone, Double Back Gears, regular equipment.
New Heavy Duty Lathes for turning 8" and 9.2" Shells.
Thor pneumatic hammers and drills.
Appleton Grinder—Challenge No. 1—slightly used.

Special 16,000 lb. 40" Boring Lathes for 6" Projectiles.
Immediate Delivery—Special Price—Write for Cuts, etc.
Good Delivery now on Lodge & Shipley 24" Lathes.
Ask for information about machines for any operation on 3", 4.5", 5", 6", 8" or 9.2" Projectiles.—Our Experience is at Your Service.

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds

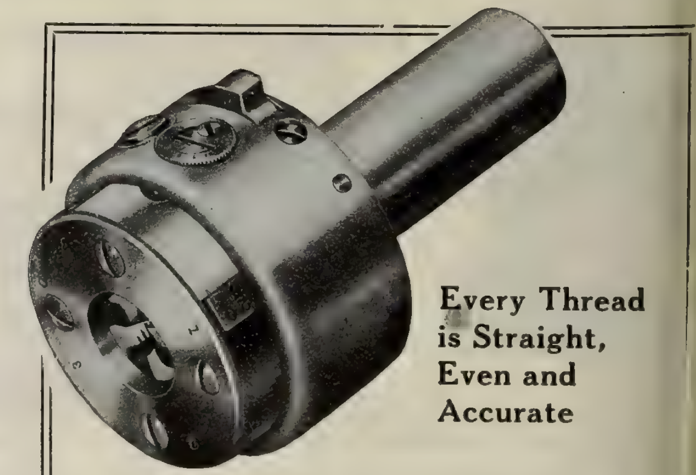
ACCURACY

Send us your rush orders for Screws and Nuts. We ship from a stock where "Accuracy" is all important. Prompt service and "GALT" quality goods only.

Specialists in Cap and Set Screws.

THE
GALT MACHINE SCREW CO.,
LIMITED
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company, Limited, 49 Common St., Montreal Que.



Every Thread is Straight, Even and Accurate

The Chasers in an **H & G Automatic, Self-Opening Die Head** are set and held in place by a steel cam. That cam once adjusted, locks; there is no stoppage or changing in size.

The quick release not only issues the cutting of the thread to a given point every time, but permits cutting right up to a shoulder when required.

Simple, Strong and Compact.

Our booklet tells more. Drop a card for it.

Eastern Machine Screw Corp.
New Haven, Conn.

Peerless HIGH SPEED
PEERLESS MACHINE CO RACINE WIS U.S.A.

"100% Better, Faster and More Reliable

than any Sawing Machine we have ever used; we have had almost all makes of Sawing Machines manufactured."

Just what a customer in Toledo, Ohio, reports after a thirty days' trial.

You don't have to take anybody's word for it, try it out under your own conditions. You are under no obligations if it fails—remember we also pay the freight both ways.

Not only 100% more production, but saves 100% floor space. These problems have handicapped many manufacturers for some time. They can now readily be solved by the Peerless High Speed Heavy Duty Metal Cutting Saw.

Write us for complete description and references. Some of these machines may be working in your vicinity.

Peerless Machine Co., 1607 Racine St., Racine, Wis.

MORE SPEED **LESS BLADES**

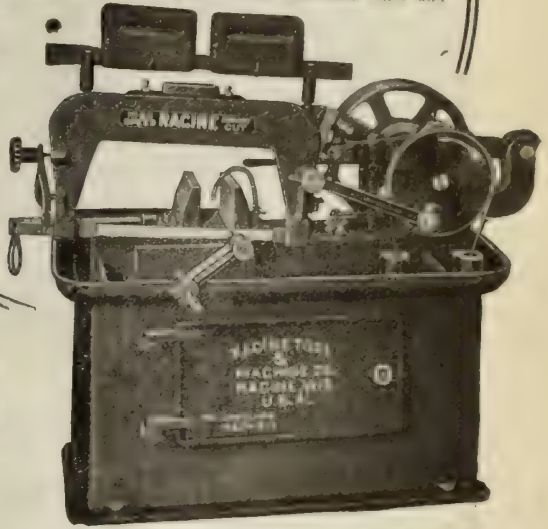
One Canadian Steel Company uses 120

RACINE METAL CUTTERS

and has saved $11,019.50. Particulars on request.

These machines are popular everywhere because they work fast and are easy on the blades—because springing is absolutely prevented by the mechanically correct design and construction.

The heavy, rigid saw frame guide of the Racine is made of the best grade of semi-steel and will hold the saw frame absolutely rigid and work at all times, insuring a straight cut with the least possible waste of material.



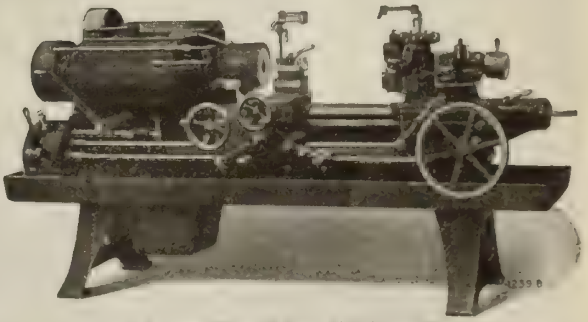
There are other Racine features well worth investigation — the **Positive Automatic Lifting Device, the Combination Vise, the Cooling System, etc.** May we tell you about them and about our unusual trial offer?

RACINE TOOL & MACHINE COMPANY
15 Melbourne Avenue, Racine, Wis., U.S.A.

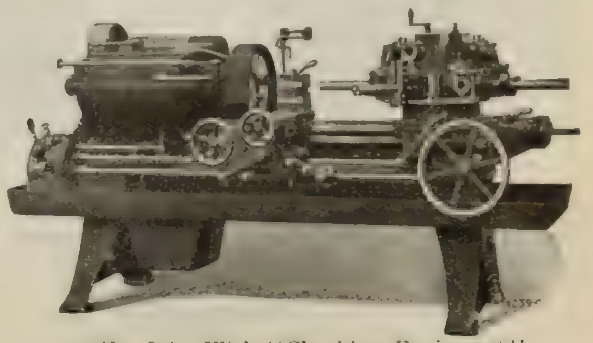
Two Cuts at One Time

The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the ime-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes



No. 2-A—With "Bar Equipment"



No. 2-A—With "Chucking Equipment"

eparate feed shafts, each with ten individual feeds, operate the arriage and turret saddle independently, and provide the exact eed required for each.

nd to this great advantage are added the other essentials for pid and accurate production—excess power, extreme rigidity, eat adaptability, and a power rapid traverse that saves time d conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal

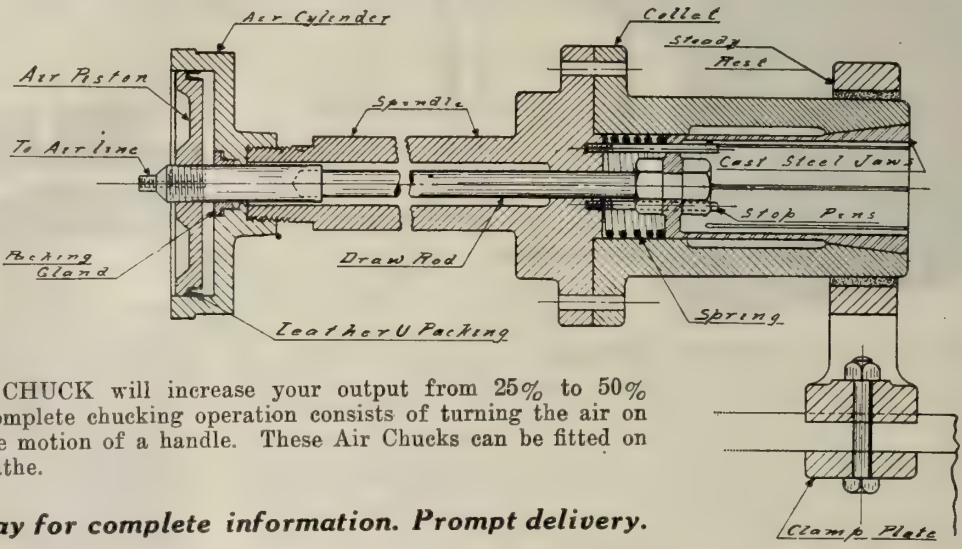
Get Out Your Watch and Time Your Chucking

With most screw chucks you have to use brute force or the hammer to tighten, and even then your shell is not always rigid.

H.E.W. AIR COLLET CHUCK IS RIGID

Saves Time

Saves Money



H.E.W. AIR CHUCK will increase your output from 25% to 50% because the complete chucking operation consists of turning the air on and off, by the motion of a handle. These Air Chucks can be fitted on almost any Lathe.

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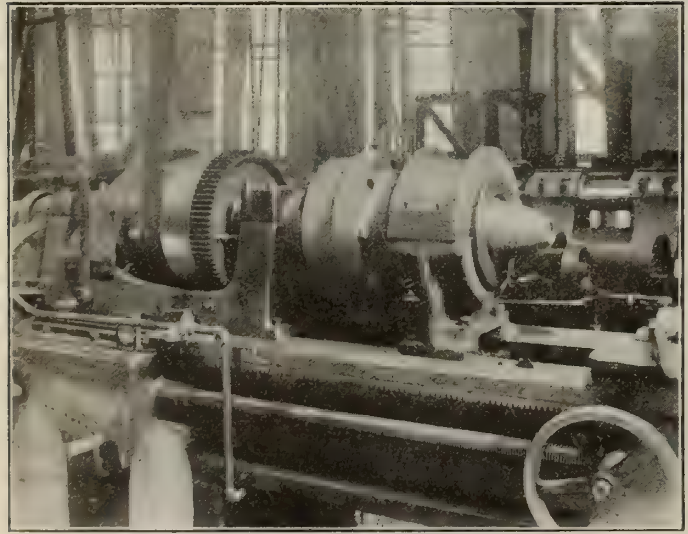

Cut shows Chuck on nosing operation. This is one of over two hundred in this Canadian plant.

This chuck is *built on the duplicate part system. It is simple, effective and fool-proof.*

It grips the shell in a predetermined position. The jaws will not slip on the shell. It has shell interior and exterior adjustable stops.

A trial on one of your lathes will convince you that this is THE Chuck for shell work.

A Big Efficiency Unit in Your Shell Plant

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LOW PRESSURE

Compressed Air Chuck

This chuck can be applied to any make of lathe, withou alteration to the machine, and will increase productio from 25% to 75%. It grips and releases the shell while i motion—no need to stop your machine.

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Quick, accurate work in threading Fuse Plugs for Shrapnel Shells is essential if you would make maximum profits. Your field is unlimited and your output governs your income. **Why not give the special type "C" Ideal Die a hard trial at this work and see if it will not boost production for you?**

Let the "IDEAL" cut the threads that bind you to low production. They will fit your machines. Circular on request.

"IDEAL" is a *different* die. The head revolves around a stationary cam, thereby utilizing the belt power or cutting strain as opening power. Chasers are supported directly back of cutting strain, which will remove any tendency to bell out and cause taper threads.

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MAKERS ARE finding that Murchey Collapsing Taps and Automatic Self-Opening Dies are paying propositions on this kind of work. We can tap any size hole from 1 inch to 12 inches. All chasers used on shell work absolutely guaranteed to be made of the highest grade of high-speed steel. Get the benefit of our experience and the experience of some of the biggest shell manufacturers in the country. Let us tell you about the savings. Send blueprints. Write to-day for catalog.

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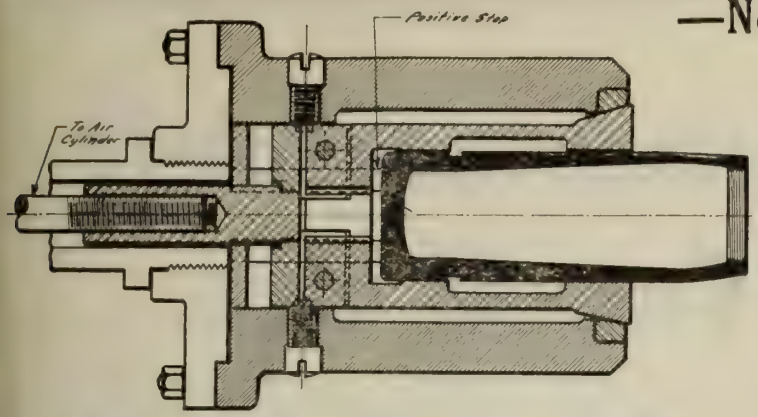

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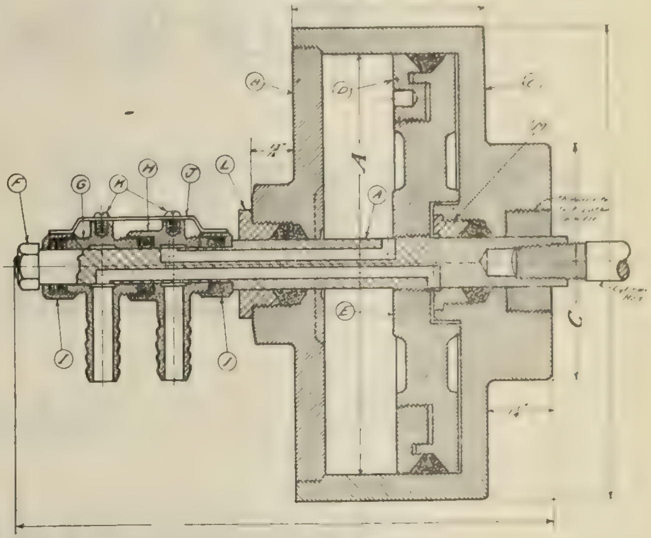

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Embody every strong feature consistent with modern requirements. Construction of piston permits adjustment, preventing unnecessary loss of air.

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The Base Tank and Large Gear Pump is the latest addition to its many advantages. Tank holds 20 gallons of cutting lubricant.

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Pump never requires priming and will deliver ten gallons per minute to the cutters, keeping them cool when run at very high speed.

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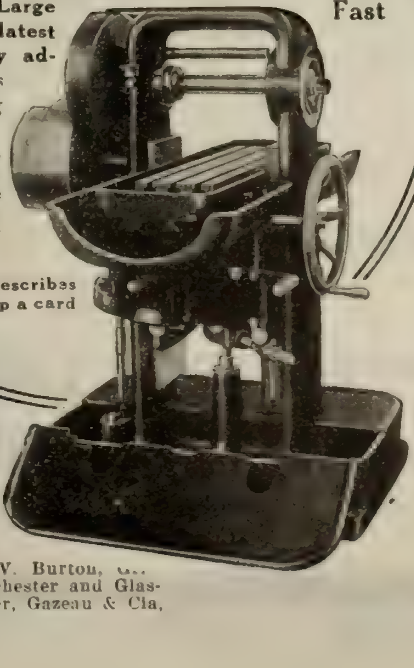

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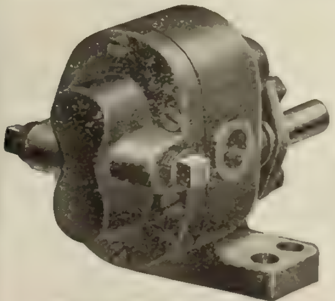

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C. F. Roper & Co.

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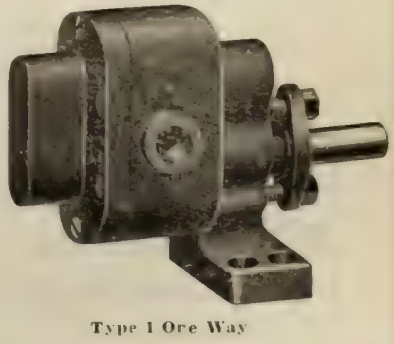

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Our facilities in this connection will make our service of value to you,

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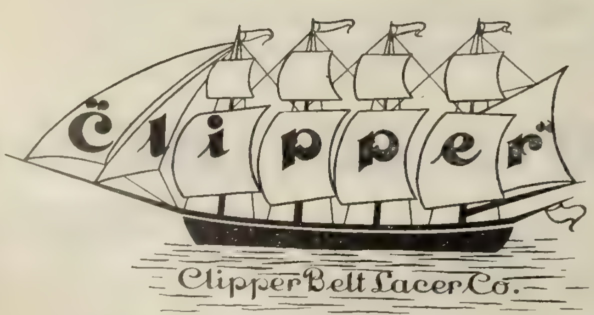

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"CLIPPER" BELT LACERS and "CLIPPER" BELT HOOKS

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It is made of stitched canvas for the reason that this material, processed the ANACONDA way, makes belts more waterproof, with less slip, less stretch and of greater general serviceability than any other belts of any kind —leather, rubber, balata, or fabric, including canvas.

In other words, only in ANACONDA can you obtain those belt qualities which you know are needed in your plant, and an investigation at least cannot fail to be profitable.

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Economic Shell Washer

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Bearings fit any
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The ordinary line shafting consumes from 15 to 60 % of power developed—

But the line shafting that's equipped with Chapman Double Ball Bearing will save 75 per cent of the friction loads making an average total saving of power from 15 to 30 per cent.

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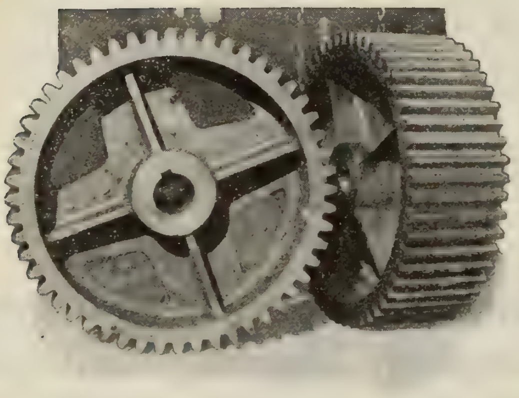
CUT GEARS

CUT GEARS



ALL STYLES OF GEARS,
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Write us for quotations.

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The Man is as Efficient as his File

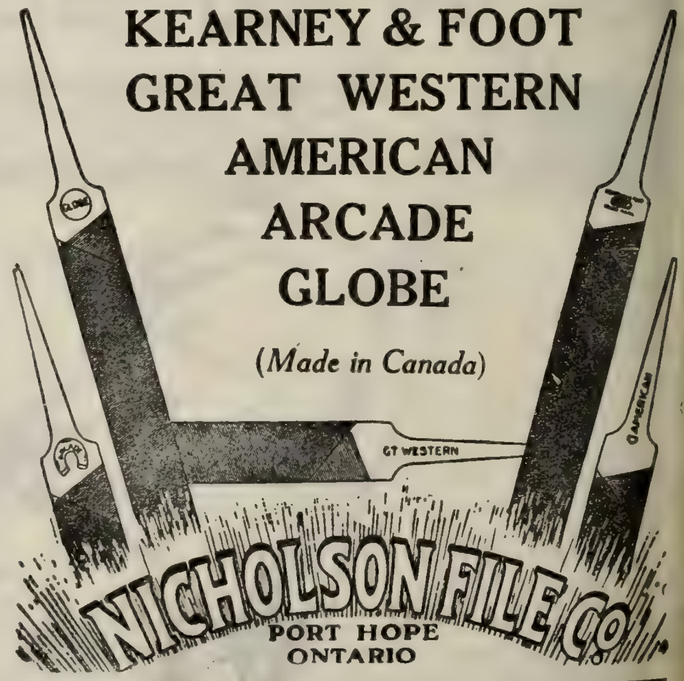
—and because he's a skilled mechanic, he prefers to work with one or other of the "Famous Five" Files.

He likes their balance. He appreciates the quality of the steel in them and the innumerable grades of Files he can obtain to fit the different kinds of work he has to do.

If you could take a vote from among the men in your factory, you would find that they all know the "Famous Five" and prefer to work with them.

It is just as well to specify them when ordering.

The "Famous Five" are:



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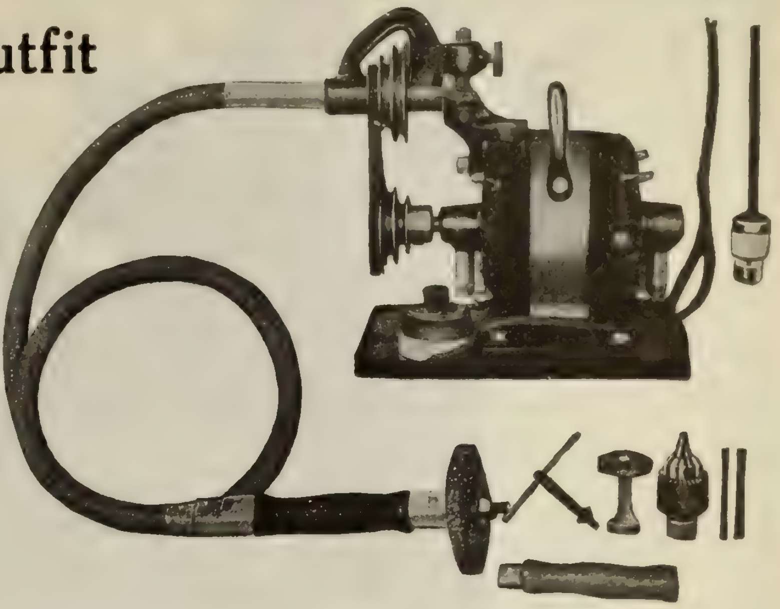
"Strand" Flexible Shaft Outfit

for light grinding, polishing and drilling. Built for either a 1-10 or a 1/4 horse-power motor, which drives a 4 in. x 3/8 in. and 5 in. x 1/2 in. wheel, respectively.

The Strand Flexible Shaft—

is made with an improved metal casing which eliminates much of the trouble usually experienced with flexible shafts.

It is so constructed as to be freely flexible to a certain radius, where it automatically forms a stop, thus preventing accidental short bends.



Three-Speed Countershaft. Three-speed belts, acts as a safety drive to prevent overloading of the motor.

By removing the detachable handle and wheel, the drill chuck can be attached very conveniently.

Buying Strand Flexible Shaft Equipment means making a big profit-earning investment double-sure.

Our catalog gives all the information. Drop a card for it now.

R. E. T. Pringle, Limited

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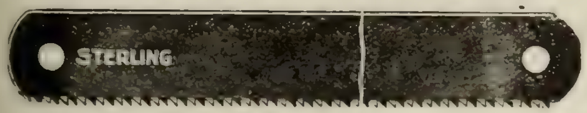

Sterling
POWER HACK
SAW MACHINE

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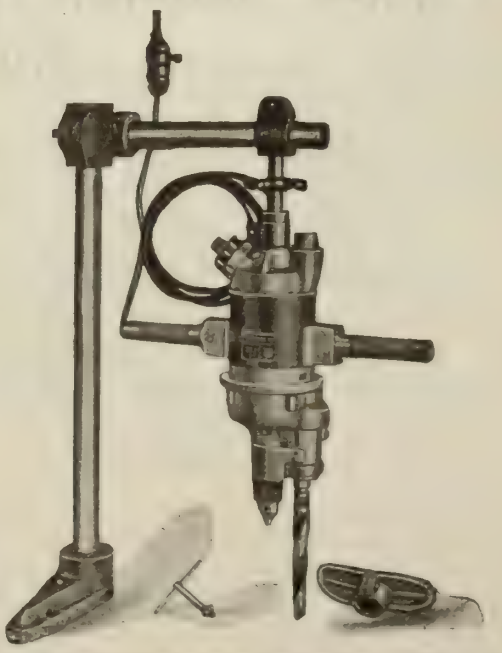
DIAMOND SAW & STAMPING WORKS

BUFFALO, N.Y., U.S.A

Stow Two Speed Two Spindle Drill



The only tool of its kind on the market. Fills a long-felt want. Will cut your cost.

We make drills of every size.

STOW MFG. CO., Binghamton, N.Y., U.S.A.

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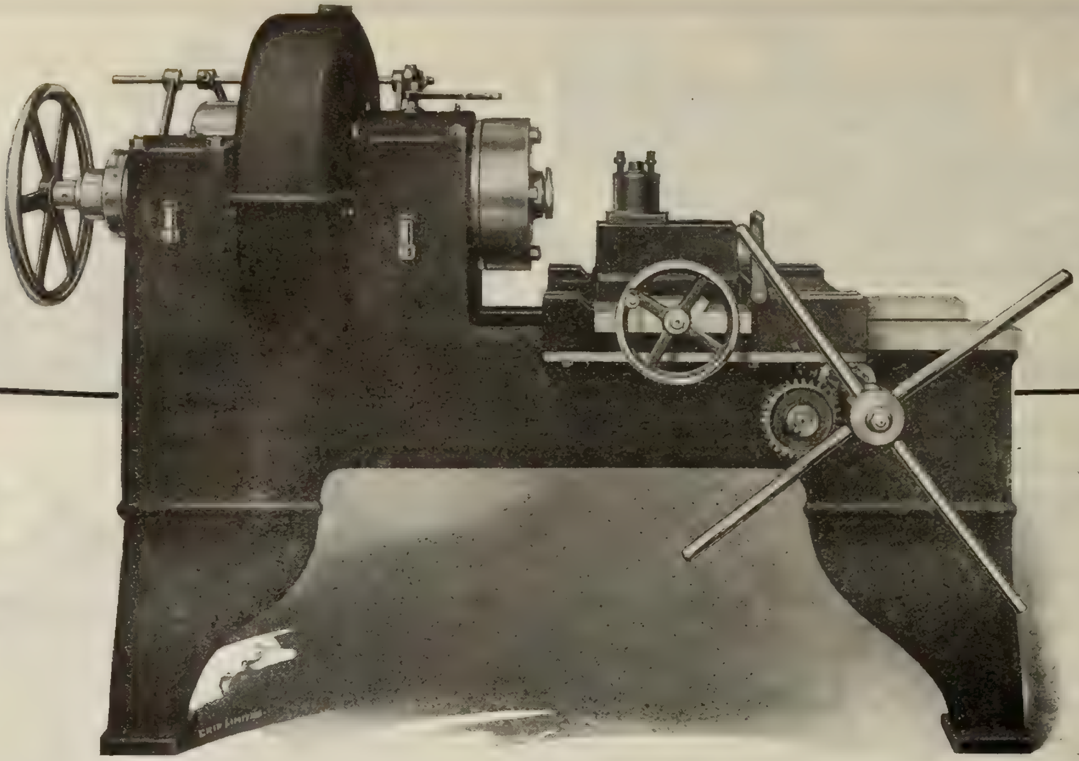
Oldest Portable Tool Manufacturers in America.



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Front Bearing Bronze 12" long 9" diam., Rear Bearing Bronze 10" long 5" diam. Pulley, 16" diam., 4½" face T & L on Mach. Gear ratio 10 to 1. Collet Chuck.

The Bawden Hollow Spindle Lathe for 6" Shells

Machines Furnished for Following Operations:

Machining Base Plug. Machining Base Plug with Power Cross Feed.
Base Recessing Machine. Base Recessing Machine with Tool.
Base Finishing Machine. Base Finishing Machine with Power Cross Feed.
Machine for Nose Operation after heating, with 6-hole Turret.
Machine for Nose Operation after heating, with 6-hole Turret with Swinging Tool Post and Profile for rectifying profile of nose after heating.
Waving Machine.

AIR CHUCK FURNISHED EXTRA
Two Speed Friction Counter Shaft Furnished Extra.

The Bawden Machine Co., Limited
TORONTO, CANADA

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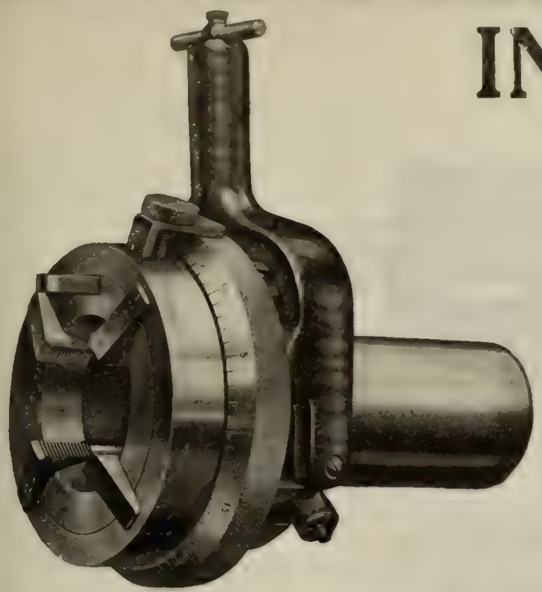

Wells Self-Opening Die—Model V.
A large number of these Dies in stock ready for Immediate Shipment.

In your fight to reduce operating expenses, to get the maximum production in your threading operations, you really ought to consider the

WELLS
Self-Opening Die

Every point of construction is planned with efficiency in view.

The cutting speeds possible with the W.S.O.D. have set new standards in screw cutting.

We have an interesting blueprint containing tables of cutting speeds figured for all sizes ¼″ to 1″, computed on the basis that the amount of metal removed should be the same for all sizes.

We will be glad to send you a copy together with further information about the W.S.O.D.—if you are interested.

Wells Brothers Company of Canada, Ltd.

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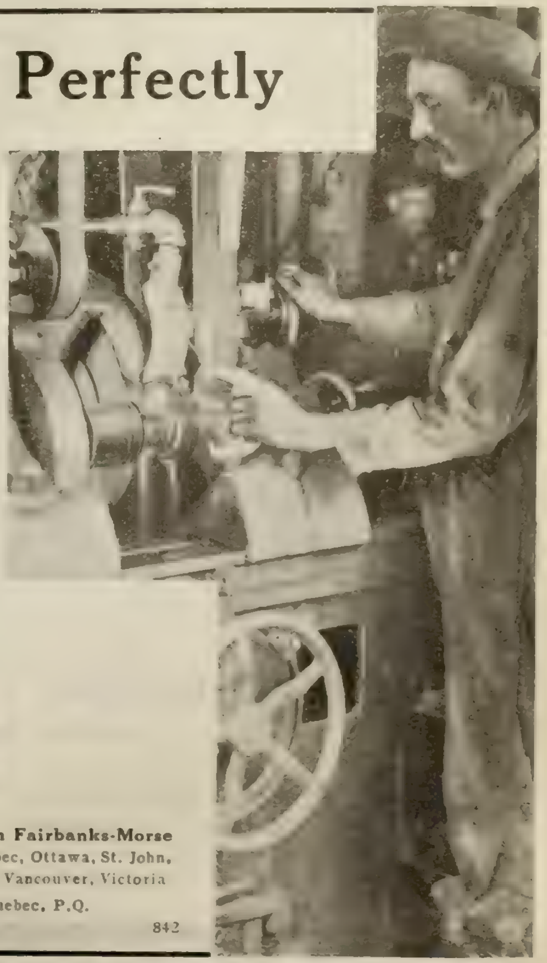
To the Trained Mechanic a Perfectly

ground piston is a piece of art. Whether you are the very man whose machine turns out hundreds of finished ground pistons a day or not, you must realize that grinding of this class requires a wheel that is *right* in every respect. A large number of records have shown that a 36-J or K Crystolon wheel has uniformly produced the best results on piston as well as piston ring grinding.

Other than Crystolon wheels will grind pistons, but scores of manufacturers claim no other wheel will grind them with the same high rate of production, with as little dressing and produce as good a finish. Your problem may not be pistons, but we have records of wheel production on practically every kind of grinding which will aid us in recommending the right wheel for your work.



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Electric Furnace Plants

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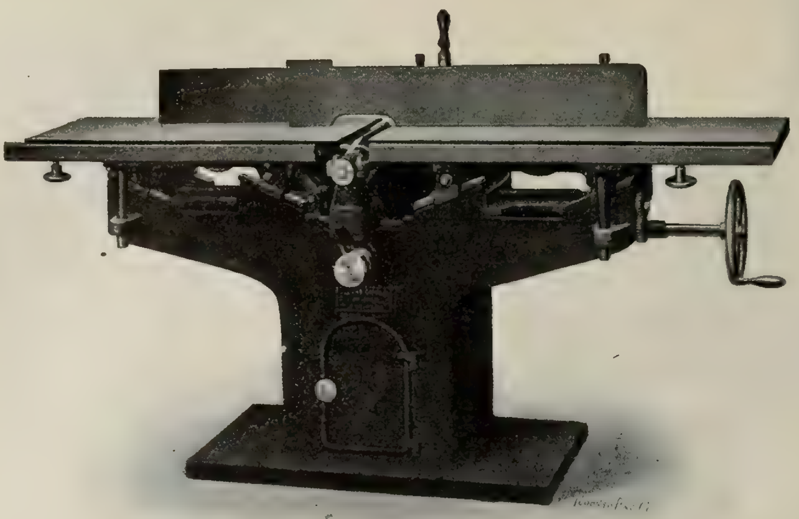

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- " (Band)
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- Bits
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6—Woodworking Shop

Pattern-making—the main feature of this shop—calls for the highest grade and most reliable machinery and tools. Manufacturers realize that their pattern-making equipment will either make or mar their reputation.

The regular carpenter's shop also requires the best of Machinery in order to ensure the maximum of production.

The Fairbanks-Morse lines of machines and tools includes everything necessary to equip the most up-to-date plant.

Your enquiries will receive prompt attention, and we can assure you the best deliveries.

The Canadian Fairbanks-Morse Co., Limited

Canada's Departmental House for Mechanical Goods.

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CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

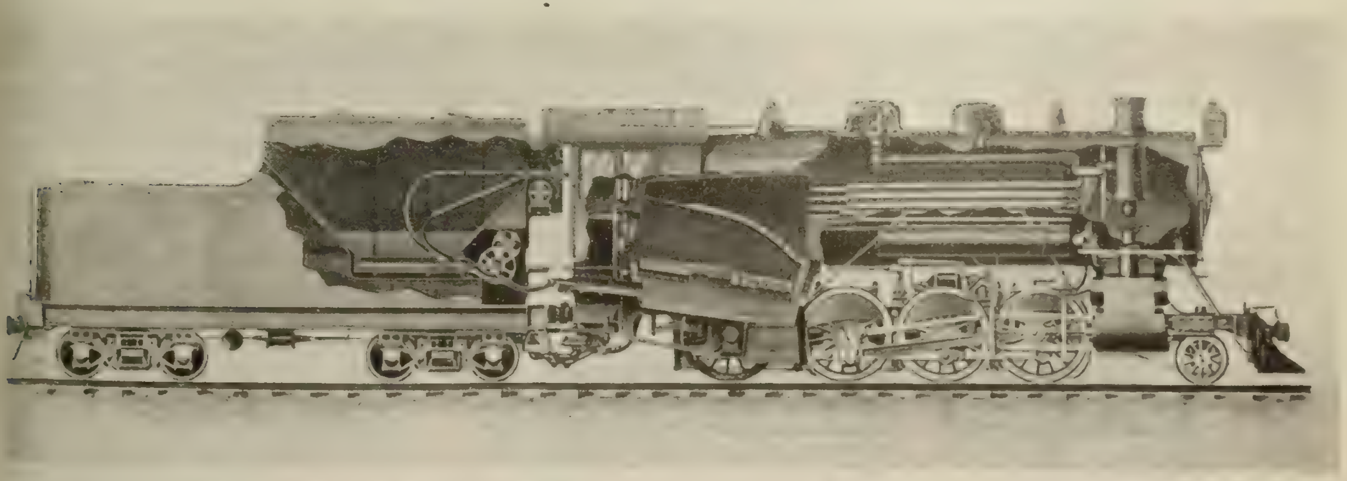
Pulverized Fuel Application to Steam Locomotives*

By Joel S. Coffin, Jr.**

Pulverized fuel firing is a development which has already made considerable headway, both as regards its practical application to steam locomotives, and to stationary steam boiler installations. The probability that steam coal will maintain in large part permanently its meantime well-nigh prohibitive cost, and the fact that immense quantities of what is now missed go more or less to the discard heap, have contributed materially to bring about the substantial progress and accomplishment which to-day is in evidence. The accompanying article sheds considerable light on the future possibilities of pulverized fuel firing generally.

COAL dust as fuel was first experimented with as far back as 1818, but it was 1895 before its actual industrial application began, at which time the increased cost of fuel oil resulted in its use in cement plants. About sixteen years ago the Manhattan Elevated Railroad in New York City experimented with pulverized coal on one of their locomotives, using a combined pulverizer, blower and steam turbine, located on the locomotive. The cylinder exhaust was not used to create boiler draft; the coal was coarse; and no means of precipitating, cooling and collecting the slag were provided, all of which led to the disuse of this equipment. During the past few years, the Swedish Government Railways have also experimented with burning peat and powdered coal on some small locomotive boilers. The powder, however, is blown into the furnace by steam, and the fire box brick work is very complicated.

The first locomotive of any size, to be equipped and sucessfully operated, having a self-contained equipment for burning pulverized fuel in suspension, was ten-wheel type engine of 31,000 pounds ractive power on the New York Cenral Railroad, which was converted in he early part of the year 1914. Later similar application was made to one of the Atlantic type locomotives on the Chicago & North Western.



STEAM LOCOMOTIVE IN PART SECTION, EQUIPPED FOR BURNING PULVERIZED FUEL.

The equipment and method of burning pulverized fuel in steam locomotives has passed the experimental stage, and early this spring the first complete commercial installation of a fuel drying and pulverizing plant and coaling station, in combination with a locomotive operating in regular train service, and equipped for burning pulverized fuel was made by the Delaware & Hudson Co. Since last spring many other arrangements for commercial applications have been made, and the equipment is now being furnished as rapidly as it can be produced.

Suitable Fuels

Based on the various coals tested to date, any solid fuel, having two-thirds of its content combustile, when in a dry pulverized form, is suitable for steam generating purposes. Dust, sweepings, culm, slack and screenings, which are generally considered waste, unsaleable, and otherwise low value coal mine and strip pit products, as well as lignite and peat, are as suitable as the larger sizes and better grades of coal for drying and pulverizing to be burned in suspension. The semi-bituminous coal from Brazil, South America, is probably the most severe test yet made. This coal analyzes when pulverized:

Moisture .... from 2% to 28%
Volatile .... from 14% to 28%
Fixed carbon .... from 58% to 34%
Ash .... from 26% to 30%

Sulphur averaged from 3 per cent. to 9 per cent. and the B. t.u. from 10,900 to 8,800. No difficulty whatever was found in maintaining maximum boiler pressure when working the locomotive using this fuel, under most severe operating conditions.

At the Hudson Coal Co's. power plant at Olyphant, Pa., they are burning clear anthracite slush, which is really the discoloration in the water after it has been used for washing their coal. This water is run into bins where the liquid drains off leaving the slush, which is then dried and pulverized, and burned in their stationary boilers. On the D and H engine No. 1200, they are now burning anthracite slush, mixed with 40 per cent. bituminous, and are getting exceptionally fine results.

Both time and money have been spent in briquetting small coal, but as a general proposition it costs from seventy-five cents to one dollar a ton, whether the coal is bituminous or anthracite, which is prohibitive, and the bonding material will always burn out first, and does not add anything to the fuel value of the coal. The solution of the small coal proposition, therefore, lies entirely in pulverizing.

Preparation

The coal must be properly dried and prepared in a pulverized form before supplying to the locomotive tender, and to do this a suitable storage, crushing, drying, grinding and conveying plant is installed at the principal coal handling stations. Pulverized fuel, to produce the best results, should not contain an excess of 1 per cent. of moisture, and should be of uniform fineness, so that not less than 95 per cent. of the total will pass through a 100 mesh, and not less than 85 per cent. of the total will pass through a 200 mesh screen. This fineness is required, as the greater degree of uniformity in fineness, the greater assurance that every particle will burn instantaneously, when in suspension in the fire box.

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*Paper read before the Canadian Railway lub, Montreal, Nov. 16, 1916.

**Canadian Sales Manager, Locomotive Pulerized Fuel Co.

Although coal has been burned in pulverized form, having a moisture content greater than the 1 per cent. mentioned above, it is not advisable to do so. When undried coal is fed into the furnace, the moisture must be evaporated in the furnace, which not only results in a reduction of furnace temperature, but also in a direct heat loss. This means that additional coal must be fired to overcome the above resultant losses. Further, during the process of grinding, conveying, storage, and combustion, dry coal will readily flow and give less trouble tendency to pack, clog and adhere. Care must also be taken in the construction of storage hoppers to eliminate the liability of the prepared coal absorbing any moisture.

The total cost to dry and pulverize fuel in a suitably equipped plant, will vary from ten to fifty cents per ton, depending upon the plant's capacity. For the railway coaling station of average capacity, this total cost will be less than twenty-five cents per ton, which is more than offset by the ability to utilize mine refuse and sweepings, run-of-mine, screenings and slack grades of coal that cannot now be used to good advantage, as well as inferior grades of sub-bituminous coals, lignite and peat, at considerably lower cost per ton than the better grades now required for burning satisfactorily on the grates. The general average, from available records, covering periods of the past five to ten years at cement and metallurgical plants show the following costs, assuming that the coal requires crushing in addition to the pulverizing, and has a moisture content of from five to ten per cent. when placed in the dryer:

Capacity of plant in short tons per hour	Average total cost for preparation per short ton
2	from 25 to 50 cents
3	from 20 to 45 cents
4	from 16 to 40 cents
5	from 14 to 35 cents
10	from 12 to 30 cents
25	from 10 to 20 cents

The fuel required for drying the coal averages from one to two per cent. of the coal dried, and the distribution of the cost is approximately as follows:

Fuel for drying	10 percent.
Power for operation	30 percent.
Labor	30 percent.
Maintenance and supplies	25 percent.
Interest, taxes, insurance and depreciation	5 percent.
Total	100 percent.

It is often asked if it is possible to pulverize coal at the mines and transport it successfully. This would be almost impossible for large quantities, as the pulverized coal packs very solidly. The only way it could be done would be to ship it in tanks, so constructed that the coal could be readily fed from them by a suitable conveying means.

Equipment

The following principal factors have been kept in mind in designing the equipment employed in connection with the burning of pulverized fuel in a steam locomotive.

1—Readily applicable to either new or existing locomotives of standard design.

2—Simplicity and the standardizing of various details, making them interchangeable for different types and sizes of locomotives.

3—Applying all possible operating equipment in a self-contained manner to the tender fuel tank, leaving only the fuel and air supply control levers in the cab.

4—The elimination of all complicated fuel conveying mechanism between engine and tender.

5—Elimination of all manual handling of fuel, fire or ashes in the operation.

6—The positive control over the fuel feed, which will quickly meet all conditions of road or terminal operation.

7—Provision for quick firing up, free steaming, perfect combustion, regularity of boiler pressure, uniform fire-box temperature, and maximum capacity of boiler with the minimum heat loss.

8—The entire regulation of combustion is controlled by three levers in the cab, namely; fuel feed, air supply and induced draft (the latter is only used when locomotive is not using steam).

9—The arrangement of the refractory furnace, which provides ready accessibility to all parts of the fire box for inspection and maintenance.

10—Positive assurance of a supply of dry fuel under all conditions of weather.

11.—Elimination of the necessity of firing tools, such as scoops, rakes, hoes, slash bars and grate shakers, as well as the glare, heat effect and lowering of fire box temperature, and draft from furnace door openings.

12—Reduction to minimum of noise and dust in the cab.

13—The reduction of engine house facilities and delays, and expense incidental to the building, preparing, cleaning and dumping of fires, and hostelring locomotives.

14—Making the pulverized fuel burning and storage equipment on the engine and tender readily convertible for the use of fuel oil.

The following are the only changes incidental to the application of pulverized fuel burning equipments to existing types of steam locomotives:—

Smoke Box.—Remove the existing diaphragm, table and deflector plates, nettings and cinder hoppers and enlarge the exhaust nozzle opening.

Fire Box.—Remove present grates, ash pans, fire doors and operating gears; utilize the usual arch tubes and sectional type of brick arch; and install fire brick lined fire pan, slag-pan, primary arch and fuel and air mixers.

Cab.—Install furnace door, and fuel and air supply regulating levers.

Tender.—Install enclosed fuel container equipment with fuel and pressure air conveying, feeding, commingling and discharge apparatus, and steam turbine operating mechanism.

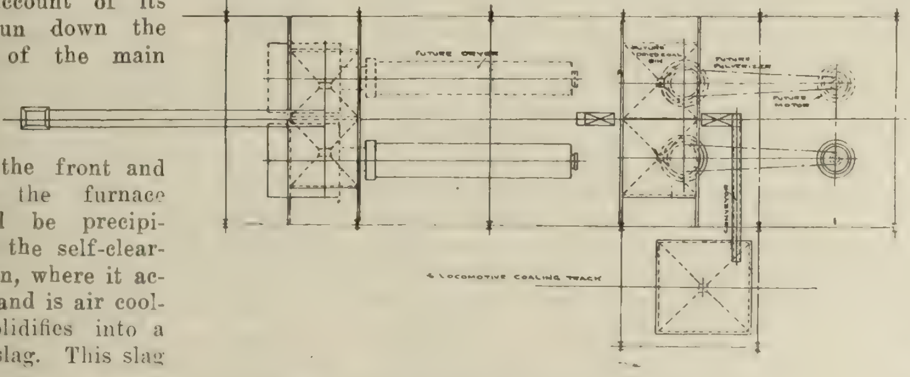
Engine and Tender Connection.—This is made by the use of one or more hose, which connect the fuel and pressure air outlets on the tender, with the fuel and pressure air nozzles on the engine. Also the use of metallic flexible conduits for conveying the fan and fuel feeding motive power.

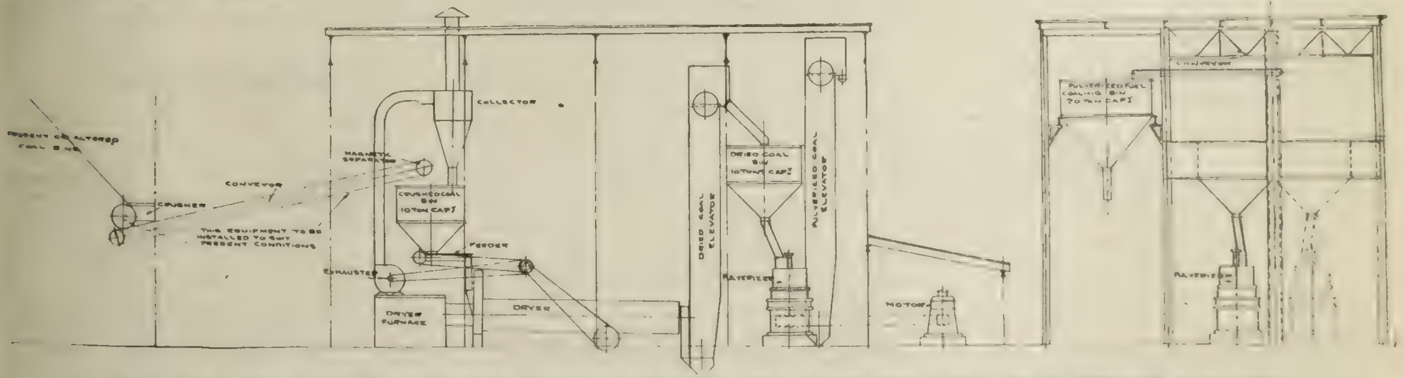
Operation

When firing up a locomotive, the draft is formed in the usual manner, by turning on the stack blower. Then a piece of lighted waste is put through the fire box door opening and placed on the furnace floor directly ahead of the primary arch. The pressure fan and one of the fuel and air pressure feeders are then started. Full steam pressure can be obtained in from forty-five minutes to one hour, from water at a temperature of forty degrees F. The fire is then controlled by the regulation of the fuel and air supply to meet the various conditions of standing, drifting or working. The stack blower is used only when the engine is not working steam. The feeding and burning of pulverized fuel is briefly as follows:

The pulverized fuel, having been placed in the enclosed fuel tank on the tender, gravitates to the conveyor screws, and is carried to the fuel and pressure air commingler where it is thoroughly mixed with and carried by the pressure air through the connecting hose to the fuel and pressure air nozzles on the engine. From these nozzles, it is blown into the fuel and air mixers, where additional induced air is supplied, and the combustible mixture, thus formed, is induced by smoke box draft into the furnace, where it ignites in nearly a gaseous form. The flame formed at this point obtains its maximum average temperature of from 2500 to 2900 degrees F. in the forward combustion zone under the main arch, where auxiliary air, heated to a very high temperature, is also induced by smoke box draft, to finally complete combustion.

The coal being pulverized so fine, each little particle of fuel is assured of being in direct and intimate contact with the exact amount of air to complete its combustion. The little particle of white feathery ash, which is left in suspension, will be carried with the gases, through the flues and out of the stack, unless the temperature is higher than the fusing point of that particular ash, when it will liquefy, and on account of its density, run down the underside of the main arch and the front and sides of the furnace walls, and be precipitated into the self-clearing slag-pan, where it accumulates and is air cooled and solidifies into a button of slag. This slag is easily dumped by opening the drop bottom doors.




PRESENT OR ALTERED COAL BIN
CRUSHER
CONVEYOR
THIS EQUIPMENT TO BE INSTALLED TO SUIT PRESENT CONDITIONS
MAGNETIC SEPARATOR
COLLECTOR
CRUSHED COAL BIN 10 TON CAP'Y
FEEDER
EXHAUSTER
DRYER FURNACE
DRYER
DRIED COAL ELEVATOR
DRIED COAL BIN 10 TON CAP'Y
PULVERIZED COAL ELEVATOR
PULVERIZER
MOTOR
CONVEYOR
PULVERIZED FUEL COALING BIN 70 TON CAP'Y
PULVERIZER

FOUR TONS PER HOUR PULVERIZING PLANT, ARRANGED FOR EIGHT TONS PER HOUR FUTURE CAPACITY.

By referring to the photograph it will be seen that the flame and products of combustion at all times flow (by induction) towards an opening, for as explained above, the fuel is blown, or forced as it were, only as far as the mixing chambers, and induced from that point. Therefore, you do not get any Bunsen burner effect or destructive impinging action against the brick work and heating surfaces. The fuel and pressure air feeder are so arranged that a certain number of revolutions represent so much coal; and as each feeder has a range in capacity of from 500 to 4000 pounds of pulverized fuel per hour, and it being possible to easily apply one to five of these to the ordinary locomotive tender, there is no difficulty in meeting any desired capacity.

Danger

Organic dust or any combustible material of certain fineness, suspension, and temperature, such as the dust in grain, soap, sugar, planing and other mills, is explosive. Coal, pulverized to the required degree of fineness, carries no danger unless combined in a dry state, in floating suspension, in nearly still air and mixed with the proper proportion of oxygen at the requisite temperature to produce primary ignition. There are certain established rules and regulations governing the manufacture, storage, handling and use of pulverized fuel, which make it comparatively easy to avoid trouble.

General Results

The smoke box gas analysis will average between 13 and 14 per cent. of CO_2 when coal is fired at the rate of 3000 pounds per hour, and increases to between 15 and 16 per cent., at the rate of 4000 pounds per hour, showing that there is no falling off in efficiency as the rate of combustion increases as is the case when coarse coal is fired on the grates. The smoke box temperatures have varied from 430 to 482 degrees F., with superheated steam having a temperature of from 580 to 715 degrees F. respectively. The evaporation averages from 8½ to 12 pounds of water per pound of coal. The boiler efficiency, which now ranges from 65 to 55 per cent. on a superheater equipped locomotive boiler, working at from one-half to maximum boiler horsepower capacity, is increased from 10 to 15 per cent. The poisonous and suffocating effect of the products of combustion coming from the stack, are very materially reduced, as the sulpharous and other poisonous gases, resulting from combustion, tend to combine with the liquid ash into slag.

Another important result is the elimination of sudden changes of temperature in the fire box. From recent scientific experiment, it has been found, for example, that each time the fire door is opened to put in coal, there is a drop in the temperature of the fire side of the fire sheet of from 250 degrees to 300 degrees, F., and that the action of the sheet was first backward, then upward, and then forward. This condition does not exist with the use of powdered coal, and further, the sudden change of temperature, which obtains on hand fired locomotives in going from the ash pit to the round house after the fire is cleaned, is entirely eliminated, which results in reducing fire box maintenance to the minimum. It stops the practice of "slugging" in firing, as the feeding of excess fuel has the same effect on steam generation as an insufficient supply.

The following conclusions will briefly set forth the results of the practical application and operation of pulverized fuel burning locomotives that have been in use during the past two years on several railways in the United States:

First—Saving in Transportation Expense

(a) Increased train load over ruling grades and on long pulls, due to greater boiler capacity and efficiency, improved steaming, and reduced cylinder back pressure.

(b)—Reduced handling and delay of locomotives on engine-house and ash-pit tracks through the elimination of cleaning, dumping and rebuilding fires.

(c)—Reduced fuel consumption at

terminals and on road through more effective combustion and positive control over the fuel feed.

(d)—Ability to utilize grades of fuels that are not now suitable for burning on grates in locomotives.

(e)—Greater average monthly mileage per locomotive.

(f)—Less liability for engine and train crew overtime, particularly on relatively long runs.

(g)—No necessity for arduous labor or equipment to shovel or push coal ahead on tenders, or fire coal on grates.

(h)—Less coaling station expense.

(i)—No ashes and cinders to be disposed of at terminals and on the line of road.

(j)—Elimination of smoke, sparks, cinders and fire hazard, resulting in less loss and damage claims.

(k)—Less classification and switching of company—use fuel at coaling stations.

(l)—No spilling or loss of fuel from tenders or through grates.

(m)—No special fuel or equipment, and quicker and more economical firing up of locomotive.

Second—Saving of Maintenance of Way Expense

(n)—Elimination of liability for burning of wooden trestles and cross ties.

(o)—Better drainage and reduced forking of ballast due to elimination of ashes and cinders along the right-of-way.

(p)—Less up-keep of existing fuel ash handling stations and equipment.

Third—Saving of Maintenance of Equipment Expense

(q)—Elimination of grate, ash-pan and smoke box draft appliance inspection, adjustment, repairs and renewals.

(r)—Reduced fire-box and boiler repairs and renewals through the maintenance of more uniform steam pressure and fire-box temperatures.

(s)—Elimination of firing tools, squirt hose and like loose equipment.

(t) No clogging or cutting out of boiler or superheater flues with ashes or cinders.

(u)—Less trouble through neglect of proper methods of firing coal on grates.

MACHINE TOOL INDUSTRY IN JAPAN

ALTHOUGH it is only within the last ten or fifteen years that the Japanese have taken up the manufacture of machine tools on any scale, this now promises to become an important native industry. Very little progress was made until about four years ago, when the Government decided that it was time to encourage domestic manufactures, with the double object of checking the excessive flow of specie abroad, and of rendering the markets less dependent on foreign supplies. Government works and dockyards were instructed not to buy imported machinery if suitable domestic substitutes could be obtained, and contractors to the Government were requested to use as much domestic material and machinery as possible in the execution of contracts. Influential people were sent around the country to encourage this propaganda, and further assistance was given in many ways, such as by paying higher prices for home-made machines than for imported ones, etc. This naturally led to the establishment of works for the manufacture of machine tools, and it must be said that rapid strides were made in the quality of their products.

War Time Development

The war in Europe has had a great effect in the development of this industry, as owing to the difficulties of obtaining imported machines, and to the very long deliveries quoted, the Japanese were thrown practically upon their own resources. As an example of what has been accomplished, it is stated in Herbert's Monthly Review that recently a large works was established for the production of a certain article, the plant consisting of, roughly, 1,000 engine lathes, 300 capstan lathes, 150 sensitive drilling machines, etc. Within three months of the first orders being given out, the whole works were completed, and the plant installed, over 90 per cent. of the machines being Japanese made.

The greatest difficulty has been the lack of skilled workmen, but the universities and technical schools are doing their share in turning out students having a sufficient knowledge of engineering to enable them to take their places in the works now established. Of course, there are instances of valuable machinery being badly treated owing to lack of knowledge by the operators, but in this respect the Japanese, as a whole, are no worse than other countries, taking into consideration the age of the industry.

It must be borne in mind that it was only a matter of 50 years or so ago that Japan was thrown open to foreign trade. The developments made in this time are little short of marvellous. The Japanese are very quick in adjusting themselves to new conditions, and any new methods which come along, having advantage over the old, are soon adopted. For example, in England and the United States, it is common practice for manufacturers of high-class machinery to keep a staff of expert operators, who visit their customers' works when new machinery is supplied, and instruct workmen in the efficient handling of same. This, however, is not the case in Japan. In many instances the importing houses hear very little further of any machinery they may supply when once delivered and paid for. It is necessary, however, for the suppliers to have salesmen who know the machines they sell, and it is a mistake to think that it does not matter much who shall be the manufacturer's agent or representative. This, however, is getting away from the subject of this article.

Cheap Labor

Labor in Japan is very cheap, and this has a considerable bearing on the cost of manufacture. On an average, the following are the wages paid to artizans:—Fitters, 75 cents per day; turners, drillers, etc., 50 cents per day; boys (apprentices), from 10 cents to 20 cents per day; laborers, about 25 cents per day. Hours of labor are fairly long, the general rule being a 9½ hours day, including Saturdays. Some of the smaller works run on Sundays, and have the 1st and 15th of every month as holidays. This, however, is gradually being superseded, and Sunday is now generally becoming a day of rest. Labor troubles and disputes are very rare, and though there are many unions looking after the interests of workmen, it is very seldom that these come into public light. Female labor is used to a large extent, though it is generally on unskilled work. Many shops employ women laborers for cleaning up, carrying away dirt and waste, and keeping machines free from cuttings, etc. Some foundries even employ women for fettling castings and similar laborious work.

Methods and Processes

Regarding methods of manufacture and processes followed, there is little worth special mention. Jigs and fixtures are not used to any great extent, probably because there has not been any serious attempt to turn out machines on a manufacturing basis. Most of the works will accept any order that comes along within their capacity, consequently there is little opportunity for specialization. A point which is worthy of notice is the fact that the advantages of powerful plain milling machines are not appreciated as much as they might be. The majority of horizontal milling machines in use are of the universal type; which machine, though essential in the tool room, is hardly a manufacturing machine. Universal machines, however, of any type, always meet with a better reception than plain powerful machines, this, no doubt, being also an effect of the general principle of taking on any job that comes along. Turret lathes are much appreciated, but owing to the cheapness of labor automatic machines have not found much favor.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data and Ideas Evolved from Actual Practical Application and Experience

THE MANUFACTURE OF SHRAPNEL PLUGS—I.

By J. Davies.

THE shrapnel plug is a very simple looking article—there is nothing elaborate or imposing about its appearance, yet to manufacture it to standard requirements, a high degree of mechanical skill is necessary. The limit of error allowed in the different sizes is very small, besides which it is rather an awkward piece to handle. It weighs when finished between 9 and 9½ ozs. and the operations must be so simplified that an unskilled workman can perform them. The methods here described are in use by a Canadian firm whose daily output is about 20,000 plugs per day.

Casting the Blanks

The pattern, Fig. 1, is an aluminum plate, about ⅜ in. thick, made to fit a common foundry flask, such as is used in moulding machines. The plate has 12 holes bored in it, and each hole is fitted with an aluminum pattern. These patterns are made long enough to allow for the thickness of the plate, so that the portions above and below the surface of the plate make up the exact length of the plug. The cores for the square hole in the top of the plug are made in a core box, shown in Fig. 2. It is a very simple but effective little box, made of cast iron, and in two parts, which are held in proper relation to each other by two dowel pins, the coremaker simply holding the two halves together by the pressure of his hands. The moulding is done by a number of pneumatic moulding machines.

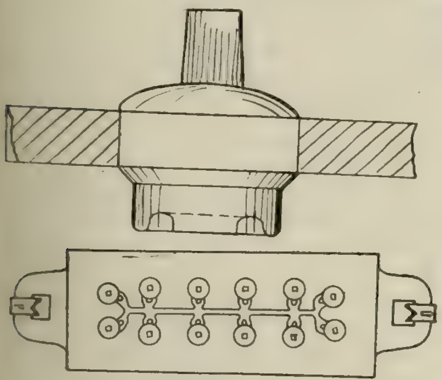


FIG. 1.

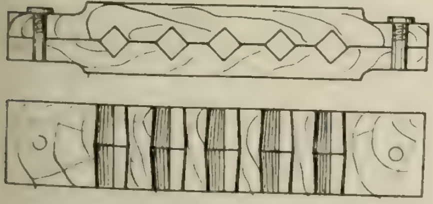


FIG. 2.

The rough plugs are conveyed from the foundry to the cleaning or milling room by means of an overhead track, which runs through every department. The plugs are loaded up into buckets or round iron cans, which are raised from the floor by means of a bevel wheel and screw arrangement operated by hand. When the plugs reach the milling room, they are dumped into an ordinary foundry mill and thoroughly cleaned and inspected for defective castings, each moulder's work being put into a separate mill.

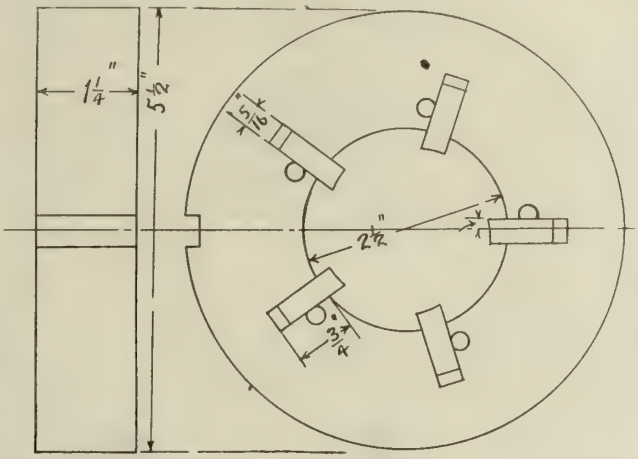


FIG. 3.

Forming the Thread

The first, and probably the most important, machining operation is threading; it must be a clean, smooth thread, 14 threads to the inch, and within all the limits for size of Government requirements. The plugs are not turned or machined in any shape or form before threading. They go to the threading machine direct from the foundry, milling or cleaning room.

A sketch of the threading die is given in Fig. 3. The body A is made of soft cast steel, turned to a standard diameter of 5½ in. to fit the die holders of the machines, which are all alike, so that the dies are interchangeable. This is very necessary, as the dies must be kept in perfect condition, and require to be changed quite often. These dies are 1¼ in. thick, and have five slots, 5-16 in. wide and ¾ in. deep, to take the thread chasers. The slots are cut in the die ⅛ in. ahead of the centre, so that when the chasers are fast in position, the cutting edge is ⅛ inch in advance of the centre. This has been found by extended experiments to give very good results.

The thread chasers are held in position by keys which are slightly tapered, well fitted and driven home. Adjustment for size is made by means of the tapered key fitted behind the thread chaser. A key seat is cut on the outside of body, as shown in sketch for driving, and two safety set screws are used to prevent the die dropping out of its place.

Making the Chasers

The thread chasers themselves are made about 2 in. long, so that the ends can be ground a number of times before they are worn out. The thread is cut on the chaser blades in the lathe by means of a master tap and a suitable jig for holding the work, Fig. 4. A cast iron block is made to fit the top of the lathe tool post, and firmly secured by the bolt B; C is the blade to be threaded, which fits in a step on the block A machined to receive it. It is held in position by a plate and two set screws shown. The master tap D, is held between the centres of the lathe, and clearance is obtained in the chaser blade by setting it up above the centre, the top of the chaser being 3-16 in. above the centre of the lathe. The lathe is geared up to

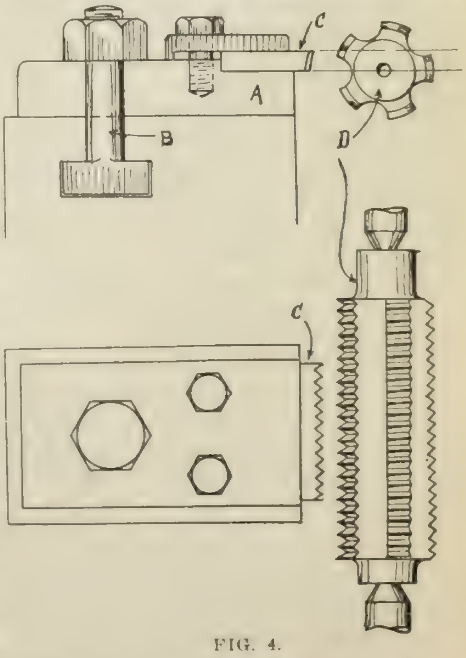


FIG. 4.

correspond with the number of threads per inch on the master tap. The blade is fed against the master tap until a complete full thread is cut.

Assembling the Die

After the threaded blades are hardened and the keys have been fitted in, the die is ready to be assembled or set up. This is a very important part of the work, and is accomplished by means of a bench jig. Great care must be taken in the assembling of the dies, as they must be interchangeable and cut a complete full thread from the rough casting in one cut within the allowable limit for size, which is only a few thousandths either way; a few thousandths is left for the final re-threading, which is done by hand after all other machine work is done. The points to be observed in assembling the die are:—

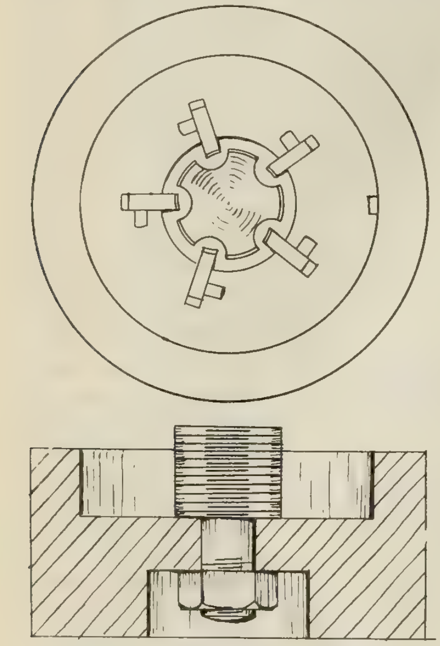


FIG. 5.

1.—That the threads have the proper relation to each other—that is, that they perfectly follow each other, the same as the threads on the master tap.

2.—That they will cut the right size.

3.—That they are perfectly concentric with the outside of the die, so that they will run true in the machine. All these results are obtained by means of bench jig shown in Fig. 5.

Assembling Jig for Dies

A cast iron block is bored to fit the outside diameter of the die and to a depth equal to the thickness of the die. It is also bored to fit the shank of a standard plug used for assembling the die. The plug used in this jig is threaded exactly the same as the shrapnel plug. Five grooves are cut in it, so that the die can be placed over it when it is fast in position. The threaded blades are set up against the threads of the plug and secured in the right position by means of the keys.

* * *

GANG TOOL FOR PISTON RINGS

By "Nene."

THE manufacture of locomotive piston rings presents some problems, worthy of consideration, by the machinist of to-day. These rings should fit in the grooves in piston head fairly close, the limits being .002 in. between the plug gauge for the grooves, and the snap gauge for the thickness of the rings, the plug gauge being .002 in. larger than the snap gauge.

Previous practice had been to turn these rings in the form of a cylinder or bull ring on a boring mill, and part off each ring separately, at the same time facing off the upper side of ring to proper thickness. The gang tool described below is the result of an effort to reduce the cost of these operations. Other styles of gang tools were tried for parting off four or more rings at one operation, but for various reasons, they proved unsatisfactory, hence the development of the tool herein described.

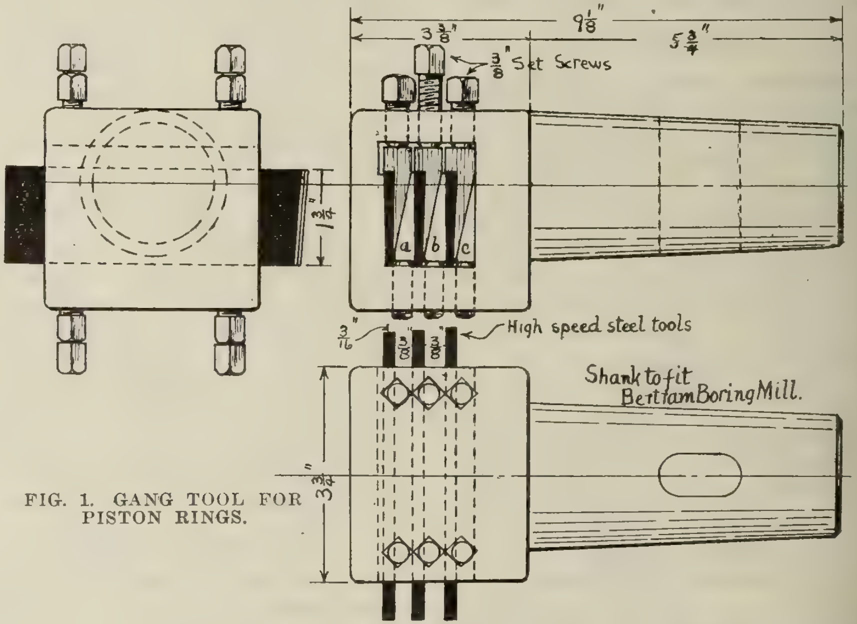


FIG. 1. GANG TOOL FOR PISTON RINGS.

The sketches, Fig. 1, show clearly the construction of the tool, the body of the tool being made from a forging of axle steel, with the shank machined to fit a Bertram boring mill. Note the generous depth of the tools, 1¾ in., our experience having shown that the usual 3-16 in. x 1 in. steel, made for this purpose, is not sufficiently strong to stand the heavy strain occasioned by modern high-speed machinery. The wedge-shaped bars (a) and (b), Fig. 1, afford adjustment for width between the tools, thus determining the thickness of the lower two rings. The thickness of the third ring being governed by the setting of the tool the proper distance from top of bull ring. The wedge bar (c), Fig. 1, is for binding all the tools firmly together, by tightening the set screws at the bottom of the tool; the cutters are also clamped by the set screws on top of tool, rendering the whole arrangement solid and compact. The centre set screws are left longer than the other screws, to facilitate the use of wrench on same.

Difficulty had always been experienced in procuring high speed steel of suitable cross section, for this purpose, possibly owing to the fact that our purchasing agent was not impressed with the necessity for the steel being an exact duplication of steel formerly supplied by being influenced more by market quotations, etc. To overcome this inconvenience we now make our own cutters, by forging the high-speed steel to required shape, and finish by grinding in surface grinder. Fig. 2 shows one of the jigs used for holding the cutters for grinding the sides of cutter, in surface grinder. This fixture is a simple arrangement and should require no further explanation other than the sketch.

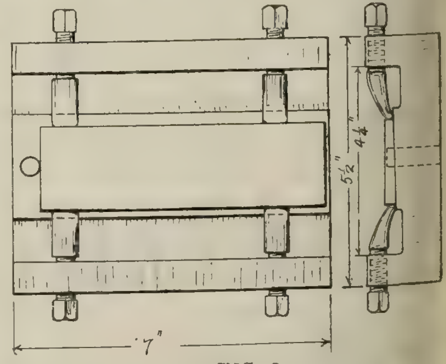


FIG. 2

Principles and Apparatus Employed in Testing Limit Gauges-II[*]

By R. T. Glazebrook, C.B., F.R.S.[**]

Perhaps no finer evidence of the value of the National Physical Laboratory in England can be offered than the work of which this paper is at best an outline only. The enormous number of gauges required for munitions production was only possible as a result of training given to numerous skilled toolmakers at this institution. The value of properly made gauges will be still more appreciated in the future and increased demands on the Laboratory resources for testing precision apparatus by engineering firms are confidently predicted.

THE detection of errors and accurate determination of the variations is of as great importance as the suitability of the design employed for gauges. Screw thread measurements constitute an important section of the work, and several special machines have been built for this purpose.

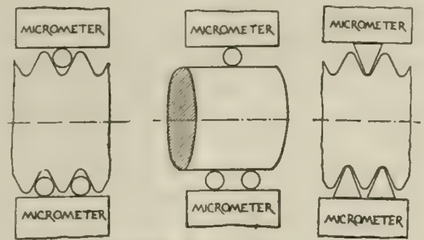
The Tolerance Feature

We pass next to the tolerances on the gauges and the means of detecting these; the last is closely connected with the methods of production, and has recently been discussed in a memorandum "Notes on Screw Gauges" (to be obtained from Mr. W. F. Parrott, The Causeway, Teddington, or through the Engineering Standards Committee), issued in February, 1916, from the National Physical Laboratory. In the case of a plug gauge, if a satisfactory ring check is available, the first step will normally be to try it with this. If it fails to enter it is usually rejected, but further examination is made to see to what particular the failure is due. If it enters, examination is still necessary to determine whether it is up to size in all its elements; it may have an excessive pitch error, which is compensated for by a large reduction in ts effective diameter, and in this case it is useless as a gauge. Thus in nearly ll cases measurement is required. For he full diameter a micrometer or some imple form of measuring machine is ll that is needed. The principle inolved in the measurement of the effecive and core diameters is shown in Figs. , 6, and 7.

Effective Diameter Measurement

For the effective diameter, three small ircular cylinders — three carefully seected needles of known diameter—are serted in the thread and a micrometer ading is taken over these; the mean ameter of the needles is determined by easuring them when suspended against cylinder of known dimensions, and om these two readings the effective ameter can be calculated. Instead of plain cylinder, we may employ a linder having a circular V groove th an angle of 55 degrees cut it to a suitable depth. This is tested means of two accurate cylinders, and its effective diameter is found as though it were part of a screw thread; the method of using it as a reference bar is obvious.

For the core diameter the circular needles are replaced by three bars of triangular section, the angle at the apex being considerably less than that of the screw; measurements are taken with the micrometer, (1) with the bars against a cylinder of known diameter, (2) with the bars in the thread, and the core diameter is thus found.



FIGS. 5, 6 AND 7.

To carry out these measurements rapidly at the laboratory, a special apparatus is employed. The screw to be measured is held between suitable centres. A light carriage supporting two micrometers can move on balls either parallel to or at right angles to the axis of the screw; the axes of the micrometer are in the same plane as and at right angles to that of the screw. To measure the full diameter, a standard screw is placed between the centre, and one micrometer A is set to some convenient mark; the other, B, is then adjusted until the standard screw is just held between the micrometers; the pressure required for this should be very light, as the screw is easily deformed. Micrometer A is then withdrawn, the standard screw removed, and the screw to be examined put in place. This screw is then measured, using micrometer A. The difference in readings of A then gives directly the error in the full diameter of the screw.

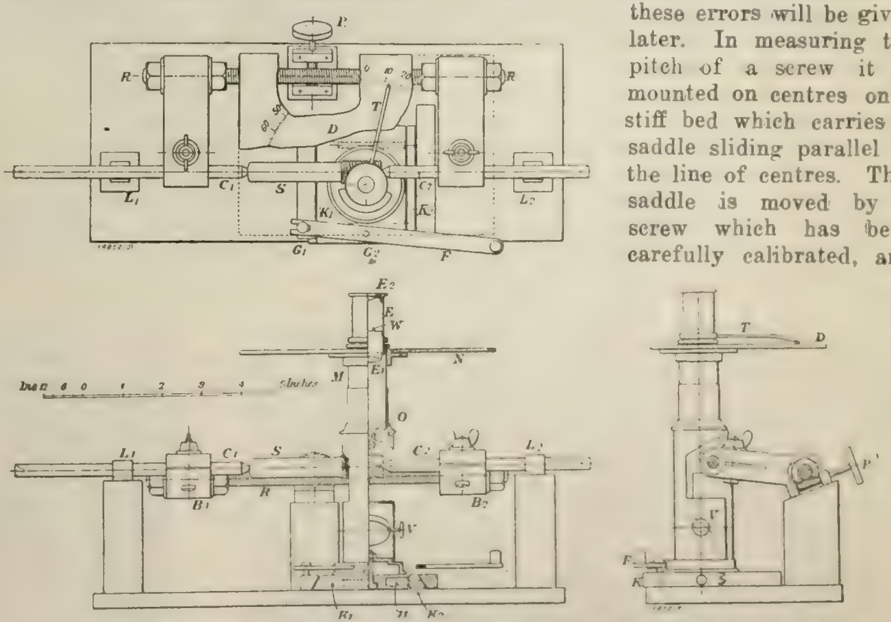


FIG. 8. APPARATUS FOR MEASURING THE ANGLE AND FORM OF A THREAD.

Pitch Measurement

Turning now to the measurement of pitch, we notice first that pitch error may be of two kinds—(a) a progressive error increasing regularly as we go along the screw; and (b) superposed in many cases on this a periodic error, depending frequently on some want of adjustment in the leading screw of the lathe on which the thread was cut. Examples of these errors will be given later. In measuring the pitch of a screw it is mounted on centres on a stiff bed which carries a saddle sliding parallel to the line of centres. This saddle is moved by a screw which has been carefully calibrated, and the motion is read on a larger micrometer head.

In its simplest form the saddle carries a pointer accurately ground to an angle of 55 deg., with its axis at right angles to that of the screw. The pointer can slide in the direction of its own length on the saddle. The pointer is set by the micrometer with its two edges in contact with the sides of a thread and a reading taken. It is then withdrawn, the micrometer is turned until the pointer is opposite the next thread, when it is again adjusted, and so on. A series of readings taken thus give the distances between the consecutive roots of the thread—i.e., the pitch, and from these the pitch error is calculated. The method is clearly slow, and not very accurate; it is difficult to set the pointer. The method in use at the laboratory is as follows:—

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[*] Presented at the meeting of the British sociation at Newcastle, September, 1916.

[**] Head of the National Physical Laborat y. Teddington.

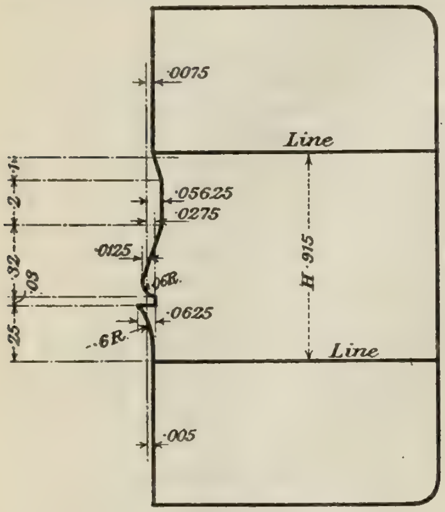


FIG. 9.

The screw is mounted as before, but the feeler carried by the saddle takes the form of a small spherical ball at the end of a bent lever. The ball is held pressed into the threads of the screw by a light spring, and, as the saddle is traversed along, the ball moves to and fro, always remaining in contact with the screw. The ball is too large in diameter to reach the bottom of the thread. In its motion it slides down one flank of the thread until it is arrested by contact with the opposite flank when it immediately begins to move up this flank; this change of motion is very sharply defined. By noting on the micrometer screw the positions of the slider at which these changes of motion take place, we clearly have a means of measuring the pitch of the screw. To effect this a mirror is attached to the arm carrying the small sphere and rotates backwards and forwards as the arm moves. A spot of light reflected from the mirror on to a scale moves in one direction, then stops and moves back; after a time its motion is again reversed, and so on. The sharp reversals caused by the point of contact of the sphere, passing from one flank of the screw to the opposite flank are clearly defined, and by their means an accurate measure of the pitch is obtained.

Thread Angle and Thread Form Measurement

To measure the angle and form of a thread a miscroscope is most conveniently used. The microscope is fitted with cross wires, and can rotate about its axis. Some means of measuring this rotation is required. Means also for bringing the part of the screw to be examined and for focusing are required, and care must be taken that the light which enters the microscope may come along the rake of the thread. The axis of the microscope is set at right angles to that of the screw. A simple apparatus has been devised at the laboratory for this measurement. See Fig. 8.

To make a measurement of the angle the microscope is first focused on one of the centres which carry the screw; it is then moved aside, and the screw is put in position and traversed by means of the adjustments until in the field of view. This method of focusing ensures that an axial section of the screw is under examination. The microscope is then rotated about its axis until the cross wire is along the flank of one of the threads and a reading is again taken; the difference between these gives the angle of the screw. By setting the cross wire to run along the crests of the thread and taking a reading the squareness of the threads to the axis can be verified, while the general shape of the thread is obvious to the eye. By attaching the part carrying the screw to two slides at right angles, one parallel to the other at right angles to the axis of the screw, fitted with accurate micrometers, measurements of the diameters and pitch of a small screw may be made.

In many cases, however, observations on angle and form can be made most readily by a projecting apparatus. The screw is suitably mounted and illuminated by the aid of a small arc lamp and condenser. Carefully arranged lenses throw a magnified image on a screen, and observations are made on this image. The lenses must be chosen to produce uniform magnification over the field, and there must be absence of distortion. At the laboratory lenses to secure this have been obtained, and the method has proved rapid and of great value. A magnification of 50 has been selected; the screen carries an accurate drawing of a section of the screw fifty times actual size. It is easy to compare the image formed with this correct profile. The screen carried adjustments which serve to bring the image and the drawing readily into coincidence. Another method of comparison is to project simultaneously the image of an accurate screw placed alongside the one under examination; the differences are readily apparent.

The checking of screwed rings is more difficult. Direct measurement is only possible if they are of considerable diameter. Means have been devised, provided the ring is not too small, and, where the information is specially required, are employed by measuring the diameters by the aid of small spheres fitting into the threads and internal micrometers. In general, however, check gauges are resorted to, the Taylor system being employed whenever real accuracy is desired. This in itself does not give a measurement of the diameter, but it is generally possible by the use of a sufficient number of checks of slightly different sizes to form a close estimate of the limits within which it lies.

Form and Position Gauges

These which are often exteremely difficult to make, to measure, and to check, perhaps hardly come within the category of limit gauges. In the case of plate form gauges the examination can sometimes be done readily by measurement, but check gauges are usually necessary, and the observation is made by bringing the two into contact on a plate of glass and holding them up to the light. The eye can readily detect a want of fit; to say exactly what is wrong is more difficult—e.g., in the case of an elaborate band gauge for a shell. We have found the difficulty best met by the supply to the maker of an accurate check in addition to the drawing. More recently the projection employed for checking the form of a screw thread has been freely used, and has given good results. Figs. 9 and 10 show some examples of such profile gauges.

Position gauges again need checks for their verification, and the design an manufacture of these often present difficulties. The check is clearly an accura replica of the part which it is intende to gauge , made, however, in a for which lends itself to exact measuremen so that its accuracy may be secured. Th details of measurement will differ fo each gauge, and no general account ca be given.

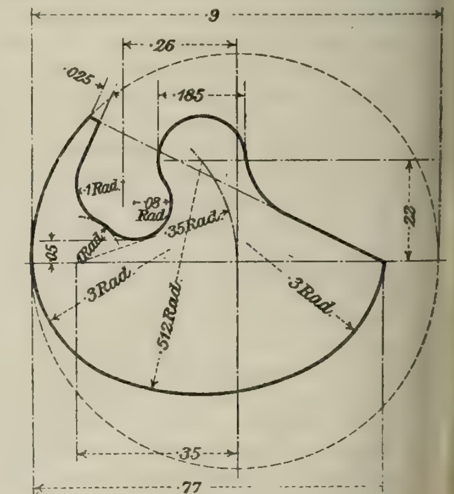


FIG. 10.

Limit gauging is a wide field to di cuss, and in this hasty survey the frin has only been touched. The experien of the past year has shown its impor ance, and when once this was realiz and the fact that accuracy was esse tial was grasped, British manufacture have risen to the occasion, and may proud of the output of serviceab gauges now supplied to munition wor

EDITORAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions—Your Co-operation is Invited

SAFETY DEVICES IN THE MACHINE SHOP

By D. O. Barrett.

THE accompanying photos show a number of safety devices which the writer recently installed in a machine shop in order to comply with the particular state laws and the regulaions of a liability company. All the uards were constructed of one-inch lack iron pipe and regular fittings, speial rail fittings being employed in only few instances. No left hand threading as resorted to in any of the guards As the floor of the shop was of concrete, sockets of one and one-quarter inch pipe and six inches long, capped at the lower end, were set into the concrete flush with the floor. It was then possible to easily and quickly remove and replace any of the guards without difficulty. In assembling, the posts and tops were first screwed together. The tees used for the lower cross members were next bored out through the run so as to slip easily over the posts. The cross pieces were then entirely assembled and slipped into position, being afterward located as desired, holes being drilled through the tees and pipe, and five-sixteenth pins riveted in. This made a very substantial guard and one that can be easily built without any special method, the vertical posts are in one piece where otherwise they would be in two parts. In place of three-way elbows, a tee, close nipple and plain elbow may be used, as shown in Fig. 6 showing the belt guard at the back of the Colburn boring mill. In place of a side outlet tee, two tees may be used as shown in the same cut. The guard in Fig. 2 had

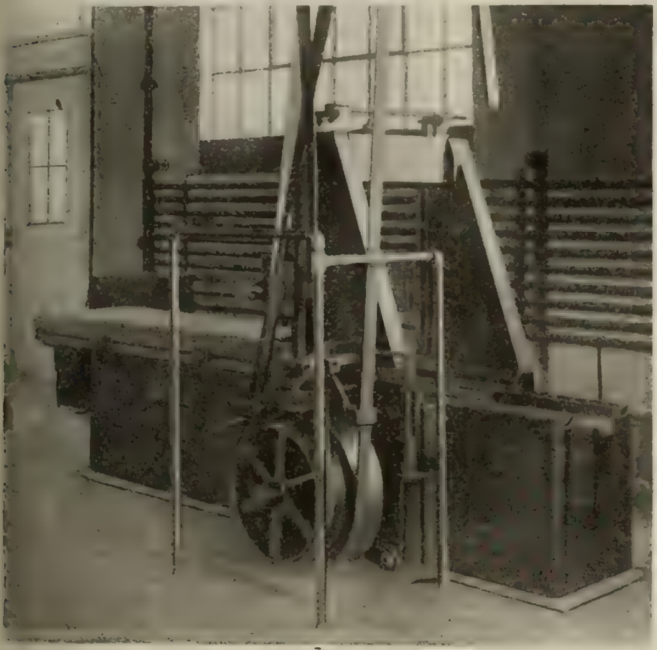


FIG. 1.

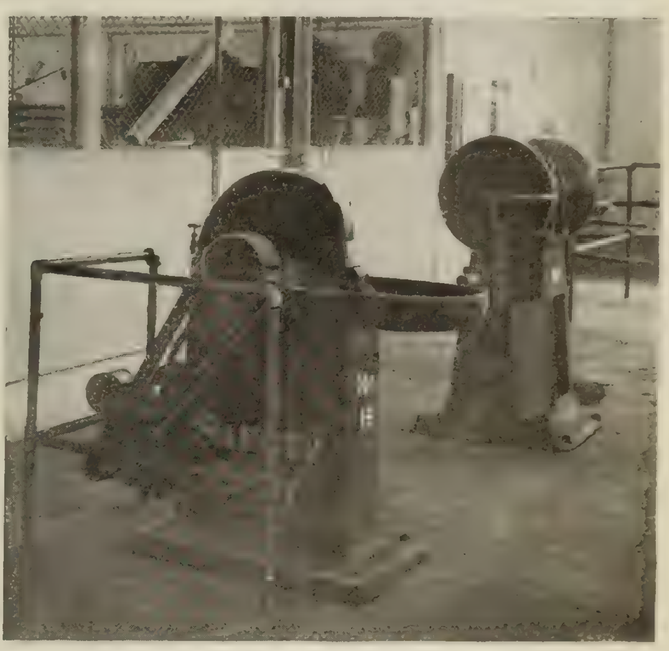


FIG. 3.

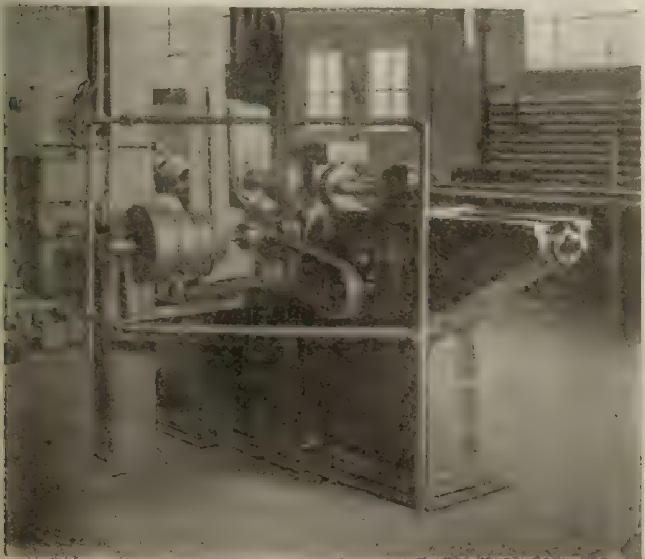


FIG. 2.

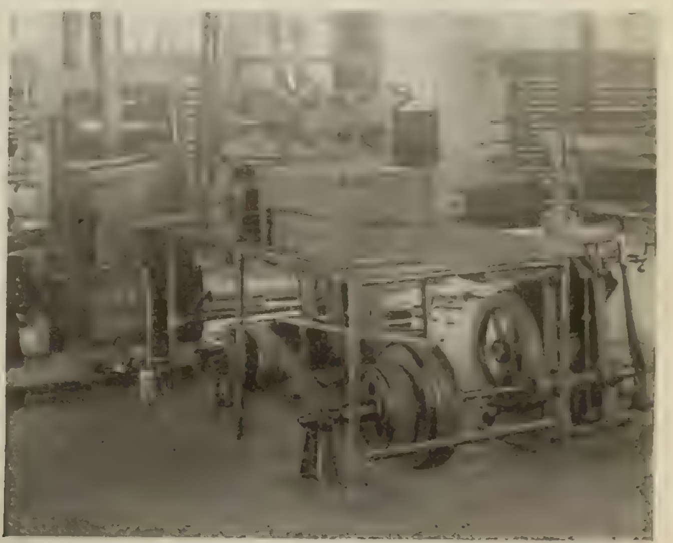


FIG. 4.

45 degree elbows in the cross members to properly clear the belt of the horizontal boring mill. The guards for the drill presses, Figs. 7 and 10, were quite large in proportion to the size of the machine, but the one side was placed far enough away from the machine so that when the table was swung around it would clear the post. The gear hobber in Fig. 11 was placed close enough to the wall so that guards were only necessary at the sides.

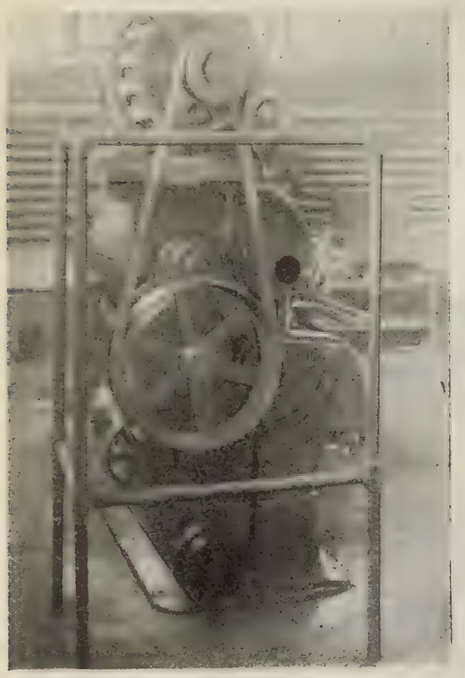


FIG. 5.

The belt guards in Figs. 13 and 4, were constructed to have a utilitarian value. The Little Giant keyseater was set out a considerable distance from the building column in order to take care of any large work that might come up. This necessitated a countershaft on the floor with the consequent waste of a considerable amount of space. The frame of the guards was brought up nearly to the height of the keyseater table and a two-inch plank covering put over same. As a milling machine was located near the one end of the table, this was an admirable place for the dividing head and other tools. The belt from the ceiling to the floor countershaft was also protected by pipe on the two sides, and th other two sides were covered with plan which served for hanging up small tools etc. This made a very useful arrangement as well as being fairly ornamenta In order to complete the four side of the rectangle at the top it was necessary to bore out one of the three-wa elbows and pin in the pipe.

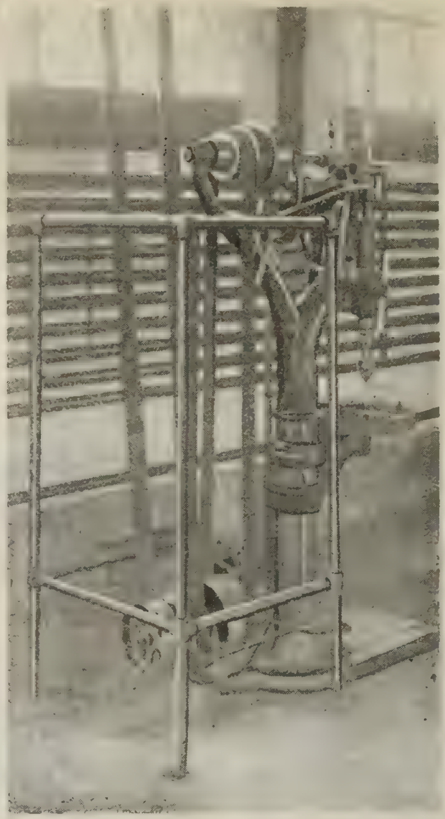


FIG. 7.

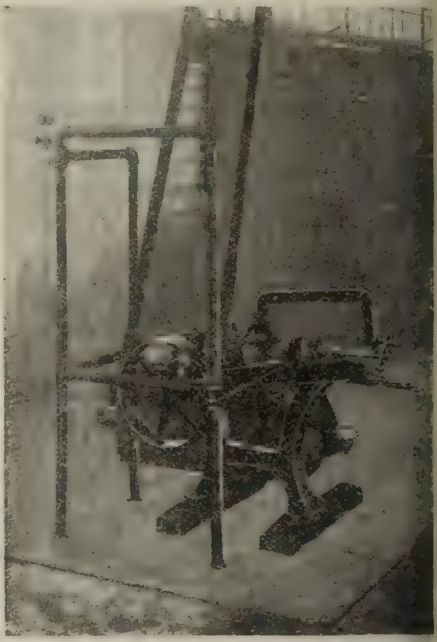


FIG. 9.

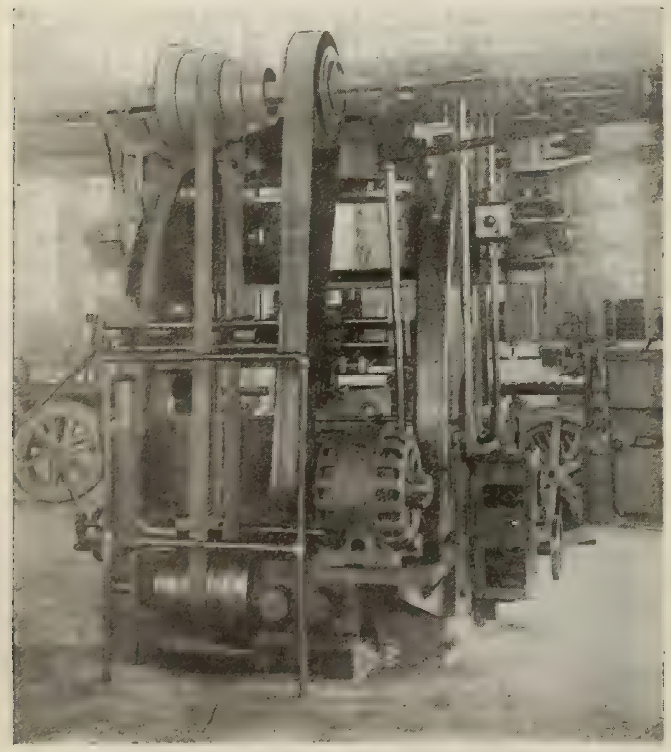


FIG. 6.

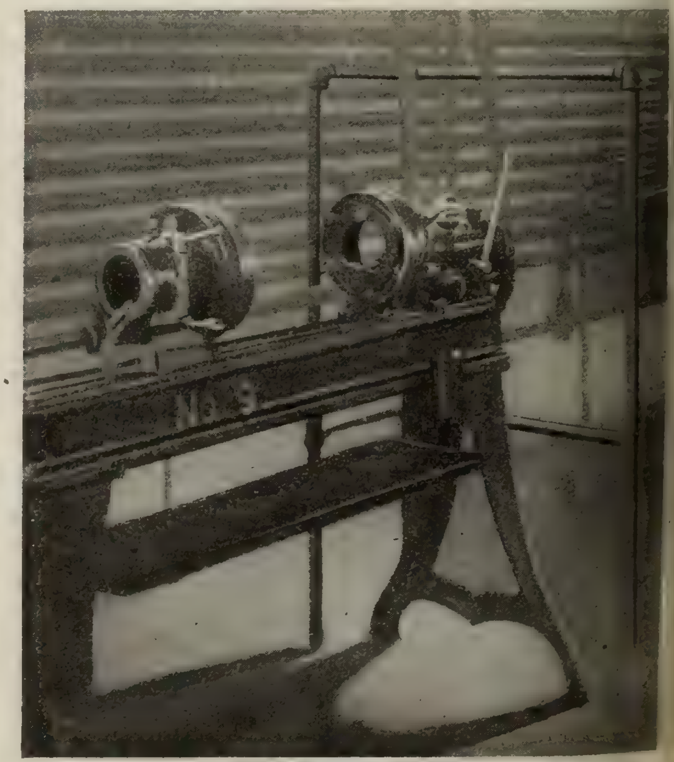


FIG. 8.

The only addition which might be suggested in connection with these guards would be the use of screens covering the sides, but these were not thought ne-

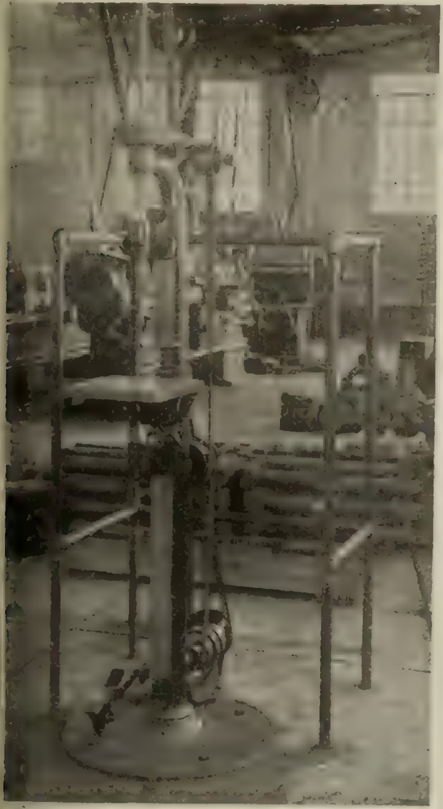


FIG. 10.

essary, nor were they asked for by the iability company.

* * *

CAPITAL AND LABOR

TEPS are being taken to adjust varius differences between capital and labor. The Parliamentary Committee of the Trade Union Congress and the Employers' Parliamentary Committee are discussing means towards co-operative action, and the Government have been asked to assist in the matter and a deputation to the responsible Minister is being organized. It will be remembered that Mr. Runciman, the President of the Board of Trade, in reply to a deputation last week, hinted at Government measures for the establishment of a minimum wage for all workers. The proposals under discussion, briefly are:—

Membership of a trade union to be compulsory upon all workers.

Compulsory forty-eight hours' working week in every occupation.

Compulsory minimum wage of 30s for all adult workers.

No reduction of present wages or increase in working hours.

Complete recognition by employers of trade unions, and of agreements, entered into between the unions and employers' associations.

State unemployment pay for men and women out of work.

Settlement by the unions of the conditions of women's labor after the war.

It is hoped to arrive at a settlement which will run for at least three years as an experiment.

* * *

CANADIAN TRADE

A GAIN of more than $600,000,000 is shown in the trade statement issued by the Minister of Customs, Hon. J. D. Reid, covering the seven-month period ending Nov. 1. The grand total for the seven months, including the movement of gold as well as of merchandise, amounts to $1,313,189,891, compared with $709,537,488 for the corresponding period of the last fiscal year. The October trade rose from $150,004,125 to $164,320 479, a gain of $14,326,354. Imports of merchandise increased from $39,515,144 to $71,196,552 in October, and from $253,107,663 to $462,161,795 in the seven months, while exports of domestic merchandize rose from $80,038,582 to $85,312,175 in October, and from $326,430,730 to $622,033,689 in the seven months. The most important gain in exports for the month of October is found under manufactures, the figures being $12,880,731 in October, 1915, and $28,637,814 in October this year. Exports of other lines were fairly well maintained with the exception of agricultural products, which dropped from $39,833,353 in October, 1915, to $27,306,934 in the same month this year.

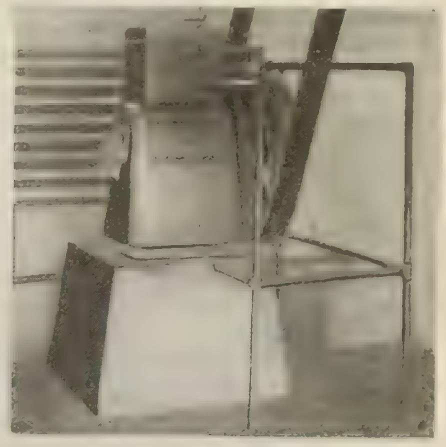


FIG. 12.

* * *

Canada to Supply World's Paper.—J. E. A. Dubuc, President of the North American Paper Co., says that in his belief, Canada will eventually produce enough wood pulp to supply the needs of the entire world. Owing to the increasing demands for paper and the many uses to which it is being put, Mr. Dubuc does not look for any recession in the prices of paper. The North American Co. controls 1,360,000 acres of pulpwood lands and plans have already been perfected for a greatly enlarged output.

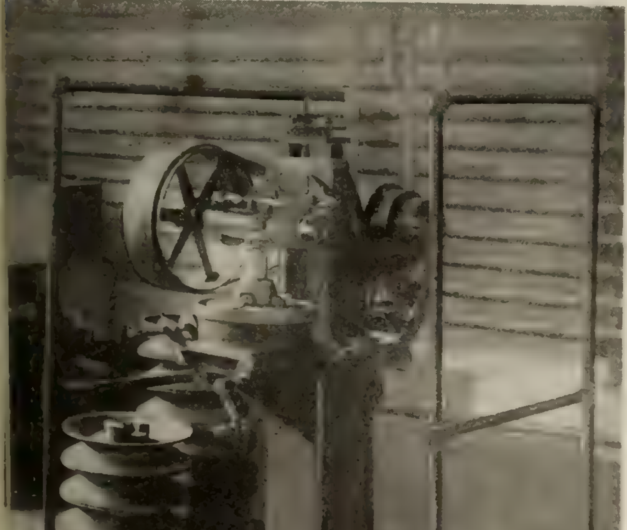


FIG. 11.

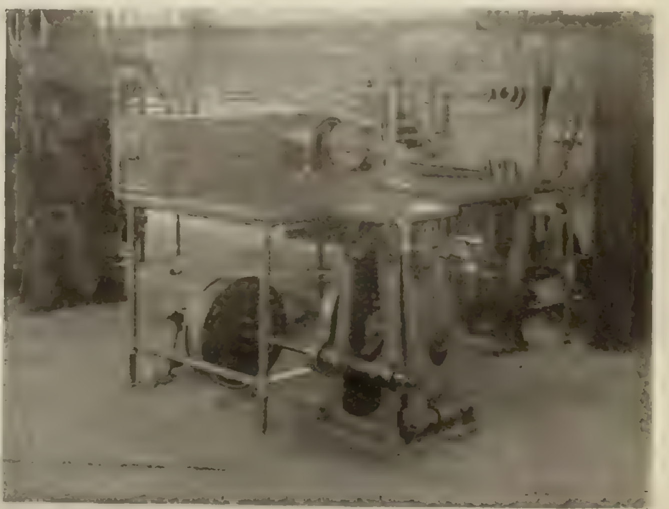


FIG. 13.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

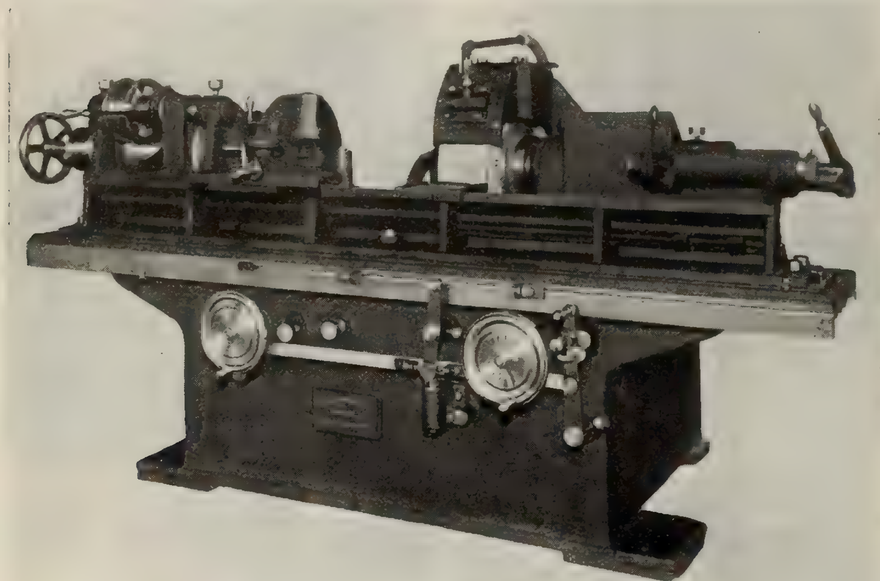
HEAVY DUTY GRINDER

THE Ford-Smith Machine Co., of Hamilton, Ont., has recently placed on the market a combination traverse and form grinder for both standard and special cylindrical grinding. While the machine is designed for standard cylindrical work, the headstock is so arranged that any special requirements can be easily accommodated. The machine has already proved its worth in the operation of grinding the large punches used in the manufacture of shrapnel and high explosive shell forgings. These punches range from 3 ins. to 6 ins. in diameter, and vary in length between two and five feet.

In grinding a shell forging punch, the threaded end and parallel part of the punch pass into the hollow spindle and are gripped in the chuck with the formed end out. This end is then ground with a wide form wheel exact to shape. The punch is next put on centres, the formed end running in a ball bearing cup centre. The "Form" wheel (on special wheel centre), is removed, and a 22 x 2½ in. traverse wheel put on, the punch being then ground parallel as in a regular traverse grinder. Used-up punches can thus be kept in repair cheaply as annealing and rehardening are eliminated. The saving in this direction and in better forgings tends to quickly pay for the equipment. This work indicates the line of usefulness of a grinder built heavy enough to carry form wheels up to 8 ins. face, and with a hollow spindle to allow gripping the work close up, not to speak of the usual cylindrical traverse grinding features.

The headstock, as already stated, can be arranged to suit any requirements desired, and is of extra rigid construction. Work is held by means of a universal chuck, together with a special interior centreing arrangement inside the hollow spindle. Numerous changes of speeds and feeds are provided, all levers relative to same, etc., being situated at front of machine within easy reach of operator. The wheels used are 22 ins. diameter, and of such width as may be required by the nature of work to be ground. A special trueing device is rigidly attached to the machine table, making it an easy matter to keep the wheel in first class shape. Water is supplied to the wheel by a pump of ample capacity located at the rear of the machine, an unusually large tank cast on the grinder bed constituting the source of supply.

Careful attention has been paid to the wheel hood which is both convenient in service and also for changing wheels. The drive is self-contained, and the machine may be direct-connected to motor or lineshaft as required. The machine has a large capacity, swinging 18 ins. x 5 ft. between centres, with adjustment for taper grinding. Although simple in design, the heavy duty feature has been given due consideration and effect, all parts being of rugged construction so as to stand up to the most exacting requirements with at the same time the minimum of vibration. For form grinding, 20 horse power is required; and for traverse grinding from 10 to 15 horse power. The weight of the machine complete is 14,000 pounds, and the floor space occupied, 6 ft. x 15 ft.

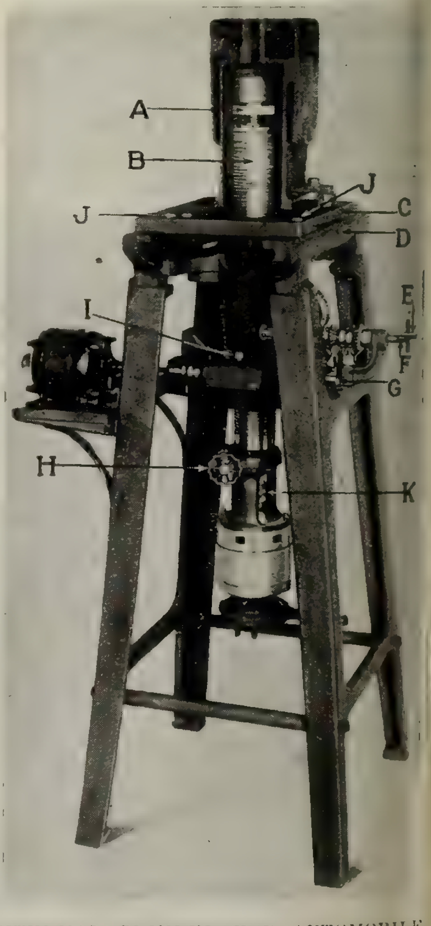


HEAVY DUTY TRAVERSE AND FORM GRINDER FOR BOTH STANDARD AND SPECIAL CYLINDRICAL WORK.

◆

INTERNAL GRINDER FOR AUTOMOBILE CYLINDERS

THIS grinder has been developed to meet the demand of automobile manufacturers, high-class repair shops and service stations for an efficient and inexpensive method of grinding out automobile cylinders, and for various other internal grinding operations. It is a sturdy little tool and can be set up in any convenient part of the shop and connected to the nearest electric service lines, a vertical motor revolving



INTERNAL GRINDER FOR AUTOMOBILE CYLINDERS.

the grinding wheel and a horizontal motor operating the up and down movement of the wheel. The emery dust incident to grinding can either be sucked out the exhaust port of the cylinder by connecting to an exhaust fan, or be blown out by connecting a compressed air line to an attachment furnished with the grinder. The time required for grinding out a cylinder is a minimum as the cylinder can be quickly adjusted on the bed plate of the machine, the actual time for grinding depending of course on the condition of the cylinder and the amount of metal to be taken out.

The grinder consists of a vertical bar B with a circular rack. This is fed through a chain of gearing around and down at the same time, by the horizontal motor. Inside of the main bar B is a sleeve which contains the grinding spindle, and this sleeve is eccentric to the main bar, which permits grinding cylinders of different sizes.

Flexibly coupled to the grinding spindle is a vertical motor which revolves the grinding wheel A at high speed. The hand wheel H is for increasing or decreasing the throw of the grinding wheel for various sized bores, and for regulating the depth of cut to be made. At F provision is made for raising or lowering the main bar B by hand, while the shifting rod E can be thrown in or out for automatically feeding the main bar up or down. At is a hand adjustment for revolving the main bar, while the screws J are for tilting the face plate C so that the cylinder can be placed in the proper angle for grinding.

The cylinder is placed on the face plate, but, before clamping down, a steel disc is substituted for the grinding wheel and the main bar is slowly revolved, the throw of the wheel being regulated by the hand wheel H until the cylinder centers itself. The face plate is then clamped tight to the bed D, and the cylinder in turn clamped tight to the face plate C. The steel disc is replaced by the emery wheel, and the verti-al and horizontal motors are started y throwing the two switches placed on he machine; the depth of the grind is regulated by hand wheel H. The shift-ng rod E is next thrown in, auto-natically feeding the grinding wheel up hrough the cylinder. The whole oper-tion of setting up and grinding is uickly accomplished.

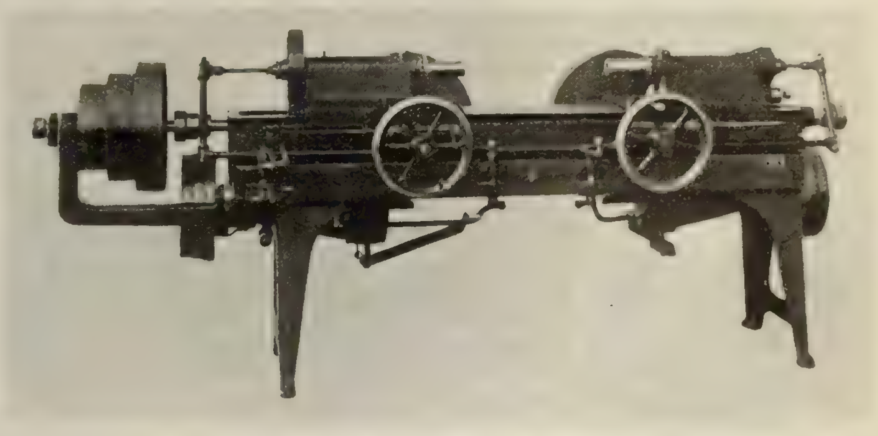
The capacity of the machine is for ylinders from $3\frac{1}{4}$ to $5\frac{1}{2}$ ins. in dia-eter with a cut $10\frac{1}{4}$ ins. long. Its eight is 45 ins. from the floor line to p of bed plate and the floor space oc-upied only two feet square. The bed 20 ins. long by 12 inches wide, and the face plate, 15 ins. long by 12 ins. wide, carrying an elongated hole. The net weight is 400 pounds. The grinder is manufactured by the Reno-Kaetker Electric Co., Cincinnati, Ohio.

* * *

DUPLEX HORIZONTAL DRILL

A DUPLEX horizontal drill in which provision is made to alter the separate spindle speeds as desired is shown in the accompanying photograph, the machine being a recent product of the Moline Tool Co., Moline, Ill. Both heads are gear driven from a central driving shaft extending the full length of the bed, various gear ratios for either head being available.

The bed is cast in the form of an oil tank with that portion of the top closed which extends between the heads, thus insuring freedom from chip trouble. Three spindle speeds are obtained from the cone pulley, and each spindle has three changes of feed independent of the other. Following are the principal dimensions of the machine which is furnished complete with pump, tank, and piping: Length of bed, 7 ft.; distance between spindles, min., 4 in., max., 30 in.; spindles bored No. 4 Morse taper; height, bed to spindles, 6 in.; width of bed, 10 in.; belt capacity to pull up to 1 in. drills.



DUPLEX HORIZONTAL DRILL.

* * *

RUSSIAN LANGUAGE FOR EXPORT TRADE

WHEN Principal Eldon, of the High School of Commerce, Toronto, asked the Board of Education recently, that classes in Russian might be started in his school, he was told to await further word from the Department, who had not yet given a definite decision to the motion on the part of the Board.

Already the University of Edinburgh has two lecturers in Russian, one a Russian born and the other a Scotsman. The Royal High School has a course in the language and about fifty students have registered. Several manufacturing concerns have started night schools in Russian and have a large attendance. Two woolen mills in the south of Scotland have established night schools for the study of Russian.

United States Consul Fleming, at Edinburgh, in a report to the Bureau of Foreign and Domestic Commerce, says that the establishment of Russian classes in the Public Schools and other institutions in Scotland has been done on the recommendation of many Chambers of Commerce and other commercial institutions interested in the extension of foreign trade. He states that in Edinburgh there are now 168 young men studying Russian with a view to taking positions either under the Government or with private concerns for the purpose of promoting trade with Russia after the war. The University of Toronto have taken steps to introduce a lectureship in Russian by the appointment of a committee who will make the necessary arrangements.

* * *

THE BISHOP'S PREFERENCE

A YOUNG lady sat next to a distinguished bishop at a church dinner. Awed by the bishop's presence, she hesitated to speak to him, waiting for what she considered a favorable opportunity. Finally, seeing some bananas passed, she turned to him and said:—

"I beg your pardon, but are you fond of bananas?"

The bishop was slightly deaf, and leaning forward, replied:—

"What did you say?"

"Are you fond of bananas?" repeated the young lady, blushing.

The bishop thought for a moment, and then said:—

"If you want my honest opinion, I have always preferred the old-fashioned nightshirt."—Threads.

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PEACE TIME STEEL OUTLOOK

TWO weeks ago reference was made in our editorial columns to the probability of Great Britain being wholly independent of foreign steel by March, 1917. We now learn that both France and Germany are also so equipped as to ensure steel outputs largely in excess of their domestic requirements in the coming peace time, notwithstanding obviously necessary rebuilding and reconstruction demands by one at least of the two countries referred to. The fact that the former has already doubled her 1915 output, in spite of the past two year's occupation of much of her iron ore territory by Germany, is especially significant. Neglecting Belgium for the time being, as in her case the return to even her normal steel output is likely to be more or less delayed, we anticipate a merry scamper for post-war supremacy in the world's steel markets with Britain, France, the United States and Germany figuring as giant contestants.

A full appreciation of what such an eventuality will mean to Canada either with regard to projected export trade, or what is equally important, her domestic trade, has not as yet been fully, if at all realized. We are prone to assume that the belligerents have had their hands so full of fighting that, even with the provision of the wherewithal to prosecute same in satisfactory measure, their steel production capacity has not been developed to such an abnormal extent as to give them individually a hitherto unparalleled preponderance in peace-time. The capacity of Canadian steel plants as a result of war munitions requirements has very materially increased comparatively, and the same may be said with respect to the steel enterprise of the United States. In neither case, however, has the development been such as to promote a comforting peace-time prospect; rather the reverse, we should say, judging from diagnosis of the outlook by interested and competent authorities in the latter country which have come to our notice.

With the merry scramble in the world's markets—offence and defence, the price toboggan of steel and steel products will get off to a good start, and, so far as Canada is concerned, it is to the defence feature against the coming scramble that provision and effort should more than the other be directed. Already in the United States where steel strength is many times our peer, defense views are finding expression, and little harm will be done but an immense service will be rendered to our not-distant future commerce and industry, if earnest and timely cognizance be taken of the sure possibility of our being steel engulfed, unless definite action be planned to prevent it. The matter is of national moment.

◆

MODERN LANGUAGES AND EXPORT TRADE

THE probability of reciprocal trade relations among the Allies being established and maintained for a time, at least, following the war, has directed attention to the subject of the acquirement by our youth in colleges, universities, etc., of an intelligent conversational grasp of one or more of the languages spoken in the different countries. Special activity is to be noted as regards acquirement of the Russian language, due of course to the greater business and commercial possibilities which Russia with her immense territory and its opportunity for development afford. It is self-evident that business worth the name can only be transacted when the accredited representative of a firm seeking to establish and build up trade relationships in a foreign country has the language of the latter at his tongue tip, so to speak, in the first instance. If he has this, a more or less brief association with his prospective clients usually suffices to become familiar with their whims and fancies, business methods and customs, etc.

Not only has the teaching of the Russian language been installed as a regular course in at least one university in Scotland, but we learn that in different industrial centres night school instruction in the same language has been started, with, in every case, a large attendance of students. The movement, as we understand it, has had its origination through the efforts of manufacturers with an eye to the establishment and development of Russian business in a business-like way. "The Lord helps those who help themselves," seems to have been their view of the situation, as against waiting for Governments to get busy, which they seldom do to the most effective purpose. We in Canada have had Russian trade opportunities—even dramatically on occasion, brought to our attention many times during these past war months. Unfortunately, however, the language feature was in large part obscured in the general display. Action is, however, being taken now regarding it, and there is evidence that with the opening of the New Year our principal universities and commercial colleges will be well started on the work of instruction. "Trade," we are wont to say, "follows the flag"; in this case, trade with our Allies may be said to be likely to follow acquirement of their language.

There is so much of novelty in this Russian language development that it is quite possible to overlook the claims and advantages derivable from a conversational and literary intimacy with that of France. It may be said that so far as Europe is concerned, whether from a business or social standpoint, intimacy with the French language is much more important than is Russian, the former being by habit and general consent the medium through which international transactions—business and otherwise, are conducted. For some reason or other, acquirement of even a conversational intimacy with the French language has given little evidence of keen desire on the part of our English-speaking citizens, in spite of the fact that both business and social opportunities for its exercise are unusually abundant. Even our Minister of Trade and Commerce at the recent Trade Conference of the Allies in Paris, was among the very few—two altogether, we think, for whose benefit the proceedings had to be translated into English. He is now a powerful pleader, recognizing his own shortcoming. If from the standpoint of business or otherwise the Russian language must be acquired, the other should under no circumstances be neglected.

INDUSTRIAL NOTABILITIES

WILLIAM STORRIE, A.M. Inst., C.E., chief engineer and director, John verMehr Engineering Co., Waterworks Engineers, 154 Simcoe Street, Toronto, was born at Paisley, Scotland, October 4, 1883, son of William and Jessie (Cochrane) Storrie. He was educated at John Nelson Institution, Paisley; Paisley Grammar School; Paisley Technical College; Glasgow and West of Scotland Technical College, and became articled pupil to James Lee, C.E., city engineer of Paisley, Scotland; being engaged chiefly on waterworks construction, from 1899 until 1907. He gained the Brough Scholarship in 1902, and the Glasgow Building Trades Exchange Prize in 1905.

WILLIAM STORRIE, A.M. Inst. C.E.

From 1907 to 1909 he was chief assistant to Messrs. Crouch & Hogg, Glasgow, Scotland, on waterworks, bridge, canal and harbor construction. Mr. Storrie came to Toronto in 1909, and was appointed resident engineer on construction of waterworks filtration plant of the City of Toronto, 1909-1912. He was waterworks engineer, City of Ottawa, 1912-1913; and became chief engineer, John verMehr Engineering Co. in 1913. This company designed and constructed the Ransome drifting sand water purification plant for the City of Toronto, this plant being the first of its kind in North America and the largest in the British Empire. Its total cost is $1,100,000, and its capacity, 60,000,000 Imperial gallons per day. He served with the Queen's Own Royal Glasgow Imperial Yeomanry, from 1901 to 1908.

Mr. Storrie married Margaret Paterson Cowan, daughter of the late William H. Cowan, J.P., Hamilton, Scotland, January 30th, 1913; has one daughter. His clubs are: Engineers (Toronto); Associate Member, Institution of Civil Engineers, London, England; Associate Member, Canadian Society of Civil Engineers; Member of the American Waterworks Association. In religion he is Presbyterian. His residence is 17 Heath Street West, Toronto.

Photo courtesy British and Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$25 45
Lake Superior, charcoal, Chicago	26 25
Standard low phos., Philadelphia	44 00
Bessemer, Pittsburgh	30 95
Basic, Valley furnace	25 95

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton	$32 25	32 00
Victoria	32 25	32 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.40
Steel bars, base, Toronto	3.50
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.35
Steel bars, base, Montreal	3.50
Twisted reinforcing bars, base	3.55
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.65
Small shapes	3.85
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.35
Bars, 2 in. and up	3.75
Strucural shapes	3.35
Plates	4.00

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs.	
	C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$34 00	$34 00
Electrolytic copper	34 00	34 00
Castings, copper	33 00	33 00
Tin	46 00	48 00
Spelter	14 00	14 00
Lead	9 00	9 00
Antimony	15 00	18 00
Aluminum	70 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$5 00	$5 00
Heads	5 35	5 25
Tank plates, 3-16 in.	5 25	5 25

WROUGHT PIPE

Prices in effect Nov. 17, 1916.

Buttweld

Per 100 feet.	Black.	Galv.
⅛ in.	$ 3 50	$ 5 00
¼ in. and ⅜ in.	3 30	5 43
½ in.	4 25	5 82
¾ in.	5 18	7 30
1 in.	7 65	10 80
1¼ in.	10 35	14 61
1½ in.	12 38	17 46
2 in.	16 65	23 50
2½ in.	26 33	37 15
3 in.	34 43	48 58
3½ in.	43 24	60 26
4 in.	51 33	71 40

Lapweld

2 in.	$19 24	$25 72
2½ in.	28 67	38 90
3 in.	37 49	50 87
3½ in.	46 92	63 94
4 in.	55 59	75 76
4½ in.	64 77	88 27
5 in.	75 48	102 90
6 in.	97 92	133 40
7 in.	130 90	174 90
8 in. x 25 lbs. per ft.	137 50	183 80
8 in. x 25 lbs. per ft.	158 40	211 70
9 in.	189 80	253 60
10 in. x 32 lbs. per ft.	176 00	235 20
10 in. x 40 lbs. per ft.	226 60	302 80

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$21 50	$20 00
Copper, crucible	24 50	23 50
Copper, heavy	24 50	23 50
Copper wire	24 50	23 50
No. 1 machine compos'n	18 50	18 00
No. 1 compos'n turnings	15 00	16 00
New brass clippings	15 00	16 00
No. 1 brass turnings	13 00	13 00
Steel, low phos.	14 00	14 00
Heavy melting steel	11 50	12 00
Boiler plate	12 00	10 50
Rails	14 75	15 00
Axles, wrought iron	19 00	19 00
Tires, steel	12 00	11 00
Rails	13 75	13 00
Shafting	16 75	16 00
Malleable scrap	10 25	11 00
Pipe, wrought	10 50	9 00
Stove plate	10 25	11 50
Heavy lead	7 00	7 00
Tea lead	5 50	5 25
Scrap zinc	7 50	7 75
Aluminum	35 00	30 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	35
Stove bolts	60
Plate washers	20
Machine bolts, ⅜ and less	25
Machine bolts, 7-16 and over	15
Blank bolts	15
Bolt ends	15
Machine screws, flat head, iron	66 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts, hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	35
Boiler rivets, base ¾-in. and larger	$5.25
Structural rivets, as above	5.15
Wood screws, flat, bright	77½
Wood screws, O. & R., bright	72½
Wood screws, flat, brass	45
Wood screws, O. & R., brass	42½
Wood screws, flat, bronze	37½
Wood screws, O. & R., bronze	35

MILLED PRODUCTS

	Per Cent.
Set screws	40
Sq. & Hex. Head Cap Screws	30
Rd. & Fil. Head Cap Screws	15
Flat & But. Hd. Cap Screws plus	15
Fin. & semi-fin. nuts up to 1 in.	30
Fin. & semi-fin., nuts over 1 in.	25
Studs	15
Taper pins	45
Coupling bolts plus	15
Planer head bolts, without fillet	15
Planer head bolts, with fillet	net
Planer head bolt nuts, up to 1 in.	30
Planer head bolt nuts, over 1 in.	25
Planer bolt washers plus	10
Hollow set screws list plus	40
Collar screws list plus	20
Thumb screws	20
Thumb nuts	70
Patch bolts add	65
Cold pressed nuts to 1½ in. add	$3.50
Cold pressed nuts over 1½ in. add	$2.00

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$50 00
Open-hearth billets, Pittsburgh	50 00
O. H. sheet bars, Pittsburgh	50 00
Forging billets, Pittsburgh	73 00
Wire rods, Pittsburgh	55 00

NAILS AND SPIKES

Standard steel wire nails, base	$4 25	$4 20
Cut nails	4 00	4 00
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs		$4 10

MISCELLANEOUS

Solder, guaranteed	0.31½
Solder, strictly	0.29½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Gasoline, per gal., bulk	0.26½
Benzine, per gal, bulk	0.25½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	1.12
Linseed oil, boiled, single bbls.	1.15
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	8 00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.12
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes	35
S.S. drills, 1/16 in. and larger	50
Standard drills to 1½ in.	50
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	20
3-fluted drills over 1½ in.	10
Bit stock	50
Ratchet drills	20
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	25
Sockets	30
Sleeves	40
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, Black, No. 28	$4 15	$4 30
Sheets, black, No. 10	5 25	5 20
Canada plates, dull, 52 sheets	4 75	4 75
Canada Plates, all bright	6 30	6 50
Apollc brand, 10¾ oz. galvanized	6 75	6 75
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 45	7 35
Gorbal's Best, No. 28	7 75	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 25	6 50
Premier, 10¾ oz.	6 50	6 75

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch.	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65
Kearney & Foot, Arcade	65
J. Barton Smith, Eagle	65
McClelland, Globe	65
Black Diamond	65
Delta Files	65
Nicholson	55
Globe	60
Vulcan	65
Disston	..

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$30 00	....
1¼ in.	30 00	....
1½ in.	30 00	23 00
1¾ in.	29 00	20 00
2 in.	31 00	19 00
2¾ in.	33 00	.....
2½ in.	37 00	25 00
3 in.	39 00	28 50
3¼ in.	45 00	32 00
3½ in.	46 00	33 00
4 in.	60 00	44 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.23
Royalite, per gal., bulk	.10½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Union thread cutting oil antiseptic	.70
Acme cutting oil, antiseptic	.39½
Imperial quenching oil	.39½
Petroleum fuel oil	.12¾

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	.30-10%
Standard	.40%
Cut leather lacing, No. 1	$1.40
Leather in sides	1.20

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke.	
Connelsville Foundry Coke	....
Yough Steam Lump Coal	...
Pittsburgh Steam Lump Coal	....
Best Slack	....

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.17
Peerless	.17
Grand	.16
Superior	.16
X L C R	.15
Atlas	.15
X Empire	.14
Ideal	.14
X press	.13
COLORED	
Lion	.12¼
Standard	.10¾
No. 1	.10¾
Popular	.9¾
Keen	.8¾
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.39 to .41
Tin	.49 to .56
Zinc	.18 to .20

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 in.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.35
Emery in kegs, American.	.06
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.35 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.17
Cobalt sulphate	.70
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.12
Nickel carbonate	.35
Nickel sulphate	.17
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.55
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.41
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents

Montreal, Que., Nov. 20, 1916—Industrial circles continue in a state of unabated activity, these conditions being featured by a constant advance in price of practically all materials which may be still further accentuated by the closing of navigation—the existing car shortage has already caused difficulties in transportation.

Pig-Iron

The price of pig-iron continues upward, and still higher levels are reached this week. Advances quoted range from $1 to $2 per ton, Bessemer and grey forge, Pittsburgh, being among the latter. These are now quoted at $29.95 and $25.95 respectively.

Steel

Price advances continue to feature the steel situation, and despite the fact that these prices have reached a record high, the outlook for the immediate future would indicate that the upward movement has not yet ceased, or even attained a position where the highest point can be foreseen. Production is proceeding at an unprecedented rate, yet the demands of consumers are far greater than the mills can supply. This abnormal activity is expected to continue throughout the whole of next year or even longer, should the war continue. All raw and semi-finished material is constantly advancing, the exception being in coke, which shows a slight decline from that of the past few weeks. A $2 decline is reported on furnace spot, the current quotation being $6 per ton. Foundry grades are 50c easier, prompt being now quoted at $9.50 per ton. The Pittsburgh quotations on Bessemer and open-hearth billets and sheet bars show another $2.50 advance, the price being $57.50. Heavy export business recently closed has materially aided the latest advance.

Plates are still in heavy demand, but mills are so crowded that consumers are unable to cover their requirements. Rails are very active. The recent demand for sheets has created a scarcity, more especially in galvanized and prices are again climbing. The heavy requirements for wire and wire products are keeping producers very active and a recent advance of $5 per ton, Pittsburgh, on wire rods may mean a further rise on wire products. Inquiries for iron and steel bars are likewise heavy as reflected in a $1 advance on iron bars, Chicago. Lap welded wrought iron pipe is hard to obtain and makers of boiler tubes are booked 6 to 8 months in advance. No local changes are effective this week, but dealers here look for an advance shortly.

Metals

The feature of the metal markets has been the extraordinary developments in the copper situation, which is fast assuming a record position in the history of the industry. Tin retains its strong position and is slightly higher. Other metals are unchanged and prices are generally well maintained. Local dealers report good business in all metals, with copper especially active.

Copper—With the market taking on strength daily, and the continued demand for copper, which producers are unable to supply, it is anticipated that further advances will be featured shortly. The eagerness that some buyers are showing in their unsuccessful attempt to purchase metal is some indication of the actual state of the market, and the fact that many large producers are practically out of the market for the next six months give little prospect of relief for some time. London has recently reported a very active market and the latest quotations show an advance of over £10 in standard copper. New York is advancing, the latest quotations being 32½c for lake, 33c for electrolytic, 30½c for castings; these prices are 2¼, 1 and 1¼c respectively stronger than last week. Local dealers report a very active situation, and are quoting lake at 34c, electrolytic at 34c and castings at 33c; an advance on the week of 3c per lb.

Tin—The restrictions imposed on tin shipments by the British Government, have gradually depleted the available supply of metal in this country, and this scarcity is causing some anxiety in trade circles. It is expected that the situation will shortly be relieved by the freer granting of permits, in order to keep the trade supplied with sufficient metal to meet requirements. An advance of over £4 is reported from London and New York quotations show an advance of 1¾c per pound, the nominal price being now 45c. The situation here is practically unchanged, but dealers have advanced prices one cent per lb., now quoting at 46c.

Spelter—The present strength of the market is entirely due to the action of the producers in refusing to sell except on small lot orders. With the export business much lighter and home consumers taking very little interest in the situation, it was expected that prices would become easier. New York reports an advance of ¾c, the current quotation being nominally 12¼c per lb. The local situation is unchanged and prices are firm at 14c per pound.

Lead—The market is very steady and prices are firm. Demand is not active, but conditions point to continued strength. The trust price remains firm at 7c, with outside quotations slightly in advance. Conditions here are strong at 9c.

Antimony—The market is steady and strong, with slight advance in price quotation, New York being ¼c higher at 13¼c per pound. Dealers here are quoting 15c on a steady and unchanged market.

Aluminum—No change is reported in the market and prices are firm at 70c per pound.

Machine Tools and Supplies

An improved demand for the heavier machinery has developed additional activity in machine tool circles. While much of this business has been for shellmaking purposes, the inquiries for lighter equipment has been quite general. The total volume of business is not large, but sufficient is passing to keep tool manufacturers actively employed. Deliveries are better, but on certain machinery, such as the better type of tool room equipment, shipments are extended for some months. Supplies are in good demand with prices very firm, some showing higher tendencies.

Scrap

The conditions prevailing in the old metal market continue to improve and prices are keeping pace with the advances quoted in other lines of industrial activity. Demands for all kinds of scrap are heavy, more especially copper and heavy melting steel. Dealers here report a very active market with a 1½c advance on all old coppers, with the exception of wire, which is one cent higher, the quotations ranging from 21½c for light to 24½c for heavy and crucible copper. Heavy melting steel is ½c higher, being quoted at 11½c per pound.

—

Toronto, Ont., 21.—The strike of the C.P.R. freight handlers has intensified an already acute situation, and the local freight yards are more congested than ever. Relief has been promised by bringing in help from outside points, but merchants are suffering serious inconvenience in the meantime. Trade all over the country continues good and most industries are deriving considerable benefit, either directly or indirectly, from the large orders for war supplies that are being placed from time to time. The volume of production is however, being restricted by the scarcity and high cost of raw materials ,and also by the inadequacy of the supply of labor and its impaired efficiency. In neither case can the situation be improved to any great extent under prevailing conditions. Wages are also higher which further tends to increase cost of production. The bulk of the trade being for export naturally increased the volume of that business, this being clearly shown in the returns issued by the Dominion Government. For the months of October, the exports of manufactured goods were valued at $28,637,814 as against $12,880,731 for the corresponding month last year.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Steel

The steel market continues remarkably active and prices are still advancing. The mills are unable to meet the enormous demand for steel owing to their limited capacity, which although it has been considerably increased, is not sufficient to take care of all the offerings. Scarcity of fuel and labor is also tending to restrict output. The shortage of steel is becoming more acute and deliveries are more backward than ever. The wrought pipe market is stronger and prices have advanced owing to the increase in cost of raw materials and production. The advance has affected both lapweld and buttweld pipe. Makers of plates have announced another advance, ½ inch and larger being now quoted locally at 5c, while heads and tank plates ¼ inch are now 5¼c per pound, delivery at mill convenience. Large orders for ship plates are being placed at high prices, premiums being paid for quick delivery. There seems to be practically no limit to the tonnages of plates that many buyers are seeking, or the prices they are willing to pay for desired deliveries. Local warehouse prices on steel bars have advanced to 3.65c, while a further advance in mill prices on the same material is looked for in the near future. Higher prices on tubes are expected about the end of this month while manufacturers predict that prices of rivets will also be put up at an early date. Cut nails have advanced 30c, being now quoted at $4 per 100 lbs. Coach and leg screws, plate washers, machine bolts, black bolts, and bolt ends, have all advanced about 10 per cent.

The market for sheets is very strong and higher prices are expected, particularly on light gauge black and on galvanized sheets. Manufacturers of sheets are withdrawing from the market, many mills refusing to quote on further inquiries. Production, while at a high rate, is not heavy enough to take care of accumulated tonnages, and practically all mills will carry over into next year a large tonnage of present quarter business. Back and galvanized sheets have gone up $3 per ton in the States.

In the United States, the market is very firm and the upward tendency in prices is very much in evidence. An advance of $5 per ton in rail prices has been announced by the U.S. Steel Corporation, applying to all deliveries; Bessemer rails are now $38, and openhearth rails $40 per ton, mill. The export business continues very heavy. Recent orders from the Allies include 250,000 tons of shell steel for Great Britain and France; 20,000 tons of soft steel billets for Great Britain; 30,000 tons of wire for France, while a Canadian car works has just placed an order for 15,000 tons of plates and shapes in Eastern Pennsylvania.

Pig Iron

Prices of domestic pig iron have made a further advance of $1 per ton, Hamilton and Victoria being now quoted at $32 per ton. In the States the market is advancing and new high levels have been reached. Grey forge, Pittsburgh is now quoted at $25.45; Bessemer $30.95; and basic, $25.95 per ton Pittsburgh, Lake Superior charcoal pig iron is now $26.25 per ton Chicago. The furnaces in Buffalo are in a sold-up condition, all producers reporting that they are oversold.

Machine Tools

The machine tool market continues active and the situation generally very much as reported last week. Tentative inquiries have been received by local machinery houses for tools for the new type 18 pounder high explosive shell. The new type has a different style of nose, a bigger bore and thinner walls. It is not unlike the Russian shell of similar calibre. There is also a demand for tools for the new mark III. 6 in. shell, while 4.5 in. plants are also being changed over to suit the new type of shell of that calibre. The demand for machine tools for making fuse parts is quieter, buyers having to a large extent satisfied their requirements meantime. There is still a tendency toward higher prices for most types of machine tools. Prices on high-speed drill presses have advanced 12½ per cent. recently, making quotations in these tools about 25 per cent. higher than they were two years ago. Prices on ordinary upright drill presses also have advanced 10 per cent., making present quotations about 25 per cent. higher than they were two years ago. Prices on ordinary upright drill presses also have advaned 10 per cent., making present quotations about 25 per cent. higher than they were two years ago.

Supplies

The revised standard lathe chuck list has been issued, and adopted by all makers who are also using the same discounts. Prices on the new list are practically double those on the old lists, but the extras have been reduced to list plus 15 per cent. The new price is list plus 15 per cent., while the old price was list plus 40 per cent. Canadian crude oil has advanced 5c making the present price $1.88 per barrel. This indicates that higher price for gasoline may be expected. Active business is reported by local supply houses with a general tendency towards higher prices particularly for iron, steel, and brass goods.

Metals

The outstanding feature in the metal markets this week is a sharp advance in local prices of copper following a similar movement in New York. It is being realized that the copper production in the States has been sold out for the first half of 1917; the position of this metal is thus an exceptionally strong one. Tin is also higher, due to a rather tight spot market in New York. Spelter is in good demand at unchanged prices, while lead is also unchanged and firm. Antimony and aluminum are quiet and unchanged. Higher prices on solders have been announced.

Copper.—The continued active demand for copper, combined with the growing scarcity of this metal, has had a marked effect on prices. Some producers are sold out for the entire first half of next year. The demand, both export and domestic, is enormous, and there is no relief in sight, indications pointing to a more acute situation, as there does not appear to be sufficient copper being produced to satisfy the world's requirements. Copper has advanced 3c locally, electrolytic and lake being quoted at 34c, and castings at 33c per pound.

Tin.—The demand for tin is heavier, due, it is thought, to the fear that stocks on hand in the States may become reduced owing to the increased difficulty in obtaining permits for exporting metal from England. The market is thus excited and quotations higher. Tin has advanced 2c locally, and is now quoted at 48c per pound.

Spelter.—The output of spelter is well sold ahead, and there is some scarcity of spot metal. The market continues firm, with spelter in good demand, particularly from the brass mills. Local price, 14c per pound.

Lead.—The market is steady and unchanged. The trust continues to quote 7c New York, but independents are asking 7.05c to 7.10c for December lead. In London the situation remains unchanged. Local price firm at 9c per pound.

Antimony.—The market is easier and demand very quiet. Local price, 10c per pound.

Aluminum.—The market is quiet, with a weaker tendency. Local price, 68c per pound.

Solders.—Prices are higher following the advance in tin. Solders have advanced 1½c per pound, guaranteed being quoted at 31½c and strictly at 29½c per pound.

POST-WAR TRADE POSSIBILITIES

FRANK BAILEY, in his presidential address to the Association of Engineers-in-Charge, reviewing after-war possibilities, said:—"Our workshops and factories (now in many cases efficient arsenals) ought to be filled with orders ready for execution when all munitions requirements are fulfilled. Stocks of all kinds require replenishing, and great markets will shortly be open for our goods in the countries of our Allies, and in all parts of the world where Hun atrocities have created a welcome for the trade of an honest country. We now see signs in every direction that the stress, anxieties, and tragedies of war have roused Britain to throw off all allegiance to tradition, and to cease to cling to ideas which seemed to be part of an unalterable limitation. The awakening has arrived, and we are now ready to adopt innovations, laws, systems, and methods which had no chance of receiving intelligent consideration in former times. Progress and necessity call for combination, co-operation, concentration, and efficiency. Individualism is gradually disappearing; the family concern, founded probably by the grandfather and handed down from son to son, has outgrown its limits of administration, or shrunk to ineptitude; many private banks have been merged into the great joint stock banks, and business generally is more a contest of efficiency than part of a personal greeting of friends, or a recreation."

CHEAPER PAPER DOUBTFUL

PRACTICALLY no hope is held out by the experts of the Federal Trade Commission for lower prices for print paper, and their intimation is that prices are apt to advance rather than decline. The Commission this week will set a date for a hearing on the subject at which representatives of newspapers and other publications, as well as representatives of the paper manufacturers, will appear to present their cases.

For several months the Commission has been investigating the causes of the enormous rise in the price of print paper, but its findings have not been made public and will not be until the hearing has been held. When it started out the Commission felt that perhaps prices were being juggled by the manufacturers, but it is understood that its investigations showed that conditions on this continent and abroad were such as to force a tremendous rise in many of the materials used in the manufacture of print paper and paper manufacturers are confidently predicting that they will be absolved from all blame for the rise.

Conditions in Canada have a strong bearing on the question, as the amount of news print paper imported equals about one-third of the domestic production, and most of the imported paper comes from Canada. The paper trade claims that costs are bound to increase in the future because of the scarcity of labor in the Canadian woods and the consequent increase in the labor of bringing logs to the mills.

The newspapers of Washington are so alarmed over the situation that they have organized paper saving campaigns all over the city. The merchants are being urged to use as little wrapping paper as possible, while school children are bringing bundles of old newspapers to school every day, the proceeds from the sale of which go toward the improvements of the municipal playgrounds.

* * *

Dominion Machinery Co., Toronto, Ont., have taken out a permit to erect a modern warehouse at 14 Darling Ave., at a cost of $5000. They will carry a full line of shell machinery, machine tools, both new and second-hand. Office address is 110 Church Street, Stevenston Building, Toronto.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department of Trade and Commerce, Ottawa, is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL

Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE

Valparaiso, British Consul General.

COLOMBIA

Bagota, British Consul General.

ECUADOR

Quito, British Consul General.
Guayquil, British Consul.

EGYPT

Alexandria, British Consul General.

FRANCE

Havre, British Consul General.
Marseilles, British Consul General.

INDIA

Calcutta, Director General of Commercial Intelligence.

ITALY

Genoa, British Consul General.
Milan, British Consul.

MEXICO

Mexico, British Consul General.

NETHERLANDS

Amsterdam, British Consul.

PANAMA

Colon, British Consul.
Panama, British Vice-Consul.

PERU

Lima, British Vice-Consul.

PORTUGAL

Lisbon, British Consul.

RUSSIA

Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN

Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN

Stockholm, British Consul.

SWITZERLAND

Geneva, British Consul.

URUGUAY

Monte Video, British Vice-Consul.

VENEZUELA

Caracas, British Vice-Consul.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya, Ploshch 9, Petrograd.

L. D. Wilgress, Canadian Government Commercial Agent, Bukhgolza Ulitza No. 4. Omsk, Siberia.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

AUSTRALIA, B. Millin, Sydney, N.S.W.

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND DENMARK.

C. E. Sontum, Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Guelph, Ont.—The Guelph Stove Co. will build a new foundry.

Winnipeg, Man.—The Breen Motor Co., is erecting a garage to cost $35,000.

Hamilton, Ont.—The Dominion Steel Castings Co. will build an extension to their plant.

St. Catharines, Ont.—The Metal Drawing Co. will build an addition to their machine shop.

Copper Cliff, Ont.—The Canadian Copper Co., contemplate extending their plant here.

Kinmount, Ont.—H. Deltman is in the market for a 60-h.p. engine and 75-h.p. boiler for a sawmill.

Toronto, Ont.—The Canadian Carbon Co., will erect a three-story factory on Paton Road, to cost $23,400.

Toronto, Ont.—W. H. Banfield & Son have commenced the erection of a factory, estimated to cost $10,000.

London, Ont. — The McLaughlin Motor Car Co., will erect an addition to its plant on Richmond Street, to cost $6.500.

Trail, B.C.—It is proposed to make extensive improvements to the city lighting and power system that will cost about $25,000.

Guelph, Ont.—Work will be commenced at an early date on the erection of an addition to the Loudon Machinery Co., plant to cost $6,000.

Hamilton, Ont.—The W. T. Rawleigh Co., of Freeport, Ill., has purchased a site in the east end and purpose building a $100,000 factory next year.

Toronto, Ont.—The Canadian Fairbanks-Morse Co., will build an extension to their plant on Bloor street to cost $2,500. A permit has been granted.

Toronto, Ont. — The American La France Fire Engine Co., will erect an addition to its plant at Western Avenue, and Weston Road, to cost $6,000.

Montreal, Que.—Plans have been perfected for increasing the output of the St. Lawrence Pulp & Lumber Corporation to 75,000 tons annually, against present capacity of 37,500 tons of sulphite pulp annually.

Winnipeg, Man.—The Willys-Overland Co., has commenced the erection of a reinforced concrete and brick garage on Portage Avenue to cost $60,000.

Hamilton, Ont.—The Standard Underground Cable Co. will make an addition to their plant to cost $30,000. Prack & Perrine, Toronto, are the architects.

Sarnia, Ont.—The Mueller Manufacturing Co. of this city is considering the installation of a private fire-fighting apparatus similar to the one now existing at the Imperial Oil Co.

Toronto, Ont.—Tenders are being received for an addition to the plant of the Booth-Coulter Copper & Brass Co., 115 Sumach Street, to cost $5,000. Bond & Smith, 15 Wilton Avenue, Toronto, are the architects.

Chicoutimi, Que. — The Chicoutimi Pulp Co. will increase its pulp mill capacity to 130,000 tons annually, compared with present output of 80,000 tons of mechanical pulp. This mill is claimed to be the largest exporter of mechanical pulp on this continent.

Quatsino Sound, B.C.—The Colonial Pulp & Paper Mills, Ltd., will erect a sulphite mill with a capacity of 120 tons a day. The first unit will have a capacity of 60 tons. It is expected that the plant will be completed in about a year.

Cochrane, One.—The Frederickhouse & Abitibi Pulp Wood Co., now being organized here, proposes to build saw mills and a wood-working plant at a cost of $150,000 and later to erect a rosser plant. J. A. McAndrews, Lumsden Building, Toronto, is interested.

Prince Rupert, B.C.—The bonding of the Dunsmuir mineral holdings on the Hocstahl River, near Port Essington, by E. Hinman, representing New York interests, is regarded here with a good deal of interest, for the transaction may foreshadow the construction of a smelter which would be of vast importance to the business life of this city.

Windsor, Ont.—The Sterns Tire and Tube Co., of Canada, has announced that it would build a plant in Windsor for the manufacture of a new kind of automobile tire invented and placed on the market by Edward Sterne, of St. Louis, Mo. The factory will be built on Howard Avenue. The property which the company will buy comprises three acres. It has an authorized capital of $1,000,000.

Whitby, Ont.—The Town Council has decided to submit a by-law to the ratepayers providing for the guarantee by the town of bonds to the extent of $100,000 for the proposed new tractor industry to be located here. The company it is understood, will erect a $200,000 plant, if the by-law carries.

Montreal Aqueduct Scheme.—A committee appointed by the ratepaying engineers of the city of Montreal to investigate an ambitious aqueduct scheme to supply the city with water and power from the St. Lawrence River, and to cost $10,000,000, has pronounced it a failure. The sum of $5,200,000 has already been spent on the aqueduct, and this is regarded by the engineers as wasted. The city is warned that if the remainder of the money called for by the scheme is spent it too will be wasted. The engineers find that the city entered upon the operations without sufficient study.

Municipal

Walkerton, Ont.—A hydro by-law will probably be voted on at the January elections.

Three Rivers, Que.—The City Council contemplate extending the waterworks system.

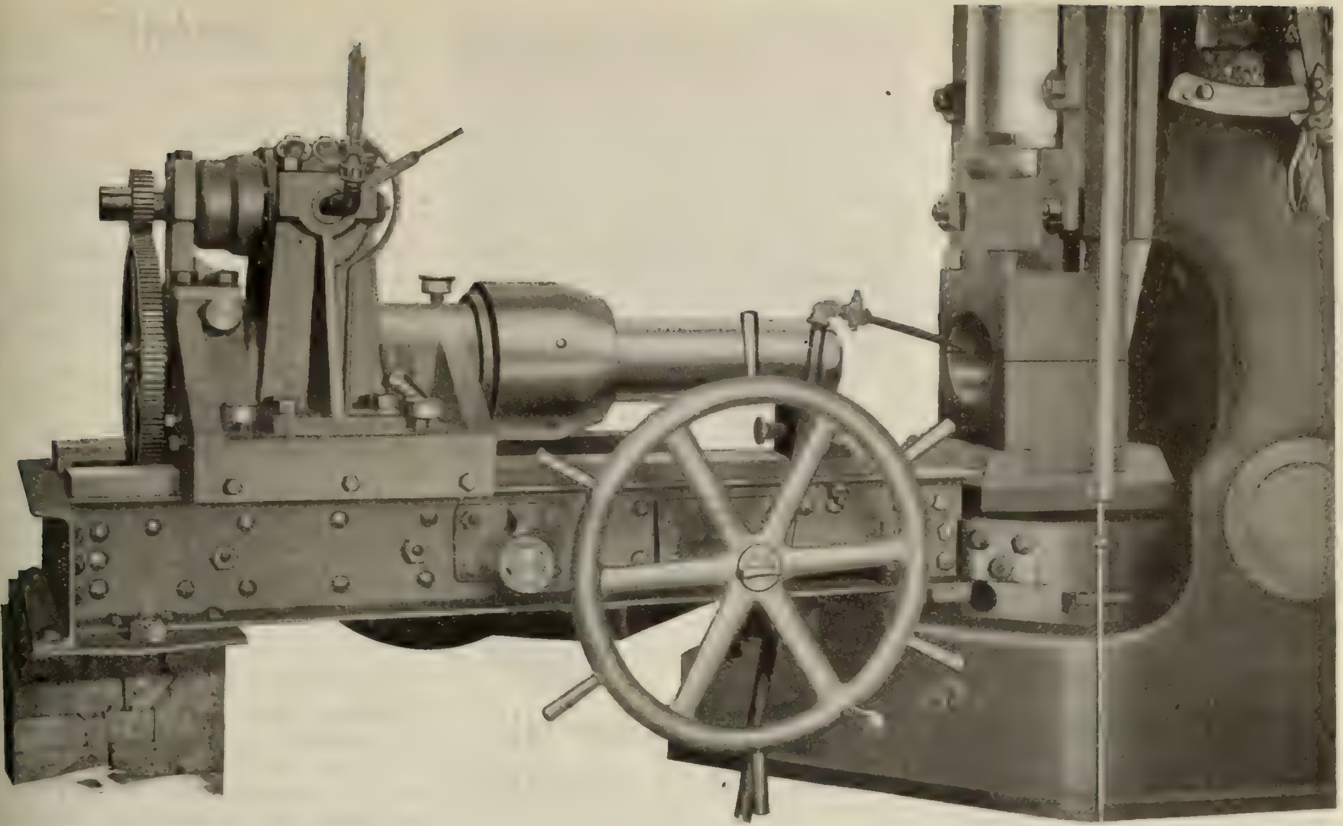
Penticton, B.C.—The Town Council have decided to purchase an engine for the electric light station.

Levis, Que.—The Town Council propose installing a filtration plant at an estimated cost of $45,000. Quimet & Lesage, of Montreal, are the engineers.

Sault Ste. Marie, Ont.—The City Council contemplate the purchase of tw motor-driven pumps of a capacity of 5,000,000 imperial gallons per 24 hour each.

Hamilton, Ont.—A by-law will be submitted to the ratepayers in January t sanction the expenditure of $275,000 o a steam turbine driven pump as an auxiliary for the waterworks system.

Hamilton, Ont.—The proposed reservoir, if constructed, will cost about $500,000. City Engineer Gray and Hydr Engineer Sifton have practically completed their joint report on specifications and estimates for the twenty million gallon reservoir. An alternativ scheme is a steam pumping plant.



Whelan Hammer Nosing Apparatus

4.5" 60 Pounders 6" H.E.

THE Whelan Nose Apparatus has been designed with the sole object of giving an absolutely uniform and concentric nose, and at the same time of leaving the inside radius true with the main body of the shell. The shell is held at the base by means of a Collet Chuck, and is revolved by a reversing air motor, which is also used to open and close the chuck.

The carriage travels on plain gibbed ways, and is fed up to the hammer by means of the large pilot wheel geared 3 to 1 into rack on carriage.

The frame is of steel sections, the ways also are of machinery steel, accurately planed.

Our confidence in this apparatus is justified because in one shop has nosed over 35,000 shells without a spoil or a breakdown.

This method eliminates inside profiling, and the nose of the shell after coming from the hammer, when put in a lathe, runs just as true as the body.

The A. R. WILLIAMS Machinery Co., Limited

66 Front St. W. - Toronto

INDUSTRIAL CARS, FLOOR-TRUCKS, PORTABLE STEEL TRACK, TURNTABLES.

Hammant Car & Engineering Works
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MacKinnon, Holmes & Company, Limited

Design, manufacture and erect all classes of Steel Work.

Specialties:-

Bridges
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Penstocks
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Smoke Flues & Stacks.

Prompt deliveries assured.

Designs and Estimates from Head Office at

SHERBROOKE, QUE.

METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS
372 Pape Avenue, Toronto, Can.

Hepworth, Ont.—A by-law will be submitted to the ratepayers on November 27 for the purpose of granting a franchise to the Hepworth Light, Heat & Power Co., for a term of 99 years.

West Vancouver, B.C.—The ratepayers have passed a by-law granting a fixed assessment to the Vedder River Shingle Mill Co., of Chilliwack, B.C. The company will erect a large shingle mill here.

Sarnia, Ont.—It is understood that as a result of the recent inspection of the city's fire fighting apparatus and water system by the underwriters' inspector, Norman R. Wilson, C.E., a recommendation will be sent to the city council next month that a new fire alarm system be installed all over the city, and that another fire station be erected in the south ward, and that a combination chemical tank and hose truck, motor-driven, be installed in the main station on George Street.

General Industrial

Hamilton, Ont.—The American Can Co. will probably extend their factory here.

Montreal, Que.—The Dominion Cutlery Co., 591 St. Catherine street west, are considering the erection of a factory.

Ingersoll, Ont.—Important orders from Russia for agricultural implements have been received by the Noxon Company.

Vancouver, B.C.—The Great North-Western Salmon Cannery and a wharf were burned at West Vancouver. Loss $20,000.

Winnipeg, Man.—Fire on November 17 destroyed the Borbridge Co. harness factory on Ross Avenue. The loss is estimated at $100,000.

Toronto, Ont.—The Imperial Varnish Co. premises at 8 Morris Street were badly damaged by fire which broke out late Saturday night. The damage is estimated at $3,000 to the contents and $500 to the building.

Toronto, Ont.—Fire, entailing a loss of about $100,000, broke out on Nov. 15 in the section of the Adams Bros.' factory, at the corner of King and Frederick streets, which was devoted to the manufacture of saddlery and harness. The loss is fully covered by insurance.

Smith's Falls, Ont.—On Nov. 9 fire destroyed the plant of the Canadian Cooperage Mfg. Co. The main buildings were burned and all the machinery was ruined. The fire is supposed to have started in the boiler house, and the loss is estimated at from $10,000 to $12,000, which is partly covered by insurance. It is expected the plant will be rebuilt at once.

Tenders

Winnipeg, Man.—Tenders addressed to the undersigned will be received up to December 18, for the construction of 9½ miles of 5 ft. 6 in. reinforced concrete pipe. Plans, specifications and form of tender can be secured on application to the district, accompanied by certified cheque for $20. R. D. Waugh, chairman of Winnipeg Water District Commissioners, 901 Boyd Building, Winnipeg.

Electrical

Quebec, Que.—The electric plant of the town of Megantic was entirely wiped out by fire on Nov. 9.

Toronto, Ont.—The Toronto Hydro-Electric Commission propose building an extension to the sub-station on Duncan street. The cost is estimated at $90,000.

Aylmer, Ont.—A by-law to authorize the construction of a Hydro radial line via Aylmer and Tillsonburg to Port Burwell will be submitted in January to the ratepayers of Westminster Township, South Dorchester Township and Dereham.

Sarnia, Ont.—Hydro power will be first used here at the plant of the Central Stone Co. of Canada, which is now being erected at Point Edward. This company is ready for operation and will start work on the stone for the Central Station, Toronto.

Kingston, Ont.—The Hydro-Electric Commission, through its engineer, Gordon Kribs, has made a new power proposition to the Kinyston Utilities Commission. The new offer is to supply 1,000 h.p. at $29 per h.p. When the consumption is increased to 1,125 h.p., the commission will be able to get it for $28 per h.p. This makes the third offer from the Hydro Commission.

Railways—Bridges

Watford, Ont.—The G. T. R. overhead bridge here, which was a wooden structure, is being removed by the company and preparations being made for a new steel structure.

Toronto, Ont.—It is proposed that authority be given the Harbor Commissioners to proceed with the erection of a new bascule bridge at the foot of Cherry Street to provide access to the industrial area in Ashbridge's marsh district. This has already received the sanction of the council, but owing to the delay in awarding tenders for the work and other causes, the cost originally estimated at $101,200 has been increased to $149,000.

The officials report that the cost is likely to be further increased if advantage is not taken of the prices now quoted by contractors.

New Incorporations

The Sterling Engine Works, of Winnipeg, have been incorporated with a capital of $25,000 by R. M. Wolvin, G. Coulter, and F. Milan.

The New Westminster Foundry Co., of New Westminster, B.C., has been incorporated to carry on a general business of iron founders, boilermakers, etc.

The Foundry Products, Ltd., of Calgary, has been incorporated with a capital stock of $500,000 by Daniel L. Redman, Charles W. Coole, Peter D. McAlpine and others.

The Universal Smokeless Heat Generator Co., Victoria, B.C., has been incorporated for $50,000. It will acquire patents held by its stockholders for improvements in heat-generating processes and furnaces.

The Reid Products Co. has been incorporated at Toronto, with a capital of $40,000, to manufacture incinerators, etc., at Toronto. Incorporators are: L. A. Reeves, R. H. Reeves, and A. C. F. West, all of Toronto.

The Beaver Board Timber Co. has been incorporated at Ottawa, with a capital of $100,000, to manufacture pulp and pulp products, the head office to be in Toronto. Incorporators are: J. B. O'Brien, M. C. vander Voort and A. T. Maher, all of Toronto.

British Chemical Co. has been incorporated at Ottawa, with a capital of $50,000, to manufacture all kinds of explosives, chemicals and fertilizers, with head office at Montreal. The incorporators are: F. G. Bush, G. R. Drennan, and A. G. Yeoman, all of Montreal.

The Sterling Engine Works, Ltd., of Winnipeg, has been incorporated with a capital stock of $25,000 by Vincent C. Maddock, Roy M. Wolvin, William J. Leaney, and others, to manufacture steam and gasoline engines, boilers, agricultural implements, etc.

Contracts Awarded

Galt, Ont.—The contract for the construction of two new buildings for the Galt Brass Co., has been awarded to P. H. Secord & Sons, of Brantford, Ont. Estimated cost, $15,000.

New Toronto, Ont.—The general contract for the erection of a factory for the Dominion Abrasive Wheel Co., Ltd., has ben let to the Toms Contracting Co., Toronto. Approximate cost, $65,000.

"HAWK'D CHROME VANADIUM STEEL"

Will Give You Exceptional

Shell Forging Production

WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

There are many cases where each punch has turned out over 2,000 shells.

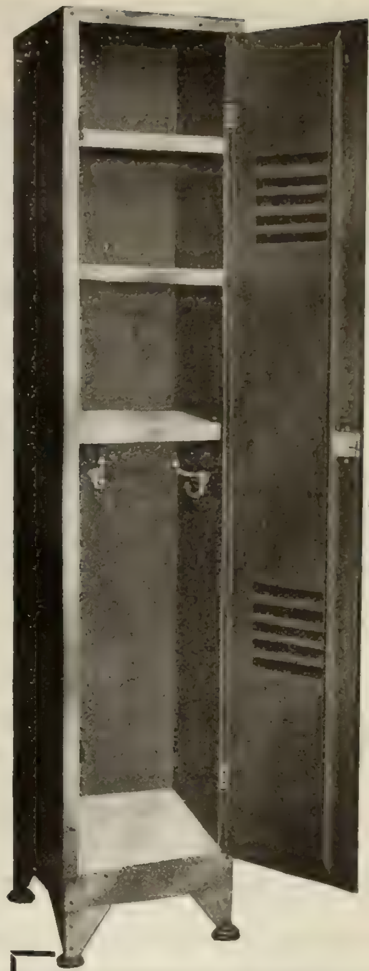
It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

Hawkridge Brothers Company
303 Congress St., BOSTON, MASS.
U. S. A.

HAVE YOU read pages 68 to 69 ? Turn to them now and see for yourself whether or not they are of interest.

Canadian Machinery
Classified Advertising Section



An Ideal Locker for Clothes and Personal Tools

This combination Tool and Clothes Locker will be very useful to the mechanic because it provides ample space for clothes and a safe place for his tools.

Built for life-time service. Supplied in unit or group construction.

We also manufacture STEEL SHELVING FOR ALL PURPOSES. Drop a line for full details.

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184 Mance St. Montreal, P. Q.

"Barnes-made" SPRINGS

are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

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Established 1857.
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U.S.A.

Man'f'rs of "Barnes-made" Products
Springs Screw Machine Products Cold Rolled Steel and Wire

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REPORTS BY EXPERTS ON SCIENTIFIC, TECHNICAL AND INDUSTRIAL DEVELOPMENT.
SPECIAL RESEARCHES ARRANGED.
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Patent Solicitors. Head Office, Royal Bank Bldg., Toronto. Ottawa Office, 5 Elgin St. Send for our Plain Practical Pointers. Copy of National Progress, in which our patents are advertised, mailed free.

QUANTITY
PRODUCER

This tool is used in shops where parts are keyseated by thousands. It is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. Shops large and small can use the tool, and it is readily attached to a drilling machine for which it is designed. The tool keyseats in places where Keyseating Machine, Planer and Shaper can't reach. The right tool to use for keyseating interchangeable parts. There is no limit to the variety of work possible to be key-

NATIONAL MACHINE TOOL CO.
2270-2272 Spring Grove Avenue,
Cincinnati, Ohio, U.S.A.
Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria.

London, Ont.—Contracts for two new 72-foot steel motor coaches for the London & Port Stanley Railway, to be delivered in time for next season's excursion business, have been awarded by the London Railway Commission. The wheels were let to a Walkerville company, the electric motors and air brake apparatus to another Canadian company and the car bodies to the Jewett Car Co., of Newark, Ohio.

Marine

Victoria, B.C.—An order for a steel stern-wheel vessel, similar to one now under construction, has been placed with the firm of Yarrows, Limited, of this city.

The American Star Steamship Corporation has, it is understood, purchased the Fordonian and Algonquin from Canadian owners. The Fordonian was built in Glasgow in 1912 and has a gross tonnage of 2,368 tons. The Algonquin, with a gross tonnage of 1,806 tons, was built in 1888.

Ottawa, Ont.—The business of building ships in Canada for Norwegian register is developing rapidly. An Order-in-Council has been passed authorizing the construction of two steel steamers in the Vancouver yards of J. Coughlan & Sons, on an order from Norwegian interests.

Vancouver, B.C.—S. Spratt, representing the Amalgamated Dry Dock & Engineering Co., which concern holds the Order-in-Council authorizing the issuance of bonds to the extent of five and a half million dollars for establishing a plant at Vancouver, have been here in connection with the big scheme.

Third Oil Tanker Commissioned.—On the morning of Nov. 19, the Sarnolite left Collingwood on her maiden trip to Montreal. She was launched September 27, and is the third oil tanker of this class turned out by the local shipyards this year for the Imperial Oil Co. She will be used this winter on Atlantic coast service.

C.P.R. Buys Steamer.—The C.P.R. is reported to have purchased the steamship Hackness from Pyman Bros., Ltd., of Wales. The Hackness was built in 1914 and is of the shelter deck type, 4,928 gross tons and 2,954 tons net register. She was formerly owned by the London & Northern Steamship Co., owning 16 vessels, with a combined carrying capacity of 93,000 tons, all of which have been acquired by Pyman, Watson & Co., South Wales, for about $2,000,000. The Hackness has been under charter to the C.P.R. for several months, plying in the Atlantic service.

Sarnia, Ont.—The steamers Royalite and Iocolite, of the Imperial oil fleet, will leave in the near future for the Atlantic Ocean, where they will be engaged in the oil trade during the coming winter. It is expected that they will carry oil from Halifax to other points on the Atlantic, and will return to the lakes in the spring. They will take a cargo from here to Montreal on their last trip.

Sarnia, Ont.—The Reid Wrecking Co. has purchased the steamer Kongo from Cleveland parties and will transfer the steamer to Canadian register. It will be used for transportation of coal, or any other merchandize. The Kongo is a 252-foot boat and has a carrying capacity of from 900 to 1,000 tons. This boat makes the third addition to this company's fleet of steamers, the other two being the Spokane and the Wyoming.

The Canada Steamship Lines, Ltd., steamship Wahcondah is reported to have been sold recently to British buyers at about £46,000. This steamship, well known on the lakes and in Montreal, has a gross tonnage of 1,554, and she was built at Port Glasgow in 1903. The Grelford, known formerly under the names of Nancy Lee and Minterne, has been sold to Watkin, Williams & Co., Cardiff, for about £75,000, a tidy profit when one considers that Messrs. J. Gould & Co., Cardiff, bought the vessel in November last for £44,000.

Wood-Working

Hamilton, Ont.—The Parry Sound Basket & Veneer Co., which proposes t discontinue business in Parry Sound may build a factory at Stoney Creek near here.

Personal

Geo. D. MacDougall, mechanical superintendent of the Dominion Steel Corporation, Sidney, N.S., has been promoted to the position of chief engineer.

Trade Gossip

Winnipeg, Man.—The Ontario & Manitoba Cold Storage Co. proposes to buil a cold storage plant to cost $100,000.

The Canadian Ice Machine Co., Toronto, have been awarded a contract for cold storage and ice plant for the General Hospital, Sault Ste. Marie, Ont.

Kingston, Ont.—The Canadian Locomotive Co. have received an order fo twenty locomotives from the Russia Government. The price has not been divulged.

Price of Oil Advances.—Crude oil has been advanced five cents by the Imperial Oil Co., making the present price $1.88 per barrel. This is only one of many advances in the price of crude oil recently.

Toronto, Ont.—The Polsons Iron Works will build two steel freighters for Norwegian owners, in addition to two now under construction at their shipyards. Each of the new steamers will have a capacity of 4,250 tons.

Toronto Ont.—The Toronto Harbor Commission announces that numerous enquiries have been received for industrial sites in the Ashbridge's Bay factory district. Baines & Peckover, steel merchants, of Toronto, have leased a site for a warehouse to cost $20,000.

St. Catharines, Ont.—Rumors that when work on the ship canal is shut down for the winter season it will remain in that condition until after the end of the war have been revived, and are given some credence by Chief Engineer Weller, who also intimates that the original estimate of the cost, $50,000,000, would likely be exceeded because of existing conditions.

Natural Gas Supply Fails.—Complaints are being made in Sarnia and Ford, Ont., owing to the frequency which the natural gas supply has failed during the past few weeks. The fields near Tilbury are taxed to the utmost and the cold weather has made the situation worse. Many factories supplied from Tilbury are affected.

Victoria, B.C.—Steel shipbuilding on an important scale will be started in Victoria with the closing of a deal which is pending between local shipyards and a syndicate of Bergen and Christiania shipping interests, represented by John Meyer a prominent civil ngineer of Christiania, who is looking nto the local situation with a view to lacing contracts for a number of steel reighters.

Trade Commission Report.—A commission headed by J. W. Woods, of Toronto, which last summer visited Great Britain, France, Italy and Belgium, tudying ways and means of developing anadian trade, has submitted a report o the Minister of Trade and Commerce, Ottawa. There are a number of recomendations, some of which are already force, while the report itself will be ade public shortly.

Russia Has Closed Pacific Ports.—he Department of Trade and Commerce, Ottawa, has been advised of the osing of the Russian Pacific ports. icenses for importations via the port Vladivostok will be granted by the

Steel Shell Forgings or Billets of any size or weight will move any distance or about curves upon our specially constructed Gravity Carriers and Incline or Horizontal power devices. No labor required.

Canadian Mathews Gravity Carrier Co., Toronto, Ont.

MORTON MANUFACTURING CO.
PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R.R SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE AND WORKS: MUSKEGON HEIGHTS USA

We are qualified Tool, Die, Jig, Gauge and Fixture Makers.

WRITE US.

Windsor Machine & Tool Works.
WINDSOR, ONT.

Steel Castings

We are in a position to make immediate delivery of all kinds of steel castings, 100 lbs. and heavier.

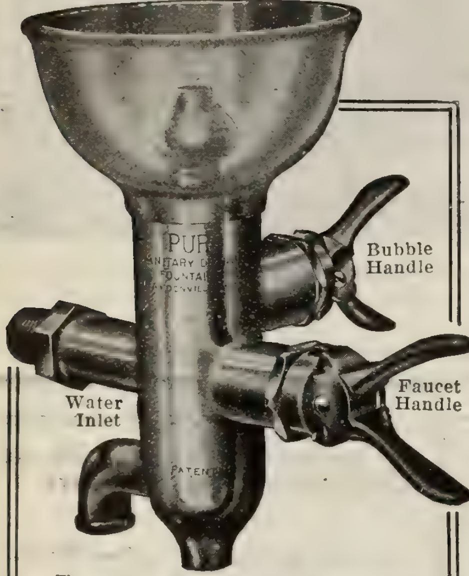
Send us your next order.

Dominion Steel Foundry Co., Ltd.
Hamilton, Ont.

I BELIEVE

In Safety First and always.
In providing for the Health of my Fellow Workmen.
In Light and Air and sanitary Working Conditions.
In clean, fresh drinking water for everybody.
In the Safety, Economy and Man-betterment.

PURO SANITARY DRINKING FOUNTAIN
(MADE IN CANADA)



The loss of a man through impure drinking water is a crime that "the front office" must bear.

An ugly statement, isn't it? But true, absolutely.

When a man comes to work in your factory he puts his health in your keeping.

Are you willing to take chances on such a trust?

Impure drinking conditions are responsible for more tragedies than any machine ever built.

Apply the "Safety First" Principles to your water supply; don't deny your men a clean, fresh drink of water.

Conserve their health and they will improve your profits; make yourself as worthy of the name of "employer."

Install the Gold Medal winner Puro in your plant, office and shop alike.

The only Sanitary Drinking Fountain that is safe, sanitary, simple, automatic in control and easily attached.

Let us tell you just what it will cost you to

"PURO-FY"

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

Russian Minister of Commerce in Petrograd. The reason of the Russian Government for taking this means of controlling the Pacific import trade is not stated, but it is possible that the purpose is to conserve transportation facilities as far as possible for shipments necessary in the conduct of the war.

U. S. Bank at Petrograd. — The National City Bank, it is learned, has obtained the necessary authority from the Russian Government to establish a branch bank in Petrograd. The branch is to be opened at once When established it will be the second foreign bank in the Russian metropolis. The branch is to be under the management of H. F. Meserve, of the National City Bank forces, who has been in Petrograd several months superintending the details preliminary to the opening of the branch bank, and in anticipation of the receipt of the necessary permission.

Canadian Gasoline Consumption.—American consular reports say that the consumption of American gasoline in Canada during 1916 will be 25 to 30 per cent. greater than during 1915, when the total used was some 60,000,000 gallons. The average price of gasoline in Canada to garages is 31.25 cents per Imperial gallon, or 26.04 cents per American gallon. Besides freight, American gasoline must pay an import duty of 2½ cents, and there is also a war tax of 7½ per cent. Bad weather and increased production of crude oil in Canada was looked upon as likely to reduce imports in the central portion of the Dominion soon. Canadian gasoline is largely the product of imported American crude.

Merger of Subsidiaries.—It is persistently reported that some plan is under consideration whereby two of the Dominion Bridge subsidiaries, Montreal Ammunition and Dominion Copper Products, will be brought together into one company before long. Presumably the merger would be of advantage from an organization standpoint, and it is also probable that in a merger a basis of capital could be arranged more in conformity with the money invested in the two enterprises than exists under the present capitalization. From time to time there has been talk of the parent concern making a distribution to its shareholders of its holdings in both concerns, but it is not likely that any plan of the sort would be put into effect just now.

Freight Rates not to be Increased.—The Board of Railway Commissioners has decided that the time is inopportune to increase the freight rates westward from Atlantic ports, and therefore has taken no action on the application by the G.T.R., G.T.P. and C.P.R. for approval of a new schedule on freight bound west from Montreal, Portland, Maine and St. John, N.B. The proposed increase were opposed by importing interests. The commissioners are of the opinion that no hardship will ensue to the railways in determining that no action should be taken in this case until the effect of the Eastern rates judgment can be clearly demonstrated. The decision of the chief commissioner, Sir Henry Drayton, was concurred in by the others.

Women Munition Workers.—The Ministry of Munitions is about to open an instructional workshop in a suburb of London for the training of workers for the production of aero-engine parts. About 200 women pupils will be employed who must have been through preliminary training in a munitions school. At the new workshop the material for instruction will be part of the actual production. After training they will be drafted into aircraft factories, and during training, which will take from four to six weeks, they will be paid a maintenance grant. In charge of the women will be a woman engineer, herself a daughter of a famous engineer. It is proposed also to train women in certain forms of inspection, this being a new development of Government work. Some 300 men will also be employed at the new workhsop.

Use these wonderfully big time savers.

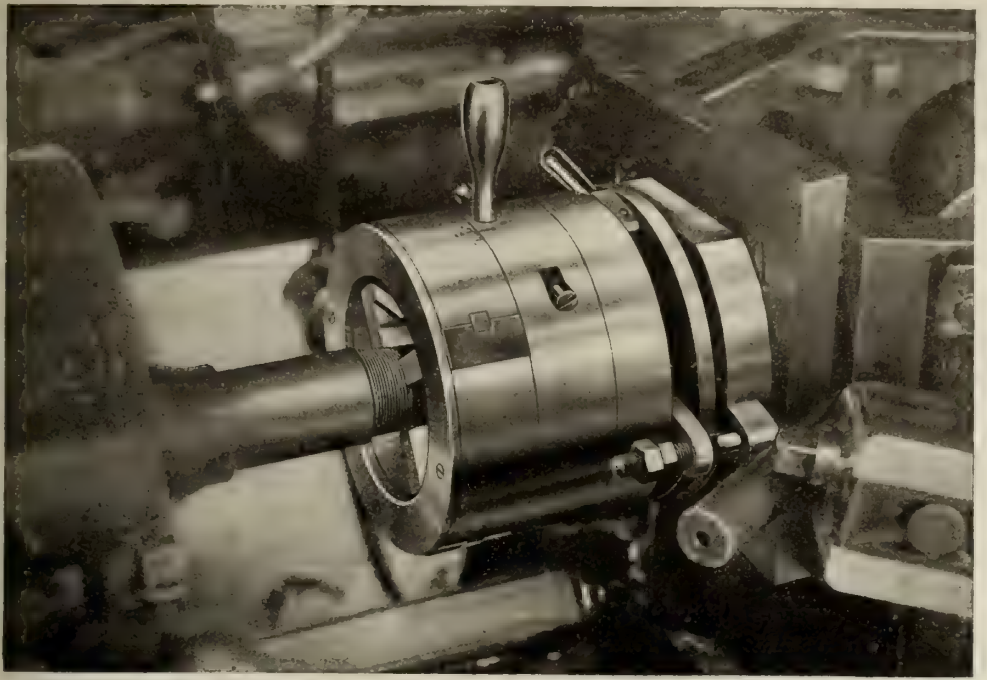
VICTOR Collapsible TAPS

Remarkably Strong and Durable

THESE TOOLS ARE EXTENSIVELY USED FOR THREADING SHELLS AND OTHER WORK WHERE CLEAN CUT, ACCURATE THREADS ARE ESSENTIAL.

VICTOR TAPS are made with few parts, have machine steel body, high-speed steel chasers and are simple, strong, durable tools. A set screw adjustment from the front end maintains accuracy, automatic trip prevents spoiled work and there is ample adjustment to allow for wear.

Victor Tool Company
Waynesboro, Pa., U.S.A.



A GEOMETRIC STYLE D-D DIE HEAD at work for the

ANDERSON ELECTRIC CAR CO.

The turret on the machine that carries this die head is excessively large and heavy. No trouble is experienced on this part, for with the Geometric style "D-D" type of die head it is not necessary for the operator to follow the thread closely. Two sets of compensating springs give perfect threads at the start, and cause the dies to follow the lead properly.

What can we do for you. We are at your service. So are our Thread-cutting Tools.

The Geometric Tool Company, New Haven, Conn., U.S.A.

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

Building Up Light-Weight Shells

ONE ONLY OF ITS NUMEROUS USES

THE SCHOOP METAL SPRAYING PROCESS

Solves one of the greatest problems heretofore confronting the structural engineer, because it produces on iron or steel a permanent coating not susceptible to corrosion.

Carbons can be coated with copper, etc.

For full information write for booklet "D".

The Metals Coating Co. of Canada, Limited

Versailles Building,
90 St. James Street,
MONTREAL,
CANADA

Preparedness—

THE watchword of the day. Start now and be ready for the big business that is coming.

SPECIAL machinery and equipment is our forte. We ask the opportunity of having our engineers solve your problems.

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Classified Advertising Section

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FOR SALE

HEAVY DROP HAMMER FOR SALE. Metallic Roofing Co., Toronto. (21)

16 H.P. IDEAL GAS ENGINE — ALSO quantity of pulleys. Chipman & Millman, Brantford, Ont. (10)

FOR SALE—TWO BAKER DRILLS NO. 310, with pumps; almost new. 1 Colburn drill No. 14, with pumps; standard. Alton Foundry Co., Alton, Ont. (22)

6½ H.P. WESTINGHOUSE AND 1/3 H.P. Toronto & Hamilton Electric Co. 60-cycle motors, in first-class order. Geo. H. Lees & Co., Hamilton. (17)

FOR IMMEDIATE SALE, TORONTO—3,000 feet seamless steel tubing, 1⅝" O.D. by 5-32" wall. No reasonable offer refused. Box 227, Canadian Machinery. (15)

FOR SALE—TWO C.M.C. TURRETS—SPEcially built for inside boring for 6" shells; almost new. These are offered for sale subject to special terms as to delivery, and at price to be arranged. Taylor-Forbes Co., Ltd., Guelph. (19)

ONE REED TURRET LATHE, 8' BED, swing, 28"; 4 2" holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 241, Canadian Machinery.

FOR SALE — HOT SAW AND MILLING machine, Ajax. New; never used. Address Canadian Warren Axe & Tool Co., St. Catharines, Ont.

FOR SALE—45 H.P. GAS PRODUCER AND engine, complete. Good condition. For particulars write Canadian Warren Axe & Tool Co., Ltd., St. Catharines, Ont.

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

For Sale Cheap

1—Box Girder Type Overhead Hand Power Crane, 48' 6" span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.

1—Brantford (Gas) Bake Oven and 4 Racks.

1—Linderman 2-Spindle Boring Machine.

1—26" Drill, London Machine Tool Company.

1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

11—New 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.

30—Used 1-13/16" High Speed Twist Drills, No. 5 Morse Taper Shank.

M. BEATTY & SONS
Limited
Welland, Ont.

BRASS RODS, 1¼, 1½, 1¾ UP TO TEN FT. Brass tubings, 2⅜ o.d., with ¼ wall; all lengths to ten feet. Louis Lovitz, 186 Markham St., Toronto. Telephone College 5711. (17)

FOR SALE—TWELVE H.P. GAS OR GASOline Engine. Goold, Shapley & Muir Ideal. In first-class condition. Cheap. Stedman Brothers, Ltd., Brantford, Ont. (21)

FOR SALE—FIVE THOUSAND FEET OF 1" black piping. Newell Mfg. Co., Prescott, Ont. (18)

BUSINESS FOR SALE — MACHINE SHOP with a good, steady run of work and always busy. A good opening for a young man to get into business. Owner has other interests. Box 224, Canadian Machinery. (12)

WE CAN GIVE EARLY DELIVERY ON difficult fixture cutting, also on gauges and jigs. We have a large shop and the finest equipment. Apply Box 235, Canadian Machinery.

FOR SALE — IMMEDIATE SHIPMENT — New Heavy Duty Shell Boring Lathe for manufacture of 6" High Explosive Shells. Write for complete specification. Wm. Hamilton Co., Ltd., Peterboro, Ont. (20)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

FOR SALE—1 40 H.P. ROBB, ARMSTRONG high-speed engine; 1 4 x 1 Marsh deep well steam pump, and 1 Barton generator, 80 lamp capacity, with switch-board. All in good order and cheap for quick sale. Richards-Wilcox Canadian Co., Ltd., London. (20)

FOR SALE.—ONE BROWN-BOGGS MARKing Machine, suitable for 6" Mark XVI. or Mark III. English Shells. Only object in selling is that other methods of marking have been adopted. Price on application. Taylor-Forbes Co., Ltd., Guelph. (14)

1 VERTICAL, SINGLE ACTION, DOUBLE cylinder hydraulic pump, 6" stroke, all ready to connect up; almost new; price $75. McGregor & McIntyre, 1139 Shaw Street, Toronto. (tf)

GAP LATHE — LONDON TOOL CO. — swings 41" in the gap, 26" over shears, 20 ft. bed, rod and screw feed, compound rest, steady rest, countershaft, 2 face plates, 4-jaw chuck, weight about 10,000 lbs. This tool has been very little used, and is in excellent condition. Bargain for quick sale. Winnipeg Machinery Exchange, Sutherland & Gladstone Sts., Winnipeg, Man. (17)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

PATENTS

NOTICE IS HEREBY GIVEN THAT SWIFT & Company has obtained for Canada Patent No. 168736, in connection with a branding tool device, and the firm of Patterson & Heward, of Toronto, Ontario, is manufacturing this article and is prepared to supply the same to any person who may wish to purchase the same at a reasonable price. Any person, firm or corporation desiring to purchase this article will kindly communicate with Patterson & Heward, Toronto, Ontario. (21)

SITUATIONS WANTED

COMPTROLLER, OFFICE MANAGER, chief accountant, credit man, executive ability. Twenty years' experience. Now holding responsible position. Desirous negotiating with large manufacturing industry offering good future prospects for equal services. Address Box 244, Canadian Machinery.

PRODUCTION MANAGER, YOUNG MAN, 10 years' experience, interested in high-grade permanent position, capable either installing or maintaining and improving efficient production system covering all manufacturing details from design to shipping platform. Box 240, Canadian Machinery. (23)

SITUATIONS VACANT

WANTED—NIGHT SUPERINTENDENT TO take charge of factory making 4.5 sockets. Apply Box 237, Canadian Machinery.

FOREMAN TOOL-MAKER WANTED — TO take charge of tool room in plant manufacturing 4.5 sockets and other munition work. Apply Box 236, Canadian Machinery.

WANTED — EXPERIENCED STEEL works draftsman for Nova Scotia. Give full particulars, including salary, permanency. Apply Box 234, Canadian Machinery. (17)

ALL-ROUND MACHINISTS WANTED FOR tool-room; highest wages paid. A. R. Ormsby Co., Limited, 48 Abell Strett, Toronto. (21)

WANTED SUPERINTENDENT FOR FACtory machining 4.5 shells. To one who has had successful experience, and can produce results a liberal proposition will be made. Apply Box 242 Canadian Machinery. (20)

MECHANICAL DRAUGHTSMAN WANTED for tracing and detailing on general machine work, also opening for man with experience on plate and structural work. Box 245 Canadian Machinery. (23)

SPLENDID OPPORTUNITY FOR YOUNG man about twenty-one, well educated and with some mechanical knowledge, who desires to learn the machinery business. Apply in first instance with full particulars as to experience, etc., to Box 243 Canadian Machinery.

WANTED — MANAGER MACHINE TOOL department. Must have full knowledge of general miscellaneous machinery, especially for munition plants. Position affords every opportunity for advancement. Please state experience and salary expected. Apply to Box 239, Canadian Machinery. (20)

WANTED — SUPERINTENDENT FOR 18-pdr. shrapnel shell factory equipped and now turning out 1,200 shells per day. must have good executive ability and able to produce results; liberal salary to right man. State fully past experience and record, and salary expected. Address Box 238, Canadian Machinery. (19)

WANTED

WANTED — BORING MILL, 30" TO 42" table; state make, condition, time used, lowest price, and send cut to Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (21)

WANTED — THREE TURRET LATHES suitable for steel sockets, also Thread Millers suitable for milling outside thread of sockets. Give price and particulars to Steel Furnishing Co., New Glasgow, N.S. (19)

The Four Best Things in Tool Steels

STELKO High-Speed Steel, the only steel containing Treoxide, the new alloy, 30% better than Tungsten or Cobalt.
Titanium Tool Steel for all-round tool work, such as Punches, Dies, Shears, Taps, Reamers, etc., the last word in carbon tool steel.
Chrome Manganese Steel for hot work, the best adopted for mandrels and dies for hot shell punching, being air-hardening, is the easiest to treat, furnished annealed.
Silver Steel Drill Rod and Nonshrinkable tool steel for delicate tools, this steel does not lose its shape in hardening and tempering.
Write for prices, we can save you money while furnishing you with superior tool steels, we specialize in this one branch.

THE NEW METAL TOOL STEEL COMPANY
PORTLAND, ME. **General Office and Works, SEBAGO LAKE, ME.**

FOR SALE

One 16″ Engine Lathe 8′ bed hollow spindle, full set of gears, raise and fall tool rest with chuck and countershaft. $250.00.

One 12″ Rockford Engine Lathe hollow spindle compound rest, cross feed, full set of gears, countershaft. Price, $150.00.

One Armstrong Tech School Worcester Twist Drill Grinder, brand new, was never used. Price, $40.00. Apply

Box 246
Canadian Machinery

FOR SALE

1—No. 1 Acme Chucking Turret Lathe, with power feed, back-geared, swings 16″, hole in spindle 1 1-16″; excellent condition.

1—No. 3 Foster Geared Friction Head Turret Lathe with automatic chuck and wire feed, hole in spindle 1 9-16″; practically new.

1—Copper and Nickel Plating Plant with piping, 2 rheostats, one 280 amp. dynamo and countershafts.

1—Only 5-C Modern Die Head.

This equipment can be inspected at

THE GRAY MANUFACTURING & MACHINE COMPANY, LIMITED
686 St. Clarens Avenue - Toronto
(23)

Long Distance is Calling!

Telegrams and Long Distance Telephone Messages are not uncommon among the replies to ads in our Classified Advertising Section.

FAIRBANKS-MORSE
New and Used Machinery

In Stock at Toronto

1—⅞″ 4-spindle National Acme Automatic; used.
2—No. 3 1″ Foster Hand Screw Machines.
4—No. 4 1½″ Smurr & Kamen Turret Lathes.
1—10″ x 5′ Seneca Falls Lathe; used.
2—18″ x 8′ Springfield Lathes; new.
5—20″ x 9′, 19 16″ x 7′, 3 16″ x 9′ Fairbanks-Morse Lathes; new.
2—No. 1 Racine Hacksaws; new.
1—No. 304A Oster Pipe Machine; new.
1—20″ x 8′ Hendey Lathe; used.
1—Gisholt 16″ Special Lathe, type C, 6½ bore.
1—Walcott 20″ x 8′ Engine Lathe.
5—Barnes 18″ x 8′ Engine Lathes; new.
7—Potter & Johnson No. 6A Automatics; used.

In Stock at Montreal

3—Gisholt 16″ Turret Lathes; new.
2—Gisholt 25″ Turret Lathes; new.
Waving and Grooving Machines, 6″ shells; new.
1—Hendey 16″ Lathe; used.
2—American 16″ x 6′ Tool Room Lathes; new.
1—Rivett Precision Lathe; used.
1—Brown & Sharpe No. 1½ Universal Mill; used. used.
1—Valley City No. 1½ Universal Mill; used.
2—Ford-Smith 20″ Wet Tool Grinders; new.
1—Wilmarth & Morman Drill Grinder; new.
3—20″ Back-geared Drills; new.
1—25″ Sliding Head Drill; new.
1—Banfield Plug Miller, 6″ shells; new.

This is only a partial list of our stock of Machine Tools.

CFM

The Canadian Fairbanks-Morse Co., Limited
26-28 Front St., Toronto
84-98 St. Antoine St., Montreal

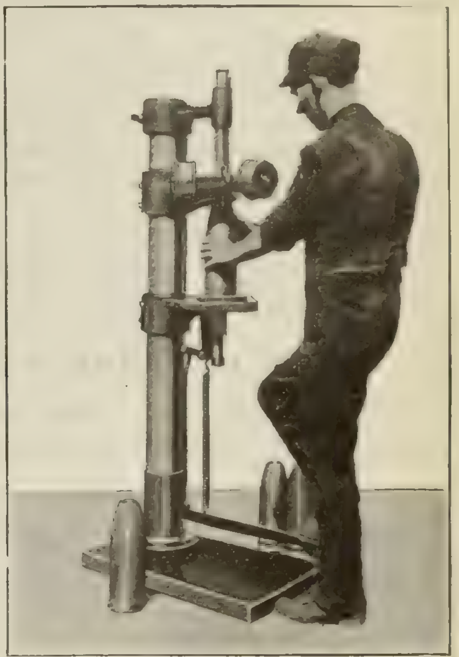
CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

MONARCH
Milling Machine
(Made in Canada)

For Milling the three slots in the nose of

Mark 7 Shells

Adjustable to take any size shell from 4.5 to 9.2 inclusive.



ONE MOVEMENT of foot lever clamps the shell and feeds the three cutters in to the right depth.

CAPACITY ON 4.5—6 to 8 shells per minute. Actual cutting time is simply — "zip" and the three slots are finished.

THE MACHINE is complete with High Speed Cutters and drive pulleys which should run at about 550 revolutions per minute. It can be driven by three 2-inch belts, either from overhead counter or line shaft. The clamping device does not interfere with copper band, and altogether it will be found to be a very satisfactory tool—CONVENIENT and ACCURATE.

For further particulars address

H. W. PETRIE, LTD.
FRONT STREET WEST, TORONTO
Sole Selling Agents for Canada

AT PUBLIC AUCTION

ESTIMATED VALUE, $300,000

The ENTIRE STOCK of MACHINE TOOLS of the

CO-OPERATIVE USED MACHINERY COMPANY,

located at their Warehouse, 408 Claremont Avenue, Jersey City, N.J.

THIS IMMENSE STOCK, numbering about 635 MACHINE TOOLS, consisting of:—

40 Lodge & Shipley, quick change gear LATHES from 14″ to 30″ swing, all lengths of bed.

About 75 LATHES, 12″ to 96″, all STANDARD, PROMINENT MAKES, such as Reed, Prentice, Putnam, Niles, Pond, LeBlond, Davis, Harrington, New Haven, Fitchburg, Etc., Etc.

Several BORING MILLS 28″ to 10′ swing.

21 PLANERS 24″ to 60″ wide.

54 DRILL PRESSES, Radial Drills and Multiple Drills.

48 MILLING MACHINES, all makes and sizes.

42 TURRET LATHES and SCREW MACHINES from 12″ to 30″ swing.

A full line of GENERAL MACHINE TOOLS, including:—
SHAPERS; AUTOMATIC SCREW MACHINES; POWER HAMMERS; BOARD DROP HAMMERS; STEAM HAMMERS; PIPE MACHINES 3″ to 12″; COLD SAWS from 4″ to 8″ capacity; 10 x 72 NORTON PLAIN GRINDER and others; HORIZONTAL BORING MACHINES; AUTOMATIC GEAR CUTTERS up to 112″; SLAB MILLERS; 12 POWER PRESSES direct acting and geared up to 15,000 pounds weight; PUNCHES and SHEARS; ROTARY PLANERS; AUTOMATIC BOLT HEADERS, Etc., Etc., Etc.

Each and every one of these machines will be sold separate to the highest bidder.

THE AUCTIONEER HAS MADE ARRANGEMENTS TO LOAD AND SHIP ALL PURCHASES, ABSOLUTELY FREE OF COST TO THE PURCHASER.

This, the LARGEST STOCK OF HIGH GRADE MACHINE TOOLS in the country to-day, the majority being rebuilt machines, will be offered for sale on TUESDAY, DECEMBER 5th, 1916, at No. 408 Claremont Avenue, Jersey City, N.J., by

HIRAM H. PARKE, Auctioneer - 924-926 Broadway, NEW YORK CITY

Descriptive Catalogue will be furnished by Auctioneer

Machine Tools For Sale In Stock for Immediate Delivery

LATHES

4—13 x 6 Worester (new).
1 13 6 Barnes.
1 16 x 6 Canedy Otto (new).
2 16 x 6 Style A Hamilton (new).

TURRET LATHES

2—21 inch Style H Gisholt. Taper attachment.

GEAR CUTTER

1 No. 3 Brown & Sharpe. automatic spur gear cutter.

BENCH MILLER

1 Sloan & Chace (new).

BENCH LATHES

A variety of new and used bench lathes with collets.

DISC GRINDERS

2 - No. 6 x 20″ Ring Diamond Disc Grinder with compound table micrometer adjustment.
2 No. 6 x 14″ Ring Diamond Grinder with table, same as above.

GRINDERS

2 No. 1 Cutter and Reamer Grinders (new).
2 7 x 32 Norton Plain Grinders.
2 10 x 24 Norton Plain Grinders.
2 16 x 36 Bridgeport Plain Grinders.

SQUARING SHEAR

1 36″ Stoll. ¼″ capacity (new).

SHAPER

1 Double Head Traveling Head Bement Miles.

BORING MILL

1 —84″ Cinncinati. like new.

SCREW MACHINES

2—No. 2 B & O (new).
1 1 inch Pierce (new).
2—1½″ B. & O (new).
1 No. 4 Foster.

STRONG & HERY CO.
225 State St. Rochester, N.Y.

For Sale (Subject to Prior Sale)

5-TON LOCOMOTIVE CRANE

Manufactured by Balmforth Bros., of Rodley, England

Specifications:

One wheel 4′-8½″ gauge locomotive crane with 38′ boom capable of lifting and swinging safely when properly ballasted. and running on good substantial track the following loads with booms dropped to different radii:—

30,000	**pounds**	**at**	**10**	**feet**	**radius**	**(Minimum radius)**
26,250	"	"	**12**	"	"	
20,000	"	"	**15**	"	"	
14,000	"	"	**20**	"	"	
11,000	"	"	**25**	"	"	
9,000	"	"	**30**	"	"	
7,000	"	"	**35**	"	"	
6,000	"	"	**40**	"	"	**(Maximum radius)**

Crane is fitted with rail clamps to give higher capacity, if wanted. The crane has a draw bar pull of 7,600 pounds. Ballast for lower truck 5 tons. Crane weighs 35 tons, 10 cwt.

Steel Shafting ranging from 6 15-16 to 9 15-16 by 28 ft. 250 tons steel rails. 20 lb. 10 Trucks, 36″ gauge.

1 100 H.P. Marine Boiler, with valves complete. As good as new. Price $550.00.

1 Concrete Mixer on wheels, with engine attached Price **$450.00.** Maker. Gould, Shapley & Muir, Brantford, Ont.

34 Lengths New Pipe, 20″ Bell and Spigot Class 2

RICHARD JAMES, 704 POWER BUILDING
MONTREAL - - QUE.

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Then insert a condensed ad. here and find it.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto, Canada

TOOLS AVAILABLE

- 2—Lucas Horizontal Boring, Drilling and Milling Machines.
- 65—No. 2 Plain Head Hand Screw Machines, 1 1-16" capacity, New.
- 1—72" Pond Double Swivel Head Vertical Boring Mill.
- 1—16 x 8 LeBlond Quick-Change Lathe.
- 1—22" Barnes Upright Drill, back-geared and power feed.
- 1—14" Sellers Slotter.
- 1—48" Gould & Eberhardt Automatic Gear Cutter.
- 1—20" 4-spindle Barnes Multiple Drill.
- 1—No. 1 Kearney & Trecker Plain Milling Machine.
- 2—No. 2 Kearney & Trecker Plain Milling Machines.
- 1—16 x 6 LeBlond Quick-Change Lathe with taper attachment.
- 1—16 x 6 LeBlond Quick-Change Lathe.
- 1—14 x 6 American Lathe.
- 1—Brown & Sharpe Vertical Chucking Machine.
- 1—No. 2 Bardons & Oliver Turret Lathe.
- 1—Wilmarth & Morman Drill Grinder.
- 1—No. 2 Lapointe Double Broaching Machine.
- 1—42 x 24 LeBlond Heavy Duty Lathe.
- 2—4¼" Gridley Automatic Screw Machines.
- 2—Jones & Lamson double spindle machines.
- 1—14 x 6 Gleason Lathe.

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Biggs Watterson Co.
CLEVELAND - OHIO
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If you want second-hand equipment of any sort, advertise for it in our Classified Advertising Section—you'll get results.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Avenue
TORONTO - ONTARIO

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

Machine Tools
Second-Hand

LATHES.

13" x 6' Willard Lathe, double back-geared head, compound rest and taper attachment.
14" x 6' Reed Lathe, with elevating rest.
14" x 6' Hamilton Lathe, with compound rest.
14" x 8' Monarch Lathe, with compound rest.
14" x 8' Sebastian Lathe, with compound rest.
16" x 6' Pratt & Whitney Lathe, elevating rest.
16" x 6' Porter Lathe, with compound rest.
16" x 8' Reed Lathe, with elevating rest, T.A.
16" x 8' Rahn-Mayer-Carpenter Lathe, with C.R.
16" x 8' Bradford Lathe, with C.R., turret on bed and turret tool-post.
18" x 8' Davis Lathe, with compound rest.
18" x 10' Rahn-Mayer-Carpenter Lathe, with C.R.
18" x 10' Prentice Lathe, with compound rest. rest.
20" x 12' New Haven Lathe, with compound rest.
26" x 12' Star Lathe, with compound rest.

SHAPERS.

16" Pratt & Whitney Crank Shaper.
16" Ohio Machine Tool Co.'s Crank Shaper.
20" Morton Draw-cut Shaper.

PLANERS.

16 x 16" x 4' Pease Planer.
30 x 30" x 6' Pond Planer.

TURRET MACHINERY.

14" Warner & Swasey Back-geared Universal Turret Lathe.
15" Bardons & Oliver Universal Turret Lathe, friction geared head.
18" Foster Universal Turret Lathe, friction geared head.
2—½" capacity Pearson Geared Head Screw Machine.
2 x 26" Pratt & Whitney Turntable Turret Lathe.
3 -4¼" Cleveland Automatic Screw Machines.
7 x 14" Potter & Johnston Turret Lathe.
21 x 6" Lodge & Davis Geared Head Chucking Lathe.

DRILLS.

22" Barnes Back-geared Stationary Head Drill.
8 spindle Western Mach. Tool Co.'s Multiple Drill, with 18" circular head.
8 spindle Bausch Mach. Tool Co.'s Multiple Drill, 20" head.

MISCELLANEOUS.

12 x 42" Landis Plain Manufacturing Grinder.
24 x 48" Springfield Auto. Planer Type Surface Grinder.
24 x 2" Leland Water Tool Grinder.
No. 3 Burr Cold Saw.
No. 12 Higley Cold Saw.
2" Landis Pipe Machine
4" Hurlburt & Rogers Cutting-off Machine.
No. 3 Single spindle Garvin Profiler.
No. 6 Mitts & Merrill Keyseater.
10 ft 16 gauge capacity Ohl Power Squaring Shear.

The W. M. PATTISON SUPPLY COMPANY
MACHINERY DEPARTMENT
Cleveland Office: 777 Rockwell Ave.
Detroit Branch: 1534 Dime Bank Building

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

MACHINE TOOLS

LATHES.

1—28 x 15 Putman Standard Engine Lathe, C.R., S.S., P.F.
1—22 x 14 Putman Standard Engine Lathe, C.R., S.S., P.F
1 18 x 36 x 16' LeBlond Extension Bed Engine Lathe.
3—(New) 7 x 60 Fitchburg Lo-Swing Lathes, with 2 tool taper att.
1 (New) 18 x 8 Reed-Prentiss D.B.G. Engine Lathe.
1—18 x 8 Jones & Lamson Engine Lathe.
2 16 x 6 Barnes Engine Lathes.
1—16 x 8 Cincinnati Engine Lathe.
1 16 x 6 Walcott Engine Lathe.
1—16 x 6 Reed Engine Lathe.
1—16 x 8 Porter Engine Lathe.
1—14 x 6 Lodge & Shipley Engine Lathe.

MILLING MACHINES.

1—(New) No. 25 Ohio Milling Machine.
1—No. 3 Chicago Hand Miller.
1—No. 12 P. & W. L.T. Miller.
4—No. 13 P. & W. L.T. Millers.
1—Warner & Swasey Profiler.

GRINDERS.

1 No. 2 Bath Universal Grinder.
2—12 x 36 Landis Plain Geared Head Grinders.
1—No. 5 Springfield Oscillating Surface Grinder.
1—No. 2 Gardner Disc Grinder.
1—No. 34 Gardner Double Disc Grinder.

PLANERS.

1 Pond 62" (widened pattern type), 9' bed.
1—36 x 36 x 10 Industrial Planer, one rail head and one side head.

TURRET LATHES.

1—No. 6 Foster Friction Geared Hand Screw Machine.
1 3 x 36 Jones & Lamson, with bar and chucking attachment.
1—2 x 24 Jones & Lamson, with bar and chucking attachment.
2—(New) No. 4 B. & O. Chucking Turret Lathes.
1 (New) No. 4½ B. & O. Hand Screw Machine, wire feed.
1 No. 4 Warner & Swasey Friction Geared Hand Screw Machine.
1—14" B. & O. Chucking Machine.
1 No. 5 Pearson Hand Screw Machine.
1 1 x 8 Pierce Hand Screw Machine (new).
1 2" Cleveland Automatic Screw Machine (Model A).
2 2" Cleveland Jigger Feed Screw Machines.

AIR COMPRESSORS.

Steam.

1 12 x 12 x 12¼ x 12 Ingersoll-Rand, Class M.F. 1.
1—16 x 18 x 12 D.A. Union, S.L., 2 S., Air Compressor.
2 8 x 8" Westinghouse.

Belt.

2—10 x 10 Bury Hor. Belt Driven (182 C.F.)
1—10 x 10 Curtis Vertical D.C., with base (160 C.F.).
1—8 x 8 Ingersoll-Sergeant Hor. (100 C.F.).
1 8 x 8 Chicago Pneumatic Hor. (100 C.F.).

DRILLS AND SLOTTERS.

1 (New) No. 61B Harrington Multiple Spindle Drill Press, 19 spindles.
1 (New) No. 51A Harrington Multiple Spindle Drill Press, 10 spindles.
1 (New) No. 51B Harrington Multiple Spindle Drill Press, 8 spindles.
4 (New) No. 61B Harrington Multiple Spindle Drill Presses, 16 to 33 spindles.
2 (New) 26" Buffalo Drills, W. & L.F.
1 17 spindle Moline.
1 7 spindle Barnes.
1 24" Niles Geared Slotter.

GEAR CUTTERS.

2—11" Gleason Gear Generators.
1 12" Becker-Brainard Automatic Gear Cutter.
1 37" Newark Spur Gear Cutter.

PRESSES AND HAMMERS.

1 No. 64 Toledo S.S., B.G.
1 No. 95 Consolidated Press.
2—Briscoe S.S., 7" stroke.
2—1500 lb. B. & S. Roll Board Hammers.
1 800 lb. B. & S. Roll Board Hammer.
1—1200 lb. Toledo Roll Board Hammer.

We carry a large line of Boilers, Pumps, Engines, Generators, etc.

Riverside Machinery Depot
Detroit, Mich.

FOR SALE

GRINDERS.

12 x 44 in. Modern Plain Grinder.
12 x 24 in. Modern Plain Grinder -Self Contained.
10 x 36 in. Landis Plain Grinder.
18 in. 30 x 96 in. Morton Gap Grinder.
No. 3 Landis Universal Grinder.
No. 2 Oesterlein Universal and Cutter Grinder.
No. 6-x Diamond Disc Grinder 14-in. Ring Wheel Chuck, one end.
No. 120 Gardner Disc Grinder, used four months.
No. 14 Besley Disc Grinder, with 2 26-in. discs, two ring wheel chucks. Almost new.

GEAR CUTTING MACHINES.

15 in. Gleason Bevel Gear Generator.
20 in. Grand Lees Gear Hobber; good as new.
24 in. Gleason Bevel.
64 x 16 in. Gould & Eberhardt Gear Cutter.

BORING AND TURNING MACHINES.

1—72 in. Niles-Bement-Pond Heavy Type Vertical Boring and Turning Mills, Motor-Driven, 220 Volts D.C.
84 in. Cincinnati Boring and Turning Mill, Motor-Driven.
84 in. Sellers Vertical Boring and Turning Mill.
36 in. Niles Vertical Boring and Turning Mill, 2 swivel heads.
Betts Horizontal Boring Machine, 3 ft. Bar, 48 in. Swing.
Special Horizontal Boring and Facing Mill, 20 in. Swing, 42 in. between heads.
Beaman & Smith 2-spindle Boring and Facing Mill (Horizontal).
No. 2 Barrett Cylinder Borer with 5-in. spindle.
34 in. Colburn Vertical Turret Boring Mill, 4-jaw chuck, thread cutting attachment.

MILLING MACHINES.

No. 0 Pratt & Whitney Plain Milling Machine.
No. 2 Kempsmith Plain Miller.
No. 3 Becker-Brainard Universal Miller, Cone Driven, Gear Feed.
No. 2 Cincinnati Plain Miller, single pulley drive.
No. 3 Cincinnati Universal Miller with vertical and spiral attachment.
No. 9 Bement Vertical Milling Machine; fine condition.

MOTORS.

Generator, 36 Amp. 15 K.W., 1,800 volts r.p.m.
15 H.P. General Electric Motor, 220 volts, A.C.
20 H.P. Westinghouse Motor, 220 volts, A.C., 3-phase, 60-cycle, 1,200 r.p.m.
25 H.P. General Electric Motor, 220 volts, A.C., 3-phase, 60 cycle, 1,200 r.p.m.
100 H.P. Form K Motor, 550 volts, 3-phase, 25-cycle, 750 r.p.m., with base and pulley; used 60 days.

PLANERS.

24 x 24 in. x 6 ft. Pease Planer, one head or cross-rail.
30 x 30 in. x 8 ft. Lodge & Davis Planer, one head on cross rail.
36 x 36 in. x 14 ft. Niles Planer, one head.
56 x 36 in. x 8 ft. Putnam Planer, two heads on crossed rail.
72 x 57 in. x 17 ft. Gleason Planer, two heads on cross rail.

SCREW MACHINES.

2—6-A Potter & Johnson Automatic Chucking Lathes.
2—No. 1 Foster Hand Screw Machines, wire feed and auto chuck; fine condition.
No. 2 Pierce.
No. 2 Bardons & Oliver Screw Machine.
2-in. Cleveland Automatic.
No. 3 Stecher Screw Machine.
No. 3 National Acme Automatic Screw Machine, 4 spindles, ⅞-in. capacity.
4—No. 54 National Acme 4-Spindle Auto Screw Machines.
No. 5 Warner & Swasey Screw Machine, 2¼-in. capacity.
8—6A Potter & Johnson Automatic Chucking Lathes.
No. 53 National Acme Auto Screw Machine, single pulley drive, one inch capacity, fully equipped; almost new.
No. 515 National Acme Auto Screw Machine, 9-16 in. capacity.

TURRET LATHES.

3 x 36 in. Jones & Lamson Turret Lathes, patent head type, with chucking equipment; fine condition.
2 in.—2 x 24 in. Jones & Lamson Flat Turret Lathes, single pulley drive, set over heads, bar and chucking equipment.
24 in. Gisholt Turret Lathes.
24 in. Steinle Turret Lathe, single pulley drive, 4-in. hole through spindle, chucking and bar equipment.
8—21 in. Gisholt Turret Lathes, belt driven.
Lodge & Davis Turret Lathe, power feed to turret, 18 in. swing, 2 in. hollow spindle.
10—13 in. Gisholt Turret Lathes.
14 in. Davis Turret Lathe, cone drive.
15—Reed Prentice Semi-Automatic Manufacturing Lathes, oil pans, pumps and regular equipment.

ENGINE LATHES.

5—Cataract Precision Lathes.
11 in. x 5 ft. Star Lathe, foot and belt drive.
18 in. x 6 ft. Bradford, arranged for motor drive.
18 in. x 6 ft. Bradford, belt drive.
20 in. x 10 ft. Reed Lathe, 1½ hollow spindle.
24 in. x 14 ft. Bradford, taper attachment; fine condition.
26 x 48 in. McCabe Double Spindle, 14 and 18 ft. Beds.
26 in. x 10 ft. Bradford.
42 in. x 10 ft. 6 in. Lodge & Shipley, iron screw cutting.
48 x 27 in. Betts, triple geared.
54 in. x 12 ft. New York, triple geared.

DRILLING MACHINES.

1—30 in. Bickford, B.G. and P.F.
5—Colburn D-3.
1—4 ft. Bickford Radial Speed Box Drive.
7—D-4 Colburn Heavy Duty (new).
3 ft. Dreses Radial Drill.
16—Allen 4-spindle High Duty Ball-Bearing Drilling Machine; guaranteed good as new.
25 in. Kern Sliding Head, tapping attachment.
50 in. Swing Blaisdel, 36 in. table, upright drill.
5—Baker, No. 300, Heavy Duty.
2—Moline 4-Spindle Drills, ¼ in. capacity.
1—Bausch 8-Spindle Adjustable, 11-16 in. capacity, 21 in. circle, table 24 in. square.
1—6-Spindle Foot-Burt, with 18 x 30 in. table.
1—10-Spindle Pratt & Whitney, 3-16 in. capacity, 4 in. circle.
1 10-Spindle Pratt & Whitney, 12 in. table, ½ in. capacity.
1—Gardam 12-Spindle, ½ in. capacity.

SHAPERS.

14 in. Hendey Geared Friction.
16 in. Stockbridge, back-geared.
24 in. Kelley; almost new.

W. F. DAVIS MACHINE TOOL COMPANY

CHICAGO, 32 N. Clinton St. CINCINNATI, 3 Greenwood Bldg. NEW YORK, Singer Bldg.

High-Grade

MACHINE TOOLS

The list below is a small portion of our present stock. Write for complete lists.

2—18" x 10' Rahn Mayer H.S., C.R.
18" x 10' Cincinnati H.S., C.R.
9—17" x 8' New National Quick Change.
14" x 10' Prentice Taper Attachment.
13" x 7½' Carroll Jamieson, New.
2" x 24" Jones & Lamson.
1" x 8" New Pierce Screw Machine.
¼" x 5' Bridgeport Turrett.
¼" Hartford Auto Screw Mch., with slotting attachment.
36" Baker Bros. tapping and boring drill.
36" Currie & Snyder sliding head drill.
No. 2 M. U. Garvin New Miller.
No. 210 Heald Wet Ring Grinder.
48" x 48" x 11' 6" Sellers Planer, 4 heads.
42" x 42" x 10' Fitchburg Planer, 2 heads.
22" x 22" x 6' Powell Planer.
18" x 18" x 5' Pond Planer.
12—26" x 48" x 14' new style McCabe double spindle heavy pattern new lathes.
32" x 16' New Rahn Larmon D.B.G.
32" x 12' New Rahn Larmon D.B.G.
24" x 10' New Carroll Jamieson.
20" x 8' Prentice H.S., C.R., T.A.
3—19" x 8' New Sidney D.B.G. swing 21".
3—19" x 8' New Sidney D.B.G. Quick Change, swing 21".
3—17" x 8' New Sidney D.B.G. Quick Change, swing 19".
20" Cincinnati B.G. Shaper.
16" New Steptoe Shaper.

FRANK TOOMEY, INC.

127-131 North Third St., PHILADELPHIA, PA., U.S.A.

Assuming that you want a grinder that is better than the average—

A grinder with massive table, micrometer adjustments, very long knee and gibs, and extra heavy head- and tailstock—it will pay you to investigate the

Standard No. 6
Universal Grinding Machine

In addition, you'll find that the headstock is fitted with large bearing for chuck spindle and with special bronze bearings of navy specifications, spindle is tapped and tapered, bored to take wheel arbors and bearings are 1 in. in dia. and 2¾ in. long, and an exceptionally simple and sturdy countershaft with self-lubricating bearings.

Start the investigation by sending for the full details—to-day.

Simmons Machine Co., Inc.

1001 Singer Bldg., New York City
981 Broadway. Albany, N.Y.

The world your field

IMMEDIATE DELIVERY

BORING MILLS.

40" Rogers & Hemphill, two swivel heads.
42" Gisholt, one turret and one swivel head.
52" Niles, car wheel boring mill.
62" Bement, horizontal.

DRILLING MACHINES

22" Aurora, s.h, b.g., p.f.
26" W. F. & John Barnes, s.h. b.g., p.f.
32" Hamilton, s.b., b.g., p.f.
34" Barnes, s.h., b.g., p.f.
3½' Industrial Radial.
No. 10 Natco 8 spindles.
No. M-1 Natch 8-spindles.
12-spindle Multiple, P. & W.
No. 30 C. Baush, 12-spindle.
Allan, 2 spindles (new).
Allan, 4 spindles (new).

GEAR CUTTERS

30" x 9" G. & E. Auto. for spur and bevel.
24" x 7" G. & E. for spur.
36" Walcott, for spur.

GRINDERS

14" x 20" B. & S. Universal.
Gisholt Tool Grinder.
No 5 Diamond Water Tool.
No. 3 Modern Universal (new).

LATHES

12" x 5' Davis, c.r.
14" x 6' LeBlond, c.r., taper.
14" x 6' Fairbanks ,c.r., taper.
16" x 6' Prentice, c.r.
16" x 6' Sebastian, p.r.
16" x 8' L. & S. pat. head, c.r., q.c.g.
16" x 10' Greaves & Klusman, c.r.
17" x 10' Blaisdell, c.r.
18" x 6' Bradford, c.r., taper.
18" x 8' L. & S., pat. head, c.r., taper.
18" x 10' Bradford, c.r., taper.
18" x 12' Draper, c.r.
18" x 12' Barker, c.r.
20" x 10' Flather, c.r.
20" x 14' Blaisdell, c.r.
21" x 12' New Haven, c.r.
21" x 12' Bradford, c.r., taper.
24" x 12' New Haven, c.r.
24" x 16' Schumacher & Boye, c.r.
24" x 13' New Haven, c.r.
30" x 27' Reed, c.r., taper.
32" x 16' Blaisdell, c.r.
36" x 22' Lodge & Shipley, geared head, q.c.g., motor drive with motor.
68" x 20' Fifield, s.r., t.b.g.

MILLING MACHINES

No. 3 B. & S. plain with vertical attachment.
No. 2 Cincinnati, plain.
No. 4 LeBlond, plain.
No. 13 P. & W., Lincoln
No. 3 Cincinnati Universal.
2 No. 4 B Becker Vertical.
No. 5 Becker Vertical.

PLANERS

24" x 24" x 6' Cincinnati, one head.
30" x 30" x 12' Cincinnati, two heads.
36" x 36" x 12' Powell, single head, arranged for two.
36" x 36" x 16' Sellers, one head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.
42" x 36" x 12' Cincinnati, two heads.

PRESSES

No. 3 Walsh O.B. Inc.
No. 6-N American Can, s.s., geared.
No. 174 Consolidated, double crank.
No. 25 Toledo, O.B. Inc. Cam drawing.

SCREW MACHINES

No. 1 Chicago automatic.
1—3/16" Hartford automatic.
2" Cleveland automatic.
2¾" Cleveland automatic.
1" B. & S., plain.
16" P. & W., plain.
3¾" Cleveland automatic.

TURRET LATHES

16" Lodge & Shipley.
25" Niles.
No. 2 Warner & Swasey Hollow Hexagon.
2" x 24" Jones & Lamson.
24" Gisholt, spindle capacity 6¼".
3" x 36" Jones & Lamson, chucking outfit.

MISCELLANEOUS

Bolt Cutter, 1½" Acme.
Centering Machine, No. 1 Whitton.
No. 3 Burr Cold Saw.
No. 2 National Oil Separator.
No. 00 Baker Keyseater.
2 - 100 lb. Bradley Helve Hammers.
No. 6 Bicknell & Keeler Pipe Machine.
No. 8 Bicknell & Keeler Pipe Machine.
No. 18 Bicknell & Keeler Pipe Machine.
No. 120 Niagara Foot Shear.
36" Niagara Foot Shear.

Write for our Stock List.

The H. A. Stocker Machinery Company,
566-572 W. Randolph St.,
CHICAGO, ILL.

All in good Condition

IMMEDIATE DELIVERY

SECOND-HAND MACHINERY

1—Class B1—Rand Duplex steam-driven air compressor, duplex steam and air cylinders, automatic oil feed and self-regulating governor. Heavy flywheel, 60" dia.

1—8 x 12 Centre Crank Engine with Pickering governor, forged crank. Pulley flywheel, 34 x 8¼.

1—6½ x 8 Side Crank Engine, with Pickering governor. Pulley flywheel 28 x 6.

1—30" Boston Cupola and forge blower.

1—Rand air hoist, 4" x 4 ft. left.

1—D.C. S.D. Hoisting Engine: 7 x 12 cylinders, 36 x 36 drum.

1—S.D. 8 x 11 double purchase mast wrench.

1—H.T. Boiler 32" x 9' with 46 2" tubes 8' long. Government pressure allowed 90 lbs.

1—H.T. Boiler 30" x 9' with 20 3" tubes 8' 0". Government pressure allowed 80 lbs.

NEW MACHINERY

A number of Vertical Boilers 30", 33", 37" and 40" diameter.

A number of Stratton Steam Separators 1", 1½", 2", 3", 3½", 4" and 5".

1 Steel Ore Bucket 37" x 37" ring and pin fastening.

1 Steel Ore Bucket 8 cu. ft. taper sides, pin fastening.

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2" Cleveland.

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2½" Bar Niles Horizontal.
No. 2 Baker Cylinder Borers.

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4' Baush Radial.
24" Cincinnati Upright.
Quint Turret Head.

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10 x 50 Norton.
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No. 6 Modern, arranged for internal grinding.
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No. 1 Cincinnati Cutter and Tool.
No. 12 Gardner Disc Duplex.
No. 2 Leland & Faulconer Wet Tool Polishing and Buffing Stand.

GEAR CUTTERS.
No. 326 Brown & Sharpe.
36" Flather.

KEYSEATERS.
No. 0 Baker.
No. 2 Baker.
No 3 Mitts & Merrill.
18" x 1½" Morton.

LATHES.
14 x 6 Fay & Scott.
16" x 6' Blaisdell, R. & F. Rest.
18 x 8 Hamilton.
18 x 8 Davis, three-step cone double back gear.
18 x 10 Bradford.
18 x 12 Lodge & Shipley.
22 x 14 Davenport.
26 x 12 Bridgeford three-step cone double back geared.
36 x 16' Springfield.
38 x 16' Fifield.
Tindell-Morris Crank Shaft.

MILLING MACHINES.
No. 1 Kempsmith, single pulley drive, plain
No. 7 Becker Lincoln Type.
No. 3 Brown & Sharpe Plain.

PLANERS.
48 x 48 x 12 Hewes & Phillips, two heads.
30 x 30 x 10 American, 1 head.
30 x 30 x 10 Gray, one head.

SHAPERS.
14" Steptoe.
20" Gould & Eberhardt.
16" Steptoe.

TURRET LATHES.
24" Gisholt, 6¼" hole.
24" Gisholt, 5¼" hole.
21" Gisholt, 2⅝" hole.
22" Libbey.
18" Libbey.

SCREW MACHINES.
4½ x 26" Bardons & Oliver motor drive.
1½" Bardons & Oliver.
1" Foster Kimball.
⅞" Garvin.
1" Warner & Swasey.

TAPPING MACHINES.
7" Baker.
No. 2 Garvin.

MISCELLANEOUS
Rockford Fly Wheel Balance Machine.
72" Niagara Folder.

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COMPLETE UNITS FOR EITHER SHRAPNEL, 4.5 INCH AND 5 INCH HIGH EXPLOSIVE SHELLS.

Will sell as a whole, or to suit purchaser.

Some special machinery, but all bought originally with a view of subsequent use in general work.

In splendid condition. None used over 12 months, some not at all. Demonstration of operations, if desired.

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3X Reed-Prentice Semi-Automatic Lathes.
2X Reed-Prentice Semi-Automatic Lathes.
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6A Model 2 Potter & Johnson Automatic Lathes.
2—¾", Model C, Cleveland Automatic Lathes.
Warren Hydraulic Automatic Machines.

BELT LACING MACHINES.
12" Belt Lacers.

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Automatic Copper Band Cutting-off Machine.
Williams' Cutting-off Machines.
McMeans-Bosler Cut-off Machine.

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20" Silver.
No. 315 Baker High Speed.
24' Milwaukee Sliding Head.
16" Reed-Prentice Sliding Head.
24" Aurora Sliding Head.
Allan 2-Spindle Drill Press.

DROP PRESSES.
Automatic Drop Presses.

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20" x 10' Shumacher, Boye & Emmes.
24" x 12' Shumacher, Boye & Emmes.
20" x 10' Hindman High Duty.
26" x 10' Wickes.
26" x 10' Pittsburgh.
22" x 10' Putnam.
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GRINDERS—TOOL AND PROJECTILE.
No. 1 Cincinnati Universal.
Wm. Sellers No. 2 Universal.
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United States Double Wheel Motor.
Westinghouse Double Wheel Motor.

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Holden-Morgan Plug Thread.

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Amalgamated.
5" Thurlow Shell Groover and Undercutter.
18" Reed Shell Groover and Undercutter.
Jenckes Copper Band Turning.

SHAPERS.
24" Potter & Johnston.
15" Potter & Johnston.

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Brown-Boggs Body Marker.

TURRET LATHES.
18" Libby.
24" Steinle.
3A Warner & Swasey.
2A Warner & Swasey.
No. 4 Warner & Swasey.
24" Davis Boring and Chucking.
14" Reed Heavy.
18" American.

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Mechanical Wrenches.
Shell Washing Machines.
De Vilbiss Varnish Machines.
65-gal. Bowser Pumps.
Shell Bake Ovens.
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Morgan No. 9 Box Nailer.
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Two 5 x 6 Vertical steam engines, 8 horse	**$105.00**	**each**
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One 5 x 6 Horizontal steam engine, 8 horse, with base	**125.00**	
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Five 6 stroke engines, with base, 10-15 H.P.	**150.00**	**"**
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One 11 x 10 Automatic, with base, 47-85 H.P.	**725.00**	

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Classified Advertising Section
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New 10" x 24" Norton Plain Cylindrical Grinder
No. 2 Bath Universal Grinder, 10" x 36"
No. 2 Brown & Sharpe Surface Grinder
Springfield Surface Grinder, working surface 19" x 50"
Saxon Surface Grinder, working surface 8" x 18"
Whitney Surface Grinder, working surface 6" x 12"
No. 6A Bryant Hole and Face Grinder
2—New Style "BX" Wilmarth & Morman Grinders
No. 3 Brown & Sharpe Cutter and Reamer Grinder
Warner & Swasey Cock Grinder
No. 2 Garvin Cutter and Reamer Grinder
2—No. 1 Cincinnati Universal Cutter and Tool Grinders
No. 1 Brown & Sharpe Internal Grinder
10" x 84" Brown Roll Grinder
6—American Surface Die Grinders

BORING MILLS

10'—16' Niles Vertical, two heads
10 ft. Betts Vertical, two heads
66" Betts Vertical, two heads
60" Baush Vertical, two heads
60" Niles Vertical, two heads
5 ft. Bement Vertical, one head
No. 1 Barrett Horizontal, 3¾" bar
Betts Horizontal, 3" bar
Rockford Horizontal, Drilling and Boring Machine, 2 1-16" bar

DRILLING MACHINES

10—Foote-Burt No. 25 High Duty Drills
12—Baker Bros. 24" High Duty Drills
4 spindle Bickford, 1¼" spindle
4 spindle Barr, ¾" spindle
3½ ft. Gang Plain Radial, tapping attachment
3 ft. Universal Company Plain Radial
3½ ft. Gang Plain Radial
2½ ft. Gardam Plain Radial
4 ft. Gang Plain Radial
4 ft. Niles Semi-Universal Radial
5 ft. Box Plain Radial
5 ft. Western Full Universal
4½ ft. Bickford Plain Radial

New York Machinery Exchange
Offices: 50 Church St., NEW YORK
MACHINE SHOPS AND WAREHOUSES:
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Contents:

From Stephen Leacock is "Abdul Aziz Has His"—a follow-up to his "Germany From Within," one of the best things Leacock ever wrote. It tells the story of Leacock's visit, disguised as an English Governess, to the Yildiz Kiosk.

A story, "The Pride of Pauline," by Sir Gilbert Parker. A story of the Canadian North-west—a typical Parker story.

Robert W. Service's contribution is 'The Ballad of Jean Desprez"—a very stirring story of the war, with a mighty swing to it.

Two exceptionally good Christmas stories—much above the average. One is "The Blue Water Prodigal," by A. C. Allenson, a story that combines humor and sentiment with a patriotic setting. The second story is by Alan Sullivan, a story of missionary life—"The Soul of Nanook"—an admirably written thing.

H. F. Gadsby has an article dealing with the problems facing Canadian statesmen, under the heading: "Peaches and Lemons." Gadsby gives some straight-from-the-shoulder talk from a purely non-partisan standpoint.

A sketch of the Hon. W. M. Martin, the new Premier of Saskatchewan, by Norman Lambert, under the heading: "The Man Who Brings Back the Ball."

Add to the foregoing the fine Review of Reviews Department; the regular Business Outlook Article, and the Department—"Information for Investors," and you have a magazine worth fifteen cents of any Canadian's money—a magazine for a true Canadian. **Better** for a Canadian than any other magazine, no matter how or where produced.

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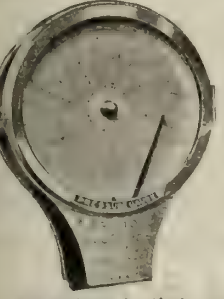

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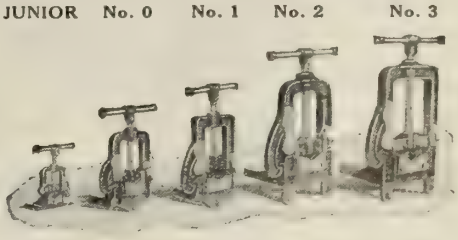

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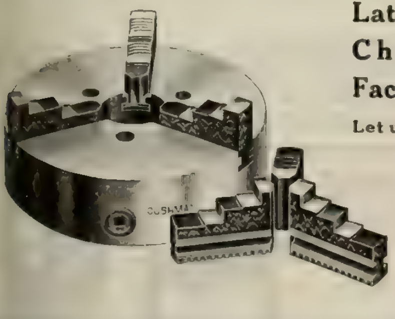

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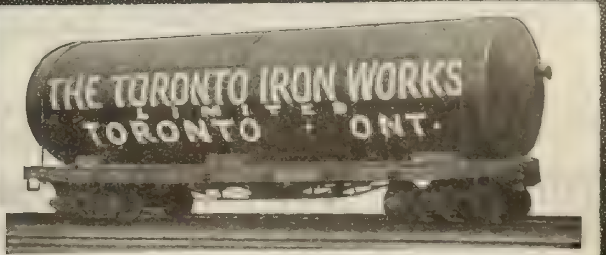

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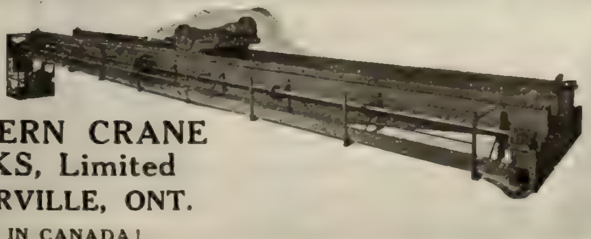

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ALSO ELECTRIC AND AIR HOISTS
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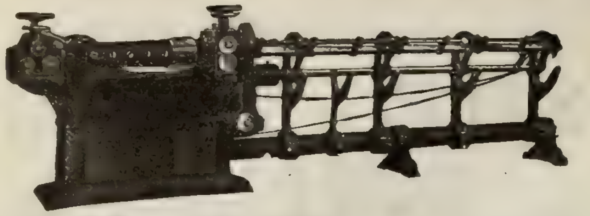

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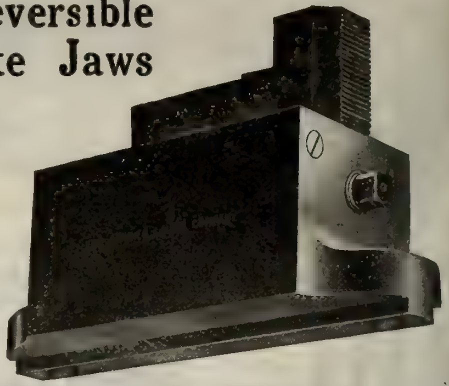

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SEE PAGE 68

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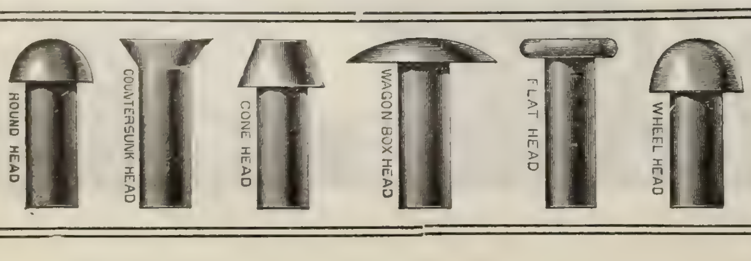

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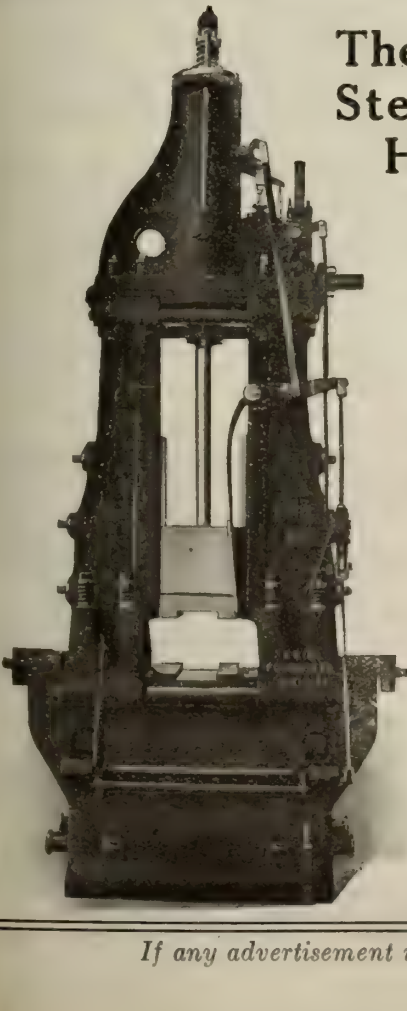

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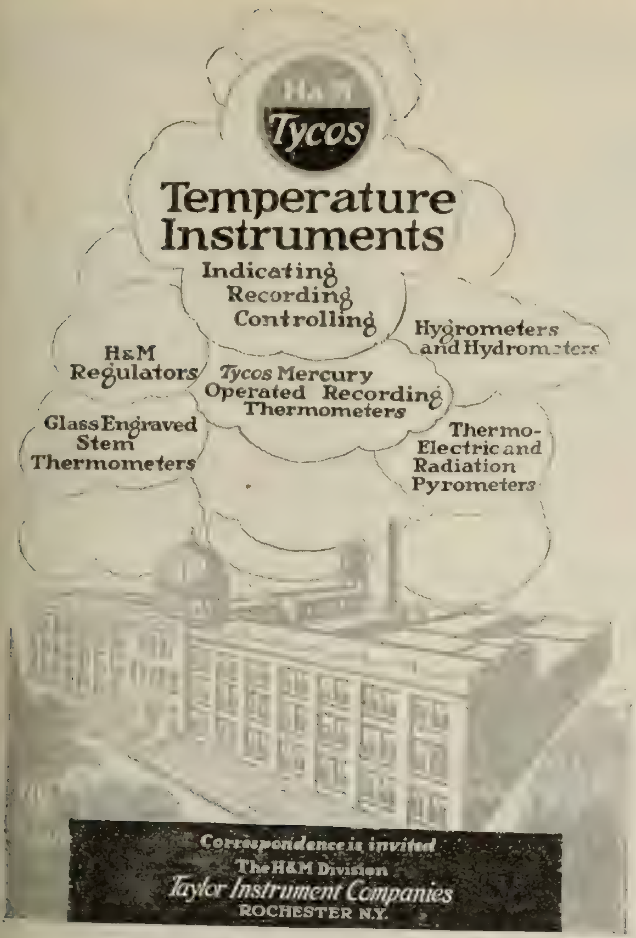
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John Bertram & Sons Co., Dundas.
Bawden Machine Co., Toronto, Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Davenport Locomotive Works, Davenport, Iowa.
Dominion Machinery Co., Toronto.
Douglas, W. & B., Middletown, Conn.
Foss & Hill Machy Co., Montreal.
Foundry & Mach. Co., Montreal, Que.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Hendey Machine Co., Torrington, Conn.
Hepburn, John T., Ltd., Toronto, Ont.
Himoff Machine Co., New York.
Hyde Engineering Works, Montreal, Que.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
Wickes Bros., Saginaw, Mich.
A. R. Williams Machy. Co., Toronto.

LATHES, JOURNAL TRUEING
Bridgeford Mach. Tool Works, Rochester, N.Y.

LATHES, PATTERNMAKERS'
J. G. Blount Co., Everett, Mass.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Jenckes Mach. Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

LATHES, SINGLE PURPOSE
Bertram, John, & Sons Co., Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Himoff Machine Co., Inc., New York, N.Y
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Roelofson Mach. & Tool Co., Toronto, Can.
Root & Van Dervoort Engr. Co., East Moline, Ill.

LATHES, SCREW CUTTING
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Davenport Locomotive Works, Davenport, Iowa.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Mach. Co., Madison, Wis.
Hepburn, John T., Ltd., Toronto, Ont.
Niles-Bement-Bond Co., New York.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

LATHES, SPINNING
Bawden Mach. Co., Toronto, Ont.
Bliss, E. W., Co., Brookln, N.Y.
Toledo Mach. & Tool Co., Toledo.

LATHES, TURRET AND SPEED
John Bertram & Sons Co., Dundas.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Hepburn, John T., Ltd., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

LEATHER STRAPPING
Graton & Knight Mfg. Co., Worcester, Mass.

LIFTS, PNEUMATIC
Whiting Foundry Equipment Co., Harvey, Ill.

LINK BELTING
Can. Fairbanks-Morse Co., Montreal.
Graton & Knight Mfg. Co., Montreal.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LIQUID AIR
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.
Lyman Tube & Supply Co., Montreal, Que.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Canada.

LOCOMOTIVE EQUIPMENT
Davenport Locomotive Works, Davenport, Iowa.

LOCOMOTIVES
Davenport Locomotive Works, Davenport, Iowa.

LUBRICANTS
Can. Economic Lubricant Co., Montreal.
Cataract Refining & Mfg. Co., Toronto.

LUBRICATORS.
Bowser & Co., Inc., S. F., Toronto.
Cincinnati Lubricant Pump Co., Cincinnati.
Roper, C. F., & Co., Hopedale, Mass.

MACHINERY DEALERS
Baird Machy. Co., W. J., Detroit, Mich.
Can. Fairbanks-Morse Co., Montreal.
Dickow, Fred C., Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Fales, C. E., Machy. Co., Detroit, Mich.
Garlock-Machinery, Toronto.
Foss & Hill Machy. Co., Montreal.
New York Machinery Exchange, New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
Stocker, H. A., Machinery Co., Chicago, Ill.
A. R. Williams Machy. Co., Toronto.

MACHINERY GUARDS (SEE GUARDS)

MACHINERY REPAIRS
Sumbling Mach. Co., W. H., Toronto, Ont.

MACHINISTS' SCALES, SMALL TOOLS AND SUPPLIES
Can. Fairbanks-Morse Co., Montreal.
Frank H. Scott, Montreal.
J. H. Williams & Co., Brooklyn, N.Y.

MANDRELS
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Stone Tool & Supply Co., J. R., Detroit, Mich.

MARKING DEVICES
Matthews, Jas. H., & Co., Pittsburg, Pa.
Pritchard-Andrews Co. of Canada, Ottawa, Ont.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Noble & Westbrook Mfg. Co., Hartford, Conn.
Perrin, Wm. R., Toronto.

MEASURING TAPES AND RULES
James Chesterman & Co., Ltd., Sheffield, Eng.

METALLURGISTS
Can. Inspection & Testing Lab., Montreal, Que.
Toronto Testing Laboratory, Ltd., Toronto.

METALS
Canada Metal Co., Toronto, Ont.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.

MILLING ATTACHMENTS
John Bertram & Sons Co., Dundas.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Hendey Mach. Co., Torrington, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Brown & Sharpe Mfg. Co., Providence.
John Bertram & Sons Co., Dundas.
Garlock-Walker Machinery Co., Toronto, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Gooley & Edlund, Cortland, N.Y.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio
A. R. Williams Machy. Co., Toronto.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Chicago, Ill.
Hendey Machine Co., Torrington.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Cook, Asa S., Co., Hartford, Conn.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Tabor Mfg. Co., Philadelphia, Pa.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Cumming & Son, J. W., New Glasgow, Canada.
Jenckes Mach. Co., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke.
Marsh & Henthorn, Belleville, Ont.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Jenckes Mach. Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Mach. Co., New Britain, Conn.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Lachapelle, J. D., & Co., Montreal, Que.
Lancashire Dynamo & Motor Co., Ltd., Toronto
H. W. Petrie, Ltd., Montreal.
R. E. T. Pringle, Ltd., Toronto, Ont.
Wickes Brothers, Saginaw, Mich.
A. R. Williams Machy. Co., Toronto.

MOTORS, PNEUMATIC
Cleveland Pneumatic Tool Co. of Canada, Toront
Garlock-Walker Machinery Co., Toronto, Ont.

MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.

NAME PLATES, BRONZE, ETCHED AN STAMPED
Matthews, Jas. H. & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Can.

NIPPLE THREADING MACHINES
John H. Hall & Sons, Ltd., Brantford, Ont.
Landis Machine Co., Waynesboro, Pa.

NITROGEN
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.

NOZZLES, SPRAY
Can. Blower & Forge Co., Kitchener, Ont.

NUTS, SEMI-FINISH AND FINISHED
Galt Machine Screw Co., Galt, Ont.

NUT BURRING MACHINES
National Machy. Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

NUT MACHINES (HOT)
National Machy. Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

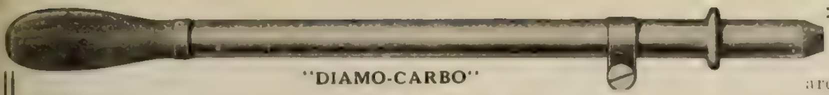
NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machy. Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.
Victor Tool Co., Waynesboro, Pa.

NUT TAPPERS
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Carvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machy Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

OIL GROOVING MACHINES
National Mach. Tool Co., Cincinnati, O.

OIL SEPARATORS
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
Smart-Turner Machine Co., Hamilton.

OIL STONES
Aikenhead Hardware Co., Toronto, Ont.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.



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You can make your dull or coated grinding wheels like new in efficiency by dressing them with

DESMOND-STEPHAN GRINDING WHEEL DRESSERS

and you will eliminate delayed production and lost time, due to the loss of their cutting properties.

Insist upon having your dealer supply you with one of our tools for trial. If he cannot, write us, and we will send any of them on approval.

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Our **"Diamo-Carbo"** Dressers are the economical substitute for the Black Diamond Dressers. They are so low priced that each grinding stand may be provided with its own dresser.

Our **"Sherman Huntington"** Dressers are for use on large and coarse wheels upon which the Diamond cannot be used. It is the most satisfactory Dresser ever designed.

"SHERMAN-HUNTINGTON"

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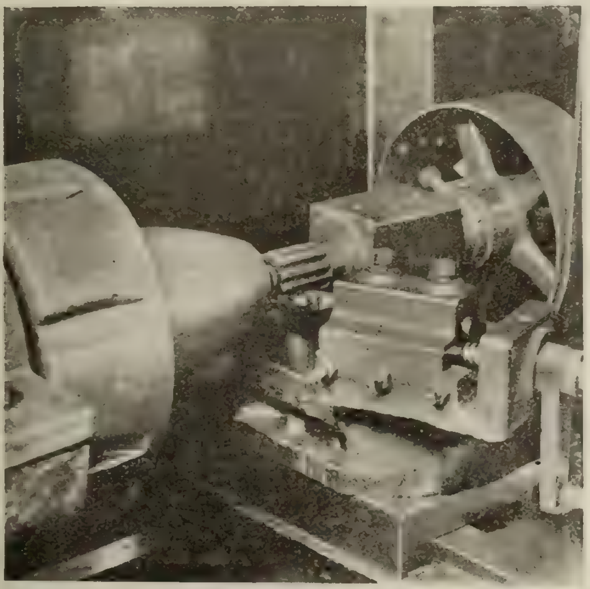
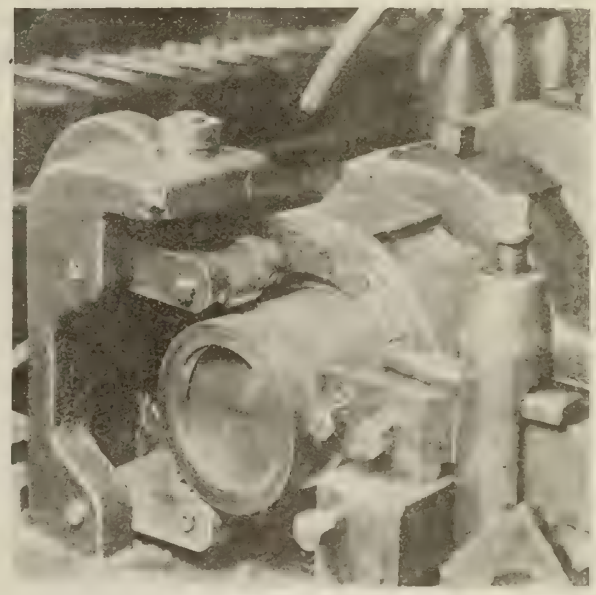


The only correct time to perform the seating operation is to do it in the same fixture with the milling operation This fixture will fit any engine lathes, and costs only $120.00, including milling, cutter and seating tool. The angle of seating can never vary.



Most of the British Shells may now be knurled. This fixture is quick in operation and most accurate. The cost is only $100.00, and it can be used as an attachment to almost any lathe.

We have all gauges for both Mark V and Mark VII Shells, consisting of plug, length, outside diameter, form, thread and seating gauges.

Our Nosing Die Outfit is the best for the Mark VII shell. Leading manufacturers, such as P. L. Robertson Co., Milton; Wilford & Co., Lindsay; Manitoba Engines, Ltd., Brandon; Canadian Westinghouse, Hamilton; Vancouver Engineering Works; Vulcan Iron Works; Otis Fenson Elevator, etc., are using our dies. **One of the above users has already nosed over 22,000 4.5 shells with one of these dies.**

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Whiting Foundry Equipment Co., Harvey, Ill.

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Oven Equipment & Mfg. Co., New Haven, Conn

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Carter Welding Co., Toronto.
Coleman Fare Box Co., Toronto, Ont.
Toronto Welding Co., Toronto, Ont.

OXY-ACETYLENE WELDING AND CUTTING PLANTS

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Lachapelle, J. D., & Co., Montreal, Que.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Indianapolis, Ind.

OXYGEN (SEE ACETYLENE)

PACKINGS, LEATHER, HYDRAULICS, ETC.

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H. W. Petrie, Toronto.

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New Britain Mach. Co., New Britain, Conn.

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Bertrams, Ltd., Edinburgh, Scotland.

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Garlock-Walker Machinery Co., Toronto, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

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Budden, Hanbury, A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Ross Thomson & Co., Ottawa, Ont.

PATTERNS

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PERFORATED METALS AND ORNAMENTAL IRON GOODS

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Steel Co. of Canada, Ltd., Hamilton, Ont.

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Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
H. W. Petrie, Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.

PIPE CUTTERS, ROLLING

Armstrong Mfg. Co., Bridgeport, Conn.
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
John H. Hall & Sons, Ltd., Brantford, Ont.
H. W. Petrie, Ltd., Montreal.

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Toronto Iron Works, Ltd., Toronto.

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Armstrong Bros. Tool Co., Chicago.

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Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Oliver Machy. Co., Grand Rapids, Mich.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

PLANING MILL EXHAUSTERS

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Sheldons, Ltd., Galt, Ont.
Niles-Bement-Pond Co., New York.

PLIERS

Aikenhead Hardware Co., Toronto, Ont.
Canadian Billings & Spencer, Ltd., Welland.

PLUG MILLERS

PRESSES, ARBOR

Banfield, Edwin J., Toronto.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
Atlas Press Co., Kalamazoo, Mich.

PRESSES, BROACHING, FORGING AND FLANGING

Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, CAM, TOGGLE, EYELET

Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo, O.

PRESSES FOR SHELLS

Atlas Press Co., Kalamazoo, Mich.
Charles F. Elmes Eng. Works, Chicago.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER

Lymburner, Ltd., Montreal.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, DROP AND FORGING

W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago, Ill.
Can. Fairbanks-Morse Co., Montreal.
Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Niles-Bement-Pond Co., New York.
Wm. R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

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John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, HYDRAULIC DIE STAMPING

Hydraulic Press Mfg. Co., Mount Gilead, O.

PRESSES, PNEUMATIC

Metalwood Mfg. Co., Detroit, Mich.
Tolodo Machine & Tool Co., Toledo.

PRESSES, POWER

Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
Garlock-Walker Machinery Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, BALING

Hydraulic Press Mfg. Co., Mount Gilead, O.
William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT

Baird Machine Co., Bridgeport, Conn.
Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

PRESSES, SCREW

Barnes, W. F. & John, Co., Rockford, Ill.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING

Erie Foundry Co., Eric, Pa.

PRESSURE REGULATORS

Can. Fairbanks-Morse Co., Montreal.

PROPELLERS

Ontario Specialties, Ltd., Ottawa, Can.

PULLEYS

American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Dodge Mfg. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Ltd., Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PULLEY MACHINERY, DRILLING AND TAPPING

Can. Fairbanks-Morse Co., Montreal.
Wells Bros. Co. of Canada, Galt, Ont.

PUMPS, AIR

Bawden Machine Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL

Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Darling Bros., Ltd., Montreal, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

PUMPS, HIGH PRESSURE

Charles F. Elmes Eng. Works, Chicago.
Darling Bros., Ltd., Montreal, Que.
Hydraulic Press Mfg. Co., Mount Gilead, O.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

PUMPS, ALL KINDS

Bawden Machine Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PUMPS, HYDRAULIC

Charles F. Elmes Eng. Works, Chicago, Ill.
Darling Brothers, Montreal.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto.

PUMPS, LUBRICANT AND OIL

Cincinnati Lubricant Pump Co., Cincinnati, Ohio
Roper, C. F., Co., Hopedale, Mass.

PUMP LEATHERS

Graton & Knight Mfg. Co., Montreal.

PUNCHES AND DIES

W. H. Banfield & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER

John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

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John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
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Canada Machinery Corp., Galt, Ont.
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Wickes Brothers Saginaw, Mich.

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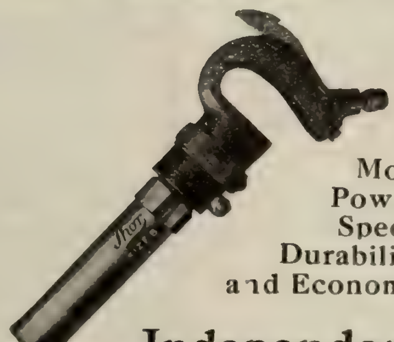

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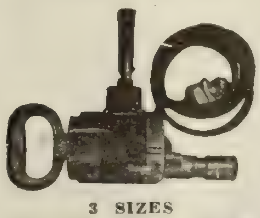

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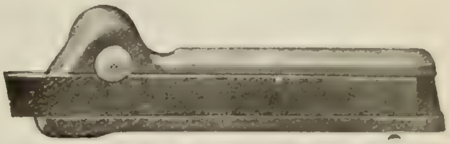

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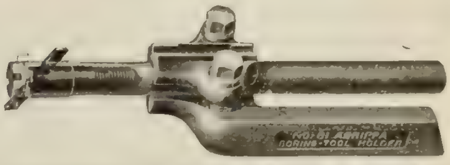

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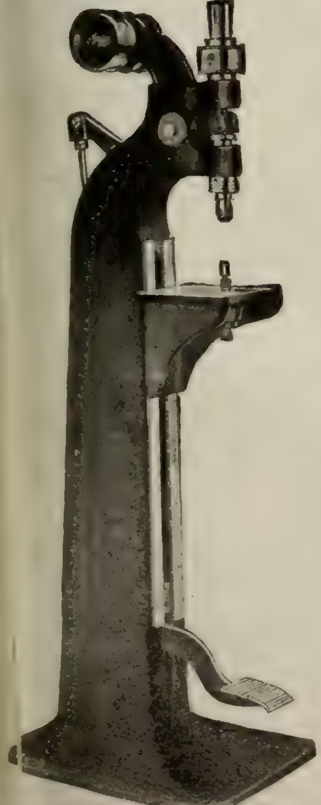

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One rivet per second.

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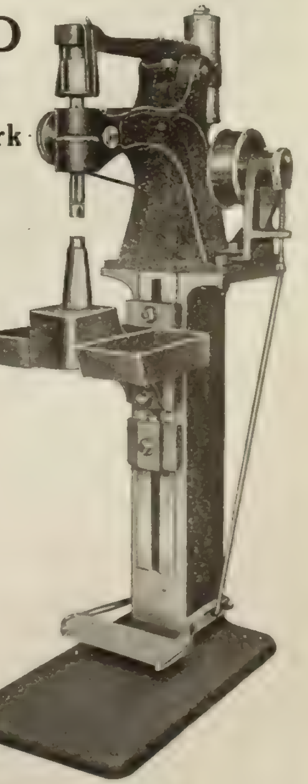

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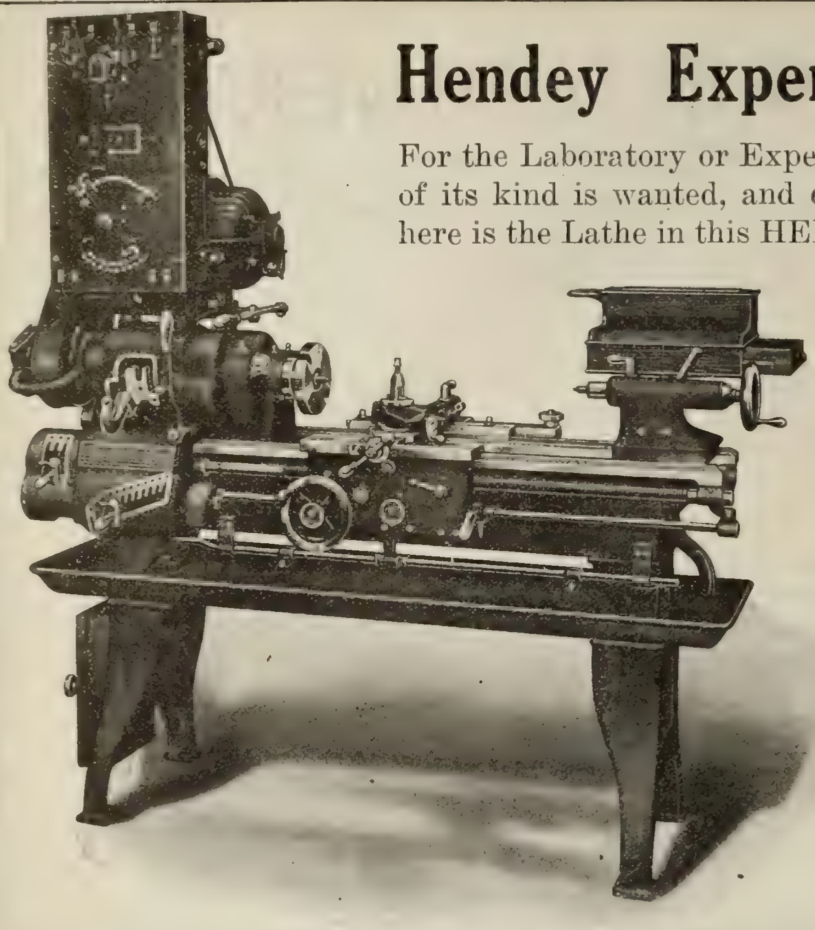

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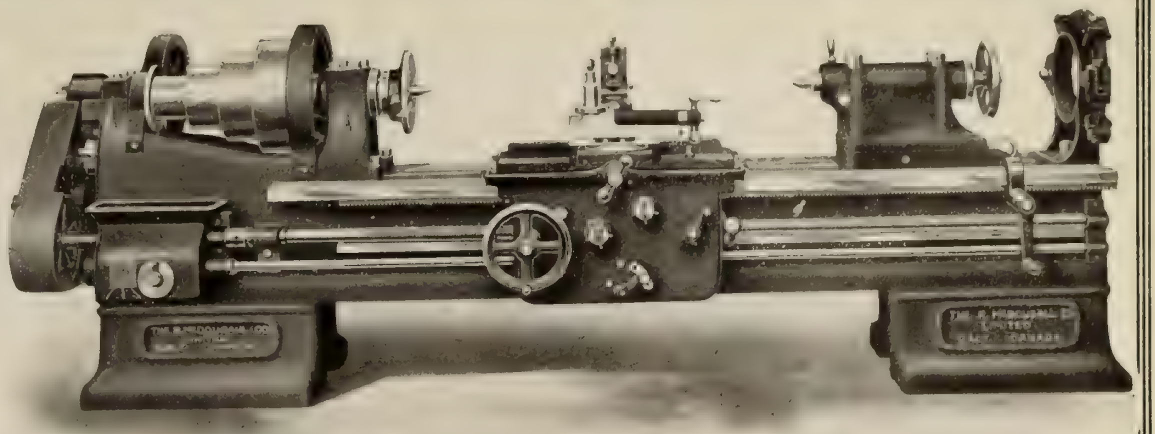

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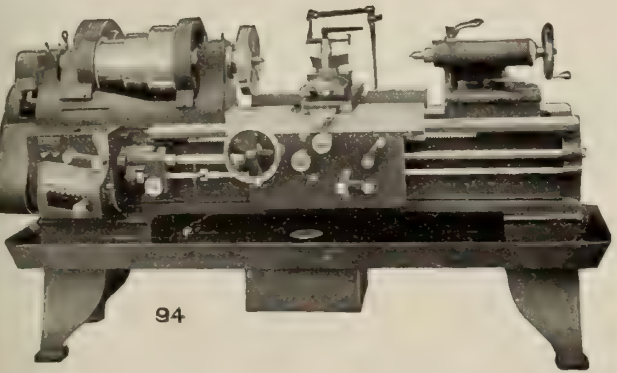

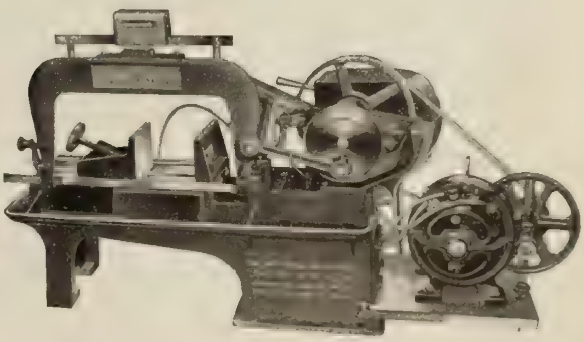

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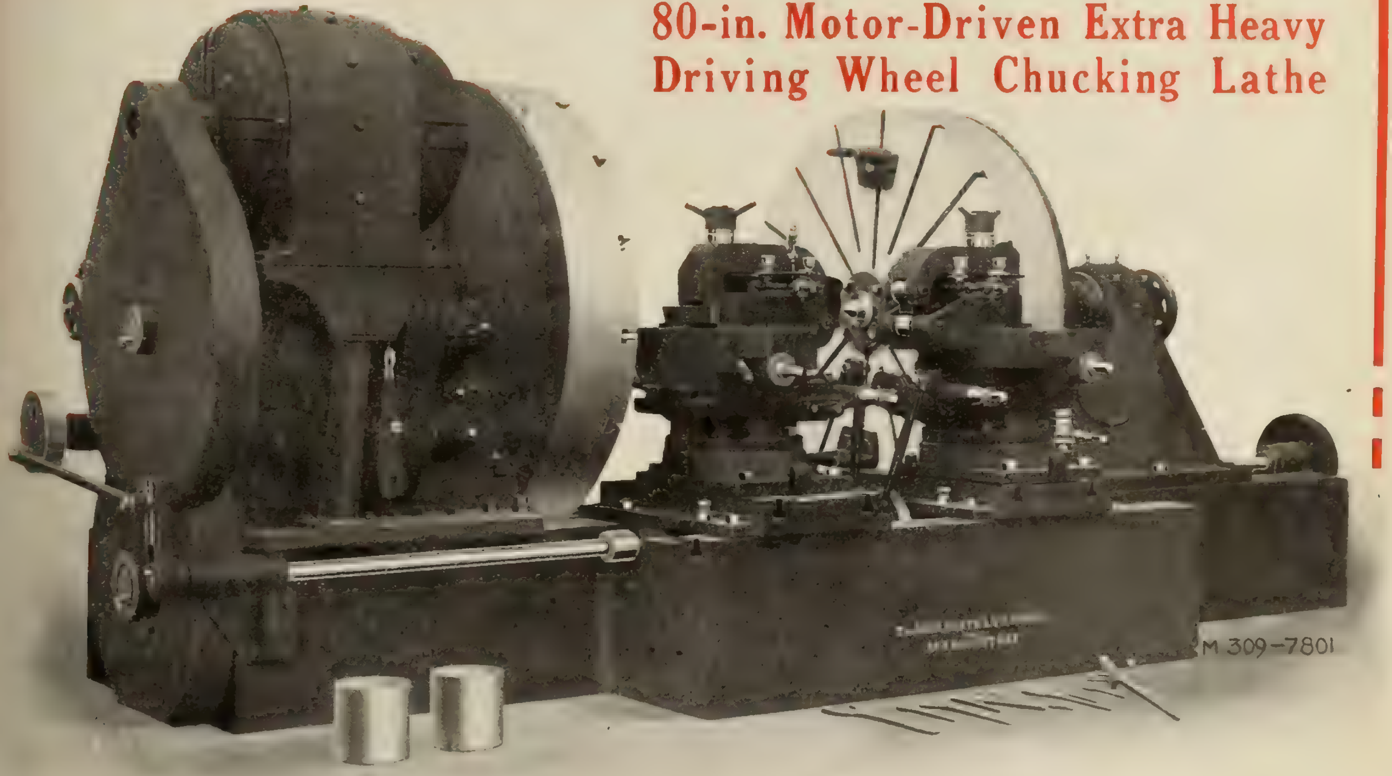

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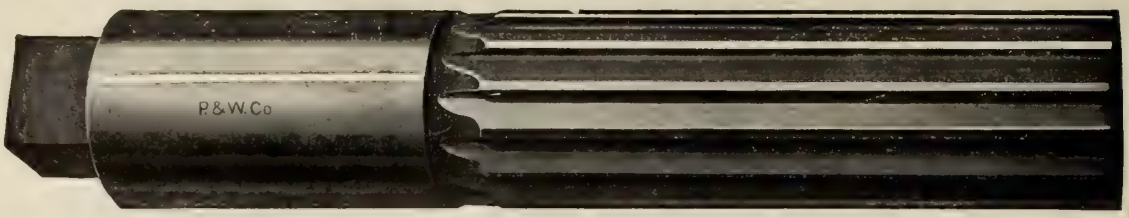

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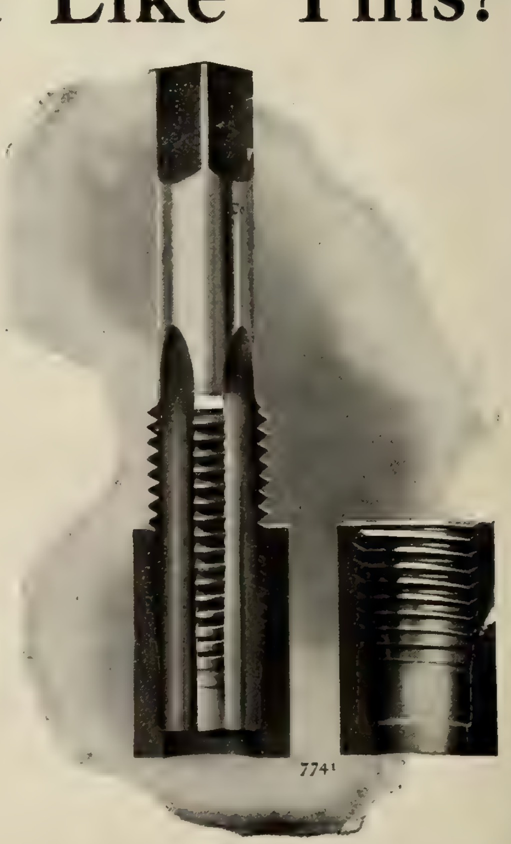

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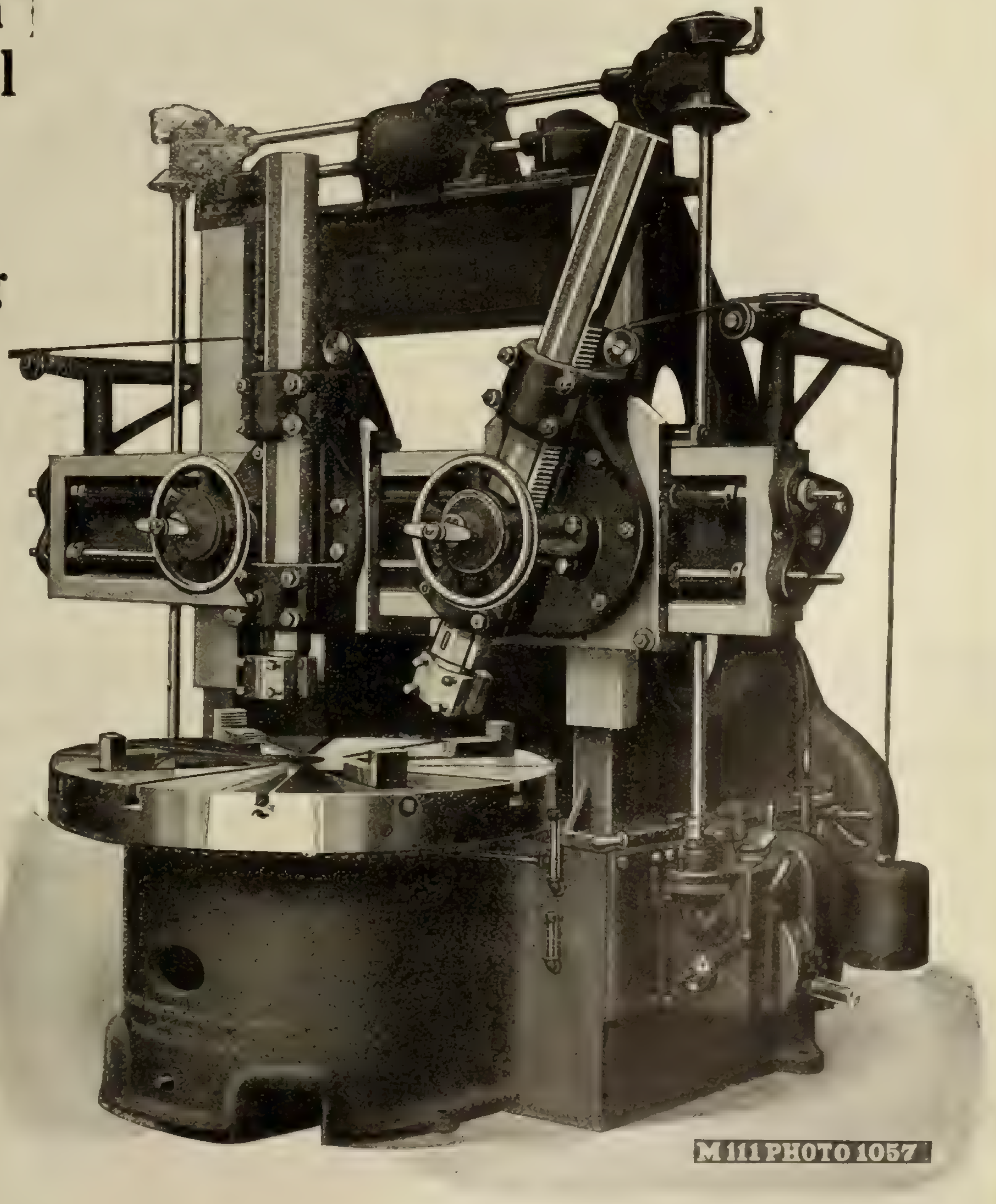

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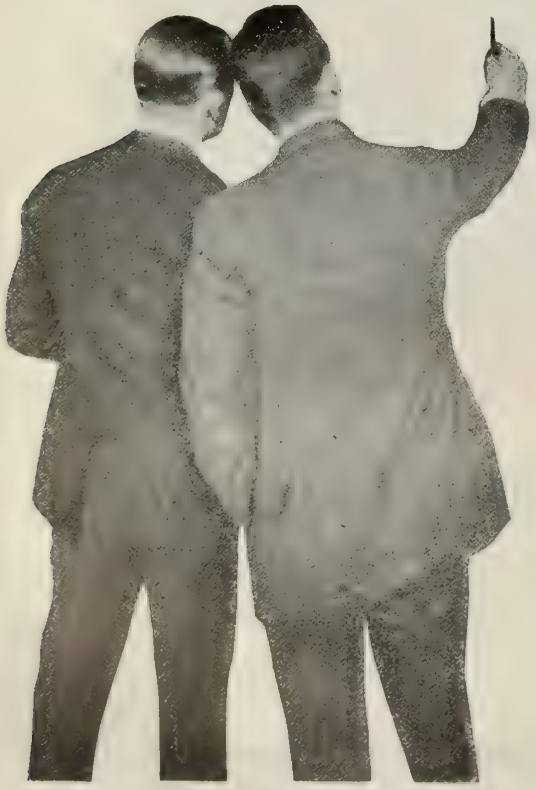
December 7th, 1916

1,000 copies will be mailed to importers in Great Britain, France, Russia, Australia, Japan, South Africa and other Allied and Neutral Countries.



OUR December 7th issue will be the 7th Number we have sent abroad. Advertisers are getting direct results, and what is more important, they are building for the future.

Make your announcement in our next Export Number as complete a message for the foreign buyer as you can.

Illustrations are great little salesmen—use lots of them if your product requires them. Wire your space reservation and rush copy and cuts.

CANADIAN MACHINERY
and Manufacturing News
143-153 University Avenue, Toronto

Quality **Service**

Courtesy in Business

* * *

Fittingly framed and hanging in the Offices of one of the most important Public Service Corporations on this North American Continent is the following

> **'Did you say Please and Thank you?'**

Broad minded men direct the destiny of that Corporation, men who know that public or private enterprises to be lastingly successful must operate for the public good.

Quality and Service are the two important factors in our business life today, but Courtesy is the door through which they must enter.

We are large producers of Hamilton Pig Iron and our output of Open Hearth Steel Blooms and Billets, Iron and Steel Bars of all shapes and size runs into enormous tonnage.

The products of our mills include practically everything that can be manufactured from Iron and Steel and these we distribute to thousands of satisfied customers.

Our business is an extensive one and a successful one. The World is our market: but our prosperity and success in the future, as in the past, depend upon the continued confidence, co-operation and good-will of the people we serve.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG

STELLITE

MADE IN CANADA
STELLITE

High Speed Tool Metal

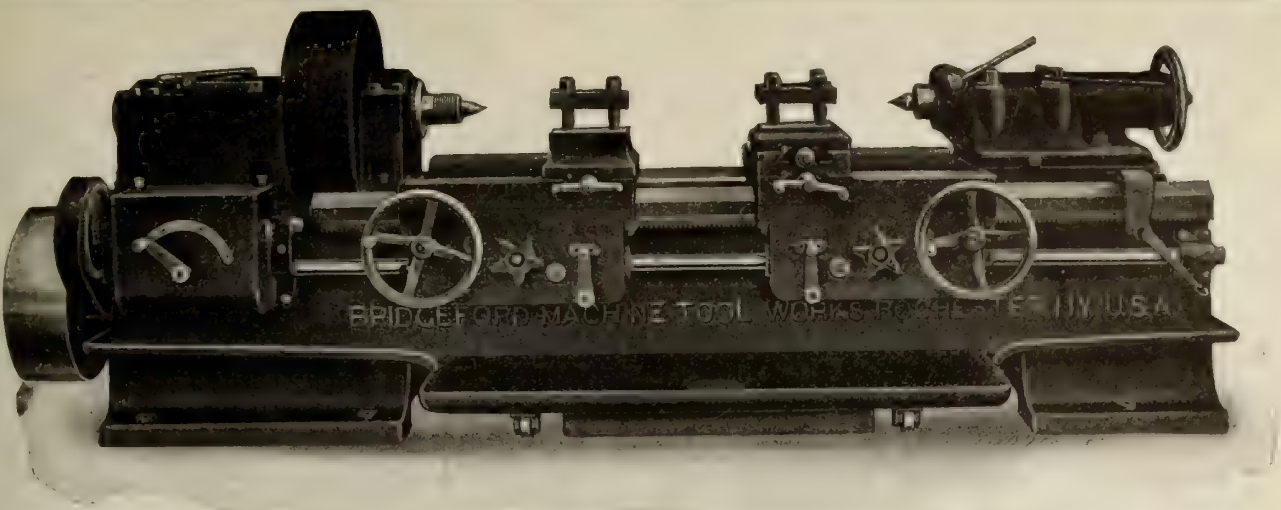
Cutting tools that have that marvelous lasting power are made of Stellite. This material is not a steel, it contains no iron—it is Stellite. Heat has no effect on the cutting edge. Stellite tools cut just as well when red hot as when cool. Run steel tools that way, you know what happens. They burn up—lose their temper. Stellite has no temper.

It is an alloy so hard and tough that it will perform every operation at a higher speed than is possible with the best high-speed steel tool.

Try it out on your most difficult operation, only speed up the machine more. The result will convince you of its merit and you will agree, as a great many others have done, that it is better than the best steel and that it will pay you.

Made in Canada by
THE DELORO MINING AND REDUCTION CO., LIMITED
DELORO, ONTARIO

The Canadian B. K. Morton Co., Limited
SOLE SELLING AGENTS FOR CANADA AND NEWFOUNDLAND
49 Common St., MONTREAL, QUE. 86 Richmond St. East, TORONTO, ONT.



"BRIDGEFORD" 27-in. HEAVY DUTY LATHE

The Ideal Machine for Rough-Turning Shells

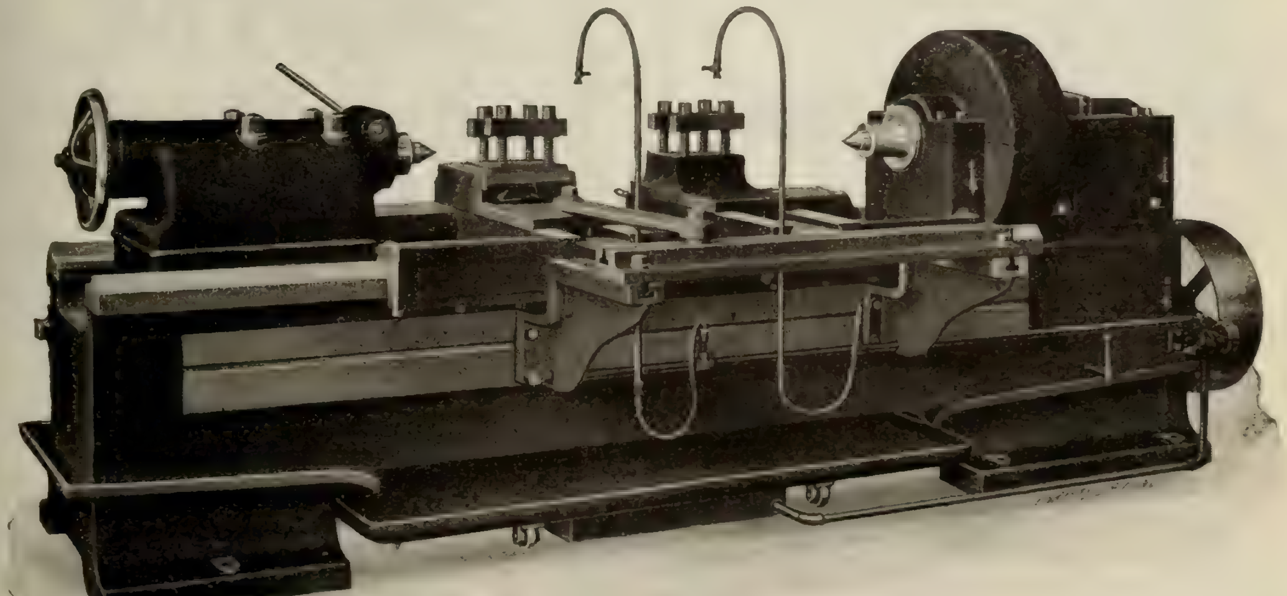
This is an especially heavy duty machine, and as shown in the engravings, is arranged for rough-turning 8", 9.2" or 12" shells. Power is transmitted through 8" driving belt, with three instantaneous speed changes through hardened steel gearing. Main driving gear 6½" face. Four instantaneous feed changes—all through cut steel gearing, running in oil. Leading shell manufacturers have from 70 to 120 of these machines in operation—giving remarkably satisfactory results.

Owing to greatly increased facilities, we can make early deliveries on Bridgeford Lathes. Write us.

BRIDGEFORD MACHINE TOOL WORKS

HEAVY LATHE SPECIALISTS FOR 20 YEARS

237 MILL STREET **ROCHESTER, N.Y.**



STEEL

for
SHRAPNEL
SHELLS
AND SHELL BLANKS

Only Company in Canada producing steel ingots by the "HARMET" Liquid Process.

REASONS WHY THESE INGOTS ARE SUPERIOR TO THE ORDINARY KIND:

1. Prevention of cracks, due to shrinkage; of internal stresses and resulting cracks and fissures.
2. Early cessation in the crystallization of the metal, and the production of fine crystallization of the metal, without cleavage planes.
3. Lessening of segregation, i.e., reduction of tendency to carbon and other impurities to concentrate in the central and upper parts of the ingot.
4. Prevention of "Pipes" or interior cavities, and thus preservation of absolute solidity in the ingot.
5. Improvement in physical properties.
6. Reduction in waste of ingot.

WE CAN SUPPLY FORGINGS OF ALL SHAPES AND SIZES MADE OF ORDINARY OR "HARMET" FLUID COMPRESSED OPEN-HEARTH STEEL ON THE SHORTEST NOTICE.

Nova Scotia Steel and Coal Company
Limited
Head Office:
NEW GLASGOW,
N.S.
Western Sales Office,
Room 14 Windsor Hotel,
MONTREAL

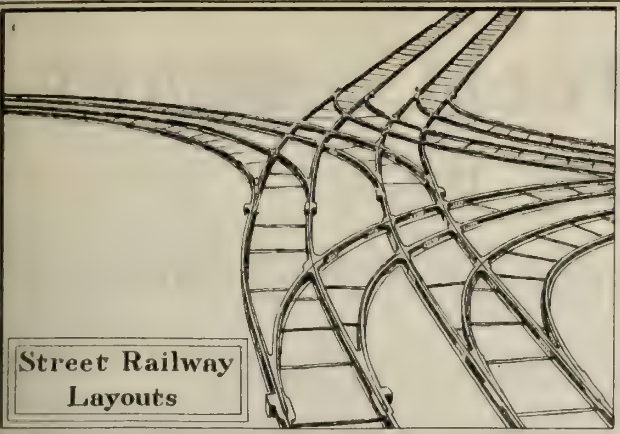
WOLFRAM
MADE IN THE U.S.A
HIGH SPEED STEEL
TRADE MARK

Wolfram Cobalt High-Speed Steel, **BEST FOR TURNING SHRAPNEL.** Vulcan Hot Piercing Steel, **FOR ALL KINDS OF HOT WORK.** Vulcan Regal No. 2 Steel, **FOR BRASS FINISHINGS.** Vulcan Special "W" Steel, For Special Taps and Dies. Vulcan Non-Shrinkable Steel, For Intricate Dies. Vulcan Special Vanadium Steel Does Twice the Work of Regular Carbon Steels.

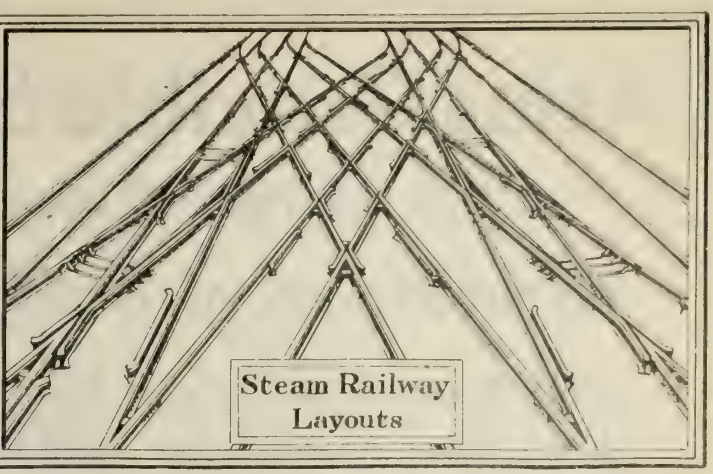
VULCAN CRUCIBLE STEEL COMPANY
ALIQUIPPA, PA.

Red Cut Superior High Speed Steel

Quality First
THE BEST FOR MACHINING ALL HARD MATERIALS
Are your tools made of **Red Cut**?
Send for folder
VANADIUM-ALLOYS STEEL COMPANY
PITTSBURGH, PA.
Works at Latrobe, Pa.



Street Railway Layouts



Steam Railway Layouts

Switches, Frogs and Every Description of Trackwork.
Solid Manganese Steel Construction. Cast Iron and Cast Steel bound Construction with Manganese Steel Inserts.

CANADIAN STEEL FOUNDRIES,
LIMITED
MONTREAL AND WELLAND.

ECONOMY

Rapid production is dependent on the use of

Economical Tools and Steel.

It is safer NOT to specify High Speed Steel but

Demand "TYR," the Economy Steel.

(MADE IN CANADA)

Armstrong, Whitworth of Canada, Limited
OFFICES: 22 Victoria Square, Montreal, P. Q.
Dominion Bank Building, Toronto, Ont.
WORKS: Longueuil, P. Q.

Thread Miller

7", 8", 9" Sizes

THREAD MILLER

Holden-Morgan Mfrs.

Unusual threads are obtained through this Miller. Speed and perfection of production feature its daily work. Our Service Department has equipped a great many munition factories with these Millers, and they all are perfectly satisfied that they made the right selections.

Our Service Department for Particulars.

THE A. R. **WILLIAMS** MACHINERY CO., Limited
64-66 Front Street West - - Toronto, Ont.

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX	Carbon Tool Steel
High Speed Steel, Atlas LX	"Deward" Oil Tempering, Non-Skrinking
Chrome Vanadium Steel	

"When ordering steel, it is important to state purpose for which steel is to be used."

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO, LIMITED, SHEFFIELD, ENGLAND

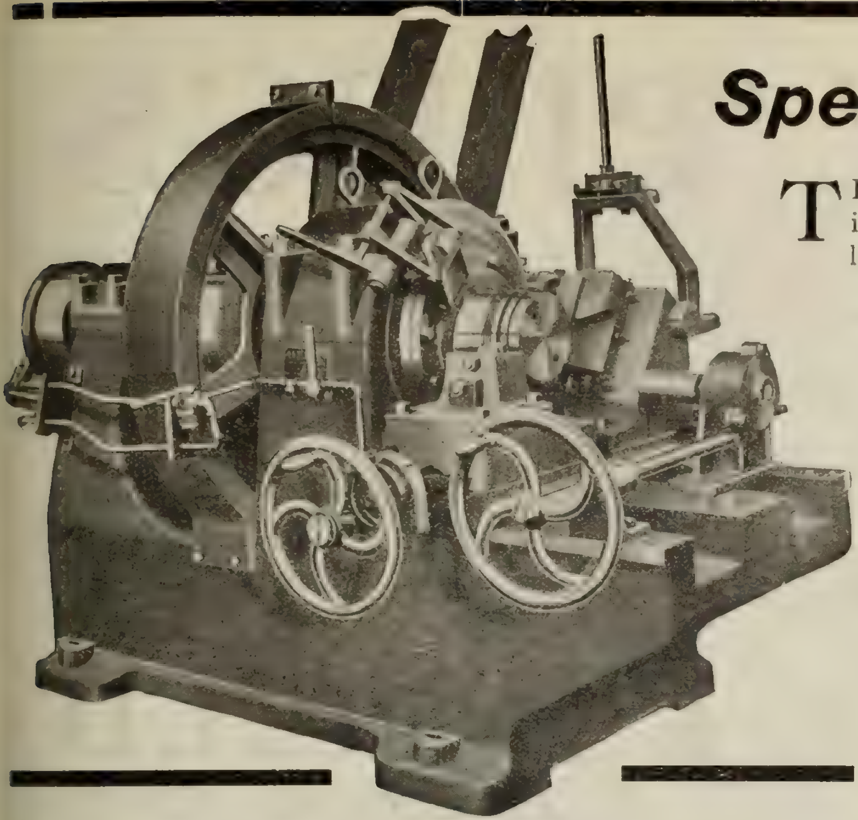
Sole Agents for Canada:

H. BOKER & CO., Inc.

(Formerly Hermann Boker & Co.)

332 St. James Street, Montreal, P.Q.

Established 1837 Incorporated 1914



Speed—Accuracy

THE two most important factors in shell-making. The former is desirable, the latter absolutely necessary. Both are assured by the use of *Jenckes Single Purpose Lathes for Shell Work.*

Illustration shows the latest addition to this famous line—a Banding Lathe for 8″ shells. Note the liberal proportions, the general appearance of sturdiness. They mean an extra measure of long and efficient service.

These machines are also manufactured for 18 pdr., 4.5″, 5″, 6″, 8″, 9.2″, 12″ and 14″ shells; are tooled when required for the mm. sizes corresponding to Russian and French ammunition.

THE JENCKES MACHINE COMPANY, LIMITED

**WORKS: Sherbrooke, Que.
St. Catharines, Ont.**

SALES OFFICES:

727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

PIG IRON

"Victoria" Foundry and Malleable, made by The Canadian Furnace Co., Port Colborne, Ont., Canada

M.A. HANNA & CO.

M.A.HANNA&Co. Sales Agents: CLEVELAND, O., U.S.A.

JAMES McKAY COMPANY, PITTSBURGH, PENNA., U.S.A.
Manufacturers of

SHELL FORGINGS

We have the Equipment and Experience and can execute orders for

Nose Sockets Base Plates Adapter Plates

For any size Shells. Can execute orders promptly.

SPECIAL FORGINGS—We can make any forging that can be made under Drop Hammers.
CHAINS AND ACCESSORY FORGINGS—We have a complete line.

Address our Representative: **JOHN A. BUCHANAN, King Edward Hotel, Toronto**

BASE PLUGS

Machined to Government Specification

Have in stock for immediate shipment machined plugs for 4.5", 5" and 6" High Explosive Shells.

Capacity 3,000 per day. Write for prices.

EDWIN J. BANFIELD

STAIR BLDG. ∴ TORONTO, ONT.

Manufacturer of Plug Milling Machines for All Sizes of Shells

Special Vanadium Steel Piercing Die Forgings

For Hot or Cold Work

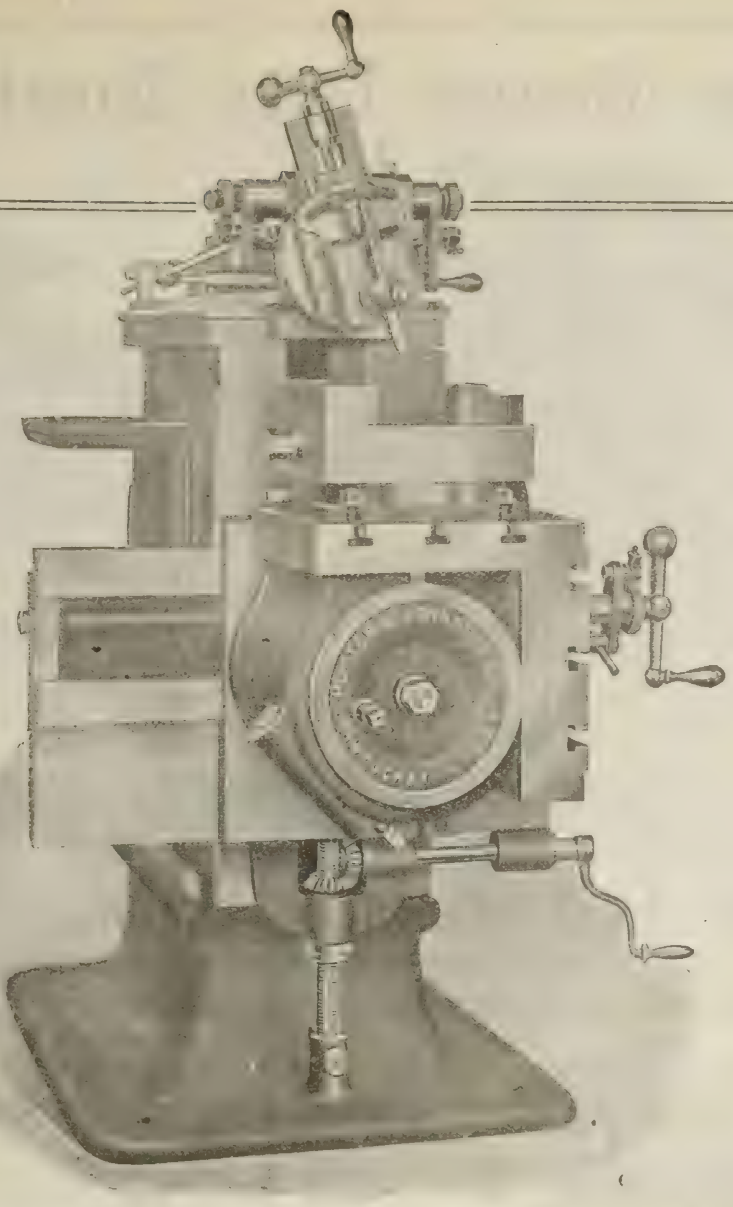
Made from High-Grade Special Vanadium Tool Steel and hammer-forged in any size.

These forgings cut down your machining costs 100% and give you a tougher, more durabl
Die than you have ever had.
Punches made to match the dies
Send us your Blue Prints.

Hammond Steel & Forgin
Co., Inc.

SYRACUSE, N.Y., U.S.A.

Fine Tool Steels, Specialists in Manufacture of Hig
Grade Hammered Forgings, Hammered Alloy Steel
Weldless Rings—Special Shapes, Die Blocks



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15″ Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

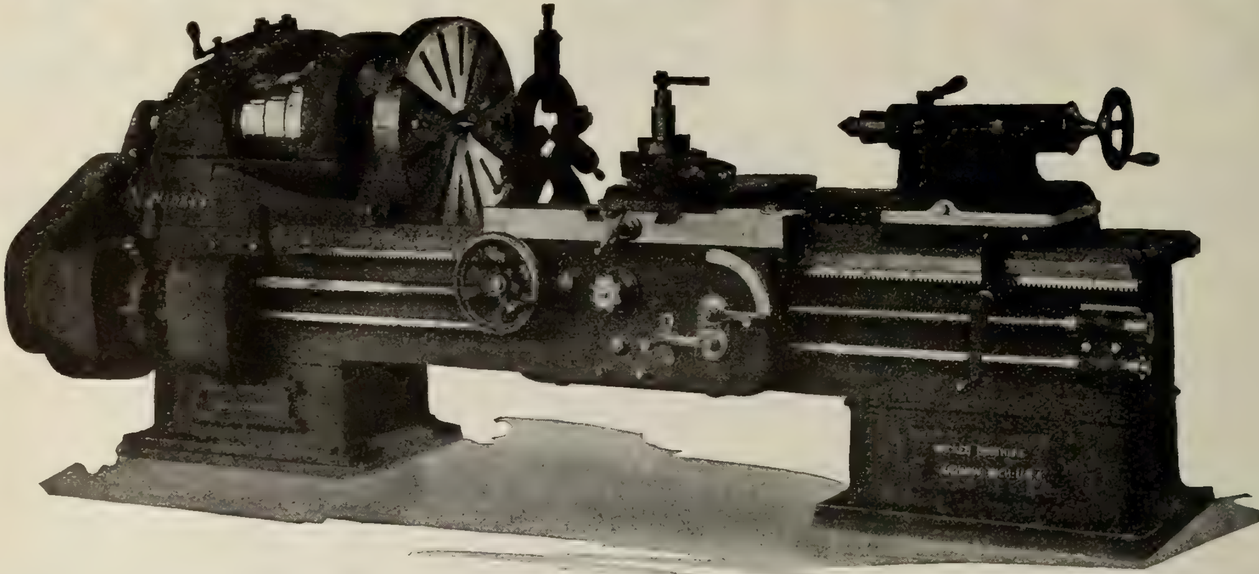
WRITE FOR PRICES AND DELIVERIES

Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

Wickes Heavy Duty Engine Lathe



The Wickes 26" Heavy Duty Lathe.

Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.

This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.

Let us tell you about this lathe and our 20", 32", also our 17" Rapid Production Lathe for Automobile and other work.

We can make prompt shipment.

WICKES BROTHERS **Saginaw, Michigan**

Brass, Phosphor Bronze, Copper and Aluminum CASTINGS

We have the largest Jobbing Brass Foundry in Canada.

Can make prompt delivery.

Tallman's reputation is in the goods.

Tallman Brass & Metal Co.
HAMILTON, ONT.
CANADA

The BARNES DRILLS

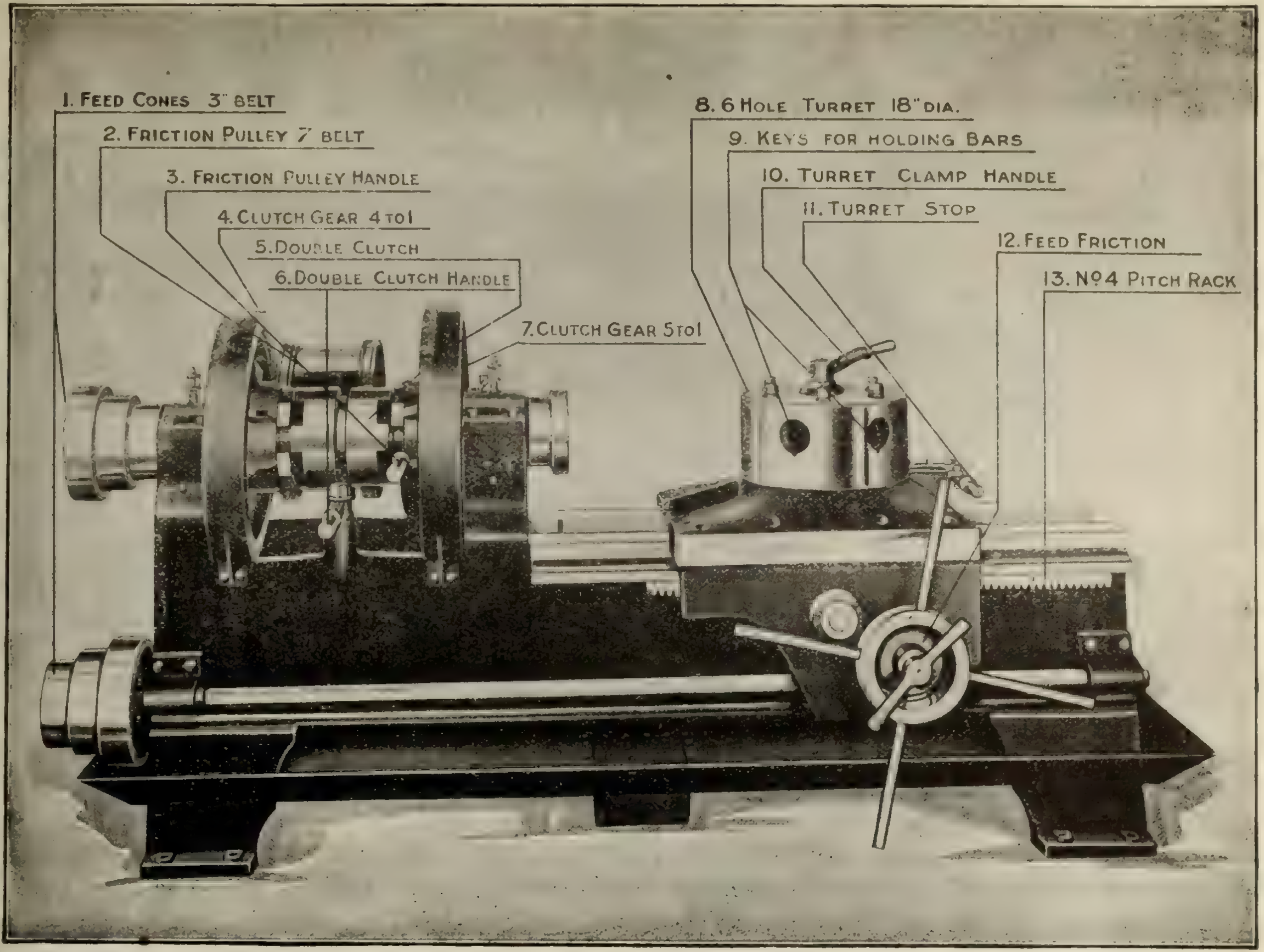
Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

W. F. & JOHN BARNES CO.

104 Ruby Street - ROCKFORD, ILL.
Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal


1. FEED CONES 3" BELT
2. FRICTION PULLEY 7" BELT
3. FRICTION PULLEY HANDLE
4. CLUTCH GEAR 4 TO 1
5. DOUBLE CLUTCH
6. DOUBLE CLUTCH HANDLE
7. CLUTCH GEAR 5 TO 1
8. 6 HOLE TURRET 18" DIA.
9. KEYS FOR HOLDING BARS
10. TURRET CLAMP HANDLE
11. TURRET STOP
12. FEED FRICTION
13. Nº4 PITCH RACK

SPECIAL SHELL LATHE

For boring and turning shells from 9.2 down. Above cut shows bed turret for boring operations. We have them in stock for both boring and turning.

Among other good features, note the following:—

No. 1—3" belt on feed.
" 2—7" belt and 75 H.P. friction.
" 8—18" turret.
" 9—Keys for boring bars.
" 12—External Feed friction.
" 13—Four-pitch rack.
Note ratio of gearing.

Note Sheet Steel Oil Pan.
No countershaft required.
Bronze bearings throughout.
Sight feed oilers.
Hardened and ground thrust collars.
An overplus of strength throughout.
Workmanship guaranteed.

This lathe will give you satisfaction.

Immediate Shipment From Stock

(Subject to Prior Sale)

The Foundry & Machine Co., Limited

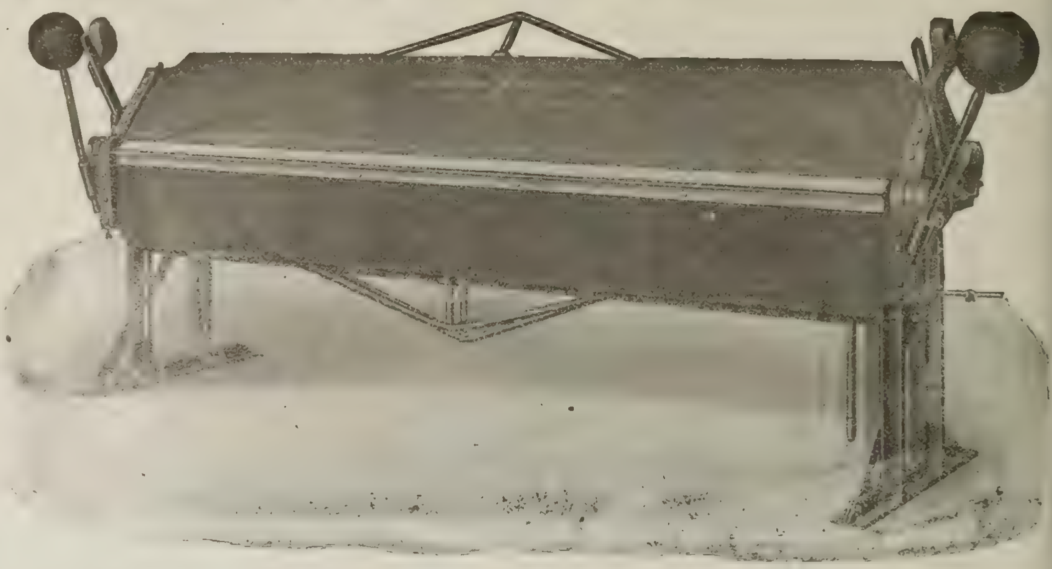
1167 Carriere Road
Montreal, Canada

A GOOD INVESTMENT

A "B.B." STEEL BRAKE

FOR a Cheap Brake the "B.B." Steel Plate Machine is the best investment you can make. It is especially designed for rapid forming of sheets, and is suitable for a large variety of work, such as can be accomplished on an ordinary Cornice Brake. We can furnish these Brakes for bending all sizes and gauges of metal.

Write for Catalogue if Interested.

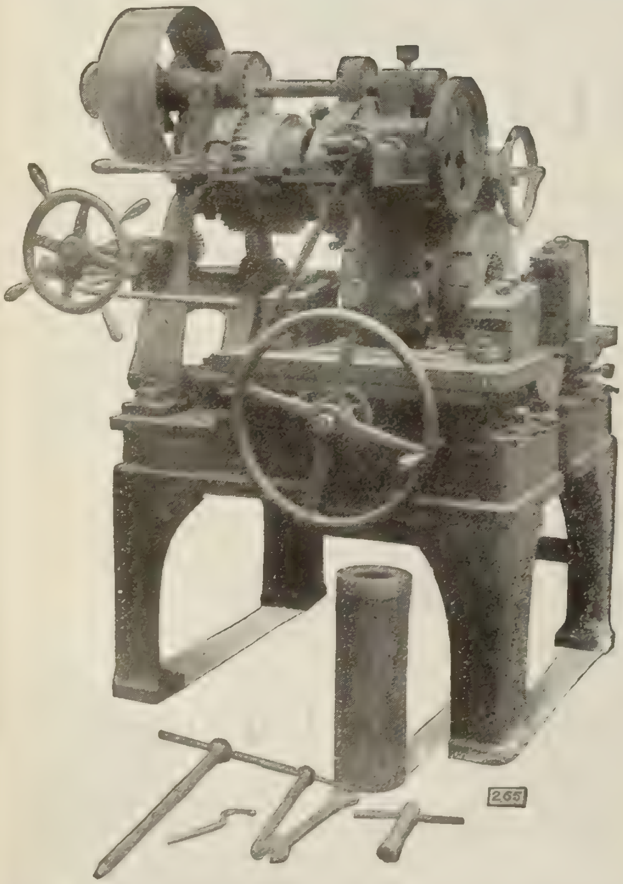


"ALWAYS, EVERYWHERE, SPECIFY 'B.B.' QUALITY."

The Brown-Boggs Co., Limited, Hamilton, Canada

Tinsmiths' Tools, Sheet Metal Working Machinery, Dies, etc.

Western Representatives: MESSRS. BISSETT & WEBB, LIMITED, WINNIPEG AND EDMONTON



CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE

Wm. Kennedy & Sons
LIMITED

OWEN SOUND, CANADA

POLISHING COMPOSITIONS

FOR ALL METALS

EMERY PASTE
F. F.
THE HANSON & VAN WINKLE CO.
POLISHING O.S. COMPOSITION
N.J. U.S.A. CHICAGO
THE HANSON & VAN WINKLE CO.
TRIPOLI No 9 COMPOSITION
NEWARK, N.J. U.S.A. CHICAGO
THE HANSON & VAN WINKLE CO.
POLISHING XXX COMPOSITION
CHICAGO
CROCUS COMPOSITION

"Made in Canada"

TRIPOLI

Brand No. 3-A.G.—
A standard fast cutting material.

Brand No. 1-A—
A high-class composition for Silver Trades.

Brand No. 2, Ebonite—
Very fast cutting black composition.

Brand S.M.—
Specially adapted for polishing copper.

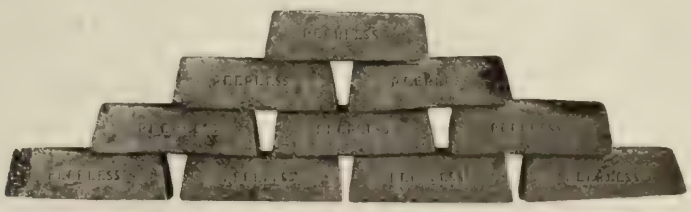
Brand No. 9—
Both cuts and colors.

Brand No. 5-B—
Fast cutting and moist.

All packed in about 400-pound barrels.

WHITE FINISH—*Ideal Lime Composition*

Made in standard grades for all classes of coloring brass, copper and nickel, put up in air-tight tins.



PEERLESS WHITE FINISH

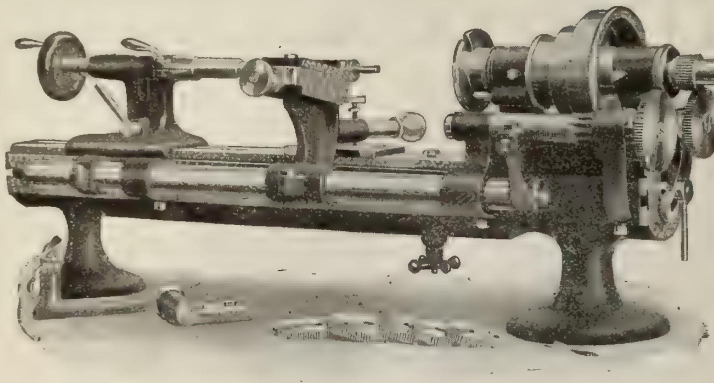
A specially high coloring composition put up in two-pound cakes, and equal to lime compositions for many classes of work.

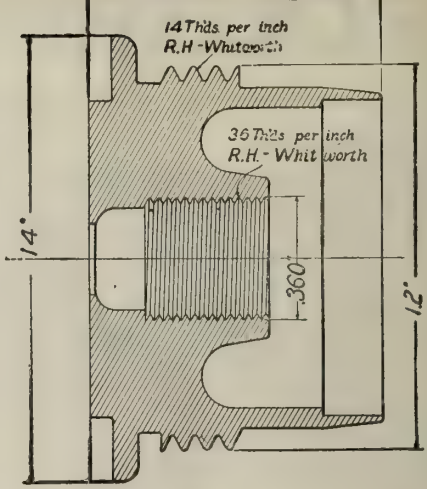
Emery Cake—Emery Paste—Crocus Tallowene—Brush Brass Finish.

We can supply any class of composition for any particular work, let us know your needs—we will do the rest.

CANADIAN HANSON & VAN WINKLE COMPANY, LIMITED
TORONTO : : CANADA

THE CATARACT BENCH LATHE WITH CHASING ATTACHMENTS



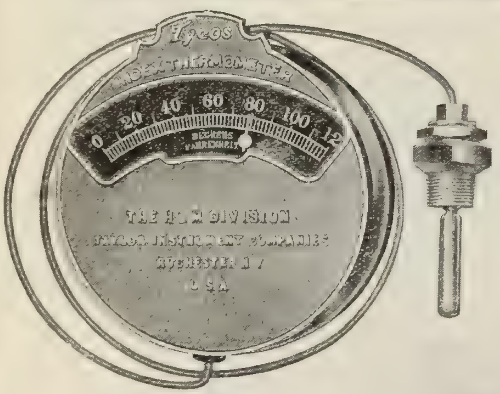


We have sold many of our lathes to Canadian concerns who are eminently satisfied with results. Will you be next?

For work requiring greatest accuracy and rapidity, THE HARDINGE CATARACT BENCH LATHE will not disappoint you. Machine equipped with Automatic Chuck Closer for rapid operation of chuck, and with chasing bar arranged with multiple point, chasing tool is producing from ten to twelve hundred 14-pitch Whitworth threads on primers in TEN HOURS. Prompt deliveries. Catalogue No. 15 is ready to mail TO YOU. You are invited to write for it to-day.

HARDINGE BROTHERS, Inc., 1770 Bertau Ave., CHICAGO, U.S.A.

H&M Thermometers



You Can Put The Indicator Any Place.

The *Tycos* Index Thermometer is Convenient

Regardless where the bulb is located, the indicator of the *Tycos* Index Thermometer may be placed at a point in plain view.

It is especially designed for condensers, feed water lines, economizers, superheated steam pipes and flue gases upon which the usual Thermometer would be hidden.

The instrument shown here has all the characteristics of the *Tycos* Recording Thermometer, in addition to its own special convenience. It is operated by the expansion of mercury in a powerful tube system that is highly sensitive. You ought to know the service this *Tycos* Index Thermometer renders.

Is trouble proofed by accurate workmanship and design. Skilled, honest craftsmen build them. Strength and stability in every point.

Full information free and no obligations. Your questions will receive prompt attention and we hope convincing answers.

The H&M Division
Taylor Instrument Companies
Rochester, N.Y.
201 Royal Bank Bldg., Toronto, Ont.

PRACTICALITY

AFTER fifteen years' study of the Miner's and Lumberman's wants, we know just what is and what is not required in tools for them.

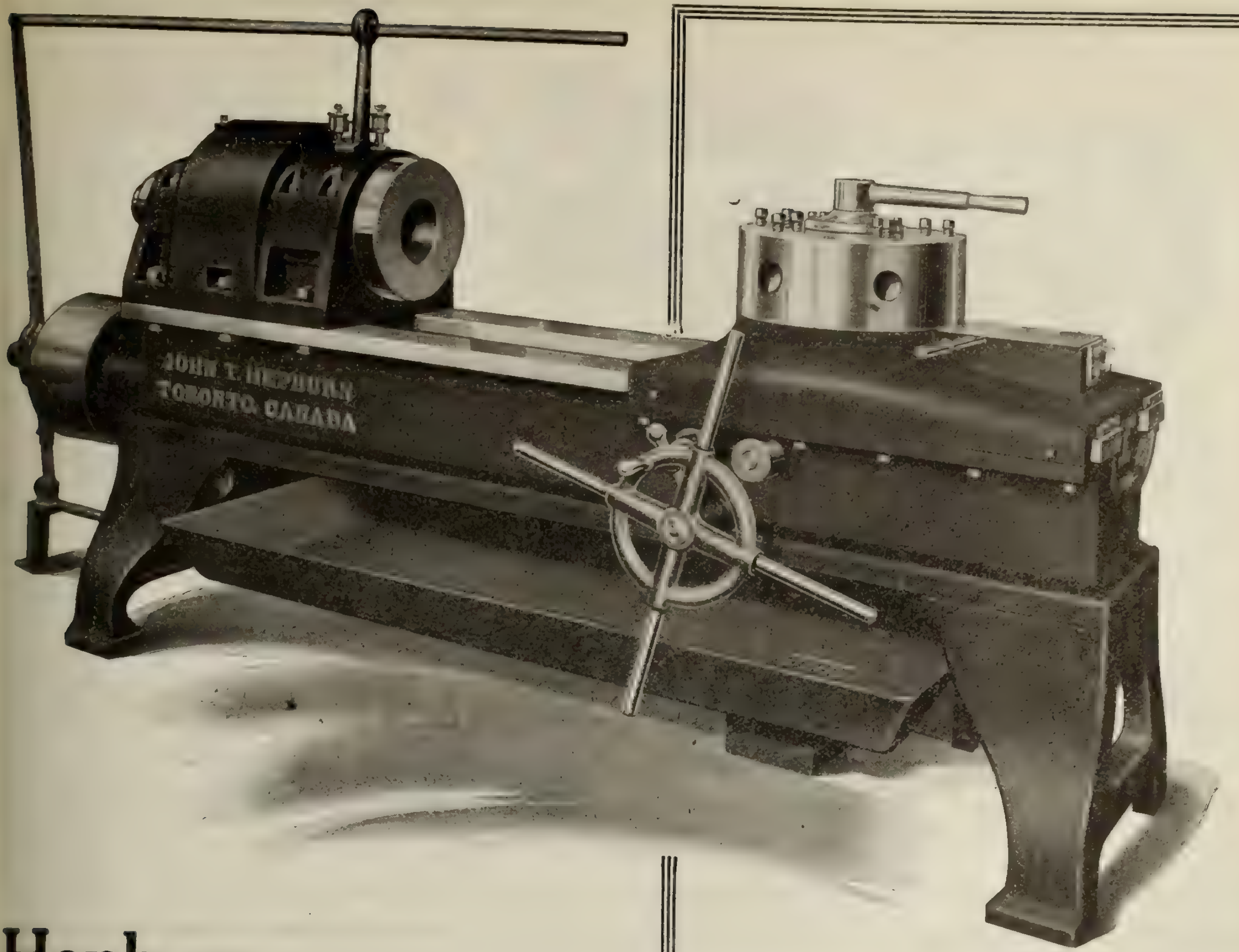
Practicality has been the keynote of our organization. Experience has aided us in eliminating all unnecessary parts and in perfecting the design of our tools.

The use of best material and finest workmanship enable us to manufacture tools that are unexcelled.

We make a complete line. Write us for prices.

J. W. CUMMING & SON, LTD.
NEW GLASGOW, - - CANADA

Wood or Steel, let Cummings make it.



Hepburn Heavy-Duty Shell Lathes

◆

Speed
Accuracy
Power
Strength
Simplicity

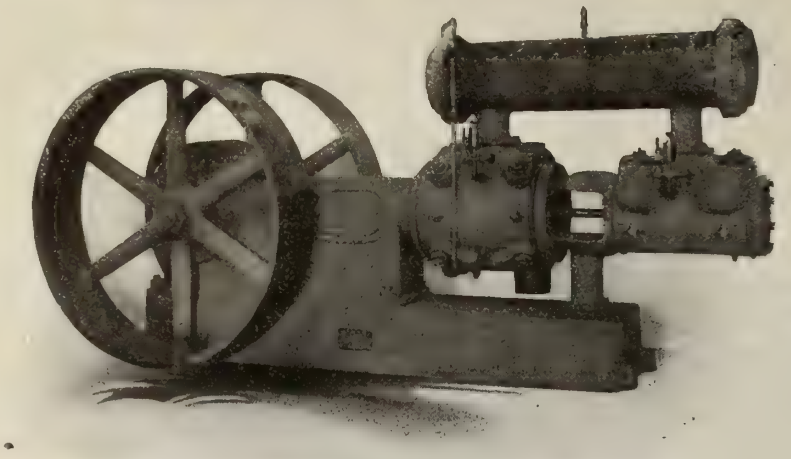
The pioneering or experimental days are over. The lathe illustrated above has embodied in it a scientific knowledge of the requirements of heavy duty lathes and a modern equipment to produce it. Its worth has been proven by the way in which a great many munition firms are repeating their first order.

Study the illustration, note the massive strength of the headstock and the turret; they are well proportioned to give the maximum speed. Strength is again suggested in the bed and legs. Oil tank and strainer. Speed, accuracy, power, strength and simplicity is a description of the Hepburn Lathe in a nutshell.

If you are in the market for shell-making lathes, ask us for specifications. Any desired size. Turning and turret lathes up to and including 9.2".

John T. Hepburn
LIMITED
18-60 VAN HORNE ST. - TORONTO

"Maximum Power at Minimum Cost"



COST OF ATTENDANCE

is a large item of expense with most air compressors.

INGERSOLL-RAND COMPRESSORS

are so completely automatic that practically all the attention they require is to start them and stop them.

With their extreme simplicity there is little likelihood of "trouble," and "splash" lubrication takes care of the oiling problem.

Ask our nearest office for information.

CANADIAN INGERSOLL-RAND CO., LIMITED
COMMERCIAL UNION BUILDING - MONTREAL, CANADA
SYDNEY TORONTO COBALT TIMMINS WINNIPEG NELSON VANCOUVER
Works : Sherbrooke, Que.

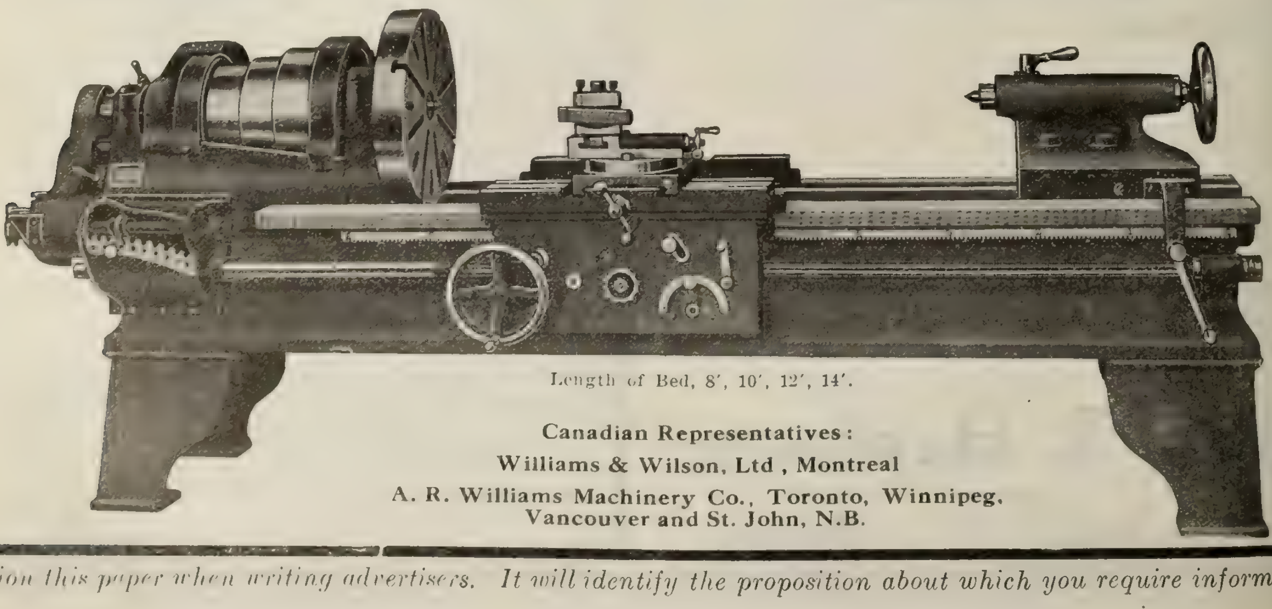
Davenport 22-Inch Lathe — For Extra Heavy Service

These lathes are built exceptionally rigid and heavy. No feature has been omitted, to secure great strength and power. The bed, the headstock, the tailstock, the carriage—every detail has been designed and constructed with a view to driving the heaviest cut that any tool will stand up against. At present we can make quick deliveries on this machine.

Built with ordinary change gears unless otherwise specified.

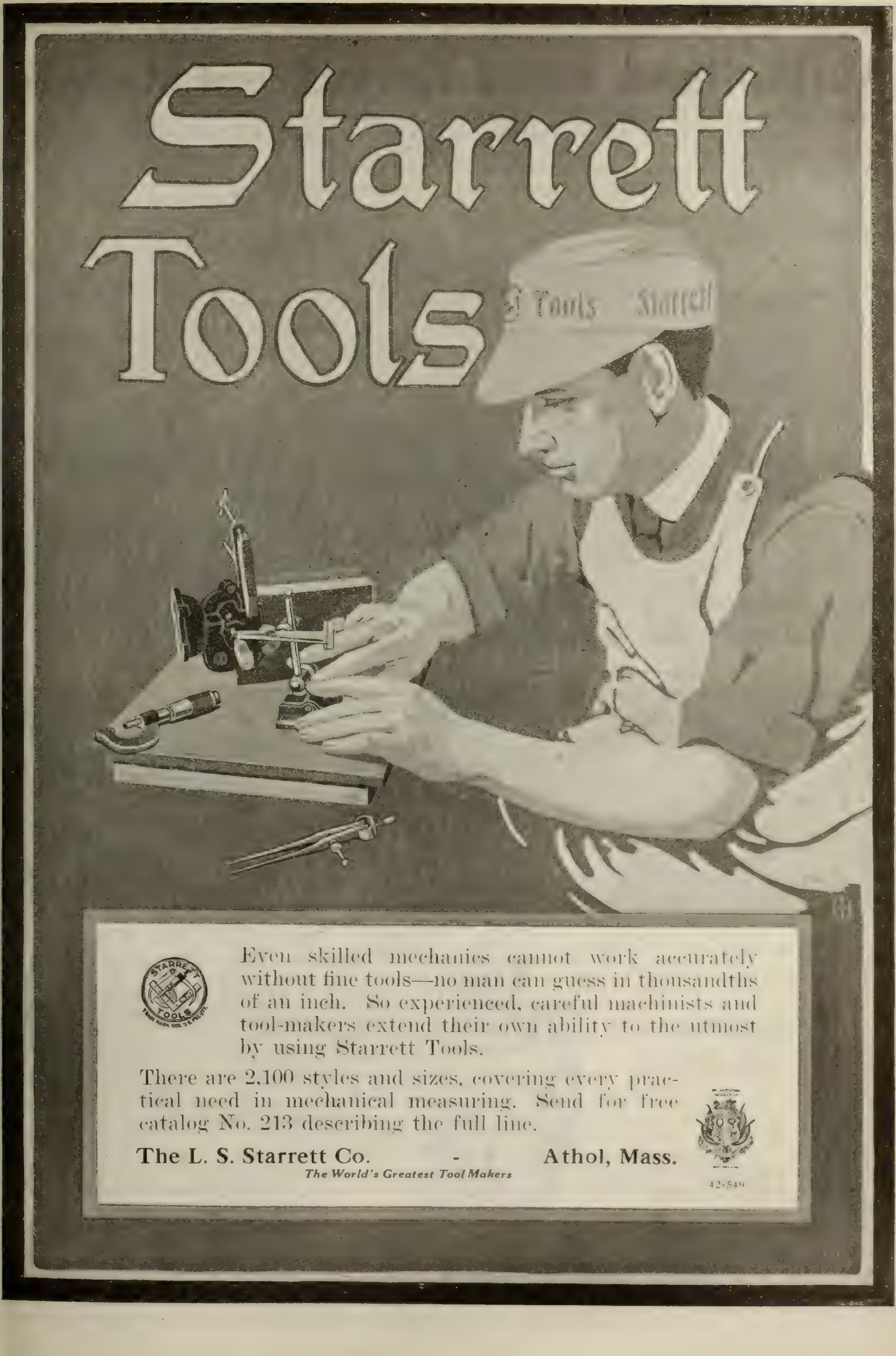
Write at once for Bulletin. It gives full details of construction.

DAVENPORT LOCOMOTIVE WORKS
DAVENPORT, IOWA



Length of Bed, 8', 10', 12', 14'.

Canadian Representatives :
Williams & Wilson, Ltd , Montreal
A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver and St. John, N.B.



Even skilled mechanics cannot work accurately without fine tools—no man can guess in thousandths of an inch. So experienced, careful machinists and tool-makers extend their own ability to the utmost by using Starrett Tools.

There are 2,100 styles and sizes, covering every practical need in mechanical measuring. Send for free catalog No. 213 describing the full line.

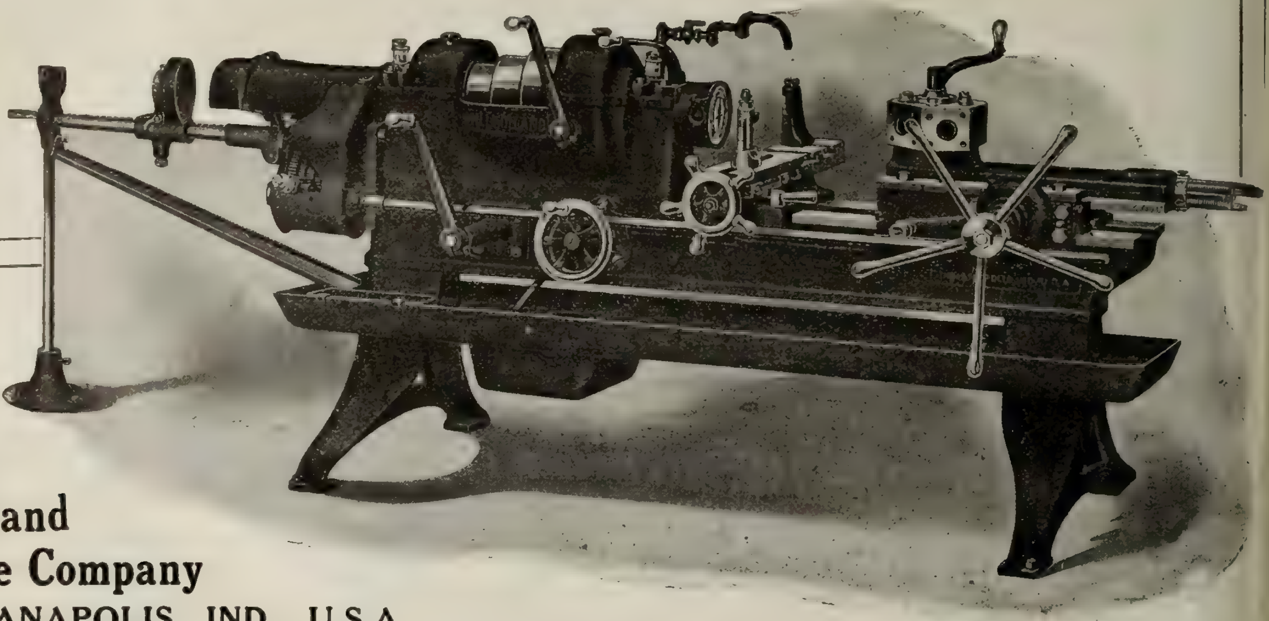
The L. S. Starrett Co. - Athol, Mass.
The World's Greatest Tool Makers

42-549

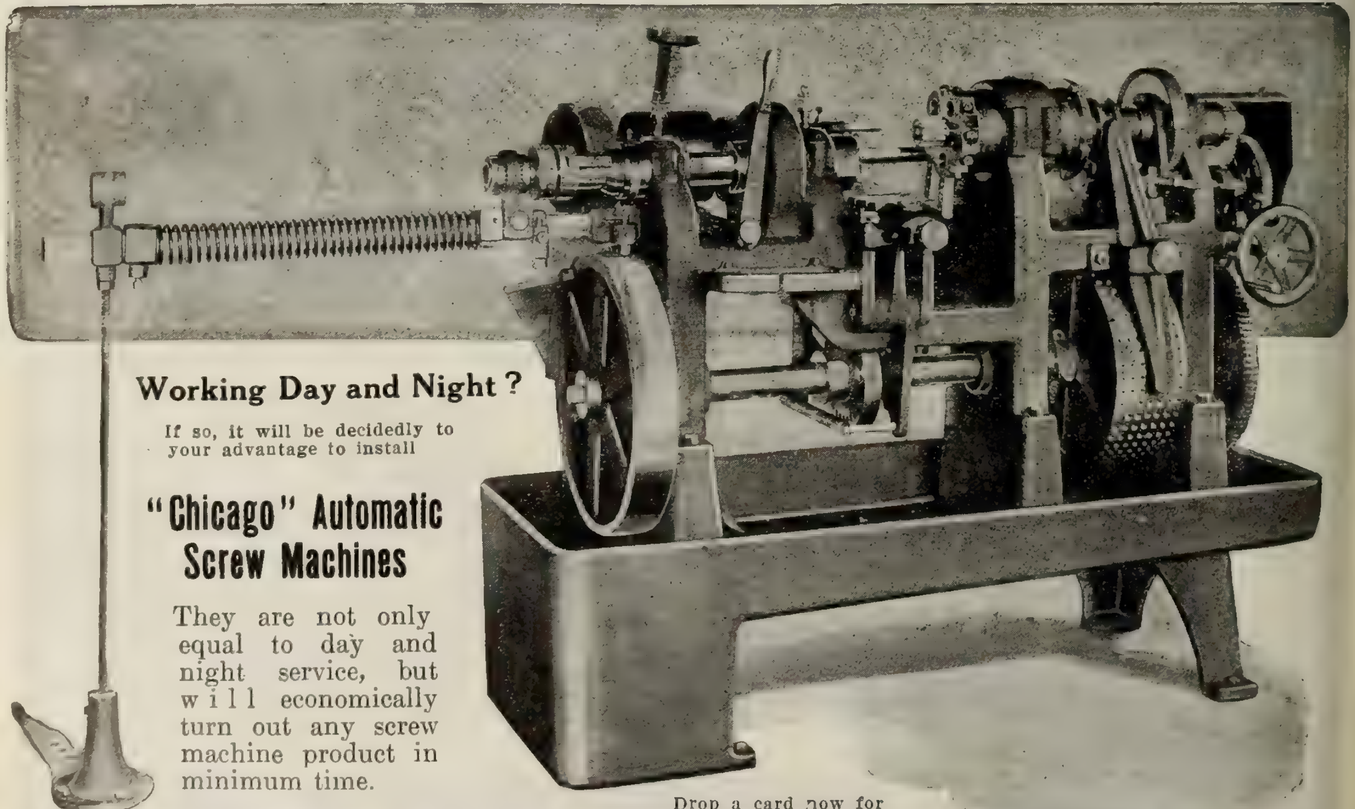
Millholland $1\frac{5}{8}$ x 10 Turret Screw Machine

The combined result of two generations of engineering and mechanical experience. While, as a whole, it is no radical departure from established lines of the turret lathe, it has many original features, and with these features are combined well-known devices.

Safety, rigidity, convenience, production and durability are the ideas behind every step in their construction. Your request will get you full details and specifications by early mail. Make it.



**W. K.
Millholland
Machine Company**
INDIANAPOLIS, IND., U.S.A.



Working Day and Night?

If so, it will be decidedly to your advantage to install

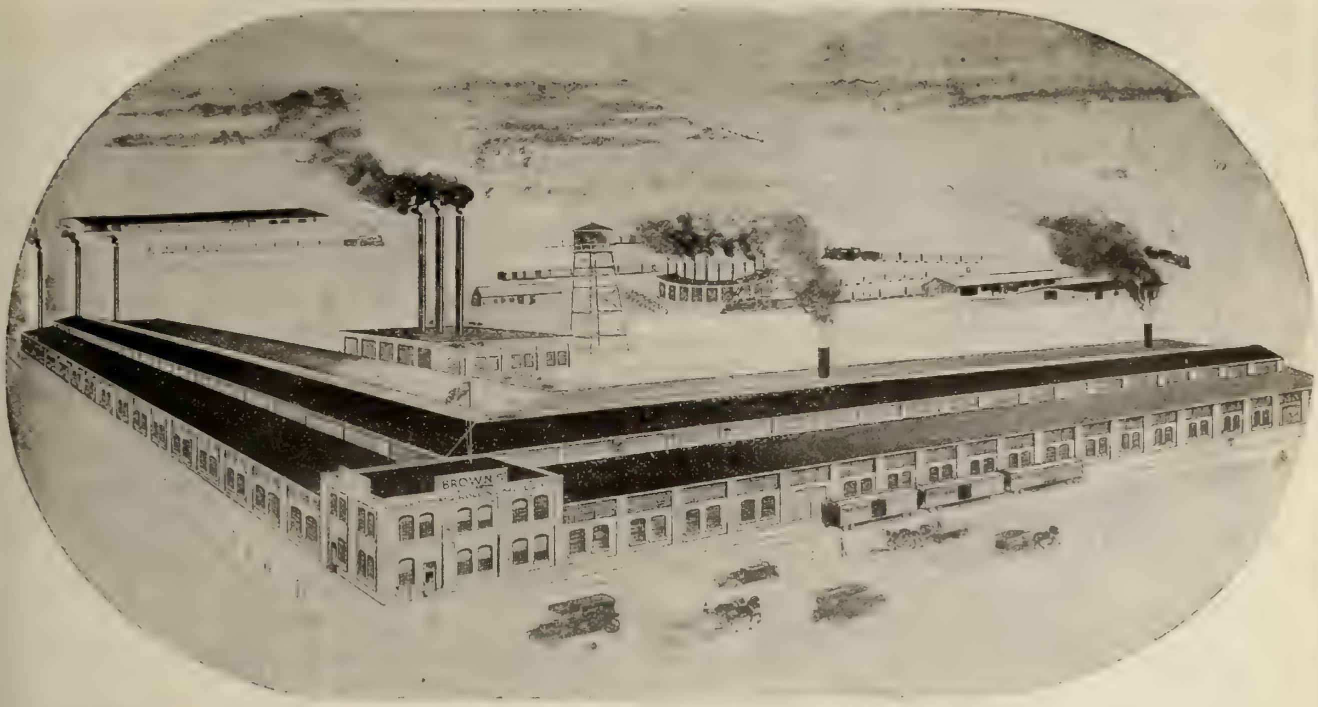
"Chicago" Automatic Screw Machines

They are not only equal to day and night service, but will economically turn out any screw machine product in minimum time.

Drop a card now for specifications.

READY FOR OPERATION IN YOUR PLANT IN LESS THAN SIX WEEKS from the time your order reaches us.

The John MacNab Machinery Co., 90 West Street NEW YORK.
European Representative: John MacNab, Hyde, England.



Bronze Brass

COPPER & BRASS
BROWN'S
QUALITY
ROLLING MILLS

Gilding Metal in Sheets, Rolls, Plates and Rods

QUALITY is embodied in all our products because our reputation and experience are behind it. We could not afford to risk the production of poor quality material; our business is too large. Our prices and deliveries will surprise you. Get in touch with us.

Special Marine Bronze Rod for Shafting and Bearings.

Beaver Brass Rod for drilling and free turning.

Beaver Brand "Spinning Brass."

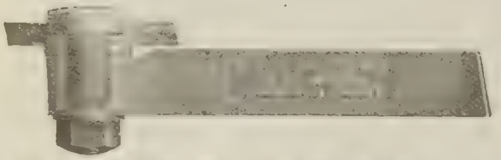
Can We Help You?

Brown's Copper and Brass Rolling Mills, Limited

General Offices and Mills - - - NEW TORONTO, ONT.

Williams' "AGRIPPA" Tool Holders

"THE HOLDERS THAT HOLD"



The Planing Tool with thirty-six angles of adjustment may be used on shapers or for heavy turning on lathes.

The Threading Tool with lockable spring head will do roughing, finishing and threading at one setting in the tool post.

Their P.P.I.E. "Grand Prize" was only an incident. The satisfaction they are giving is what counts.

A tool that performs both cutting-off and side work by the mere substitution of suitable cutters tells its own story of economy.

NO. 81 AGRIPPA BORING-TOOL HOLDER

The Boring Tool takes any size or shape of bar and requires no bushings. Its sleeve bar permits either straight or angular adjustment of cutter, without resetting.

Western Office and Warehouse
40 So. Clinton Street,
Chicago, Ill.

J. H. WILLIAMS & CO.
45 **RICHARDS STREET BROOKLYN, N.Y. CITY**
THE WRENCH PEOPLE

Secure "Agrippas" from your dealer with the assurance that WE guarantee them.

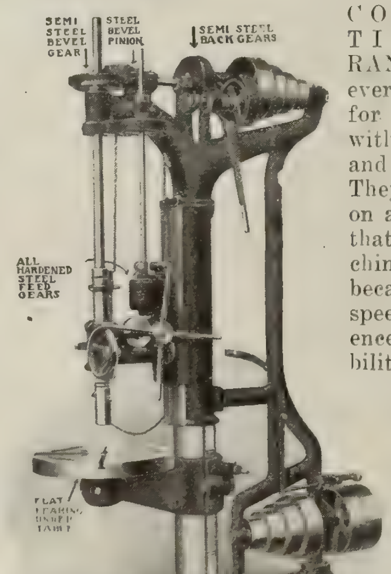
Gauges, Tools, Fixtures, Jigs, Dies

If you want something in jigs, tools or fixtures—if you have difficult die or gauge work, we will assume all your problems.

Your inquiry will receive prompt attention. Consult us at once.

Slocum, Avram & Slocum Laboratories, Inc.
531 West 21st St., New York, N.Y.

"AURORA" Drilling Machines



COVER AN EXCEPTIONALLY WIDE RANGE OF WORK, and every provision is made for handling this work within closest time limits and at lowest labor costs. They will save you money on any work in your shop that's suitable for machine tools of this kind because of their unusual speed, accuracy, convenience, strength and durability.

Ask for Details.

Stationary Head, sizes 20"-21"

Sliding Head, sizes 22"-44"

The Aurora Tool Works
AURORA - IND.

GARLOCK-WALKER MACHINERY CO. LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

WE HAVE AT TORONTO FOR IMMEDIATE DELIVERY:

New **Davis 6" Cutting-off Machines,** fully equipped, size of hole in spindle 6⅞".
New **Giddings & Lewis** 18" x 8' Heavy Duty Engine Lathes, 3-step Cone, Double Back Gears, regular equipment.
New Heavy Duty Lathes for turning 8" and 9.2" Shells.
Thor pneumatic hammers and drills.
Appleton Grinder—Challenge No. 1—slightly used.

Special 16,000 lb. 40" Boring Lathes for 6" Projectiles.
Immediate Delivery—Special Price—Write for Cuts, etc.
Good Delivery now on Lodge & Shipley 24" Lathes.
Ask for information about machines for any operation on 3", 4.5", 5", 6", 8" or 9.2" Projectiles.—Our Experience is at Your Service.

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

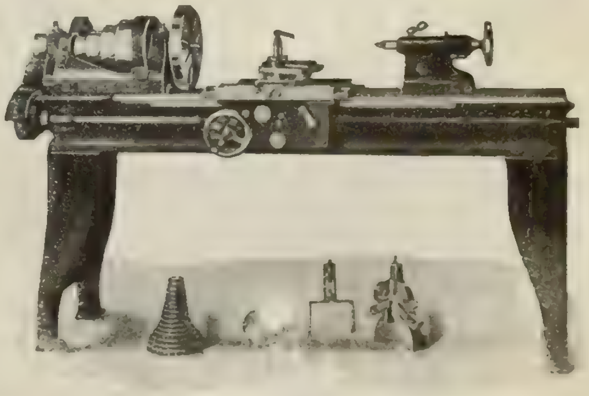
METAL and WOODWORKING MACHINERY of all Kinds

The "McKenzie" Engine Lathe

The Standard of Accuracy

Made from new patterns, of improved design, and constructed of the very best material by expert workmen. Every part is mechanically perfect and excellently finished. Its accuracy and durability mean a big saving of money to you.

Let us put full details before you. Write!



The Improved Power Hack Saw

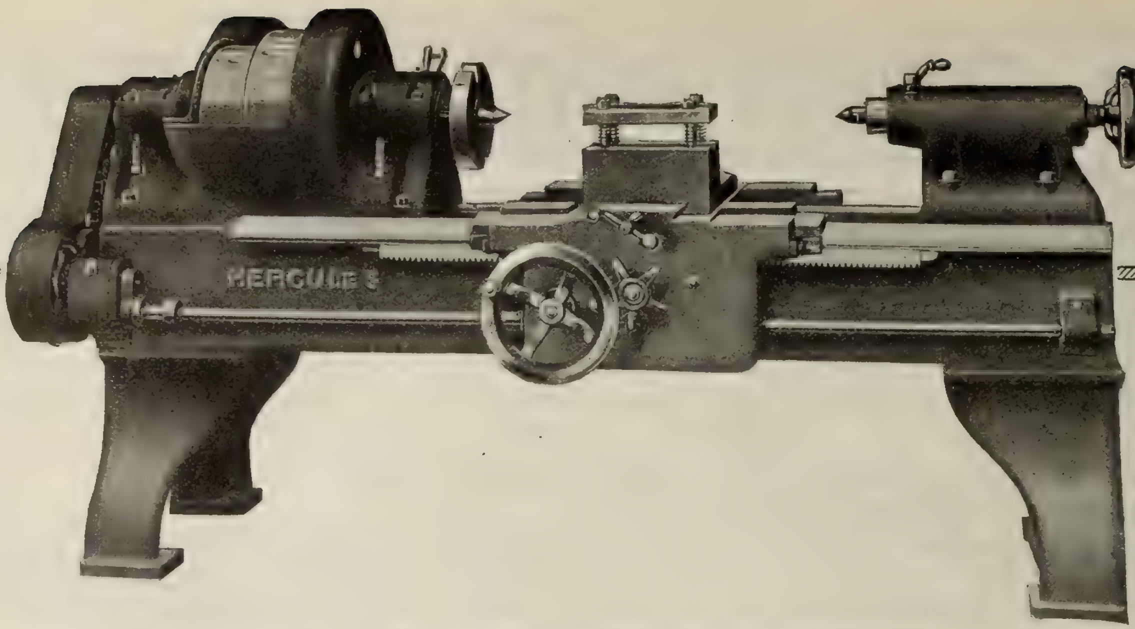
will cover its cost many times over with the money it saves through long, efficient service.

Saws bars 6 x 6 in., either round or square, and is so constructed as to require no attention after work is put in vise, and stops automatically when piece is cut off.

The improved Saw Guide is a Special Feature—it keeps the saw perfectly in line at all times.

The D. McKenzie Machinery Company

Guelph, Ontario



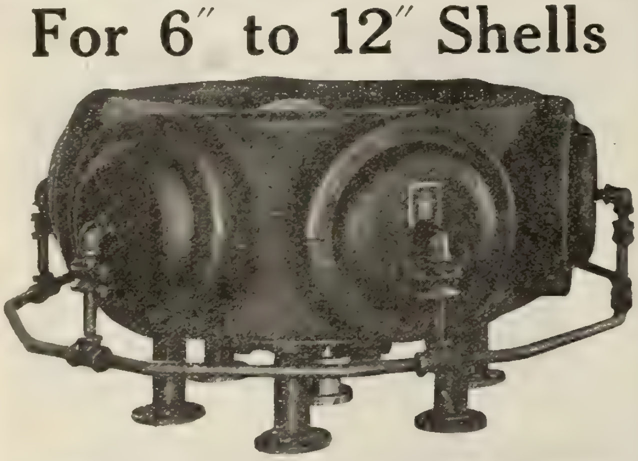
There's Nothing Fancy About the "Hercules," but—

when it comes to turning—well, just watch it. When you have a tough job of straight or taper turning the very absence of frills and special attachments is a decided advantage. That's the idea behind a "Hercules"—a lathe that can handle work requiring sheer strength and power. Its extreme simplicity avoids confusion in operation and facilitates quick handling. When you realize that the majority of lathe work is plain turning, there are possibilities in the "Hercules" well worth considering. Early deliveries. Write us now.

Investigate our Turret Screw Machines

Himoff Machine Co., 128 Mott St., New York City

For 6″ to 12″ Shells



"Metalwood" Banding Press

Has a remarkably sturdy construction. It stands up to the most severe service and constant use.

While the price of this press is somewhat higher than others on the market, customers who have used both unhesitatingly prefer our machine, even to the point of discarding other types.

Rams—6—Semi-steel 11″ diameter. Move of each ram ½″ or more if necessary. All rams returned by levers on plate with heavy Vanadium Steel Spring. Cylinder—Removable, of alloy steel.

Hydraulic inlet to cylinder 1¼ pipe. Distributing ring 2″.

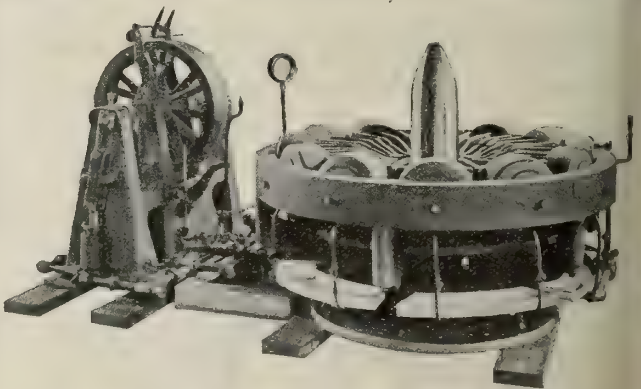
All pipe, seamless steel tubing; all fittings, drop-forged steel. All parts under strain, alloy steel castings or forgings.

Dies 6, forged chrome nickel steel, hardened and removable, without disturbing any part of press by loosening 2 nuts.

Weight 9,500 lbs.

Can be operated either from accumulator or pump.

Metalwood Manufacturing Co.
Leib and Wight Sts., DETROIT, MICH.



The New "West" Banding Press

For 9.2″ and 8″ shells

12 Cylinders; Ample Power; Ample Strength; Reasonable Price.

NO ACCUMULATOR REQUIRED.

The West Tire Setter Co.
255 Mill Street, Rochester, N.Y.

PRESSES

Made in Canada

Hydraulic Presses, Pumps and Accumulators for all purposes.

WRITE FOR PRICES AND DELIVERIES

WILLIAM R. PERRIN, Limited
TORONTO, CANADA

A Combination of Rigidity, Accuracy, Simplicity and Ease of Operation

Bodies are inclinable and convenient for handling dies and material. Slides are long and well gibbed.

BLISS

Inclinable Power Presses

reduce the maintenance cost of both machine and tools.

Built in eighteen sizes.

Adapted for many operations in the manufacture of tin cans, pieced tinware, metal packages, brass goods, electrical goods, trimmings, etc.

Catalog 2-G, decribing them, sent on request.

E. W. Bliss Co., No. 20 Adams Street
Brooklyn, N.Y., U.S.A.

Chicago Office: Peoples Gas Co., Bldg.
Detroit Office: Dime Bank Building

"TOLEDO"

Open Back Inclinable Power Presses

Stand out as the foremost machine for all-around efficiency.

The increased bed area and die space—new form of knock-out in slide, hammer forged Pitman screw and crank shafts, new pattern inclining attachment, are but a few of the advantages.

Twenty sizes from 250 to 9,000 lbs. weight and adapted to nearly every kind of blank cutting, forming, perforating, drawing, shaping and combination die work.

The Toledo Machine & Tool Co., Toledo, Ohio

Elmes Hydraulic Press No. 676

With ¾-in. Automatic Lever Operating Valve No. 677-A

This press is of steel and semi-steel construction, and the stands which support the press are threaded at the ends to receive the steel columns and have holes for fastening to the floor. The platen is guided by the columns.

The operating valve is attached to the cylinder, and is designed with a weight to be set for the pressure desired, and releases automatically. To start the ram up, the lever is pushed down; upon the ram reaching the desired pressure, the lever automatically releases (acting as a safety valve as well), causing the ram to descend. Valve body is made of bronze, and other parts are made of tool steel and machine steel. If desired a hydraulic gauge can be attached to show the various pressures, although with this valve it is not necessary.

Write for our Hydraulic Machinery Catalogue.

Charles F. Elmes Engineering Works 217 N. Morgan St.
Chicago, U.S.A.

Over 50 years' experience building hydraulic machinery.

Cincinnati ALL STEEL Machine Vises

There's a solid, crouching strength about these vises. Look how they lie on the table.

And yet they're light in weight. Because they're all steel. Without the movable jaw and tail-piece you can lift one with one hand.

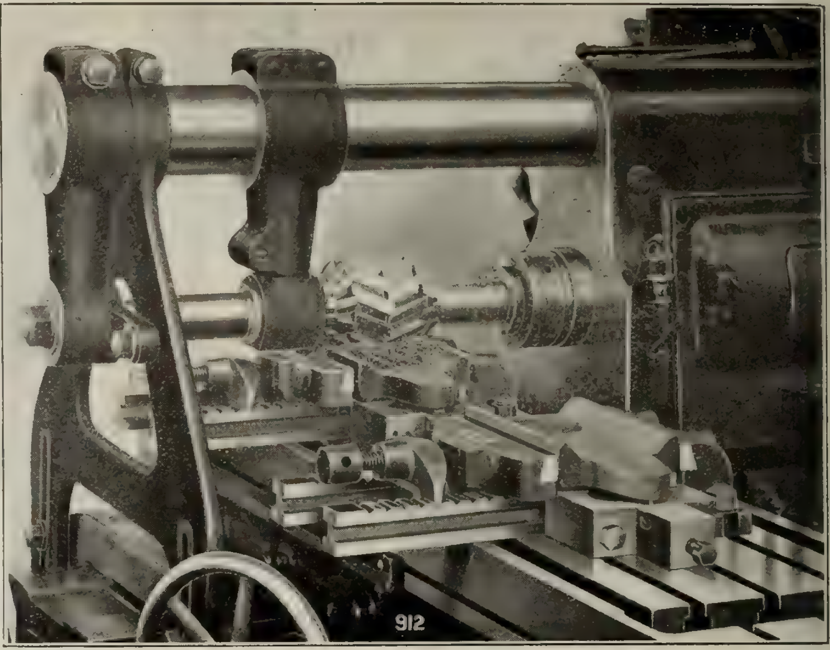
Rugged—you can drop it on concrete without damaging it.

Strong—the heaviest cuts won't tear out the clamped piece.

Quick-acting—Universal Range.

We shall be glad to put the full particulars before you.

INCIDENTALLY this shows some excellent milling results on the Cincinnati No. 4 Miller. The pieces milled are clamps for one type of our Semi-Automatic Machines. The cutters are 6" diameter, 42 r.p.m., 12 6-10 feed. The width of cut is 7", 3-16 stock removed. The milling time, including chucking, is 6 minutes. The best previous time we had on this work was 17 3-10 minutes.



The Cincinnati Milling Machine Company

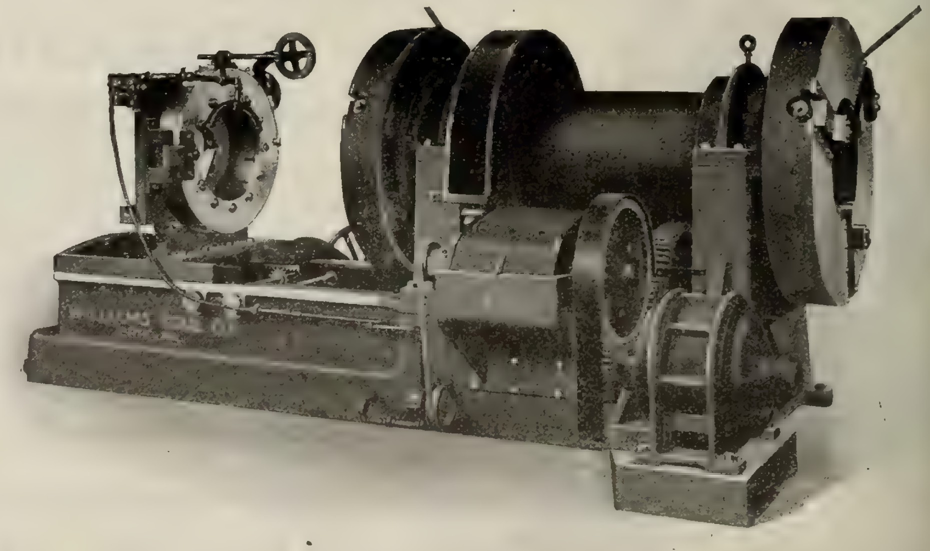
Cincinnati, Ohio, U.S.A.

CANADIAN AGENTS:

H. W. Petrie, Ltd., Toronto, Ont. H. W. Petrie of Montreal, Ltd., Montreal, Que. Taylor Engineering Co., Ltd., Vancouver, B C.

WILLIAMS PIPE MACHINES

Received Highest Award at Panama Exposition



The Following Letter Explains Why:

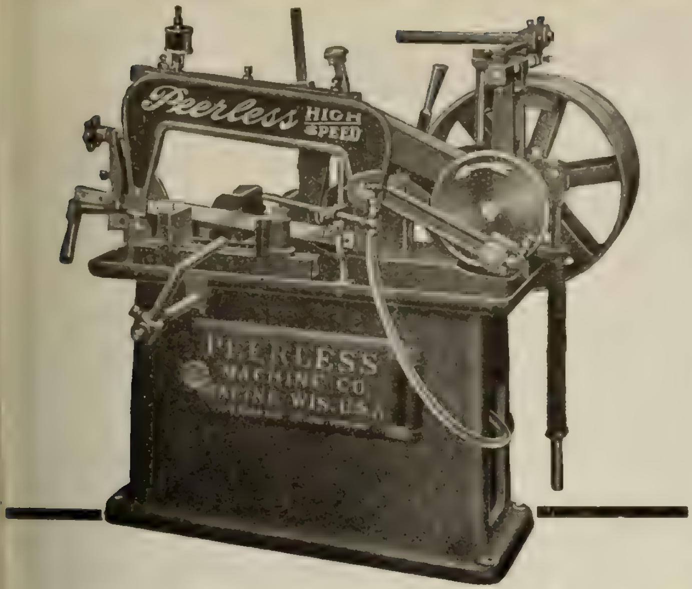
Williams Tool Co., Erie, Pa.: Rochester, N.Y., 12-3-14.

Gentlemen:—We are so pleased with our No. 3 Pipe Machine, and it is doing such splendid work for us at a minimum of expense that we are now considering the advisability of displacing two smaller machines for one of your No. 1½ or No. 2 motor drive.

The machines which we would displace, if we make a change, are belt drive, are (names of two of the oldest and best known machines on the market) equipped with nipple holders, extra dies, etc. Both of these machines are still in fairly good condition. On what basis could we make an exchange with you?

Yours very truly, SAMUEL SLOAN & CO.

WILLIAMS TOOL CO. - - - ERIE, PA.



"100% Better, Faster and More Reliable

than any Sawing Machine we have ever used; we have had almost all makes of Sawing Machines manufactured."

Just what a customer in Toledo, Ohio, reports after a thirty days' trial.

You don't have to take anybody's word for it, try it out under your own conditions. You are under no obligations if it fails—remember we also pay the freight both ways.

Not only 100% more production, but saves 100% floor space. These problems have handicapped many manufacturers for some time. They an now readily be solved by the Peerless High Speed Heavy Duty Metal Cutting Saw.

Write us for complete description and references. Some of these machines may be working in your vicinity.

Peerless Machine Co., 1607 Racine St., Racine, Wis.

ONE BLADE on this machine does what SIX of the same kind will do on any other

The Racine Metal Cutting Machines are exceedingly easy on the blade, BUT THEY FAIRLY EAT THE METAL.

One reason for the greater blade life is the **Positive Automatic Lifting Device** which lifts the blade clear of the work on the non-cutting return stroke.

Another reason is the **Saw Frame Guide** which positively prevents springing, and insures greater accuracy and there are many other reasons that we will be pleased to put before you.

The Racine is a metal cutting machine that will effect an immense economy in your plant.

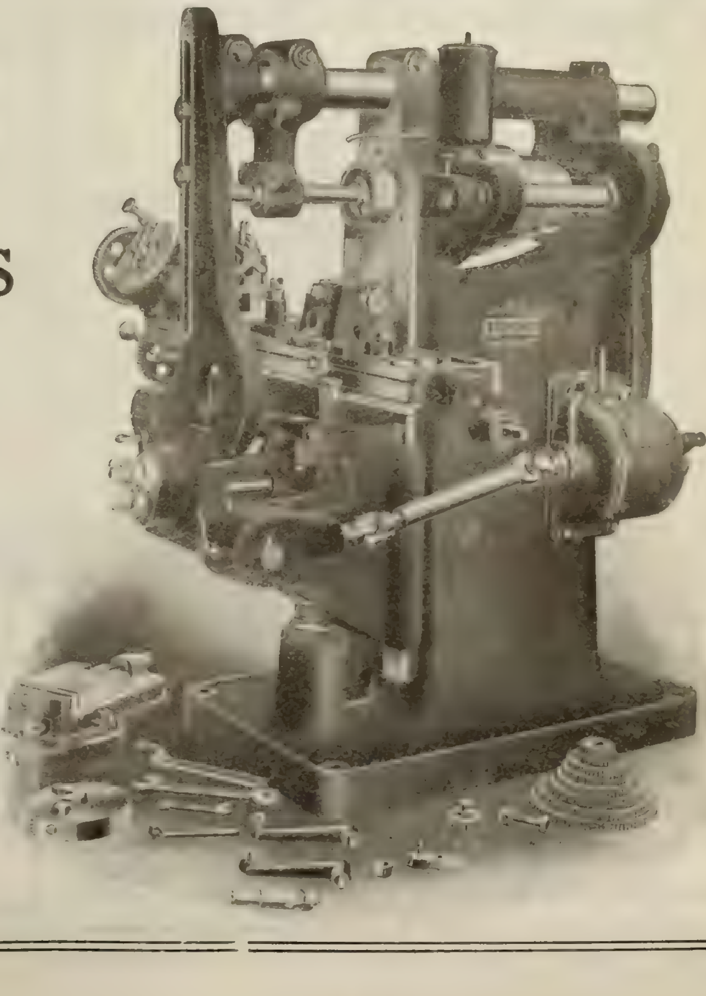
Many Canadian plants are on our list of users. One Canadian Steel Company is using 120 Racine machines and has saved $11,019.00—particulars of saving will be sent on request.

Racine Tool & Machine Company

15 Melbourne Ave., Racine, Wisconsin U.S.A.

KEMPSMITH

UNIVERSAL MILLING MACHINES



Are built in three standard sizes. They embody every worth-while feature to be found on a tool room Milling Machine

We call especial attention to the Dividing Head which is part of the regular equipment of every Universal Miller.

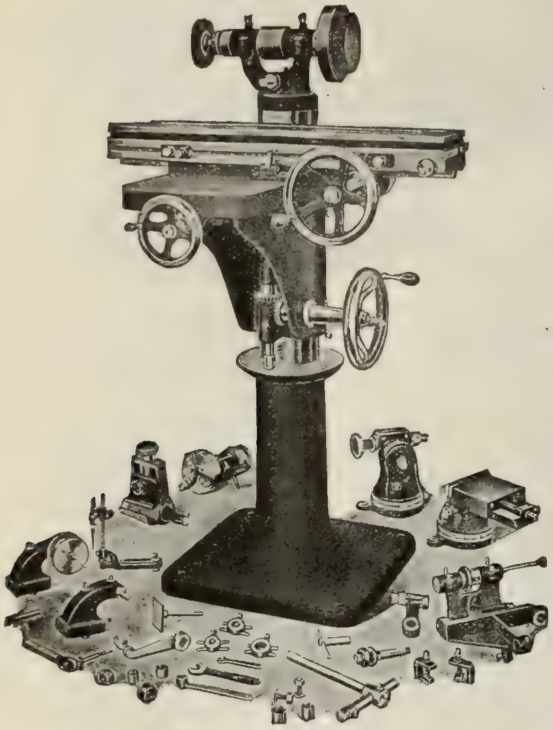
The Kempsmith Dividing Head is compact and rigid, unusually convenient in operation and so constructed as to maintain its accuracy under heavy service.

We publish a thirty-two page book elaborately illustrating and describing this Dividing Head. A copy will be sent free on request. Just ask for "Dividing Head Book."

Kempsmith Manufacturing Co.

MILWAUKEE, U. S. A.

Agents:—Foss & Hill Machinery Co., Montreal
General Supply Company, Toronto and Ottawa
Western Supply and Equipment Co., Calgary



The Greenfield

Universal Grinder

For General Tool Room Work

This Grinder is furnished with attachments for grinding all sorts of milling cutters, reamers, counterbores, and other machine shop tools.

It is also suitable for cylindrical, internal and flat work which frequently turns up in the making of tools and jigs.

These attachments are all very simple in design and easily adjusted upon the machine, being graduated so that any desired angles can be at once obtained.

The whole machine is thoroughly well built, well finished and will be found a dependable, convenient grinder.

Greenfield Machine Company

Greenfield, Mass., U.S.A.

The "Steno" Duplex Surface Grinder

Ask us to tell you how

perfect work can be done on two different jobs by two operators at the same instant.

THE STENOTYPE COMPANY, INDIANAPOLIS, INDIANA, U.S.A.

Manufacturers of the "STENO" Duplex Surface Grinder, the "STENO" 1" x 7" Turret Hand Screw Machine and "STENO" Milling Cutters, Reamers, Fixtures, Jigs and Gauges.

Assuming that you want a grinder that is better than the average—

A grinder with massive table, micrometer adjustments, very long knee and gibs, and extra heavy head- and tailstock—it will pay you to investigate the

Standard No. 6
Universal Grinding Machine

In addition, you'll find that the headstock is fitted with large bearing for chuck spindle and with special bronze bearings of navy specifications, spindle is tapped and tapered, bored to take wheel arbors and bearings are 1 in. in dia. and 2¾ in. long, and an exceptionally simple and sturdy countershaft with self-lubricating bearings.

Start the investigation by sending for the full details—to-day.

Simmons Machine Co., Inc.

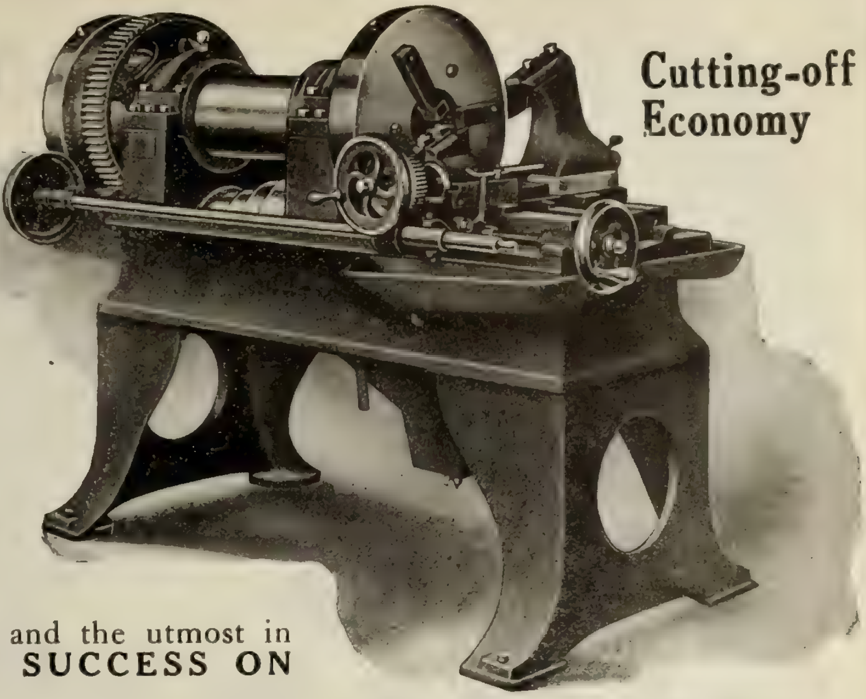
1001 Singer Bldg., New York City
981 Broadway. Albany, N.Y.

Two Cuts

Simultaneously

One up, the other down. This is what makes the **Hurlbut-Rogers Cutting-Off and Centering Machine** virtually double the output and reduce the cost per piece about one-half.

The Hurlbut-Rogers Machine gives you capacity of two machines at the expense and in the floor space of one machine.



Cutting-off Economy

5-inch Cone-Driven Machine

We build them for hard work and the utmost in accuracy—and their **GREAT SUCCESS ON SHELLS** shows it.

Let us go into details.

HURLBUT-ROGERS MACHINERY CO., South Sudbury, Mass.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle-on-Tyne. H. W. PETRIE, TORONTO, CANADA.

U. S. Electric Drills and Grinders

Save Time, Labor and Money

They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

3 SIZES
3-16 inch, W.G.T. 6 lbs.
¼ inch, W.G.T. 9 lbs.
⅜ inch, W.G.T. 12 lbs.

All motors wound for 110 or 220 volts.

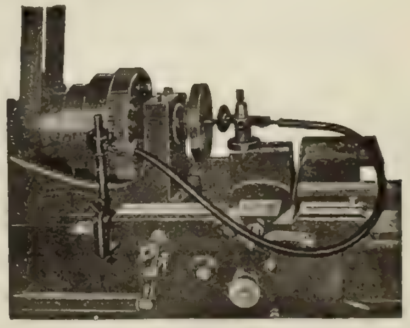
Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.

½ inch—2 SPEED.
Speed, 400-750 R.P.M.

For Sale By
The Canadian Fairbanks-Morse Co., Limited
Montreal. St. John, N.B., Toronto. Winnipeg. Calgary. Vancouver.

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO



CENTER GRINDER

(Improved)

CHEAP! PRACTICAL! DURABLE!

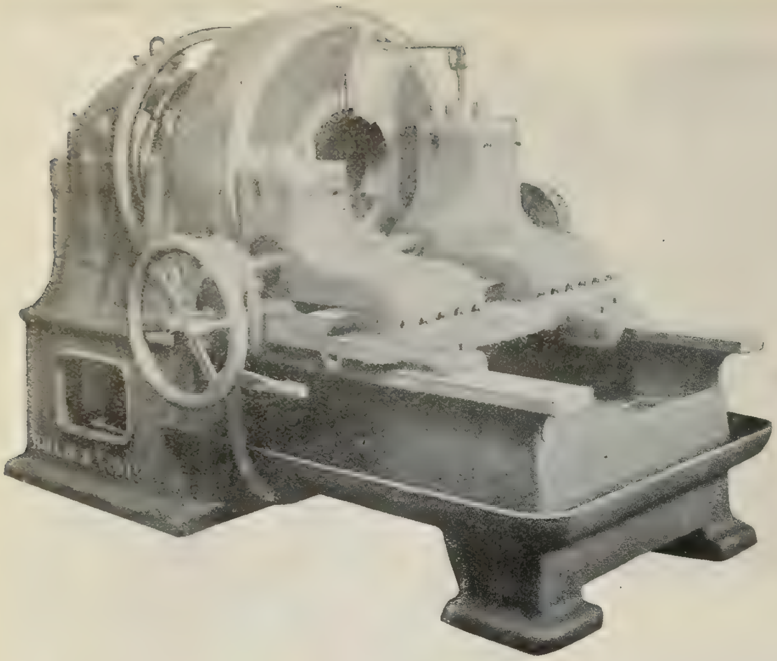
The most popular tool of its kind on the market. Adjusted in a moment.

An occasional use will keep your Lathe centers in perfect order.

Stow Mfg. Co.

Binghamton, N.Y., U.S.A.

London, Eng., Stock, 85 Queen Victoria Street.
Oldest Portable Tool Manufacturers in America.



Cut illustrates our No. 12 cutting-off machine for cutting-off and facing 6", 8", 9.2", 10" or 12" shells.

The bed of the machine is of the box lathe type, with sufficient weight and strength to give great rigidity under the severest strain.

We manufacture a full and complete line of machinery used in the manufacture of shrapnel, 4.5, 60-Pr. and 10" shells.

Cutting-off machines range from 1½" to 12".

For cutting off the open ends.

For facing off the closed ends.

For facing off projecting ends of plugs.

For cutting off bar stock.

For cutting off ingots, any size.

Pipe lathes ¼" to 18".

Double and single head nipple cutters.

Roller pipe cutters.

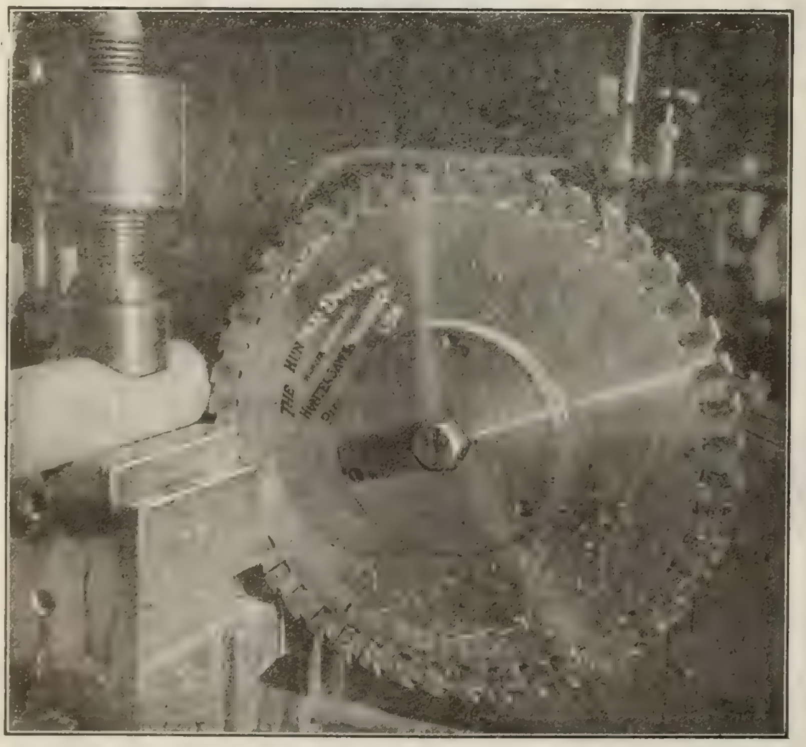
Let us tell you the nearest point at which you can see some of our machines in operation.

John H. Hall & Sons
Limited

Brantford Canada

Manufacturers of Pipe Threading and Special Machinery

A Hunter "Duplex" on Shrapnel Stock



FAST GOING
on Newton Machine

Through 3½" round 60 Carbon, 70 Manganese Shrapnel Stock every

2 MINUTES

The secret of Hunter "Duplex" Saw speed is the method of holding the high speed teeth.

You can use this speed profitably—on shrapnel or any other stock.

Let us send full Particulars.

HUNTER SAW & MACHINE COMPANY, Pittsburg, Pa.

VAN DORN ELECTRIC DRILLS

Are Not General Purpose Devices

They are particular tools for particular purposes, and each and every tool embodies only those features of design, material and construction which have been proved out during the manufacturer's thirteen years of specialized experience in the manufacture of portable electric drills.

A sure sign of distinctive merit is the fact that "Van Dorn" Drills drill more holes in this continent than all other together, and in many more varied products.

VAN DORN tools are remarkable in their economy and durability.

Drop us a card for catalog. It gives full particulars.

R. E. T. Pringle, Limited
Manufacturers' Agents
OFFICES:
Tyrrell Bldg., 95 King Street East, Toronto
809 Unity Bldg. - Montreal, Que.
3402 Osler Ave. - Vancouver, B.C.

The Ford-Smith Machine Company

Ford-Smith

27" x 19" x 7½"

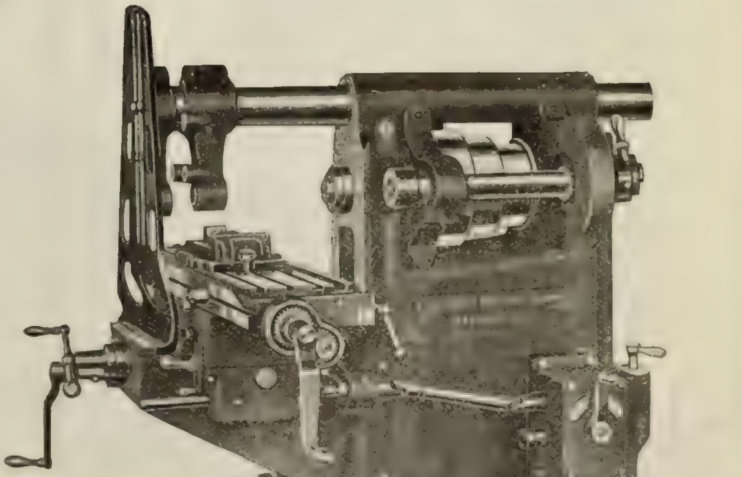
Milling Machines

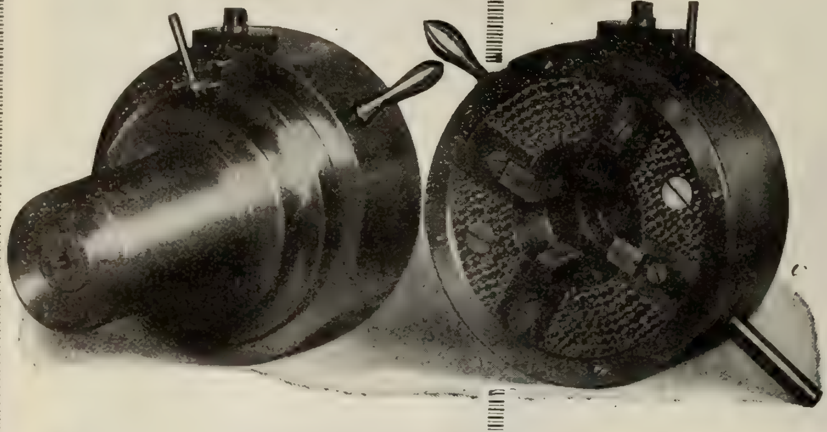
At one time it was believed that the manufacture of an up-to-date Milling Machine in Canada was impractical, but since the Ford-Smith Miller has been placed on the market, opinions have changed in this regard.

This Machine is not a Tool designed for Munition Work only, but embodies all features found on Modern Millers and is one of our Regular Lines, not merely a War Product.

We will be pleased to give further information upon Request, and at present we can make Interesting Deliveries on these Machines.

The Ford-Smith Machine Company, Limited
HAMILTON - CANADA





Modern Tool Co.

State and Peach Streets
ERIE : : : -- PENNA.

New York Office: 50 Church Street
Chicago Office: 32 N. Clinton Street

Resident Engineer and Export Agent:
F. Wesley Parker, 2 Rector St., New York

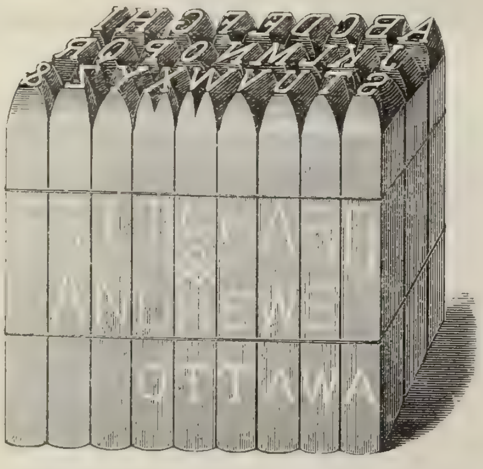
Die Heads

Self-Opening
Adjustable

Promote the efficiency of the work you are doing and the scope of the work you can do in your thread cutting department. A single cut gives you a finished thread. Realize the great saving to be made there? See the possibilities in your own plant? And those threads are finished with microscopic accuracy in diameter, pitch, form and lead.

The self-opening heads and adjustable feature are worth while in themselves. Head may be thoroughly cleaned without dissembling. Clogging is unknown. Cuts close to a shoulder.

Canadian Agents:
Rudel-Belnap Machinery Co. - - - Montreal



STEEL STAMPS

FOR MARKING SHELLS, ETC.

We will Give You Satisfaction on All Work of this Kind

SEND FOR PRICES

Pritchard-Andrews Co., of Ottawa
General Engravers and Die Sinkers
264 SPARKS ST. OTTAWA, CANADA

SAWS FOR SHELLS

We have experimented on the

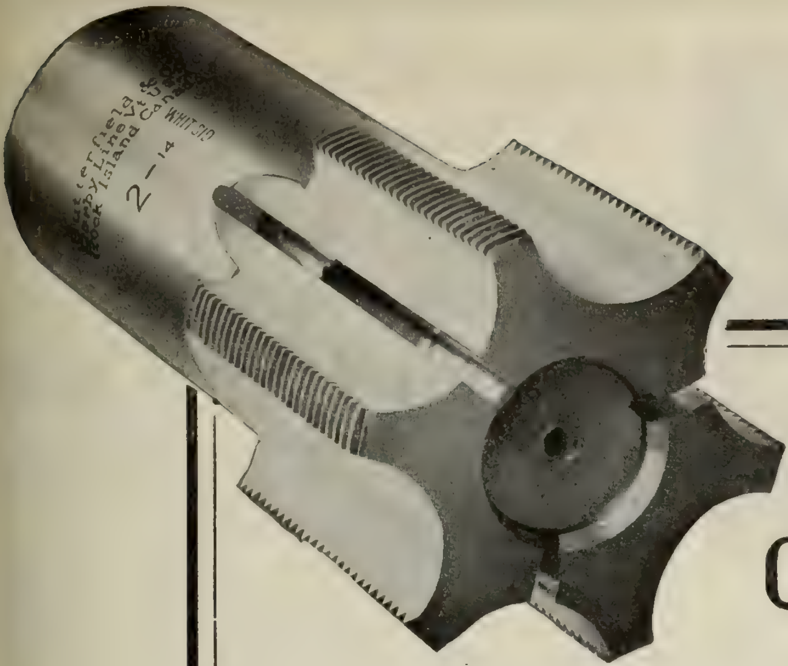
SPECIAL SHELL STEEL

and have produced a *HACK SAW BLADE* that will give unequalled service on this material in *HIGH-SPEED MACHINES.*

Possibly we could help you.

"VICTOR BLADE—CANADIAN-MADE."

Victor Saw Works, Ltd.
Hamilton, Ont., Canada


Butterfield
Derby Line Vt
Rock Island Canada
WHIT STD
2-14

ON TIME!

These Butterfield High-Power Tools will help you get out your rush work on time. They are built to stand up under the heavy strain of exceptional production. Look at them! See their strength! Their compact, rigid design. We have developed this line of Taps especially for shrapnel and shell work.

The name "Butterfield" on your taps, dies and reamers is a guarantee of quality—a mark of superiority. We build into every one the experience of thirty-five years devoted to the manufacture of high-grade tools.

That is what makes Butterfield quality. We have a new catalog. Let us send you a copy.

Butterfield & Co., Inc.
Rock Island,
QUEBEC

Toronto
Office:
1505 Traders
Bank Bldg.,
Phone Main 1382.
H. A. Harrison, Mgr.

Butterfield & Co
Derby Line, Vt. U.S.A.
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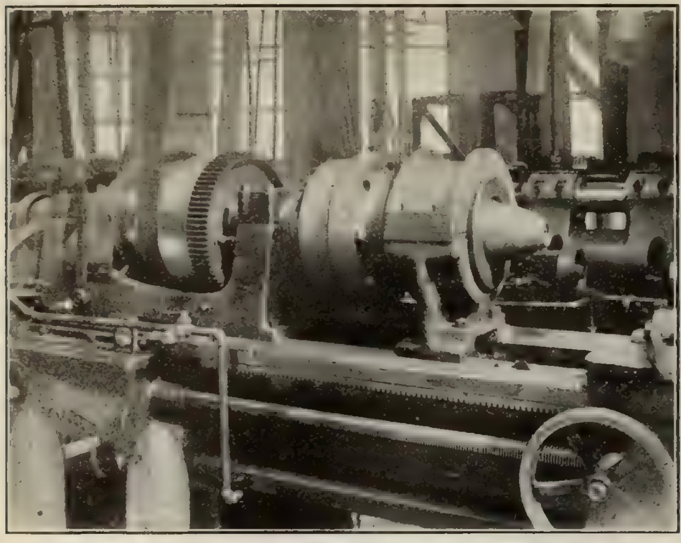

Cut shows Chuck on nosing operation. This is one of over two hundred in this Canadian plant.

This chuck is *built on the duplicate part system. It is simple, effective and fool-proof.*

It grips the shell in a predetermined position. The jaws will not slip on the shell. It has shell interior and exterior adjustable stops.

A trial on one of your lathes will convince you that this is THE Chuck for shell work.

A Big Efficiency Unit in Your Shell Plant

A. J. LAVOIE'S
LOW PRESSURE
Compressed Air Chuck

This chuck can be applied to any make of lathe, withou alteration to the machine, and will increase productio from 25% to 75%. It grips and releases the shell while i motion—no need to stop your machine.

It is a single unit combination attached to the face plate o lathe, supported by an additional heavy duty bearing, thu making a heavy duty lathe out of a light machine. small lever operates the chuck.. Will operate with pressure of 60 lbs. per sq. in.

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The Montreal General Tool Co
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Also manufacturers of shell tools, and special machine attachments of all kinds made to order.

The "IDEAL" Die
for
Shrapnel

Quick, accurate work in threading Fuse Plugs for Shrapnel Shells is essential if you would make maximum profits. Your field is unlimited and your output governs your income. **Why not give the special type "C" Ideal Die a hard trial at this work and see if it will not boost production for you?**

Let the "IDEAL" cut the threads that bind you to low production. They will fit your machines. Circular on request.

"IDEAL" is a *different* die. The head revolves around a stationary thereby utilizing the belt power or cutting strain as opening pow Chasers are supported directly back of cutting strain, which will rem any tendency to bell out and cause taper threads.

The Ideal Tool & Mfg. Compan
BEAVER FALLS PA., U.S.A.
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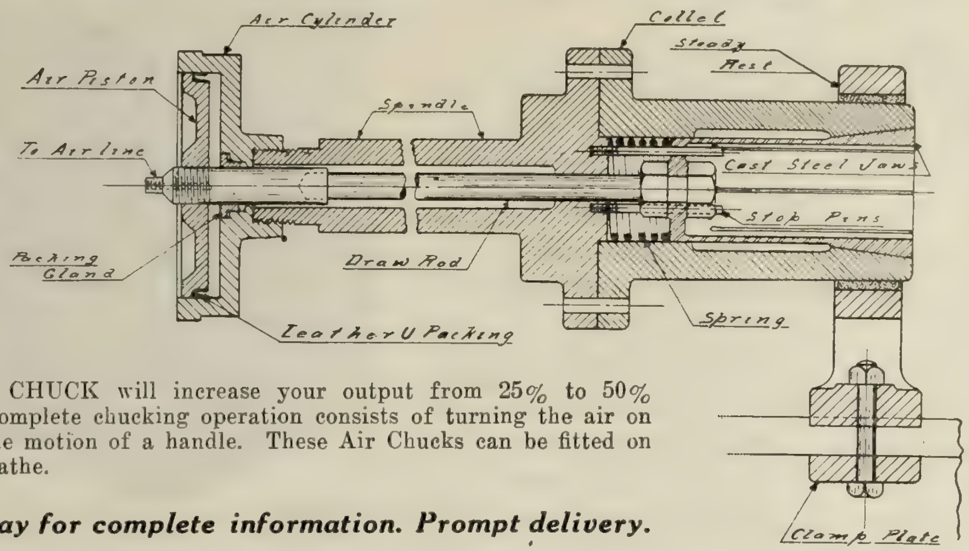
With most screw chucks you have to use brute force or the hammer to tighten, and even then your shell is not always rigid.

H.E.W. AIR COLLET CHUCK IS RIGID

Saves Time

Saves Money



H.E.W. AIR CHUCK will increase your output from 25% to 50% because the complete chucking operation consists of turning the air on and off, by the motion of a handle. These Air Chucks can be fitted on almost any Lathe.

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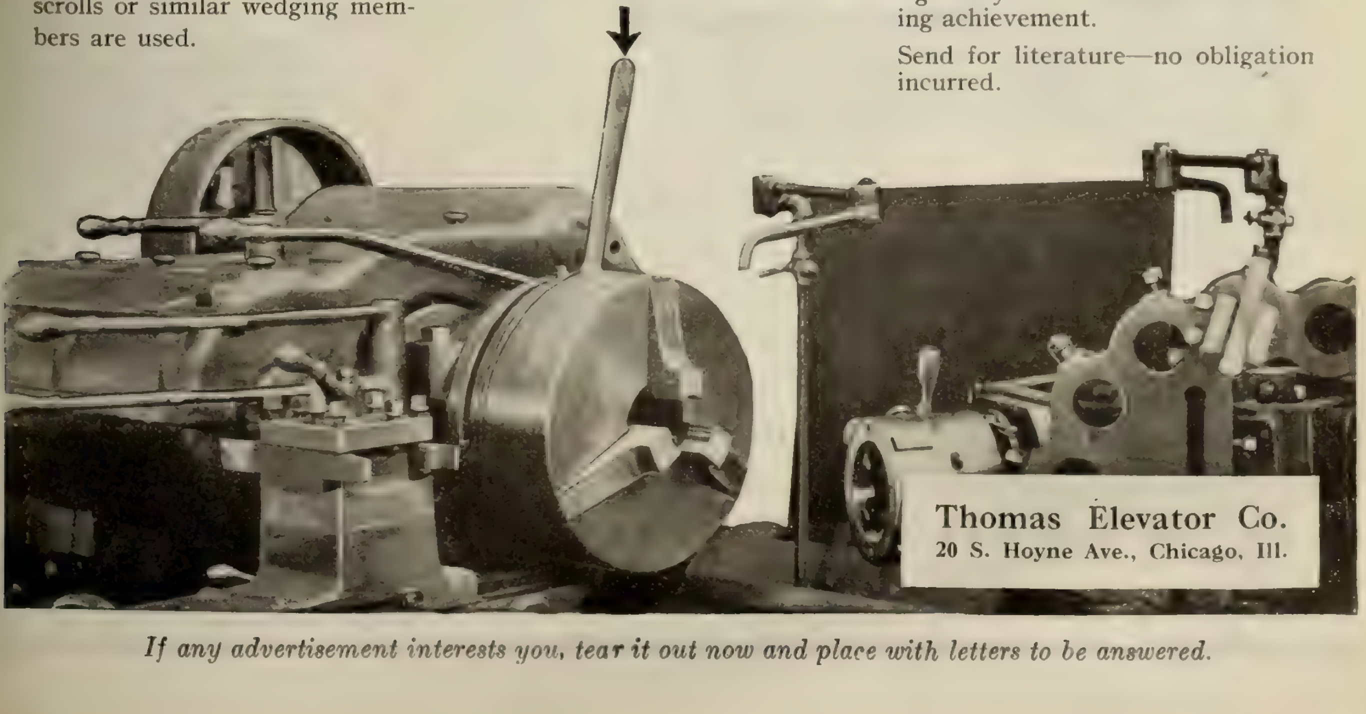
by using Barker Wrenchless Chucks

In transmitting the movement from the cam to the jaws of a Barker Wrenchless Chuck a leverage principle is involved which eliminates to a large extent the tremendous frictional loss incurred in chucks where scrolls or similar wedging members are used.

Operating mechanism combined with the chuck proper forms a single unit—no time lost in mounting—quick acting—opened and closed while the machine is in motion—these and many other vital points on this new but established departure in chucks may rightfully be considered a striking achievement.

Send for literature—no obligation incurred.



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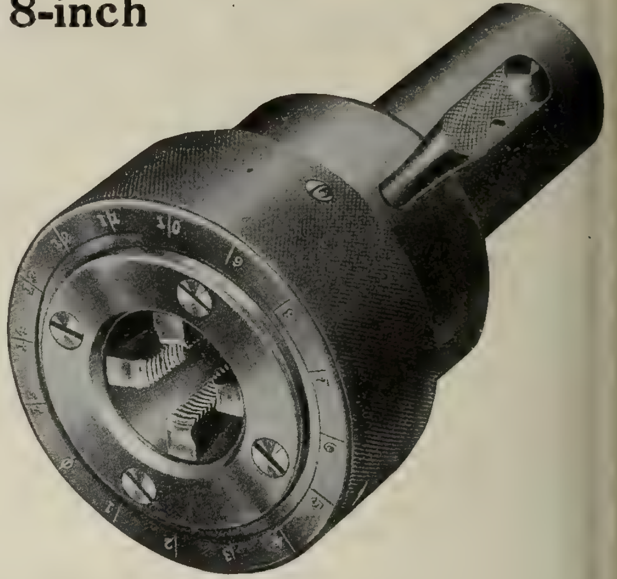
Very extensively used on 6-inch, 8-inch and 9.2-inch shells



MAKERS ARE finding that Murchey Collapsing Taps and Automatic Self-Opening Dies are paying propositions on this kind of work. We can tap any size hole from 1 inch to 12 inches. All chasers used on shell work absolutely guaranteed to be made of the highest grade of high-speed steel. Get the benefit of our experience and the experience of some of the biggest shell manufacturers in the country. Let us tell you about the savings. Send blueprints. Write to-day for catalog.

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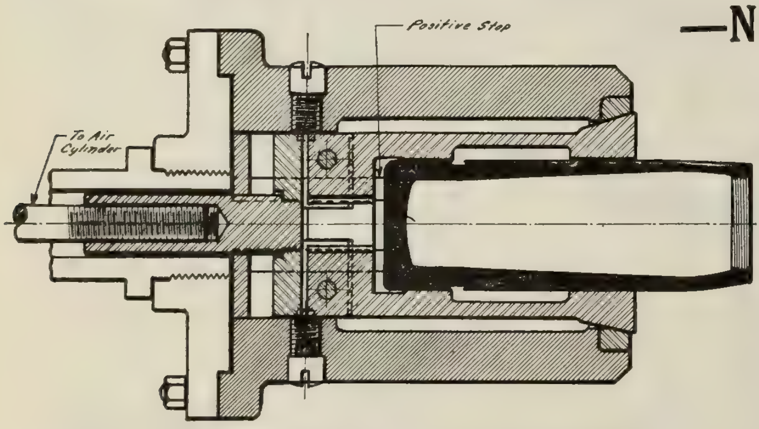

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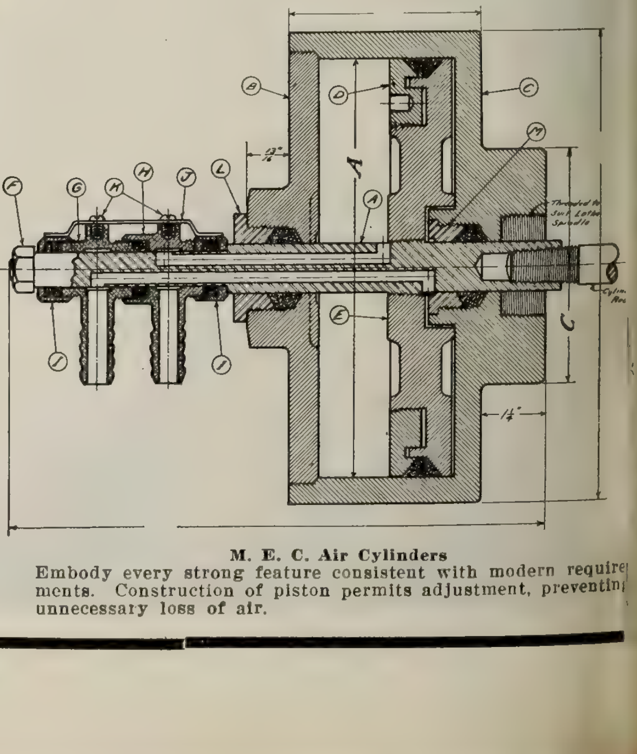

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Embody every strong feature consistent with modern require ments. Construction of piston permits adjustment, preventin unnecessary loss of air.

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The "Keith" Fan is the one that will give you continued and unqualified satisfaction.

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with the new box-column type

Heavy Duty "Rockford"

Drilling Machine

This Rockford machine tool meets the most exacting requirements.

It is **STRONG, RIGID, ACCURATE AND FAST,** with individual features. Built in three styles.

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16 in. Lever POST DRILL

A Giant Little Machine For Light Drilling.

Will drill up to ⅞ inch.

The Feed Lever Socket is adjustable on the feed shaft, to provide for setting the lever in the most convenient position for the operator.

An adjustable friction is provided for the feed shaft, which acts as a balance to the weight of the spindle.

Bevel Gears, Feed Pinion and Rack are all machine cut, working smoothly and without noise.

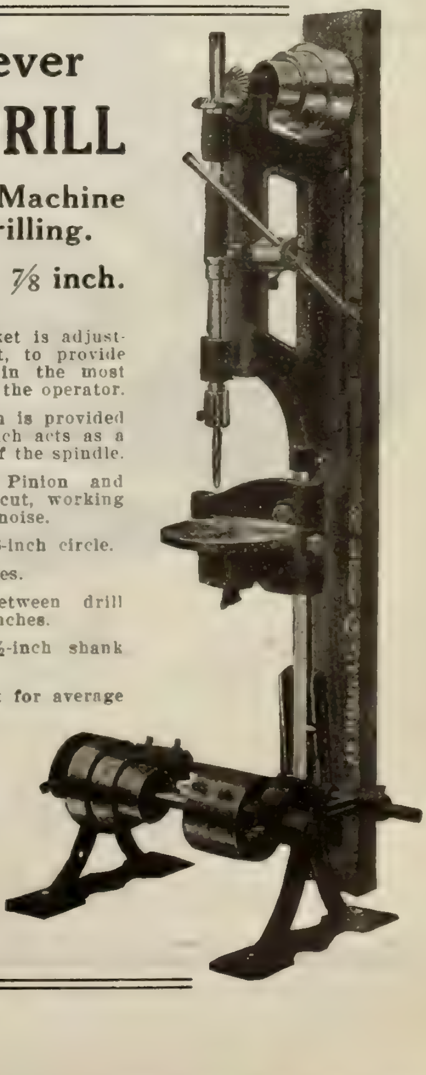
Drills to centre of 16-inch circle.

Run of feed 5¼ inches.

Greatest distance between drill spindle and table, 22 inches.

Spindle bored for ½-inch shank twist drills.

Speed of countershaft for average work, 300 per minute.



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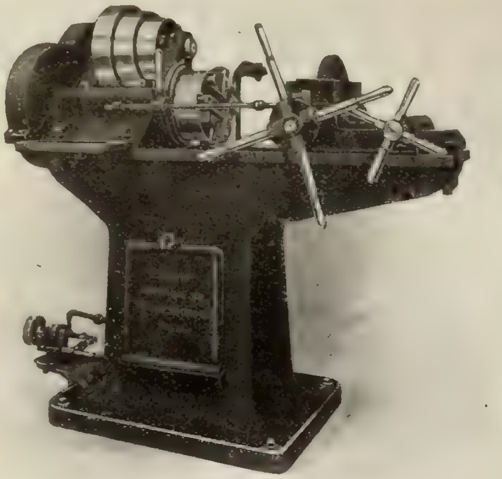

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That is why the Landis die is conceded to be the most efficient threading tool on the market.

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Let us show you.

Catalogue No. 22.

LANDIS MACHINE COMPANY

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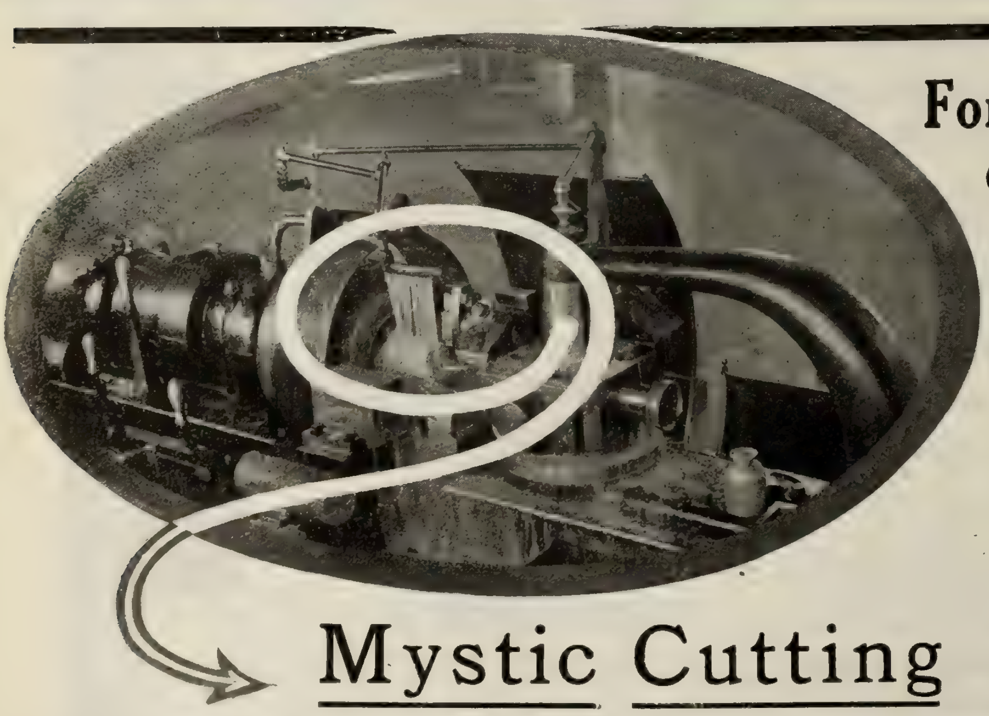

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A free-flowing, unsaponified animal oil lubricant. Does not separate in solution, grow rancid or cause rust. It is non-combustible and contains nothing injurious to operator's hands.

Let us demonstrate **free of cost** what Mystic Compound can do for you.

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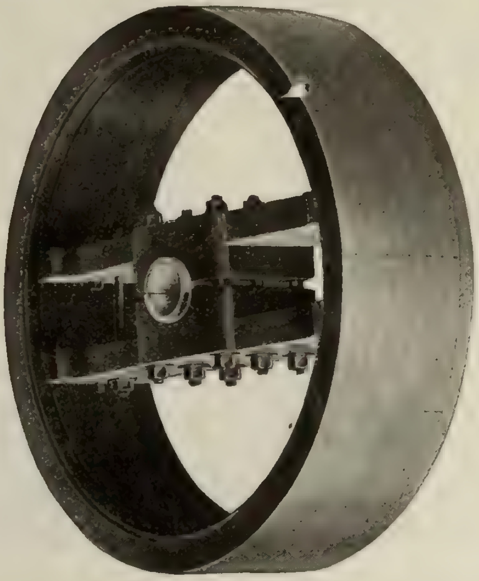
No Keys

No Set Screws

In Perfect Balance



Lighter

Stronger

Better Belt Surface

The Dodge Standard Wood Split Pulley

The Wood Split Pulley is better than either cast iron split pulleys or steel split pulleys for the following reasons—

The wood pulley is lighter, stronger, better balanced, and provides a very much better belt surface. It costs 33 1-3% less money and provides 50% more returns in horse-power value. It may be run at very much higher speeds with no danger of bursting—also it may be had quicker and in a greater range of sizes.

It costs less to get—less to put on—and less to keep.

We make approximately 300 Dodge pulleys every day—everybody uses them.

There are more Dodge pulleys making ammunition than any other kind—you can get them quick.

Every pulley is thoroughly nailed. Every pulley is guaranteed for Double Belts.

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DODGE MANUFACTURING COMPANY

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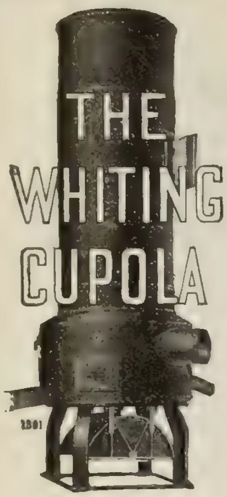

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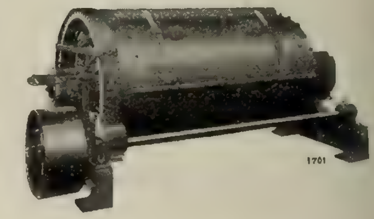

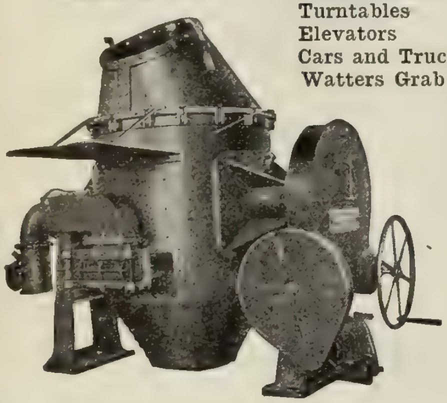

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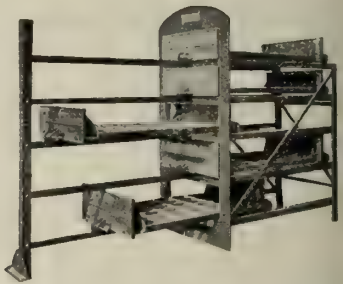

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MISS FAY DAVIS

As Hero, in "Much Ado About Nothing"

"One doth not know
How much an ill word may empoison liking."

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The Babbitt Metal without a fault is one of our specialities and worthy of its reputation as the Best Babbitt Metal for all

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We Guarantee every pound to give

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If he cannot supply you, send to our nearest factory.

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Have we succeeded? Let the following facts answer:

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We introduced steel working parts in place of iron used on other hoists making a longer wearing, safer hoist and at the same time cutting down repair bills. We made the patented Loop Hand Chain Guide a part of standard equipment. This guide prevents gagging of the hand chain, no matter at what angle or at what speed it is operated. This is another safety feature, the value of which was quickly recognized.

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greatly reduces cost of producing

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or any factory product where numerous operations are required.

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Yours truly,

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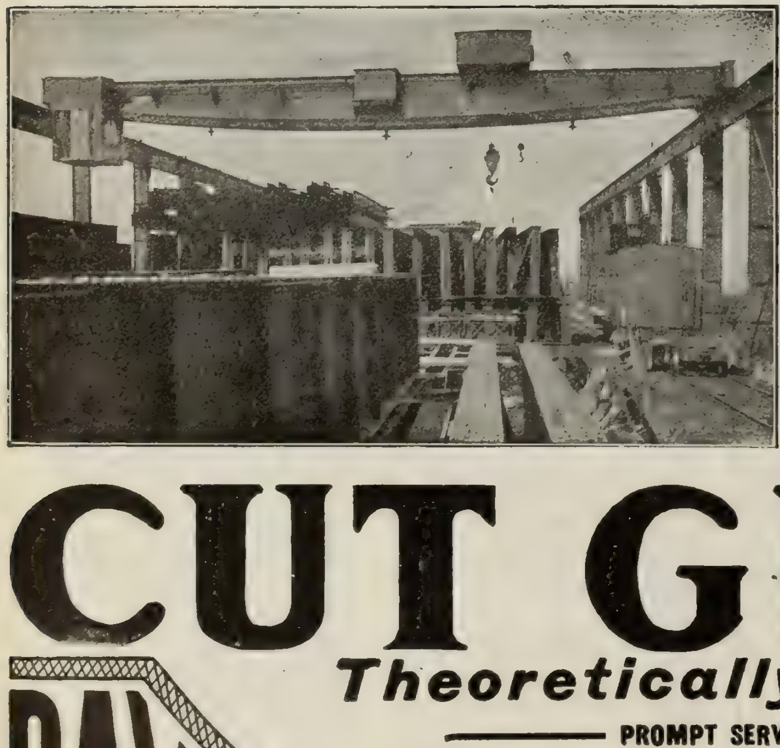

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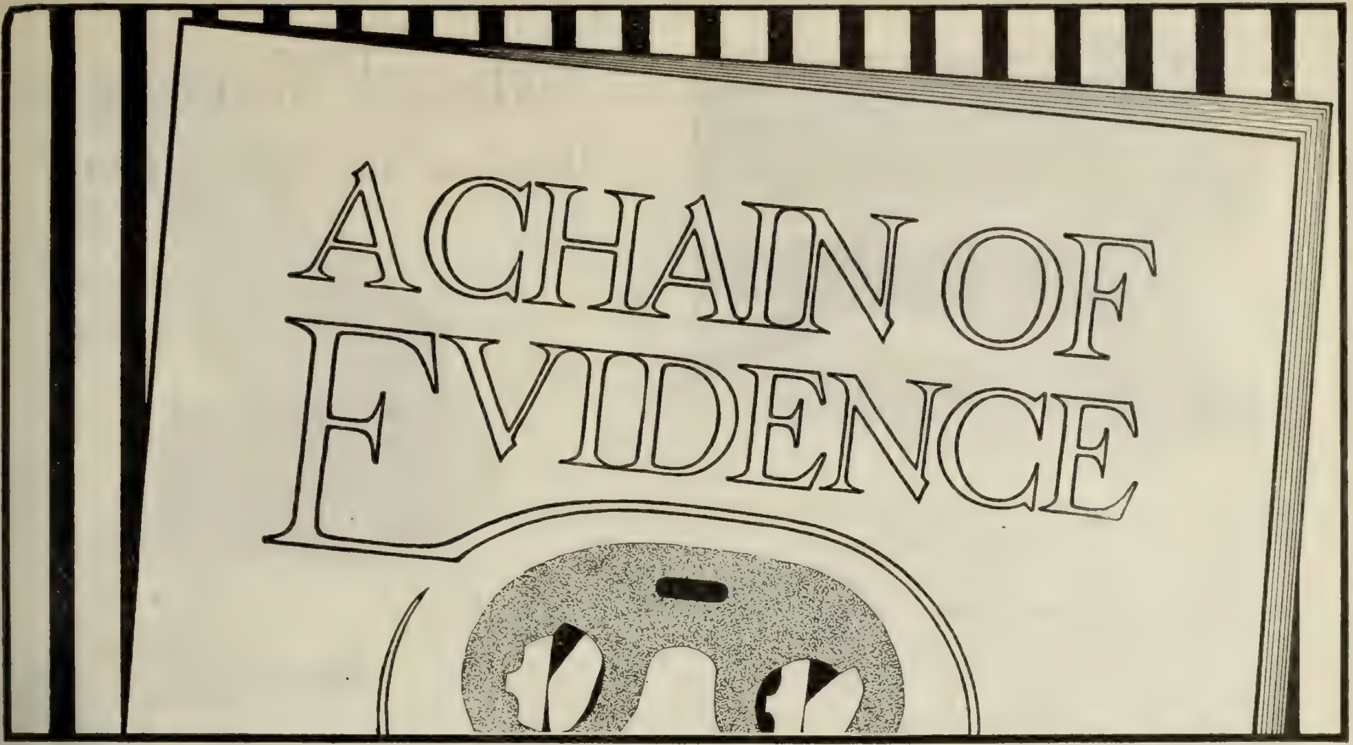

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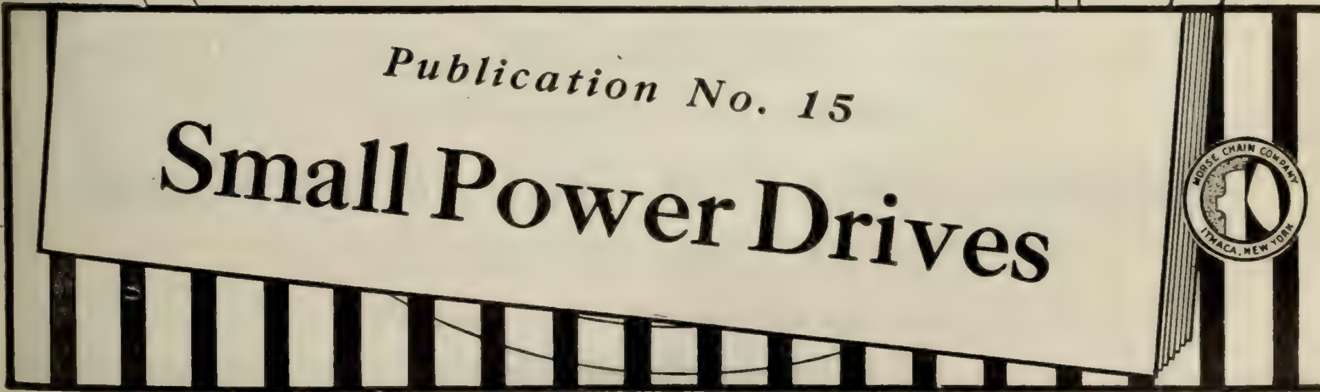

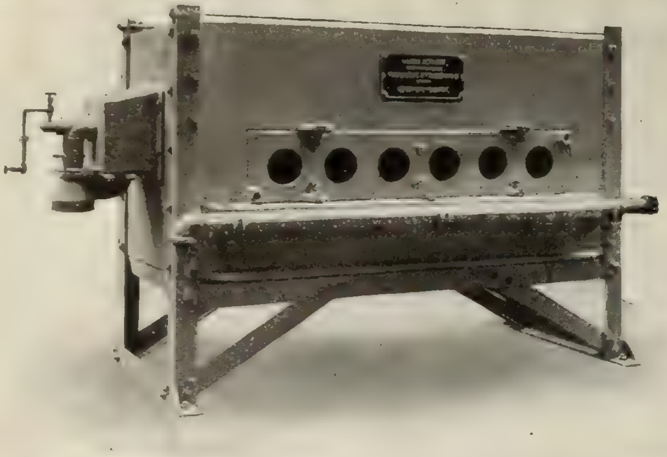

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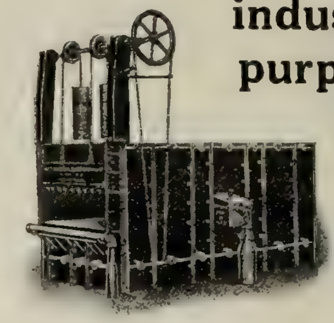

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A Clean Workshop without Smoke or Soot.
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No chimneys or flues required.
Instantaneous and perfect control of temperature.
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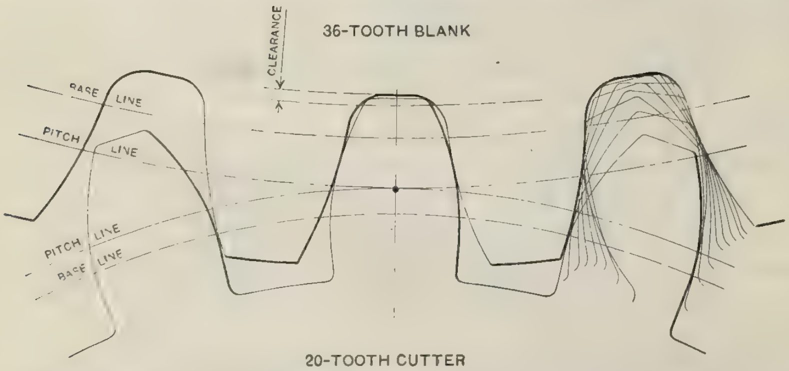

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By our process of cutting gears, the tooth bears on its whole face, making it wear longer and run smoother.

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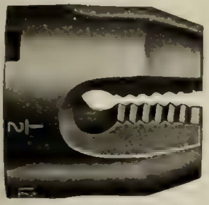
Die and Holder



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Let the ACORN DIE Cut Your Threads

The adjustment is mechanically perfect—simply turn the cap and all the prongs of the die converge equally—a great advantage over the spring die.

The Acorn Die Holder is smaller in diameter than any other die holder of equal cutting size.

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The photograph shows the machine grinding one of these rods, the tapered body of which is 30 inches long. The shaft is a drop forging, the finished small diameter is $1\frac{3}{8}$ in., and the large diameter $1\frac{7}{8}$ in. From 0.020 in. to 0.030 in. is removed—enough to clean up all lathe tool marks—the rod coming to the grinding machine after a roughing lathe cut only has been taken.

The wheel used is a Norton Alundum, 24 x 2 x 5 in., grain 24, grade M, running at a periphery velocity of 6,000 ft. per minute.

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1	Langelier No. 1 Drill, F.O.B. Providence	90.00	1 week's shipment	New
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9	Barnes No. 7 15" plain vertical drills ....each	96.00	Toronto	New
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1	Type DU. ½" capacity Portable Electric Drill; universal motor	100.00	Toronto	New
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4	Norton No. 1 Universal Tool and Cutter Grinders	....	February shipment	New
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15	Burke No. 1 Hand Bench Millers ....F.O.B. Conneaut	120 00	3 weeks shipment	New
1	Pratt & Whitney No. 2 Plain Milling Machine	954 00	Toronto	New
1	Brown & Sharpe No. 1½ Universal Milling Machine with vertical attachment	2,320.00	In transit	Used

The Canadian Fairbanks-Morse Co., Limited, Toronto

Shrapnel Shell Manufacture

By C. T. R.

In view of the recent stimulus given to the output of 18-pdr. shrapnel, the accompanying article may not come amiss even if only by way of comparison as regards development in processes, methods and devices, employed.

AT the plant under review, where 18-pdr. shrapnel shells are being manufactured, there existed a well equipped machine shop, so that a comparatively few new tools were required when the plant was turned over to the manufacture of shells. Some special equipment was of course required, such being necessary for this particular class of work. Existing machines were, however, tooled up and arranged in such a manner as to interfere as little as possible with the ordinary business of the firm. An interesting feature at this plant is the employment of women, who are engaged at present on the lighter operations such as washing shells, filling, and inspecting, etc. The experiment, it is understood, has been entirely successful.

The sequence of operations follows in a general way the order usually observed in most shrapnel plants. The first operation, that of centering the base, is done on a Cincinnati drill, the forging being held on a suitable fixture, which is pivoted at the base to permit the shell being handled without moving the drill table. The fixture, properly attached to the table, is thus always in the same position relatively with the counterbore in the drill spindle.

Cutting Off and Rough Turning Body

At the second operation the open end of the forging is cut off to an approximate length on a Davis cutting-off machine, with two cutting-off tools located on the front and back of cross slide respectively. Two Davis machines are installed for this operation. The outside diameter of shell is then rough turned for about two-thirds of its length, the nose end being machined later. The nose end is held on a short taper mandril on the lathe spindle, while the base centre is on the tailstock. One roughing cut only is necessary. The lathes installed for this operation were supplied by the McGregor, Gourlay Co., Canada Machinery Corporation, Lodge & Shipley, and Walcott & Wood.

Cutting Off and Finishing Base

The fourth operation consists of cutting off the base on a Davis cutting-off machine, there being three such installed. The machines are of the same type as used for the second operation, two tools being used, located on the cross slide for front and back.

The next operation is to finish the base and form the radius. This is done on an Alfred Herbert turret lathe, the turret holding a fixture with a facing cutter in the centre, and another small tool at the side for forming the radius.

Inside Bore, Powder Pocket, Diaphragm Seat and Outside Nose Profile

The sixth operation consists of roughing and finishing the inside bore, powder cup pocket, diaphragm seat, roughing outside nose profile, and facing up the open end. Four Warner & Swasey turret lathes are used for this work, each being equipped with a collet chuck fitted with a hand-operated draw back mechanism. The turret holds four tools for the inside operations, while the tool for forming the outside profile is held in a tool post on a cross slide. The first minor operation is to rough turn the outside nose profile, the tool in tool-post as noted above, being used. The open end of nose is then faced up with a slight bevel by a tool on the turret. At the third minor operation the inside bore of shell, powder cup pocket and diaphragm seat are roughed. The cutters are fixed in a boring bar held in the turret and are adjusted to do these operations at one time. A similar tool is used for finishing the inside bore, powder pocket and diaphragm seat. At the conclusion of this operation the shell is cleaned out with compressed air and carefully gauged.

Waving, Grooving and Under Cutting

At the next operation, which is the seventh, the copper band groove, waving and undercutting is done. One McDougal and one Butler lathe, both equipped with a

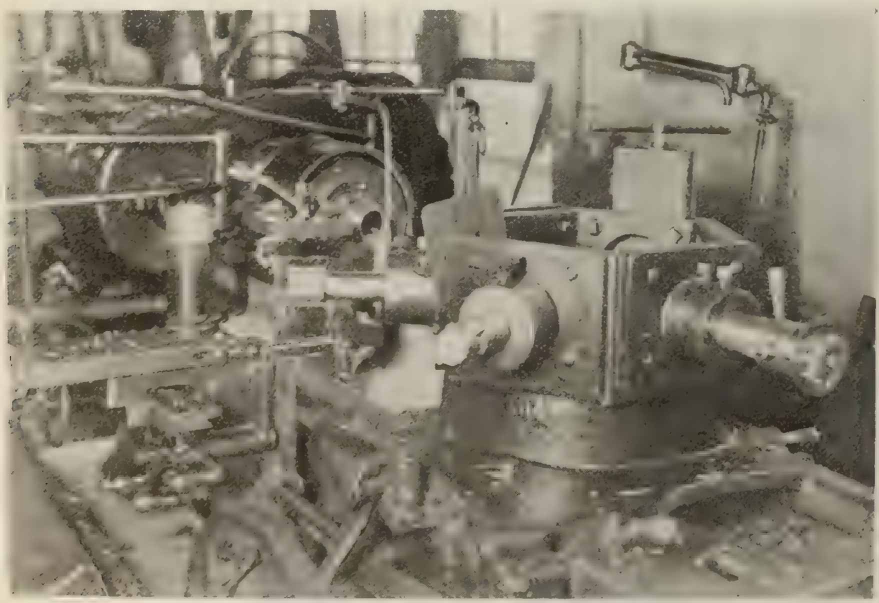
HEAT TREATING AND SHELL NOSING.

Bertram waving attachment, are used for this work. The shell is held in a chuck with the usual 3-point cam fixture on the face, while the base of the shell is carried in a cup centre on the tailstock mandril. The grooving and waving tool is situated in the front, and the undercutting tools at the back, all tools cutting at the same time.

At the eighth operation, that part of the outside diameter of shell between the groove and base is finished. The outside diameter above the groove is finished after heat-treating. A Fitchburgh lathe fitted with an air chuck is used for this operation, the tool being held in the tool post or front of cross slide.

Nosing and Heat Treating

The first series of machining operations have now been completed and the shell is ready for nosing-in, after which follows the heat-treatment. What was originally a somewhat delicate process in the production of shrapnel shells is now comparatively easy and there are now few rejections due to improper heat treatment. Improved methods and equipment and a better knowledge of the requirements have all tended to produce more satisfactory results. Before nosing-in, the shells are heated in a Tate-Jones furnace fired by natural gas. The furnace is rectangular in form and will take nine shells at once, each shell being put in a separate hole, nose end only. A heavy power press is used for nosing-in, the shell being held in a box chuck on the table and the dies in a fixture on the ram above. The shells are cooled gradually, being placed nose down in powdered mica during the process.



CUTTING NOSE THREADS, FINISHING INSIDE AND OUTSIDE PROFILES.

The heat-treating plant consists of three circular Tate-Jones furnaces heated by natural gas. Each furnace will hold about twelve shells at a time, the temperature being around 1,500 degrees Fah. The temperatures in the furnaces are indicated on a Canadian Hoskins Co. electric pyrometer. After being in the furnace about half an hour, the shells are taken out and quenched in a tank containing heavy oil. They are next dipped in a soda bath to remove the oil.

SHELL MACHINERY. WARNER & SWASEY LATHES IN FOREGROUND.

The shells should now have the required degree of hardness, but have to be tested on a scleroscope in order to ascertain precisely what this degree is and if it is sufficiently near the required limit to pass inspection. A test piece has already been taken from one shell selected at random from each series. This is tested for tensile strength and should agree approximately with the reading on the scleroscope. Before being tested on the "Shore" scleroscope, the shells are buffed on a polishing wheel so that greater accuracy may be obtained in the readings. A series of tests are made at various points, the shell being turned round by the operator for this purpose. The shells are now ready for the next machining operation and are taken back to the machine shop on trucks.

Boring and Threading Nose, Inside and Outside Profile

The eleventh operation consists of boring and threading the nose, and finishing the inside and outside profile. A battery of three Warner & Swasey turret lathes are installed for this work. These machines are exactly the same type as are used for the sixth operation, inside bore, etc., the tools only, of course, being different. The outside profiling tools, two in number, are situated in the tool post on front of cross slide, while the tools for the inside work are held in the turret. The tool for rough turning the outside profile is first of all placed in position at the end of nose and the boring tool on the turret is also placed in position. Both tools start cutting simultaneously. When the boring is completed, a cutter at the base of the boring tool faces up the nose. The turret is then moved round to the next position, and a reamer is put through the nose for the finishing cut. The next tool in the turret is a Murchey collapsible tap, which cuts the threads in the nose.

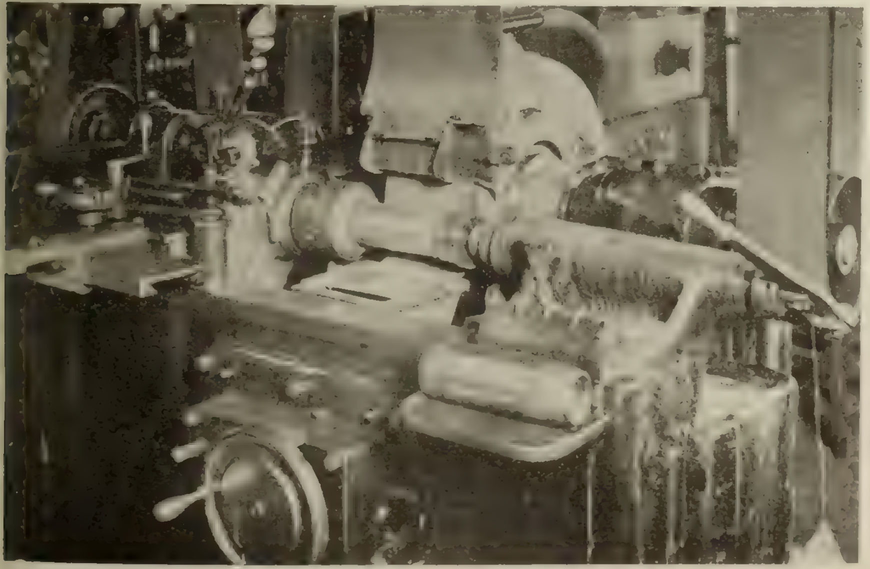
The following operation is finishing the inside profile. The tool used for this purpose is held in a special fixture in the turret. The tool post works in vertical slides on the fixture, and is placed inside the nose and then against the inside of shell to finish the profile. When this operation is finished, the tool is moved out, the turret swung round, and the next tool finishes the nose bevel or socket seat. While the turret operations are being performed, the outside profile is being turned. The first tool, already mentioned, while roughing the profile is travelling in the direction of the headstock. When the roughing cut is finished, the tool post is moving round and the second tool is placed in position to begin the finishing cut. The feed, however, is reversed, so that the tool travels back, away from the headstock towards the end of nose.

Finishing Outside Shell Body

The outside of shell body has up, to this stage, been finished except the straight part between the copper band groove and point where the profile begins. The straight part is finished on a Ford-Smith grinder. Two large grinders installed for this operation, as well as two smaller machines. The method employed is essentially the same for all the grinders. The shell base is held in a chuck and the nose in a cup centre. The large grinders have a broad wheel and the shell is stationary, whereas the smaller machines have narrow wheels and the carriage with the shell travels backward and forward. The larger machines are fitted with a wheel trueing attachment. This completes the twelfth operation.

Cleaning and Crimping Operations

There now follow a series of minor operations. The first of these is to take the shells to the sand blast to have the base and groove cleaned. They are then washed, first in a soda solution and afterwards in water. A new feature which has more or less recently been introduced in the manufacture of shrapnel shells is crimping or forming a small groove in the outside of nose near the end. This is done to secure a metal cover over the fuse as a means of protection. The operation is performed on an ordinary lathe with a special tool designed for the purpose fixed in the tool holder. At the side of the tool is a guide for locating the tool in the proper position in relation to the end of nose. At the next operation, the markings on the shell body are stamped on in a marking machine.



FINISHING OUTSIDE SHELL BODY ON FORD-SMITH GRINDER.

Copper Band Pressing and Turning

After a preliminary Government inspection, the shells are taken to another department to have the copper bands pressed on. The banding press was built by the Goldie & McCulloch Co., Galt, Ont., and is operated hydraulically at a pressure of 900 pounds per square inch. The press is of standard design, and is used in many shell plants, a full description is, therefore, unnecessary here. The copper band is first put over the groove, and the shell placed in the press. The power is applied three or four times, the shell being moved slightly after each application. The power for the press is supplied from a Deane triplex, belt-driven, pump, $1\frac{1}{2}$ in. by 4 in., using an accumulator.

The next operation is turning the copper band on a Le Blond lathe equipped with a special fixture designed for the purpose. The shell is held in a collet chuck, while the nose end is in a cup centre on the tailstock. The tools are located on the cross slide, the back tool making the roughing cut and the front tool the finishing cut. The back tool does not feed down as in some cases, but is moved towards the work by operating the cross slide up to a stop. This operation completes all machining on the shell proper, that is with the exception of the brass nose socket, which is machined after the shell has been filled.

Assembling and Filling

The assembling department is separate from the machine shop and a number of women are employed for this work. The first thing to be done is to hand-tap the nose, after which the tin powder cup is slipped into the pocket in base of shell. The diaphragm is already in, having been dropped inside the shell immediately preceding the nosing operation. The brass fuse tube is then screwed into the diaphragm, the tube plugged with waste and the bullets poured in. After being weighed, hot resin is poured in and the shell is again weighed. The brass socket is then screwed into the nose and soldered to the fuse tube.

The brass socket which has been screwed into the nose, is in a semi-finished condition on arrival at this plant that is, some parts of it have already been machined, and the grub screw hole has been drilled and tapped. The sockets are finished on a lathe with tool fixture on the cross slide. The shell is held in a chuck and supported by a carrier. The first tool forms a profile on outside diameter of socket to conform with that of the shell nose. The second tool faces up inside base of socket, cutting off the projecting fuse tube. The third tool forms the fuse seat. The socket is next hand-tapped and the shell cleaned. It then undergoes the final Government inspection, the plug being screwed into the socket. Painting the shells follows, after which they are shipped when dry.

* * *

NOTES ON EFFECT OF BLAST-FURNACE GASES ON WROUGHT IRON[*]

By Dr. J. E. Stead, F.R.S.

THE object of this note is to describe the effect of blast-furnace gases on wrought iron at temperatures between 400 deg. and 500 deg. Cent. The phenomena were observed quite incidentally when experimenting on the magnetic properties of manganese steels with the object of ascertaining the effect of very prolonged heating at relatively low temperatures. Bars of steels were placed inside a wrought iron tube or case, and the case with contents was placed in the middle of a gas flue, where the temperature ranged between 400 deg. and 500 deg. Cent., and was allowed to remain there for nearly two years; the case and the bars were however removed and examined at intervals.

After exposure for a year the wrought iron tubes were found to be blistered in many places, and at certain points layers of the iron had been torn away from the places where the screwing terminated and were beginning to curl over. As one had the opportunity of examining the outside of the case at intervals, the gradual and progressive tearing action was being followed. From the first it was clear that carbon was being deposited from the gas, and was responsible for causing the disruption. On screwing off the cap to get at the bars, a considerable quantity of fine, dense, black powder fell out with the bars, and the lower part of the upper tube contained much of the same substance loosely adhering to its sides. In physical appearance the powder resembled lampblack. All the blisters on the tubes were filled with this black powder, and some had deposited on the inside walls of the thicker tube as well as the walls of the thin tube.

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[*] Iron and Steel Institute contribution

Originally these walls, as well as the exterior surfaces, were coated with a thin layer of blue scale, as is usual with all such hot rolled material. Carbon seems to have deposited over the whole interior surfaces, but none at all on the exterior portions, excepting at the parts which had been cold distorted at the screwed portions beyond the terminations of the caps. The larger amount of manganese in the deposit found in the case itself suggests that a portion of it had come from the surfaces of the manganese steel bars. As the caps were screwed tightly on to the ends of the case, it was supposed the latter was quite gastight, and if it was, one is forced to the tentative conclusion that carbonic oxide passed through the solid iron. That it is capable of penetrating iron to a depth of about a quarter of an inch at 600 deg. to 650 deg. Cent. has been proved by previous experiment, but that it should penetrate right through the iron and deposit carbon on the inside walls of the iron tubes at under 500 deg. Cent., if true, is very remarkable, and further trials are being conducted to confirm or negative these observations.

On testing the black deposits for carbon by color, only traces were found in the deposit from the upper tube, but 0.21 per cent. in that from the lower tube; a portion of this may have come from the manganese steels, which contained up to 2 per cent. carbon. Incidentally, it may be remarked that at high temperatures spongy iron reduced from iron ore is rapidly carburized, and it is justifiable to believe that as ore is reduced and descends down the shaft of a blast-furnace it becomes highly carburized before it reaches the melting zone, and not, as is usually assumed, that it remains as spongy iron till it begins to melt. It is more than probable that before the reduced iron is half way down to the hearth it will have combined with at least 2 per cent. carbon.

In reviewing the result of the observations and experiment given in this note, it would appear:—(1)—That even hard and refractory iron scale and the magnetic cinder enclosed in wrought iron are capable of reacting with carbonic oxide at temperatures between 400 deg. and 500 deg. Cent. (2)—That wrought iron containing free oxides is capable of being partially broken up by the action of carbonic oxide gas on the enclosed oxides or cinder. (3) That under the conditions named even initially non-oxidized steel acts on carbonic oxide gas, inducing carbon to be deposited on the surface.

BRITAIN'S INCREASING MUNITIONS PRODUCTION

CANCELLATIONS of large contracts for arms and munitions placed in the United States by Allied Governments are not altogether unexpected when viewed in the light of a speech made by Mr. Montagu, British Minister of Munitions some few weeks ago. The enormous increase in Britain's facilities for producing munitions of every description were apparent from the fact that apart altogether from national shell factories, the great armament firms of the country had made extensions amounting to 1,000,000 sq. ft. and had installed upwards of 2,500 new machines to carry out the Army gun programme alone. The Minister of Munitions was of course not quite definite in several statements but it was gathered that, apart from the eighteen factories for filling ammunition, all of which have been ordered, planned, and built during the last twelve months, and thirty-two small national shell factories, there are, further, twelve large factories in various stages of completion, occupied in making heavy shell, which were barely working at one-half of their proper capacity. These buildings, Mr. Montagu stated, cover an area of 70 acres, or about twelve times the space devoted to gun factory extensions. The bays average 14 ft. deep and have a total length of 15 miles. Apparently all these are independent of factories for fuse or cartridge manufacture.

* * *

CENTRAL DEPARTMENT OF MINERALS AND METALS

THAT the department of minerals and metals maintained by some of the British Dominions are a feature worthy of adoption by the British Government was the opinion expressed by such leaders of industrial thought and action as Sir W. Beardmore, Geo. Beilby W. Thornycroft and Edgar Taylor, in a recent communication to the Chairman of the Advisory Council for Scientific and Industrial Research.

The argument put forward is that while there are similar well-organised departments in some of the British Dominions, there is no connecting link or "clearing" house in the Metropolis of the Empire. Various departments of the Home Government have all been concerned with the collection of information bearing on the sources of supply of minerals and the production of metals, but there does not seem to have been any serious attempt to co-ordinate and render available this information, and it is certain that there has been considerable overlapping and duplication of effort with corresponding waste and confusion. In the opinion of the Institutions represented by the signatories the organization of a central Department of Minerals and Metals is imperatively necessary in the public interest, and the work of organization which will necessarily take much time to complete, should be begun at the earliest possible moment.

"It cannot be doubted," the letter proceeds, "that if a properly organized and efficiently conducted Department of Minerals and metals had been in existence, much valuable time, many lives and vast sums of money would have been saved to the nation in the conduct of the present war, and much of the cost and inconvenience to British industries depending largely for their raw materials on mineral products would have been saved, with corresponding advantàges to the prosecution of the war and to many industries."

The following are given as among the duties of the suggested new Department:—

1. Arrangements for expediting the completion of mineral surveys of the United Kingdom and the Crown Colonies and other British Possessions.

2. The systematic collection and coordination of information bearing on the occurrence, uses and economic value of minerals and their products; special attention being devoted, to securing industrial applications for newly-discovered minerals or metallurgical products, and to finding mineral materials required for new metallurgical products or inventions.

3. The investigation of all questions and problems relating to the utilisation of the mineral or metallurgical resources of the Empire.

4. The co-ordination and dissemination of information.

5. A general review from time to time of the developed and undeveloped mineral resources and of the position of each mineral or metal, to ensure that the mineral wealth of the Empire is being exploited with due regard to Imperial interests.

6. Generally, to advise the Imperial Government on all questions bearing on the mining and metallurgical industries.

* * *

Discipline.—Many of the accidents which now occur may be eliminated by discipline—not after the accident occurs nor as administered to an offender; but the kind of discipline which originates within the man, which he applies to himself. True discipline is an education, a development of faculties by instruction and exercise; it is a training to act habitually in accordance with established rules; it is a training to obey either a superior or one's own mind immediately and without question.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data and Ideas Evolved from Actual Practical Application and Experience

THE MANUFACTURE OF SHRAPNEL PLUGS—II.

By J. Davies.

THE blanks having been cast and the die heads assembled, as described in the previous article, the mechanism for handling the work and dies is now discussed. Next to the required accuracy, the question of output was most important, and the manner in which this was satisfactorily accomplished is now described.

Machine for Threading Blanks

Many experiments and different machines were fitted up for threading, and some idea of the general construction of the simplest and most efficient can be gathered by reference to Fig. 6. A piece of cold-rolled shaft A is turned to fit the bearings B and the gear C. It is free to slide through the gear C, being driven by a feather key. It is bored out in the end to receive the steady plunger D and spring E, the outer end of the plunger being made to fit the end of the plug. In the back end of the shaft A is fitted a ead screw F, working through a brass bush G, which can be prevented from rotating by screwing down the cap. This ead screw regulates the position of the ie and keeps the pitch exact. The die older or chuck is keyed on the other nd of the shaft. The plug is driven by a hardened piece of steel squared to fit e cored hole in the plug, and fitted into he end of a sliding sleeve worked by a ever and toggle joint. The joint is made o lock itself in position when the plug ready to be threaded.

The machine is driven through two riction clutches I and an intermediate ear is threaded to receive the reverse crew J, which is prevented from turning round by its squared end fitted into suitable bearing. The machine is started by a hand lever, which operates the iction clutches, the driving clutch beg held in position by the lever K as own. When the machine has travelled e required distance, the lever K is lifted up by the adjusting collar, and the spring forces the friction into the other clutch, thus reversing the machine. The machine continues to run in the opposite direction until the adjusting screw pushes the friction into mid-position, when the machine stops for the removal of the plug.

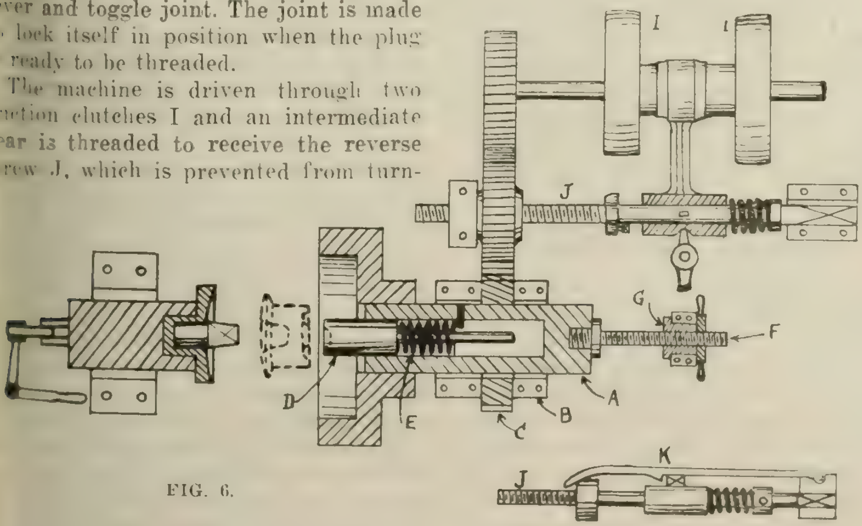

FIG. 6.

Facing or Grooving

Facing or grooving is done with the same machine as the threading. It is not necessary, however, to have a leading screw or a reverse screw, as the machine must run continuously in one direction until reversed by the operator.

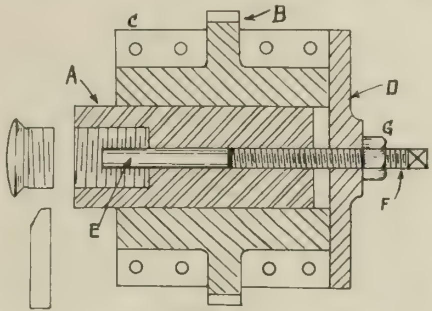

FIG. 7.

Fig. 7 shows the method of holding the plug during the facing operation. A cast steel sleeve A is made to fit the gear B. This gear has a long bearing boss cast on each side of it, which fits into the pockets of the machine C. One end of the sleeve A is bored and threaded to fit the plug, the thread extending into the sleeve for three or four inches, so that as soon as the thread wears the least bit loose, the sleeve is taken out and a piece ground off the end.

The plug only goes into the sleeve for about three threads, so that it is an absolute necessity to have the plugs a snug fit into the sleeve. The sleeve itself can be adjusted after being ground by means of the threaded flange D. The plug is prevented from going too far into the threaded end of the sleeve by the hardened steel piece E, which is adjusted by means of the screw F, secured in position by the lock nut G.

An ordinary or improvised rest is bolted to any convenient part of the machine; only one slide is necessary, as both sleeve and plug can be adjusted. The tool is practically a forming tool, being ground to the exact shape. The plug butts up against the piece E, and the tool is fed in straight to the required depth. After the facing operation, the plugs are taken out of the chuck by inserting a bent bar, squared to fit the hole in plug, and then reversing the machine.

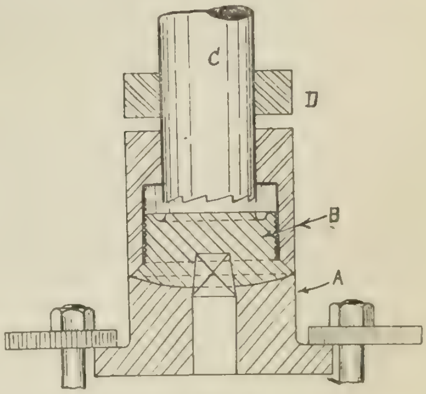

FIG. 8.

Rectifying Variations in Work

In the final inspection the plugs must fit the gauges exactly on the bevelled face, and also be the exact length. Some may be a little short and some a little long—the short ones are put back into the machine and re-faced, the long ones are spot-faced in the drill press.

The jig shown in Fig. 8 is used for the latter purpose. A cast iron block A is fitted with a hardened square centre to fit the plug; B is a bush made to drop over the threaded portion of the plug and fits the bevelled face; C is an end mill fitted with a collar D, which regulates the amount to be milled off the end of the plug.

SHELL RESEATING MACHINE.

By Geo. Armstrong.

THE machine shown in the accompanying sketches was built for the purpose of accurately re-seating the noses of shells—that is, to form the beveled mouth accurately and true with the body of the shell when the work done by the regular methods did not meet inspection requirements. The shell is gripped in a swinging clamp A, hinged to the upper part of the main frame B. Supported in a bearing mounted on the front of main frame, is a cutter spindle, the upper end carrying the cutter C and the lower end a bevel gear driven from belt pulley D.

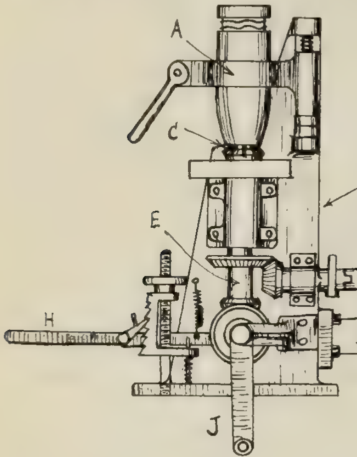

FIG. 1.

The cutter spindle is hollow and through it passes a feed rod E, the upper end having a stop pin F, for the shell to rest on, and a threaded portion G, which fits the shell nose. By means of feed lever H, the shell can be drawn down on top of the revolving cutter C, while the shell is kept from revolving by clamp A, which, however, is free to travel vertically to allow the shell to feed down on the cutter.

When placing the shell in position, the feed rod E is revolved rapidly by hand crank J, to enter the threaded portion in the shell nose. A clutch is shown for stopping the cutter while changing shells, although any other method of control is equally suitable.

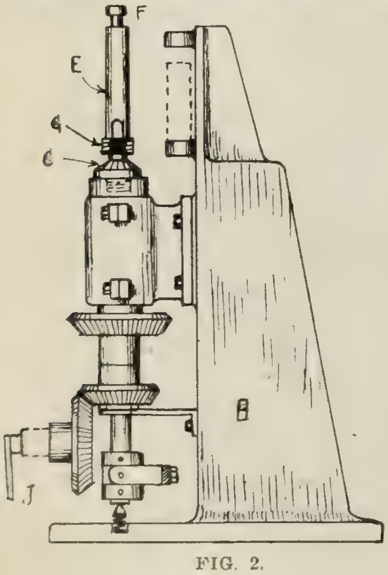

FIG. 2.

LITTLE KNOWN FACTS ABOUT GRINDING—CHATTER MARKS

By Howard W. Dunbar.

THERE is a common belief among users of grinding machines that, invariably, chatter marks are caused by gearing in the headstock. To the uninitiated this might sound feasible, but those who have spent years in experimenting and years of investigating on grinding problems have long since discovered that it is more often true that chatter marks are caused by many other things, and that only rarely can chatter marks be charged to gears.

While there may be such a thing as imperfect gearing in machines when the work is driven with gears, and this imperfect gearing may cause marks in the work, it is more often the case that the gearing is correct, and that marks are caused by some other thing independent of anything in connection with this gearing in the machine. In the minds of those people who have made a study of this chatter mark question there are chatter marks—and then again there are other chatter marks.

There are marks which are perfectly evident in a ground piece of work without the aid of a microscope, without the aid of a lap, and they may be seen several feet away from the work. Then there are other chatter marks which, upon the closest inspection, are not evident on the surface of the work, and cannot be seen until they have been lapped with a perfect lap, which polishes off the high spots and brings out the chatters. These, for want of a better name, we choose to call "invisible chatter marks," and they are evident in work which is driven by a belt, by a chain, or by gears, or any other known method of work drive. Marks which are clearly evident on the surface, without any outside means for bringing them out, are apt to appear in any form of drive, but can be removed from any form of drive by observing certain laws and principles, and this applies equally well to the gear-driven headstock.

Causes of Chatter Marks

We are giving below a list of things which we have actually found will cause chatters in work, simply that the reader may—when he has trouble with chatter marks—look to some other source for his trouble, rather than turning to the gears in the headstock, without investigating what may be the real source of his difficulties.

1.—Improper speed relation between wheel and work. Speed of revolution is important and cannot be ignored, no matter what the design of the machine, and no matter what the method of driving the work. The proper speed of revolution and the proper wheel must be selected to prevent imperfections in grinding, and whoever ignores this fac will simply have his troubles for hi pains. It is better for us to recogniz these physical laws and obey them, rather than to attempt to avoid them an try to get something for nothing, whic is always impossible.

2.—Improper use and not a sufficien number of steadyrests, whether the wor is being revolved direct by belt or b gearing, or by some other means. If th work itself vibrates while the wheel i rubbing upon it, these vibrations wil cause imperfections in the work bein ground. Sometimes they will be visibl to the eye before lapping; other time they will be so small as to be invisibl until the work is lapped. The best wa to overcome this—and the only way—i to use proper steadyrests, and the stiffe these steady rests are the more rapi will the work be done and not caus chatters.

3.—Vibrations of steadyrest shoes because they are loose in the holders.

4.—Uneven thickness of belt drivin the wheel or the work. More often th wheel belt causes trouble because of th uneven thickness of the belt when lump comes over the pulley and sends th vibration out through the spindle to th wheel and thus to the work; when great many lumps in the belt keep doing this, a great many vibrations are se up. The only cure for this is to true th belt off to a uniform thickness, using carpenter's chisel as a lathe tool, an rigging the belt up to run over a drum passing the tool in front of it and making it of uniform thickness.

5.—Poorly cut gears, unevenly space and rough on the face. These are seldon found in a geared headstock, and onl found when some one has been neglectful and inspection not rigid enough.

6.—Improperly trued wheel. If th wheel is not trued perfectly round an straight on the face, of course work cannot be expected to be any more perfec than the wheel is.

7.—Poorly fitting centres. Centre that do not fit in the taper perfectly wi vibrate and cause chatters in the work

8.—Loose centres and centres that ar not round. All can be classed with th above.

9.—Centres in which the taper in th centre hole is greater than the taper o the centre point.

10.—Centres not properly lubricate

11.—Poor fit of surfaces on wheel slid which is a result of wear caused by moving the wheel slide back and forth in small space on special work requirin only a short motion.

12.—Attempt to force production o machines too light for the work bein ground will cause conditions note above.

13.—Irregular rotation of work o wheel, caused by loose belts, change i voltage or power, slipping of belts, etc.

14.—A change in the surface of the wheel, such as glazing or filling, which causes a different action of the wheel at different points on its cutting face.

15.—Wheel out of round, caused by the wheel being brought up against the work without any lubricant on it, which breaks away the face of the wheel, and every time such a spot comes around on the work it leaves its mark.

16.—Loose wheel spindle. A case in which the wheel spindle needle needs adjustment.

17.—Wheel out of balance will cause vibrations all through the machine, the wheel slide, the work table and the work itself, which will cause chatters.

18.—On crankshaft pin and bearing grinding chatters are sometimes caused by the cheek of the crankshaft not being cleared away sufficiently to allow the wheel to pass by without touching it, as the crankshaft revolves by the side of the wheel. This causes a vibration in the wheel and in the work which is responsible a great many times for a large amount of the chatters in crankshaft grinding.

19.—Too weak driving pin. Will not allow the work to be revolved with a uniform motion.

20.—Heavy and long revolving parts running at high speed being out of running balance. All cause chatters.

21.—Work not tight on the centres.

22.—Centre points which are not true, and centre holes which are not round. No work can be more accurate than the centres and the centre points.

23.—Wheel loose on wheel sleeve, causing the wheel to slip.

24.—End play in any revolving shaft running at high speed, which has collars on it that might knock against some frame work or bearings on the machine.

25.—Motors used in connection with the machine in which the armature is not in running balance, vibrations from which will cause marks in the work being ground.

Geared Headstock Factor

It is probably true that the grinding machine to-day would not be possible of as great production and hold the important position that it does in the machine tool field were it not for the geared headstock. Gears and geared forms of drive will increase in number rather than decrease. The gears themselves may be made better and more perfect, but it is true that their use will be employed to greater extent than ever before. All efforts up to the present time on the part of users of grinding machines to substitute belts or other forms of drive for gears in the work drive — except where the work is very small and light —have only been a temporary expedient and sooner or later troubles arise, either from lack of power, lack of speeds or some other unforeseen reason.

One manufacturer who solicited our efforts in providing him with an extra nice, specially designed headstock to provide for a specially smooth and nice uniform motion of revolution for the work drive, frankly admitted to us that the only reason that he wished to grind work free from these very small invisible chatter marks (which could only be brought out by lapping), was to overcome the letters of complaint coming from foolish and unreasonable customers who required ground work free from these little blemishes. He stated that it was tradition which led to this, and that they must attempt to meet tradition in order to protect themselves against these unreasonable letters and complaints.

There are probably many other things which cause chatters, but these are some of the most common things we look for when we have trouble, and which must be corrected if one wishes to produce work which shows absolutely no blemishes. It is doubtful if it will ever be possible to produce commercial work that a determined critic cannot find some faint chatter or blemish in by lapping with a perfect lap and a little abrasive, but such tests are not sensible ones to apply to any ground work, for the reason that anything requiring a more accurate surface must be lapped anyway and marks which are evident in the work and are visible to the naked eye can be removed, whether they are ground with a belt drive, gear chain, chain drive or any other form of drive headstock.—*Grits and Grinds.*

RE-MELTING CAST IRON TURNINGS

NO engineering works that includes both a foundry and a machine shop can consider it satisfactory in these days to sell its cast-iron turnings to the puddler at $15 a ton, says *Page's Weekly*, while it is at the same time buying machine scrap for the foundry cupola at anything up to $24.50 a ton; for, after all, they are the same article, except that one is in granular form and the other in the lump. Indeed, of the two, the turnings are preferable, for they comprise the known standard mixture of the works, and are not so apt to contain unpleasant surprises as is miscellaneous scrap. Here is a margin of $7.30 to $9.70 a ton which can be saved to the works, provided a means can be found of charging the turnings into the cupola. As is well known, it does not serve simply to tumble the turnings loose into the cupola. If that is done there is a heavy loss of metal, amounting in some cases to as much as 75 per cent., whilst even that portion which survives and runs down into the well yields a metal heavily charged with sulphur and other impurities. To ensure economical melting it is necessary to feed the turnings into the cupola in a compact mass, so that they shall melt after the fashion of a lump of pig iron or scrap.

One way of doing this is to compress the turnings into a block by placing them in a suitable mould, and bringing down upon them a hydraulic ram working at about 14 tons pressure. This process is in fairly general use. It yields briquettes in the form of a cylinder, which may be perhaps five inches in diameter and four inches in height. With some irons, a compact block can be made without any binder, but, in other cases, lime-water, powdered lime, or some other cement has to be used to assist cohesion and prevent premature disintegration in the cupola. The cost of briquetting varies from 50c to $2.50 a ton, according to locality, circumstance, and equipment; but even at the higher figure there is an ample margin of saving over selling turnings and buying scrap—provided the melting is satisfactory.

CAST IRON SHELL

IT would seem as if the continued consumption of shells on a vast scale by the belligerent powers would ultimately demand a radical change in methods of manufacture, and the fact that efforts in this direction are being made in some quarters is evidenced by frequent references to, and articles on the production of, cast iron shells. According to a writer in the *Practical Engineer*, cast iron is used in some of the smaller shells, made for penetrative work, and in order to give them additional penetrative power, the noses or points are rather deeply chilled—a feature which to some extent removes the job from the ordinary run of moulding work. In the first place, the flasks must be specially made for the work, special chills of considerable

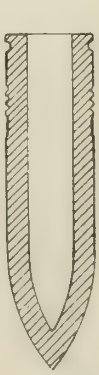

FIG. 1.

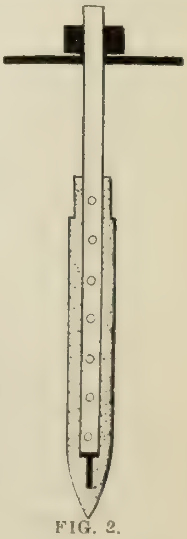

FIG. 2.

thickness must be used, and the cores must be of special construction, while, in the second place, the working must be exact to the 64th of an inch, or there will be too many rejections to make the job pay.

Roughly, the shells are as shown in Fig. 1 in section, it not being necessary to give exact dimensions, and unless the shells are turned inside as well as out the walls must be of equal thickness, or when fired the shell will gyrate too much, instead of spinning regularly on its flight from the gun. Usually, however, the shells are turned and bored, the hardened points being ground, as they are too hard to machine with an ordinary tool, this making it necessary that the shell be cast axially true to save over grinding on any side of the axis. An entirely soft shell could be more or less rectified in turning, but a well cast article is best.

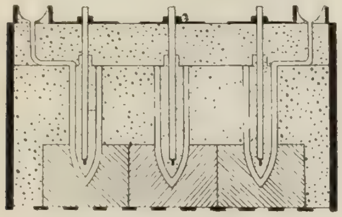
FIG. 3.

Core Feature

The cores should be struck up on a hollow perforated barrel, the general construction of which is as shown in Fig. 2 in section, together with the fittings used to secure rigidity when in place in the mould. Being quite enclosed, the cores have to be rigidly held from the cope, and a proper print must be on the pattern to ensure that the exact position is held during pouring.

The chills must be thick to be effective, or they will not carry off heat fast enough, and in regard to this we consider that both flasks and chills should be specially made for the work on some standardized interchangeable plan, and where machine moulding is adopted, this can be carried so far that cost of production can be reduced to the lowest possible point. The possibilities of machine moulding are such as few persons can foresee, but, like almost everything connected with the iron foundry, very little attention is really paid to this class of work, and hand moulding is generally used owing to its causing little trouble to initiate.

According to size the castings may be made singly or in groups, and the flask in section would appear very much as shown in Fig. 3, and if poured with clean iron the castings would come out well without segregation. The cores should be well blacked to prevent the inner part of the casting being gritty and bad to cut, plumbago being the best blacking to use for this kind of work. The metal must be poured hot and fluid, while the castings may be poured singly or in groups, this being dependent on the practice of each foundry.

The grooves should not be cast in, but machined, as this tends to more rapid production, the saving of time in moulding more than compensating for the time taken in cutting the grooves.

Of course it is possible to cast shells on the side, but, owing to the liability of the cores to float, there is no great certainty of the castings being true enough to pass inspection, and in any case they are unequal in weight as between the upper and lower sides in the mould, this being rather a serious matter in regard to their accuracy when fired, there being a tendency to gyrate when the weight is not balanced radially in the body of the shell, a point which tells somewhat against their increased use.

Unchilled Shells in Permanent Molds

Unchilled shells can very well be cast in permanent moulds, should such shells be needed, and in regard to this they could be produced ready for use if we except the bare skimming over the outer surface. With a sufficiency of moulds, and a trained body of men exclusively employed on this work, the output would be continuous and large, but of course every item of the process must be methodically arranged, the melting of the metal being continuous from start to finish. A double set of moulds would be advantageous, as it is desirable that the moulding surfaces should be kept polished with plumbago, while an abundance of iron cores should be provided to secure replacements where one or more gets fast in the casting. The cores also should be kept well coated with plumbago, this acting as a lubricant, and also leaving a smooth surface on the interior of the shells, which is a large advantage. A section of a shell mould is shown in Fig. 4, with the core in position.

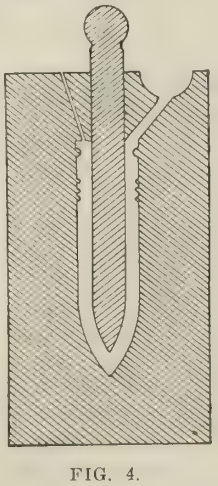
FIG. 4.

In working the mould would be closed and locked with the cores held tightly in position, then poured, and as soon as the metal is set, but before the contraction sets in, the core withdrawn with a spiral motion, and a few moments later the mould would be opened and the shell thrown out while still bright red-hot. It must always be remembered in this kind of work that contraction does not commence for an appreciable time after the metal solidifies, and in this stationary period there is ample time to remove metal cores, but, of course, the exact point of removal can only be found out in practice by the workers. In no case is the metal chilled when cast in permanent moulds, where the castings are thrown out hot, but the texture of the metal is different to that cast in sand moulds. For shell work permanent moulds offer possibilities, but, of course, chilled work is out of the question with these.

SHIPBUILDING IN BRITISH COLUMBIA

IT is of interest to note that there are fully twenty-five wooden ships now under construction on the North Pacific Coast, between British Columbia, Puget Sound and Oregon ports. The vessels, though rigged as five-masted schooners, are properly classed as motor ships of the general type which the Swedes and Danes have perfected to such a degree in recent years. The design for these new vessels is a new departure in naval architecture. The vessels are built on low lines, with minimum amount of space which cannot be used for cargo. It is estimated by the designer, J. H. Price, that the cargo space of these vessels is 95 per cent. of the whole.

The general dimensions of the new vessels are given as 44 feet beam, 21 feet depth, 225 feet keel, with length over all 265 feet. Their lumber capacity is figured at 1,500,000 feet, considerably over the average of the old-time windjammer. Power is furnished by two Bolinder engines of 160 horse-power each. These engines are of Swedish design, Diesel type, using crude oil fuel. Without the aid of the sails it is figured that the engines will drive the ships at a seven-knot rate, loaded.

British Columbia's new fleet of lumber carriers will have the distinction of being the first ships to be built under and classified according to the new rules of Lloyd's Register of Shipping. Because of radical changes made in wooden shipbuilding on this coast in recent years, changes which are considered to mark great progress, most recently built vessels had been classified under other shipping registers, as Lloyd's rules had not been altered and were rather strict with respect to the changes which had grown up.

EDITORAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions—Your Co-operation is Invited

THE ENGINEER AND HIS ADVERTISING—II.*

By Chas. B. Penwarden.

THE following question is in the nature of a conundrum:—Assuming you had sat for eight solid hours working through the advertising pages of British Engineering Trade Journals, how many advertisements would you be able to recall after the expiration of two weeks? I tried this out myself, and I was able to remember, without effort, but one firm, and I remembered that firm by name and by the goods advertised because they, or whoever did the work for them, understood the use of both white space and illustration.

The Illustration Feature

Does an engineer know what a steam engine is, what an electric motor is, what a factory is, what an oil can is, what steel rails are, what a thousand and one things are which are in daily use amongst his fellow craftsmen? It seems an absurd question to ask, but on the answer depends the decision whether engineers as a class have money to burn or not, for, if you go through the journals, you will see square yards of space taken up with more or less attractive pictures of this type, costing considerable money for photos and blocks, and still more for space occupied. Imagine the exaggerate amount which has been paid to show the engineer pictures of things with which he is perfectly familiar, and which will not induce him to spend a penny. Business men do not buy engines, motors, and a thousand other engineering necessities through seeing a picture, but they would certainly study the advertisement more if these pictures, instead of being dull and inanimate, possessed action, individuality and suggestion—really told things.

Sometimes I have tried very hard to imagine myself in the position of a buyer with a fair amount of money to invest in engineering material, and I have gone through the trade papers on a search for reasons why I should buy certain goods. Those reasons have never been discovered because they were not given. Recently I had occasion to go through the works of a big engineering firm, and one of the directors very courteously assisted me in my search for knowledge regarding a certain article. In return I went through his advertising matter.

This gentleman said that he had come to the conclusion that his firm's advertising was not effective, and he had set to work to find out why. The results of the changes he made were amazing, and more direct enquiries had been received from one short series of particular advertisements than could be traced to many times the number of advertisements of the old style—just name, address, business, and the usual insipid and money-wasting specimen of illustration. I asked him why it was that engineering advertising, as a whole, was so terribly weak and wasteful, and he, quite seriously, said that as it was all alike everybody seemed satisfied, but no doubt that as soon as one or two firms took the trouble to raise the tone others would follow suit.

What a confession! What an amazing situation that men engaged in one of the most important professions in which human energy and enterprise is employed, men who are trained in precision, foresight, calculation, and carefulness, who must, by the very nature of their occupation, be always striving for newer and better ways to do things, should ignore the tremendous possibilities in efficient publicity at home and abroad because they are all as bad as one another!

The Great Importance of Selling

It is all very well to say that when the British get to work they do things. It is not sufficient for any business man to be capable of making things efficiently. To-day he must also be capable of selling them. As a matter of fact, the selling side is, in many respects, more important than the manufacturing side. While we may see, at periods of our history, many capable mechanicians out of work, nobody will ever see a capable, hard-working, dependable, and successful salesman out of a job.

Emerson has said something to the effect that if a man will make a better mousetrap than any other man, the crowd will make a beaten path to his door, though it be in the depths of a forest. That might have been the case in Emerson's day. It is not so now. We move and live too fast. While the superior workman is waiting for the crowd to find out where he lives, the capable salesman is scooping in all the possible orders—especially if he uses publicity to the best advantage. So with the engineer.

While so many firms are depending upon their sadly wasted space to remind possible clients that they make a certain class of goods at the same old stand in a certain locality, and are patiently waiting for the time when somebody finds the need for their goods, the wide-awake, up-to-date advertiser is telling those who form his market all they would ask about the goods if they were face to face, and, instead of waiting for business which might come, is creating business by rousing his readers to action through stimulated desire.

Take a certain motor car which appeals to a particular section of the community. We may laugh or sneer or tolerate according to our personal temperaments, but we cannot deny that that particular motor-car is being made and sold by the hundred thousand every year, and that the number of owners runs into millions, or that it is to be found in every country on earth, from the arid plains of India to the lonely hills of Klondyke; mainly through the power of properly understood and controlled publicity.

The Indispensable Engineer

Now to the engineering industry as a whole is due the honor of the world's industrial progress. Far in the van of civilization goes the trained engineer, and probably no further progress could be made without him. It is to the engineer we look for increased production, for many things, in short, that help to make life worth living. It may be the gas engineer, or the electrical engineer, or the mechanical engineer, but somewhere in the scheme of new things will be found an engineer. Therefore does it seem the more inexplicable that, in every branch of the engineering profession, disregard or ignorance is so universally shown of a power equally as great in its own way as engineering itself.

There are many reasons for the existence of engineers, but there is only one reason for the existence of publicity as applied to trade, and that is to secure more business and make more money. There has never been a time in the history of any country when the selling side of any commodity which can be exported needed so much attention and care. There has never been a time in history when business men needed to watch so carefully and continuously the stream of foreign-made articles of every imaginable character being landed on our shores, and paid for by good solid gold which ought to remain with us—articles which could and should be made by our own workmen and sold by our own salesmen aided by intelligently handled publicity.

The average engineer either cannot or

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* *Herbert's Monthly.*

will not see that advertising—paper, ink and brains—is becoming every day a more and more indispensable auxiliary, an increasing necessity—not a luxury or a speculation—in his scheme for increasing output. That output will have to be increased from a national standpoint is certain, for never has there been a time when so much leeway had to be made up. The devastation of war, the transference of accounts and business to firms hitherto practically unknown, the switching over of thousands of firms on to war work, and their consequent dropping into comparative oblivion; the energies of neutrals in markets which the belligerents have been forced to relinquish, even though temporarily, and a thousand and one other causes will impose upon the engineering industry as a whole a burden it has never yet had to carry—a burden of dead weight, unrelieved by any of the advantages which might have been secured ten or twenty years ago.

One Thing to Claim—Another to Prove

Our goods may still be the best in the world—but, on the other hand, they may not. We may still dogmatically claim that we can beat the world, but something more than claims is needed now. We have to deliver the goods; but, what is of equal importance, we have to create the demand; and, when the demand is created, we have to see to it that our customers are given what they want, not what we think they ought to have.

It does not come within my province to speak of the conservatism and obstinacy of the average manufacturer, who, with an experience of travel extending perhaps to Paris, presumes to know just what people in the Far East or in other parts of the Empire should buy, although from experience I could say a good deal about that subject, but it does come within my province to speak of the imperative need for greater and more careful study and consideration of the problems of modern selling—especially by means of the printed word.

I had recently a typical experience of the average Englishman's attitude towards the buyer, and a more short-sighted policy it would be difficult to find. The firm in question publish a series of books in which engineers of all grades are invited to advertise, and in which a large number of firms do advertise. To the managing director I said:

"What do you do to help the advertiser to get results?"

"Do?" said he. "We print the books and send them to so-and-so and such and such places."

"Yes, but I mean what do you do to help the advertiser to get the best out of the space he buys? Do you write or suggest any copy for him?"

"Copy? Not likely. We sell the space, and he can do as he likes with it. Supplying copy is his job, not ours."

The point is that the employment of a man or men to prepare copy at a cost of about one per cent. would have resulted in a further profit of nine per cent., as the price of the space could easily have been raised another 10 per cent., the value of it being probably 25 per cent. extra on account of the proper use which would have been made of it. I am not going to say what an American or a German would do under the circumstances, because I don't know, but I want to point out that a great amount of business is lost and a vast amount of money is wasted by engineers in their advertising because they will do nothing to help the consumer buy.

The Power of Suggestion

If the publication manager referred to had laid himself out to improve the advertising in his books he could have secured a great deal more business at a great deal less cost, and made an additional 9 per cent. on top of it. If the advertising engineer would realize that the man he is appealing to in his advertisements is a being of flesh and blood and brains and nerves and most of the weaknesses man is heir to, he would at the same time realize that the power of suggestion is quite as potent in his case as it is in the case of a pill manufacturer, although it should, naturally be used in a different way.

So that the pictures of ordinary steam engines and motors and steel rails and the hundred other everyday articles illustrated at a certain expense which represents waste should be scrapped and pictures used which contained the power of suggestion, showing things worth knowing and giving distinction and individuality to the whole advertisement, I ask:

What does your article do?

What is it for?

What is its value as a money saver; as a time saver; as a labor saver; as a producer?

According to the manner in which any one of these questions is answered will the point of contact be found in the reader. When your advertisement, through whatever cause, makes a man think "Yes," it has reached a point of contact with that man's ideas, and you have his interest. That is why all advertising should be written in a strong, positive sense.

Thinking Backwards

Now most engineers think backwards. They make an article and put it into stock or in the showroom, or wherever they usually put the finished product, and say, "That's ready for sale." On the other hand, if they made to order, they get all ready, and, in effect, say, "We are now ready for your esteemed commands," or something equally inane. They are ready to sell; but is the other party ready to buy?

Around the answer to that simple question is involved all that makes the difference between failure and success. If the other party is not ready to buy, there is not much use in being ready to sell. Obviously, then, it is a part of the engineer's duty to see that the other party is ready to buy. It is his duty to preach, to coax, to persuade, to educate, to suggest, to stimulate, or do any other lawful and legitimate act in order to induce the other party to make up his mind that he is ready to buy, and, that accomplished, the sale is easy.

Travellers, in their reports, often say, "He is not ready to buy," and leave it at that, but it is the traveller's duty, as it is the duty of the advertisement, to persuade the buyer that he is or should be ready to buy. Why? Because when a man is ready to buy is just the time when competition comes in. Everybody knows when a man is ready to buy, but if an advertisement convinces him to the extent of making up his mind quicker, the article properly advertised will get preferential treatment.

No advertisement which gives a picture of a little boy holding aloft a reel of cable and taking a whole page to do even that (an actual fact) is likely to sell much cable, neither will an advertisement, which takes three-fifths of the available space to show a picture of a locomotive, sell many locomotives.

Is Your Expenditure Proving Profitable?

In considering these things, we have to bear in mind that they apply not only to the goods which we wish to sell at home, but even more so to the goods we wish to sell abroad. There is something of a craze just now for considerable advertising in journals with a repute for foreign circulation, the object presumably being to secure some of the business which is supposed to be "coming along," as the expression goes. In my opinion, however, something more than bare catalogue details will be essential if the money spent in this direction is to come back again with profit; so, in this consideration of the essentials—or some of them—of commonsense advertising, take a ramble through the engineering advertisements in the trade papers, and try to find more than about one-half of one per cent. that answers even one of the questions asked above.

In taking this ramble, think of the good money that is being spent in paying for the space those advertisements occupy. Think of the hundreds of thousands of pounds expended in the course of a year in trade papers, catalogues, directories, and other media for no purpose than to say: "I am Jack Jones, of Halifax, and I make Friction Clutches," because that is what it all amounts to; and then, when you realize that a tremendous waste is going on every day, try to realize how much better that space would be used if those responsible for the bills had a better understanding and appreciation of its real value when put to its legitimate use—Salesmanship in Print.

If ever there was a time when every art and artifice known to man needed to be brought into play, that time is now and the coming years. Broadly speaking, publicity is capable of accomplishing anything. At least 90 per cent. of the engineering firms of any country can expand and extend. Those who will free their minds of prejudice and will realize what a tremendously powerful force can be wielded by paper and ink will find eventually, if they will have faith and be persistent, that modern advertising is the quickest and least costly method of securing business—if it is done on the right lines.

THE FUTURE OF MUNITIONS FACTORIES

UNTIL such times as peace seems to be reasonably well in sight, the immediate purpose of shell factories will continue to be as heretofore, i.e., shells. When the end of the war is actually in sight the problem will become more or less acute, but just where readjustment will be most necessary is a question which will be influenced by something more than finding work for the machines. The various questions of factory location, lay-out, equipment, and plant, will all demand consideration, while the question of peace time shell contracts is a subject which also will have to be considered later. The following extract from the editorial columns of *The Engineer*, is of particular interest, coming as it does from a reliable source in close touch with existing conditions, and indicating the various factors which have influenced the design of Britain's shell shops, along with certain problems which will be encountered during the resumption of commercial work by the thousands of firms at present controlled by the Ministry of Munitions.

"It does not seem altogether improbable that, for the first two or three years at least after the return of peace, most of these factories will still be kept fairly busy, though not necessarily only on munition supply for ourselves, for it must be remembered that a considerable proportion of these factories in England are engaged on work for other countries, and that a considerable number of foreign orders are likely to be placed in England after the war by nations that have not been engaged in this struggle. It cannot altogether be expected that the present high rate of output per man or per woman will obtain, and we may reasonably anticipate a greatly reduced individual output from the worker, which will tend to give an almost automatic solution of some of the prospective difficulties. Next, there will be a demand for an adequate reserve of ammunition, to be maintained throughout the Empire, so as to ensure no recurrence of the appalling danger in which we stood early in 1915. This will keep some of the factories busy, but as there will be so much less urgency in the production of munitions, night work and Sunday work, which alone will reduce the output by over 50 per cent., will probably be discontinued entirely. It seems probable, therefore, that in many cases it will not be necessary entirely to close down the munition plants, which were specially designed for shell making. Those plants. as, for instance, in the cases of the textile manufacturers or motor builders, which were adapted for shell making, will simply revert to their original business, and in these cases we may be sure that extensions which have been made for munitions will be readily welcomed for the increased output of the original product that will certainly be required.

Unsuitable Plants

In other cases, however, it seems probable that the shops built for shell making will prove unsuitable for general engineering purposes. They were laid down purely as shell shops, and in most cases the width of bay adopted is too narrow to admit of a convenient general engineering plant being installed. Moreover, many of the lighter shell shops are too low or too light in structural strength to admit of any but the smallest jib cranes being employed. Traveling cranes would be quite impossible. That they will suffice as small machine shops is true, but for that purpose their locality is sometimes against them. Where possible, therefore, it is to be supposed that these shops will be kept on shell work as long as orders are available and if the space they occupy is not urgently required for some more pressing work. The average width of a small shell shop bay might be taken as 25 ft., and of the larger shell bay, 30 ft. to 36 ft. In the latter case, for handling shells of 8-in. diameter and upwards, overhead cranes are a sine qua non, and are invariably fitted. These shops are of ample height and strength to carry them. Unlike so many other manufactured articles, a shell does not increase in bulk as it travels through the shop, and for calibres of 6 in. and less, when the shell can be easily handled, cranes are unnecessary except in the form of whips for facilitating handling in and out of the machines. Unfortunately it thus comes about that those shell factories which are most suitable for general engineering work after the war are precisely the heavier national factories, which appear most likely to be retained indefinitely in their present role.

Shell Making Too Specialized

When it comes to the question of machinery, one may safely say that the quantity of special shell machinery that will be available after the war will be enormous. Much of it will be virtually worn out. Still more will be practically useless for general engineering work. particularly in the case of small calibre shell lathes. So much machinery for shell manufacture had to be made in the least possible time in the early stages of the war that specially simple machines just big enough for the work were found to be most readily obtainable, and shell lathes are far from being general service lathes. Nor are rough boring machines for shell work, except in large sizes, capable of being readily applied to other work. The mass of small tools which have been erected for making machine guns, fuses, hand grenades, rifles, etc., is amazing, and when the demand for these products falls, as it must, to a fraction of the present output, it seems that there will inevitably be an enormous amount of small second-hand tools thrown on the market. It is probably not generally realized what quantities of special munition machinery have been made in the last eighteen months. One suggestion for the future disposal thereof we have heard mooted is the sale of complete plants to countries like Roumania or the South American Republics. No country in future can afford to be dependent on others for the supply of munitions. The means for their manufacture must be internal, and the colossal scale on which ammunition has been expended during the present war must cause small Powers serious misgivings as to the adequacy of their owin stocks.

General Plants Least Affected

Generally speaking, shipyards and marine engineering works have not very greatly increased their plants, especially for war work, and it would appear that they are likely to find themselves as busy as they can be for some years. Those which have, however, will find no difficulty in making use of the developments in shop space. When the inevitable settling down does take place after the war, we shall expect to see a very great demand for steel. It is possibly in this direction that our biggest development will take their place. At the present time, especially in view of the quantities of steel being absorbed for munition work, we might almost be inclined to suggest that our machine shop capacity is far in advance of our ability to produce steel. Steel works development, however, is an extremely lengthy and costly business, and necessitates plant of the heaviest type, and it must not be overlooked that widespread and great as have been the munition extensions, they are mostly light shops with the simplest plant, and have, therefore, been relatively easy to erect and start working. When it is remembered that our engineering export trade has been enormously curtailed in the last two years, and that to supply our own requirements after the war in the shape of the accumulated leeway in almost every section of the engineering trade—locomotives, rolling stock, looms, ships, and engines, and the vast mass of miscellaneous work—will involve a tremendous amount of work, it seems almost a pity that some of these national factories could not have been laid down with a view to conversion into general engineering works on the conclusion of peace. At the time, however, it was of such urgent necessity to make sufficient shells to win the war that such a point may reasonably have been ignored."

LUMBER TRADE

THE Department of Trade and Commerce is calling a conference of Canadian lumbermen to concert measures for taking advantage of the great market for lumber in European countries consequent upon the reconstruction demands after the war. The Department has in course of completion a report on trade openings for Canadian lumber in Europe as investigated by H. R. Macmillan, Chief Forester of British Columbia.

It is pointed out that every one of the belligerent nations will require immense supplies of lumber as soon as rebuilding starts. In Belgium, forests have been entirely destroyed. In Northern France, thousands of new homes will have to be built, and railway rebuilding will require an immense quantity of railway ties.

In England and Scotland forests have been denuded, the supply of lumber already exhausted, and imported lumber is in urgent demand. In Italy the same condition applies. Russia still has great supplies of standing timber, but it is said to be unsuited for rebuilding opertions owing to its lower quality.

In the United States lumbermen have already under way several export associations with foreign sales agencies to secure and distribute orders for American lumber. Sir George Foster wants a similar organization of Canadian lumbermen to secure European business for Canada

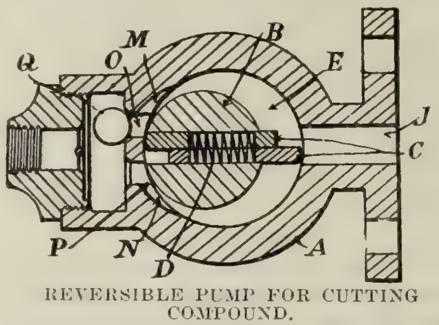
RAILWAY JOINT TARIFFS

THE Railway Commission has made an Order disallowing all notices of cancellation of joint freight tariffs which have not been superseded by other joint freight tariffs duly filed with the Board and applicable between the same points and to the same classes of traffic.

The Order is the result of a report made to the Board by its chief traffic officer that the C. P. R. and G. T. R. have been cancelling joint tariffs without submitting new ones as required by law, and that this was being done only in so far as connections with the Canadian Northern were concerned. In like manner the C. N. R. has cancelled joint tariffs applicable to points on the other lines. The new Order exempts such cancellations as are justified by the constructions of new lines or otherwise.

REVERSIBLE LUBRICANT PUMP FOR MACHINE TOOLS

THE use of cutting compounds has become such a recognised feature of metal cutting operations that increased attention is being given to lubricant pumps for machine tools. Various devices have been developed for overcoming the necessity of a separate belt drive to the pump which is necessary where the machine spindle is subject to reversal, and a reversible pump which delivers continuously in one direction while being driven in either direction forms the subject of a recently issued English patent. It has been specially designed for direct drive on machines which have reversible motion, and as shown in sketch, it accomplishes its object through the medium of a free ball Q which seats itself on either of the ports O and P according to the direction of rotation. By placing the inlet port J diametrically opposite, a suction effect is created hebind the suction effect is created behind the flow of liquid through one of the discharge ports and seats the ball accordingly. By using suitable material for the ball, the possibility of it settling at the bottom is overcome. The remainder of the pump construction is amply apparent from the illustration.



REVERSIBLE PUMP FOR CUTTING COMPOUND.

READERS' QUERIES

Question.—Can you give me a recipe or furnish me with information as to how tools are mottled, such as Brown & Sharpe, or Starrett tools.—H.E.

Answer.—The mottled finish on drop-forged steel tools is produced by case hardening in bonedust. This is a long, slow process of several hours, and requires a quantity of bonedust, a good-sized receptacle, and fire-clay. Practically the same thing can be obtained without these, although the case hardening will not run so deep. Put enough potassium cyanide in an iron receptacle of suitable size and heat until red-hot. Dip the articles mottled into the molten cyanide and leave a few minutes long enough to be brought thoroughly up to the red heat and a little longer; then take out and quench in clear, cold water, and you will have a fairly mottled surface.

The mottled finish may be imparted to steel surfaces by a mechanical method also. To the end of a short, round piece of steel fasten a disc of leather ⅛ inch thick by means of steel pins inserted in the end of a steel piece; the pins must protrude through only far enough to hold the leather, and not penetrate through. Place the steel piece in a drill chuck and apply a small quantity of fine emery and a little oil to the surface of the leather. Hold the tool against the leather while the tool revolves. Various effects may be obtained by moving the article being finished into different positions while holding it against the leather. Different sizes of circles or spots will require different sizes of leather and shank. When used in a universal milling machine, the mottled effect can be greatly diversified, and many graduations of the circles may be employed to good advantage.

* * *

Question.—Owing to existing conditions, a staff of men are given a 25 per cent. increase, with the stipulation that a similar cut will be made at the end of six months, if circumstances warrant it. If the wage before the increase was $20 per week, what would be the rate after the proposed cut?—C.M.

Answer.—If the amount of the increase were to be deducted at the end of the period, the rate of pay would be the same as before the advance; but on a percentage basis, the rate after the advance would be $20×1.25 equals $25, and a 25 per cent. cut on this amount would represent a decrease of $25×.25 equals $6.25; therefore, the rate of pay after the cut would be only $18.75.

* * *

Question.—At a maximum speed of 80 feet per second for cast iron, what would be the largest diameter of flywheel that could be used to obtain 300 revolutions per minute?—P.H.

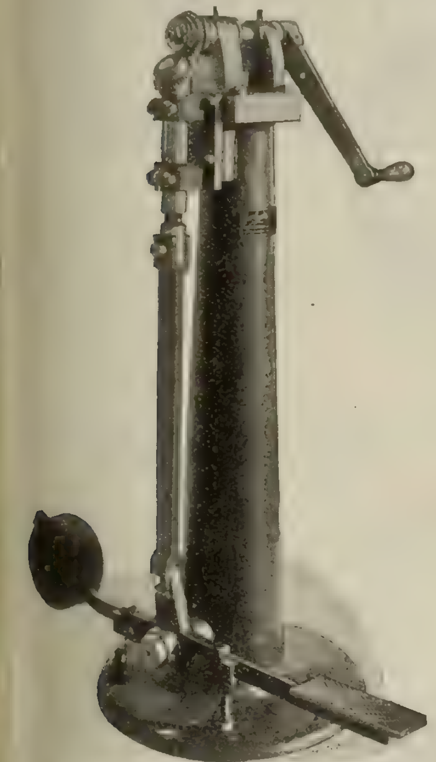
Answer.—A speed of 80 feet per second is equal to 80×60, equal to 4,800 feet per minute; therefore the circumference of the wheel would be the space passed through per minute, divided by the number of revolutions, or 4,800 divided by 300 equals 16 feet; and the diameter would be the circumference divided by 3.1416, or 16 divided by 3.1416 equals 5.09 feet, or approximately 5 feet in diameter.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

SPECIAL MACHINE FOR MARKING FUSE CAPS

A SPECIAL marking machine for graduating and numbering bevel fuse caps in one operation has just been put on the market by the Noble & Westbrook Mfg. Co., of Hartford, Conn., fully equipped with graduating dies ready for the operator to start work. This is an addition to their well-known Dwight slate marking machines. As illustrated herewith, the ew unit is simple in construction, ac- trate and easy to operate.



FUSE CAP MARKING MACHINE.

The graduating die is held in a hold- r keyed to shaft, the shaft, as mark s made, revolves with the die, wind- ng a spring tension which as soon as ontact with work is broken returns vork holder to its proper position to ark the next piece. The shaft runs n bronze bearings with collar adjust- ent. The work is held in place with elation to die by accurately cut gears; nd depth of impression is provided by oot pressure through a lever and cam hich is adjustable so that it is pos- ible to regulate the depth of impres- on to an hundredth part of an inch. his means that even and accurate im- ressions can be secured.

The machine is suitable to graduate not only fuse caps but any bevel surface such as micrometer collars on lathes, milling machines or any machine using graduated collars. It can also be used to put on lettering in place of graduations on bevel surface, and is claimed to give excellent results. The saving of time and labor by using a machine of this nature is easily appreciable, as with one turn of the hand lever a complete mark is made and dependence can be placed on each succeeding mark being accurate and uniform.

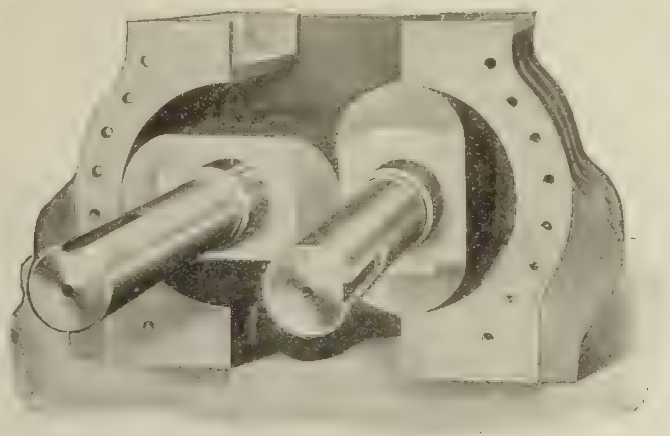


FIG. 1. GENERAL INTERIOR ARRANGEMENT.

ROTARY PUMPS FOR BY-PRODUCT PLANTS

THE pumps described are used to circulate the wash oil, which sometimes is termed straw oil due to its color, through the scrubbing equipment of by-product plants. The oil is pumped in at the top of these scrubbers, and as it passes down through the apparatus, it absorbs the by-products, such as benzol, tuluol, zyols, phenol and other hydro carbons. The oil ladened with the substances which have been absorbed from the gas, passes into a large tank or sump from which it is taken to apparatus which removes the products picked up while passing through the scrubbers, that is the benzol, tuluol, etc. After these have been removed, th oil is returned to the system and pumped through the apparatus again. The quantity of oil to be handled varies from 4,000 to about 40,000 gallons per hour, and the discharge head runs as high as 150 feet, but is usually around 125 feet. In some cases the discharge head has been as low as 50 feet. In some installations the oil flows by gravity to the ends of the pump while in others, the suction lift runs as high as 8 ft. but it is usually around 5 ft. The wash oil or straw oil is handled at a temperature of about 120 degs. C.

The operating principle of those rotary pumps is remarkable for its simplicity. The moving parts consist of two parallel shafts with an impeller on each and having a gear keyed on the

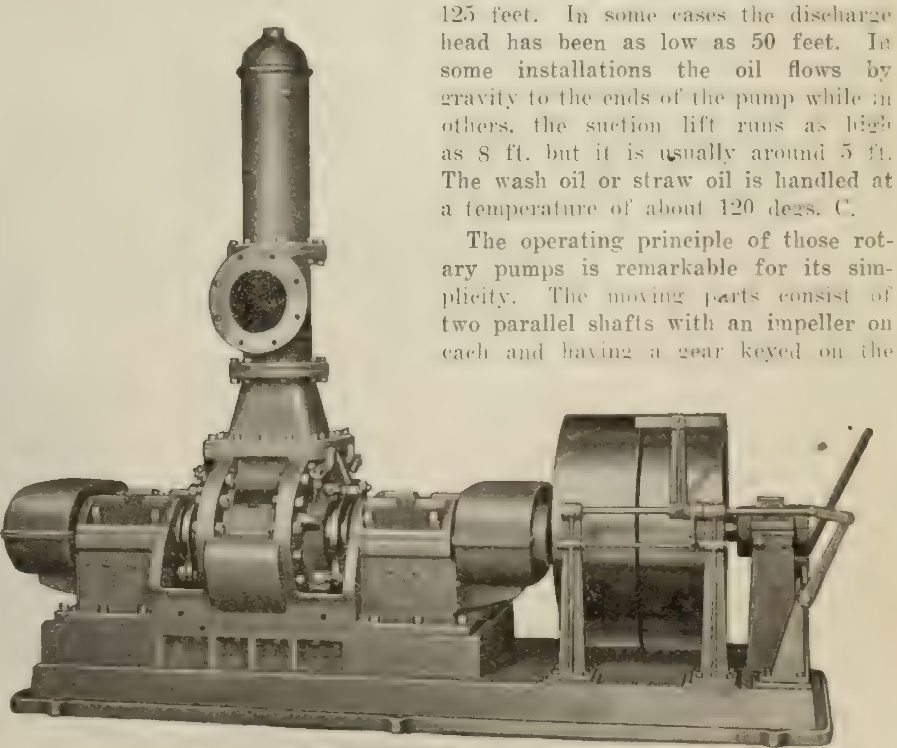


FIG. 2. ROTARY PUMP FOR CIRCULATING WASH OIL.

ends. They are assembled to 90 degs. one to the other and this relation is permanently maintained by means of the above mentioned gears. Fig. 1 shows a section through the pump. The impellers rotate in opposite directions, one clockwise, the other counterclockwise. The water from the suction pipe is enclosed between the impeller (as shown in vertical position), and the case, so that for an instant there is a body of water which is not open to either the suction or discharge sides. As the impeller continues to rotate, it immediately opens to the discharge side and the volume which was enclosed is forced into the discharge side. Since, owing to the shape of the impellers, there is at no time a possible return between the shafts, it is evident that a quantity of water equal to the enclosed volume is discharged at every half revolution of each impeller. For each revolution of the pump, therefore, four times this volume is discharged.

Pump Case

The case is composed of two identical semi-circular castings and two identical headplates, all substantially ribbed to eliminate deflection. Suction air chambers are cast in the lower part of the case. The bearings are approximately three times the diameter of the shaft which, since the shaft is of ample proportions, gives a very low bearing pressure. This together with effective oiling maintained by oil chains or rings reduces wear to a minimum. Since practically all of the wear occurs vertically, the single wedge beneath the lower half box permits adjustment at any time, if necessary, while the pump is in operation. In the pumps of large capacity, the expense of a quarter box bearing is justified owing to the greater nicety of adjustment thus made possible, besides being of course necessary. The oil reservoirs beneath the bearings are of generous proportions, permitting continuous operation without attention. The main bearings are cast integral with the headplates, resulting in a quite compact and rigid design.

In the production of the gears, we understand that a special cutter is used for each size. The exceptionally wide face, about seven times the circular pitch, gives long life with a minimum wear. The involute tooth is used. For material, semi-steel has been found to have excellent wearing qualities. The pump is self contained on a deep, well-ribbed bedplate, and each pump is shipped ready to be grouted into position. Local conditions and the purchaser's preference generally govern the choice of the drive. As these machines have their most common application for pumping water and non-corrosive liquids, cast iron and steel are commonly used, but in case the liquid to be handled is corrosive, suitable resisting metal is selected.

Designs have been gotten out for three ranges of pressures:—Low lift pumps for heads from 0 to 30 feet; medium lift pumps for heads from 30 to 80 feet, and high lift pumps for heads from 80 to 200 feet. The capacities vary from a displacement of 1-10 of a gallon per revolution up to 50,000 gallons per minute, the applications of the pumps being universal within the capacities and heads given above. Besides irrigation projects, reservoirs, condensers, cooling towers, and circulating systems, we understand that this type pump has become a feature in by-product coke oven service for handling wash oil, tar and ammoniacal liquor. Of primary consideration are the facts that it is a positive displacement pump and that it is valveless, thus combining merits of both the centrifugal and reciprocating pump. Priming is never necessary for starting, and the delivery is constant and independent of the head. The efficiencies claimed are noteworthy, varying from 75 to 85 per cent. of the power applied to the pump shaft. Low first cost, small repair and small maintenance charges, small floor space and long life, constitute claims made on behalf of this specialty. The P. H. and M. F. Roots Co., Commersville, Ind., are designers and manufacturers of these Rotary Pumps for by-products plants.

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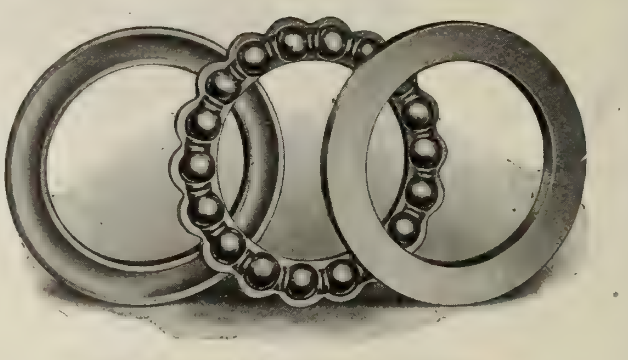
Don't guess at measurements when installing machinery.



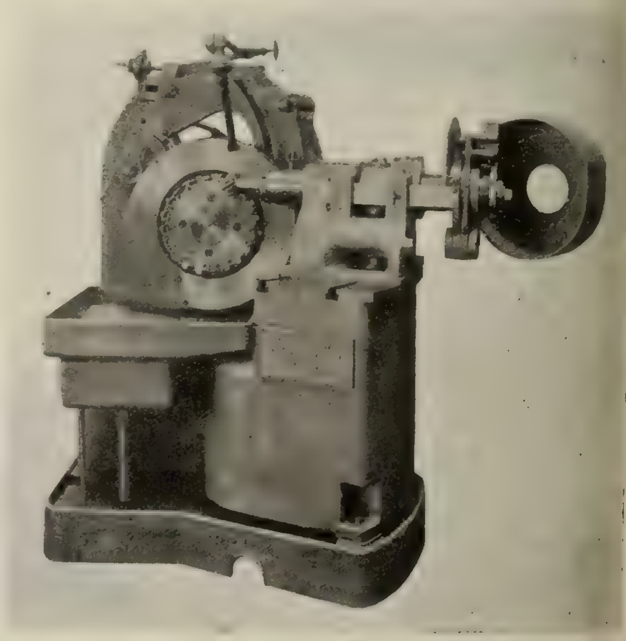
NEW BALL TYPE THRUST BEARING.

BALL THRUST BEARINGS

THE Rochester Ball Bearing Co., Inc., of Rochester, N.Y., has introduced a line of ball thrust bearings which, while they do not incorporate any radical departure from generally accepted good practice in this line of manufacture, embody a number of interesting features. Of special merit in these bearings is the solid brass retainer. Experience has shown that a large proportion of ball thrust bearing failures are traceable to the use of sheet metal retainers, which wear rapidly, allowing particles of steel to fall into the races. The shock and extra wear, due to the balls running over these particles, eventually ruins the bearing. This, it is claimed, cannot happen with solid brass retainers. These bearings are usually made with round grooves, although V groove bearings are regularly made for high speed, light duty conditions, special bearings being, in addition, made to order. Thrust bearings for heavy duty are made with self-aligning spherical seat washers. The illustration shows medium weight bearings of large size. The retainers of small bearings are not scalloped.

UNIVERSAL ROUGHING MACHINE FOR BEVEL PINIONS

A UNIVERSAL machine for roughing either right or left-hand bevel pinions preliminary to finishing on a standard spiral type bevel gear generating machine is a recently developed product of the Gleason Works, Roches-



UNIVERSAL ROUGHING MACHINE FOR BEVEL PINIONS.

ter, N.Y. While the builder's standard spiral type bevel gear generating machines will either rough or finish the pinions, it is possible by using the new machine to perform the roughing operation cheaper and faster. The cutter operates at a speed of 130 ft. per minute and one tooth can be cut in as short a time as 19 seconds.

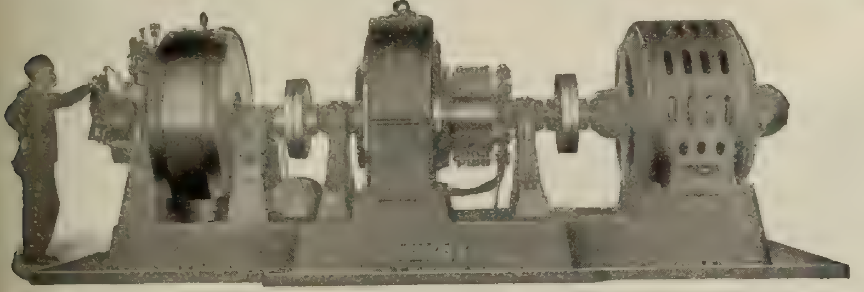
The machine is entirely automatic and will rough either right or left-hand spirals. The generating roll of the work spindle actuates a positive indexing mechanism, and, for spacing teeth, a notched dial with the required number of divisions is employed. The feed, which is of the positive type, is driven by a cam mounted directly on the cutter sleeve. The machine is driven from the countershaft by a belt. The driving pinion for the internal gear drive to the cutter is mounted on this shaft, and all the other drives, including that for the pump, are taken from it. The cutters and the mandrels used are of the same type as those employed on the finishing machine and, of course, are interchangeable. The adjustments for setting to the spiral angle can be easily and quickly made. The cutter is permanently set to the root angle and, as pointed out, requires adjustment only as it wears, or a new cutter is required. All parts are easily accessible and can be readily oiled and adjusted. The attachments furnished include one index dial, a set of feed change gears, a cutter gauge, an oil pump and connections, a set of wrenches and a countershaft.

EXCITER UNIT WITH DUPLEX DRIVE

THE exciter unit shown in the accompanying illustration is one of a number now being installed in the new power plant of the Buffalo General Electric Co. These sets are of large capacity—300 k.w. normal—and are provided with two independent sources of power for driving each exciter.

Each unit consists of a 300 k.w. exciter direct-connected to an induction motor at one end and to a steam turbine at the other end. The governing mechanism of the turbine is so arranged that if the power for the induction motor should fail, the turbine would automatically pick up the load. In case of trouble on the main circuits, the exciters can be depended upon to take care of themselves without attention, and the operators can give all their attention to clearing up the trouble on the main circuits, while with ordinary motor-driven exciters the exciter unit shuts down as soon as the voltage of the main circuit fails, and it is necessary to start up an independent unit before voltage can be restored to the main circuits.

Another advantage of the Duplex Exciter Drive is that it gives the exciter unit a higher all-day efficiency than either a motor-driven or a steam-driven exciter. This maximum efficiency is secured by driving the unit from the turbine end when the station is operating at full load and the turbine exhaust can be used efficiently in the heaters, and by shifting the drive to the motor end when the station load is light, and the main generators can easily carry the exciter load. The turbines were manufactured and the units assembled by the Terry Steam Turbine Co., Hartford, Conn.

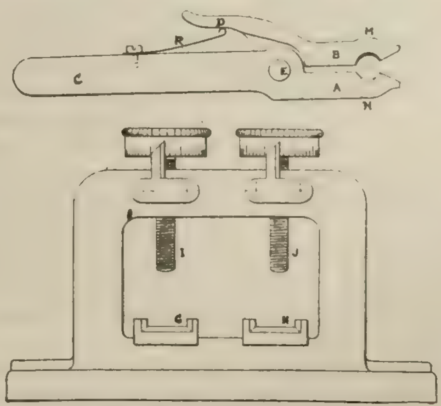


EXCITER UNIT WITH DUPLEX DRIVE.

A FRENCH SCREW GAUGE

THE order recently made by the French Minister for War, enforcing the adoption of the S.I. screw thread, directs attention to the "instructions" on the nature and measurement of this thread which were circulated amongst French manufacturers in 1913. In these instructions a description is given of a simple form of screw gauge devised by M. Marre, which was published in a recent issue of *The Engineer*.

The principal feature of interest is the use of a species of handvise known as a "crocodile," which is used in conjunction with a high and low limit indicating gauge. The gauge proper is the "crocodile" shown in the annexed sketch. The hole in the jaws is tapped to fit a standard screw. It is obvious that any screw which fits the jaws approximately, but is yet incorrect in pitch or diameter, will either cause movement of the jaws or will jam when screwed in. The extremities of the jaws are cut away as shown, and the section of the thread, which is thus made, when engaged with a screw presented to the jaws shows roughly the nature of any obvious defects. A master screw being put in the jaws, the crocodile is placed on the anvil G, and the screw I is brought down till delicate contact is made. The surfaces M and N of the crocodile jaws are truly cylindrical. The micrometer screw can be turned back to give the maximum reading. A similar adjustment, but for minimum diameter, is made with the screw J. Further explanation is unnecessary. Any screw that is too small will allow the crocodile to pass the "not-go" gauge; any screw that is too large or defective in pitch, etc., will not revolve in the hole, and will open the jaws so that they will not pass the "go" gauge.



FRENCH SCREW GAUGE.

TRYING TO CONSERVE NIAGARA'S POWER

THE Minister of Inland Revenue is arranging to meet the various interests concerned in the Niagara power situation some day this week. The Federal authority has been invoked as a means of aiding in the movement to conserve the power developed at the Canadian Falls for use in Ontario through the Ontario Hydro-Electric Power Commission. The companies which are exporting power from the Canadian side into the State of New York are being urged to turn this power or part of it back into Ontario for use by the Hydro. It is urged, on the other hand, that the power exported is being delivered to consumers in the United States under contract. The export is done under license issued by the Inland Revenue Department, and it is to this department that the parties are now appealing.

* * *

Scotticism.—McTavish and Macpherson are adrift at sea in an open boat. McTavish (on his knees)—"O Lord, I ken I've broken maist o' Thy commandments, and I've been a hard drinker all my days; but, O Lord, if we're spared this time, I promise never ——" Macpherson—"I widna commit mysel' ower far, Donald. I think I see land."

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A weekly newspaper devoted to the machinery and manufacturing interests.

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CANADIAN SHIPBUILDING FOR EXPORT

ANENT the recently passed Order-in-Council at Ottawa, whereby a 99 per cent. drawback becomes effective on material imported for shipbuilding purposes in Canada, some difference of opinion appears to exist as to its all-round value to the industry here. The first clause of the Order-in-Council is that on which the question altogether hinges; we quote it as follows:

A drawback not exceeding 99% (ninety-nine per cent.) of the Customs duty paid, may be granted and paid by the Minister of Customs on materials used in the original construction of ships and vessels measuring over five hundred tons gross tonnage, built in Canada, when such ships or vessels are authorized by Order-in-Council to be exported for Registry outside of Canada or are British Registered in Canada and are constructed so as to obtain a class in Lloyds, Bureau Veritas, British Corporation or other recognized classification satisfactory to the Minister of Customs; provided that the drawback payable under this section shall be in lieu of any drawback based on a specific rate per registered ton.

It is expressly stated in the foregoing that the drawback is only effective when vessels built here are authorized by Order-in-Council for export to registry outside Canada or for British registry in Canada. No concession is made with respect to Canadian built vessels to Canadian registry and as a consequence what has been promulgated savors of a hardship in the estimation of some. On the face of it, there does not, of course, appear any good reason why the Order-in-Council should not have been made all-inclusive in its application, yet "half a loaf is better than no bread," and as under present circumstances, the biggest half loaf is our shipbuilder's portion, it may not be in order to find fault to any great extent. The major portion of the vessel contracts under performance by our various shipbuilding plants are for registry other than Canadian, and for several years to come a like condition is certain to prevail.

Shipbuilding—wood and steel is booming in Canada as never before, ample evidence in itself that the recent Order-in-Council has accentuated rather than deterred the degree of activity. As bearing out this opinion we understand that the Shipping Federation of Canada—a body representative of our principal vessel owners, expresses the view that the drawback effect cannot fail to induce greater shipbuilding activity on our lake and ocean shores. In any case, the step taken by the authorities at Ottawa is in the right direction—aid to native shipbuilding, even although of outside registry, and bearing in mind the fact that the aid has been forthcoming at an opportune time to make it of helpful effect, there is little doubt but that the little remaining disability concerning Canadian built vessels for Canadian registry will disappear when conditions warrant.

It has been quite general practice to have our canal size lake-boats built in Great Britain in years past as also many of our coasting vessels, the difference in cost of construction materially favoring such procedure. Because of the world-wide shortage of "bottoms" for ocean services, due to the almost complete cessation of new construction in Great Britain for many months; the normal and war losses; the fact that the shipyards there will be taxed to the limit of capacity output for well-nigh the next decade; and that comparative costs as between Canada and the Old Country will have drawn more nearly level following the war, a lessened construction abroad of vessels to Canadian registry will result, with a corresponding increase in the home built product and like registry. As world output begins to overtake arrears and a slackening of the demand for Canadian built ships of outside registry becomes imminent, we look to see the drawback made applicable to all our vessel construction.

* * *

THE N.T.R. SHOPS AT ST. MALO

LEST we forget. The National Transcontinental Railway shops erected and partly equipped at St. Malo, Que., are still lifeless. What is perhaps still worse, they are rapidly approaching the wreck and ruin stage. A nesting place for sparrows is the most recent version of their meantime condition, from which perhaps other and still more interesting conclusions can be drawn. Whether these particular shops should ever have been built is beside the question at the moment, but having got to the near stage of completion evidenced a few years ago, steps should have been taken to give the finishing touches to the undertaking. The war, so far as they were concerned, through the demand made upon us to supply shells, should have stimulated instead of retarded action. Political party strife, and that alone, is responsible for the productive inactivity and hopeless ruin of the St. Malo shops in which several million dollars have been sunk for buildings, plant and equipment.

What surprises us, however, is that the Imperial Munitions Board, now almost a year in existence, did not take up the utilization of this going-derelict plant and wrest it from the political lions. The record of the Board during the past year has been a good one, in spite of the fact that in the view of many, ourselves included, more or less arbitrary methods have been on occasion employed. With respect to the St. Malo shops, we should have thought that with the Letters Patent of the Imperial Government and the high-grade executive personnel of its members, it should have been possible for the Munitions Board to not only arrest the destruction of these shops but to have turned them to good account as a representative national munitions factory. It may not be too late yet for action. In any case, the St. Malo shops will be wanted one day—we are led to this conclusion because of the tremendous industrial development that is so generously prescribed for our Dominion following the war. In anticipation, wouldn't it then be wise to set about the work of reclamation, while there still remains a percentage worth while of what has been spent?

INDUSTRIAL NOTABILITIES

RALPH BERGEN HAMILTON, M.E., president and general manager, The Packard Electric Co., St. Catharines; director, Reo Motor Car Co. of Canada; director, Precision Mfg. Co., St. Catharines, was born at Toledo, O., April 11, 1875, son of John Allen and Harriet Hale (Rowland) Hamilton. He was educated at the Public School, Saginaw, Mich.; The Dresden Polyteknik, Germany; Cornell University (M.E., 1896), and began his business career as a draughtsman with the Buffalo Engineering Co., Buffalo, N.Y., in 1896. He was assistant engineer, Howard Iron Works, Buffalo, 1897-1898; assistant manager, Iroquois Iron Works, Buffalo, 1899-1900; acting manager, Packard Electric Co., St. Catharines, 1901; became secretary-treasurer and general manager, 1901-1912, and was appointed president and general manager, 1912.

RALPH BERGEN HAMILTON, M.E.

Mr. Hamilton is an ex-director, Rochester *Times* Publishing Co., and of the McMillan Springs Co.; president, St. Catharines Board of Trade, 1906-1907; member of Finance Committee, Patriotic League; chairman, Manufacturers' Committee, Recruiting League; ex-member, Executive Board, Canadian Manufacturers' Association; and was appointed by the Imperial Munitions Board, special representative on investigations pertaining to the manufacture of munitions.

He married Edith Raphael Seixas, daughter of Gersham A. Seixas, New York City, 1899; has three sons. His clubs are: St. Catharines Golf; National (Toronto); University (Buffalo); Alpha Delta Phi (New York); Engineers' (Montreal); Little Saguenay Fish and Game; and his societies: the American Society of Mechanical Engineers; Associate Member, American Institute of Electrical Engineers. His residence is 30 Bellevue Ave., St. Catharines, Ont.

—Photo, courtesy International Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$26 95	
Lake Superior, charcoal, Chicago	26 75	
Standard low phos., Philadelphia	47 00	
Bessemer, Pittsburgh	30 95	
Basic, Valley furnace	25 50	
	Montreal	**Toronto**
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton	$32 25	32 00
Victoria	32 25	32 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.40
Steel bars, base, Toronto	3.50
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.35
Steel bars, base, Montreal	3.50
Twisted reinforcing bars, base	3.55
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.65
Small shapes	3.85
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.35
Bars, 2 in. and up	3.75
Strucural shapes	3.35
Plates	4.00

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs.	
	C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$37 00	$36 00
Electrolytic copper	37 00	36 00
Castings, copper	36 00	35 00
Tin	46 00	48 00
Spelter	14 00	14 50
Lead	9 50	9 00
Antimony	15 00	18 00
Aluminum	70 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$5 00	$5 00
Heads	5 35	5 25
Tank plates, 3-16 in.	5 25	5 25

WROUGHT PIPE

Prices in effect Nov. 17, 1916.

Buttweld

Per 100 feet.	Black.	Galv.
⅛ in.	$ 3 50	$ 5 00
¼ in. and ⅜ in.	3 30	5 43
½ in.	4 25	5 82
¾ in.	5 18	7 30
1 in.	7 65	10 80
1¼ in.	10 35	14 61
1½ in.	12 38	17 46
2 in.	16 65	23 50
2½ in.	26 33	37 15
3 in.	34 43	48 58
3½ in.	43 24	60 26
4 in.	51 33	71 40

Lapweld

2 in.	$19 24	$25 72
2½ in.	28 67	38 90
3 in.	37 49	50 87
3½ in.	46 92	63 94
4 in.	55 59	75 76
4½ in.	64 77	88 27
5 in.	75 48	102 90
6 in.	97 92	133 40
7 in.	130 90	174 90
8 in. x 25 lbs. per ft.	137 50	183 80
8 in. x 25 lbs. per ft.	158 40	211 70
9 in.	189 80	253 60
10 in. x 32 lbs. per ft.	176 00	235 20
10 in. x 40 lbs. per ft.	226 60	302 80

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$23 00	$22 00
Copper, crucible	27 00	25 00
Copper, heavy	27 00	25 00
Copper wire	27 00	25 00
No. 1 machine compos'n	21 00	20 00
No. 1 compos'n turnings	17 00	18 00
New Brass clippings	17 00	17 00
No. 1 brass turnings	15 50	14 00
Steel, low phos.	14 00	14 00
Heavy melting steel	12 00	12 00
Boiler plate	12 00	10 50
Rails	14 75	15 00
Axles, wrought iron	19 00	19 00
Tires, steel	12 00	11 00
Rails	13 75	13 00
Shafting	16 75	16 00
Malleable scrap	10 25	11 00
Pipe, wrought	10 50	9 00
Stove plate	12 00	11 50
Heavy lead	7 50	7 50
Tea lead	6 00	5 50
Scrap zinc	8 00	8 00
Aluminum	35 00	35 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	35
Stove bolts	60
Plate washers	20
Machine bolts, ⅜ and less	25
Machine bolts, 7-16 and over	15
Blank bolts	15
Bolt ends	15
Machine screws, flat head, iron	u6 & 5
Machine screws, fl & rd. hd, brass	12½
Machine screws, fil head, iron	25
Machine screws, fil. head, brass	5
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts, hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	32½
Boiler rivets, base ¾-in. and larger	$5.25
Structural rivets, as above	5.15
Wood screws, flat, bright	77½
Wood screws, O. & R., bright	72½
Wood screws, flat, brass	45
Wood screws, O. & R., brass	42½
Wood screws, flat, bronze	37½
Wood screws, O. & R., bronze	35

MILLED PRODUCTS

	Per Cent.
Set screws	40
Sq. & Hex. Head Cap Screws	30
Rd. & Fil. Head Cap Screws	15
Flat & But. Hd. Cap Screws plus	15
Fin. & semi-fin. nuts up to 1 in.	30
Fin. & semi-fin., nuts over 1 in.	25
Studs	15
Taper pins	45
Coupling bolts	plus 15
Planer head bolts, without fillet	15
Planer head bolts, with fillet	net
Planer head bolt nuts, up to 1 in.	30
Planer head bolt nuts, over 1 in.	25
Planer bolt washers	plus 10
Hollow set screws	list plus 40
Collar screws	list plus 20
Thumb screws	20
Thumb nuts	70
Patch bolts	add 65
Cold pressed nuts to 1½ in.	add $3.50
Cold pressed nuts over 1½ in.	add $2.00

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$52 50
Open-hearth billets, Pittsburgh	52 50
O. H. sheet bars, Pittsburgh	52 50
Forging billets, Pittsburgh	78 00
Wire rods, Pittsburgh	65 00

NAILS AND SPIKES

Standard steel wire nails, base	$4 25	$4 20
Cut nails	4 00	4 00
Miscellaneous wire nails	65%	
Pressed spikes, ⅝ diam., 100 lbs	$4 10	

MISCELLANEOUS

Solder, guaranteed	0.31½
Solder, strictly	0.29½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Gasoline, per gal., bulk	0.26½
Benzine, per gal, bulk	0.25½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	1.12
Linseed oil, boiled, single bbls.	1.15
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	8 00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.12
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes	35
S.S. drills, 1/16 in. and larger	50
Standard drills to 1½ in.	50
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	20
3-fluted drills over 1½ in.	10
Bit stock	50
Ratchet drills	20
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	25
Sockets	30
Sleeves	40
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, Black, No. 28	$4 50	$4 50
Sheets, black, No. 10	5 50	5 50
Canada plates, dull, 52 sheets	4 75	4 75
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	6 95	6 95
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 45	7 35
Gorbal's Best, No. 28	7 75	7 50
Colborne Crown, No. 28	7 25	6 75
Premiar, No. 28 U.S.	6 50	6 75
Premier, 10¾ oz.	6 80	7 00

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65
Kearney & Foot, Arcade	65
J. Barton Smith, Eagle	65
McClelland, Globe	65
Black Diamond	65
Delta Files	65
Nicholson	55
Globe	60
Vulcan	65
Disston	..

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$30 00	....
1¼ in.	30 00	....
1½ in.	30 00	24 00
1¾ in.	29 00	21 00
2 in.	31 00	20 00
2¾ in.	33 00	.....
2½ in.	35 00	26 50
3 in.	40 00	30 00
3¼ in.	45 00	34 00
3½ in.	50 00	35 00
4 in.	60 00	45 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.23
Royalite, per gal., bulk	.10½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Union thread cutting oil antiseptic	.70
Acme cutting oil, antiseptic	.39½
Imperial quenching oil	.39½
Petroleum fuel oil	.12¾

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30-10%
Standard	40%
Cut leather lacing, No. 1	$1.40
Leather in sides	1.20

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke.	
Connelsville Foundry Coke	....
Yough Steam Lump Coal	....
Pittsburgh Steam Lump Coal	....
Best Slack	....

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.17
Peerless	.17
Grand	.16
Superior	.16
X L C R	.15
Atlas	.15
X Empire	.14
Ideal	.14
X press	.13
COLORED	
Lion	.12¼
Standard	.10¾
No. 1	.10¾
Popular	.9¾
Keen	.8¾
WOOL PACKING	
Arrow	.20
Axle	.16
Anvil	.12
Anchor	.10
WASHED WIPERS	
Select White	.12
Mixed colored	.9
Dark colored	.8

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.39 to .41
Tin	.49 to .56
Zinc	.18 to .20

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 in.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.35
Emery in kegs, American.	.06
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.35 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.17
Cobalt sulphate	.70
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.12
Nickel carbonate	.35
Nickel sulphate	.17
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.55
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.41
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.50
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents

Montreal, Que., Nov. 27, 1916.—The industrial situation is still featured by the unceasing demand for all kinds of product and advancing prices. The continued increase in production is not sufficient to supply trade requirements, and consumers in many instances are forced to wait the pleasure of the producer. The situation is also becoming more affected by car shortage, which, with the near approach of heavy weather and the close of navigation, may have a serious result on early market conditions.

Pig Iron

The upward movement in pig iron still continues, and further advances are reported. The fact that ore producers have advanced the price of various ores would indicate that the market value of pig iron has not yet attained a maximum. Pittsburg quotes Bessemer pig at $30.95, an advance of $1 per ton.

Steel

Remarkable activity continues to feature the general steel situation, and prices are still soaring. Quoted prices are only a guide to what is being paid by the average purchaser. If the metal was available for early delivery it is believed that almost any price could be received by the mills. The higher cost of furnace operation is one of the main factors in present advances, as spot coke has advanced another $1, the current quotation being $7 per ton. Foundry coke at $10 is 50c per ton higher than last week. The exceptional demand for billets and sheet bars is maintaining this market in a very strong position, and a higher price tendency is evident. The inquiry for all kinds of plates is very heavy, but producers are not in a position to supply the trade for delivery under six or eight months. A recent advance of $3 per ton has put Pittsburg refined bars on a basis of $3 per hundred, while steel bars are quoted at $2.90. Structural shapes are now $3 Pittsburg, following an advance of $3 per ton. Steel rails are active, more especially the lighter sizes. Recent heavy demand has resulted in a shortage in sheets and prices are higher; black sheets are now quoted at $4.50 Pittsburg; tin mill black is also $4.50, an advance over the week of 50c a hundred. Blue annealed sheets are now $3.60 Pittsburg, and galvanized sheets $6; the general advance on all sheets being about 50c a hundred. Recent developments are beginning to tell on wire and wire products, and with the continued demand higher prices are expected. For early delivery on wire rods price is a secondary consideration. Nuts, bolts and rivets are from $3 to $5 higher, due to the higher cost of raw material. Wrought iron pipe and boiler tubes are still very active. The local steel situation continues very strong, with higher quotations pending; the advances this week are confined to sheets, No. 28 black being now $4.50; No. 10 black, $5.50; Apollo, 10¾ oz., galvanized, $6.95; Premier No. 28, $6.50; and 10¾ oz , $6.80.

High-speed Steel

The situation in high-speed steel continues very good; the demand is not quite so heavy and the volume of steel used is lighter owing to more efficient methods of using the steel. Producers are still working to capacity filling trade requirements, but conditions are becoming easier. Prices are still well maintained.

Metals

The outstanding feature of the metal situation is the phenomenal advance in copper, which is at present overshadowing all other developments. Tin is strong, and quite active. Spelter is in good demand on higher prices. Lead is firm, with stronger tendency. Antimony is also firmer, and aluminum is unchanged.

Copper.—The scarcity of available metal is still pronounced, and it is reported that copper contracted for several months ago at 25½c is being sold to-day at current prices, which would indicate a maintenance of existing quotations. European reports show a decline of stock on hand and London quotations are firmer. New York prices have again advanced 1½c on lake, 1c on electrolytic, and 2⅛c on castings; the present nominal quotations being 34c for lake and electro, and 32⅝c for castings. The local situation is active, with prices very strong, dealers here having advanced their quotations 3c during the week; lake and electrolytic being now 37c and castings 36c per pound.

Tin. — The market is developing strength, and prices are advancing, the U. S. situation being affected by the inability to secure sufficient tin for present requirements, due to the fact that shipping permits are being withheld. London prices have advanced, and New York is quoting ½c higher than a week ago. Dealers here, report a strong market with prices firm and unchanged.

Spelter.—Gradual improvement is maintained in spelter, and the increasing demand, together with a steady return to higher levels, seems to indicate a better market. The brass mills are active buyers, and with the feeling that much of the recent buying of copper has been made by these interests, further activity is expected in spelter. Slight advances have been made in London quotations, and New York prices are ¾c higher, prompt being quoted at 12.92c per lb. Prices here are firm on a steady market.

Lead.—The market is very steady, with an undertone of additional strength. While the Trust is inclined to hold to its recent quotation of 7c, outside interests are asking 7¼c.

The local market is active, and prices have advanced, dealers quoting 9½c, an advance of ½c per lb.

Antimony.—Owing to a slight increase in demand, the market is stronger, with prices advancing. New York has advanced 1¼c during the week, the present quotation being 14½c per lb.

Aluminum.—No change is reported, and quotation of 70c is very firm.

Machine Tools and Supplies

The changes recently effected in the make of some of the smaller-sized shells has developed increased activity in many of the smaller tools. While the general demand is not heavy, sufficient business is passing to keep machine tool makers very busy, and in some instances delivery is still backward. Present additions to existing plants and those under consideration, both for munitions and domestic purposes, will require further equipment, assuring continued activity in this direction. Higher prices are general owing to the situation in steel and metal markets. All supplies are in good demand, with prices showing higher tendency.

Scrap

Higher prices prevail, and the market is generally stronger. Heavy buying in heavy melting steel is one of the features of a very active market. Borings and turnings are in good demand, and dealers' prices have advanced. Local conditions are reflecting the trend of the market, and dealers report an active situation, old copper being the feature, 2½c being the advance on all grades; light quoted at 23c, and crucible, heavy and wire going at 27c. No. 1 machine composition shows a similar advance, the current price being 21c. Composition turnings and brass clippings are now 17c, an advance of 2c. Brass turnings at 15½c are 2½c higher. Heavy melting steel is ½c stronger at 12c per lb. Stove plate is 1¾c higher, being quoted at 12c. Lead is stronger, heavy being quoted at 7½c and tea lead 6c per lb. Scrap zinc at 8c is an advance of ½c per lb.

Toronto, Ont., Nov. 28.—Reports from the United States to the effect that the British Government is cancelling contracts for rifles have been denied in some quarters. There is, however, reason to believe that there may be some truth in these reports, as the Government has already inaugurated a policy of having all war equipment and munitions made, as far as possible, in the Empire. Such a policy will naturally be of the greatest benefit to Canada, and manufacturers and munition makers are thus assured of practically all the business that they can take care of for the duration of the war.

Steel

The situation in the steel trade is best illustrated by a recent announcement that the output of the Algoma Steel Corporation was sold out for 1917; this also applies to the three other important steel producing concerns in Canada. The Algoma Steel Co. had on Oct. 31 unfilled orders amounting to approximately 380,000 tons, consisting principally of shell steel and steel rails. The logical result of such a situation will be that prices will continue to advance until supply and demand are more equally balanced. The time when this is likely to happen is not yet in sight, for the demand appears to grow heavier in greater proportion than the increase in capacity of the mills. Another factor tending to further enhance steel prices is the more or less recent but rapid advance in pig iron. Prices of wrought pipe are very firm, following the advance noted last week, and higher prices are looked for before the first of the year. Another advance in boiler tubes has been made, which will be followed in the near future by a further advance. The tube mills are sold out for eight to ten months, and consumers continue to specify freely. The demand for plates, particularly from shipyards, is exceedingly heavy, and prices are consequently very high. The Carnegie Steel Co. has advanced its price on steel plates $5 a ton, making $3.50 per pound for shipment at mill convenience.

A serious scarcity of sheet bars has developed, which is threatening to tie up the sheet mills; a decided shortage in the supply of black, blue annealed, and galvanized sheets already exists. The American Sheet & Tin Plate Co. has advanced its prices on black sheets $7 a ton. Local quotations are also higher, black sheets, No. 28 gauge, being now quoted at $4.50. Galvanized sheets have also advanced, Premier No. 28, U.S., being quoted at $6.75, and Premier, 10¾ oz., $7 per 100 lbs. The local market is very firm.

In the U. S. the scarcity of steel is more pronounced than at any previous time, and buyers are exerting more pressure than ever on sellers to hasten shipments. Buying of all kinds of steel contines heavy, but the mills are unable to accept a large amount of the business offering. Tremendous orders have been placed recently by the Allied Governments for blooms and bars for shell steel manufacture, delivery to be over the last six months of 1917. Prices continue to advance, but they are more or less nominal. Steel bars are now quoted at 2.95c and shapes 3c, Pittsburgh, shipment at mill convenience. Forging billets are higher at $78, wire rods at $65 per ton Pittsburg; Bessemer billets, open-hearth billets, and sheet bars, $52.50 a ton Pittsburg.

Pig Iron

Lake Superior iron ore has advanced $1.50 per ton over the prices current for 1916. Pig iron prices continue very firm, and the situation is generally unchanged. Prices of domestic pig irons have not advanced during the week, but will no doubt do so at an early date. Prices of American brands of pig iron are still climbing, a few being quoted as follows:— Grey forge Pittsburg, $26.95; Basic, Valley furnace, $25.50; Bessemer, Pittsburg, $30.95; Lake Superior charcoal, Chicago, $26.75; and standard low phosphorus, Philadelphia, $47 per ton. Hamilton and Victoria are quoted at $32 per ton.

Scrap

The market for scrap metals is more active and the situation has improved; old copper of all kinds is higher, ranging from 1½c to 2c above last week's prices. Machine composition and turnings are up, as are also brass clippings and turnings. Heavy and tea lead and zinc have advanced ¼c per pound, while old aluminum is also higher. Steel turnings are in better demand, with a broader market; accumulated stocks are being disposed of steadily.

Machine Tools

Considerable activity still exists in the machine tool market, due to the steady demand for equipment for munition plants. A number of inquiries have been received this week by local machinery houses for machine tools for making fuse parts, and also for the new style 4.5-in. and 6-in. shells. The demand for heavy single purpose lathes is not quite so active, although some orders have been placed, mostly for single tools. It is understood that a prominent firm in the U. S. has advanced its quotations on all sizes of lathes from 12 in. to 24 in. by approximately 12½ per cent., and the new quotations are higher by that amount than the general level now prevailing. It is considered likely that other lathe makers will follow suit.

Supplies

There have been no important developments during the week in this market. Business continues remarkably good, notwitstanding the high level of prices. Another advance in cotton waste is expected about the middle of December, while higher prices on rope may also be looked for. Copper wire is higher, and iron rivets are now quoted at 32½ per cent. discount, as against 35 per cent. formerly.

Metals

Copper continues to be the leading feature of the metal markets, and there is likely to be a scarcity of this metal next year. Lead and spelter are showing greater activity, the latter having advanced slightly, while higher prices for lead appear probable. Tin continues firm, but unchanged, while antimony and aluminum are also in better demand. The situation for all metals looks brighter, and all prices show a firmer tendency. Business locally continues brisk, and the outlook is favorable for the future.

Copper.—The market continues strong and quotations have advanced locally, although the primary market is unchanged. As nearly all of the production of many companies, which they are willing to sell in advance, has been disposed of until the third quarter of 1917. It is believed probable that prices will go far above the present level. Every effort is being made to increase the output of the metal, but unless some of the companies now in the prospect stage find large amounts of the metal, it is considered improbable that the output will be large enough to take care of any but the most urgent buyers next year, outside, of course, of those who have already contracted for their needs. Prices have advanced 2c locally, electrolytic and lake copper being quoted at 36c, and castings at 35c per pound.

Tin.—The market is firm and steady. The New York market continues firm, due to a shrinkage in stocks and an active demand, while the amount of tin coming in has decreased. The situation in the tin market is such that higher prices may be looked for. Local quotations are unchanged at 48c per pound.

Spelter.—The demand for this metal continues more active, particularly for brass special spelter, and the market is holding firm, with quotations up ½c per pound. Local price, 14½c per pound.

Lead.—While the "Trust" is holding the price of lead at 7c New York, independent producers have raised their quotations to 7.20c New York for spot metal. Local quotations firm and unchanged at 9c per pound.

Antimony.—There has recently been a more active demand for antimony and the market is firm. Local price, 18c per pound.

Aluminum.—The market is firmer, due to an improved demand and a scarcity of spot and nearby metal. Aluminum is quoted locally at 68c per pound.

* * *

LAKE SUPERIOR CORPORATION

IT was recently announced that the Lake Superior Corporation would issue periodical statements to its shareholders. The first of these announces that "for four months ended October 31 there were produced 131,600 tons of ingots, and 82,500 tons of finished material. Production has not quite come up to expectations, due to labor difficulties generally. Conditions, however, are improving, and the results for the last few weeks have been more satisfactory.

"The output is practically sold up for the ensuing year. At October 31, the Steel Company had approximately 380,000 tons unfilled orders on hand, the tonnage preponderating being shell steel and steel rails. Prices are satisfactory, but profits on war material cannot be as high as in the States from the fact that heavy duties plus war taxes are payable in Canada, and in addition it must be kept in mind that the price of steel rails has increased but slightly in comparison with other steel products.

New Construction

"Some delay is being experienced in the completion of the two new 75-ton open-hearth furnaces, but, as far as can be seen, those furnaces will be completed by the end of the year, and with their completion the steel plant should be able to produce about 45,000 tons of ingots monthly. The end of the year should also see the finish of the more important construction work. On account of labor conditions, it is doubtful if, beyond a third 75-ton open-hearth furnace, any attempt will be made to embark upon further new construction; the most formidable of which yet to be undertaken is, of course, the development of the mills.

"The subsidiary companies of the Algoma Steel Corporation, namely, the Cannelton Coal and Coke Co., the Lake Superior Coal Co., and the Fiborn Limestone Co., are generally operating satisfactorily. The coal companies are handicapped through car shortage and their output and earnings will be somewhat affected." It is pointed out that the Fiborn Limestone Co. recently acquired the Ozark Dolomite Quarries containing large quantities of high-grade dolomite suitable for steel plant operations.

NEW G. T. R. SHOPS AT PORT HURON, MICH.

PARTICULARS of the new Grand Trunk shops at Port Huron, which are to replace the old shops destroyed by fire some time ago, are now available. The shops will be used for the most part for the repair of freight and passenger cars and will cost in the neighborhood of $1,000,000.

The principal car repair plant for the lines west of the St. Clair River has been at Port Huron, Mich., for many years but was destroyed by fire during the winter of 1914-1915. The old plant was of limited capacity, and located at what was the old terminus of the line previous to the construction of the tunnel under the St. Clair River. After the fire negotiations were carried on between the town of Port Huron and the railroad, resulting in the acquisition of the property recently vacated by the Port Huron Thresher Co., which property is very much more advantageously situated, being near the new tunnel line.

The plant will consist of a power house containing six 150-h.p. boilers serving double turbo steam generating units of 300 k.w. for developing the electric power for lighting and operation of machines, all of which will be motor driven; a passenger car shop of two units, 135 feet wide, with combined length of 545 feet, accommodating 2 modern passenger cars, and between the two units there will be a transfer table 80 feet in length; a freight car shop 160 by 360 feet, accommodating 7 freight cars; a cabinet shop, with two floors each, 73 by 250 feet; a blacksmith and machine shop, 150 by 300 feet; a wood mill, 90 by 210 feet; a dry lumber shed, 47 by 147 feet; a storehouse, 61 by 154 feet, and an office building, 61 by 64 feet.

The buildings, including trackage, will occupy an area of approximately 5 acres. They are arranged for economical operation, special attention having been given to this feature to ensure maximum efficiency.

* * *

TRADE INQUIRIES

THE following inquiries relating to Canadian trade have been received by the Department of Trade and Commerce, Ottawa.

1535. Wire.—A South African firm of wholesale merchants, asks for quotations and samples where possible on barbed fencing and belting wire, also wire netting.

1536. Iron and Steel.—A South African firm of wholesale merchants asks for particulars of iron and steel sheets, bar iron, mild steel, bars and rods, angles and other iron and steel products.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department of Trade and Commerce, Ottawa, is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL
Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE
Valparaiso, British Consul General.

COLOMBIA
Bagota, British Consul General.

ECUADOR
Quito, British Consul General.
Guayquil; British Consul.

EGYPT
Alexandria, British Consul General.

FRANCE
Havre. British Consul General.
Marseilles, British Consul General.

INDIA
Calcutta, Director General of Commercial Intelligence.

ITALY
Genoa, British Consul General.
Milan, British Consul.

MEXICO
Mexico, British Consul General.

NETHERLANDS
Amsterdam, British Consul.

PANAMA
Colon, British Consul.
Panama, British Vice-Consul.

PERU
Lima. British Vice-Consul.

PORTUGAL
Lisbon, British Consul.

RUSSIA
Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN
Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN
Stockholm, British Consul.

SWITZERLAND
Geneva, British Consul.

URUGUAY
Monte Video, British Vice-Consul.

VENEZUELA
Caracas, British Vice-Consul.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC
H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALIA
J. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES
E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA
J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA
Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE
Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN
G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND
Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA
C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya, Ploshch 9, Petrograd.
L. D. Wilgress, Canadian Government Commercial Agent, Bukhgolza Ulitza No. 4. Omsk, Siberia.

NEWFOUNDLAND
W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND
W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA
W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM
Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

AUSTRALIA, B. Millin, Exchange Building, Sydney, N.S.W.

BRITISH WEST INDIES
Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.
R. H. Curry, Nassau, Bahamas.

NORWAY AND DENMARK.
C. E. Sontum, Grubbeged No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM
W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Victoria, B.C.—An effort is being made to have the smelter at Ladysmith re-opened.

Toronto, Ont.—Cluff Bros. will build an extension to their forging plant, to cost about $3,000.

Lindsay, Ont.—Flavelles, Ltd., have decided to rebuild their cold storage plant, recently destroyed by fire.

New Glasgow, N.S.—The Nova Scotia Steel & Coal Co. are building a large steel foundry at their plant here.

Wainwright, Alta.—B. L. Perry, of Edmonton, proposes to establish an electric light and power plant here.

Whitby, Ont.—The Canadian Tractor Co. proposes to build a plant here to cost $60,000. Guy R. Greelman, Fenton, Mich. is interested.

Pembroke, Ont.—The Thos. Pink Co. and the Pembroke Iron Works have purchased the Victoria Foundry at Ottawa. The purchase price is said to be about $100,000.

Hamilton, Ont.—The Tallman Brass Co. have had plans prepared for an addition to their factory, to cost about $4,000. Architects, Stewart & Witton, Hamilton.

Sudbury, Ont.—It is understood that the British-American Nickel Co. are willing to establish a refinery at Murray Mine, near here, if the Provincial Hydro-Electric Commisson will develop power in this district. The company would require 3,500 h.p. for their mines and smelter, and an additional 7,500 h.p. for the refinery.

Trenton, Ont.—The British Chemical Co. have a proposition to erect a chemical plant in this town at a cost of not less than $300,000, and to employ a large number of workers. The town is asked for exemption from municipal taxes for ten years, and to contribute $10,000 towards the purchase of a site of 134 acres.

Brantford, Ont.—A. L. Macpherson, of the Brantford Scale Co., and C. H. Herod, have left for Philadelphia and New York with the object, it is stated, of purchasing machinery for carrying out of a subcontract for manufacture of fuse parts, which the company has received from the Russell Motor Co. The contract will amount to about $250,000 and must be filled by July 1, 1917. It is expected about sixty persons will be employed, mostly women, and that operations will be begun towards the end of December.

Electrical

Sudbury, Ont.—The Hydro-Electric Commission may develop power in this district.

Strathroy, Ont.—The Town Council have authorized extensions to the street lighting system.

Oil Springs, Ont.—A hydro by-law will be submitted to the ratepayers at the elections in January.

Welland, Ont.—The local Hydro Commission will shortly begin the construction of a new sub-station at an approximate cost of $40,000. The station will not be in operation before next September.

Agincourt, Ont.—Scarborough Council passed the Hydro-Electric by-law on November 20, empowering the Reeve and Clerk to sign up a contract for electrical power with the Ontario Hydro Commission. This is to apply for house and street lighting. A line will be run along the Danforth Road to Scarborough Junction, and then to Agincourt.

Municipal

Hamilton, Ont.—The ratepayers in January will vote on a by-law authorizing the expenditure of $5,000,000 for Hydro radials.

Renfrew, Ont.—A by-law is contemplated to authorize the purchase of the Renfrew Electric Light Co. from Thos. A. Low for $6,500.

Ottawa, Ont.—The City Council propose building two public swimming baths to cost $75,000. A by-law will be submitted to the ratepayers.

Peterborough, Ont.—A by-law will be submitted to the ratepayers at the January elections to sanction the purchase of a motor-driven combination chemical and hose truck, to cost about $8,500.

Brantford, Ont.—The City Council have decided to submit a by-law to the ratepayers in January to decide the question of installing the municipal gas from Tilbury which is said to be impure.

Montreal, Que.—A committee of nine prominent Montreal engineers, after a thorough investigation of the aqueduct scheme, have advised that the project should never have been started, and that all thought of completing it should be abandoned. A sum of $5,200,000 has already been expended, and it would require $5,000,000 more to complete it The main contentions are that the capacity of the original aqueduct was sufficient for three times the present population served, and that the cost of developing power as proposed would be too excessive.

General Industrial

London, Ont.—The D. S. Perrin Co. factory was damaged by fire on Nov. 20 to the extent of $2,000.

Acton, Ont.—The Reliance Shoe Co., of Toronto, have awarded the general contract for the erection of a factory to J. B. McKenzie, of Acton. Approximate cost, $13,000.

Smith's Falls, Ont. — The Canadian Cooperage Mfg. Co., whose plant was destroyed by fire recently, will rebuild. The new plant will be larger than the old one and will be completed during the winter.

Winnipeg, Man.—Negotiations are under way which will result in the establishment of a paper mill within the limits of Winnipeg. J. D. McArthur, lumberman and railroad builder, is the man behind the enterprise. The proposed mill is to have a capacity of 50 tons a day.

Hamilton, Ont.—The Turner, Day & Woolworth Handle Co., of Louisville, Ky., have secured the property opposite the Canada Steel Goods Co., and will commence the construction of a factory early in December. Lieut.-Col. Hatch, of Hamilton, who is a director of the company, was responsible for bringing this new industry to Hamilton.

Port Arthur, Ont.—It is reported that James Richardson and associates have concluded negotiations for a site on the Port Arthur waterfront, and that their plans for the erection thereon of a terminal elevator of 2,500,000 bushels' capacity would be proceeded with in time to guarantee its partial completion in the fall of 1917. The site is on the Port Arthur waterfront near the Saskatchewan Co-operative plant.

An Opportunity and a Service

We have just purchased one of the largest Munition Manufacturing Plants in the United States: The Union Switch & Signal Company, one of the Westinghouse group at Pittsburgh, Pa.

The machine tools and equipment are practically new and of the latest type for the manufacture of:

4.5, 5 and 6 in. High Explosive Shells and Shrapnel

All machines are COMPLETELY TOOLED and equipped with the latest and most improved devices for insuring accuracy and large production. The Plant is composed of complete units for the manufacture of 1300 shrapnel, 2500 4.5″ and 2500 5″ and 6″ High Explosives per day. The following list will give an idea of the quality and class of tools employed.

3X, 2X and 1X Reed Prentice Semi-Automatic Lathes. Libby and Steinle Turret Lathes, Hydraulic Automatic Machines, Amalgamated Lathes,, High Speed Ball Bearing Drills, Thread Millers, Engine Lathes, Wave and Undercutting Machines, Banding Presses, Plug Millers, Automatic Drop Presses, Copper Band Cut-Off Machines, Heavy Baker and Colborne Drill Presses, Machine Tool and Shell Grinders, Air Compressors, Cutting-Off Machines, Separators and a number of time and labor-saving specialties to aid production.

Special Features of Sale

We will provide expert operators to demonstrate the machines and tools and to educate unskilled operators in their use. IMMEDIATE DELIVERY OF FULLY TOOLED AND EQUIPPED UNITS WITH COMPETENT DEMONSTRATORS TO INSURE IMMEDIATE AND SATISFACTORY PRODUCTION SHOULD APPEAL TO YOU.

PLANT WILL BE SOLD IN COMPLETE UNITS OR IN LOTS TO SUIT THE CONVENIENCE OF OUR PURCHASERS. SERVICE DEPARTMENT LOCATED AT PLANT TO GIVE EXPERT ADVICE. MAKE ARRANGEMENTS TO INSPECT MACHINES AT AN EARLY DATE.

Complete Data on All Operations for Piece-Work Also Furnished.

HOW TO GET THERE—

Take the Pennsylvania R.R. at 11.10 p.m. from Buffalo, arrive Pittsburgh 7.30 a.m. Spend the whole day with our representatives at the plant, leaving at 11.10 p.m. and arriving Buffalo 7.30 next morning.

Address all inquiries to

The A. R. Williams Machinery Co., Limited

TORONTO, ONTARIO

New Incorporations

Lymburner Brass Works of Montreal has been incorporated with a capital of $50,000.

The New Westminster Foundry Co., of New Westminster, B.C., has been incorporated with a capital of $10,000.

Walkerville Construction Co. has been incorporated at Toronto with a capital of $40,000 to carry on business as contractors and engineers at Walkerville, Ont. The provisional directors ahe James H. Walker, H. E. Walker, and Hiram H. Walker, all of Walkerville.

Malloy & Bryans, Ltd., have been incorporated at Toronto with a capital of $100,000 to carry on a planing and saw mill business with head office at Toronto. Provisional directors are F. M. McDowell, G. R. Sproat and G. B. Flett, all of Toronto.

The International Feldspar Co. has been incorporated at Ottawa with a capital of $50,000 to develop mineral deposits and treat metals of all kinds. The head office is at Ottawa and the incorporotors are J. V. Poaps, Nelson Hallister and Frank Curry all of Ottawa.

The Painless Horse-Shoe Nail Co. has been incorporated at Ottawa with a capital of $120,000 to manufacture horse-shoe nails and screws of all kinds. Head office is at Toronto and the incorporators are Wilson Rudd and Edward T. Thomlinson of London, England and Harold Griffiths of Croydon, England.

Contracts Awarded

Toronto, Ont.—The Board of Control has awarded the following contracts for supplies:—Cast iron pipe, the National Iron Works and Can. Allis-Chalmers, Ltd; valves, James Robertson & Co.; special pipes, John T. Hepburn.

Tenders

Toronto, Ont.—Tenders will be reecived, addressed to the chairman, Board of Control, City Hall, Toronto, up to January 16, 1917, for the installation of a 40 million Imperial gallon centrifugal sewage pump at the main sewage pumping station, Toronto. Specifications and forms of tender may be obtained at the Works Department, Room 6, City Hall.

Winnipeg, Man. — Tenders addressed to the undersigned will be received up to December 18, for the construction of 9½ miles of 5 ft. 6 in. reinforced concrete pipe. Plans, specifications and form of tender can be secured on application to the district, accompanied by certificed cheque for $20. R. D. Waugh, chairman of Winnipeg Water District Commissioners, 901 Boyd Building, Winnipeg.

Ottawa, Ont.—Tenders will be received up to January 15, 1917, for the construction of a reinforced concrete lighthouse tower and fog alarm building combined, and a wooden dwelling at Point Abino, Township of Bertie, Welland County, in the Province of Ontario. Plans, specifications, form of contract and schedule of wages, can be seen, and forms of tender procured, at the Department of Marine, Ottawa; at the Harbor Master's Office, Toronto, and at the post offices, Welland, Port Colborne, St. Catharines, Bridgeburg, Hamilton and Brantford.

Railways—Bridges

St. Boniface, Man.—The street railway will probably be extended to Transcona. It is also understood that the Greater Winnipeg Water District Commission intends to build an electric railway of its own from Provencher Bridge to Transcona by way of St. Boniface, Notre Dame Street and Mission Road, at an early date, the powers to do so being included in its charter.

Marine

Halifax, N.S.—The Plant Line, which for many years has maintained a regular service between Halifax, Hawkesbury and Charlottetown, will discontinue its winter service at the end of the year and may not resume sailings in the spring.

Sault Ste. Marie, Ont.—The steamer Thorgerd, built in the Port Arthur Shipyards, has left here on her maiden trip. She will be used in the Atlantic Coast trade between New York and the West Indies. The Thorgerd is owned by a Norwegian firm.

Halifax, N.S.—The steamer Algonquin, which was bought last spring from the St. Lawrence & Chicago Steam Navigation Co., by the Nova Scotia Steel & Coal Co., has been sold to William Job, of New York, it is reported, for oil interests. She made two trips to Newfoundland, taking general cargo and returning with iron ore.

The Canada West Coast Navigation Co., a new shipping concern, with Dominion letters of incorporation, has been organized at Vancouver, B.C., with capital of $2,500,000 to engage in business as a shipping and transportation company. Contracts for eight wooden vessels of auxiliary schooner type have been let by this company through H. W. Brown & Co,. brokers, of Vancouver.

Sir Trevor Dawson in Commission.—The new steamer Sir Trevor Dawson, built at Superior Yards for the Canadian Steamship Lines, Ltd., and recently launched, has left to take on a cargo of 11,000 tons of ore at Missabe dock. She will take her cargo to South Chicago. The Dawson was built in part from a portion of the steamer W. C. Moreland, which was wrecked at Sawtooth Reef, Lake Superior, a few years ago.

Montreal, Que.—The Montreal Dry Docks and Ship Repairing Co., Ltd., which had to close their dock on account of the repairs to the Lachine Canal, took advantage of the circumstance to extend their plant. The length of the dock has been increased from 240 to 425 feet and the depth from 10 to 13 feet. The company expects to have eight or nine boats in for repairs during the next few months.

Port Arthur, Ont.—John Burnham & Co., associated with other banking interests, of New York, have purchased the Western Drydock & Shipbuilding Co., of Port Arthur. H. G. Chace has just returned to New York from an inspection of the property, which will shortly be refinanced to permit of an enlargement in capacity. The company is now constructing vessels for foreign countries. James Whelan, of Port Arthur, is president.

Navigation Closes Soon.—From present indications it is expected the next ten days will practically see the end of navigation on the lakes. Many boats that will make their last trips next week could have made another trip were it not that ore is frozen at the upper ports. The season just ending witnessed a record ore movement, but this has been consumed more rapidly than usual, and it is doubtful if there is enough ore at the lower end of the lakes to supply the furnaces during the winter.

Haileybury, Ont.—The entire fleet of the Timiskaming Navigation Co. has been purchased by Mr. P. Gibbons. In the deal also are included all the wharves and other equipment. The new owner proposes to convert the "Silverland" into a tug, while the "Jubilee" will be refitted somewhat and kept for towing purposes. The "Meteor" and the "Timiskaming" will be taken into the Government shipyards of the Lake Shore road to undergo repairs during the winter preparatory to their being used for passenger traffic on Lake Timiskaming next spring.

Collingwood, Ont.—The SS. "Sarnolite," which the Collingwood Shipbuilding Co. has built for the Imperial Oil Co., of Sarnia, ran her special trials on the measured mile course outside the harbor on Nov. 17, the results being in every

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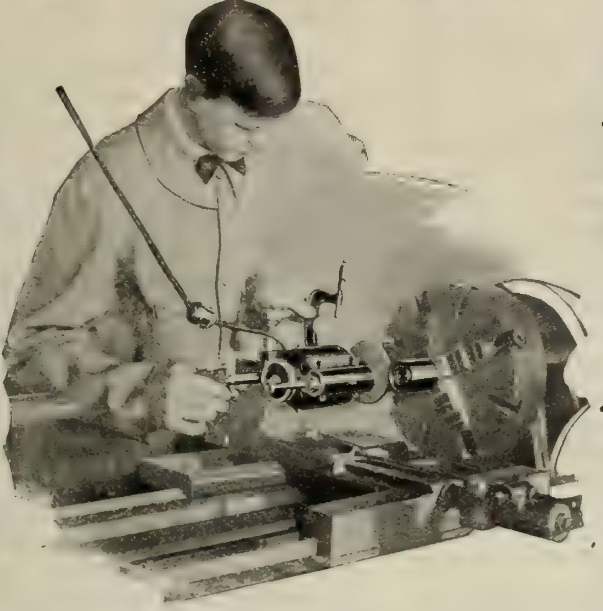
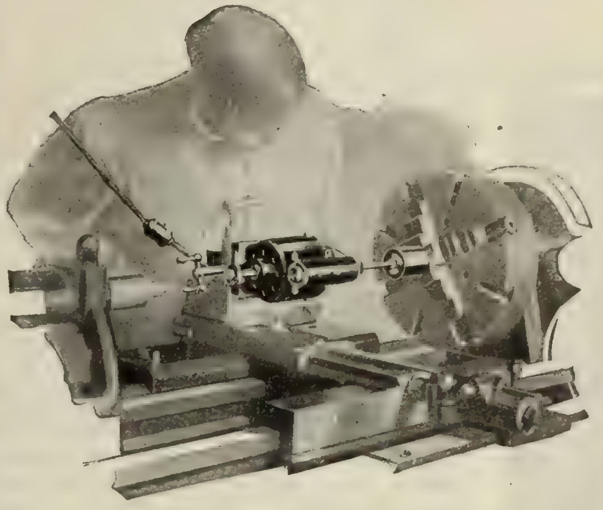


SURFACE



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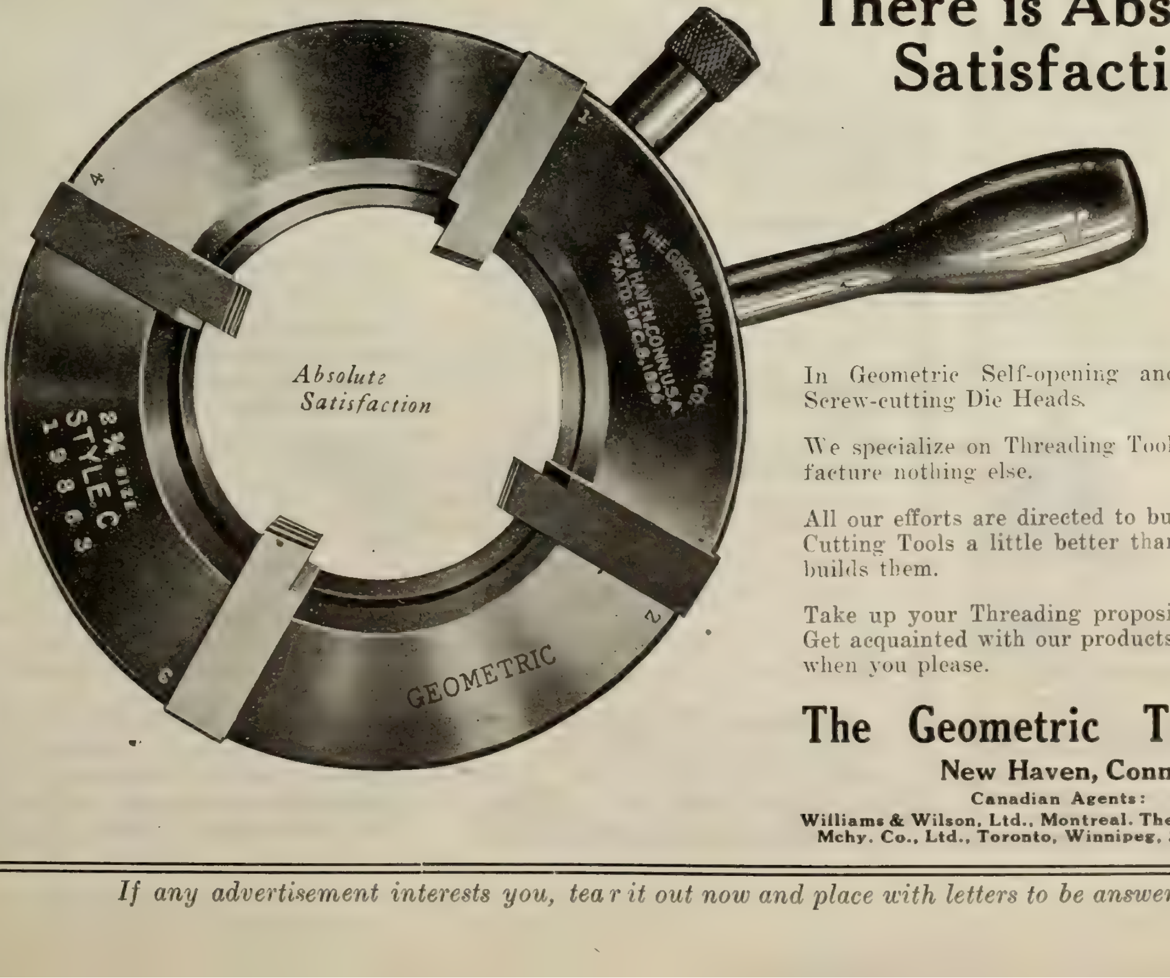

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way satisfactory to Captain R. W. Henderson, Marine Superintendent for the owners. This is the third steamer which the builders have delivered to the Imperial Oil Co. this year. The three vessels, namely, "Royalite," "Iocolite," and "Sarnolite," are going into service on the ocean this winter. The three ships are all of the same dimensions, 250 ft. x 43 ft. x 18 ft., moulded, 2,600 tons deadweight, speed on trial 18.227 knots loaded.

C. S. L. Vessel Charters.—J. W. Norcross, managing director of the Canada Steamship Lines, makes the announcement that negotiations have been completed for the chartering of fifteen steamships for ocean service for the year 1917. At the present time Canada Steamship Lines have eighteen ships in ocean service, and although present arrangements only provide for the service of fifteen of these for 1917, it is likely that the whole fleet will be re-engaged again. It is announced that rates are considerably higher than a year ago. Mr. Norcross has just returned from a trip to London, where he had several conferences with the London Advisory Board of the company.

Building Notes

Toronto, Ont.—A new departmental store, to cost, it is reported, $15,000,000, will be erected on Yonge Street, below College. H. H. Williams, real estate, is handling the negotiations. The T. Eaton Co. are understood to be behind the scheme.

Wood-Working

Prince Rupert, B.C.—E. F. Derby, of New Westminster, and J. S. Emerson, of Vancouver, will build a saw mill here.

Drummondville, Que.—Sash and door factory of J. A. Nadeau was recently destroyed by fire, with a loss of about $15,000.

Lachute Mills, Que.—E. Charlesbois has commenced the erection of a sash and door factory, estimated to cost $10,000.

Wiarton, Ont.—The lumber mill, owned by Johnson, Hunter & Crawford, has been destroyed by fire, the loss being estimated at $10,000.

North Vancouver, B.C.—The Canadian Robert Dollar Co. are about to construct a sawmill and docks, at an approximate cost of $200,000.

St. Hughes, Que.—The sash and door factory of Adelard Paquette, was destroyed by fire with a loss of $20,000. It will be rebuilt and machinery for steam power will be purchased.

Personal

H. W. Aird, manager of the Canada Paint Co., Montreal, died suddenly at his residence, Elm Ave.

Charles Booth, chairman of the Booth Steamship Co., died in London, England, on November 23, aged 76.

Joseph Alfred Gendron, founder of the Gendron Mfg. Co., Toronto, died at Ottawa, on November 25, aged 76 years.

H. E. Rice, of the Dominion Steel Corporation, Sydney, N.S., has been promoted to the position of assistant general superintendent.

R. J. Durley, Ma.E., of Montreal, has taken over the unfinished work previously handled by the Montreal office of the firm of MacMullen, Riley & Durley, which was recently dissolved and reorganized as MacMullen, Riley & Angus. Mr. Durley will also continue his consulting practice.

J. M. Nelson, formerly with the Algoma Steel Co., Sault Ste. Marie, Ont., has been appointed superintendent of the Bethlehem Steel Co. open-hearth department, succeeding W. H. Bischoff, who resigned to become superintendent of coke ovens, blast furnaces and open-hearth furnaces of the Dominion Iron & Steel Co., Sydney, N.S.

William Henry Jaques, who did much to develop the American armor plate and ordnance industry, died at High Barnet, near London, England, on Nov. 24. Mr. Jaques was born in Philadelphia on December 24, 1848, and lived for the most of his life in the United States. He was active in many companies and was President of the Holland Submarine Co.

C. R. Needs, of Galt, Ont., a well-known civil engineer, is leaving for England this week, having enlisted in the Canadian Aviation Corps. Prior to the war Mr. Needs was resident engineer of the Canadian Northern Railway. Since the outbreak of war he has been an inspector of munition plants with the Canadian Inspection Co., principally of plants at Galt.

Thomas N. Hicks, for several years past assistant superintendent of the Niagara Falls Power Co., has been appointed general manager of the Renfrew, Ont., plants of the Niagara Alkali Co., and the Electro Bleaching Gas Co. Mr. Hicks is a graduate of McGill University, Montreal. He was with the Brooklyn Edison Co. for five years before coming to Niagara Falls.

Sir Hiram Maxim, inventor of the automatic system of firearms, died in London, England, on November 24. Sir Hiram Maxim was born in Sangerville, Me., on February 5, 1840. The Maxim automatic gun was invented in 1884 in London, and was immediately adopted by the British Government. Some years later Sir Hiram was knighted by Queen Victoria after having become naturalized as an Englishman. He invented the first smokeless powder. In 1915 he was appointed a member of the Inventions Board created by the British Government to meet the needs of the war.

David McNicoll, formerly vice-president and general manager of the C.P.R., died on Sunday, Nov. 26, at Guelph, Ont., after a protracted period of ill-health. Mr. McNicoll retired from the C.P.R. two years ago. Mr. McNicoll was born in Arbroath, Scotland, 66 years ago, and started his railway career as a clerk in the freight traffic manager's office of the North British Railway. In 1874 he came to Canada, and entered the service of the Northern Railway of Canada at Collingwood, and served later on the Toronto, Grey and Bruce before joining the C.P.R. in 1883 as general passenger agent. He became second vice-president and general manager of the road in 1900.

Trade Gossip

The Dominion Forge & Stamping Co., of Walkerville, Ont., has increased its capital stock to $1,000,000.

F. H. Hopkins & Co., Montreal, have opened on office in the Mail Building, Toronto. Associated with them in the office will be the Toronto branch of the Dominion Wire Rope Co., of which Mr. Hopkins is vice-president. C. V. Osborn will be manager of the Toronto office.

Advance in Iron Ore.—Sales of Lake Superior iron ore have just been made at Pittsburgh at $1.50 per ton advance over the prices current for 1916. This establishes the official price for 1917 at $5.05 for Mesabi non-bessemer; $5.70 for Mesabi bessemer; $5.20 for Old Range non-bessemer; and $5.95 for old Range bessemer at lower lake ports.

Fraser & Chalmers of Canada, Ltd., Montreal, have been appointed Canadian agents for the Nordberg Mfg. Co., of Milwaukee, Wis., manufacturers of air compressors, hoists—steam, air and electric—Diesel engines, etc. The Nordberg Company make large Diesel engines of the Carels type. Geo. Sancton is general manager of the Fraser & Chalmers Co.

Tungsten Lamps.—It is anticipated that the manufacture of tungsten lamps will be simplified by a recent invention. Tungsten when meted or solidified is not malleable, so that it cannot be worked or drawn into wire. The addition of two per cent. boron or boron nitrate to the fused mass of metallic tungsten seems to overcome this difficulty, and forms the basis of the patent.

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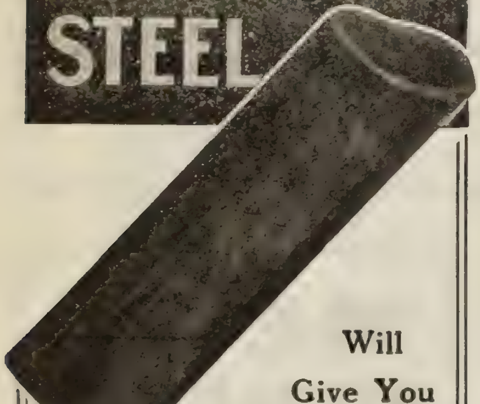

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The A. R. Williams Machinery Co., Toronto, hove purchased the entire munitions plant of the Union Switch & Signal Co., Swissvale, Pa. The machinery had been used for making 18 pdr. 4.5 in. and 5 in. shells.

Steel and Iron Import Prohibition.—It is understood that the iron and steel sub-committee of Lord Balfour's Committee which was appointed to make recommendations on the basis of the Paris Conference economic proposals, has presented a report urging the entire prohibition of iron and steel imports into the United Kingdom during at least the period of demobilization and reconstruction after the war.

Southern Canada Power.—At a recent meeting of the directors of the Southern Canada- Power Co., F. W. Teele, formerly vice-president and general manager of the Porto Rico Railways Co., was elected vice-president of the Southern Canada Power Co. J. B. Woodyatt was appointed manager at the same meeting. W. C. Hawkins, managing director of the Dominion Power & Transmission Co., Hamilton, attended the meeting.

Montreal, Que.—Announcement is made that the control of the shares of the Montreal Transportation Co., has been purchased by L. L. Henderson and associates. At a meeting of the Board of Directors, Mr. Henderson was elected president and managing director, with A. A. Wright, of Toronto, vice-president and treasurer. The other directors are Messrs. Farquhar Robertson, Abner Kingman, A. G. Thomson, A. E. Ogilvie and H. A. Calvin.

The Canadian Fairbanks-Morse Co., Montreal, have been awarded a contract by the City of Charlottetown, P.E.I., for the supply of a pumping outfit, consisting of a Gould's horizontal single-stage double-suction brass-fitted centrifugal pump. The pump will be belt-driven from a Fairbanks-Morse 15 h.p. type "Y" semi-Diesel oil engine. The unit will have a capacity of 850 U. S. gallons per minute against a total head of 30 feet when operating at 975 r.p.m. The engineers are R. S. & W. S. Lea, Montreal.

Hydro-Radials for Niagara District. Engineer Stanley, of the Hydro Commission has announced that when the Hydro-Radial line is built to Niagara Falls from St. Catharines, it will enter Niagara Falls at a point between Stamford and Southend.It will be four miles shorter than the Niagara, St. Catharines and Toronto Railway line, now operated between the two cities and 1½ miles shorter than the Grand Trunk. The line will take in Merritton, Thorold and Stamford.

State-owned Steamship Line.—A state-owned line of steamships is to be operated between Atlantic and Pacific ports of Canada by way of the Panama Canal. The official announcement was made on November 25 by Hon. Dr. Reid, Minister of Customs. Contracts have been authorized for the construction in British Columbia of two vessels for this trade. For some time British Columbia people have been agitating for an arrangement whereby all water communication between Atlantic and British Columbia ports might be had via the Panama Canal. It was found impossible to charter vessels for such a service.

Work for Returned Soldiers.—The explosives department of the Imperial Munitions Board, Ottawa, is prepared to give employment to returned soldiers in connection with the construction and operation of chemical and explosives plants which are being erected in Canada on behalf of the British Government. Not only are ordinary laborers required, but positions are available for skilled workmen. Large plants are being erected and operated at Trenton and Renfrew, Ont. Workmen of various trades are required at once, and preference will, in every case, be given to returned soldiers, provided they are willing to accept permanent positions.

I. C. R. Eastbound Traffic.—With the closing of navigation on the St. Lawrence there promises to be a very heavy movement of eastbound freight over the Government railways. Shipments to the British Government will go over the Intercolonial to the seaboard at the rate, it is believed, of 100,000 tons a month. Special preparations have been made by the Minister of Railways to provide the road with adequate equipment for the handling of this traffic. The rolling stock has been largely reinforced by the addition of box cars and a considerable number of new locomotives of a powerful type. F. P. Gutelius, general manager of the Government railways, states that the Intercolonial is in excellent shape both as to roadbed and rolling stock to handle the winter traffic.

Staff Loyalty Appreciation.—When all branches of business suffered on the outbreak of war, the Canadian General Electric Co. was faced with the alternative of discharging a large proportion of the staff or of retaining as many as possible on a 20 per cent. reduction of salaries. It is commonly urged that industrial corporations are altogether soulless, but, in the subsequent dealings with its staff, the Canadian General Electric Co. have shown themselves to be ex that category. After the lapse of twelve months, ten of the 20 per cent. reduction was reinstated, and the remaining 10 per cent. four months later. There having been a continued improvement in business, the company has decided to appropriate $130,000 to repay the entire amount deducted, in recognition of the loyalty of the staff.

Huge Shell Steel Order.—It is reported from Cleveland, Ohio, that the Entente Allies have placed an order in the United States for 1,500,000 more tons of shell steel, for delivery during the second half of 1917. The order is said to have been placed through J. P. Morgan & Co. as financial agents of the Allies. According to the report, a considerable part of the order was for steel at $80 a ton, as against the $60 or $70 paid on similar orders for delivery during the first six months of last year.

Russia Wants Agricultural Machinery.—C. F. Just, Canadian Trade Commissioner at Petrograd, states that the supply of agricultural machinery and implements in that country has been much commented upon lately, and the subject has never before received so much attention. With the active cooperation of the Ministry of agriculture, certain leading Zemstvos or municipalities, supported a central board for the purchase and distribution of agricultural machinery and implements in the districts represented. Mr. Just reports that the total requirements of the territories in question for 1917 are estimated at 96,800 machines, which include 45,000 reapers of foreign manufacture, 26,000 Russian lobogreikas, 15,000 mowers, 9000 horse rakes and 1800 binders. Siberia is also a potential market to be taken into consideration, where the need of agricultural machinery is even greater than in any part of Russia proper.

The Canada West Coast Navigation Co.—A new transportation concern, which has entered what is practically a new field in shipping in British Columbia, has some strong men on its board. Prominent among those who have invested their capital in the new undertaking are: James Carruthers, head of the Canada Steamship Lines; J. W. Norcross, of Montreal, vice-president and managing-director of the Canada Steamship Lines; James Whalen, of the B. C. Sulphite & Fibre Co., and president of the Western Drydock & Shipbuilding Co., of Port Arthur, Ont.; M. J. Haney, railway contractor, of Toronto; Sir Trevor Dawson, managing director of Vickers, Ltd., London, England; Roy M. Wolvin, a Great Lakes transportation man, and who is president of the new shipping company; H. W. Brown, president of the H. W. Brown Co., and formerly local manager of the Pittsburg Steamship Co., Duluth, who is general manager of the Canada West Coast Navigation Co.

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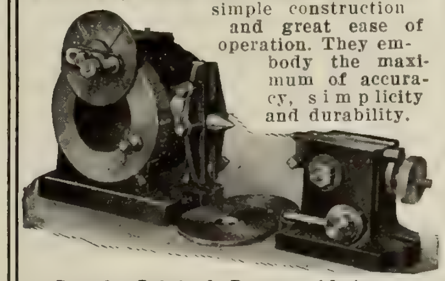

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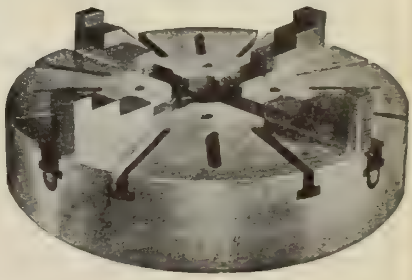

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Rubber Imports Increase.—Of unmanufactured rubber, Canada imported during 1916 fiscal year 16,894,438 pounds at a cost of $6,543,994, as compared with approximately $4,500,000 in each of the years 1914 and 1915. Raw material has come into the country in much larger quantities than usual, and, on the other hand, there has been a very decided falling off in manufactured goods into which rubber enters as the principal component part. It is a matter of some importance, therefore, that the price of rubber promises to remain at a reasonable figure, and a figure that will still leave the producers a very handsome profit. For the twelve months ending July the imports of rubber and manufactures in which it forms the chief constituent amounted to $10,221,000, as compared with $7,514,000 for the previous twelve months. Our trade is, therefore, very considerable, and the steadiness of the price of the raw material is of importance. The greater proportion of the imports are on the free list. For the three months of the fiscal year ending June 30 these were valued at $1,830,502, and the value of dutiable goods at $823,029.

Big Car Shortage. — The Dominion Railway Board has issued a statement dealing with the car shortage situation in the Prairie Provinces, which has now become acute. The board has sent its chief operating officer, Mr. Spencer, to the West with a view to securing all possible co-operation between shippers and railway officials in facilitating the rapid movement of grain. The board's statement points out that, although the daily average of cars transported over the Canadian Northern System is lower this autumn than last, the reasons are largely attributed to causes beyond the control of the company. The crop this year is unevenly distributed; the heaviest traffic comes from the western portion of the grain fields, necessitating long hauls, and bad weather conditions have hindered steady threshing and loading. All the Canadian companies have had the car shortage troubles aggravated by the acute situation in the United States. On August 1 last there were only 9,762 idle cars in the United Stotes. On September 30, there was an actual car shortage of 60,697, and on the first of this month the net car shortage was 105,010 cars.

B. C. Timber Exhibits.—So that possible purchasers may see what British Columbia can supply in lumber and other wood products, comprehensive exhibits have been placed permanently in the following public offices: Forest Branch, Victoria, B.C.; Forest Building, Hastings Park Exhibition, Vancouver, B. C.; B. C. Lumber Commissioner's office, British Columbia House, 1 and 3 Regent Street, London, Eng.; B. C. Lumber Commissioner's office, Excelsior Life Building, Toronto, Ont.; B. C. Lumber Commissioner's office, 303 Dominion Building, Regina, Sask.; Industrial Bureau, Winnipeg, Man.; Department of Trade and Commerce, Ottawa, and at the office of nearly all the Canadian Trade Commissioners throughout the world.

Ottawa, Ont.—The Dominion Government, represented by E. R. Wood, of Toronto, has practically completed arrangements for the taking over of the Curtis aviation plant on Strachan avenue, Toronto, and running it as a Government aviation plant. Negotiations have been going on for some months, and it is now understood that the Government has arranged to take over the plant and the staff, and to run it until the new two million dollar plant at Ashbridge's Bay, plans for which are now being prepared by J. M. Lyle, the Toronto architect, are completed.

Toronto, Ont.—The Hydro-Electric Commission of Ontario has decided to undertake forthwith the construction of the projected canal between the Chippewa Creek and Queenston for the supply of 200,000 h.p. of additional electrical energy. It is proposed to procure electric-driven excavating machinery and thereby avoid the uncertain element of fuel cost and the exceptional demand upon labor. It is estimated that the electrical equipment will cost between $800,000 and $900,000, as it will call for general excavation machinery of the heaviest type, while the entire construction of the canal, which will be some twelve miles in length, will reach $9,000,000. Estimates demonstrate, however, that considerably more than the entire cost of equipment and construction will be saved to the Hydro-Electric enterprise by undertaking the construction itself, not including the subsequent possession by the municipalities of the valuable construction equipment.

Catalogues

Belts, the house organ of the Federal Engineering Co., Toronto, October issue, contains considerable useful information regarding belts, their use and maintenance.

The Vanadium-Alloys Steel Co., Pittsburgh, Pa., has for free distribution a new pamphlet entitled "Vasco Vanadium," in which is given valuable information as to the study of alloy steels in general and uses of same. This pamphlet also describes the various types of Vasco Vanadium steel, together with a complete list of carbon steel extras.

Drop Forgings.—Canadian Billings & Spencer, Ltd., Welland, Ont., have issued a catalogue containing information relative to an extensive line of drop forgings, including more particularly clamps, wrenches, dogs, thumb screws, pliers, etc. Many of the principal lines are illustrated, while tables are included giving the chief dimensions and prices.

The Nash Engineering Co., South Norwalk, Conn., have issued three bulletins, No. 4, 5 and 6, dealing with different types of equipment which they manufacture. Bulletin No. 4 illustrates and describes fully, turbine, vacuum, and low pressure boiler feed pumps for return line heating systems. No. 5 is devoted to a description of the Nash hydro-turbine, air compressors and vacuum pumps, single stage type. No. 6 deals fully with hydro-turbine vacuum pumps integral with electric motor. In each case details of construction are given and tables included giving the principal dimensions and other particulars of the various units.

Flexible Shafts.—Catalogue No. 10, entitled "Strand Flexible Shaft and Machinery," describes and illustrates an interesting line of flexible shafts showing the wide application of such equipment, particularly for grinding. The construction of the flexible shaft is described, as is also the tool post grinder spindle. Particulars are given of grinding equipments with motor, while illustrations show the application of the tools for various classes of work. The concluding pages contain a partial list of users of "Strand" flexible shafts and also information regarding the "Strand" high speed blowers. Copies of this catalogue may be obtained from the Canadian agents, The R. E. T. Pringle Co., Toronto.

Stellite alloy for high speed cutting tools is dealt with at considerable length in a catalogue recently issued by the Canadian B. K. Morton Co., Toronto and Montreal, who are the selling agents in Canada and Newfoundland for this material. The principal features of "Stellite" are described at length and the various claims made on its behalf dealt with in detail. Full instructions are included, covering the use of this material. The concluding pages give particulars of various other lines handled by the Canadian B. K. Morton Co.

Die Forming Machines.—Bulletin No. 1 deals with the die-forming machines and cutters made by the Anderson Die Co., Bridgeport, Conn., for use in the cleaning rooms of foundries. The machine is illustrated and fully described, as are also the main spindle and its parts. A price list is included, covering the "Anderson" super-helical, tapered, and straight milling cutters used in the above machine.

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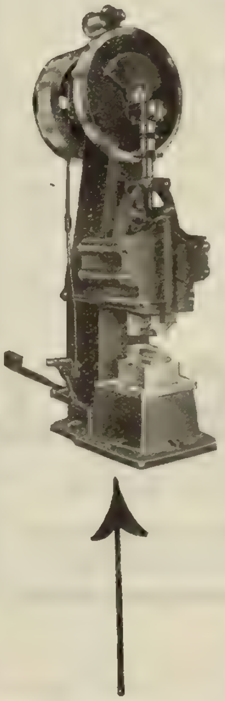

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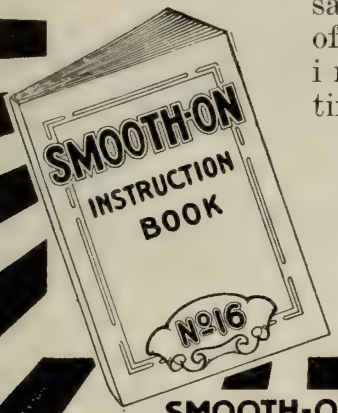
Book Review

Natural Resources Development.—The focusing of public attention in Canada upon the problem of strengthening our national organization through increased industrial and commercial efficiency lends special value and interest to the Seventh Annual Report of the Canadian Commission of Conservation, which has just been issued at Ottawa. The activities of this Commission, relating to the entire field of primary production, aim to secure greater efficiency in basic industry—in the development and utilization of Canada's natural resources. The resume of the past year's work is notable primarily for the progress recorded in the constructive programme entered upon by the newly formed Town Planning branch, with respect to one of our greatest and most urgent national problems, viz., the proper use and development of land, particularly in urban areas. Town-planning legislation of an advanced character has been secured in several provinces and thorough investigation of housing conditions has also been undertaken with a view to the drafting of model housing laws. Rapid progress has been achieved in the promotion of independent civic organization throughout the Dominion for the purpose of securing more general and thorough study of public questions. A second noteworthy feature is the attention devoted by the Commission to the reduction of the heavy economic handicap imposed upon Canada through her enormous annual fire losses. The Commission is engaged in a careful study of the causes, the extent and best methods of remedying this avoidable tax upon the country's resources. The section of the report containing the results of an agricultural survey in four representative countries presents accurate and definite data regarding the deficiencies of Canada's chief industry and affords a valuable indication of the lines along which efforts to improve rural conditions, economic and social, should be directed. Steady progress has been made by the Commission in the huge task of national stock-taking, the urgent necessity for which becomes daily more apparent. Recent experience has served to emphasize the need for accurate knowledge of the nature and extent of the Dominion's wealth in lands, forests, minerals, water-powers, fisheries and wild life, as a guidance to intelligent and permanent national expansion. The report, which is bound in cloth, and well illustrated, constitutes an important addition to the literature on Canada's resources and the problems connected with their efficient administration and development.



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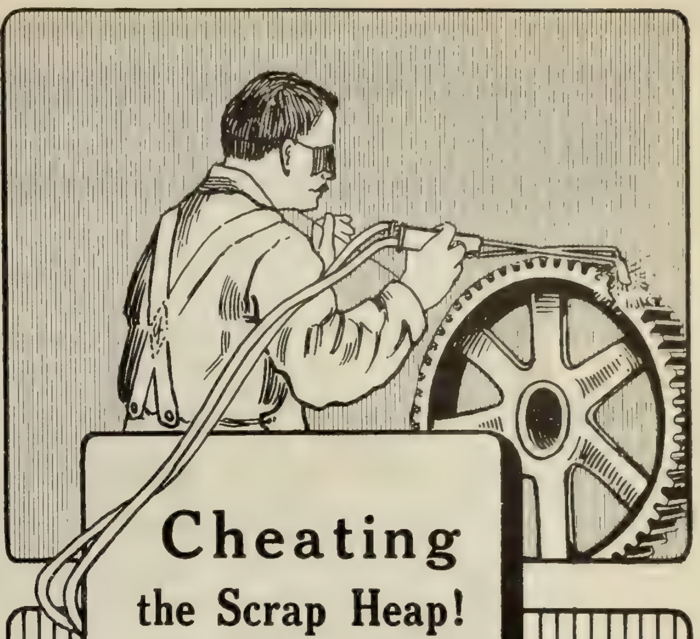

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FOR SALE—TWO C.M.C. TURRETS—SPECIALLY built for inside boring for 6" shells; almost new. These are offered for sale subject to special terms as to delivery, and at price to be arranged. Taylor-Forbes Co., Ltd., Guelph. (19)

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FOR SALE — HOT SAW AND MILLING machine, Ajax. New; never used. Address Canadian Warren Axe & Tool Co., St. Catharines, Ont.

FOR SALE—45 H.P. GAS PRODUCER AND engine, complete. Good condition. For particulars write Canadian Warren Axe & Tool Co., Ltd., St. Catharines, Ont.

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WANTED — EXPERIENCED STEEL works draftsman for Nova Scotia. Give full particulars, including salary, permanency. Apply Box 234, Canadian Machinery. (17)

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24" Bickford, shaft-driven (2)
24" London, back-geared, sliding head
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22" Barnes, back-geared, sliding head
20" Bertram, power feed
No. 10A Baush, 16 spindle
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48" Gang, plain radial, tapping attachment
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32" Canedy-Otto wall radial

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30" x 30" x 17' Wheeler
25" x 25" x 12' Lodge & Davis
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No. 5 Becker-Brainard, plain
No. 3 Cincinnati Universal
No. 12 Brown & Sharpe plain
No. 1½ Brown & Sharpe Universal
Louden Universal
24" Bertram, plain
Holden-Morgan Thread Miller

Presses

No. 12 Geared Rhodes, roller feed
No. 5 Waterbury, inclinable
No. 3 Michigan Inclinable
No. 190 Brown-Boggs inclinable

Miscellaneous

24" Gould & Eberhardt, B.G. Shapers (2)
No. 10 Racine Hack Saws (2)
No 1 Racine Hack Saws (5)
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Lo-Swing Lathes (2)
32" x 9' Special Facing and Tapping Machine
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Three American Surface Die Grinders

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Rockford Horizontal, Drilling and Boring Machine, 2 1-16" bar

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Ten Foote-Burt No. 25 High Duty Drills
4 spindle Bickford, 1¼" spindles
7 spindle Foote-Burt, ¾" spindles
Three 6 ft. Niles Semi-Universal Radial
5 ft. Western Full Universal Radial
5 ft. Box Radial
5 ft. Bement Radial
4½ ft. Bickford Radial
4 ft. Niles Radial
[illegible] ft. Gang Radial
Two 3½ ft. Gang Radial
[illegible] ft. Baush Radial
[illegible] ft. Universal Drill Co. Plain Radial
2½ ft. [illegible] Radial

New York Machinery Exchange

Offices: 50 Church St., NEW YORK

MACHINE SHOPS AND WAREHOUSES:

222-234 Culver Avenue **63-83 Pollock Avenue**
JERSEY CITY

BAIRD'S MACHINE TOOLS

Lathes

1—32 x 14 Shepard Lathe Quick Change.
1—16 x 8 Flathers Plain Lathe.
1—18 x 8 Draper Heavy Duty Plain Lathe.
4—17 x 7 Street Heavy Duty Plain Lathes.
2—18 x 8 Walcott Quick Change Heavy Duty Lathes.
1—20 x 10 Walcott Quick Change Heavy Duty Lathe.
1—10 x 4 Seneca Falls "Star" Lathe.

Screw Machines

1—¼" Cleveland Automatic—four hole turret.
1—¾" Cleveland Automatic—five hole turret.
1—⅝" Pratt & Whitney Automatic four hole Turret.
1—No. 53 Acme Automatic, (new).
4—1⅝ Hand Screw Machines, complete.
1—1½ Hand Screw Machine, complete.
2—1 5/16 Hand Screw Machines, complete.
2—Heavy Duty 22" Turret Lathes.
1—2¼ Flat Modern Turret.

Millers and Gear Cutters

1—No. 3½ Garvin Plain Miller.
1—No. 1½ Cincinnati Universal Milling Machine.
1—No. 1 Farwell Gear Hobber.
1—Farwell Gear Tester.
2—U. S. Hand Millers.
1—Farwell Hand Miller.

Drills

4—Lindgren 20" Drill Presses.
25—Burke Bench Drills.
6—13" Sensitive Drills.
3—14" High Speed Ball Bearing Drills.
3—4 spindle Foot Bench Drills.

Grinders

1—16 x 66 Landis Universal Grinder.
1—10 x 36 Landis Plain Grinder.
1—10 x 30 Modern Universal Grinder.
1—No. 1 Bath Universal Grinder.

Shapers and Planers

1—30" x 30" x 7' Flathers Heavy Duty Planer
1—16" x 16" x 3½' New Haven Planer.
1—16" Barker Shaper Plain.
1—16" Milwaukee Shaper, B.G.

W. J. BAIRD MACHINERY CO.
54-56 Jefferson Avenue **Detroit, Mich.**

For Sale (Subject to Prior Sale)

5-TON LOCOMOTIVE CRANE

Manufactured by Balmforth Bros., of Rodley, England

Specifications:

One wheel 4′-8½″ gauge locomotive crane with 38′ boom capable of lifting and swinging safely when properly ballasted, and running on good substantial track the following loads with booms dropped to different radii:—

30,000	pounds	at	10	feet	radius	(Minimum radius)
26,250	"	"	12	"	"	
20,000	"	"	15	"	"	
14,000	"	"	20	"	"	
11,000	"	"	25	"	"	
9,000	"	"	30	"	"	
7,000	"	"	35	"	"	
6,000	"	"	40	"	"	(Maximum radius)

Crane is fitted with rail clamps to give higher capacity, if wanted. The crane has a draw bar pull of 7,600 pounds. Ballast for lower truck 5 tons. Crane weighs 35 tons, 10 cwt.

Steel Shafting ranging from 6 15-16 to 9 15-16 by 28 ft. 250 tons steel rails, 20 lb. 10 Trucks, 36″ gauge.

1 100 H.P. Marine Boiler, with valves complete. As good as new. Price $550.00.

1 Concrete Mixer on wheels, with engine attached Price **$450.00.** Maker, Gould, Shapley & Muir, Brantford, Ont.

34 Lengths New Pipe, 20″ Bell and Spigot Class 2.

RICHARD JAMES, 704 POWER BUILDING
MONTREAL - - QUE.

For Sale Cheap

1—Box Girder Type Overhead Hand Power Crane, 48′ 6″ span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.

1—Brantford (Gas) Bake Oven and 4 Racks.

1—Linderman 2-Spindle Boring Machine.

1—26″ Drill, London Machine Tool Company.

1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

11—New 1-13/16″ High Speed Twist Drills, No. 5 Morse Taper Shank.

30—Used 1-13/16″ High Speed Twist Drills, No. 5 Morse Taper Shank.

M. BEATTY & SONS
Limited
Welland, Ont.

If you have a business to dispose of, or are in need of efficient help, try a Want Ad. in Canadian Machinery, and let it assist you in filling your needs.

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

Let CANADIAN MACHINERY Sell It for You.

Machine Tools For Sale

In stock for immediate delivery:

LATHES.

2—20 x 10 Hamilton (new).
1—16-24 x 8 Sebastian Gap Lathe.
1—13 x 6 Barnes.
1—9″ Porter Cable Mfg. Lathe (new).
1—16 x 6 Canedy-Otto (new).
2—16 x 6 Style A Hamilton (new).

BENCH LATHES.

A variety of new and used bench lathes with collets.

BENCH MILLER.

1—B. C. Ames (new).

PROFILER.

1—No. 14 Garvin.

HAND MILLING MACHINES.

1—No. 2 Garvin (new).
1—No. 1 Standard (new).

SLAB MILLER.

1—16 x 48 Bement Slab Miller.

COLD SAW.

1—9-inch Lea Simplex with saw grinder (new).

DRILL PRESSES.

1—4-spindle Barr.
1—3-spindle Avey.

SHAPERS.

1—16″ G. & E. B. G.

SCREW MACHINES.

2—No. 2 B. & O. (new).
1—1-inch Pierce (new).
2—1½-inch B. & O. (new).
1—No. 2½ Garvin (new).
1—No. 4 Foster.

MILLING MACHINE.

1—No. 1 Van Norman Plain (like new).

DISC GRINDERS.

2—No. 6 x 20″ Ring Diamond Disc Grinder, with compound table micrometer adjustment.
2—No. 6 x 14″ Ring Diamond Grinder with table, same as above.

GRINDERS.

2—No. 1 Cutter and Reamer Grinders (new).

STRONG & HERY
225 STATE ST., ROCHESTER, N .

FOR SALE

1—No. 1 Acme Chucking Turret Lathe, with power feed, back-geared, swings 16″, hole in spindle 1 1-16″; excellent condition.

1—No. 3 Foster Geared Friction Head Turret Lathe with automatic chuck and wire feed, hole in spindle 1 9-16″; practically new.

1—Copper and Nickel Plating Plant with piping, 2 rheostats, one 280 amp. dynamo and countershafts.

1—Only 5-C Modern Die Head.

This equipment can be inspected at

THE GRAY MANUFACTURING & MACHINE COMPANY, LIMITED
686 St. Clarens Avenue - Toronto

(23)

BIG SALE
OF
Lathe Chucks

100 Second-hand Lathe Chucks from 10 to 36 inch, Independent, at $1.00 per inch.

1–16″ Smith & Mills Back-geared Shaper	$ 400
1–24 Smith & Mills Shift Belt Shaper	300
1–24 Barker Geared Shaper, new	450
1—24 Gould & Eberhardt Back-geared Shaper	500
1–2½ ft. Fosdick Radial Cone Type	525
1—24 x 48 x 16 ft. McCabe Double Spindle Lathe	1,400
8—No. 18 Bliss Inclinable Power Presses, 1½ in. stroke each	125
1 No. 3 Garvin Hand Miller	275
1—17 x 8 American Quick-change Gear Lathe	700
1—21 x 8 LeBlond Heavy Duty Lathe	700
1–25 H.P. Gen. Elec. A.C. Motor, 60 cyc., 1,200 R.P.M., 3-phase and start	750
1–35 H.P. Pulcher Wheeler D.C. Motor, 220 volt, 700 R.P.M.	425
1–60 H.P. General Electric, D.C., 220 Volt, 1,000 R.P.M., near new	600
1–100 H.P. Westinghouse D.C. Motor, 220 V., 690-1000 R.P.M., Type S	900
1—110 H.P. Westinghouse D.C. Motor, 220 V., 690-1000 R.P.M., Type S	950

Morris Benjamin
220 Centre Street New York

All in good Condition

IMMEDIATE DELIVERY

SECOND-HAND MACHINERY

1—Class B1—Rand Duplex steam-driven air compressor, duplex steam and air cylinders, automatic oil feed and self-regulating governor. Heavy flywheel, 60″ dia.

1—8 x 12 Centre Crank Engine with Pickering governor, forged crank. Pulley flywheel, 34 x 8¼.

1—6½ x 8 Side Crank Engine, with Pickering governor. Pulley flywheel 28 x 6.

1—30″ Boston Cupola and forge blower.

1—Rand air hoist, 4″ x 4 ft. left.

1—D.C. S.D. Hoisting Engine; 7 x 12 cylinders, 36 x 36 drum.

1—S.D. 8 x 11 double purchase mast wrench.

1—H.T. Boiler 32″ x 9′ with 46 2″ tubes 8′ long. Government pressure allowed 90 lbs.

1—H.T. Boiler 30″ x 9′ with 20 3″ tubes 8′ 0″. Government pressure allowed 80 lbs.

NEW MACHINERY

A number of Vertical Boilers 30″, 33″, 37″ and 40″ diameter.

A number of Stratton Steam Separators 1″, 1½″, 2″, 3″, 3½″, 4″ and 5″.

1 Steel Ore Bucket 37″ x 37″ ring and pin fastening.

1 Steel Ore Bucket 8 cu. ft. taper sides, pin fastening.

All in good order—if interested, close prices will be quoted.

Marsh & Henthorn Limited
Belleville

FOR SALE

GRINDERS.

12 x 44 in. Modern Plain Grinder.
12 x 24 in. Modern Plain Grinder—Self Contained.
10 x 36 in. Landis Plain Grinder.
18 in. 30 x 96 in. Morton Gap Grinder.
No. 3 Landis Universal Grinder.
No. 2 Oesterlein Universal and Cutter Grinder.
No. 6-x Diamond Disc Grinder 14-in. Ring Wheel Chuck, one end.
No. 120 Gariner Disc Grinder, used four months.
No. 14 Besley Disc Grinder, with 2 26-in. discs, two ring wheel chucks. Almost new.

GEAR CUTTING MACHINES.

15 in. Gleason Bevel Gear Generator.
50 in. Grand Lees Gear Hobber; good as new.
24 in. Gleason Bevel.
64 x 16 in. Gould & Eberhardt Gear Cutter.

BORING AND TURNING MACHINES.

2 72 in. Niles-Bement-Pond Heavy Type Vertical Boring and Turning Mills, Motor Driven, 220 Volts D.C.
84 in. Cincinnati Boring and Turning Mill, Motor-Driven.
54 in. Sellers Vertical Boring and Turning Mill.
[illegible] in. Niles Vertical Boring and Turning Mill, 2 swivel heads.
Betts Horizontal Boring Machine, 3 ft. Bar, 48 in. Swing.
Special Horizontal Boring and Facing Mill, 20 in. Swing, 42 in. between heads.
Beaman & Smith 2-spindle Boring and Facing Mill (Horizontal).
No. 2 Barrett Cylinder Borer with 5-in. spindle.
34 in. Colburn Vertical Turret Boring Mill, 4 jaw chuck, thread cutting attachment.

MILLING MACHINES.

No. 6 Pratt & Whitney Plain Milling Machine.
No. 2 Kempsmith Plain Miller.
No. 3 Becker-Brainard Universal Miller Cone [illegible] Gear Feed.
No. 2 [illegible] Plain Miller single pulley drive.
No. [illegible] ati Universal Miller with vertical and [illegible]
No. 9 [illegible] Vertical Milling Machine, fine condition.

MOTORS.

Generator, [illegible] Amp. [illegible] K.W. [illegible] volts r.p.m.
15 H.P. General Electric Motor, 220 volts, A.C.
20 H.P. Westinghouse Motor, 220 volts, A.C., 3 phase, 60 cycle, 1,200 r.p.m.
25 H.P. General Electric Motor, 220 volts, A.C., 3-phase, 60 cycle, 1,200 r.p.m.
100 H.P. Form K Motor, 550 volts, 3 phase, 25 cycle, 750 r.p.m., with base and pulley; used 60 days.

PLANERS.

24 x 24 in. x 6 ft. Pease Planer, one head on cross-rail.
30 x 30 in. x 8 ft. Lodge & Davis Planer, one head on cross rail.
36 x 36 in. x 14 ft. Niles Planer, one head.
56 x 36 in. x 8 ft. Putnam Planer, two heads on crossed rail.
72 x 57 in. x 17 ft. Gleason Planer, two heads on cross rail.

SCREW MACHINES.

2 6A Potter & Johnson Automatic Chucking Lathes.
2 No. 1 Foster Hand Screw Machines, wire feed and auto chuck, fine condition.
No. 2 Pierce.
No. 2 Bardons & Oliver Screw Machine.
2 in. Cleveland Automatic.
No. 3 Stecher Screw Machine.
No. 3 National Acme Automatic Screw Machine, 4 spindles, ⅞ in. capacity.
4—No. 54 National Acme 4 Spindle Auto Screw Machines.
No. 5 Warner & Swasey Screw Machine, 2¼ in capacity.
8 5A Potter & Johnson Automatic Chucking Lathes.
No. 53 National Acme Auto Screw Machine, single pulley drive, one inch capacity, fully equipped; almost new.
No. 515 National Acme Auto Screw Machine, 9-16 in. capacity.

TURRET LATHES.

3 x 36 in. Jones & Lamson Turret Lathes, patent head type, with chucking equipment, fine condition.
2 in.—2 x 24 in. Jones & Lamson Flat Turret Lathes, single pulley drive, set over heads, bar and chucking equipment.
24 in. Gisholt Turret Lathes.
24 in. Steinle Turret Lathe, single pulley drive, 4 in. hole through spindle, chucking and bar equipment.
8 21 in. Gisholt Turret Lathes, belt driven.
Lodge & Davis Turret Lathe, power feed to turret, 18 in. swing, 2 in. hollow spindle.
10 13 in. Gisholt Turret Lathes.
14 in. Davis Turret Lathe, cone drive.
15 Reed Prentice Semi-Automatic Manufacturing Lathes, oil pans, pumps and regular equipment.

ENGINE LATHES.

5 Cataract Precision Lathes.
11 in. x 5 ft. Star Lathe, foot and belt drive.
18 in. x 6 ft. Bradford, arranged for motor drive.
18 in. x 6 ft. Bradford, belt drive.
20 in. x 10 ft. Reed Lathe, 1½ hollow spindle.
24 in. x 14 ft. Bradford, taper attachment; fine condition.
26 x 48 in. McCabe Double Spindle, 14 and 18 ft. Beds.
26 in. x 10 ft. Bradford.
12 in. x 10 ft. 6 in. Lodge & Shipley, iron screw cutting.
48 x 27 in. Betts, triple geared.
54 in. x 12 ft. New York, triple geared.

DRILLING MACHINES.

1—30 in. Bickford, B.G. and P.F.
5 Colburn D-3.
1 4 ft. Bickford Radial Speed Box Drive.
7 D-4 Colburn Heavy Duty (new).
3 ft. Dreses Radial Drill.
16—Allen 4-spindle High Duty Ball-Bearing Drilling Machine; guaranteed good as new.
25 in. Kern Sliding Head, tapping attachment.
30 in. Swing Blaisdel, 36 in. table, upright drill.
5—Baker, No. 300, Heavy Duty.
2—Moline 4-Spindle Drills, ¼ in. capacity.
1—Bausch 8-Spindle Adjustable, 11-16 in. capacity, 21 in. circle, table 24 in. square.
1 6 Spindle Foot-Burt, with 18 x 30 in. table.
1 10 Spindle Pratt & Whitney, 3-16 in. capacity, 4 in. circle.
1 16 Spindle Pratt & Whitney, 12 in. table, ½ in. capacity.
1 Gardam 12-Spindle, ½ in. capacity.

SHAPERS.

14 in. Hendey Geared Friction.
16 in. Stockbridge, back-geared.
24 in. Kelley; almost new.

W. F. DAVIS MACHINE TOOL COMPANY

CHICAGO, 32 N. Clinton St. CINCINNATI, 3 Greenwood Bldg. NEW YORK, Singer Bldg.

IMMEDIATE DELIVERY

BORING MILLS.

40" Rogers & Hemphill, two swivel heads.
42" Gisholt, one turret and one swivel head.
52" Niles, car wheel boring mill.
62" Bement, horizontal.

DRILLING MACHINES

34" Barnes, s.h., b.g., p.f.
3½' Industrial Radial.
Avey, 1-spindle, B.B. (new).
Avey, 4-spindle, B.B.
No. 10 Natco 8-spindles.
No. M-1 Natco 8-spindles.
12-spindle Multiple, P. & W.
No. 30 C. Baush, 12-spindle.
Allan, 2 spindles (new).
Allan, 4 spindles (new).

GEAR CUTTERS

30" x 9" G. & E. Auto, for spur and bevel.
24" x 7" G. & E. for spur.
36" Walcott, for spur.

GRINDERS

14" x 20" B. & S. Universal.
Gisholt Tool Grinder.
No 5 Diamond Water Tool.

LATHES

12" x 5' Davis, c.r.
14" x 6' Fairbanks, c.r., taper.
16" x 6' Prentice, c.r.
16" x 6' Sebastian, p.r.
16" x 10' Greaves & Klusman, c.r.
17" x 10' Blaisdell, c.r.
18" x 6' Bradford, c.r., taper.
18" x 8' L. & S., pat. head, c.r., taper.
18" x 10' Bradford, c.r., taper.
18" x 12' Barker, c.r.
20" x 10' Flather, c.r.
20" x 14' Blaisdell, c.r.
21" x 12' New Haven, c.r.
21" x 12' Bradford, c.r., taper.
24" x 12' New Haven, c.r.
24" x 13' New Haven, c.r.
30" x 27' Reed, c.r., taper.
32" x 16' Blaisdell, c.r.
36" x 22' Lodge & Shipley, geared head, q.c.g., motor drive with motor.
68" x 20' Fifield, c.r., t.b.g.

MILLING MACHINES

No. 4 LeBiond, plain.
No. 13 P. & W., Lincoln
No. 4-B Becker Vertical.
No. 5 Becker Vertical.

PLANERS

22" x 22" x 4 New Haven, one head.
30" x 30" x 12' Cincinnati, two heads.
36" x 36" x 12' Powell, single head, arranged for two.
36" x 36" x 16' Sellers, one head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.
42" x 36" x 12' Cincinnati, two heads.

PRESSES

No. 20 Bliss, O.B., Inc.
No. 3 Walsh O.B. Inc.
No. 174 Consolidated, double crank.

SHAPERS

14" Pratt & Whitney.
14" Smith & Mills.
16" Gould & Eberhardt.
16" American.

SCREW MACHINES

No. 1 Chicago automatic.
1 3-16" Hartford Automatic.
⅞" Cleveland Automatic.
2" Cleveland automatic.
2¾" Cleveland automatic.
1" B. & S., plain.
16" P. & W., plain,

TURRET LATHES

16" Lodge & Shipley.
25" Niles.
No. 2 Warner & Swasey Hollow Hexagon.
2" x 24" Jones & Lamson.
24" Gisholt, spindle capacity 6¼".
3" x 36" Jones & Lamson, chucking outfit.

MISCELLANEOUS

Bolt Cutter, 1½" Acme.
Centering Machine, No. 1 Whitton.
No. 3 Burr Cold Saw.
No. 14 Higley Cold Saw.
No. 2 National Oil Separator.
No. 00 Baker Keyseater.
2—100 lb. Bradley Helve Hammers.
No. 80A Grant Rivet Spinner.
Stecher Rivet Spinner.

Write for our Stock List.

Write for our Stock List.

The H. A. Stocker Machinery Company, 566-572 W. Randolph St.,
CHICAGO, ILL.

They must be getting results--

or why would they continue to advertise each week? That's logic, isn't it? This is a *direct-result* department. Have you noticed that each week the same firms' lists appear? If you don't care to use large space, insert a "liner" ad.

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto, Ont.

NEW MACHINERY

6—12x6 Seneca Falls Lathes, quick change gears. In stock.
10—16x6 Canedy-Otto Lathes, October delivery.
3—18x8 Cisco Lathes, quick change gear. In stock.
1 13x5 South Bend Lathe. In stock.
1—14x6 Carroll-Jamieson Lathe, QCG, taper attachment, relieving attachment, draw in collet. November delivery.
2—1½ American Plain Milling Machines. In stock.
3 No. 1 Dow Milling Machines, plain. In stock.
3—No. 1 Bickford Hand Milling Machines. In stock.
2—No. 1 Standard Hand Milling Machines. In stock.
1—No. 1½ Valley City Universal Milling Machine. November delivery.
1—No. 1½ Valley City Plain Miling Machine. November delivery.
10—No. 6 Standard Universal Tool and Cutter Grinders. In stock.
3—No. 1 Wilmarth & Morman Surface Grinders. In stock.
1—Style W. P. L. Wilmarth & Mormon Drill Grinder. In stock.
1—20-in. Ohio Back Geared Shaper. In stock.
2—No. 1 Wilmarth & Mormon Universal Grinders.
1—No. 2 Wilmarth & Mormon Surface Grinder.
1—28-in. Smith & Mills Triple Geared Shaper.
2—32-in. Smith & Mills Triple Geared Shapers.
2—16-in. Smith & Mills Back Geared Shapers.
1—14x6 Neat Lathe, C.R., P.C.F.
1—24x10 Advance Lathe, C.R., P.C.F., H.S., QCG, DBG.
1—16x6 Advance Lathe, QCG, D.B.G.
4—19x8 Sidney Lathes, Q.C.G., C.R.
6—21x8 Sidney Lathes Q.C.G., C.R.

60" Betts Boring Mill, 2 swivel heads, used. Guaranteed perfect condition. Complete. 10 H.P., 250 Volt D.C. Motor.

New Lists Just Issued. Write for a Copy.

The Simmons Machine Co., Inc.

981 Broadway
Albany, N. Y.

1001 Singer Bldg.
New York City

If any advertisement interests you, tear it out now and place with letters to be answered.

ALL STEEL ELECTRIC OVENS

For baking enamel or varnish in High Explosive Shells.

EXPLOSIVE-PROOF ELECTRIC UNIT

manufactured under HOSKINS' patents, will not explode enamel or varnish fumes. Owing to the heavy construction will not burn out and are guaranteed for two years. Steel clad, are protected from mechanical injuries.

FURNACE INSULATION

HOSKINS' electric ovens are insulated with the same high insulating material that has made HOSKINS' furnaces famous the world over. This material is not used by any other oven manufacturer and will save from 15 to 20% on current consumption over other makes of ovens.

Canadian Hoskins Limited

Electric, Gas and Oil Furnaces and Pyrometers

Walkerville **Toronto** **Montreal**

FOUR BIG THINGS IN CANADIAN INDUSTRY

BIG BUYING IS GOING ON IN CANADA IN THE METAL-WORKING, MACHINERY, IRON AND STEEL, FOUNDRY, SHIPBUILDING AND POWER FIELDS

Canada's trade for the month of July, 1916, showed an increase of 141 per cent.—imports $63,622,587; exports $104,964,270. Business in Canada is good. The war has aroused an unsuspecting and surprising resourcefulness in Canadian manufacturers. They are making money, extending their plants, buying equipment. They are confident as to the future and are deeply engaged in industrial preparation.

The buyers in the fields mentioned above can be reached through these

FOUR EXCLUSIVE MACLEAN MEDIUMS

CANADIAN MACHINERY

CANADA'S leading industrial paper serving the iron and steel, metal working and allied industries. It led the world in amount and quality of information, pertaining to shell manufacture. The biggest firms in Canada and the United States regarded it as a text book on the subject. The Australian Shell Committee reproduced its special Shell Number in book form.

CANADIAN MACHINERY was the first Canadian paper to undertake the development of export trade. Its first Export Number (302 pages) created very favorable attention in all allied and neutral countries. Export numbers are published monthly.

On December 30, last, CANADIAN MACHINERY'S Annual Review Number contained 332 pages—a record breaker for Canadian publications.

Leading manufacturers such as John Bertram & Sons, Nova Scotia Steel & Coal Co., The Niles-Bement Pond Co., the Canada Machinery Corp., and scores of others use regular space in CANADIAN MACHINERY. Equally well known concerns are subscribers.

Its classified advertising section is an indication of the intimate connection enjoyed by CANADIAN MACHINERY. Six pages of classified advertising are carried in each issue.

THE CANADIAN FOUNDRYMAN

SERVES the foundry trade of Canada—an ever-increasing field. Every foundry is busy. One foundry supply dealer said recently that his July business was larger than for any five months of the previous year. Labor-saving equipment, as well as supplies and standard lines are being purchased heavily. THE CANADIAN FOUNDRYMAN influences this buying—at a small cost to the firms who are getting the business.

THE POWER HOUSE

SERVES the power field, and the buyer of power equipment in every province in Canada. It serves also the manufacturers of power equipment, as is perceived in the following quotation from a letter from Wm. B. Pierce Co., Sept. 1, 1916:

> "The reason we are increasing this space in the POWER HOUSE is that we have found the POWER HOUSE costs us less per inquiry than any other publication we have used in the power plant field, and that the inquiries are generally from very high-class concerns. The percentage of inquiries that we receive that are turned into sales is unusually high, so that POWER HOUSE also stands first on our list for low cost per sale."

MARINE ENGINEERING OF CANADA

SHIPBUILDING in Canada has received a tremendous impetus as a result of the war. Shipbuilding plants are being built on the Atlantic and Pacific Coasts in considerable number, while established shipyards have more business than they can handle. MARINE ENGINEERING is the only exclusive marine paper published in Canada. Its circulation is among shipbuilders, shipowners, naval architects, government officials, masters and engineers. These men and classes are reached effectively, at small cost, through MARINE ENGINEERING.

Each of these papers has a National paid up circulation thorough in character. Each is an acknowledged **Power** in its own field. Send for specimen copies, advertising and subscription rates.

The MacLean Publishing Company, Limited, 143-153 University Ave., Toronto, Ont.
Also at Montreal Winnipeg New York Chicago Boston Cleveland and London, England

TO SHELL MAKERS

We Specialize on:

(a) Our Patented Nosing Die (4.5″-5″ and 6″).
(b) Thread and Seating Gauges (all sizes).
(c) Milling Hobs (all sizes).
(d) Thread and Seating Attachment for Lathes.

(a) If you are changing Nosing Dies every five or ten thousand shells, you are wasting valuable time and money. Try our patented die, and so make your nosing operation continuous.

(b) We Guarantee that if our Thread and Seating Gauge passes your shells, that the Government Gauges will also pass them; otherwise we take them back without hesitation. The life of our Gauge is longer than all others.

(c) Our Milling Hobs are made by experts, and we specialize on this class of work for all sizes of shells.

(d) Which would you rather use?

1 Thread Milling Machine	1 16″ Lathe
and	and
4 Hand Seating Tools	1 Thread and Seating Attachment
requiring	requiring
5 men for each Shift	1 man for each Shift
turning out	turning out
150 Shells per Shift at a cost of $18.00	150 Shells per Shift at a cost of $4.00

The cost of this attachment is only $120.00, and your engine lathe will be of use after the war work is over.

Toronto Type Foundry Company, Limited

50 Coleman Avenue, Toronto

Advertisell It!

If you have Machinery which your plant has outgrown—advertisell it. Or if you have a Factory Building which you have outgrown—advertisell it. That is, advertise it in our Classified Advertising Section and SELL what you have for sale.

CANADIAN MACHINERY
CLASSIFIED ADVERTISING SECTION
143-153 UNIVERSITY AVENUE - - TORONTO, CANADA

If any advertisement interests you, tear it out now and place with letters to be answered.

HINTS TO BUYERS

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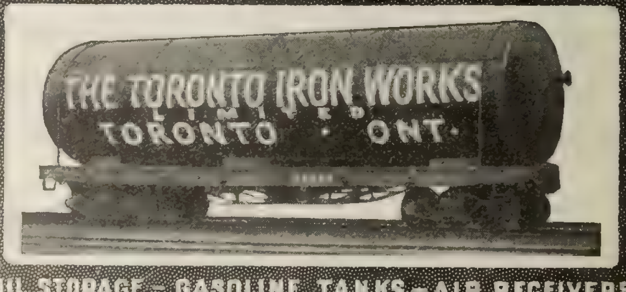

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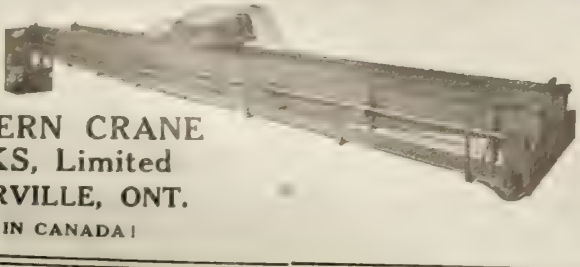

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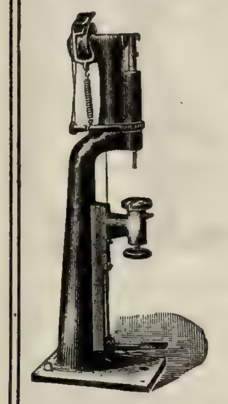

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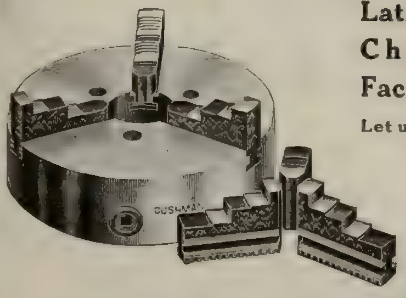

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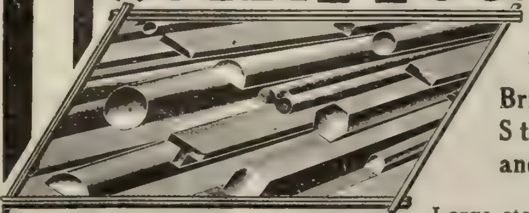

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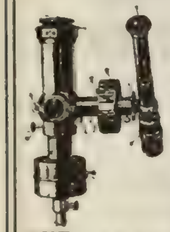

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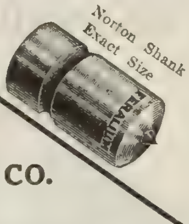

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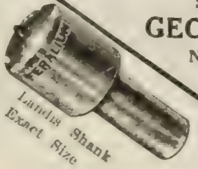

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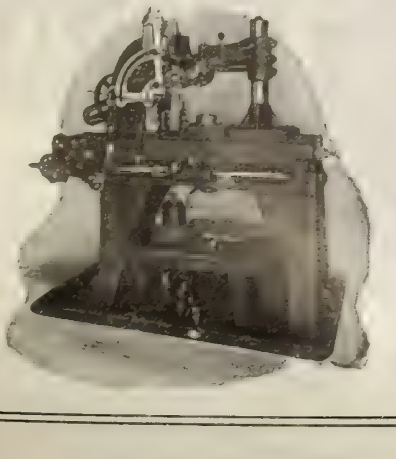

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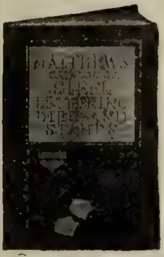
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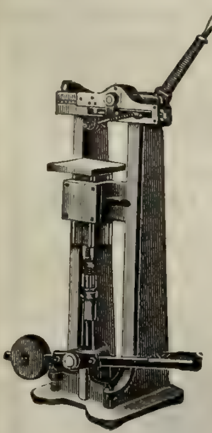
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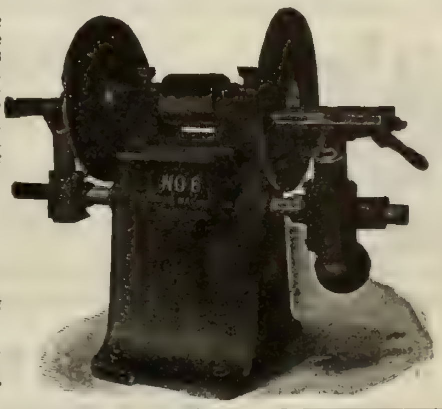
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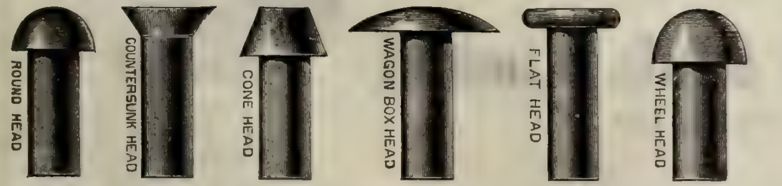

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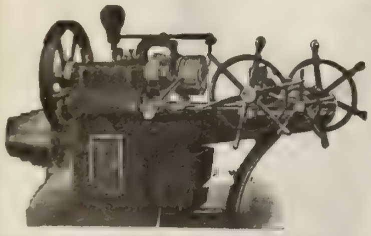

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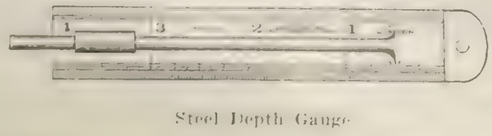

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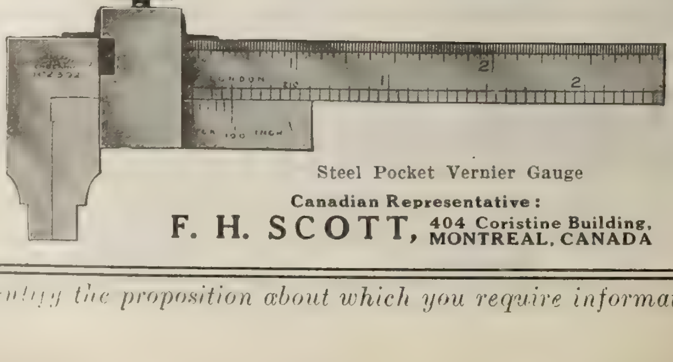

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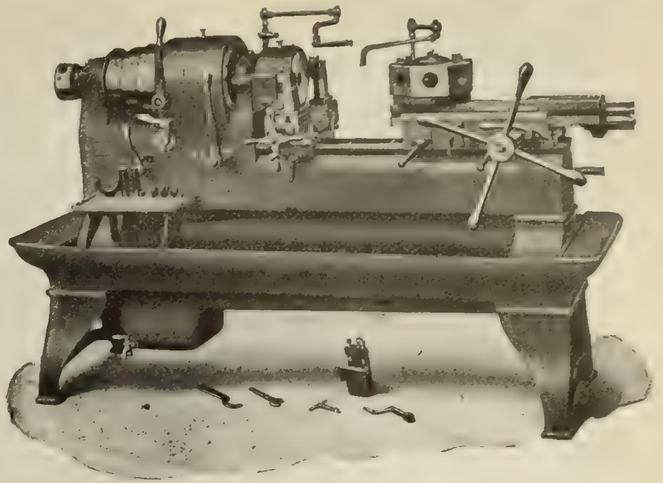

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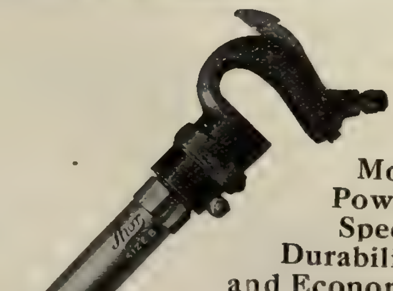

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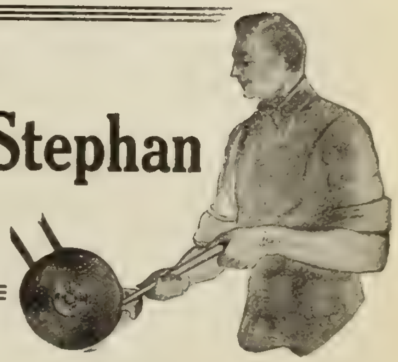

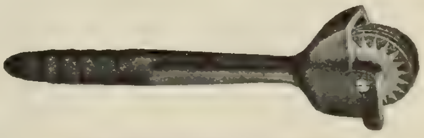

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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York.
R. E. T. Pringle, Ltd., Toronto, Ont.

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Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago.
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy Co., Montreal.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy Co., Montreal.
Morse Twist Drill and Machine Co., New Bedford.

DRILLS, TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong. Whitworth of Canada, Ltd., Montreal.
Boker & Co., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Celfor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill and Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

DRINKING FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

DRYING APPLIANCES
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Sheldons, Ltd., Galt, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.

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Sheldons, Ltd., Galt, Ont.

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Lancashire Dynamo and Motor Co., Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

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Dennis Wire & Iron Works, London, Ont.

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Curtis Pneumatic Machy. Co., St. Louis, Mo.
Whiting Foundry Equipment Co., Harvey, Ill.

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Can. Matthews Gravity Carrier Co., Toronto, Ont.

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Stow Mfg. Co., Binghamton, N.Y.

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Garvin Machine Co., New York.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Mach. Co., Hamilton, Ont.
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H. W. Petrie, Toronto.
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Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Norton Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Plessisville Foundry Co., Plessisville, Que.

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Lachapelle, J. D., & Co., Montreal, Que.
H. W. Petrie, Toronto.

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H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.

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Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque.

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Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

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H. W. Petrie, Toronto.

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Can. Blower & Forge Co., Kitchener, Ont.
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Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.

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Nicholson File Co., Port Hope, Ont.

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Dennis Wire & Iron Works, London, Ont.

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Hammond Steel & Forging Co., Syracuse, N.Y.
McKay, James Co., Pittsburgh, Pa.
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Whitman & Barnes Mfg. Co., St. Catharines, Ont.
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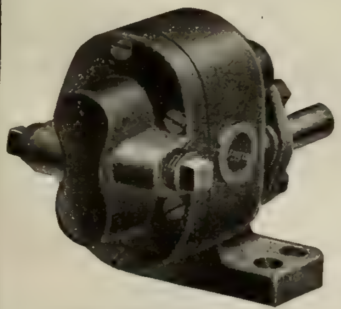
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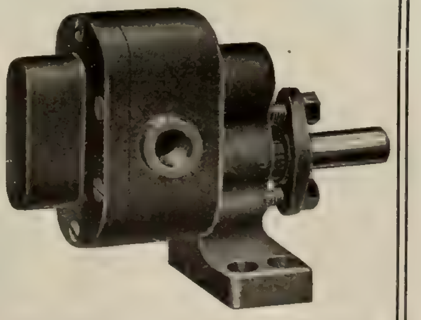
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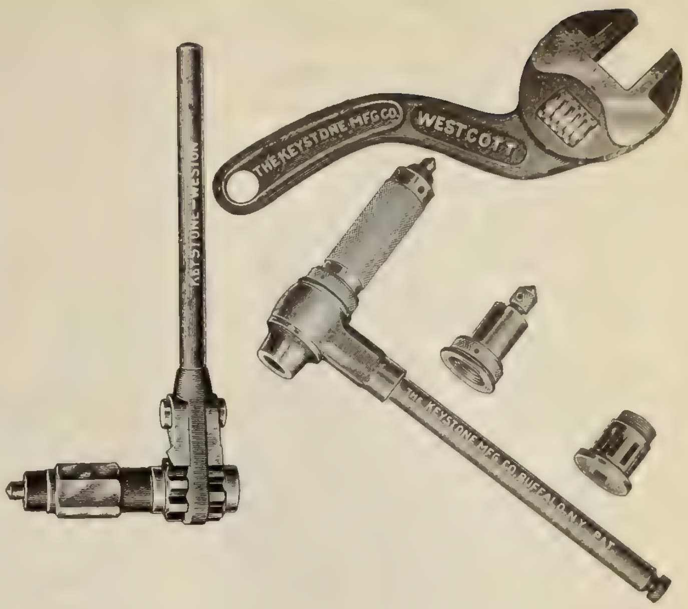

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Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Grant Mfg. & Machine Co., Toronto.
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Morse Twist Drill and Machine Co., New Bedford
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Garvin Machine Co., New York.
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Foss & Hill Machy. Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago.
Norton Co., Worcester, Mass.
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H. W. Petrie, Toronto.
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Greenfield Machine Co., Greenfield, Mass.
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Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
Niles-Bement-Pond Co., New York.
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Garvin Machine Co., New York City.

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Peerless Machine Co., Racine, Wis.

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Canadian Billings & Spencer, Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
High Speed Hammer Co., Rochester, N.Y.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.

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HAMMERS, POWER
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Erie Foundry Co., Erie, Pa.

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Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
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HINGES
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Northern Crane Works, Walkerville, Ont.
H. W. Petrie, Ltd., Montreal.
Whiting Foundry Equipment Co., Harvey, Ill.

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Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Jenckes Mach. Co., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

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The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Northern Crane Works, Walkerville, Ont.

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HOPPERS
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Toronto Iron Works, Ltd., Toronto, Ont.

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Garlock-Walker Machinery Co., Toronto, Ont.
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Garvin Machine Co., New York.

IRON ORE
Hanna & Co., M. A., Cleveland, O.

JACKS
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Northern Crane Works, Walkerville.
Norton, A. O. Coaticook, Que.
H. W. Petrie, Toronto.

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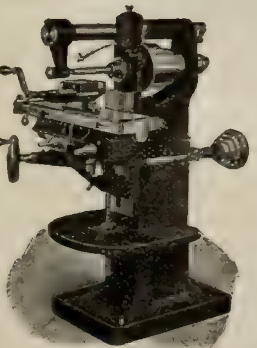

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A Steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

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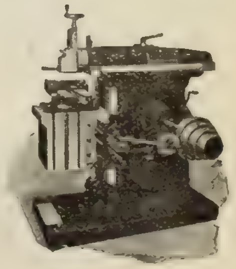
A Steptoe Shaper will do the work faster because it can be handled quicker.



The John Steptoe Company, CUMMINSVILLE CINCINNATI, OHIO, U.S.A.

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Sheldons, Limited, Galt, Ont.

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LADLES, FOUNDRY
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

LAG SCREW GIMLET POINTERS
National Machy. Co., Tiffin, Ohio.

LATHE CHUCKS (SEE CHUCKS)

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J. H. Williams & Co., Brooklyn, N.Y.

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Blount, J. G., & Co., Everett, Mass.
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Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hardinge Bros., Chicago, Ill.
New Britain Mach. Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.

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Root & Van Dervoort Engr. Co., East Moline, Ill.

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W. F. & John Barnes Co., Rochford, Ill.
John Bertram & Sons Co., Dundas.
Bawden Machine Co., Toronto, Ont.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Davenport Locomotive Works, Davenport, Iowa.
Dominion Machinery Co., Toronto.
Douglas, W. & B., Middletown, Conn.
Foss & Hill Machy Co., Montreal.
Foundry & Mach. Co., Montreal, Que.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Hendey Machine Co., Torrington, Conn.
Hepburn, John T., Ltd., Toronto, Ont.
Himoff Machine Co., New York.
Hyde Engineering Works, Montreal, Que.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
Wickes Bros., Saginaw, Mich.
A. R. Williams Machy. Co., Toronto.

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Bridgeford Mach. Tool Works, Rochester, N.Y.

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Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Jenckes Mach. Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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Garlock-Walker Machinery Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Himoff Machine Co., Inc., New York, N.Y
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Roelofson Mach. & Tool Co., Toronto, Can.
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Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Mach. Co., Madison, Wis.
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Niles-Bement-Bond Co., New York.
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Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Hepburn, John T., Ltd., Toronto, Ont.
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Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
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LIFTS, PNEUMATIC
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LINK BELTING
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Graton & Knight Mfg. Co., Montreal.

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Bertrams, Ltd., Edinburgh, Scotland.

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Lyman Tube & Supply Co., Montreal, Que.

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LOCOMOTIVES
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LUBRICATORS.
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Dominion Machy. Co., Toronto, Ont.
Fales, C. E., Machy. Co., Detroit, Mich.
Garlock-Machinery, Toronto.
Foss & Hill Machy. Co., Montreal.
New York Machinery Exchange, New York.
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H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
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Strong & Hery, Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.

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Stone Tool & Supply Co., J. R., Detroit, Mich.

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Foss & Hill Machy. Co., Montreal.
Noble & Westbrook Mfg. Co., Hartford, Conn.
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Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Gooley & Edlund, Cortland, N.Y.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio
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Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Chicago, Ill.
Hendey Machine Co., Torrington.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

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Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

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Brown & Sharpe Mfg. Co., Providence.
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Kempsmith Mfg. Co., Milwaukee, Wis.
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A. R. Williams Machy. Co., Toronto.

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Landis Machine Co., Waynesboro, Pa.
National Machy Co., Tiffin, O.
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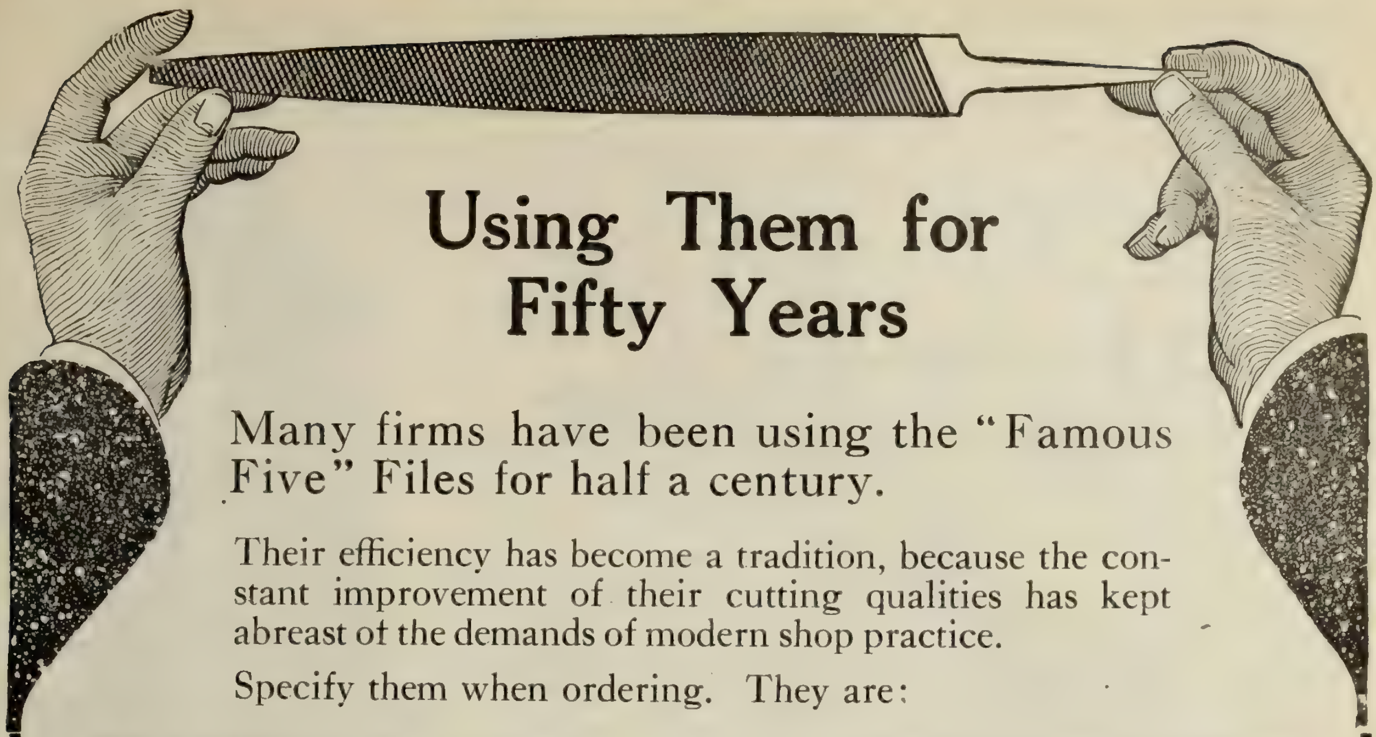

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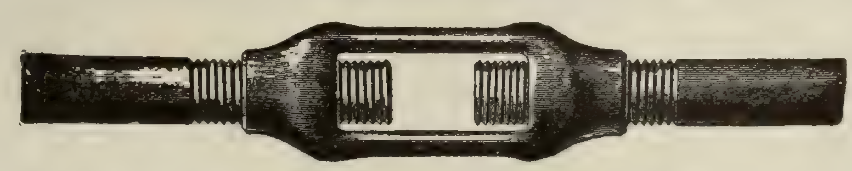

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Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PUMPS, HYDRAULIC
Charles F. Elmes Eng. Works, Chicago, Ill.
Darling Brothers, Montreal.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto.

PUMPS, LUBRICANT AND OIL
Cincinnati Lubricant Pump Co., Cincinnati, Ohio
Roper, C. F., Co., Hopedale, Mass.

PUMP LEATHERS
Graton & Knight Mfg. Co., Montreal.

PUNCHES AND DIES
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

PUNCHES, PNEUMATIC
Jno. F. Allen Co., New York.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Wickes Brothers Saginaw, Mich.

PYROMETERS
Shore Instrument & Mfg. Co., New York City.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES
John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS (SEE GUARDS)

RAIL BENDERS
Niles-Bement-Pond Co., New York.

RAILROAD TOOLS
Can. Fairbanks-Morse Co., Montreal.
Cumming & Son, J. W., New Glasgow, Canada.
Niles-Bement-Pond Co., New York.

RAILS, STEEL
Cumming & Son, J. W., New Glasgow, Canada.

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

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Garvin Machine Co., New York.

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Cleveland Twist Drill Co., Cleveland.
McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Stenotype Co., Indianapolis, Ind.
Whitman & Barnes Mfg. Co., St. Catharines, Ont

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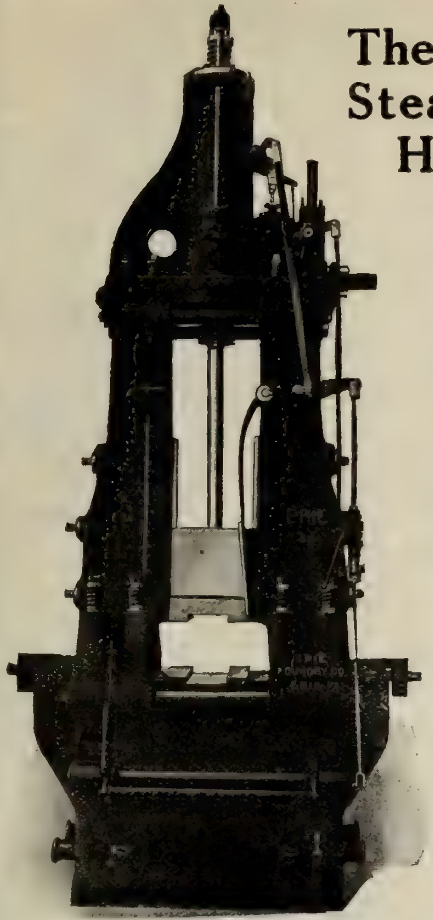
Boker & Co., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McKenna Bros. Brass Co., Pittsburgh.
R. E. T. Pringle, Ltd., Toronto, Ont.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Boker & Co., H., Montreal, Que.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.



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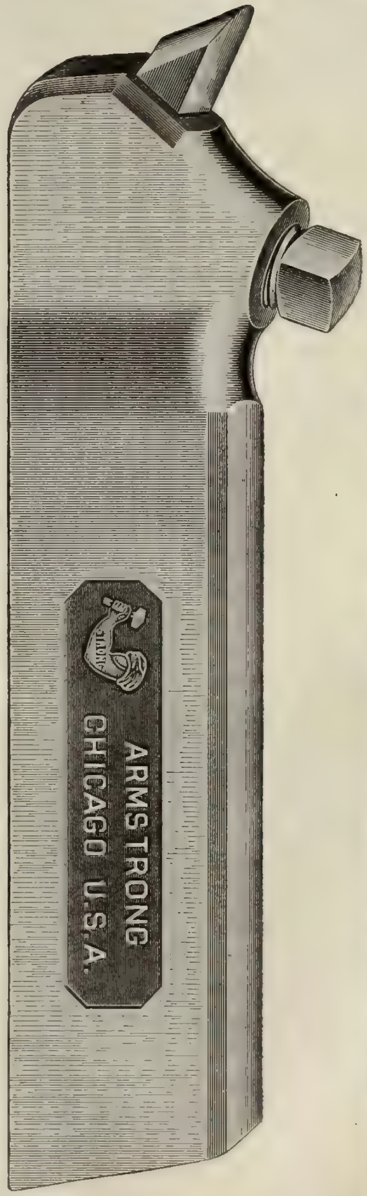
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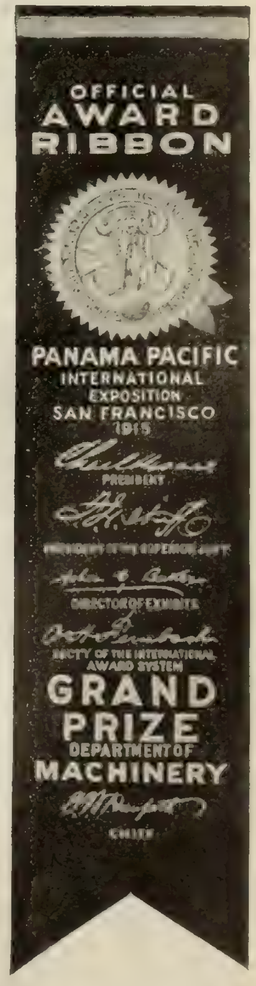
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Dominion Machy. Co., Toronto, Ont.
Gardner, Robt. & Son, Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
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H. W. Petrie, Toronto.
Wickes Brothers, Saginaw, Mich.
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Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler.
Mulholland, W. K., Co., Indianapolis, Ind.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Stenotype Co., Indianapolis, Ind.
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Wells Bros. Co. of Canada, Galt, Ont.

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Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

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Foss & Hill Machy. Co., Montreal.
New York Machinery Co., New York.
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Sheldons, Ltd., Galt, Ont.

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Bertrams, Ltd., Edinburgh, Scotland.
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Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.
Wickes Brothers, Saginaw, Mich.

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Can. Blower & Forge Co., Kitchener, Ont.
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Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

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Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada.

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Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Peck, Stow & Wilcox, Cleveland, O.
Steel Bending Brake Works, Ltd., Chatham, Ont.

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Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
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Lymburner, Ltd., Montreal.
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Noble & Westbrook Mfg. Co., Hartford, Conn.

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Whitman & Barnes Mfg. Co., St. Catharines, Ont.

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Banfield, W. H., & Sons, Toronto.
Bertram, John, & Sons Co., Dundas.
Baird Machine Co., Bridgeport, Conn.
Bawden Machine Co., Toronto, Ont.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Brown Engineering Corp., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
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Himoff Machine Co., New York, N.Y.
Jardine, A. B., & Co., Hespeler.
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Root & Van Dervoort Engr. Co., East Moline, Ill.
Smart-Turner Machine Co., Hamilton, Ont.
Webber Bros. Mach. Co., Toronto, Ont.
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SPIKE MACHINES
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Garvin Machine Co., New York.

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Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.

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Dennis Wire & Iron Works, London, Canada.

STAMPINGS
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Canada Machinery Corp., Galt, Ont.

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Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Zenith Coal & Steel Products, Montreal, Que.

STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Union Drawn Steel Co., Hamilton, Ont.

STEEL DRUMS
Smart-Turner Machine Co., Hamilton, Ont.

STEEL PRESSURE BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.

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Boker & Co., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Ltd., Montreal.
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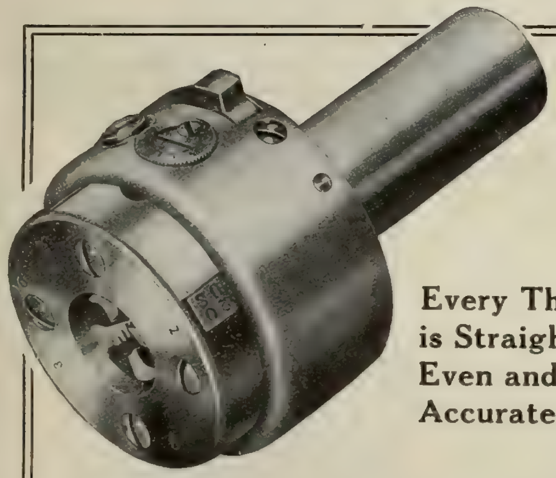

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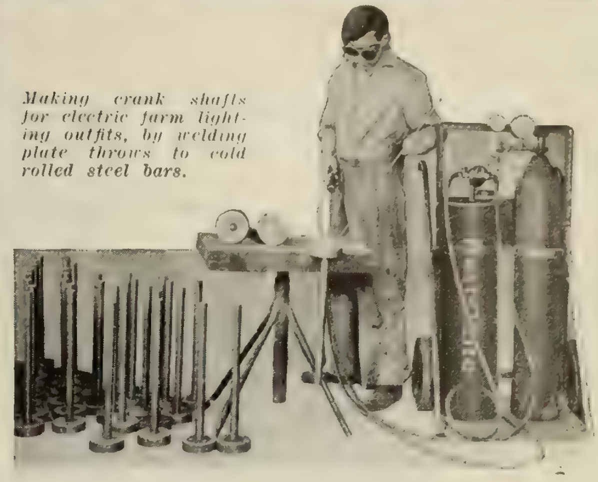

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Dominion Forge & Stpg. Co., Walkerville, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

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MacKinnon, Holmes Co., Sherbrooke
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Garvin Machine Co., New York.
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Greenfield Tap & Die Corp., Greenfield, Mass.
J. H. Hall & Sons, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
Manufacturers Equipment Co., Chicago, Ill.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rickert-Shafer Co., Erie, Pa.
L. S. Starrett Co., Athol, Mass.

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Manufacturers Equipment Co., Chicago, Ill.
Murchey Machine & Tool Co., Detroit.

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Manufacturers Equipment Co., Chicago, Ill.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Victor Tool Co., Waynesboro, Pa.

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Can. Fairbanks-Morse Co., Montreal
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy. Co., Montreal.
Geometric Tool Co., New Haven, Conn.
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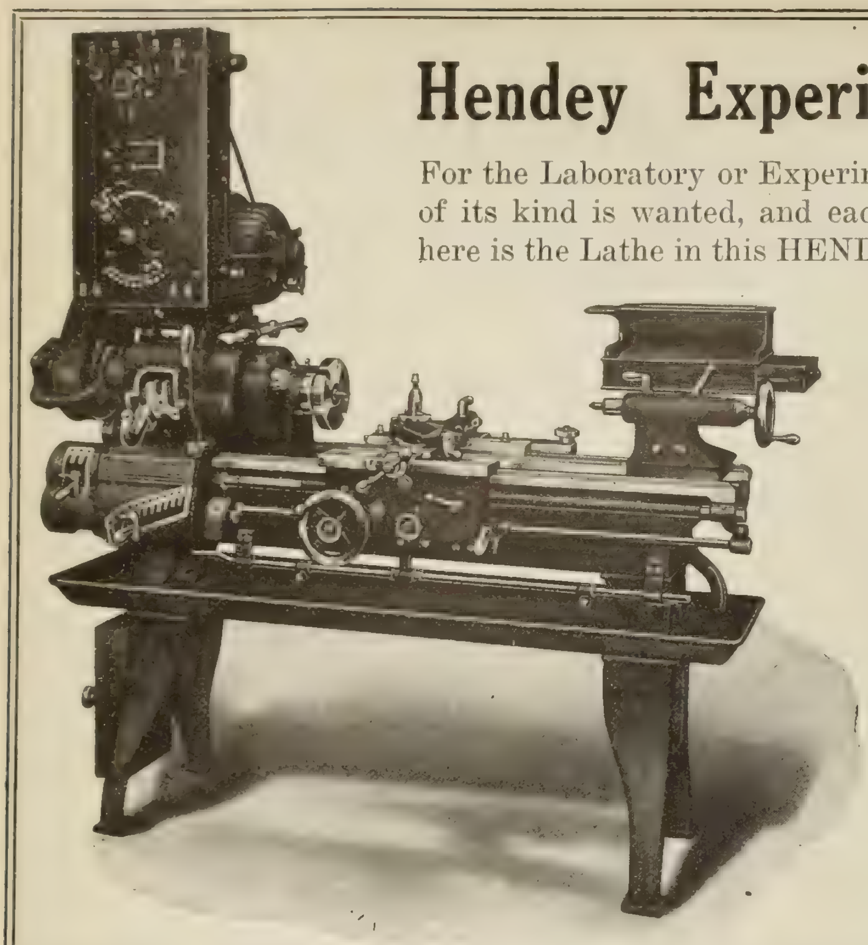

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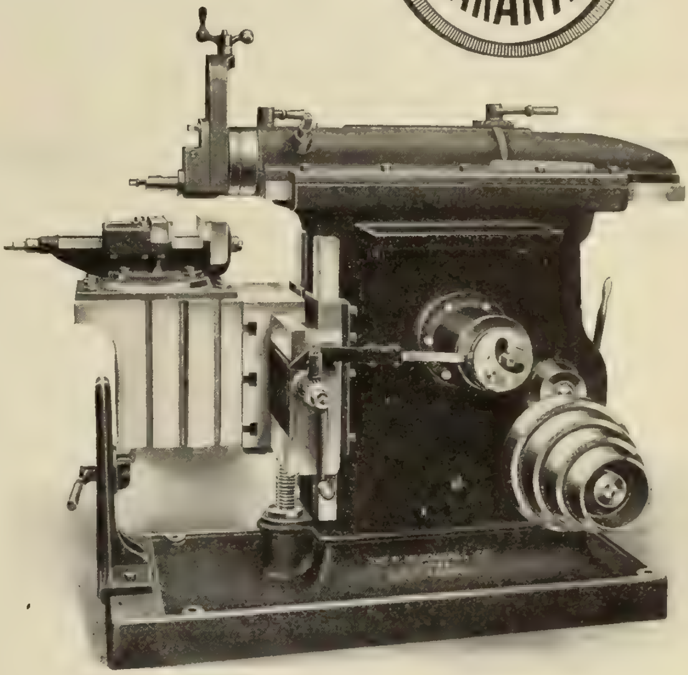

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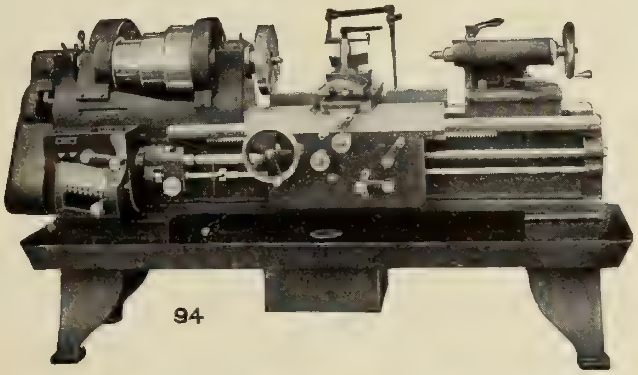

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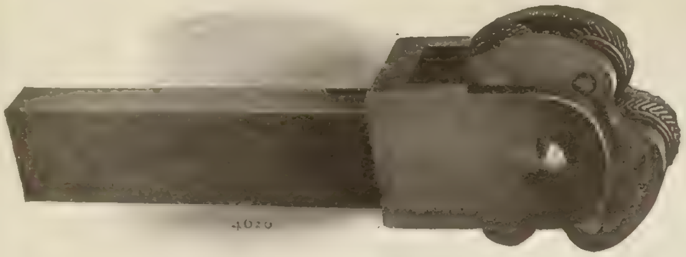
Toronto (Canada) Office: 609 Kent Building.

AGENTS:
Messrs. Ross & Greig, 412 St. James St., Montreal, Que.; Messrs. Gorman, Clancy & Grindley, Ltd., Calgary and Edmonton, Alta.; Messrs. Walkers, Ltd., 259-261 Stanley St., Winnipeg, Man.; Messrs. Robert Hamilton Co., Ltd., Bank of Ottawa Bldg., Vancouver, B.C.

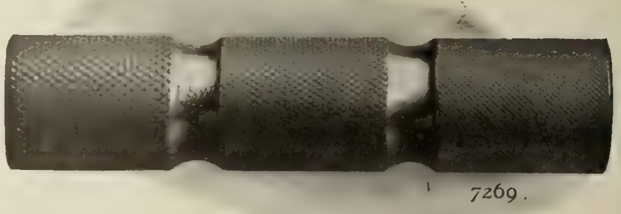


Don't Waste Time Changing Knurls

and don't be bothered with three holders when one will do.

Use the P. & W. "Three-in-One" Lathe Knurling Tool

Carries three pairs of knurls, making it three distinct knurling tools in one.



Coarse, Medium and Fine

The three pitches of knurls which we carry in stock are all combined in this one tool.

Uses same knurls as regular Lathe Knurling Tool shown opposite.

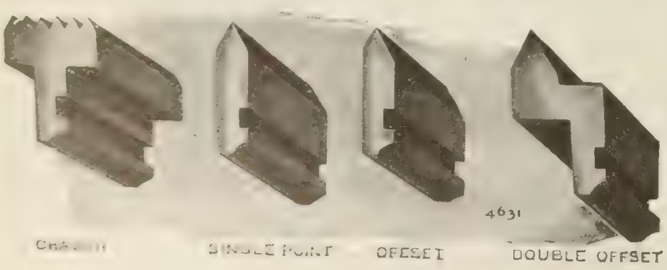
Same Holder for Chasers and Single Point Cutters

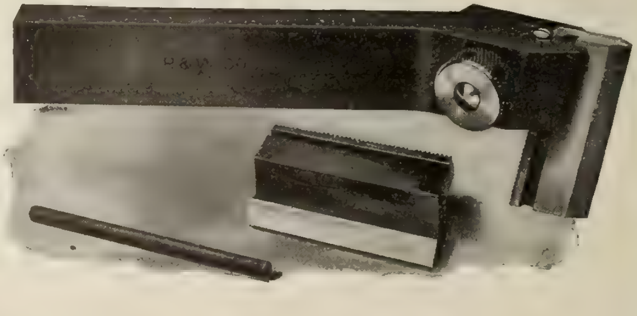
and the change can be made in a jiffy on the

P. & W. Threading Tool

A Few Of Its Advantages

1. Threads can be cut very close to a shoulder.
2. Tools are sharpened by simply grinding off top of cutter.
3. Combines economy with all features essential in a threading and forming tool.
4. Cutters have 15° clearance which experience has taught gives the longest wear in various metals.





Place a trial order with our nearest store.

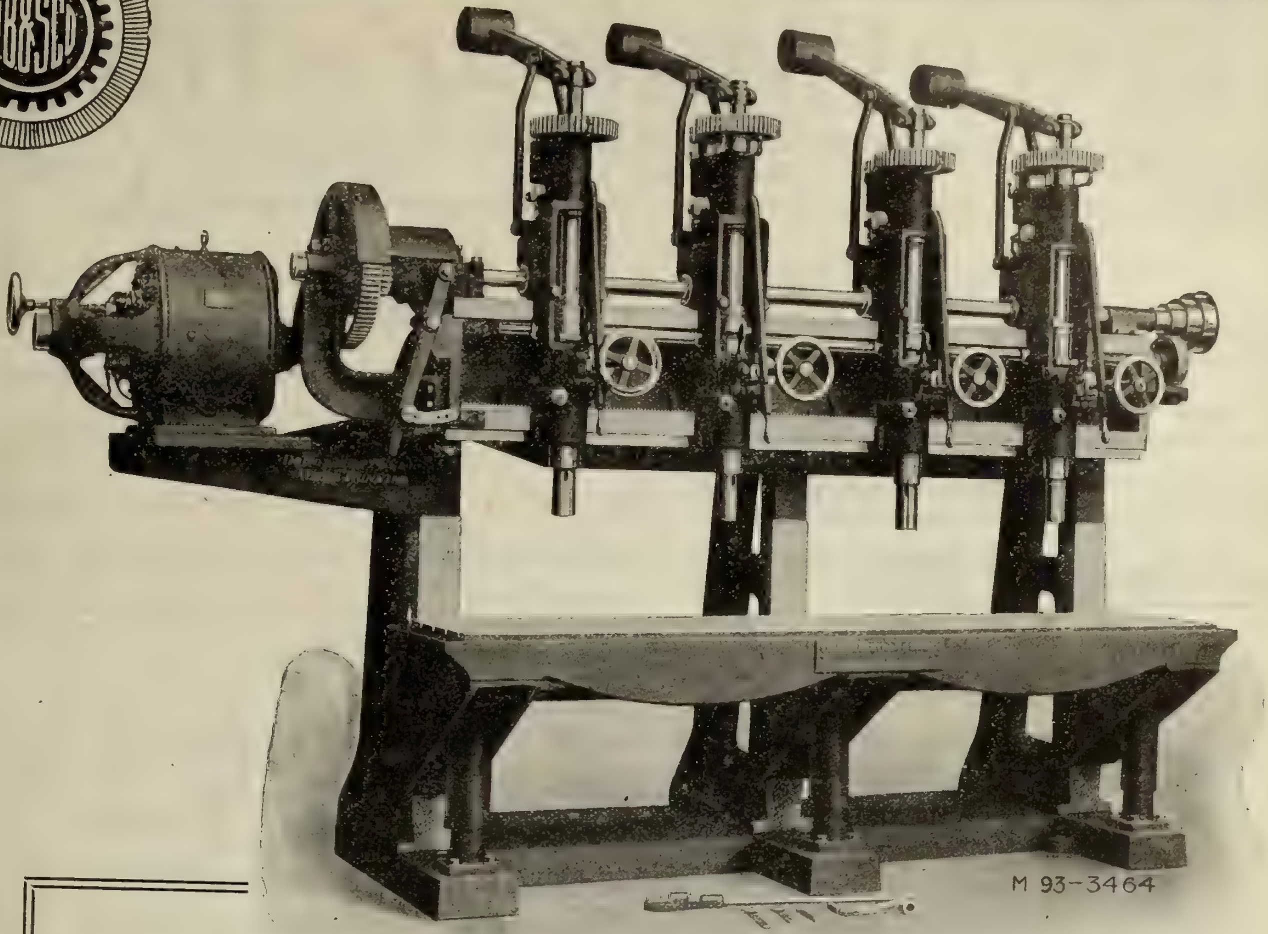
Pratt & Whitney Co. of Canada, Limited

DUNDAS
Ontario

MONTREAL
723 Drummond Bldg.

WINNIPEG
1205 McArthur Building

VANCOUVER
B.C. Equipment Co.



Multiple Drills

OF EVERY DESCRIPTION

Bertram Four-Spindle Multiple Drilling Machine for Locomotive and Other Work

SIMULTANEOUS OR INDEPENDENT FEEDS WITH INDEPENDENT KNOCK-OFF FOR EACH HEAD AND CLUTCH DRIVE FOR EACH SPINDLE.

CAPACITY, FOUR 2-inch HOLES IN STEEL.

Drop us a line for photographs and full particulars.

The John Bertram & Sons Company Limited

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO December 7, 1916

Advertisers are reminded that our Annual Review and Directory Number will be issued December 28th.

This will be the largest number of any journal ever published in Canada.

It will be the most complete reference work ever placed in the hands of Canadian manufacturers and their buyers.

Copies will be mailed to our regular export list in Great Britain, Russia, France, Australia, India, South Africa, Japan, Norway, Sweden, South America, etc.

Be sure that you have an advertisement in this big business-influencing number which will do your line justice and which will give intending buyers the information they want.

Last forms close—TIGHT—December 21st. It is imperative that space be reserved and copy sent immediately; otherwise there may be disappointments.

CANADIAN MACHINERY
and Manufacturing News
143-153 University Avenue, Toronto

Quality Service

Courtesy in Business

* * *

Fittingly framed and hanging in the Offices of one of the most important Public Service Corporations on this North American Continent is the following

'Did you say Please and Thank you?'

Broad minded men direct the destiny of that Corporation, men who know that public or private enterprises to be lastingly successful must operate for the public good.

Quality and Service are the two important factors in our business life today, but Courtesy is the door through which they must enter.

We are large producers of Hamilton Pig Iron and our output of Open Hearth Steel Blooms and Billets, Iron and Steel Bars of all shapes and size runs into enormous tonnage.

The products of our mills include practically everything that can be manufactured from Iron and Steel and these we distribute to thousands of satisfied customers.

Our business is an extensive one and a successful one. The World is our market: but our prosperity and success in the future, as in the past, depend upon the continued confidence, co-operation and good-will of the people we serve.

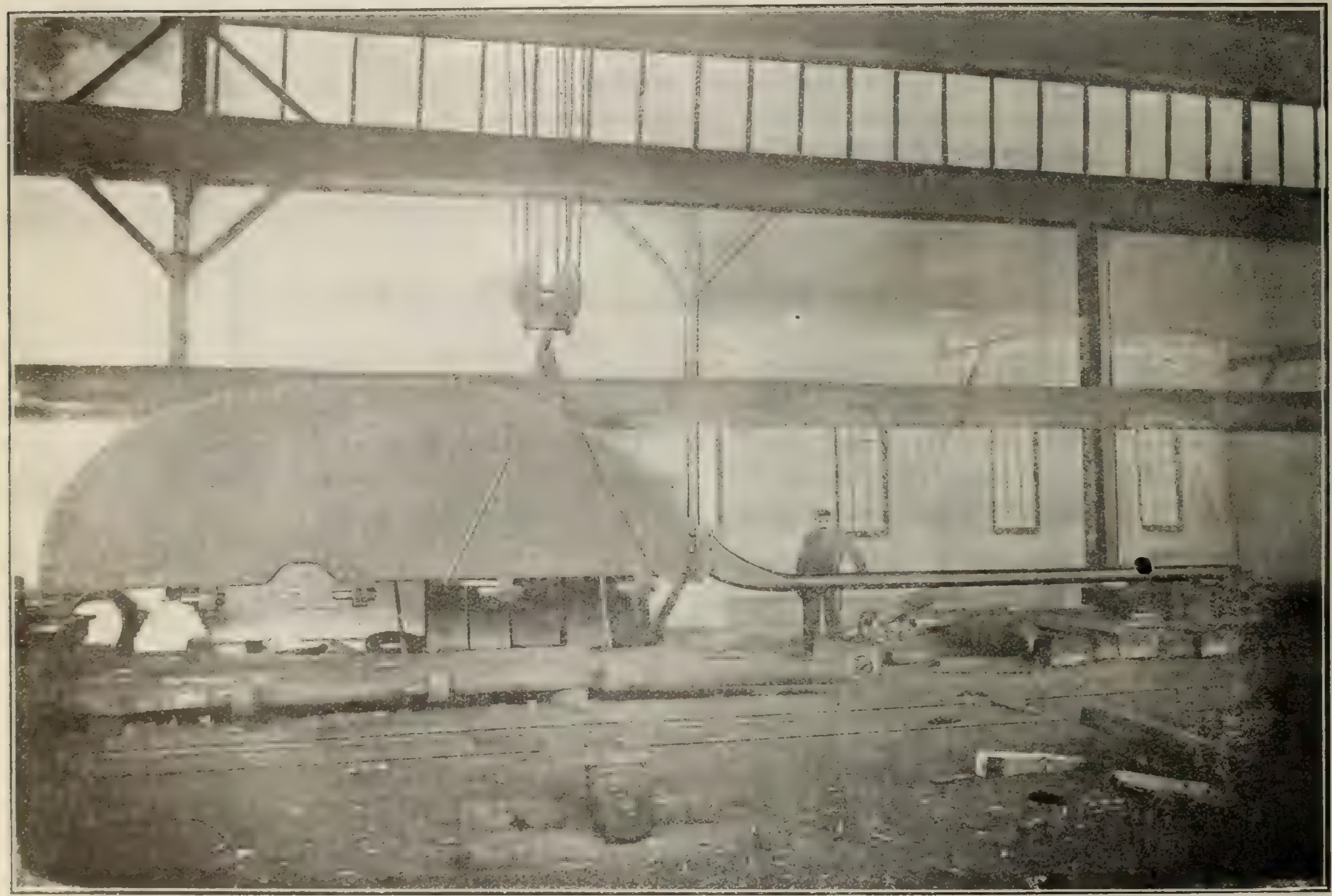
The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG

Nova Scotia Steel & Coal Company

Limited

New Glasgow, Nova Scotia, Canada



RUDDER FOR SS. "LUX." WEIGHT 9 TONS, LENGTH 42 FEET.

Ship Forgings of all Shapes, Sizes and Weights up to 75 Tons

We manufacture, of Fluid Compressed Steel, forgings entering into the construction and equipment of steel vessels up to and including the largest building or afloat, and embracing Rudder Frames—sectional or one piece, also Rudders complete; Stern Posts and Stern Brackets for Single, Twin and Triple Screw Ships, Rudder Heads, Boat Davits, Derricks, etc.

Has it ever occurred to you that the first cost of the very best High Speed Steel is infinitesimal compared with the value of the finished tool in constant daily service.

"Red Cut Superior"

A FIRST QUALITY
HIGH SPEED STEEL

THE BEST FOR ALL MACHINE WORK

VANADIUM ALLOYS STEEL CO

VANADIUM-ALLOYS STEEL COMPANY

General Sales Offices: Pittsburgh, Pa. U.S.A. Works at Latrobe, Pa

STELLITE

MADE IN CANADA
STELLITE

High Speed Tool Metal

Cutting tools that have that marvelous lasting power are made of Stellite. This material is not a steel, it contains no iron—it is Stellite. Heat has no effect on the cutting edge. Stellite tools cut just as well when red hot as when cool. Run steel tools that way, you know what happens. They burn up—lose their temper. Stellite has no temper.

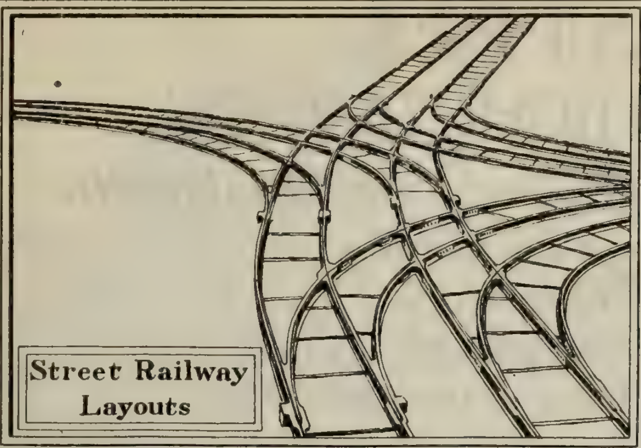
It is an alloy so hard and tough that it will perform every operation at a higher speed than is possible with the best high-speed steel tool.

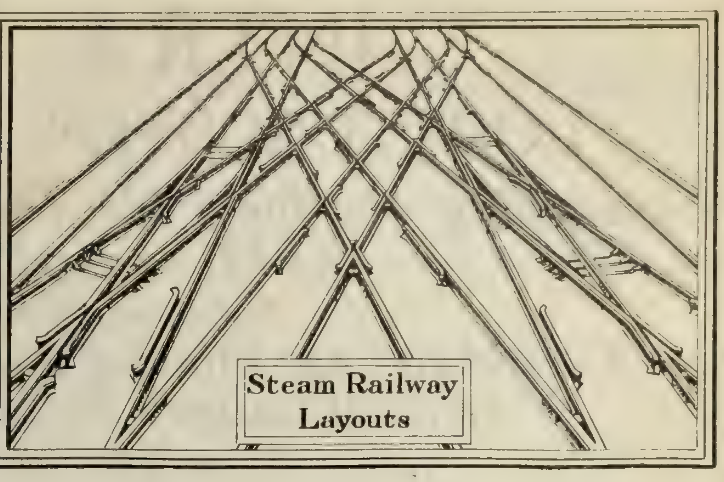
Try it out on your most difficult operation, only speed up the machine more. The result will convince you of its merit and you will agree, as a great many others have done, that it is better than the best steel and that it will pay you.

Made in Canada by
THE DELORO MINING AND REDUCTION CO., LIMITED
DELORO, ONTARIO

The Canadian B. K. Morton Co., Limited

SOLE SELLING AGENTS FOR CANADA AND NEWFOUNDLAND
49 Common St., MONTREAL, QUE. 86 Richmond St. East, TORONTO, ONT.


Street Railway Layouts


Steam Railway Layouts

Switches, Frogs and Every Description of Trackwork.

Solid Manganese Steel Construction. Cast Iron and Cast Steel bound Construction with Manganese Steel Inserts.

CANADIAN STEEL FOUNDRIES,

LIMITED

MONTREAL AND WELLAND.

EXTRA
Die Steel

is produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

You get extra service from "EXTRA" DIE STEEL. A trial is convincing.

H-A-DRURY COMPANY LIMITED

MONTREAL TORONTO NEW YORK

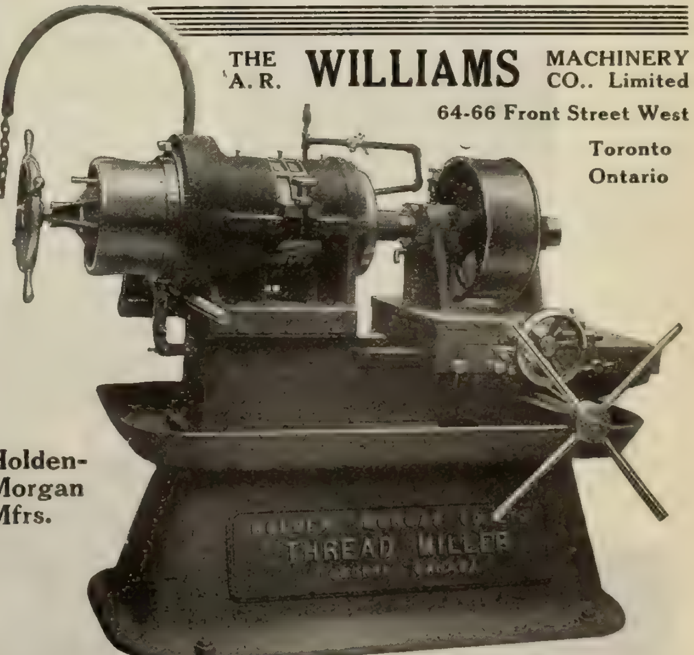
Manufactured by SANDERSON BROTHERS & NEWBOULD Limited
SHEFFIELD, ENGLAND

The Life of a Thread Miller

Depends not upon the amount of work it does, but the ease and thoroughness with which the work is done. These Thread Millers are noted for these qualities. Its quality of work is unrivalled. Our Service Department will give you all the particulars.

Write us!

THE A. R. WILLIAMS MACHINERY CO., Limited
64-66 Front Street West
Toronto
Ontario



Holden-Morgan Mfrs.

If any advertisement interests you, tear it out now and place with letters to be answered.

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO, LIMITED, SHEFFIELD, ENGLAND

Sole Agents for Canada:

H. BOKER & CO., Inc.

(Formerly Hermann Boker & Co.)

332 St. James Street, Montreal, P.Q.

Established 1837 Incorporated 1914

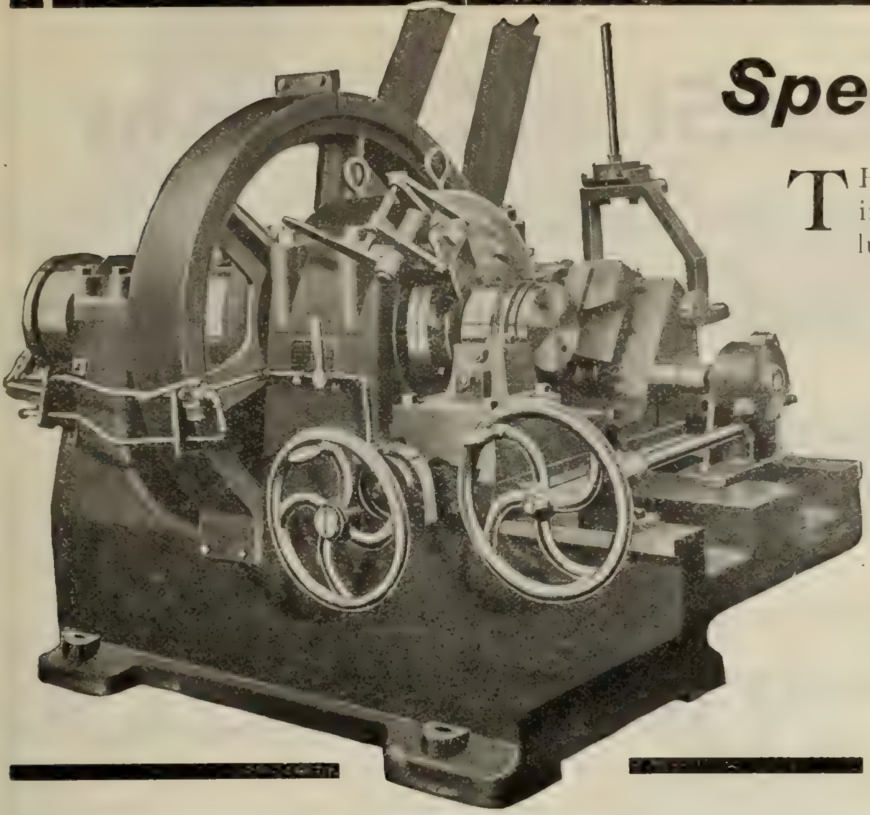
Special Vanadium Steel
Piercing Die Forgings
For Hot or Cold Work

Made from High-Grade Special Vanadium Tool Steel and hammer-forged in any size.

These forgings cut down your machining costs 100% and give you a tougher, more durable Die than you have ever had. Punches made to match the dies. Send us your Blue Prints.

Hammond Steel & Forging
Co., Inc.
SYRACUSE, N.Y, U.S.A.

Fine Tool Steels, Specialists in Manufacture of High Grade Hammered Forgings, Hammered Alloy Steels, Weldless Rings—Special Shapes, Die Blocks



Speed—Accuracy

THE two most important factors in shell-making. The former is desirable, the latter absolutely necessary. Both are assured by the use of *Jenckes Single Purpose Lathes for Shell Work.*

Illustration shows the latest addition to this famous line—a Banding Lathe for 8″ shells. Note the liberal proportions, the general appearance of sturdiness. They mean an extra measure of long and efficient service.

These machines are also manufactured for 18 pdr., 4.5″, 5″, 6″, 8″, 9.2″, 12″ and 14″ shells; are tooled when required for the mm. sizes corresponding to Russian and French ammunition.

THE JENCKES MACHINE COMPANY, LIMITED

WORKS: Sherbrooke, Que.
St. Catharines, Ont.

SALES OFFICES:

727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

PIG IRON

M·A HANNA &Co.

"Victoria" Foundry and Malleable, made by The Canadian Furnace Co., Port Colborne, Ont., Canada

M.A. HANNA & Co. Sales Agents: CLEVELAND, O., U.S.A.

Sisco Extra Special High Speed Tool Steels

Made in Sweden from best Swedish Charcoal Iron.

LARGE STOCK ON HAND.

Swedish Steel and Importing Co., Limited, Montreal

If any advertisement interests you, tear it out now and place with letters to be answered.

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

High Speed Steel, Atlas LXX	Carbon Tool Steel
High Speed Steel, Atlas LX	"Deward" Oil Tempering, Non-Skrinking
Chrome Vanadium Steel	

"When ordering steel, it is important to state purpose for which steel is to be used.'

"Quality is remembered long after the price is forgotten."

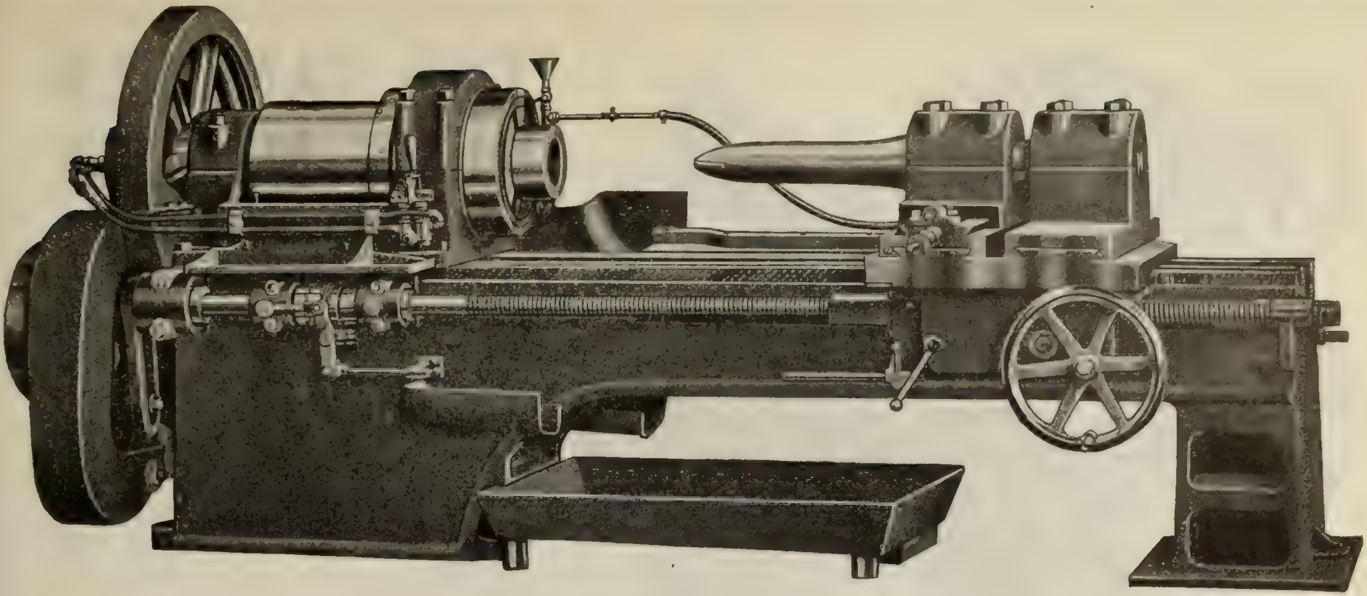
"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES

WORTH OF CANADA, LIMITED
"T.Y.R."
Highspeed Steel
(Made in Canada)
DOMINION BANK BLD'G. TORONTO
LONGUEUIL, Que.

Immediate shipment of all standard sizes and [illegible] shell-turning sizes can be made from stock.

MADE IN CANADA



It Tells a Story

Of Boring 8" and 9.2" Shells

What does that headstock tell you?—strength that is exceptionally well adapted to 9.2" boring. That gearing?—strength and speed. The carriage?—a close study will reveal some "better than word" facts. The bed?—tells you of a solid foundation. The Lathe?—a story of a machine that is built in exact proportion, whose quality is unsurpassed, whose strength, speed and efficiency are stamped in every section.

If you are at all interested in this kind of a machine, we would be pleased to have you write or wire us for further details, estimates and deliveries.

We have brought out a line of Special Single Purpose Lathes for the manufacture of High-Explosive Shells, specializing on:

- **Cutting-Off Lathes**
- **Outside Roughing Lathes**
- **Outside Finishing Lathes**
- **Band Seat Turning, Waving and Undercutting Lathes.**
- **Copper Band Turning Lathes**
- **Facing Lathes**
- **Turret Lathes**
- **Thread Millers**
- **Power Adapter Plug Driver**

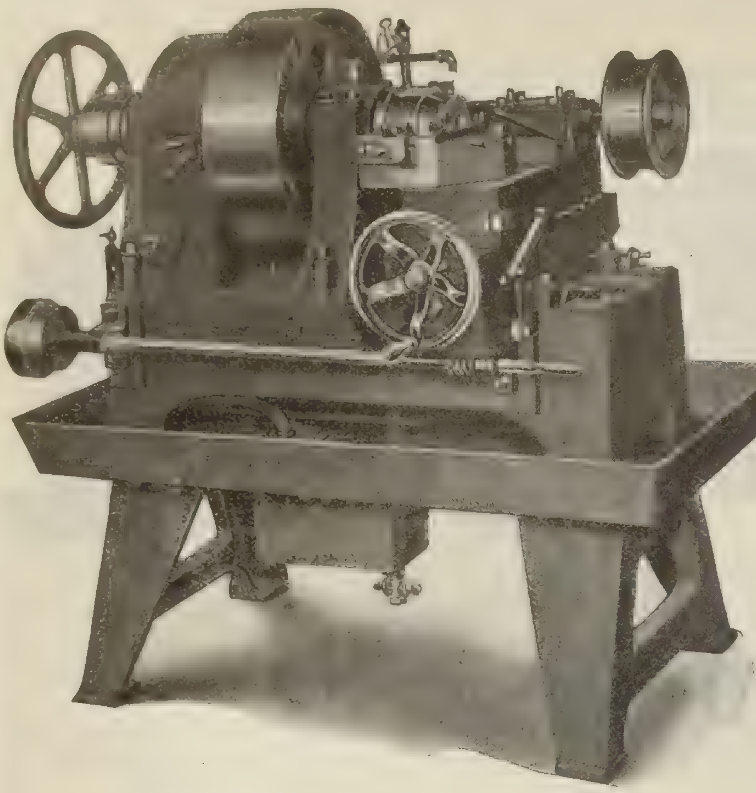
They are all of exceptionally heavy construction and simple design, to meet the severe service and special requirements of the Munition manufacturers.

These machines are making records equalled by few, and are already favorably known.

Equipped with cam for Roughing, Profiling and Finishing 8 inch and 9.2 inch Shells.

The Root & VanDervoort Engineering Company

EAST MOLINE - ILLINOIS, U.S.A.



For Turning, Facing and Milling the thread on Gas Check Plugs for 6-inch High Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling. driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells. Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

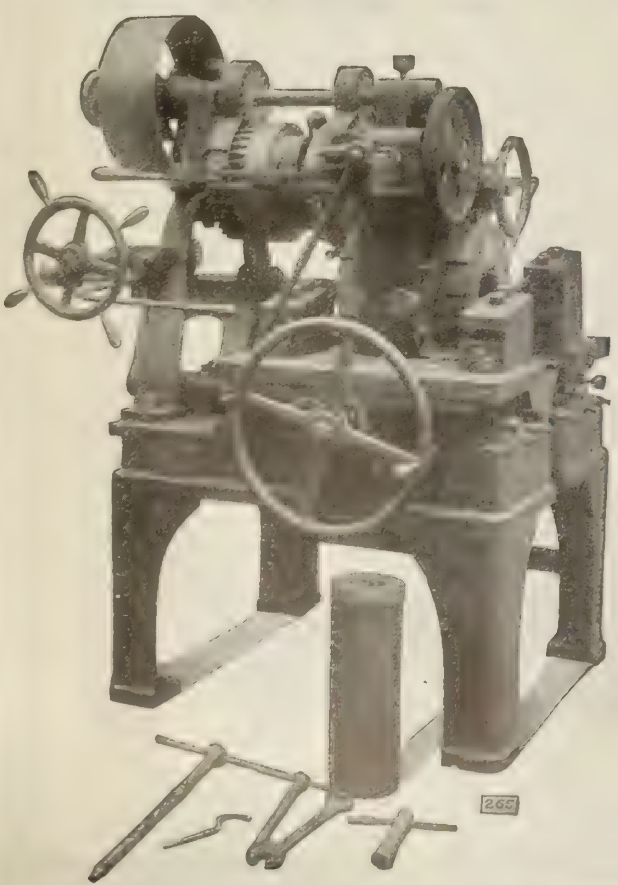
These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield
STAIR BUILDING, TORONTO, ONT.



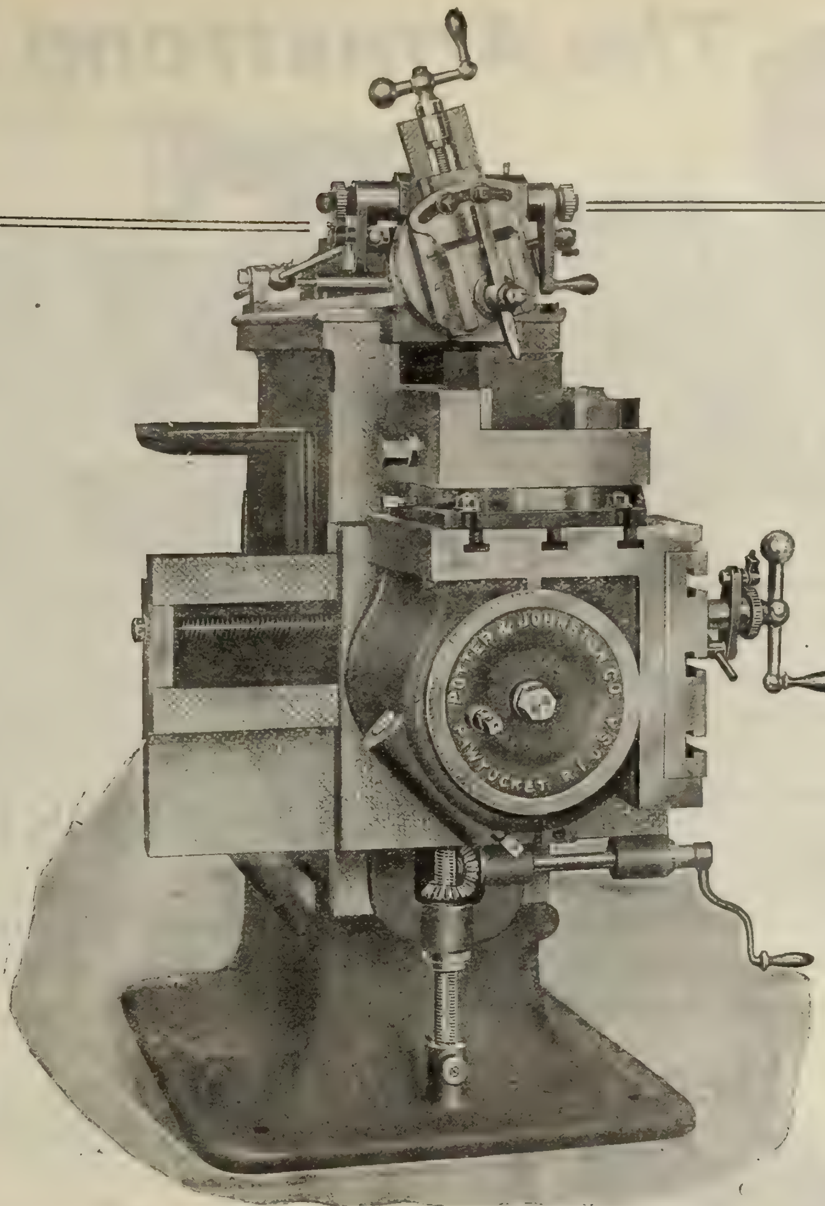
CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

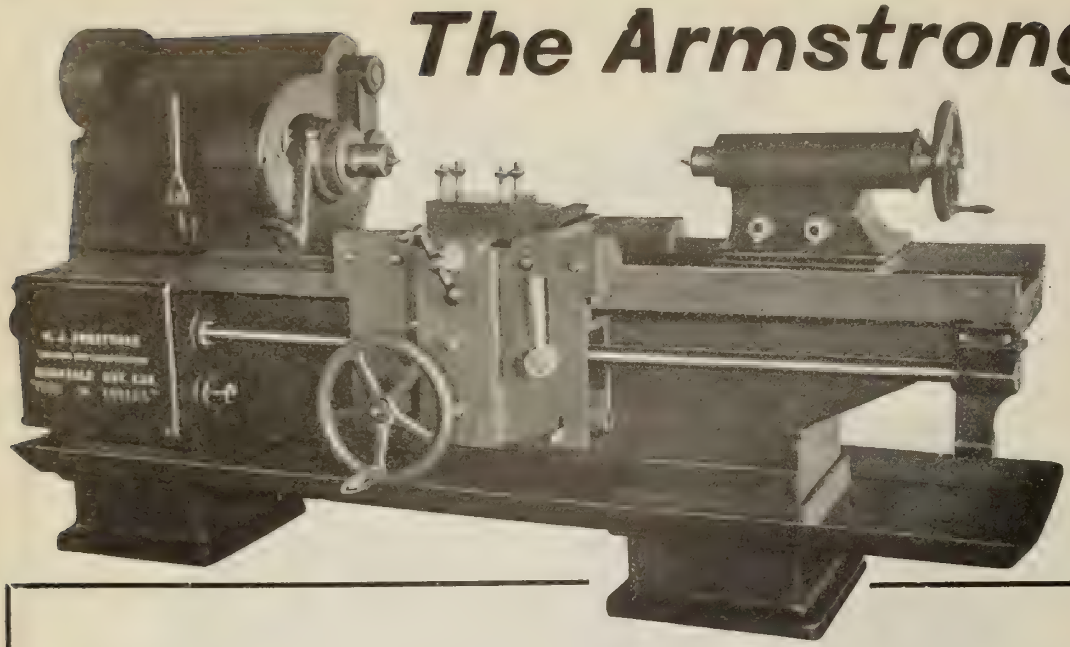
WRITE FOR PRICES AND DELIVERIES

Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

The Armstrong Lathe



An exceptionally strong, heavy machine tool adaptable to YOUR requirements

When completely equipped is a general purpose lathe, but fitted out for munition work as necessitated. Built in two sizes.

20-in. swing x 8 ft. bed for 6-in. shells, weight approximately 6,000 lbs.

32-in. swing x 12 ft. bed for all large calibre shells, weight approximately 16,000 lbs.

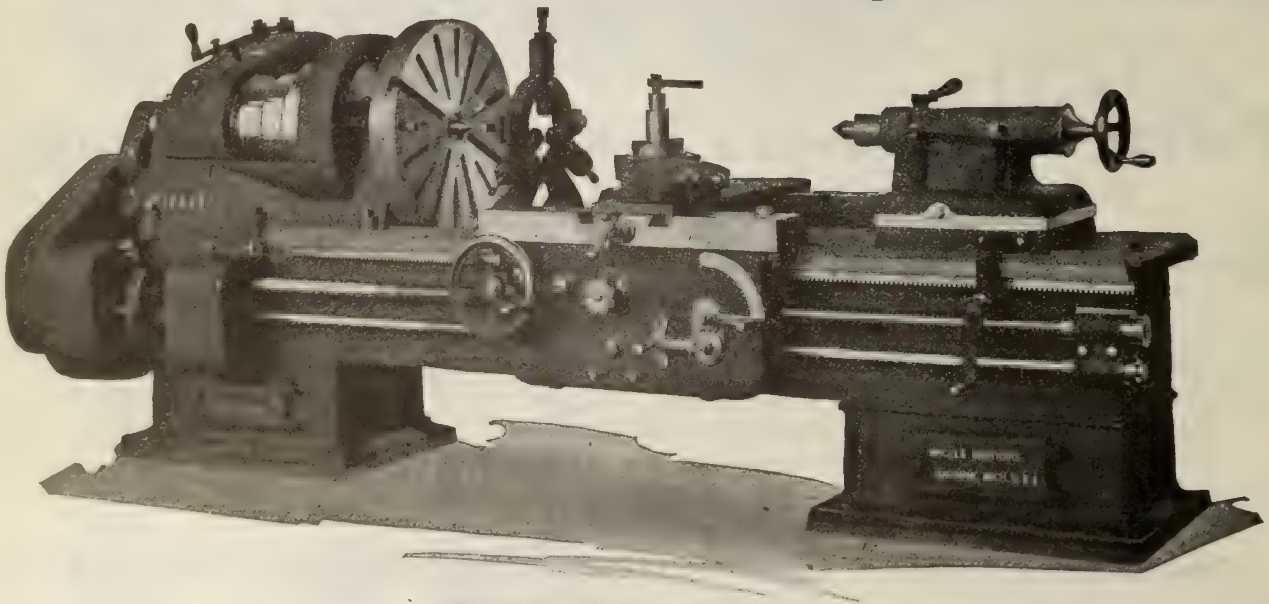
Send for complete specifications.

We also manufacture a complete line of cranes in all sizes and capacities.

H. J. ARMSTRONG

Engineer and Manufacturer
MARKDALE, ONT.

Wickes Heavy Duty Engine Lathe



The Wickes 26" Heavy Duty Lathe.

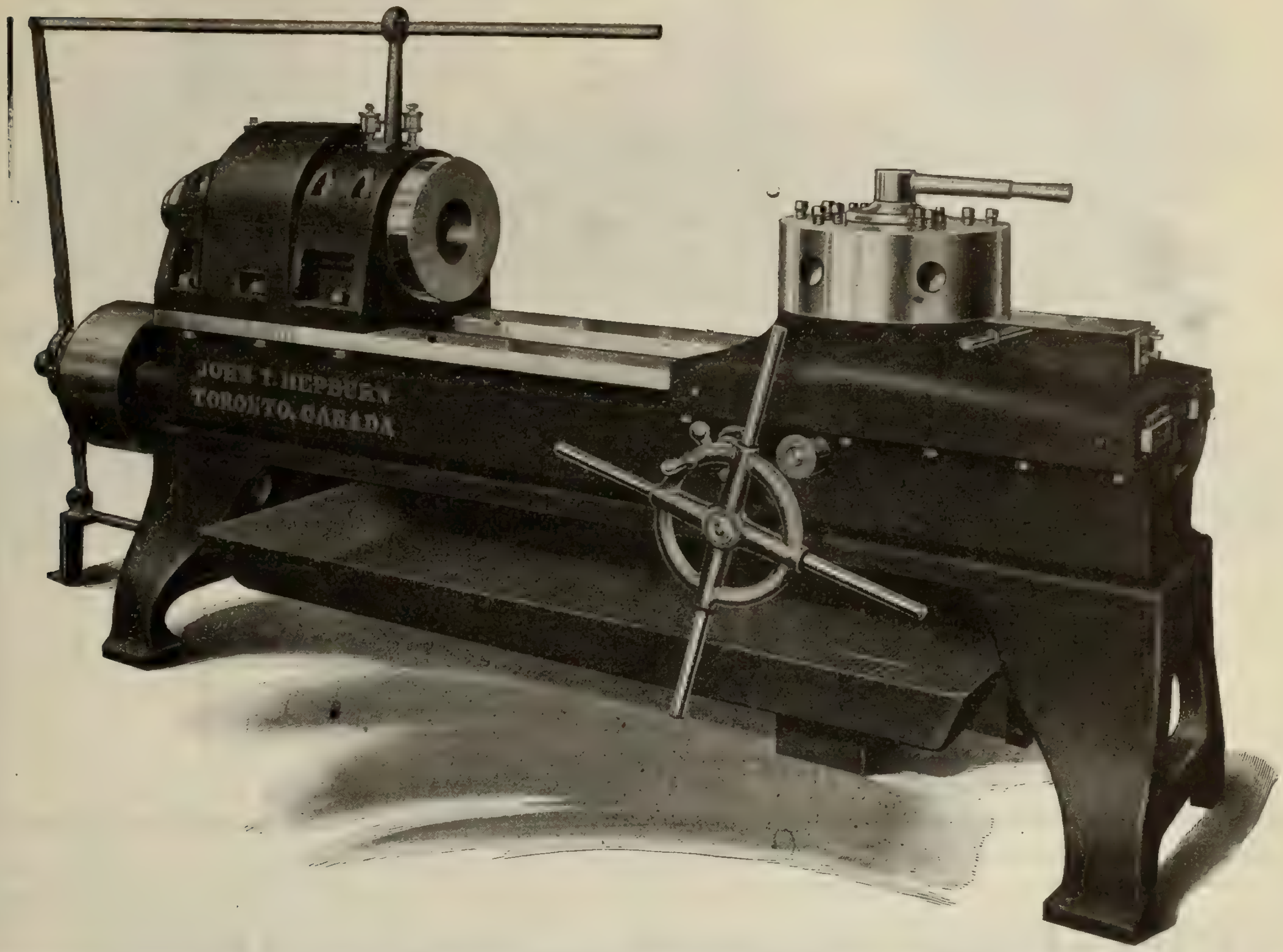
Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.

This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.

Let us tell you about this lathe and our 20", 32", also our 17" Rapid Production Lathe for Automobile and other work.

We can make prompt shipment.

WICKES BROTHERS **Saginaw, Michigan**



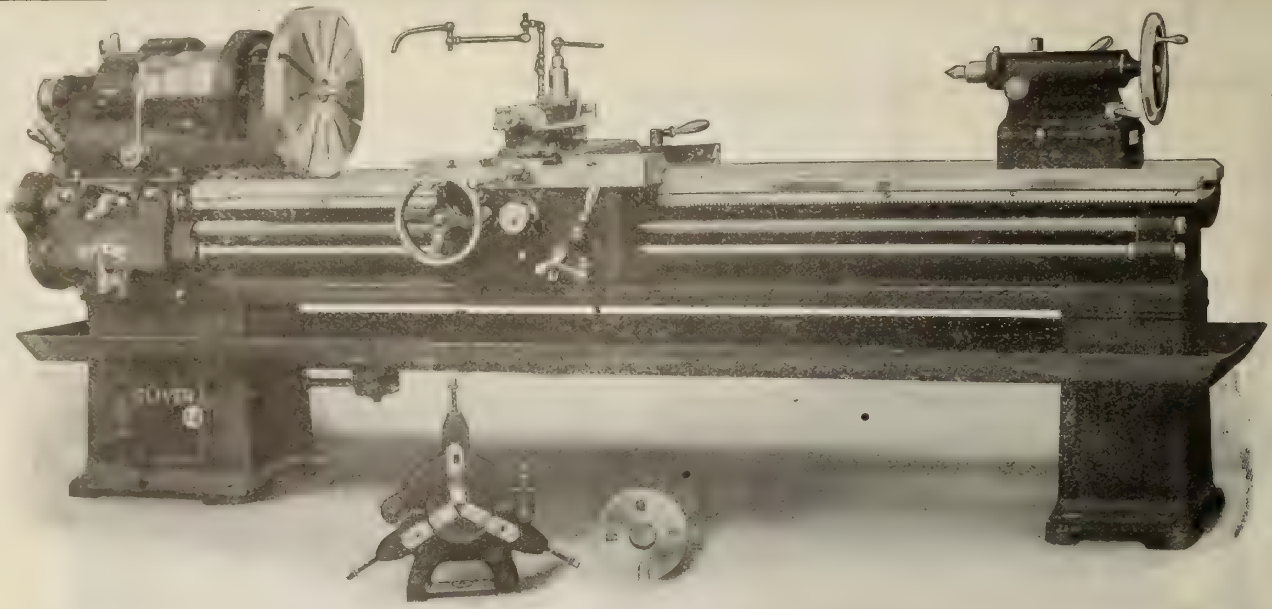
Judged by Its Quality and Found Wanting Another Lathe

That is a frequent occurence and not only quality and speed of production, but quality of construction. The large illustration shown here will reveal to you its simplicity, strength and will give you an idea of its quality. What the illustration does not show you is the strength of the vital parts, the bearings, spindles, gearing, etc. They are of such quality that they go to make this machine a speedy, accurate and simple unit.

Our address is below—what is yours?

John T. Hepburn, Limited

18 to 60 Van Horne Street - - Toronto, Canada



"Oliver" 18-inch Heavy-Duty Engine Lathe, 10-foot bed.

ENGINE LATHES
TURRET LATHES
SCREW MACHINES

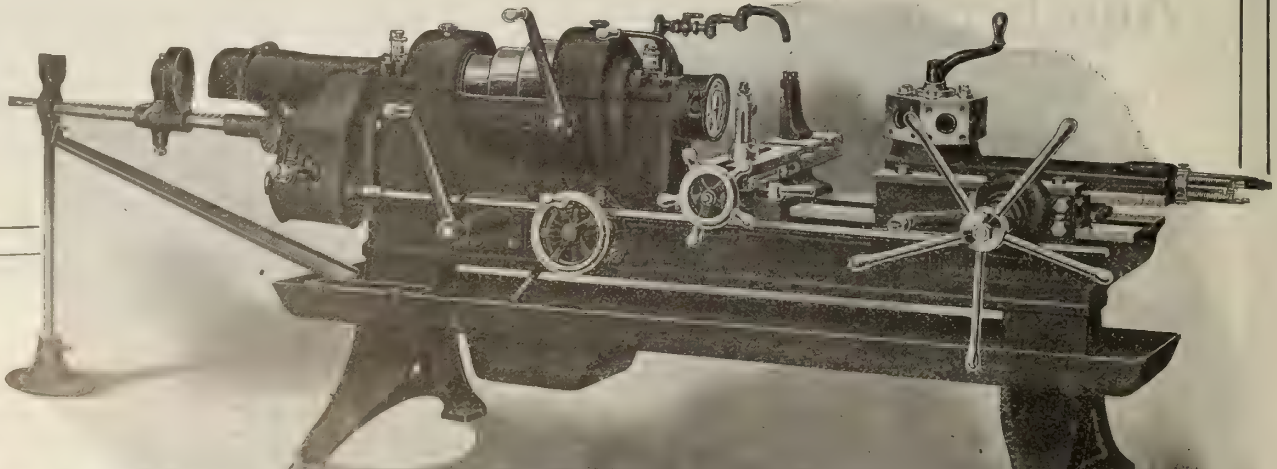
DOMINION MACHINERY CO., TORONTO
Agents for Ontario

OLIVER MACHINERY CO.
GRAND RAPIDS, MICH.

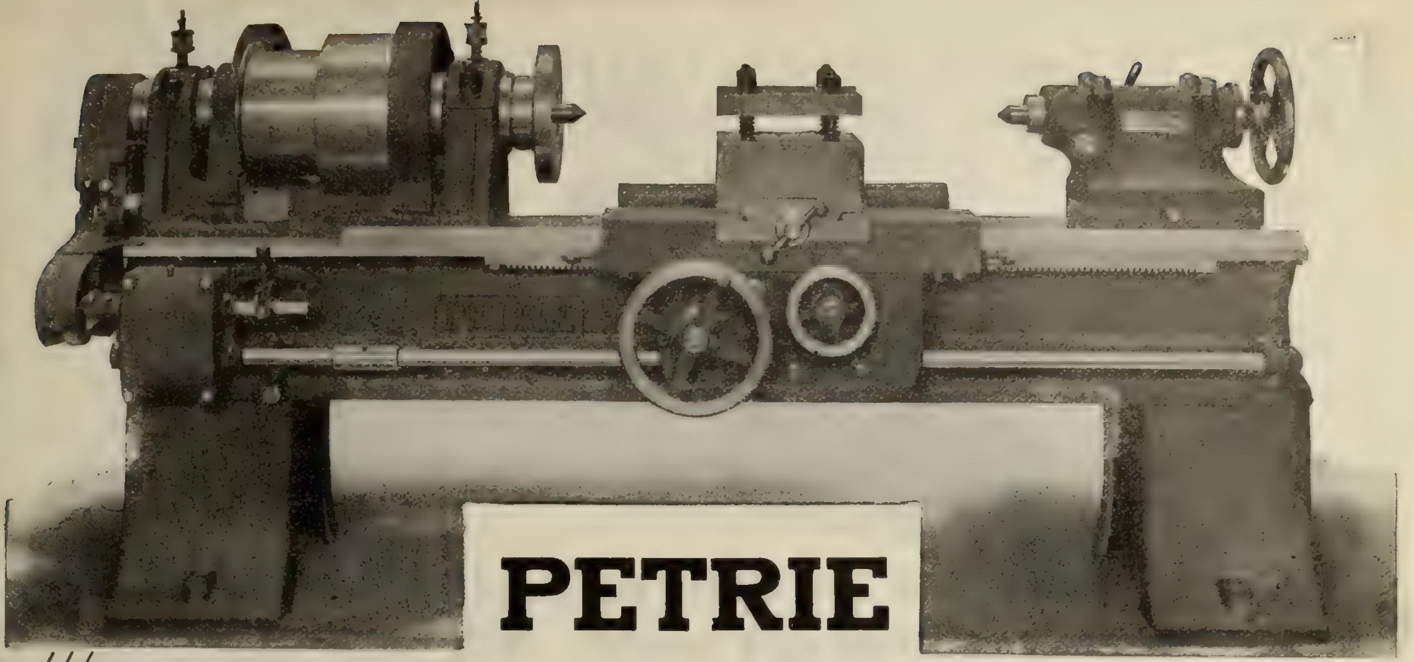
Millholland 1⅝x10 Turret Screw Machine

The combined result of two generations of engineering and mechanical experience. While, as a whole, it is no radical departure from established lines of the turret lathe, it has many original features, and with these features are combined well-known devices.

Safety, rigidity, convenience, production and durability are the ideas behind every step in their construction. Your request will get you full details and specifications by early mail. Make it.



W. K.
Millholland
Machine Company
INDIANAPOLIS, IND., U.S.A.



PETRIE

20-inch Heavy Duty Manufacturing Lathe

DESIGNED AND BUILT ESPECIALLY FOR MACHINING HIGH EXPLOSIVE AND SHRAPNEL SHELLS UP TO AND INCLUDING 8-INCH. USED AND ENDORSED BY SOME OF THE LARGEST AND MOST SUCCESSFUL SHELL MANUFACTURERS.

DESCRIPTION

HEADSTOCK—All Headstock journals are provided with well lubricated, renewable bronze bearings.

Alternate heat treated steel and bronze washers take the end thrust and a simple adjustment is provided to take up wear.

All gears are covered with neat and substantial cast iron guards that may be quickly removed when desired.

BED—The Bed is of deep construction and width to give the greatest rigidity under heavy cuts.

The shears are made extremely massive and the bed walls extra thick, providing the necessary mass of metal to absorb the vibration and shocks incident to heavy turning at high speeds.

Heavy box girths tie the front and rear walls of the bed together at close intervals.

Improved type wide angle V on front shear to take thrust of cutting tool.

The rear bearing of carriage on bed is flat instead of V-shaped.

At the rear of the bed planed pads are provided for attaching Taper and Forming Attachments.

CARRIAGE—The bridge is very wide and extraordinarily deep; it will not spring under the heaviest cuts.

The carriage is gibbed to the bed at the rear on the outside and will not lift under any conditions.

APRON—The apron is of heavy double plate type affording a support or bearing to both ends of all shafts.

Apron is tongued and grooved to the carriage, also bolted and dowelled.

The feed friction has a greatly increased diameter and will pull the heaviest feeds and cuts without slipping.

For engaging the friction a hand wheel several inches in diameter is provided and seats the friction firmly with very small effort on the part of the operator.

All studs in apron revolve and simple but adequate oiling facilities are provided.

FEEDS—Positive Gear drive through headstock spindle steel gears in gear box, three rates of feed are provided for through sliding key type. Feeds per revolution of spindle being ⅛ in., 1-16 in. and 1-32 in.

All gears in the feed train are fully guarded.

TAILSTOCK—The tailstock is a massive casting, rigidly braced internally, and is provided with a long nose, making it unnecessary to extend the tailstock spindle for ordinary work.

It is clamped to the bed by four large locking bolts operated at the top of the barrel.

A simple binder locks the tailstock spindle in correct alignment, this clamp is located at the extreme front end where it grips the spindle with the utmost rigidity and absolutely does away with distortion of any kind.

The screw is unusually large to resist any buckling tendency.

Suitable screws are provided for setting over for Taper Work.

EQUIPMENT—Unless otherwise specified Lathes are furnished with 8 ft. bed, one driving plate, hand cross feed, heavy duty plain rest, necessary wrenches, and two speed tight and loose countershaft.

Forming attachment, turret tool post, hand or power feed bed turret, oil pan, pump, and connections can be furnished as extras when desired.

DIMENSIONS

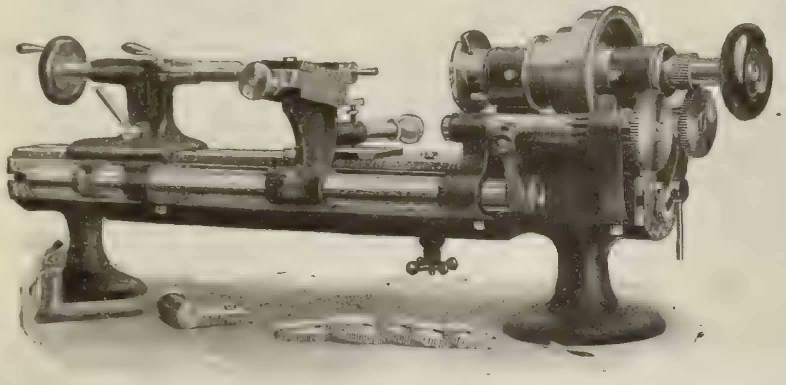
Swing over bed	20 in.	Width of Tool Slide	12 in.
Swing over carriage	11 in.	Diameter of Headstock Cones	11 in. and 14 in.
Length of Bed Standard	8 ft.	Belt Width	6 in.
Distance between centres 8 ft. bed	40 in.	Number of Feed Changes	3
Width of bed overall	19½ in.	Feeds per Revolutions of spindle	⅛ in., 1-16 in., 1-32 in.
Height from floor to centres	40 in.	Speed of Countershaft	110 R.P.M.
Dimensions of front spindle bearing	4 15-16 in. x 6¾ in.	Size of Tight and Loose Pulleys	16 in. x 6¼ in.
Dimensions of rear spindle bearing	4 in. x 5½ in.	Ratio of Back Gearing	6.7 to 1
Diameter Nose of spindle	4 in.	Face of Back Gears	2¾ in. and 2¼ in
Hole through spindle	1 5-16 in.	Length of Carriage Bearing	30 in.
Diameter Tailstock spindle	2⅜ in.	Width of Carriage Bridge	12 in.
Travel of Tailstock spindle	6 in.	Number of Spindle Speeds with Two-Speed Countershaft	8
Morse Taper—Centres	No. 5	Weight—Approximately, 8 ft. Bed	5,200 lbs.

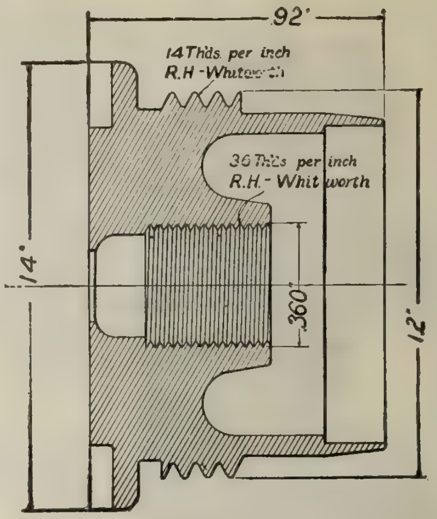
A HEAVY SIMPLIFIED LATHE FOR RAPID PRODUCTION WORK

WRITE FOR FULL PARTICULARS.

H. W. Petrie of Montreal, Limited, Montreal, Que.

THE CATARACT BENCH LATHE WITH CHASING ATTACHMENTS




.92'
14 Thds per inch R.H-Whitworth
36 Thds per inch R.H.- Whitworth
.14'
.360'
.12'

We have sold many of our lathes to Canadian concerns who are eminently satisfied with results. Will you be next?

For work requiring greatest accuracy and rapidity, THE HARDINGE CATARACT BENCH LATHE will not disappoint you. Machine equipped with Automatic Chuck Closer for rapid operation of chuck, and with chasing bar arranged with multiple point, chasing tool is producing from ten to twelve hundred 14-pitch Whitworth threads on primers in TEN HOURS. Prompt deliveries. Catalogue No. 15 is ready to mail TO YOU. You are invited to write for it to-day.

HARDINGE BROTHERS, Inc., 1770 Bertau Ave., CHICAGO, U.S.A.

More Production — Greater Accuracy — Less Globe Breakage — Happier Men

That sums up the argument on this lamp bracket. Three frictional universal joints that can't wear out and are adjustable for any desired tension give the reason.

Just a slight push or pull puts the light where you want it, when you want it.

Any workman will do more and better work if his light is always in just the right place and under instant control.

The Searchlight Bracket

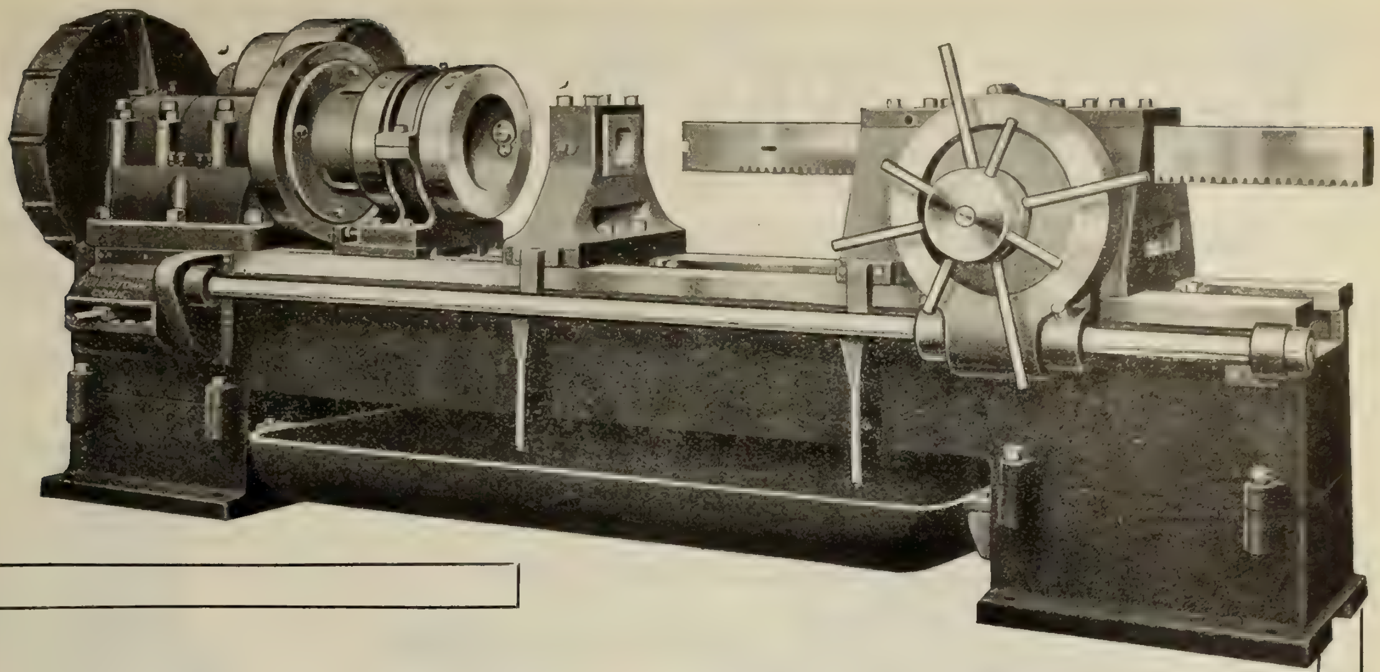
will pay for itself many times over in one season. The period of short days is approaching. Many shops are working night and day the whole year through. The cost is trifling compared with results. Only $1.50 each, with big discount, according to quantity.

Write now for samples and let us show you how your whole factory could be equipped at a big saving to you. Any quantity sent on 30 days' trial to any responsible concern. You can't possibly lose, and **You Might Win!**

The McCrosky Reamer Company

Meadville, Pa., U.S.A.

Export Agent:
Benjamin Whittaker, 21 State St., New York



Look That Illustration Over

Its very massiveness alone would make it a tower of strength. But massiveness does not necessarily mean strength. Scientific construction, expert knowledge of the requirements of a lathe of this character, highest grade materials and "Connecticut" features all combined with massiveness, have made this lathe one of rare quality and strength.

Note the headstock, centre rest, tailstock. For a 9.2″ turning or boring operation the strength is easily seen here. The enclosed gearing, the heavy bed, the oil pan, and the legs are further features worthy of your notice.

The illustration is a High Duty Lathe with pot chuck and boring tailstock. The same headstock is also used for turning operations, with carriage in place of steady rest, and screw tailstock in place of rack feed.

The "Connecticut" method of boring large shells gives the most rapid production per unit. Other methods may cost less to install but they cannot give you the results "Connecticut" gives. Remember that when inquiring.

Diam. of spindle 6″.	2 speed countershaft.
2 step cone.	5½ inch Square Boring Rack.

W. & B. DOUGLAS, Inc., Manufacturers

Agents:
Canadian Fairbanks-Morse
Co., Limited - Toronto

MIDDLETOWN
Connecticut - - U.S.A.

Agents:
Williams & Wilson
Limited, Montreal

Reasons Why We Are Busy

(AN EXTRACT FROM A PROMINENT DEALER'S LETTER)

We are desirous of having the exclusive sales agency for your "CISCO" Lathes in our vicinity and the two principal reasons we can offer for desiring this are as follows:

That we consider the "CISCO" Lathe has very few, if any, equals on the market at the present time, and

Because of the success of the little sales campaign we have instituted within the last few months in connection with your lathes, resulting in our securing several orders.

And he's not only a successful, but a wise dealer.

CISCO Lathes are Good

That's the only way we make them.
Ask Williams.
New 24-inch ready early in 1917.

The Cincinnati Iron and Steel Company

Makers of 14", 16", 18", 24" Engine Lathes **CINCINNATI, U.S.A.**

PRESSES

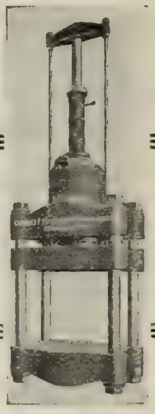
Made in Canada

Hydraulic Presses, Pumps and Accumulators for all purposes.

WRITE FOR PRICES AND DELIVERIES

WILLIAM R. PERRIN, Limited
TORONTO, CANADA

Elmes Press



For Hydraulic Forging

A press of the inverted type, hydraulic pull-back cylinder which can be made to operate either with constant pressure from the accumulator, or the valve can be made to release it before putting pressure on the main cylinder. This causes the ram to drop by gravity to the work, thus effecting a saving in power.

The press is of steel and semi-steel construction, and is the ideal press for forging operations.

Charles F. Elmes Engineering Works
217 N. Morgan Street - - Chicago, Ill.

MG

HYDRAULIC MACHINERY

Selected for Their Reliability

Four Way Balanced Poppet Operating Valve

Whenever the question of reliability is considered, **"Mount Gilead" Hydraulic Pumps, Valves and Fittings** are selected. Everywhere by their reliability they are adding strength to hydraulic press installations, increasing their output by delivering and controlling the pressure in proper proportions. If you want good everyday service from your hydraulic equipment—delay no longer, but ask us for details upon our pump equipment for your requirements. Write today.

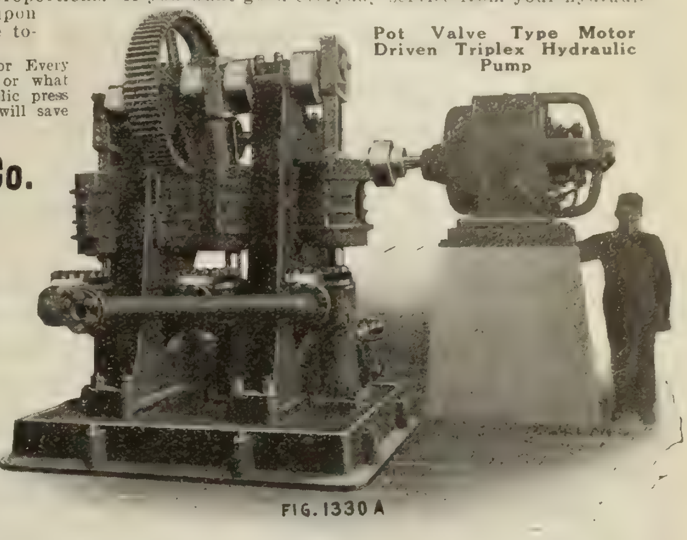
We are also designers and builders of Hydraulic Presses for Every High Pressure Purpose. No matter where you are located or what "Your Pressing Needs" may be, we have a design of hydraulic press which will do your work in the best possible way—one that will save time, labor and repair bills. Write us.

The Hydraulic Press Mfg. Co.

89 Lincoln Ave., Mount Gilead, O., U.S.A.

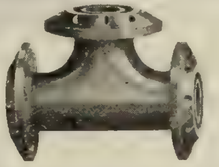
Canadian Agents:

Eastern Office: Room 1105-R, 39-41 Cortlandt St., New York City. Canadian Agents: A. R. Williams Machinery Co., Ltd., Toronto, Ont. and St. Johns, N.B.; Canadian Fairbanks-Morse Co., Toronto and Montreal; McLean & Barker, Southam Bldg., Montreal; Canadian Equipment & Supply Co., Edmonton, Alberta.



Pot Valve Type Motor Driven Triplex Hydraulic Pump

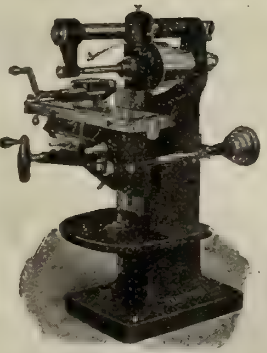
FIG. 1330 A



Hydraulic Long Radius Tee with Flanged Connections

"FOR YOUR PRESSING NEEDS"

MG



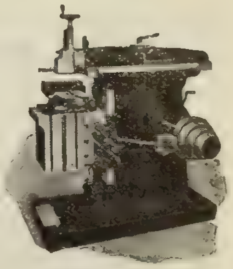
Cut Your Shop Costs

Nobody would think of putting 16-inch lathe work on a 30-inch lathe, then why leave small parts on a large Milling Machine?

A Steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

That same principle applied to your small planer work will cut the cost of planer work.

A Steptoe Shaper will do the work faster because it can be handled quicker.



The John Steptoe Company,

CUMMINSVILLE
CINCINNATI, OHIO, U.S.A.

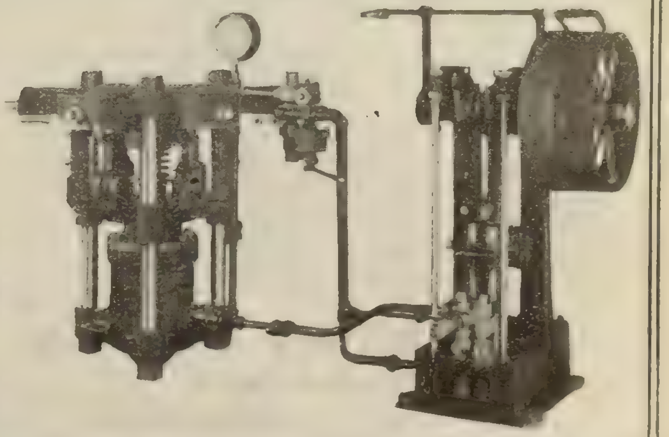
A very rapid worker—

In fact the operation of this press is so rapid that it is impossible for human operators to handle the work to and from as quickly as it completes its operations. It is impossible to utilize its full capacity.

"Metalwood" Horizontal Banding Press for Shells from 3 to 5 in.

Press is combination of Hydraulic and toggle with means of adjustment both for amount of pressure applied and stroke. Has six concentric dies coming to a common centre forming a complete circle when closed to required diameter of hand.

All working parts are fully enclosed, at the same time easily accessible for changing of dies. Toggles are arranged with adjustment so that pressure delivered on dies can be varied to suit the pressure or pressures applied on hydraulic cylinder. 2,500 lb. approximate pressure required, developing 120 tons on 9" ram.



Metalwood Manufacturing Co.

Leib and Wight Sts., DETROIT, MICH.

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO. LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

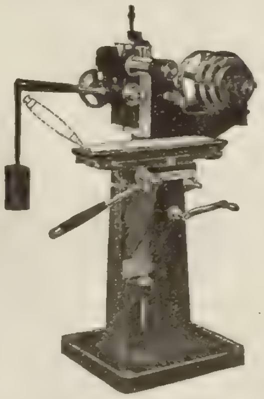
WE HAVE AT TORONTO FOR IMMEDIATE DELIVERY:

New **Davis 6" Cutting-off Machines,** fully equipped, size of hole in spindle 6⅞".
New **Giddings & Lewis** 18" x 8' Heavy Duty Engine Lathes, 3-step Cone, Double Back Gears, regular equipment.
New Heavy Duty Lathes for turning 8" and 9.2" Shells.
Thor pneumatic hammers and drills.
Appleton Grinder—Challenge No. 1—slightly used.

Special 16,000 lb. 40" Boring Lathes for 6" Projectiles.
Immediate Delivery—Special Price—Write for Cuts, etc.
Good Delivery now on Lodge & Shipley 24" Lathes.
Ask for information about machines for any operation on 3", 4.5", 5", 6", 8" or 9.2" Projectiles.—Our Experience is at Your Service.

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y.
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds



Here's What You Need in Your Shop

because it's an all around machine that can be used to great advantage in place of larger tools costing twice the money.

With it you can cut gears, cams, sprockets, do key seating, profiling, die sinking, drilling, straddle milling and countless other operations.

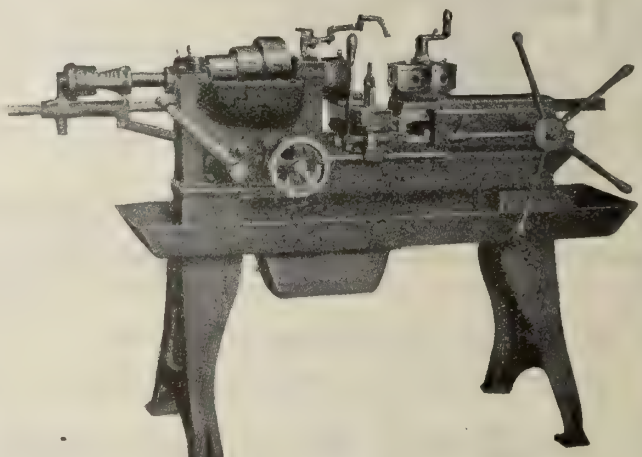
The machine has ample power for hard work and is built to stand it too. While a big machine is getting ready the "Whitney" has done the job.

Simply send for Catalog A.

The Whitney Mfg. Co.
Hartford, Conn.

Chains — Keys — Hand Milling Machines

The "STENO"
1 in. x 7 in. TURRET HAND SCREW MACHINE

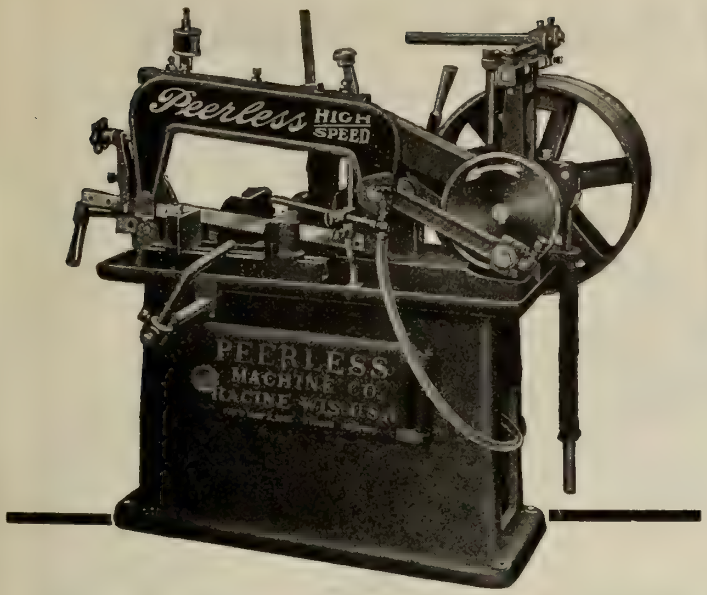


We have excellent facilities for Designing and Making the tools for your special job.

Ask for estimates.

The Stenotype Company Indianapolis, Indiana, U.S.A.

Manufacturers of the "STENO" Duplex Surface Grinder
The "STENO" 1 in. x 7 in. Turret Hand Screw Machine and
"STENO" Milling Cutters Reamers, Fixtures, Jigs and Gauges.



"100% Better, Faster and More Reliable

than any Sawing Machine we have ever used; we have had almost all makes of Sawing Machines manufactured."

Just what a customer in Toledo, Ohio, reports after a thirty days' trial.

You don't have to take anybody's word for it, try it out under your own conditions. You are under no obligations if it fails—remember we also pay the freight both ways.

Not only 100% more production, but saves 100% floor space. These problems have handicapped many manufacturers for some time. They can now readily be solved by the Peerless High Speed Heavy Duty Metal Cutting Saw.

Write us for complete description and references. Some of these machines may be working in your vicinity.

Peerless Machine Co., 1607 Racine St., Racine, Wis.

MORE SPEED LESS BLADES

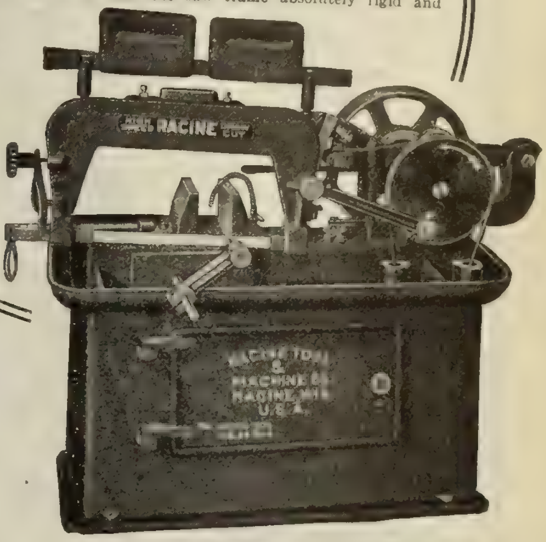
One Canadian Steel Company uses 120

RACINE METAL CUTTERS

and has saved $11,019.50. Particulars on request.

These machines are popular everywhere because they work fast and are easy on the blades—because springing is absolutely prevented by the mechanically correct design and construction.

The heavy, rigid saw frame guide of the Racine is made of the best grade of semi-steel and will hold the saw frame absolutely rigid and work at all times, insuring a straight cut with the least possible waste of material.



There are other Racine features well worth investigation — the **Positive Automatic Lifting Device, the Combination Vise, the Cooling System, etc.** May we tell you about them and about our unusual **trial offer?**

RACINE TOOL & MACHINE COMPANY
15 Melbourne Avenue, Racine, Wis., U.S.A.

Two Cuts at One Time

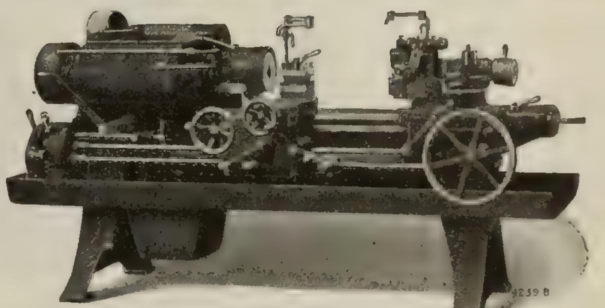
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

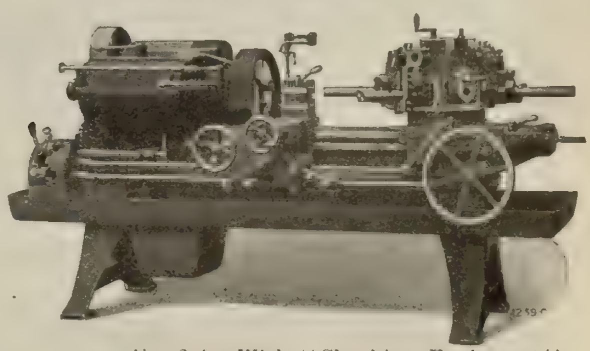
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



No. 2-A—With "Bar Equipment"



No. 2-A—With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

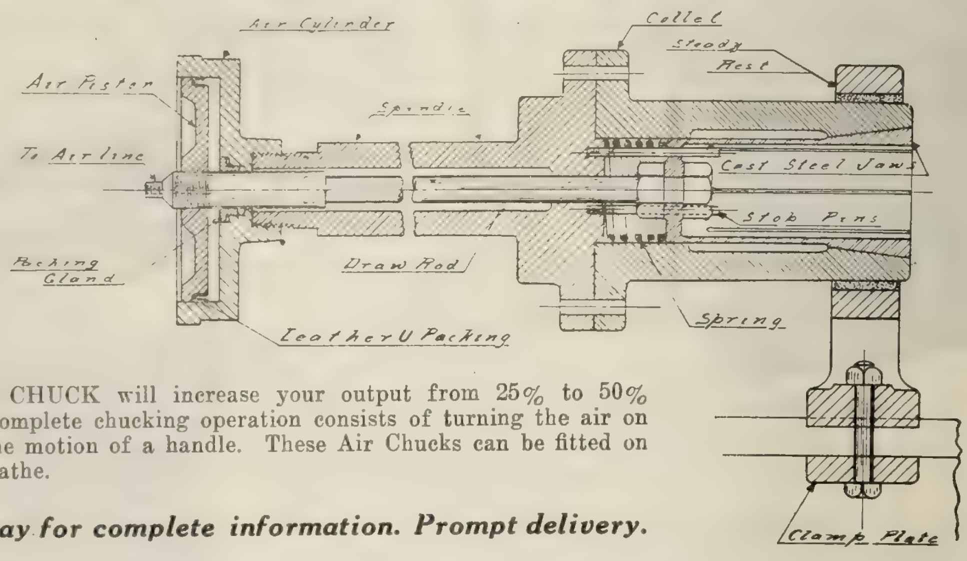
Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal

Get Out Your Watch and Time Your Chucking

With most screw chucks you have to use brute force or the hammer to tighten, and even then your shell is not always rigid.

H.E.W. AIR COLLET CHUCK IS RIGID

Saves Time



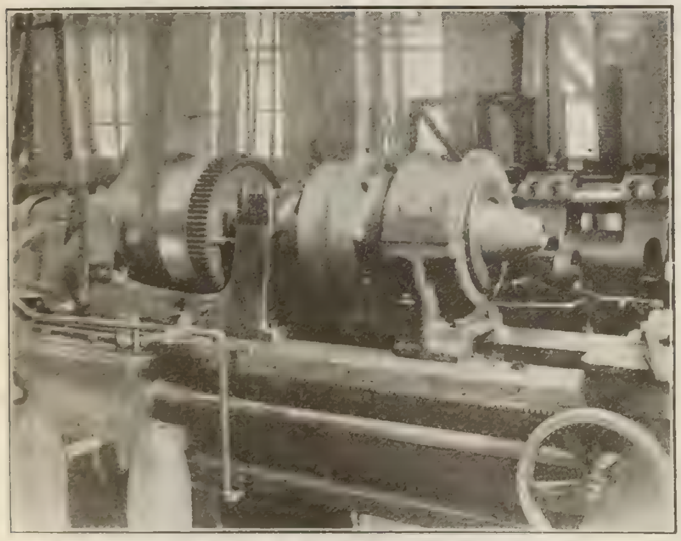
Saves Money

H.E.W. AIR CHUCK will increase your output from 25% to 50% because the complete chucking operation consists of turning the air on and off, by the motion of a handle. These Air Chucks can be fitted on almost any Lathe.

Write to-day for complete information. Prompt delivery.

HYDE ENGINEERING WORKS

P.O. BOX 1164 **27 William St., MONTREAL**



[illegible] shows Chuck on nosing operation. This is one of over two hundred in this Canadian plant.

This chuck is *built on the duplicate part system. It is simple, [illegible] and fool-proof.*

It grips the shell in a predetermined position. The jaws will not slip on the shell. It has shell interior and exterior adjustable stops.

A trial on one of your lathes will convince you that this is THE Chuck for shell work.

A Big Efficiency Unit in Your Shell Plant

A. J. LAVOIE'S

LOW PRESSURE

Compressed Air Chuck

This chuck can be applied to any make of lathe, without alteration to the machine, and will increase production from 25% to 75%. It grips and releases the shell while in motion—no need to stop your machine.

It is a single unit combination attached to the face plate of lathe, supported by an additional heavy duty bearing, thus making a heavy duty lathe out of a light machine. A small lever operates the chuck. Will operate with a pressure of 60 lbs. per sq. in.

MANUFACTURED BY

The Montreal General Tool Co.

673-5 Notre Dame Street, Maisonneuve, Montreal, P.Q.

Also manufacturers of shell tools, and special machine attachments of all kinds made to order.

MODERN

SELF-OPENING and ADJUSTABLE DIE HEADS

The Die Heads that have made good on every threading operation, and which are constantly meeting the demand where Die Heads are required for accurate thread-cutting.

In purchasing "MODERN" Die Heads you have the assurance that you are getting tools of "quality," mechanically perfect in design and construction and uniformly efficient in all sizes.

Illustration shows an installation of "MODERN" Die Heads threading Shell Ogives, where the requirements are precision and large production.

Complete information regarding the use of "MODERN" Self-Opening Die Heads upon request.

MODERN TOOL COMPANY

Main Office and Works:
State and Peach Sts. - Erie, Pa., U.S.A.

New York Office—2 Rector Street
Chicago Office—32 N. Clinton Street
Detroit Office—246 Gladstone Avenue

F. WESLEY PARKER
Resident Engineer and
Export Agent,
2 Rector Street, New York

A New Thing in Shell Gauges

A snap gauge for calipering all outside diameters, with absolute accuracy.

Can be furnished suitable for waving, grooving, rough or finish turning—all sizes of shells, from 9.2" down.

Note the improvement on this gauge for holding.

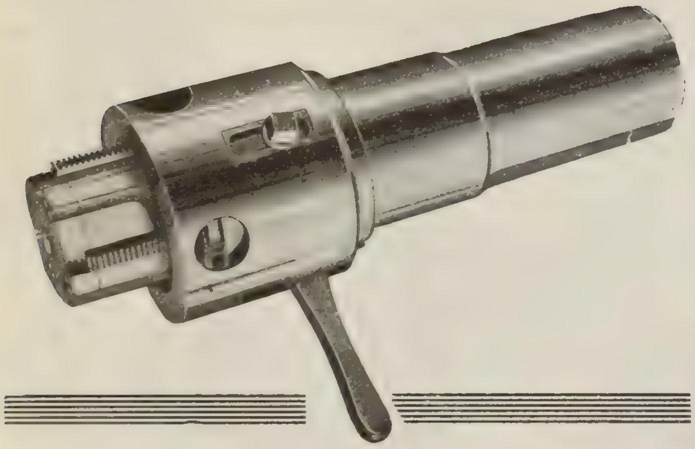
In ordering, specify diameter and part to be calipered.

Immediate shipment can be made from stock.

Note the hole for handling when using.

Save the Operators' Fingers

The Foundry & Machine Co., Limited
1167 Carriere Road
MONTREAL, CANADA



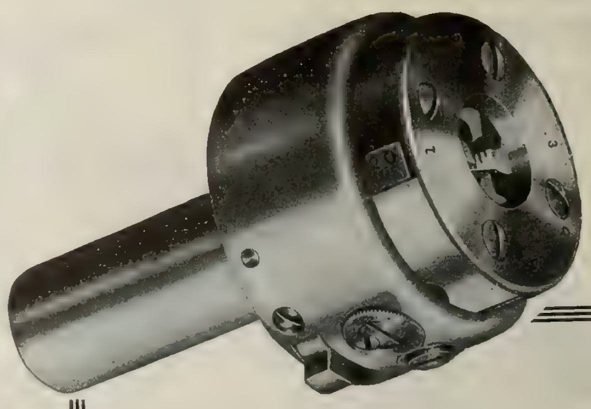
The Question Is
Your Threads——?

This question interests both of us. You because you want the best threads at a reasonable cost in mighty fast time—Us because we can give them to you.

This machine steel, collapsible tap has very few parts. Its chasers are of high speed steel. Screw set and adjustment for accuracy. [illegible] tap to eliminate spoiled [illegible]. Ample adjustment allowance for [illegible].

Write us for further particulars.

Victor Tool Company
Waynesboro, Pa. U.S.A.



Your Die Heads

are giving you the kind of threads you are now getting. Do you like them? Is the head consuming too much of your time, adjusting and repairing? H. & G. Automatic Self-opening Die Heads eliminate all that. The **chasers** are locked, and no stoppage or changing in size required. The **quick release** allows cutting to a certain point each time. It also permits cutting right up to the shoulder when necessary.

Our booklet will tell you all about it. Write for it, anyway; it is valuable to have around.

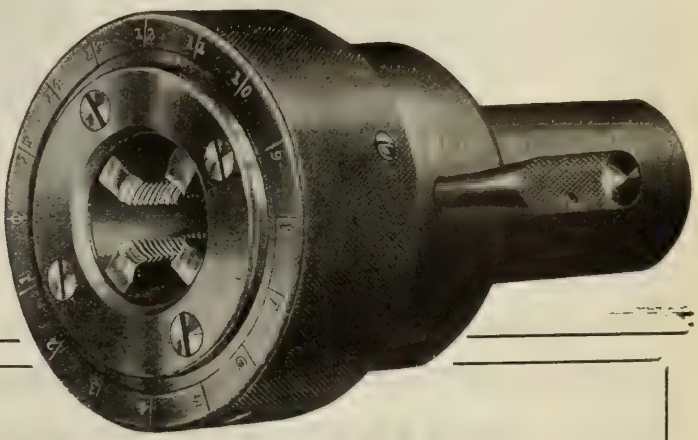
EASTERN MACHINE SCREW CORP.
NEW HAVEN, CONN., U.S.A.

H & G

MURCHEY MCH.&TOOL CO
DETROIT, MICH.
2¼-14
WHITWORTH

MURCHEY MCH.&TOOL CO.
DETROIT, MICH.

1"
to
12"

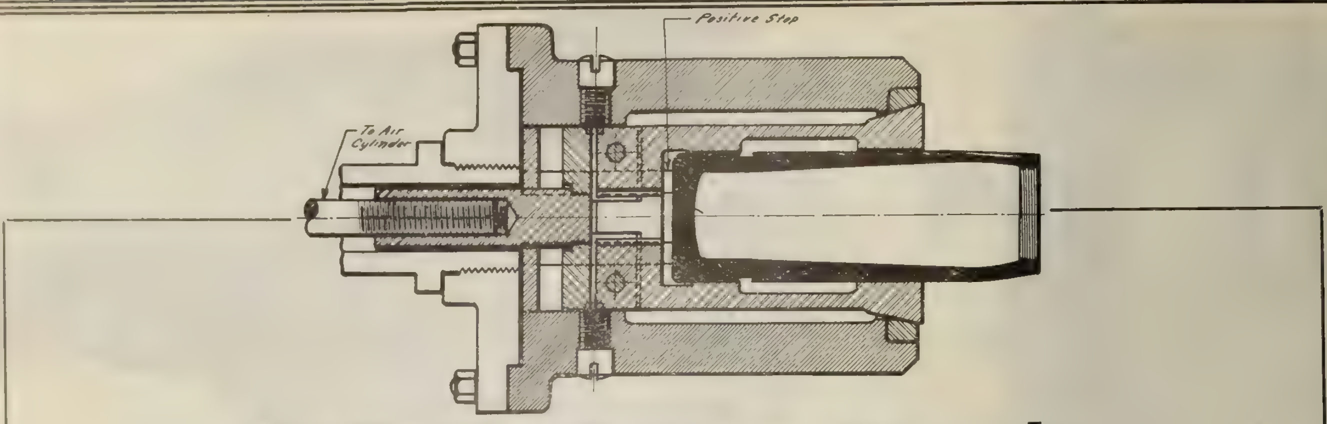


To Think Taps and Dies Is To Think "Murchey"

One can scarcely think of Murchey without thinking of taps and dies. They go together. There is another feature that is just as inseparable—quality. As to that last feature, 75 per cent. of the shell manufacturers of Canada and the United States will prove. They are equipped with Murchey Taps and Dies and therefore know their many prominent features.

Murchey tools save rechucking and rehandling. They will tap a shell in 1/5 the time it takes a thread miller to do it in. The chasers are made of best quality high speed steel, and easily adjusted to compensate for any wear. Send us your blue prints. We will co-operate with you.

Murchey Machine & Tool Company
75 PORTER STREET DETROIT, MICH.



M. E. C. Collet Chucks

They stand up under the strain of rush work. They cannot do any poor work. The mechanism of the "M.E.C." Collet Chucks are built just one way and any hasty or imperfect chucking is an unknown quantity with an M.E.C. Collet Chuck. They are air operated, of the hinge type and are adaptable to rough or finished boring operations. They are successfully and extensively used in Canada, Great Britain, Russia, France and India. That stamps this tool as a standard adjunct of the lathe. Let us hear from you.

MANUFACTURERS EQUIPMENT COMPANY

FOREIGN AGENTS: C. W. Burton Griffiths & Co., Ludgate Square, Ludgate Hill, London England.

175-179 N. Jefferson St., Chicago, U.S.A.

CANADIAN AGENTS: A. R. Williams Machinery Co., Ltd., Winnipeg, Man.

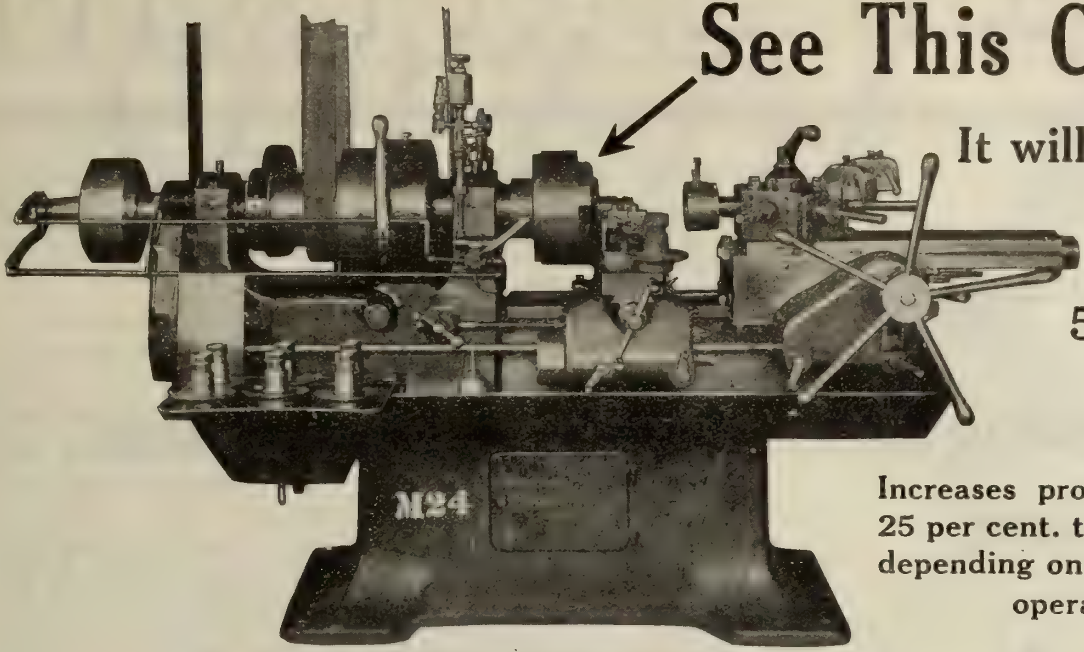
The "IDEAL" Die for Shrapnel

Quick, accurate work in threading Fuse Plugs for Shrapnel Shells is essential if you would make maximum profits. Your field is unlimited and your output governs your income. **Why not give the special type "C" Ideal Die a hard trial at this work and see if it will not boost production for you?**

Let the "IDEAL" cut the threads that bind you to low production. They will fit your machines. Circular on request.

"IDEAL" is a *different* die. The head revolves around a stationary cam, thereby utilizing the belt power or cutting strain as opening power. Chasers are supported directly back of cutting strain, which will remove any tendency to bell out and cause taper threads.

The Ideal Tool & Mfg. Company
BEAVER FALLS PA., U.S.A.
A. M. ELLICOTT CO., MONTREAL, QUEBEC
Distributors for Province of Quebec and Ottawa



See This Chuck!

It will Chuck a Piece of Work in 5 Seconds

Increases production from 25 per cent. to 50 per cent. depending on the length of operation.

Are you making Shells, Shrapnel, Fuses or Piston Rings?

If you are, get in touch with us. We want to lay a cost-cutting plan before you. We want to prove to you that

Detroit Pneumatic Chucks

will chuck a piece of work in five seconds. THIS is just about fifty-five seconds quicker than it can be chucked by hand.

The shorter the operation, the more chucking and the greater the saving with DETROIT "AIRGRIP" CHUCKS.

They fit all hollow spindles and are made entirely of steel. Gripping power is adjustable.

Made in two-jaw and three-jaw types. All sizes from 6" to 18" diameter.

Our Chucks are made entirely of steel; our workmanship is of the very highest grade; our air cylinder is a decided improvement over anything else on the market, as packing on piston is adjusted automatically.

We are just completing a new factory which will be the largest and best equipped plant in the United States for the exclusive manufacture of pneumatic chucks.

We have some open territory and will be glad to hear from good, live agents.

"We can chuck parts of any kind"

Detroit Pneumatic Chuck Company

DETROIT, MICH.

NEW BRITAIN

The Evolution *of the* Chucking Machine

TIME was when the machining of castings and forgings involving several operations about a common center required as many settings in lathe, drill press, etc.

The performance of the several operations at different settings necessarily resulted in more or less inaccurate work.

The turret lathe largely overcame this fault and greatly increased production by performing all operations at one setting, thus eliminating rechucking.

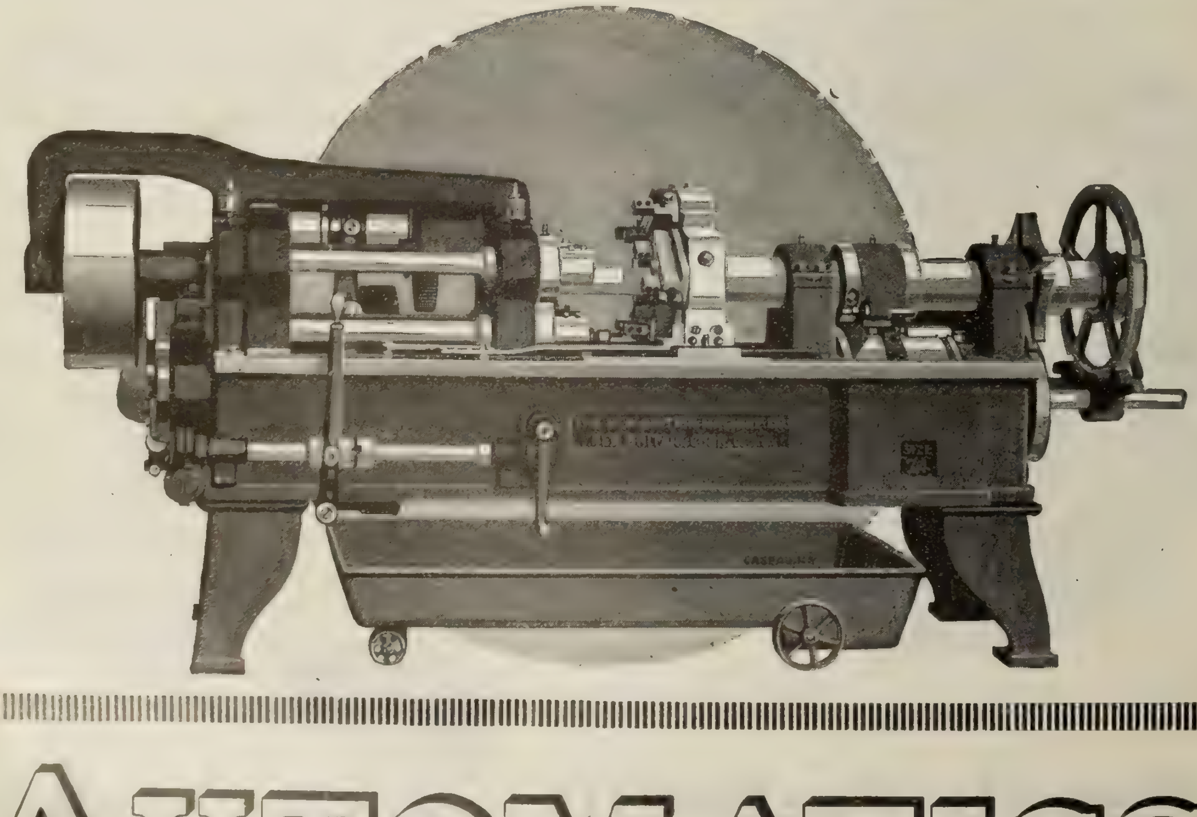
It still fell far short of being 100% efficient because it worked but one tool at a time and left all tools idle while the work was being chucked.

The final step in the evolution of chucking was attained in the "New Britain" Multiple Spindle Automatic Chucking Machine.

It performs all operations simultaneously and automatically and is so designed as to permit removal of finished work and insertion of rough blank while machining operations are progressing on the partly finished work.

"New Britain" productions run three to five times larger than those obtainable by other methods.
Interested? Write!

The
New Britain
Machine Co.
New Britain, Conn.
U.S.A.



AUTOMATICS

SPEED!

CELFOR

SPEED, Speed, speed! Every lathe, every press, every drill tuned up to the highest pitch—everything and everybody speeded up to the utmost to keep pace with the abnormal demand being made upon the metal-working industry to-day.

Even the smallest tool must play its part and stand up under the extra strain put upon it. Not the least important of these is the drill. And of all the drills used Celfor Drills are by no means the least important.

Celfor Drills have so often demonstrated their superiority in coping with extra demand and severe usage, that they are being more widely specified by buyers and used by workmen than ever before.

Celfor Drills are made by the forged and twisted process instead of being milled from a solid bar and will cut more metal and cut it faster than is possible with any other kind of a drill.

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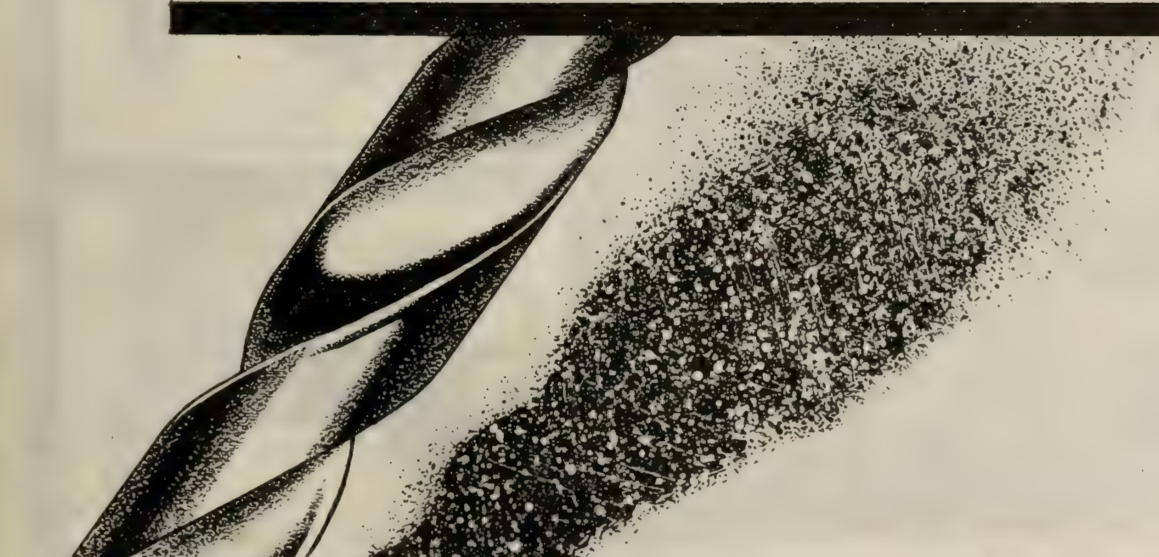

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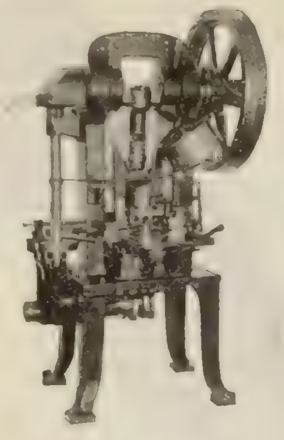
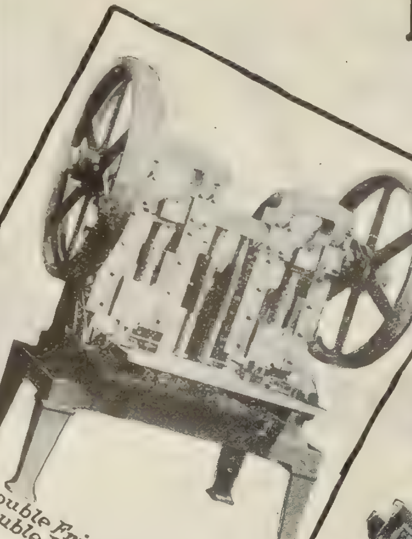
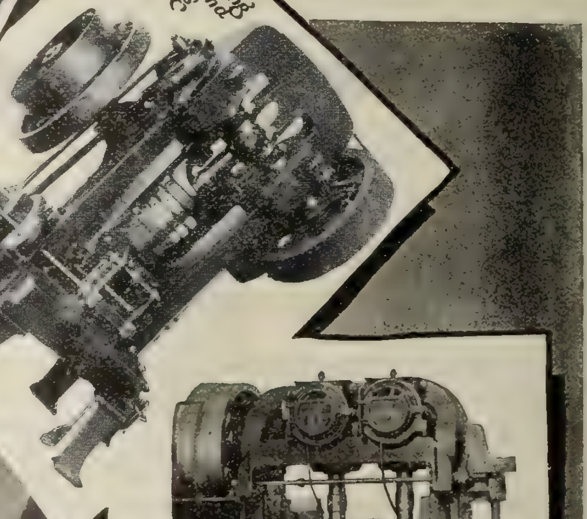
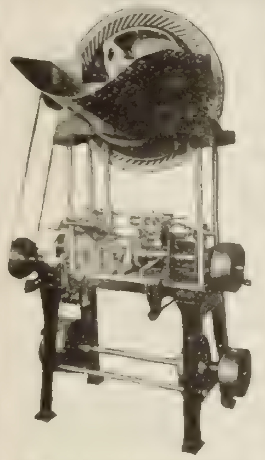
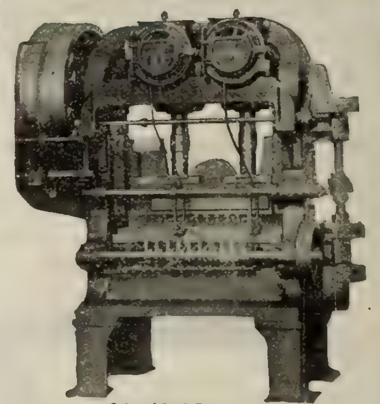
Waterbury Farrel Standard Machines


Ratchet Dial Bullet Assembling Machine

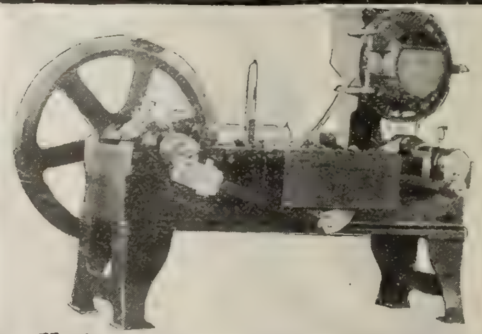

Double Friction Dial Double Punch Press


Double Acting Cutting and Cupping Press


Shell End Trimmer


Straight Line Bullet Assembling Machine

Standard Loading Machine in Government Arsenal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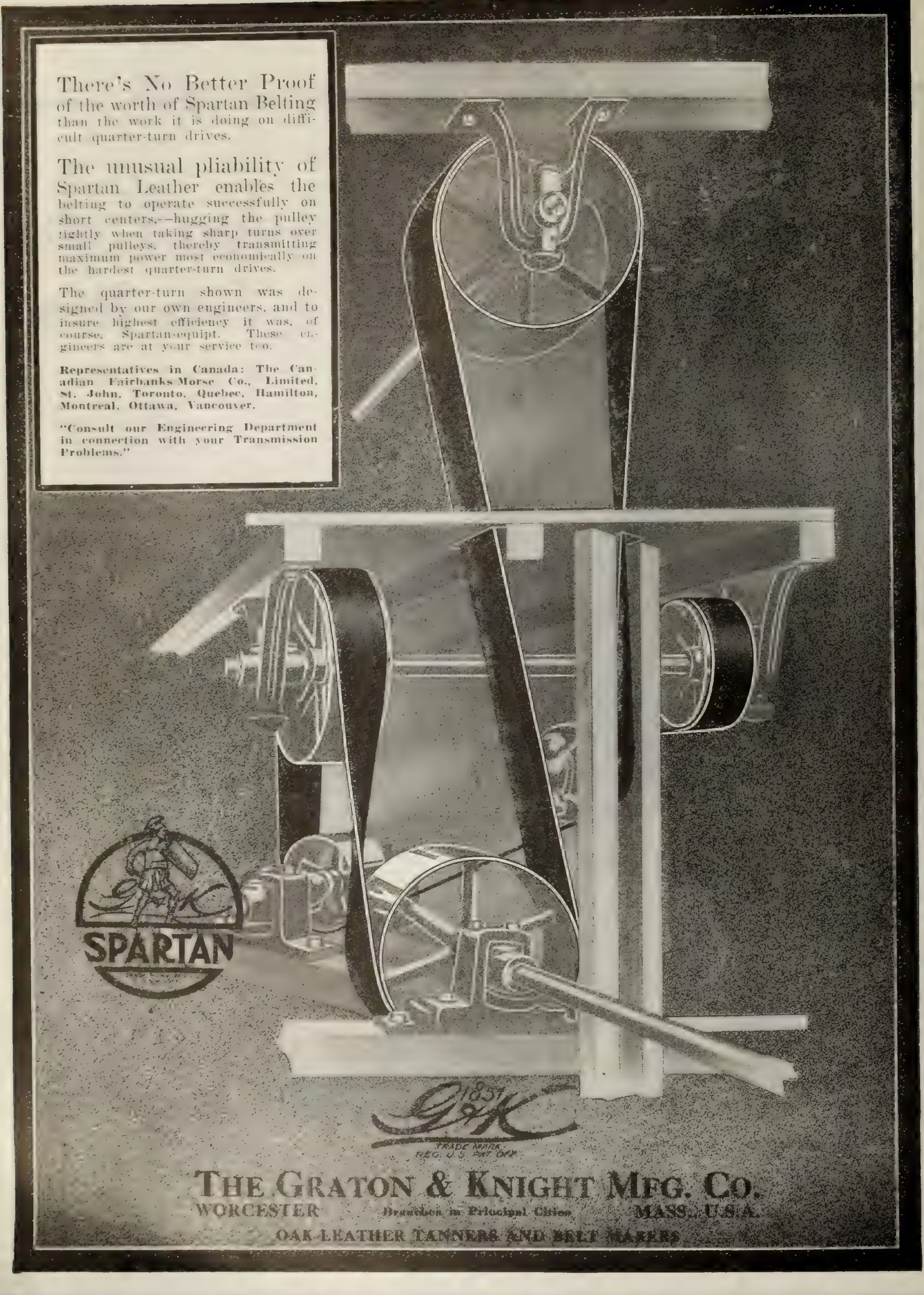
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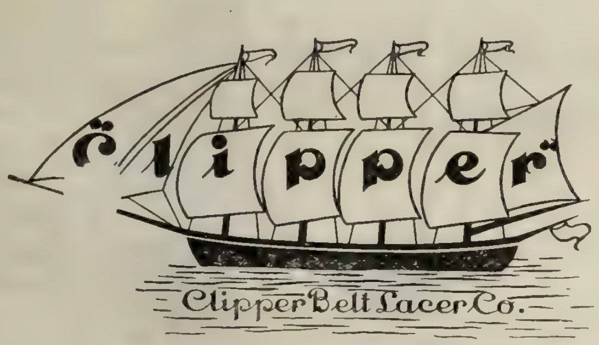

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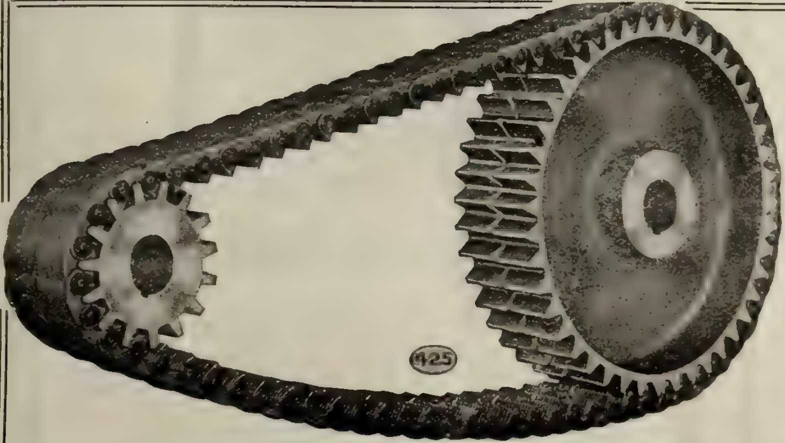

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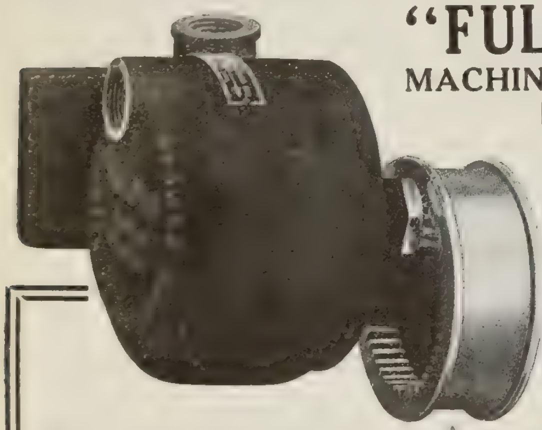

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A cutting tool will stand up to higher speed and heavier feeds, providing it is kept cool.

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No gears or other close-fitting parts to be affected by the grit, dirt, or small chips that are always present in the coolant. No clogging.

The only working part is the impellor. Since no check valve, reverse valve or any other kind of valve is present in the pump or pipe, other than the stop cock, the usual valve troubles are eliminated.

Easily attached to any machine. **Insist that the new machines you buy be equipped with the "FULFLO."**

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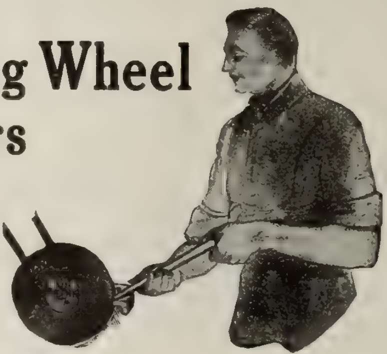

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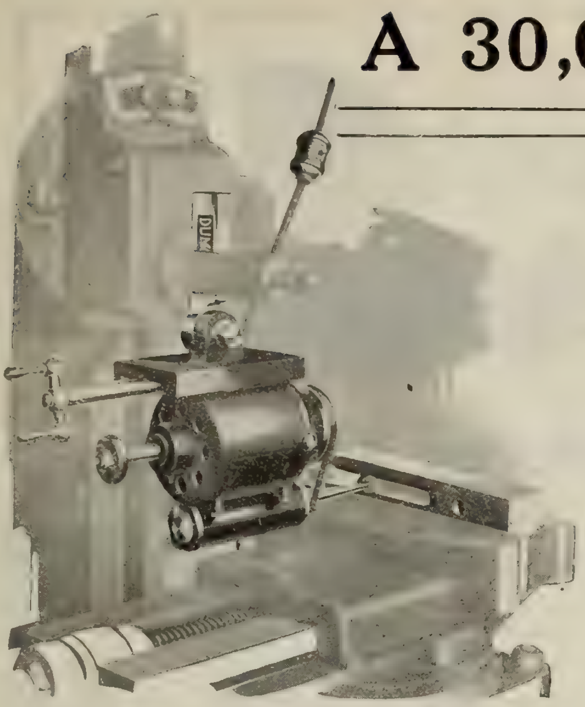

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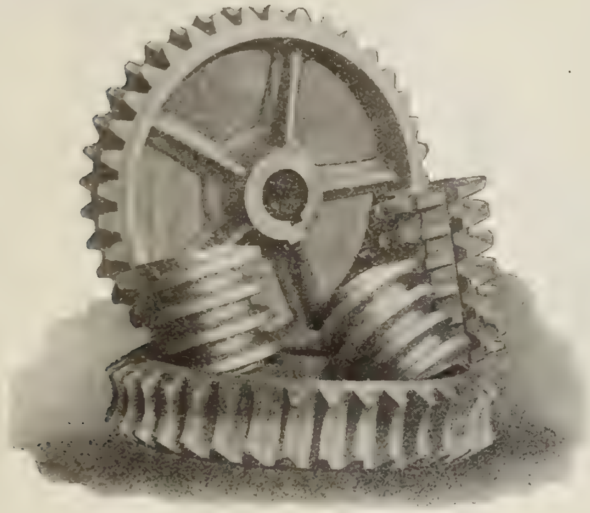

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The old mechanic was right when he said: "With a little horse sense and a grinding wheel a broken tap can be made as good as new."

First, square up the end on the face of the handiest tool-room grinding wheel (preferably Alundum).

Then grind the relief (the chamfer). That is not so easy as it looks—requires a little skill to get a radial relief and keep the cutting edges of the lands even. They are the two principal things to look out for—radial relief and even height of the lands.

Bear lightly with the wheel turning toward the cutting edge of the tooth; it gives a slightly better edge, free from burrs. But the tap must be held firmly enough that it will not be accidentally turned, carrying the cutting edge against the wheel. Keep turning slightly to get a radial relief. Light pressure and a cool, free cutting Alundum wheel practically eliminate the danger of burning or drawing the temper.

On the ordinary tap, the relief or chamfer should be ground back four or five threads, although sometimes, depending on the work, a six-thread taper is preferable.

A broken tooth should be ground entirely away, leaving no jagged edges to tear the thread.

When grinding in the flutes to re-sharpen dull teeth, eliminate nicks, or to remove the burrs, it is preferable to use a free cutting wheel faced to conform to the shape of the flute.

A tap will still do the work required of it as long as there are three good threads left.

Alundum wheels are the right tool-room wheels. Vulcanite wheels are largely used for grinding the flutes of taps, and in some cases Vitrified, grain 60 to 70, grades 0 to S, depending upon the method.

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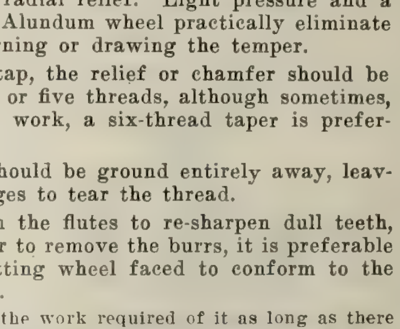

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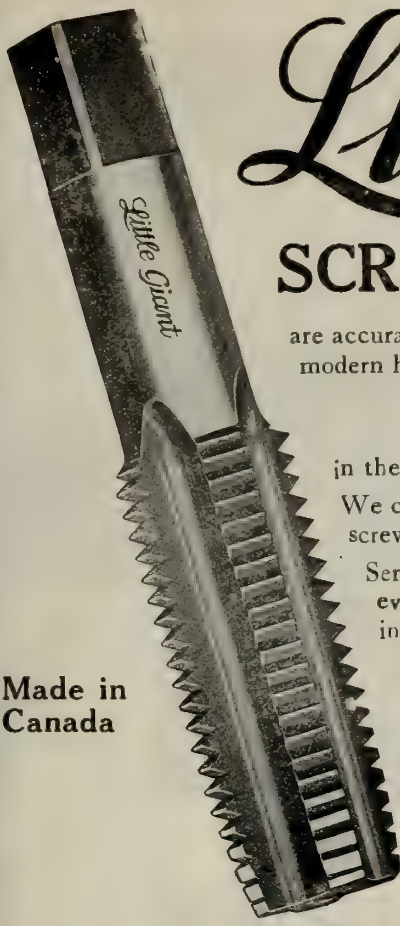

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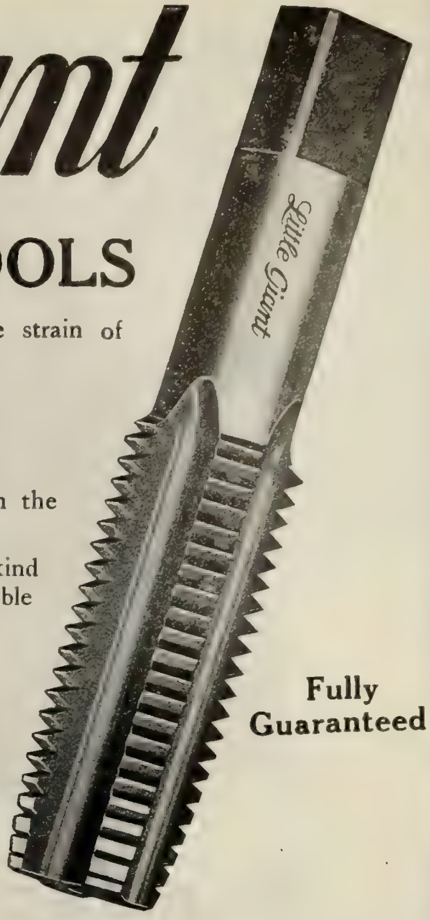

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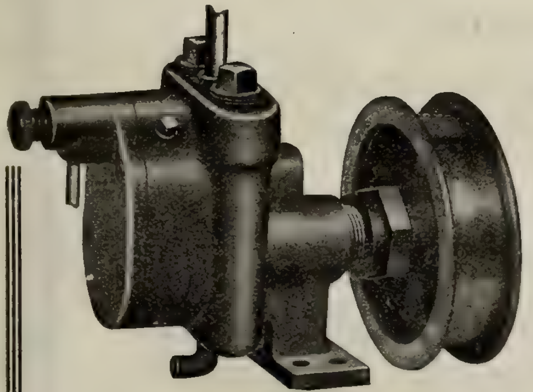

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We have listed at the left, a number of items which even every Foundryman will recognize as essential to his equipment.

We carry the largest stock in Canada of this material, and are prepared to make as prompt shipment as the present market conditions will permit.

Let us quote on your requirements.

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CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

Sheldons Ltd. Galt, Ont. Plant AND Product

GENERAL VIEW SHOWING TWO FACES OF PLANT EXTERIOR, GENERAL OFFICES ON CORNER.

Staff Article

The subjects of heating and ventilating are so closely associated as to be considered inseparable when putting into practice any scheme whereby either may have been deemed an installation necessity. The need for both is a large factor in our civilization, and in recent years it has come to be recognized as such to a greater extent. The steady growth of the plant described and illustrated indicates that Canada is fully alive to the benefits accruing from heating and ventilation progress. Kindred in large degree to both is the sphere of steam engineering, with respect to which it is only natural to find boiler and engine room specialties included in the otherwise scope of the Company's manufacturing enterprise.

ABOUT twenty years ago the McEachren Heating & Ventilating Co., established a plant at Galt, Ont., for making ventilating fans. Five years later the Sheldons, who were interested in and also active members of the concern, took over the entire control and changed the firm name to Sheldons Ltd. In the earlier years the business, being a new development in Canada, was of comparatively small proportions, but has grown steadily until now it is one of the most important in Galt, and perhaps the leading business of its kind in Canada. The officials of the company are: W. D. Sheldon, president; S. R. Sheldon, vice-president, and J. P. Stuart, sec.-treasurer. The directors include W. D. and S. R. Sheldon, A. K. Spotton, Alfred Taylor and J. M. Smith, the last named being superintendent of the plant. The company maintain a branch sales office in Toronto, and have agencies in Montreal, Winnipeg, Calgary, Edmonton and Vancouver.

At the time of the reorganization fifteen years ago, a grey iron foundry was built making the plant self-contained. During the succeeding years, the business developed both in size and variety of product, a larger foundry became necessary, so in 1913 a large and modern foundry was constructed on the north side of the plant. This additional facility made it possible for the company to still further extend the scope of their business. They are now able to make all the castings, iron or brass required in the manufacture of their various products, and also to make all kinds of iron castings for other concerns. In this connection it may be interesting to note that the company have for some time been making castings for firms in the United States. This in itself is a somewhat unusual but at the same time gratifying development.

UPPER MACHINE SHOP, SHOWING FAN CASE ASSEMBLY SECTION.

As already stated, the foundry lies along the north side of the property, while along the south side is the main building and offices. At the west side is a railroad track with a spur running into the yard, and on part of the east side is a storage. Other separate buildings on the property include pattern storage and a finished product storage, while pig iron and scrap piles are situated in the yard near the foundry. To return to the main building, on the ground floor at the east end is the employees entrance, tool room and machine shop, a section of the latter being utilized for assembling and testing heating coils. The offices are at the south east corner of the plant and are of course entirely separate from the machine shop. The middle section of the ground floor is a continuation of the machine shop, while at the west end is the fan erecting shop which includes a bar storage and store room for shop supplies. On the floor above at the west end is the fan housing erecting shop, the central section being the sheet iron department: at the east end is the pattern shop. Returning again to the ground floor, adjoining the machine shop on the north side are the power house, forge shop and heat treating plant.

Plant Products

The product of the plant may be summarized to consist of various types of ventilating fans, blowers and exhausters, heaters, and the Eclipse air washer; steam specialties, including exhaust heads, steam traps, relief valves, oil separators, etc., together with grey iron castings of all kinds. The mechanical draft section of the business is the most important, and covers a wide range. Of the various types of fan made, the Keith multivane fan stands first, the chief merit of this type of fan being its ability to handle large volumes of air at a uniform pressure at a high speed. The patent rights to manufacture in Canada have been purchased. A number of Keith fans are now being built to be installed on board war ships. For this service the requirements are very exacting. This feature constitutes an important development in the company's fan business. Other types of fan include steel plate fans, steel and cast iron blowers and exhausters, fans for forced and induced draught, planing mill exhausters for handling wood and other materials, disc and propeller fans, etc. In connection with this branch of the business, the company make vertical and horizontal fan engines, heater coils, and the Eclipse air washer.

INTERIOR VIEW OF MACHINE SHOP, SHOWING FAN ERECTING FLOOR.

In addition to the steam specialties already mentioned, other products made at this plant include elevator spouting, all kinds of sheet metal work fabricated from galvanized as well as black sheets. Under this category are included ducts for ventilating and shavings exhaust systems, and dust collectors. Blast gates, ball and socket joints, ore and mine cars, special dryers for leather, wool, hair, casein, etc. are also manufactured. In the new foundry all kinds of grey iron castings are made up to the limit of the 10 ton crane installed, although provision has been made for installing a 20 ton unit. Brass and aluminum castings are also made in the foundry, one section being set apart for these specialties.

UPPER MACHINE SHOP, SHOWING GALVANIZED IRON WORK SECTION.

Machine Tool Equipment

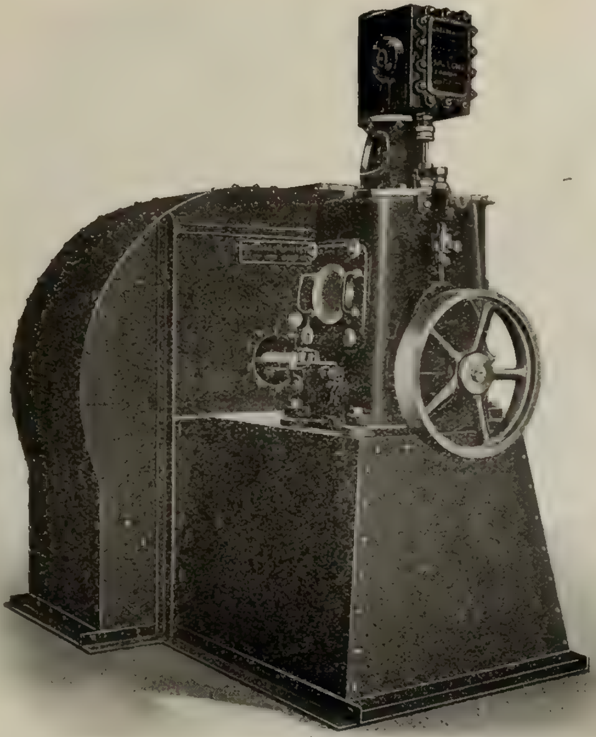
In the manufacture of mechanical draft equipment—fan wheels, housings engines, bearings, etc., a variety of machinery is required. The bulk of it is installed in the machine shop but a considerable number of tools are to be found on the floor above these consisting principally of punching machines, shears, breaks, etc. The following list includes machine shop tool equipment not mentioned specifically in connection with any particular product:—

Lathes by the R. McDougall Co., Galt, the Canada Machinery Corporation Galt; Stevens Co., Galt; McGregor, Gourlay Co., Galt; Walcott and Le Blond.

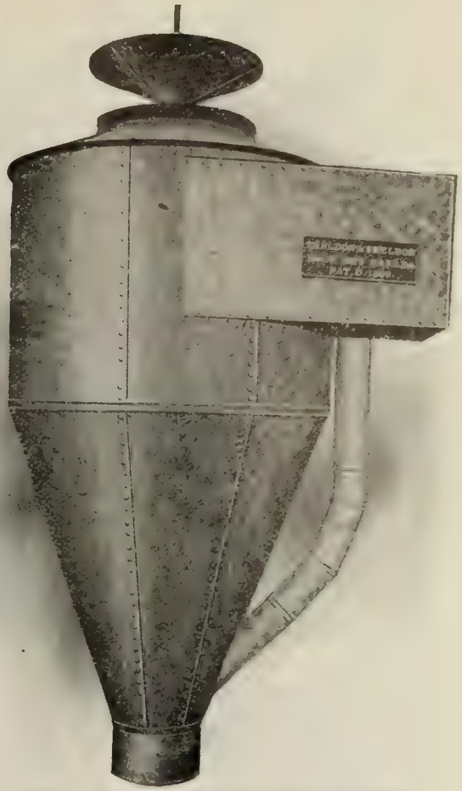
Radial drills by the American Bickford Tool Co., Cincinnati, Ohio, and the Dresses Machine Tool Co., Cincinnati.

Shapers and planing machine by the McGregor, Gourlay Co.; Stevens miller, Bertram horizontal boring machine; Landis grinder and pipe threading machines; Bertram shafting lathe, etc. A special machine is installed in the heater department for cutting heater pipes to length.

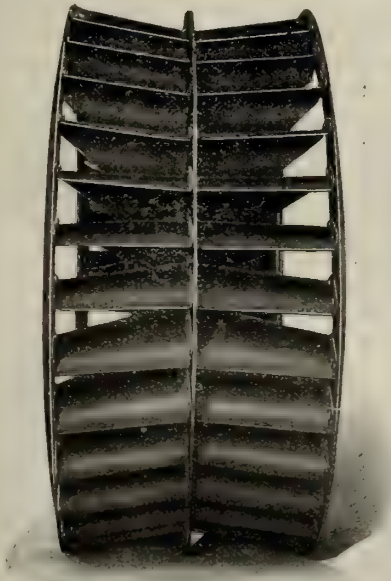
At the west end of this shop which is the fan erecting department are some



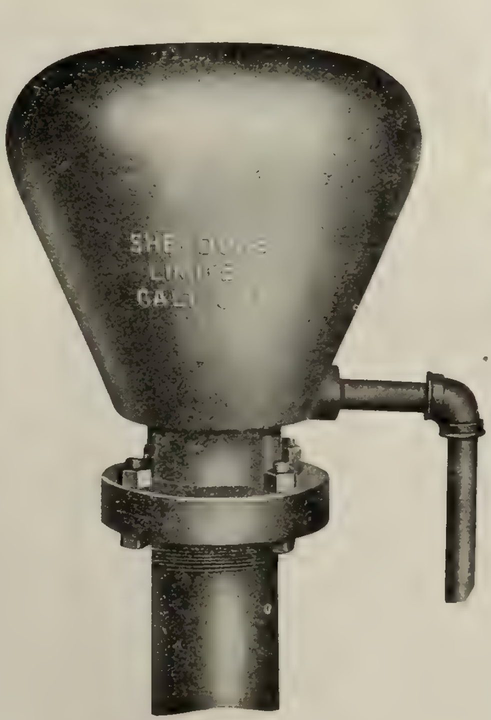
ENGINE DRIVEN FAN AND HOUSING



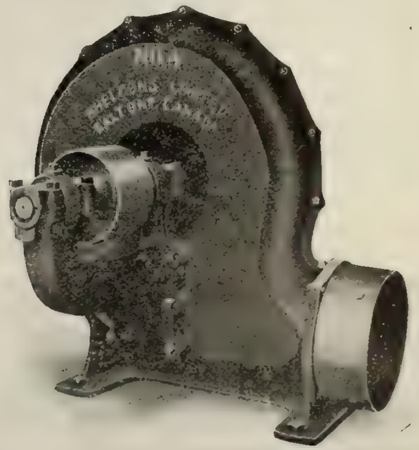
DUST AND SHAVINGS SEPARATOR



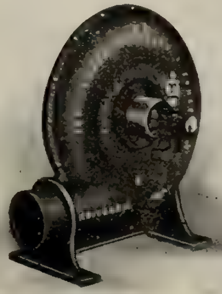
"KEITH" FAN WHEEL



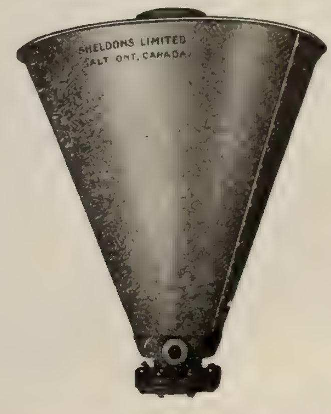
CAST IRON EXHAUST HEAD



BOTTOM DISCHARGE MEDIUM BLOWER AND EXHAUST



BOTTOM DISCHARGE PRESSURE BLOWER


SHELDONS LIMITED
GALT ONT. CANADA

CENTRIFUGAL EXHAUST HEAD

large machines for plate work. These include a heavy double punch and shear for handling small structural shapes and heavy gauge plates; a Barnes drill; and Bawden lathe; 12 ft. plate shear; a set of plate rolls built on the plant for bending plates for fan housings, etc.; and two power hack saw machines. In this department the fans are assembled and some of the large size housings built up. The fan wheels are also made in this section of the plant. The shop supplies store room is located here. A well equipped tool room is situated at the east end of the shop. The tools in the machine shop are all motor driven, the number and capacities of the latter being as follows:—One 40 h.p.; two 20 h.p.; five 35 h.p.; one 30 h.p.; and two 5 h.p.; all a.c. machines. A band operated travelling crane runs the full length of the shop and an Otis freight elevator is also installed for transportation purposes between the main and first floors. For supplying power to a hydraulic press, a triplex 1½ in. x 4 in. belt driven pump, built by the Deane Steam Pump Co., Holyoke, Mass, is installed in the machine shop.

Fan Housing Department

On the first floor at the west end, the fan housings are marked off, sheared, drilled, punched and erected. A large variety of plate work is also done in this department. The equipment installed here includes a London Machine Tool Co. punch, also a shear by the same firm; a 10 ft. plate shear, a rotary shear, a 10 ft. brake and two drill presses by McGregor, Gourlay Co.

CORE ROOM AND OVENS SHOWING BLOWER IN FOREGROUND.

The middle section of this shop is devoted to the manufacture of all kinds of galvanized sheet work such as ducts, exhaust heads, dust cleaners, and separators. The Eclipse air washer is also built in this department. The equipment is similar to that installed in the aforementioned department but for handling lighter gauge sheets. There are several bench power punches for workng on small angles, bars, etc.; a set of light plate rolls; a Barnes drill press; one 10 ft. and two 4 ft. Dress & Crump brakes; one Quickwork rotary shear, and a Toledo electric welding machine.

At the east end of this floor is the pattern shop which is equipped with a shavings exhaust system. The principal machines installed include a Cowan jointer, a pony planer by the Preston Woodworking Machine Co.; a sand papering machine, column drills, wood turning lathe, tool grinder and hand saw.

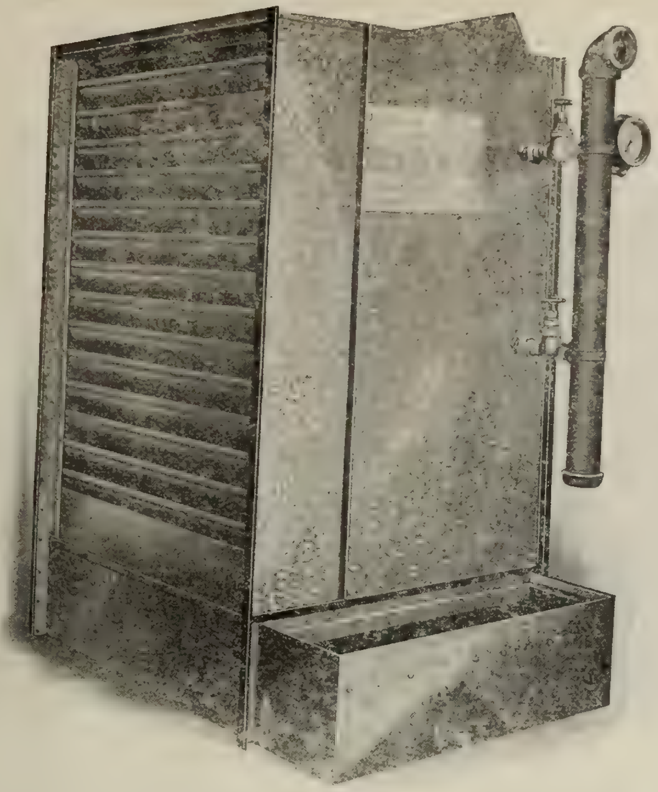
PART FOUNDRY EXTERIOR AND STORAGE YARD.

Grey Iron Foundry

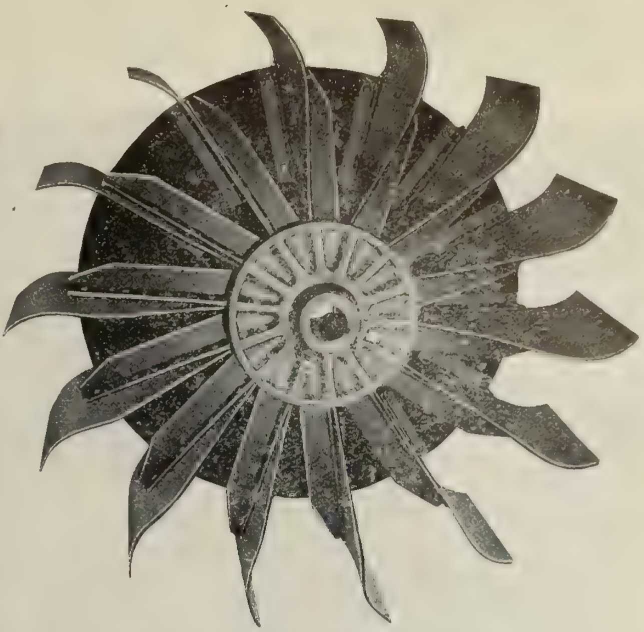
The grey iron foundry is of modern construction and unusually bright and well ventilated. The building is of steel frame and hollow tile construction with steel columns and roof trusses, the roof being of 2 in. matched boarding covered with Barrett roofing. Windows extend the full length and breadth of the building, also on the monitor roof above the centre bay. The foundry is 190 ft. long by 110 ft. wide, and is divided into three bays, the centre bay being 40 ft. wide, with a clearance height of 34 ft. The floor of the centre bay is used entirely for moulding, while in the South bay are installed a heating and ventilating plant, core room and ovens, cupola, brass foundry and cleaning department. On the North side are a number of moulding machines to which reference will be made later. Over the centre bay and operating throughout its full length is a 10 ton Northern electric traveling crane. The various movements of the crane are operated by three direct current motors of 15, 10, and 5 h.p. respectively. The crane runway and column were designed for a 20 ton crane which will be installed when necessity arises. A hand operated traveling crane is installed over the core room, and is equipped with a 1 ton Sprague electric hoist.

Heating and Ventilating Plant

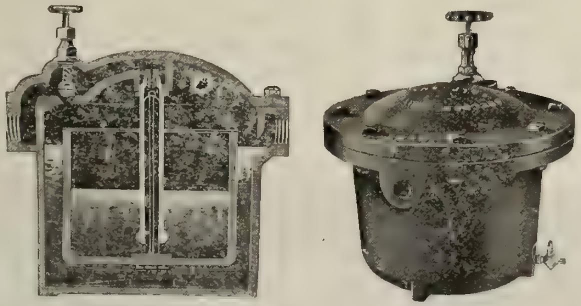
A heating and air-washing system is installed in the foundry. The plant is located at the east end of the shop and consists of a Sheldon heater, Eclipse air washer and a No. 50 Keith fan driven by a 25 h.p. Sheldon, vertical high speed, enclosed steam engine. This outfit has a capacity of 50,000 cubic feet, and delivers air through



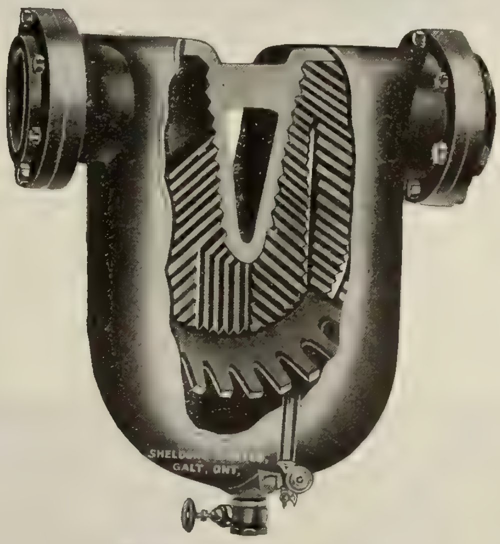
"ECLIPSE" AIR WASHER



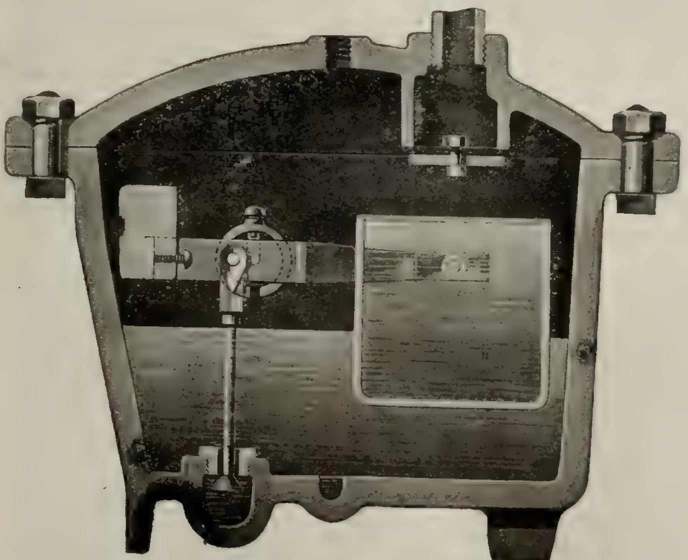
SLOW SPEED EXHAUSTER WHEEL



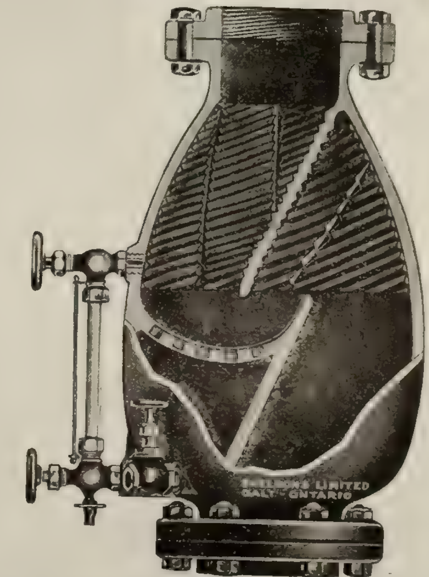
INTERMITTENT FLOW STEAM TRAP



HORIZONTAL PATTERN STEAM AND OIL SEPARATOR



UNIVERSAL STEAM TRAP


SHELDONS LIMITED
GALT, ONTARIO

VERTICAL PATTERN STEAM AND OIL SEPARATOR concrete tunnels, one on each side of the main bay, extending the full length. Galvanized iron ducts are connected to the tunnels at each column, each duct being fitted with a damper. Above the heating plant is a wash room equipped with showers, lockers, lavatories, etc., for the convenience of the work men. In this section of the foundry is installed a No. 9 blower driven by a 25 h.p. vertical steam engine, the entire unit being built by the company. The blower supplies air at 12 oz. pressure to the cupola. Provision has been made for another blower when a second cupola becomes necessary.

CLEARING ROOM AT WEST END OF IRON FOUNDRY, SHOWING TUMBLING MILLS, ETC.

A tunnel of reinforced concrete 4 ft. x 3 ft. by 150 ft. long has been constructed between the boiler room and foundry. Through this tunnel are carried steam, air and water pipes. The steam pipe is 6 ins. in diameter, and supplies steam to the fan and blower engines. The air pipe is 4 ins. in diameter and conveys air from the compressor in the power house to the various parts of the foundry where required. The water pipe is $2\frac{1}{2}$ ins. in diameter, and conveys water from a spring on the property for drinking and general purposes. The air and water pipes are carried overhead and down each column where suitable connections are made.

Cupola Features

The cupola is 36 ins. inside diameter, has a capacity of 5 tons per hour and was built at the plant. The charging floor is 35 ft. x 48 ft., and materials are carried to it by means of an Otis-Fensom electric elevator 7 ft. x 4 ft. having a capacity of 2000 lbs. The elevator is operated by a $7\frac{1}{2}$ h.p. 550 volt C.G.E. motor. A Fairbanks scale is installed on the charging floor for weighing the materials for the cupola, while draft for the latter is supplied by the blower already described.,

Core Room and Ovens

The core room and ovens occupy a space 48 ft. x 35 ft. There are three ovens, 8 ft. x 14 ft., 6 ft. x 14 ft. and 4 ft. x 14 ft., and one drawer oven 4 ft. x 12 ft. The first three mentioned ovens are equipped with tracks, while all four are heated with individual coke stoves, fired from the back, the gases being carried away to a stack outside the foundry. The core room is equipped with the usual facilities for making cores and there is also installed a sand

CENTRE BAY OF IRON FOUNDRY LOOKING EAST.

mixer supplied by the Hamilton Facing Mill Co.

EAST END OF IRON FOUNDRY, SHOWING CUPOLA AND CORE OVENS.

Cleaning Room

The cleaning room is located at the West end of the foundry, the principal equipment installed in same consisting of four tumbling mills, some grinders, and a sand sifter. The tumbling mills were supplied by the W.W. Sly Mfg. Co., Cleveland, and are as follows:—48 ins. x 48 ins. x 72 ins. long; 24 ins. x 44 ins. x 48 ins. long; 24 ins. diameter x 48 ins. long, and 18 ins. diameter x 48 ins. long respectively. Adjoining the cleaning room is the brass foundry where are installed three brass melting furnaces heated by natural gas.

Moulding Equipment

The greater number of the moulding machines are arranged along the wall on the North side of the foundry. The principal equipment installed consists of three roll-over and one squeezer machines by the Tabor Mfg. Co., Philadelphia, Pa., one roll-over and squeezer by the Davenport Machine & Foundry Co., Davenport, Iowa; one roll-over and squeezer by the Arcade Mfg. Co., Freeport, Ill.; and two Grimes roll-over and jarring machines. In addition to the above mentioned are two pulley moulding machines by the E. A. Delano Co., Chicago, one for moulding pulleys 8 ins. to 16 ins. in diameter, and the other for pulleys from 17 ins. to 30 ins. in diameter. There is also one stripper by the Killen Mfg Co.

Lighting System

The artificial lighting of the foundry is most efficient. The centre bay has six 2000 c.p., 200 volt, arc lamps, and each of the side bays have eleven, 250 watt tungsten lamps of 110 volts. In addition to the above, a number of 110 volt incandescent lamps have been installed at various individual machines.

Power Plant

In the boiler room are installed two 130 h.p., 72 ins. by 18 ft. return tubular boilers, built by Goldie & McCulloch Co., Galt. These boilers supply steam for the various steam engine units around the plant and also for heating purposes. The power house adjoining, contains a 100 h.p. Wheelock Corliss engine, which drives direct one of the line shafts in the machine shop. This unit takes care of a considerable part of the power required in the machine shop, electric motors driving the remainder. A 75 h.p. Sheldon horizontal high speed engine direct-connected to a Canadian Westinghouse generator running at 300 r.p.m. is also installed. This unit is really an auxiliary as the company employ hydro power for the shop motors to the extent of approximately 350 h.p. There is also installed a C.G.E. motor generator 3-wire 110-220 volt set. For supplying compressed air to the foundry and other parts of the plant, there is installed in the power house a steam driven air compressor built by the Canadian Ingersoll Rand Co. This machine is of horizontal type and has a capacity of 400 cubic feet of free air at a pressure of 100 lbs. per per square inch. A switchboard in connection with the auxiliary generator and motor-generator sets is installed in the plant power house.

NORTH BAY OF IRON FOUNDRY UTILIZED FOR SMALL CASTINGS.

MORE WOMEN WANTED FOR WAR WORK

THE British Ministry of Munitions are anxious to still further increase the number of women employed. This is, of course, already considerable, between 17,000 and 18,000 being employed in one shell-filling factory which was visited recently by Lord French. In other departments of munitions making, however, comparatively few women are as yet employed, although 800 to 1,000 additional hands per week are required. To increase the numbers available, special training schools have been established in various industrial areas. In some of the provincial towns there is, it appears, already a waiting list, but in London there are, it would seem, still many vacancies in the schools at Brixton, Shoreditch and other training centres. It is intended to devote one of the London schools specially to the training of girls in the light welding and other metal work required in aeroplane building. In Newcastle-on-Tyne rapid progress is reported at the women's training school opened in Rutherford College, where over 1,000 have applied for instruction. The period of training here extends over six to eight weeks. The large schools established at Birmingham in 1915, mainly with a view to training male workers, are now being used to give a similar training to women. A special feature at Birmingham is the advanced courses for students of either sex who show special aptitude. At Sheffield an attempt is being made to provide female chemists capable of taking up routine analytical work at blast furnaces and steel works for the period of the war.

* * *

THE RUSSIAN LANGUAGE

FACILITIES for studying the Russian language are being provided in one centre after another, says the *British Trade Review*, and soon there should be no town of importance in the Old Land where the study of this language is not encouraged. A week or two ago, attention was called in these columns to the decision of the South of Scotland Chamber of Commerce to establish classes for the promotion of the study of Russian. Steps have now been taken in Glasgow for the founding of a Russian Institute, backed by the Corporation, the University and Technical College. Scottish firms, thoroughly alive to after-war possibilities, have already moved in the direction of winning the trade hitherto done by Germany in the Czar's dominions by arranging for representatives to be on the spot.

With a view to furthering this enterprise, the Glasgow Institute will devote its energies to instilling a knowledge of Russian commercial methods and needs into the minds of its students. Scholarships are also to be provided for those who aim at remaining in Russia for a term to pursue their study on the spot. Of recent years a large weight of Scottish woollen goods has been bought in Scotland by Germany, and re-exported to Russia, but in future that trade will be carried out direct by the Scottish manufacturer. In point of fact, manufacturers are vying with one another to defeat the forlorn aim of the Germans to become the universal providers of the world.

* * *

IDLE MACHINERY CLEARING HOUSE

THE British Minister of Munitions has established a Central Clearing House Organization for the purpose of tracing and registering machinery which is idle or about to become idle. The organization will endeavor:—

(a)—To ensure that contracts placed by the Ministry are directed towards any unoccupied manufacturing capacity which might exist in the country.

(b)—To place engineering contractors, who have suitable facilities for particular supplies, in touch with the Ministry and with other Government departments requiring these supplies, and to help contractors who are able to undertake additional or more suitable work now or at a future date to maintain continuous employment of their machinery and labor. Manufacturers possessing idle resources and desiring to be placed in touch with Government contracting departments are invited to communicate with the Central Clearing House, Ministry of Munitions, 8-9 Northumberland Street, W.C., when further particuars will be furnished.

The Minister of Munitions announces that he has made further orders under the Munitions of War Acts, 1915 and 1916, under which 74 additional plants have been declared controlled establishments. The total number of controlled establishments under the Munitions of War Acts. 1915 and 1916, is now 4,390.

* * *

RETARDING PLASTER OF PARIS SETTING WITH ALCOHOL

ACCORDING to the "Journal Pharmaceutique et Chimique," investigators Astruc and Canals find that alcohol added to the water employed for slaking plaster of Paris has a very marked effect in retarding the time of setting and in lessening the degree of heat evolved in the reaction. This effect is directly proportional to the quantity of alcohol added. In round numbers, the addition of 10 per cent. of alcohol doubles the period of time required for the setting of plaster for surgical purposes. Thus, 10 grammes of plaster of Paris slaked with 60 mills (c.c.) of water took 14 minutes to set; with the addition of 10 per cent. of alcohol, 30 minutes was required, and with 25 per cent. an hour.

* * *

EFFICIENCY IN MANAGEMENT NEEDED

IN order to reward every man according to his deserts, we must, says H. L. Gantt, have some means of measuring the efficiency of the service rendered. So far the only efforts that have been made in this direction have been applied to the workman and they have apparently not helped us to solve our industrial problem. It is absolutely necessary for us to measure the efficiency of those in control, for without efficiency in management, efficiency of the workmen is relatively useless, even if it is possible to get it. With an efficient management there is but little difficulty in training the workmen to be efficient. This has been proved so many times and so clearly that there can be absolutely no doubt about it. Our most serious trouble is incompetency in high places. As long as that remains uncorrected no amount of efficiency in the workmen will avail very much. Can we find a measure, or even a correct indication, of that efficiency? I think we can, but we shall have to revise our methods of cost accounting, for those at present in vogue are not designed for that purpose.

* * *

MALE AND FEMALE EMPLOYEE CHARACTERISTICS

IN an article recently published, Arnold Bennett, in describing a visit to a national projectile factory, dwells on the characteristic differences of male and female workers as reported to him by the management. He was told that, "in the briefer operations demanding close concentration, the women rivalled and perhaps excelled the men, whereas in the long tedious operations (not demanding physical strength), the men easily beat the women, whose attitude was apt to be, 'Oh, bother, I've had enough of this exasperating dullness.' "

We do not know how far works managers in general would endorse this view. The opinion generally held is that women are particularly enamored of relatively simple routine work, which they are prepared to go on with day in and day out without change of occupation, which, indeed, is commonly resented. The man or boy, on the other hand, quickly gets "fed up" with work of this character, resembling the ancient Athenians in always desiring some new thing.

* * *

Don't guess at measurements when installing new machinery.

EDITORAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions—Your Co-operation is Invited

RE-BUSHING GRINDING WHEELS

By F. B. Jacobs.

MANY large manufacturing concerns use a number of grinding wheels in various departments for rough grinding of castings and general purpose work. As the stands upon which these wheels are used are generally of different makes and sizes, it is not uncommon for the diameters of the wheel ends of the spindles to vary from 1-16 inch to ¼ inch or more. Thus, while 16-inch wheels might be used in several departments, it is necessary to carry a superfluous stock to accommodate the various size spindles. To overcome this difficulty many manufacturers make a practice of re-bushing their grinding wheels as occasion requires, thereby eliminating the necessity of carrying individual wheels for each department where the sizes of the wheel spindles vary. The wheels are ordered with the correct sized arbor hole to fit the largest spindle, and with proper facilities they can be readily re-bushed to fit the other sizes of spindles at slight expense.

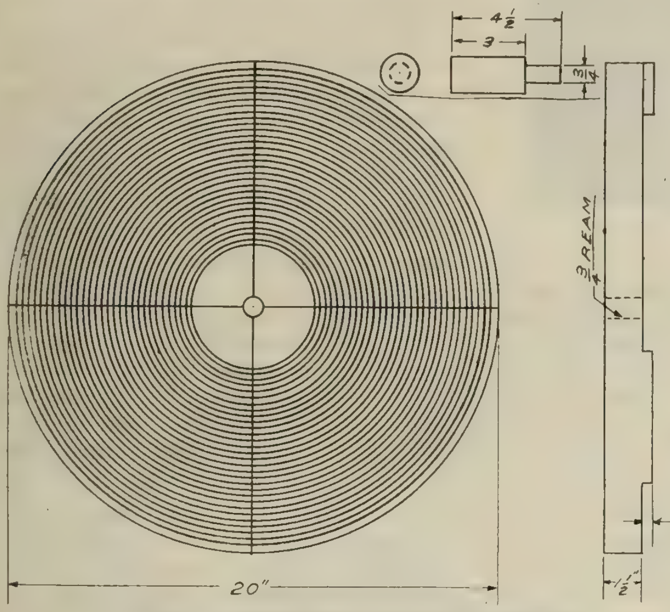


FIG. 1. REBUSHING GRINDING WHEELS.

The following method for performing the work in question calls for but a slight outlay for equipment, and the results will be found to be very satisfactory. The necessary tools are a cast iron disk or plate as shown in Fig. 1, and several plugs of the same diameter as the various arbors on which the wheels are mounted. The plate should be as large in diameter as the largest wheels used, and, for the sake of illustration, the plate shown is 20 inches in diameter, having three feet cast on it which allows setting level on an uneven surface should occasion require. The rough casting is mounted in a large lathe chuck and the face trued off, after which a 3/4-inch hole is bored and reamed in the centre. The next step is to turn several grooves ¼ inch apart. These can be cut with an ordinary threading tool, and are used to set the grinding wheel central while re-bushing its hole. Two heavy lines are next scribed on the disk 90 degs. apart, and near these lines the circles are stamped 1, 2, 3, etc. Several plugs are now made with one end to fit the hole in the disk, while the diameters of the large ends should be 0.002 larger than the arbors on the grinding stands. This slight clearance is sufficient to allow the wheels to slip on freely. The large portion of the plugs should be one inch longer than the thickness of the grinding wheels. Thus, if wheels with 2-inch face are used, the plugs should be 3 inches as shown in the illustration.

In re-bushing a grinding wheel, the first step is to cut out the present lead bushing with a compass saw as shown in Fig. 2. By making two cuts diametrically opposite, the bushing is easily removed by a few light taps with a hammer. The wheel is now laid on the disk and carefully set central by means of the nearest circle to its periphery. A plug of the correct size is next inserted and the new bushing cast in place. Lead is the best material for this purpose although any scrap stock of low melting point such as solder, die casting metal, etc., will answer the purpose equally well. The operation of re-bushing grinding wheels is so simple that any boy or handy man can do the work in a satisfactory manner, while the cost of the whole outfit should not exceed twenty dollars at the most.

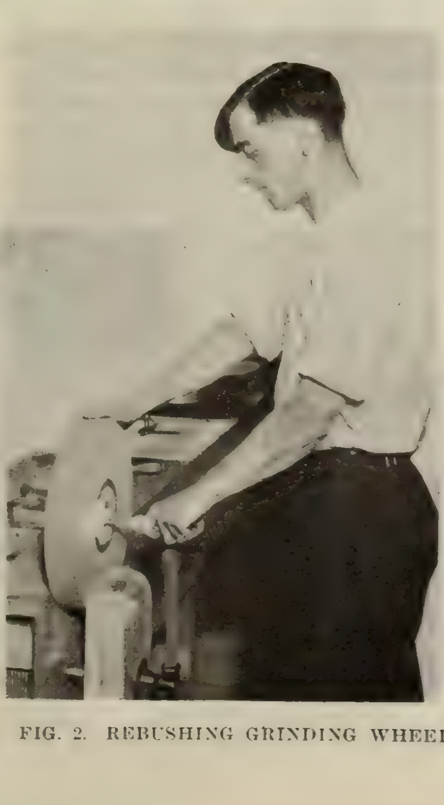


FIG. 2. REBUSHING GRINDING WHEELS.

* * *

WHAT HAPPENED TO HENRY

By D. S. Mann.

IN the past few years wonderful advances have been made in all materials of construction as regards quality and strength, but in no industry has this been exemplified to such an extent as in that devoted to the automobile. It is indeed marvelous how some of these machines in the hands of ignorant and careless owners are maltreated and still remain in running condition, and performing their natural functions.

In one of the Southern Louisiana towns which the writer visited during the irrigation season, the large pipe shown in the cut was being hauled in, and was left for the night across one of the street corners without any warning lights. This pipe was four feet in diameter and seventy-five feet long, and was used for a suction pipe in one of the larger irrigation plants; the weight was about 9,000 pounds. Some time during the night the Ford runabout, which was being driven without lights and by a one-eyed man as well, got into the position shown. How either the driver or the other occupant of the machine escaped serious injury is a miracle, but the pipe was just low enough to be caught by the top of the radiator and was entirely lifted out of the retaining blocks on the wagon bolster and carried over the side of the wheel so that about two-thirds of the total weight was on the machine. In addition to this, the front trucks of the wagon which weighed nearly as much as the Ford, were dragged about four feet to the one side. Besides breaking the windshield and radiator, and bending the steering column, the frame was only slightly bent, but not enough to take down and straighten. The car was again in commission in a few days with only a slight bill for repairs.

WHAT HAPPENED TO HENRY?

Had the pipe been six or eight inches higher, probably both occupants of the runabout would have been killed. It seems almost incredible that a machine constructed of such light material as this one could be capable of sustaining the tremendous weight with so little damage; there appears on the face of it a recommendation for the quality of the steel used in its construction.

* * *

WHAT A BOILER INSPECTION REVEALED

By D. M. M.

TO a factory in Ontario, the Provincial Government boiler inspectors were recently called to examine a battery of old boilers that were again to be put in operation. It is a fortunate circumstance that inspection was required, for the boilers were in such shape that they would surely have blown up if put into service in the condition in which they were found. No previous inspection had been made by the provincial authorities. It was believed that extensive repairs would be necessary before the boilers could be used again, and, because of this, they automatically came within the jurisdiction of the steam boiler branch of the department of Public Works, Province of Ontario. Inspection revealed the condition of all three boilers to be such as to necessitate their removal and replacement by new units. Adhesion of oil to the bottom shell plates appears to have been the undoing of the different boilers. The illustrations taken from the worst of the three after removal from the brickwork setting speak for themselves. All three boilers were of horizontal, return tubular type, 72 inches diameter and 18 feet long.

The exhaust steam from the engines was discharged as condensate into a hot well, being afterwards pumped back without filtration into the boilers. In consequence, a considerable quantity of the oil and grease used for lubrication in the engines was carried into the boilers along with the feed water, and, after combining more or less with the sediment held in suspension by the water, formed a greasy deposit which settled on the heating surfaces, preventing the water from coming in contact with the plates, besides interposing a poor conductor of heat transmission, the result being that the plates became red hot and bulged. It is noteworthy that all three boilers comprising the battery were bulged, although two of them were so to a lesser extent. The development of the bulges may have been gradual, yet when discovered, all the boilers were in a dangerous condition.

Fig. 1 shows the deformation of the bottom shell plates of one of the boilers. The bulge extended half way round the circumference, and showed 22 ins. extreme depth. The plates had stretched circumferentially about 30 inches.

Fig. 2 is a view taken through the manhole door below the tubes on the front head and shows how the longitudinal stays bent when subjected to compressive stress, due to the boiler head around the manhole being pulled in when the shell plates bulged outwards. The inside lap of the girth seam at this point was about one inch clear of the bottom shell plates, and the head was distorted about seven inches from its original face line. It was fortunate that the bulged plates remained intact, and their having done so proves that the material 7-16 in. thick, must have been of very good quality.

* * *

Out in California a centrifugal blower, driven by an electric motor, is being used in the shelling of almonds. Formerly the nuts could be shelled by hand only with the greatest difficulty. At the present time the almonds are fed into the suction side of the fan, where they are picked up by the runner and hurled against the fan casing, following which they are blown out of the discharge pipe into a box, all ready shelled.

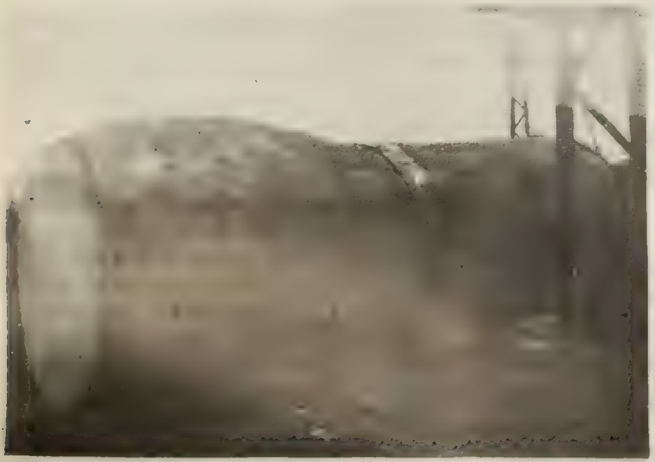


FIG. 1—BOTTOM UP VIEW OF BOILER SHOWING BULGED CONDITION OF LOWER SHELL PLATES

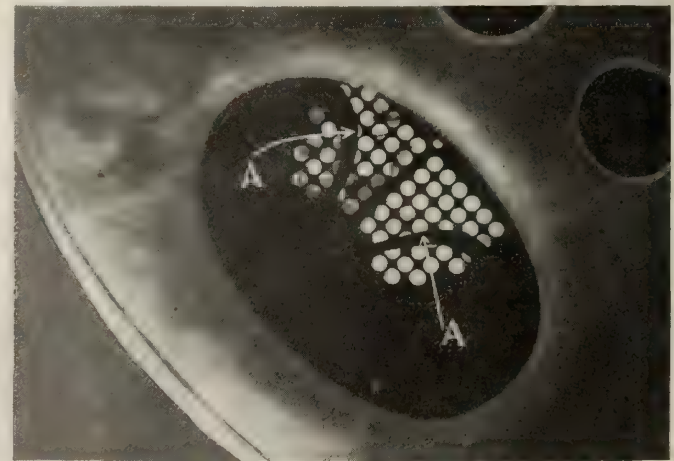


FIG. 2.—VIEW THROUGH FRONT HEAD MANHOLE BELOW TUBES SHOWING BENT LONGITUDINAL STAYS A.A.

WHAT A TRADE SCHOOL BOY SHOULD KNOW*

by J. C. Spence**

FROM my standpoint, every boy and every girl, no matter what future calling they intend to follow, would be better able to enjoy an independent life, if they had the elements, at least, of a trade that requires skillful use of the hands and mind, provided the trade is taught in a professional school and not by amateurs. A clear understanding of the machinist's trade and its allied branches puts a man in a position where the everyday things of life are not mysteries to him.

I want to congratulate all of you on having chosen to go to a school that teaches a man to earn a living. I do not agree with those people who look down on the so-called sordid side of life—the money making side. To my mind the practical trade side of modern life is of the first importance. After a trade has been acquired then let those of us who have the time acquire whatever art that appeals to us.

How much better off a man is who has a good insight into the workings of the telegraph, telephone, wireless telegraphy, electric motors, gas motors, airships, steam heating, etc. I know a man who gets a very high salary in his profession who has to call a plumber to pack a leaky faucet and yet this man looks on any one, not a plumber, who can cut a leather washer out of an old shoe and fix that faucet, as a world's wonder and he regrets very much that he cannot do such things.

To be sure, he can pay others for doing it but every one ignorant of these things cannot afford to pay for them although they have to. On the other hand, you who are mechanics know the satisfaction of being independent of outside help, even though your work, outside of your particular branch, may not measure up to the professionals yet it does what you set out to do and your training gives you the sense not to tackle the jobs you can't do. I claim that we would have better ministers, lawyers, doctors, dentists, teachers and citizens in general, if all knew something of the principles of the machinist's trade, on account of the consequent increase in common sense.

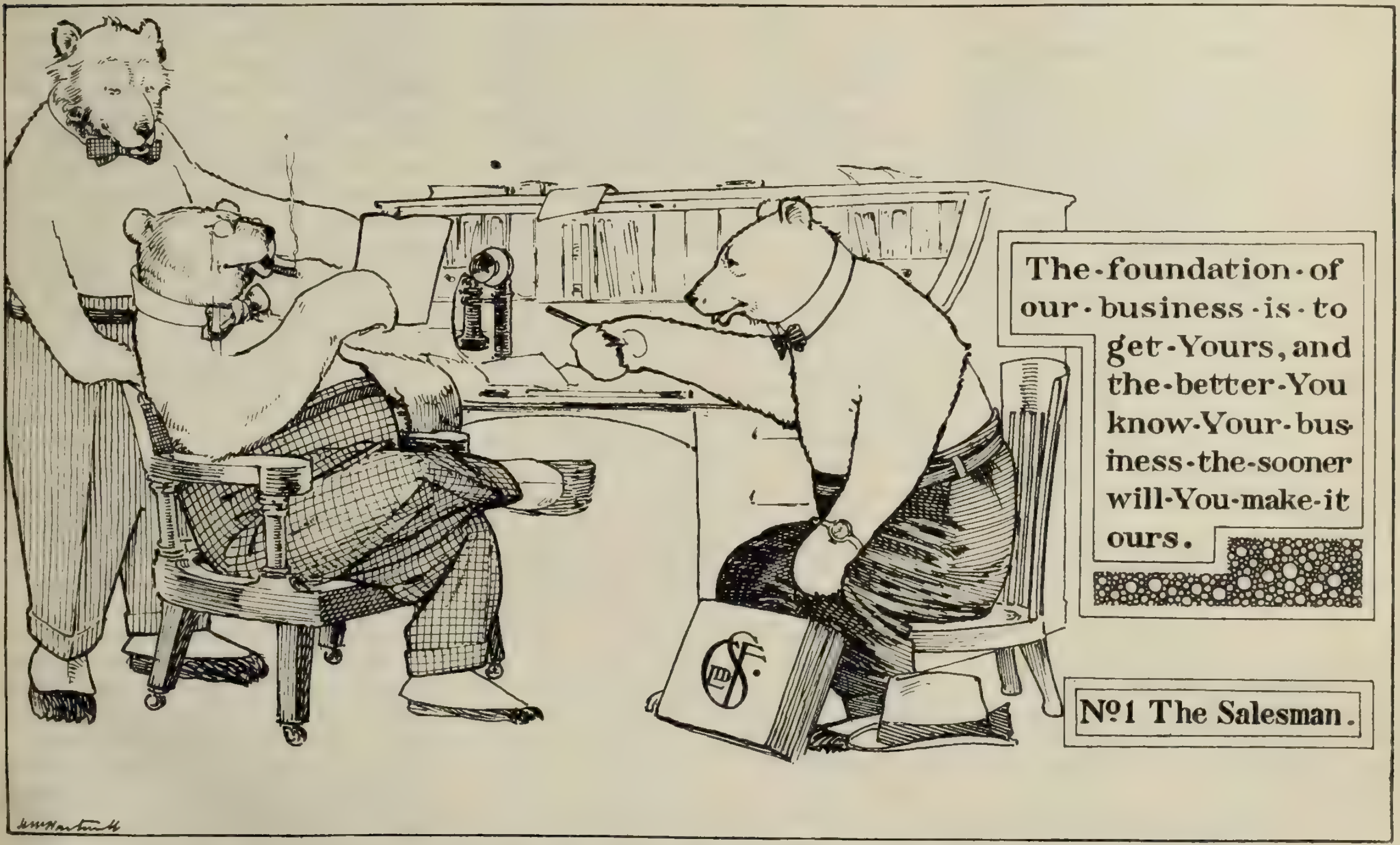
How to Get a Job

The getting of a job in good business times, is an easy matter. Whatever the times, however, the man who hires is very much influenced by those attributes known as "personality." Some people are born with, or acquire by instinct, or have forced upon them by relatives some of the essentials of a good personality. One should know that neatness of person, including clothing, hair and teeth, give very strong, favorable impressions. Do not chew tobacco or gum—you will need all of your jaw muscles for answering questions.

Wear the hat straight. Avoid "Rah-Rah," clothing of all kinds. If it is possible to get coats that are plain cut, without turned back cuffs or extra belts or forty-five degree slanting pockets, then get them. Older mechanics would as soon put up a shelf at forty-five degrees as to cut a pocket at forty-five degrees.

Never approach any man in business hours with any odor on your breath. Be careful how you handle doors and chairs. Have your shoes clean, if the approach to the factory you are visiting will allow it. I presume that you are taught all of these things and also that you know them by previous training but there are so many boys who come to me lacking in these details that I think it best to mention them.

Do not go after a job haphazard. Pick out the factory you want to work in and then find out who to see there. Don't simply walk in and ask for "the guy dat hires the help." Go at it as you would go about selling any kind of merchandise. If you really believe you ought to work for that factory don't let them turn you down. Find out who has some influence with


The·foundation·of our·business·is·to get·Yours, and the·better·You know·Your·business·the·sooner will·You·make·it ours.
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*From a Talk to the Worcester Trade School for Boys.

**Superintendent, Norton Grinding Co.

the man in authority and pull any strings you are able to. If you have to, take the job that looks next best, take anything, but finally get the job you started to get. Don't let any one lick you in your first serious business undertaking. If you do, it will not be good for your soul.

He Meant Business

Some time ago a young man from Chicago, twenty years old, came to me and asked for a chance to learn to grind. I told him business was bad and we were running short time and that I did not see my way clear to take him. He pulled a paper from his pocket and showed me a list of what he considered were the leading machine firms of this country. He said, "I cannot afford to go to a Technical School but I am going to be an engineer. I am willing to work every evening in my room. I have made up my mind to work for each of the firms on this list long enough to understand what the uses and good points of their machines and organizations are. I am going to work for your firm if I have to work for nothing. I saved a little money at the last place and I have a promise of a job at The Potter & Johnston Co., Pawtucket. I will work here for nothing until I have just enough left to get me to Pawtucket. If I went to a technical school, I would have to work four years for nothing and then would not get what I have planned to learn. Will you put me to work?"

I had to put him to work. I would not have been able to face myself, if I didn't. I took him at his word and let him work until I knew he wasn't bluffing. Then we gave him piece work and the foreman picked out snaps so he could make his living in the first three days of the week and devote the rest of the week to investigations on his own time.

That boy had man sized ideas on what he owed himself. He had thought out the capital and labor question in a manner that would put to shame the judgment of many of our leading men, to judge by the paper reports of their utterances. He had no foolish side that I could discover. He was clean from his eyes back. If he lives, he will manage large affairs. I can wish you no better outlook than that you may be like him. I tried to keep him but he had his own ideas. The superintendent side of me was sorry but the mechanic side of me was glad. I envied him his free soul and his [illegible]

Outlook the Standard

Having obtained a job in the machine trade, what should you know to hold it and to advance? First, you must know that only in rare cases does advance in wages or position come through pull or length of service. Output is now the basis used by most firms and all of the up-to-date ones can tell who did each operation, how long it took, what it cost and what was spoiled. In addition to this there is a card for each operator which gives his particular productive history. The gains and losses are continually added and subtracted so that, at a glance, it can be seen whether or not he is a bargain.

The first idea, then, is to get it firmly fixed in your minds that any propaganda that preaches limited output and puts all men on a level is doomed. The spirit of ambition that has its birth with every free-born soul will not tolerate this hindrance to its growth. The more you restrict production the greater the incentive for the "boss" to get up some scheme to do the job another way and dispense with your services. There is nothing on the other side except for the few who lead. When the barnacles become too troublesome, the old ship either drifts onto the rocks or is hauled into dock and scraped clean. The live captains of to-day are always on the outlook for barnacles and do not hesitate to use the scraper.

During your school course you should learn the materials and tools used in your calling just as a surgeon learns his appliances. You must have intended to follow this business or you would be at school. Hence you owe it to yourselves to know as much as you can possibly learn about this business. I know that you must have recreation, but find time to visit foundries, forge shops, boiler shops, pattern shops, pressed steel plants, wire mills and every mechanical place where you won't be "thrown out." If you think you need the knowledge, take a chance on being "thrown out."

Knowledge of Materials

Know your materials. Keep up to date on metals. Know for what purposes the various steels and irons and bronzes are best suited. It is astounding to learn how little the average draftsman or foreman knows about the things he deals with every day. If a lawyer knew as little law as most machinists know materials, he wouldn't get his second case.

Knowing materials also implies a knowledge of their ability to cut or to be cut. On each job put yourself in the place of the efficiency man to see just how fast it can be done at a rate possible of maintenance by you. Keep sketches and records of your work. You will need them some day when, as foreman or superintendent, you will be called upon to make a price with nothing before you but a blue-print and the cold fact staring you in the face that on your ability to figure right depends the taking or losing of work for your firm. A good way to train yourself in this line is to always estimate how long it ought to take to do a job and then in doing it, make believe that some one else did the estimating and now you are going to show him up by putting it out in a time that will make him look like an amateur. You can have a lot of fun with yourself this way.

I once had a foreman who wanted to know what he could do to get more pay. I told him to take home a blue-print that night, put himself in my place and figure to the best of his knowledge how long it ought to take his men to make that piece. Is the morning he came to me with the frank statement that he couldn't figure how it ought to take much more than half the time his men had been taking. I told him that between his statement and what his men were doing lay his possibilities for advancement. Between what the common herd are willing to think is enough to keep them from getting fired and what you can do by using your brains, lies the chance for your start in life.

Interest in Waste Prevention

Don't take the attitude that because the shop isn't yours, that you should not worry about the waste of money. If you find that there is too much stock on a casting or a piece can be made another way, one road to advancement lies in the suggesting of corrections. If your ideas are not given a hearing, especially if they are adopted and you do not get favorable comment from your foreman, then you are in the wrong shop.

Don't flare up however, and resolve to keep your mouth shut after this, but go quietly about getting a job in a better shop. Don't hurt yourself to spite some one else, because, if you cease to take enough interest in your business to think along the lines of improvements you will cease to develop as a mechanic. While you are with a firm, be loyal to them. Stand up for the product. Tell all the good things you can about it. If you know any bad, tell it to the persons who ought to correct it. If you can't honestly say that you are working for a firm that makes goods good enough for their intended purpose, then it is time to begin to hunt a new job.

Remember that rewards do not generally follow immediately on the heels of good performance. It takes time to get big returns on any capital. When you do your best on a job, you are adding to your bank account with some firm.

Some day a dividend will be declared. When you do not do your best on a job you are spending some of the capital already to your credit. If the spendings are greater than the savings you will one day face a deficit.

Among the officials of the concern for which I work, there are many discussions of the possibilities of using such and such a man for such and such a job. Do not fear that you will not be known to those who can use you. Your only care should be to be favorably known. See to it, also, that you do your own thinking. Listen to any one you may wish to, read what pleases you, but listen to and read both sides of all questions that pertain to your welfare.

Do not delegate to any man or body of men with axes to grind for themselves, the right to do your thinking or to make your decisions for you. Your future, outside of those traits or capacities imposed on you by accident or heredity, lies in your hands.

ADVISORY COUNCIL ON INDUSTRIAL AND SCIENTIFIC RESEARCH

THE following honorary Advisory Council on Industrial and Scientific Research was on Nov. 30 established by the Canadian Government:—A. Stanley MacKenzie, Ph.D., president of Dalhousie College and University, Halifax; F. D. Adams, Ph.D., D.Sc., Dean of the Faculty of Applied Science, McGill University, Montreal; R. F. Ruttan, M.D., professor of Organic and Biological Chemistry, McGill University, Montreal; J. C. McLennan, Ph.D., University of Toronto; A. B. Macallum, M.B., Sc.D., University of Toronto; Walter C. Murray, LL.D., president of the University of Saskatchewan, Saskatoon; R. Hobson, Steel Company of Canada, Hamilton; R. A. Ross, consulting electrical engineer, Montreal; and Tancrede Bienvenue, general manager of La Banque Provinciale, Montreal.

The appointment of this Council is a forward step designed to stimulate the industrial development of Canada on scientific lines, as has been done already in many countries. The need for such a step was emphasized by Sir George Foster in the House of Commons last session. Since then he has been studying the procedure of other countries and has placed himself in communication with scientific and research experts in various Canadian cities, who have given attention to this question. The Council now appointed will work along the lines already being followed in Great Britain, where the Advisory Council is responsible to a ministerial sub-committee according to a plan proposed by Mr. Arthur Henderson.

The scheme went into operation in Great Britain in July, 1915, after which a proposal was made that its scope be extended to the overseas Dominions, a proposal which was adopted in principle.

Universities' Co-operation

In January of this year circulars from the Minister of Munitions were sent to universities in Great Britain and Canada inviting co-operation in the improvement of appliances for land warfare. The universities have supplied information as to their facilities for research work and have expressed their willingness to co-operate with some branch of the Dominion Government.

Sir George Foster has recommended, and there has been appointed, a subcommittee of Council, consisting of himself and the Ministers of Interior, Mines, Inland Revenue, Labor and Agriculture to work with the Advisory Council. Their duties are to secure the co-operation of other bodies in the work of scientific and industrial research. The most practical and pressing problems presented by industrial necessities will be directed by the committee to the research bodies for solution. Reports will be made from time to time on the results of the investigations.

The practical necessities to be dealt with are the utilization of waste products, the discovery of new processes, mechanical, chemical and metallurgical, and the development of the unused natural resources of the country into useful adjuncts of industry. The importance of the step now being taken has been specially evident under war conditions when the scarcity of certain compounds and processes has caused confusion and paralysis in industries, and has added greatly to the cost of living.

In addition to the facilities offered by the universities of Canada, private, corporate and government laboratories are more or less engaged in research work. The Manufacturers' Associations also have signified their desire to co-operate in the research work in relation to the industries of the country. The new committee will of necessity travel about in carrying on their work.

PLATE GIRDER STIFFENERS

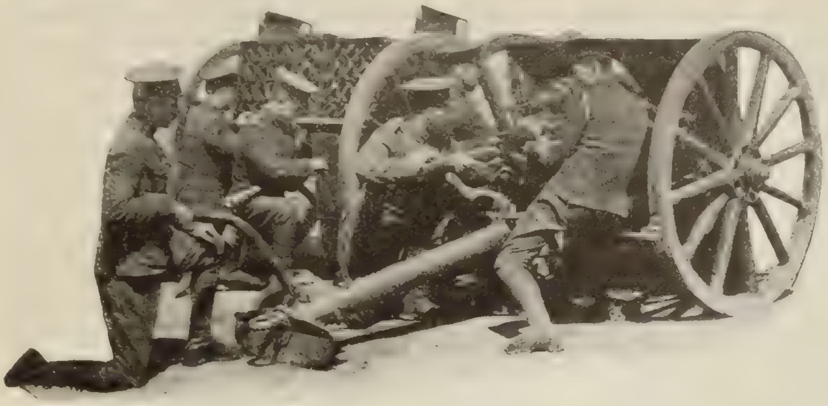
STIFFENERS, as commonly used on plate girders, perform two functions. Those placed at frequent intervals along the girders prevent the web from buckling as a column because of diagonal compression. Stiffeners placed under concentrated loads or over supports distribute the concentrated force, which would otherwise be delivered directly to the flange, over a considerable portion of the depth of the web. These latter stiffeners assist also in preventing the buckling of the web. The General Specifications of the American Railway Engineering Association for Steel Railway Bridges, 1910 edition, state, "There shall be web stiffeners generally in pairs, over bearings, at points of concentrated loading, and at other points where the thickness of the web is less than 1-60 of the unsupported distance between flange angles. The distance between stiffeners shall not exceed that given by the following formula, with a limit of 6 ft. and not greater than the clear depth of the web: $d = t \div 40\ (12{,}000 - s)$, in which d = clear distance between stiffeners of flange angles, t = thickness of web, s = shear per square inch."

A SELF-LUBRICATING METAL

A SELF-LUBRICATING metal is reported to have been produced in the United States, in which the mechanical strength of graphite is increased by impregnating it with a metal. The mixture is called "Graphalloy," and is not injured by contact with oil; in fact, oil can be used along with it. The manufacture of the alloy is described in the "Scientific American." The graphite is placed in a crucible of the same material, together with the molten metal, with which it is to be impregnated. The crucible is then placed in the cylinder of a large press, and a partial vacuum created simultaneously with the application of heat. Upon the completion of this operation, high-pressure air is admitted to the cylinder of the press. The plunger of the press on which rests the crucible is also forced up by hydraulic pressure. After impregnation, the graphite is found to have absorbed metal enough to increase its original weight by 150 per cent. For bearing purposes the alloy used is babbitt.

PRIVATE MOTOR MAKING STOPPED IN BRITAIN

THE British Minister of Munitions has made an Order under the Defence of the Realm Regulations. It prohibits as from November 15 until further notice any person, firm, or company engaged in the manufacture or repair of any vehicle designed for mechanical transport or traction, or any part of such vehicle from carrying out in any factory, workshop, or other premises, without a permit issued under the authority of the Admiralty, the Army Council, or the Minister of Munitions, any work consisting in the manufacture, assembling, or erection of any new or unused motor internal combustion engine designed or adapted for mechanical traction, or of any new or unused motor cycle, motor chassis, motor wagon, or of any tractor or other motor vehicles of any kind, propelled by mechanical means, subject, however, to the following exception:—Work required to complete contracts placed by the Admiralty, the War Office, the Minister of Munitions, or an Allied Government on or before the date of this order.



Production of 9.2 ins. High Explosive Shell Forgings

Staff Article

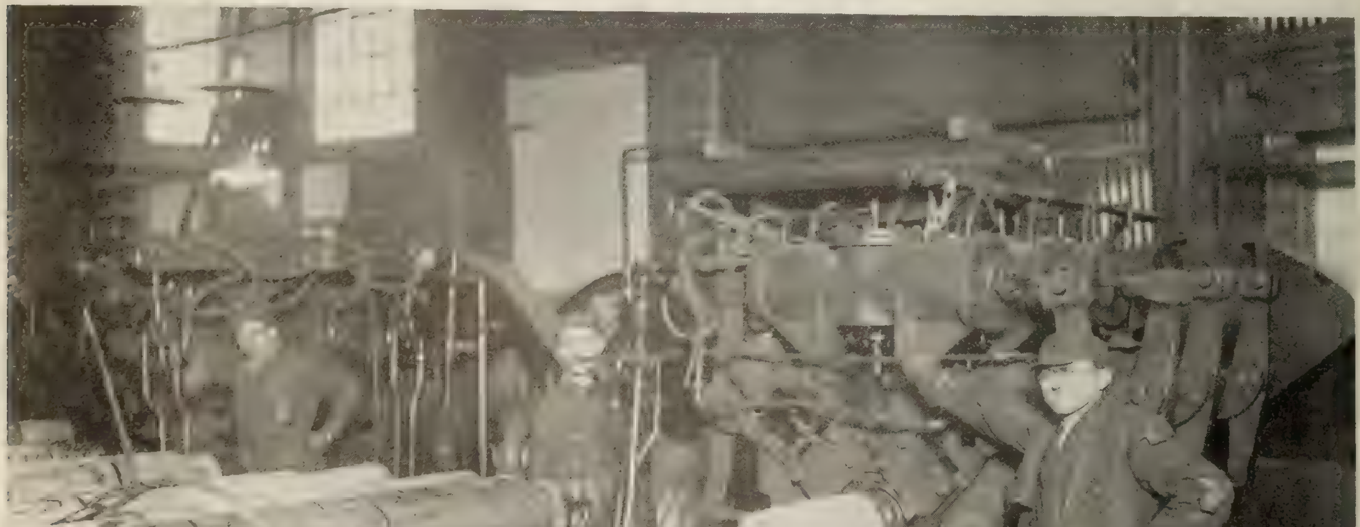
Uniformity of product in forging work is dependent to a great extent on the ability of the plant to maintain a steady rate of production. This involves well-balanced equipment, reliable in operation, accurately tooled, and systematically operated. These features are possessed in high degree by the plant hereunder described, every possibility of blacklash in operation having been eliminated, so that thoroughly satisfactory results are obtained.

THE production of forged blanks for large sized shells is characterized chiefly by simplicity and massiveness of equipment, high degree of power required for the operations, and desirability of continuous operation. The various items of equipment range from pneumatic chipping hammers of a few pounds weight to hydraulic presses of many tons.

Work on the material preparatory to forging consists of cutting into billets, breaking the billets off the bar, inspection and removal of seams and other flaws. The material from which 9.2 in. blanks are forged is received from the steel maker in the shape of round bars about 8 or 9 ft. long and 9½ in. diam., sawn roughly to length as delivered from the blooming mill.

The required size of billet is roughly 20 in. in length and the output, necessary to maintain the press equipment in constant operation is obtained by the use of multiple machines which cut four pieces simultaneously. The use of such machines was facilitated by the fact that the bar is not cut clean through, but only to a depth of about 1½ in. leaving a core which is latterly broken off by dropping a weight on the bar. This core of approximately 6 in. dia. possesses sufficient strength to drive the bar under the load of 12 cutting-off tools employed in each machine.

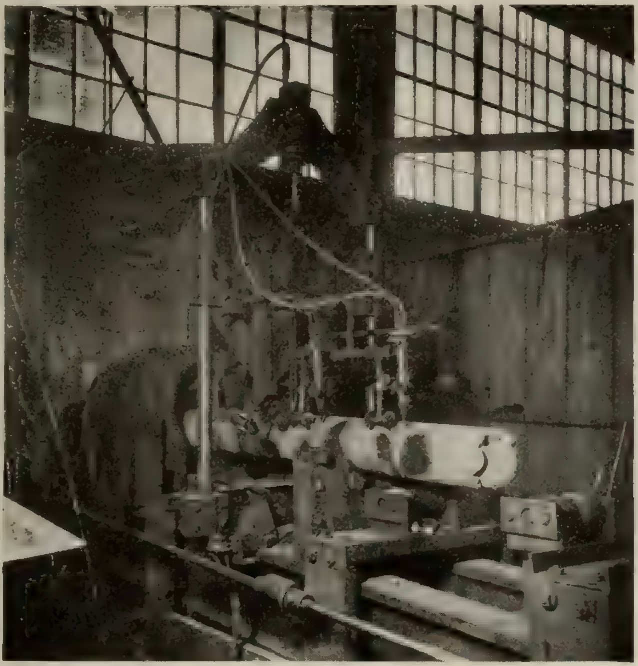
The illustration gives a good idea of the arrangement of these machines which have been developed specially for such work by the Southwark Foundry & Machine Co. Four frames are mounted on a bedplate, each frame having three pneumatic cylinders which feed individual tools into the work. The work is driven by a simple form of automatic clutch carried on a heavy spindle which is gear driven by electric motor. As any one tool may become dull more rapidly than the others, the pressure required to feed it in is greater, but as the pressure of air is elastic, the tool simply does less work and is not driven to destruction as would be the case with a positive gear feed. Handling of the bars is done by two horizontal hydraulic rams which



MULTIPLE CUTTING-OFF MACHINES WITH PNEUMATIC FEED CUTTING FOUR BILLETS SIMULTANEOUSLY.

push the bar into position from the open end of the machine, the ejecting ram being located inside of the spindle.

The application of oxygen cutting to this work is also illustrated, the machine being on the same general lines, but provided with four oxygen jets in place of cutting-off tools, and the spindle arranged to make one revolution only to complete the work. The Davis-Bournonville burner equipment was installed by the Carter Welding Co., and utilizes oxy-acetylene gas in pre-heating the metal to a point where the pure oxygen supports combustion, thus melting the metal out of each groove.

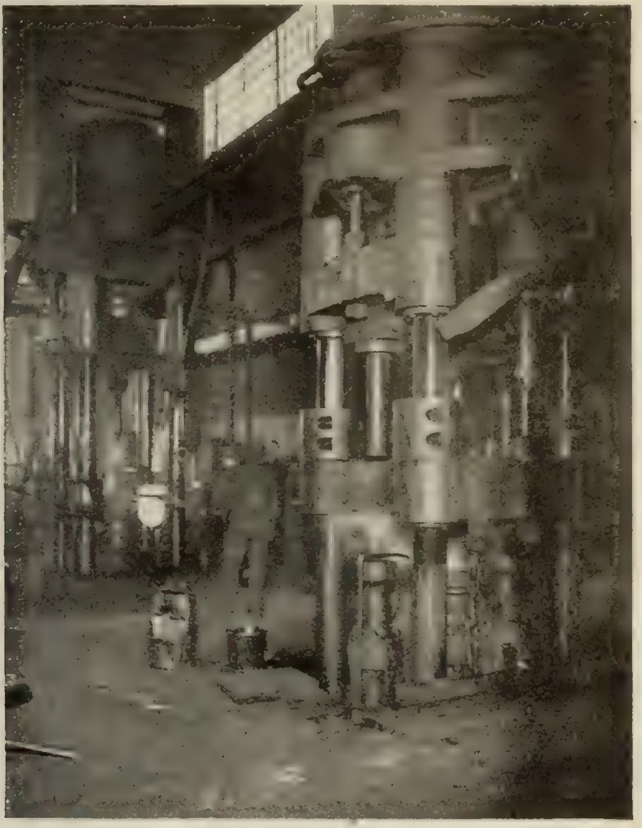


OXYGEN CUTTING-OFF MACHINE PRODUCING FOUR BILLETS PER REVOLUTION.

The grooved bars are now placed on supports and broken by a falling weight, the resulting fracture being subject to inspection to determine the exact condition of the metal, further inspection of the exterior resulting in occasional billets being set aside for the purpose of removing surface flaws. Many of these are due to scale and slivers which are easily removed by chipping off with pneumatic hammers and chisels. In some cases, however, the flaws are more than skin deep and their investigagtion to a depth of even one inch may be necessary before acceptance. Owing to the steady strain and depth of cut, the work of chipping flaws is done by an ample squad of men equipped with Cleveland hammers and safety goggles.

The work of forging, properly speaking, commences with the heating of the billets. This is done in a continuous furnace the bed of which is inclined at about 15 degs., from the entrance down to the hearth. The sloping part of the bed is wide enough to allow two billets to lie end to end across, so that two rows of billets are descending at the same time. Where the slope runs onto the hearth, it broadens out to allow room for turning the work about.

Heat is derived from coal, fed in by two American stokers of the underfeed type, the products of combustion passing up along the sloping part of the furnace from which they are discharged to atmosphere at some height above the ground.



TRANSFERRING A HOT SHELL BLANK FROM THE PIERCING PRESS TO THE FORMING PRESS.

Overhead tracks enable the hot billet to be rapidly conveyed from the hot furnace to the 1st operation press. This machine, like the others, is Southwark equipment and is an excellent example of forging machinery. Five separate cylinders are mounted on the upper yoke, the central or working ram exerting a total pressure of 700 tons when operating at a pressure of 1,500 lbs. per sq. in. Two of the smaller cylinders are located on opposite sides, and operate a floating yoke which carries a portion of the die. After the billet is in position in the permanent die, this yoke descends and remains in position while the main ram is engaged driving the punch down into the billet, piercing it and roughly shaping the lower part or nose which is enclosed.

The punch is now withdrawn by the main ram when returning, the yoke referred to acting as a stripper, after

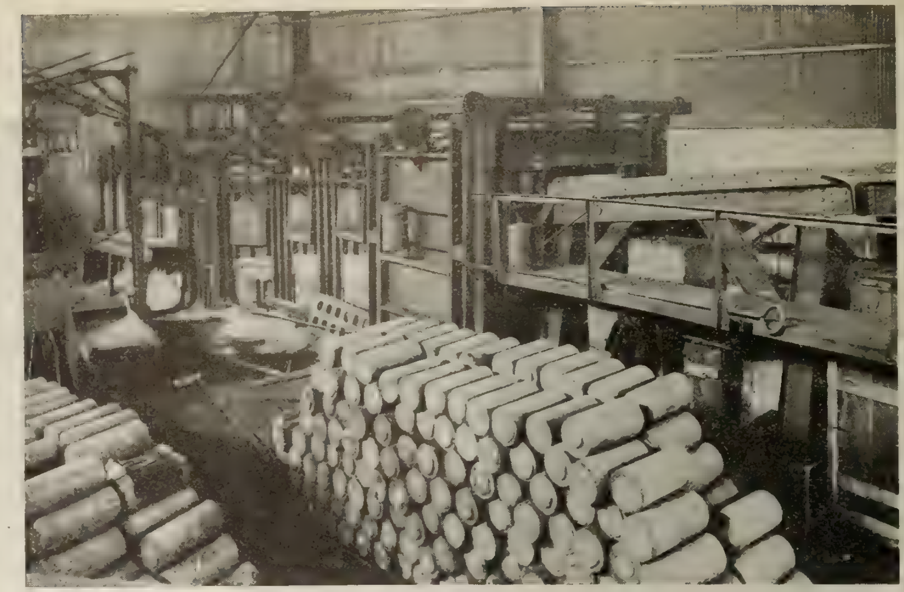
REMOVING FLAWS AND SCALE WITH PNEUMATIC HAMMERS PREVIOUS TO INSPECTION.

which the yoke itself ascends and allows the forging to be ejected, this being done by the two remaining rams which are connected by heavy chains to the ejector device below the table.

The work performed by the second press is similar in character to that described except that no piercing is done, the operation being chiefly to impart a correct profile to the nose and otherwise cause the forging to more nearly assume its final form. The press in this case is less powerful, being of 500 tons capacity, and provided with hand-operated stripping yoke, etc.

The forging, still hot from the second operation, is now transferred to a drawing press arranged horizontally in order to accommodate the long stroke necessary for the operation. The die block is conveniently located from the second press so as to avoid delay, and the long ram is suitably supported to prevent sagging during the operation. The total length of the drawing press, including die block, ram and cylinder, is fully fifty feet.

The drawing ram carries the shell clear past the end of the die block when an inverted U-shaped stripper descends behind the shell, preventing it from going back with the returning ram. The stripped shell runs down an inclined roller runway to a small platform where it is marked with identification letters and then rolled along a narrow gauge track to the cooling bed to await shipment to one of the various machinery plants engaged on this size of projectile.



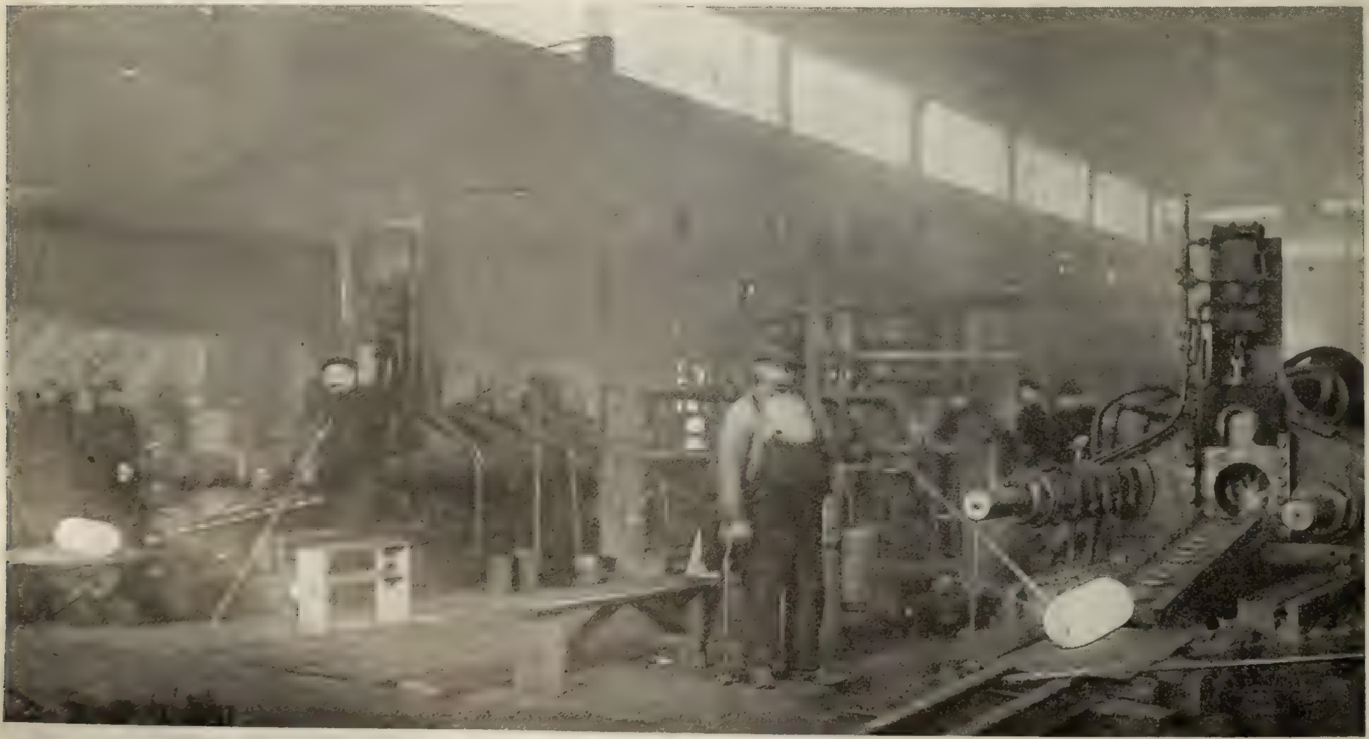
CONTINUOUS BILLET HEATING FURNACE SHOWING FEED TABLE AT UPPER END OF INCLINED BED.

ARTIFICIAL HAND COMPETITION

A CIRCULAR has been issued by the Societe Nationale de Chirurgie, of Paris announcing that an offer has been made to the Societe of a prize of 50,000 francs, to be given as a reward for the best mechanical apparatus for use by men who have lost the use of their hands. The announcement is to the following effect:

All competitors must belong to allied or neutral nations. They are to present to the Society mutilated men who have been using their apparatus for at least six months. The Societe de Chirurgie will experiment with each apparatus on mutilated men for the length of time it thinks fit. The apparatus rewarded is to remain the property of its inventor. The competition will be closed two years after the end of the war.

MM. Faure, Kirmisson, Queen, Rieffel and Rochard, who make up the committee elected by the Societe, inform the public of the condition of the competition, as stated by the donor, and beg any person wishing to compete to send his application and apparatus to M. Le Secretaire General de la Societe National de Chirurgie, a Paris, 12 rue de Seine.



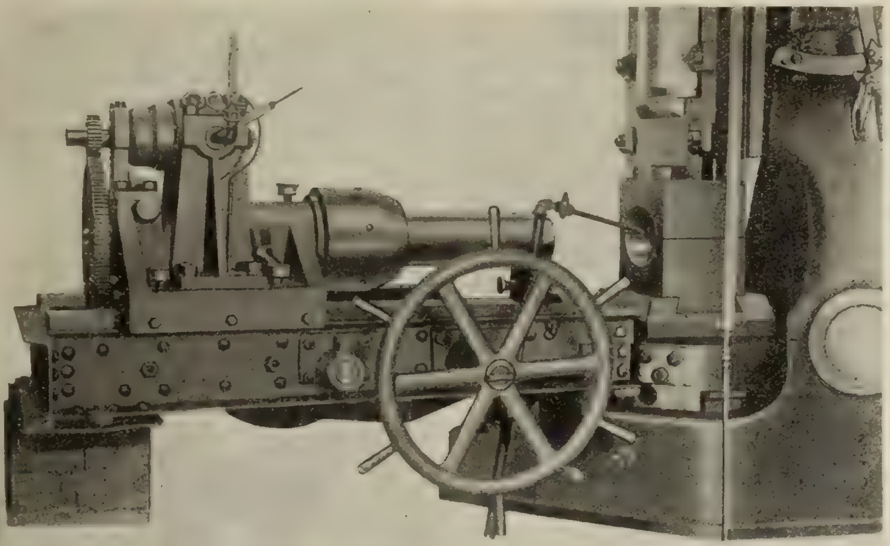
FINISHED FORGINGS BEING DELIVERED FROM HORIZONTAL DRAWING PRESSES. NOTE STREAMS OF COOLING WATER ON DIE OF NEAREST PRESS.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

HAMMER SHELL NOSING APPARATUS

THE illustration shows the Whelan nose apparatus, which has been designed with the express object of forming a uniform and concentric nose on shells undergoing this operation, the work being performed with such accuracy that the necessity for inside profiling after nosing is entirely eliminated.



APPARATUS FOR NOSING SHELLS WITH HAMMER.

The apparatus consists of a horizontal frame, built up of steel sections and provided with accurately planed machinery steel ways, on which travels a work carriage or headstock, moved to and from the hammer by a large hand-wheel.

The shell is held in a chuck mounted on the carriage spindle, which is revolved by a self-contained air motor, so that the hammer dies act on all parts of the shell nose as it revolves, the closing of the nose being gradually increased as the shell is fed towards the hammer. In addition to revolving the spindle, the air motor is also arranged to open and close the chuck.

The range of the apparatus covers 4-in., 5-in. and 6-in. shells, and it is stated that over 35,000 shells have been produced by one installation without any defects in the work or apparatus. The A. R. Williams Machinery Co. are placing this apparatus on the Canadian market.

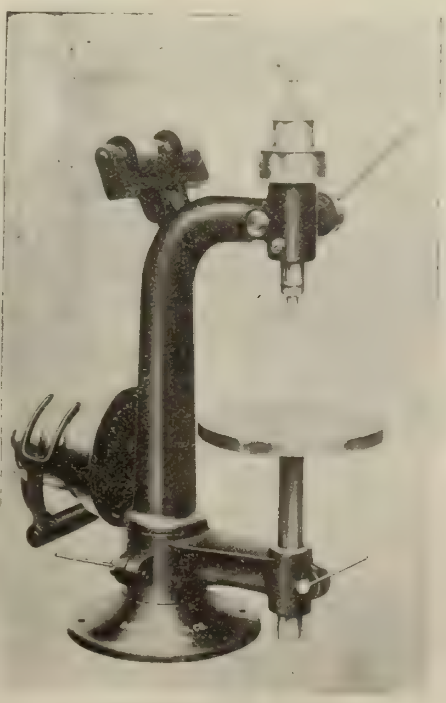
* * *

SENSITIVE DRILL PRESS

A SENSITIVE drill press possessing interesting features of construction is built in two sizes by the DeMooy Machine Co., Cleveland, O. Both sizes are similar in design, having the base and column cast in one to insure maximum rigidity. The bottom surface and arm-bearing are finished before placing the casting in jig for boring the supporting hole for spindle bushing, thus insuring the spindle being at right angles to the table.

The spindle is of high carbon steel, and in the smaller size is tapered to fit small drill chuck, the larger size having a No. 1 Morse taper; steel, fibre, steel thrust bearing on each.

The belt shifter is supported on the outer end of the cone shaft, and can be pivoted around to suit any angle of belt by which machine may be driven. The principal specifications are respectively: greatest distance from spindle to table, 7½ in. and 12 in.; vertical movement of spindle, 2¼ in. and 3½ in.; vertical movement of table, 6 in. and 7 in.; centre of spindle to frame, 5¼ in. and 7½ in.; net weights, 60 lbs. and 110 lbs.



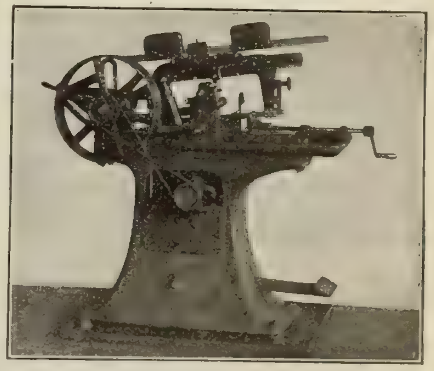
SENSITIVE DRILL PRESS.

* * *

NEW MODEL POWER HACK SAW

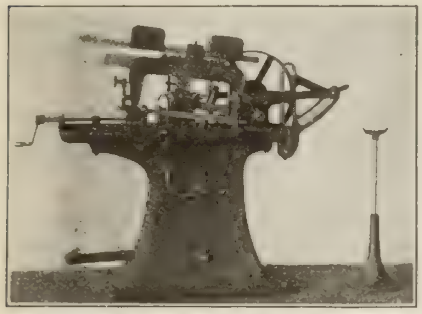
AS a result of their long connection with the metal-cutting industries through the manufacture of hack saw blades, the L. S. Starrett Co., Athol, Mass., have placed on the market a power hack saw which combines several features calculated to give increased efficiency in operation.

The base casting is of pleasing and compact design, and represents a step still further forward in that refinement of appearance, and utility of construction, which has characterized this class of machine in recent times. The saw frame is mounted on a rectangular slide, with a bearing 11¼ in. long, accurately fitted with an adjustment for wear and provided with a quick-acting saw tightener to hold the blades square. The stroke is adjustable for stock from 1 in. to 6 in. diameter; 14 in. blades are regularly used, but 12 or 13 in. blades may be used when required.



IMPROVED POWER HACK SAW SHOWING DASH POT AND FOOT TREADLE.

Among the points of particular interest to users are—the stroke adjustment, which allows the full length of the blade to be used, irrespective of the size of stock, giving uniform wear of blades and fastest cutting; a foot treadle for raising the saw frame, requiring less effort on the part of the operator and leaving both hands free for handling stock; an oil dash pot controlling the descent of the blade, so that it does not drop on the work and break, also allowing the teeth to enter gradually without stripping; lastly, an automatic locking device which prevents the saw dragging on the return stroke, and also holds the saw frame at any height when stopped for setting work.



OPPOSITE SIDE OF POWER HACK SAW SHOWING DRIVING GEAR TO FRAME.

A pump and lubricant tank are located inside the base, and are easily removable for cleaning. The height over all is 48 in., and to top of table, 28 in. Floor space occupied is 14 x 32 in.

* * *

BALL-BEARING HIGH-SPEED BENCH SAW

THE illustration shows a portable ball-bearing bench saw designed for sawing soft metals, fibre, wood, etc. The saw arbor runs at 3,500 r.p.m. on ball bearings mounted in dust-proof housings, with provision for ample lubrication. Speeds from 1,000 up to 6,000 r.p.m. can be supplied when desired.

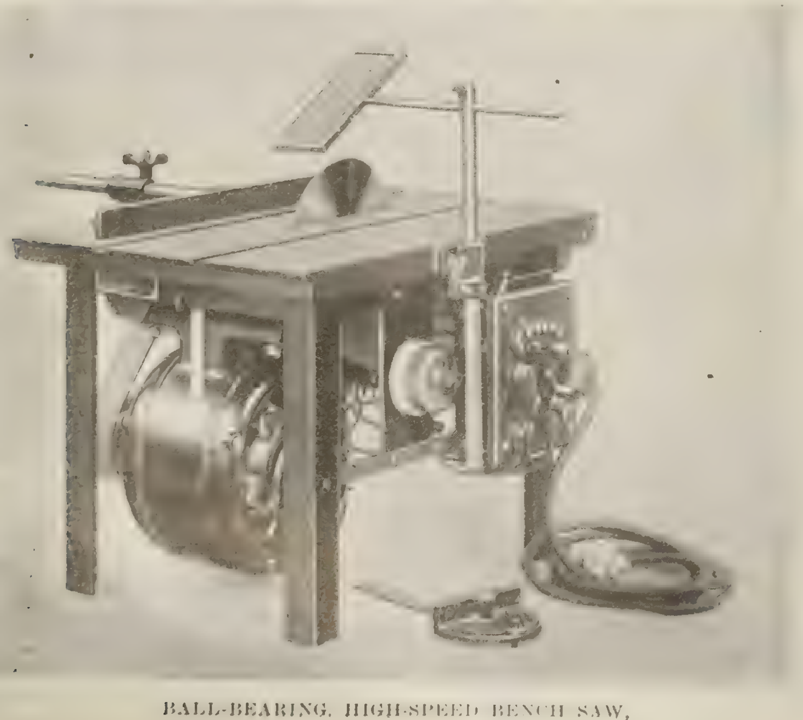
The machine, which is a recent product of H. G. Crane, Brookline, Mass., is accurately and substantially constructed, the lower part or stand being made in one casting. The motor is hung in an inverted position on a specially designed dust chute, which is hinged at the upper end. The chute serves to protect the motor, and also permits a convenient method of keeping the belt in proper tension. The turning of a hand-wheel raises or lowers the motor at will.

The illustration shows the saw table equipped with a $1\frac{1}{2}$-h.p. direct current motor, with starting box and switch. The table top is quickly raised or lowered to any position when it is desired to do grooving or slotting. The guides are easily and quickly adjusted in position, and are interchangeable to either side of the saw. The plate-glass shield, supplied as an extra, can be attached or detached without the use of tools. Motors for 110 or 220 volts, alternating or direct current, and of ¼, 1/3, and $1\frac{1}{2}$-h.p., can be supplied to answer various requirements.

The principal dimensions of the machine are as follow:—Size of top, 16 in. x 22 in.; height of machine, 18 in.; weight with $1\frac{1}{2}$-h.p. motor, 150 lbs.; size of saws, 8 in.; capacity for sawing, $2\frac{1}{2}$ in. stock.

* * *

Want Industrial Commissioner.—At a recent meeting of the B. C. Manufacturers' Association, held in Vancouver, a movement was initiated to urge the new Provincial Government to appoint a Provincial Industrial Commissioner who would work in conjunction with industrial commissioners now employed by municipalities and who would look after the industrial data in places which have no such officials.



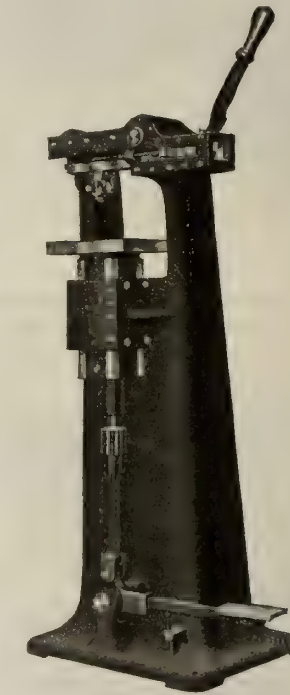
BALL-BEARING, HIGH-SPEED BENCH SAW,

HAND MARKING MACHINE

THE machine shown in the accompanying illustration was designed to meet the demand for a low-priced machine for marking trade, name, size, or patent marks on all round or flat surfaces of tools, such as drills, taps, dies, etc. Any material or article suitable for receiving impressions can be effectively handled in this No. 6 machine, which is built by the Martin Machine Co., Greenfield, Mass.

The article to be marked, if having a flat surface, is held on the table by a suitable fixture, when, by pressing the foot treadle, the table is raised to the proper height, when the die, which is held in the holder attached to the horizontal slide, is brought into contact with the work by means of hand lever, which forces the slide across, and causes the die to roll the impressions in the work.

When marking round surfaces, such as taps or dies, a flat die is attached to the slide and the work allowed to roll on the table, while the die is in contact with it. Adjustments are provided when using round or flat dies, so that the proper character on die shall come in contact with work at stated point, and screw stops are provided to govern the amount of travel after contact is made so that a clean cut is made at the beginning and end of the work.



HAND-MARKING MACHINE.

Both table and slide are gibbed to take up wear, and roller bearings are employed to reduce friction on slide. The table is adjustable for height by means of a screw and nut, for controlling the depth of letter to be marked. Several shelves are provided in the machine for keeping tools and equipment. The machine weighs 370 lbs. and occupies a floor space of 20 in. x 20 in.

12-IN. AND 14-IN. QUICK-CHANGE ENGINE LATHES

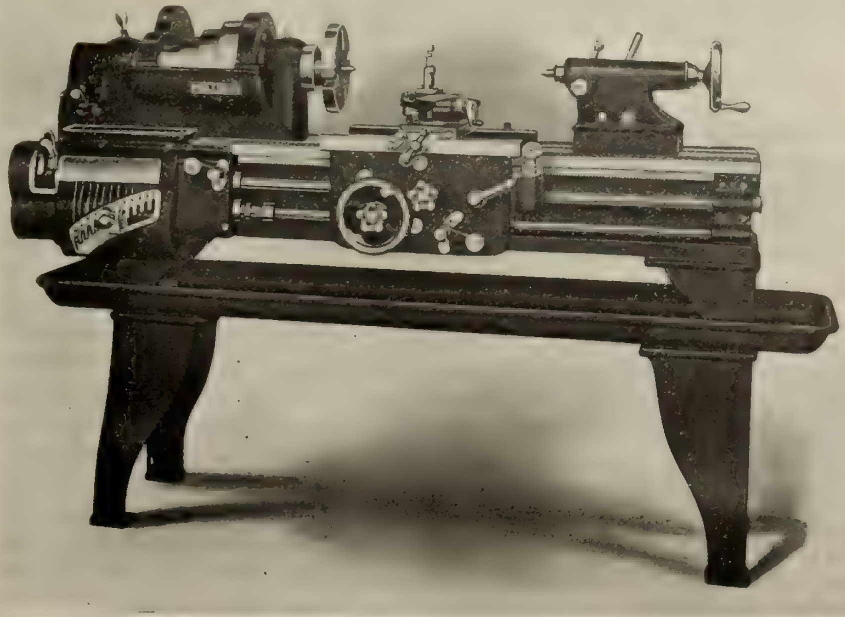
AN engine lathe of modern design, possessing features which render it suitable for tool room and high-grade manufacturing use, is now being produced by the Mulliner Machine Tool Co., Inc., Syracuse, N.Y., in two sizes—12 in. and 14 in. A high degree of rigidity is imparted to the bed which is cross-ribbed with heavy double-walled cross girths, the casting being made in such a manner that hard, close-grained metal is obtained, so that wear is confined almost entirely to the carriage, which is capable of being readjusted when necessary.

The headstock is of the four-step cone-pulley type, having a forged spindle of crucible steel running in ring oiling bearings, each of which is independently adjustable by taper construction, the front bearing of the 12 in. lathe being 1⅞ in. to 2⅜ in. x 3¾ in., and the back bearing, 1 13-16 in. to 2 3-16 in. x 2⅞ in.

The carriage vees are exceptionally long, while the bridge is of ample width and depth. A box type apron affords double bearings for all important shafts and studs. Full surface contact is provided between the compound rest and the bottom slide, full length taper gibs with end screw adjustment being fitted to both cross and compound slides.

The quick-change gear mechanism affords 37 different threads and feeds, and is mounted on the front of the bed. The cone gears are cut on the Brown & Sharpe 20 deg. involute system, which produces a tooth with slightly rounded top, permitting instantaneous engagement of the gears. An auxiliary quadrant is regularly provided so that by using extra change gears it is possible to cut all special and metric threads not regularly provided for.

Equipment regularly provided includes compound and steady rests, thread chasing dial, countershaft, large and small face plates and wrenches. Extra equipment includes improved taper and draw-in attachment. The leading dimensions of the 12 in. lathe are: Swing-over bed, 12¾ in.; over carriage, 7½ in.; standard beds, 4-5-6 ft.; hole through spindle, 15-16 in.; threads cut, 1½ to 80; feeds, 6 to 320 between centres, 6 ft. bed, 40 in.; net weight, 5 ft. bed., 1,990 lbs.



12-INCH QUICK-CHANGE GEAR ENGINE LATHE.

OUR NOVEMBER REVENUE

THE greatest revenue month in the history of the Dominion of Canada was the month of November just past. The total revenue for that single month from all sources was equal to the total revenue obtained during the full fiscal year 1879-80. No less a sum than $23,164,765 was secured during the month of November last.

Canada's revenue for the eight months of the current fiscal year has totalled $144,912,000, an increase of $40,156,268 over the corresponding eight months of last year. In November alone, the increase was about $5,000,000. The increase has been in the main due to customs revenue, which totalled for the eight months $86,399,557, an increase of a little more than $26,000,000. Stamp taxes and other special war revenue measures brought in $6,726,049. Post-office revenue increased by one million, and excise revenue by two millions.

Consolidated fund expenditure for the eight months totalled $69,567,573, an increase of $4,222,070; and capital expenditure totalled $19,954,000, a decrease of $6,092,437.

War expenditure for the eight months totalled $146,527,520.

The increase in consolidated fund expenditure is due to the increased interest charges on the public debt. The piling up of the debt due to war cost has already doubled the annual interest charge. For the past eight months the interest on the public debt has been $15,315,656, as compared with $7,110,247 for the corresponding period of 1915.

Indications are that for the full fiscal year Canada will be able to pay out of revenue, ordinary and special, between seventy and eighty million dollars of the year's war expenditure of approximately $230,000,000.

TORONTO BUILDING RECORD

THE figures issued by the City Architect of Toronto on Dec. 1, for the eleven months ending November 30, 1916, show an increase in the amount of the building permits issued of nearly half a million dollars compared with the corresponding period in 1915. The actual figures show the total business up to November 30, 1916, to amount to $6,454,823, while the total business for the same period last year was $5,955,026. The permits issued during the month of November totalled 398, covering work estimated to cost $948,026, compared with 370 permits amounting to $799,395 the same month last year. Last month 494 new erections were built compared with 426 in November, 1915.

ABAFT THE BINNACLE

AN old sailor once appeared to give evidence in a case of assault, when he was asked the following questions:—

The Judge—"Where was plaintiff standing when defendant struck him?"

Witness—"Who are they?"

The Judge—"Don't you know the difference between plaintiff and defendant?"

Witness—"No."

The Judge—"Well, you are a nice chap to come here and give evidence. You don't know the plaintiff from the defendant! Where was he when the man struck him?"

Witness—"Abaft the binnacle."

The Judge—"Abaft the binnacle! Where is that?"

Witness—"You are a fine chap to sit as a judge! You don't know where 'abaft the binnacle' is!"

* * *

The genius of the mechanical engineer has cheapened manipulations in the foundry and machine shop; that of the metallurgist, the materials used and produced.

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SENTIMENT NO FACTOR IN POST-WAR TRADE

TO buy in the best and cheapest markets, and sell to the best advantage in the same or other markets are sound business principles. Expediency and disability have, however, to be reckoned with, and, relative to our Dominion, the necessary upbuilding of a sound industrial fabric on the one hand, the lack of a merchant marine and in some considerable degree the lack of knowledge of outside requirements and possibilities on the other, militate against practical exposition of such a propaganda either whole or in part. During the past two years, numerous happenings in the prosecution of the war have made stirring appeals to sentiment, with the result that not a few hastily conceived schemes have been publicly suggested and launched concerning future trade relations with our meantime enemies. In a word, the commercial enterprise of the latter was to be circumscribed and restricted, if not altogether eliminated as a world factor. That such an undertaking was too stupendous,—a sheer impossibility fits better, perhaps, because impracticable—has come to be realized, however.

Is a trade war, following that of blood and destruction, inevitable? In some quarters such a contingency is not anticipated, being even flouted. Why, may we ask, shouldn't a trade war be the logical outcome of the other? The world owes neither of the meantime fighting nor neutral nations, in their individuality as such, a living, nor, in the enlarged sense a progressive development. They each owe it to themselves and to the world to shoulder the relative responsibility, and, as in the past, considerable effort will be expended in demonstrating the fact that such is their attitude. War as practised on the battlefields of Europe and on the sea may be hell, yet only does it differ from trade war in absence of harrowing episode and detail, although even these may be evidenced in lesser or greater degree.

Germany, we may rest assured, is going to have and take a place in the Sun following the war of blood, and her intensity of application to the furtherance of her object is likely to be less dependent on peace term detail than we are prone to imagine. Whether the war has had the like revivifying, yes and revolutionizing effect on her industrial and commercial enterprise as it has had in these directions on the other nations—warring and neutral, we are not in a position to say; this much may, however, be said, that preceding the war, Germany was in many respects an easy leader. We are inclined to think that her pre-war advantage is at least eliminated, and that little evidence of any individual nation monopoly meantime exists.

While Canada, on account of the war, may not have developed a manufacturing capacity to entitle her to rank as a world power, she has made much of the opportunity afforded, and relatively as regards manufactured products her record will bear the keenest comparison. She has nevertheless lagged in industrial and scientific research, in a word, the utilization of waste products and hitherto unused natural resources, the development of new processes—mechanical, electrical, chemical and metallurgical, have been given little attention, and therefore have found but meagre practical application. The establishment of an Advisory Council on Industrial and Scientific Research is announced, and although unnecessarily tardy of creation, may be accepted as "better late than never." Our Minister of Trade and Commerce, Sir George Foster, has been so busy gallivanting, and between times twitting our manufacturers in gallery orations with "being asleep"—even "soundly asleep,"' when opportunities were knocking at their door, as to allow two and a quarter years to elapse before realizing what were his own responsibilities and duties as well as those of his Cabinet associates.

Much is looked for from the work of this newly appointed Advisory Research Board, even in the making-up of the lost leeway. Our manufacturers are better equipped to make use of both the data and materials available than they are apt to get credit for, and it may not be assuming too much to observe that they will be called upon to both measure up to and successfully overcome the industrial competition of well-nigh a full hand of pre-war German equivalents, quite some considerable time before much research data becomes available. Our metal-working plants in munitions production constituted themselves into research boards and made good. Nothing succeeds like success, and when the pressure of competition begins to be felt in other than war-commodity manufactures, we shall be surprised if history does not repeat itself.

◆

PAPER STILL SKY-ROCKETING

JUDGING by the action of the International Paper Co. in the United States, which controls over 50 per cent. of the newsprint paper supply there, the cost peak to consumers is still tending towards higher levels. While a more or less substantial advance had been anticipated, effective with the opening of the New Year, publishers were scarcely prepared for an increase from $2.15 to $3.10 per hundred, f.o.b. mill on renewal contracts. In every branch of the publishing business the effects of paper shortage and paper cost are much in evidence, the outstanding features being fewer and smaller page issues and increased subscription rates. Just how much more the paper manufacturers' cost to consumer will affect space, quantity and cost to readers is somewhat problematical. It may be that a higher value appreciation of "printers' ink" will be cultivated and developed by and through those among whom its distribution has in the past appeared more or less commonplace.

INDUSTRIAL NOTABILITIES

RUPERT G. BRUCE, vice-president and general manager, Canadian Hanson & Van Winkle Co., Ltd., manufacturers of nickel and electroplating machinery, chemicals and munitions, Morrow Avenue, Toronto, was born in Port Perry, Ont., May 27, 1881, son of Stewart and Isabella Bruce, of Port Perry. He was educated at Port Perry High School and Upper Canada College, Toronto, and began his business career as a clerk in the Construction Department of the C.P.R., Toronto, 1899-1901. He was connected with the Electrical Development Co. (now Toronto Power Co.) from the time of its organization in 1901 until 1907, when he became secretary of the Kennedy Hardware Co., Toronto, 1907-1908. He established the business of Rupert G. Bruce & Co., for the manufacture of electro chemicals in Toronto, 1908-1910; amalgamating same with the Hanson & Van Winkle Co., under the name Canadian Hanson & Van Winkle Co., Ltd., in 1910, of which he is vice-president and general manager. Doctor Herbert Bruce, of the Canadian Overseas Force Hospitals Commission is a brother.

RUPERT G. BRUCE.

Mr. Bruce served as a private with the Q.O.R. (Upper Canada College), 1908, and went through the ranks until promoted to Captain, 1910, when he joined No. 2 District Staff under General Otter, on which he served for three years as District Signalling Officer. He married Terry Irving, daughter of the late Andrew Irving, March 21, 1908. His clubs are: Toronto, Albany, R.C.Y.C., Lambton Golf, Military Institute; his societies: A.F. & A.M., and recreations: golf and fishing. In politics he is Conservative, and in religion Anglican. His residence is 59 Foxbar Road, Toronto.

—Photo, courtesy British & Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$29 95	
Lake Superior, charcoal, Chicago	28 00	
Standard low phos., Philadelphia	50 00	
Bessemer, Pittsburgh	34 45	
Basic, Valley furnace	30 00	
	Montreal	**Toronto**
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton	$32 25	32 00
Victoria	32 25	32 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.50
Steel bars, base, Toronto	3.75
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.35
Steel bars, base, Montreal	3.90
Twisted reinforcing bars, base	3.55
Bessemer rails, heavy, at mill	2.50
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.65
Small shapes	3.85
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.35
Bars, 2 in. and up	3.75
Strucural shapes	3.35
Plates	4.00

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$37 00	$37 00
Electrolytie copper	37 00	37 00
Castings, copper	36 00	36 00
Tin	46 00	48 00
Spelter	14 00	14 50
Lead	9 50	9 50
Antimony	15 00	18 00
Aluminum	70 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$5 00	$5 00
Heads	5 35	5 25
Tank plates, 3-16 in.	5 25	5 25

WROUGHT PIPE

Prices in effect Nov. 17, 1916.

Buttweld

Per 100 feet.	Black.	Galv.
⅛ in.	$ 3 50	$ 5 00
¼ in. and ⅜ in.	3 30	5 43
½ in.	4 25	5 82
¾ in.	5 18	7 30
1 in.	7 65	10 80
1¼ in.	10 35	14 61
1½ in.	12 38	17 46
2 in.	16 65	23 50
2½ in.	26 33	37 15
3 in.	34 43	48 58
3½ in.	43 24	60 26
4 in.	51 33	71 40

Lapweld

2 in.	$19 24	$25 72
2½ in.	28 67	38 90
3 in.	37 49	50 87
3½ in.	46 92	63 94
4 in.	55 59	75 76
4½ in.	64 77	88 27
5 in.	75 48	102 90
6 in.	97 92	133 40
7 in.	130 90	174 90
8 in. x 25 lbs. per ft.	137 50	183 80
8 in. x 25 lbs. per ft.	158 40	211 70
9 in.	189 80	253 60
10 in. x 32 lbs. per ft.	176 00	235 20
10 in. x 40 lbs. per ft.	226 60	302 80

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$23 00	$23 00
Copper, crucible	27 00	26 00
Copper, heavy	27 00	26 00
Copper wire	27 00	26 00
No. 1 machine compos'n	22 00	21 00
No. 1 compos'n turnings	18 00	18 00
New Brass clippings	18 00	18 00
No. 1 brass turnings	16 00	15 00
Steel, low phos.	14 00	14 00
Heavy melting steel	13 00	12 00
No. 1 machine cast iron	15 00	15 00
Steel turnings	7 00	7 00
Boiler plate	12 00	10 50
Rails	14 75	15 00
Axles, wrought iron	19 00	19 00
Tires, steel	12 00	11 00
Rails	13 75	13 00
Shafting	16 75	16 00
Malleable scrap	10 25	11 00
Pipe, wrought	10 50	9 00
Stove plate	12 00	11 50
Heavy lead	7 50	7 50
Tea lead	6 00	5 50
Scrap zinc	8 25	8 00
Aluminum	35 00	35 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	35
Stove bolts	55
Plate washers	20
Machine bolts, 7-16 and over	15
Machine bolts, ⅜ and less	25*
Blank bolts	15
Bolt ends	15
Machine screws, fl. & rd. hd., steel	27½
Machine screws, o. & fil. hd., steel	10
Machine screws, fl. & rd. hd., brass	net
Machine screws, o. & fil. hd., brass	net
Nuts, hex., up to 1 in. $3.75 per lb. off	
Nuts, hex., over 1 in. $2.00 per lb. off	
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	30
Boiler rivets, base ¾-in. and larger	$5.25
Structural rivets, as above	5.15
Wood screws, flat, bright	.75
Wood screws, O. & R., bright	.70
Wood screws, flat, brass	.42½
Wood screws, O. & R., brass	.40
Wood screws, flat, bronze	.35
Wood screws, O. & R., bronze	.32½

MILLED PRODUCTS

	Per Cent.
Set screws	40
Sq. & Hex. Head Cap Screws	30
Rd. & Fil. Head Cap Screws	15
Flat & But. Hd. Cap Screws plus	15
Fin. & semi-fin. nuts up to 1 in.	30
Fin. & semi-fin., nuts over 1 in.	25
Studs	15
Taper pins	45
Coupling bolts plus	15
Planer head bolts, without fillet	15
Planer head bolts, with fillet	net
Planer head bolt nuts, up to 1 in.	30
Planer head bolt nuts, over 1 in.	25
Planer bolt washers plus	10
Hollow set screws list plus	40
Collar screws list plus	20
Thumb screws	20
Thumb nuts	70
Patch bolts add	65
Cold pressed nuts to 1½ in. add	$3.50
Cold pressed nuts over 1½ in. add	$2.00

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$55 00
Open-hearth billets, Pittsburgh	55 00
O. H. sheet bars, Pittsburgh	55 00
Forging billets, Pittsburgh	80 00
Wire rods, Pittsburgh	65 00

NAILS AND SPIKES

Standard steel wire nails, base	$4 40	$4 35
Cut nails	4 00	4 00
Miscellaneous wire nails		65%
Pressed spikes, ⅝ diam., 100 lbs		$4 10

MISCELLANEOUS

Solder, guaranteed	0.31½
Solder, strictly	0.29½
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Gasoline, per gal., bulk	0.26½
Benzine, per gal, bulk	0.25½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	1.12
Linseed oil, boiled, single bbls.	1.15
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	8 00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.12
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes	35
S.S. drills, 1/16 in. and larger	50
Standard drills to 1½ in.	50
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	20
3-fluted drills over 1½ in.	10
Bit stock	50
Ratchet drills	20
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	25
Sockets	30
Sleeves	40
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, net; B and C, 20 and 5 per cent.; cast iron, 50; standard bushings, 60 per cent.; headers, 60; flanged unions, 55; malleable bushings, 60; nipples, 72½; malleable, lipped unions, 60.

SHEETS.

	Montreal	Toronto
Sheets, Black, No. 28	$4 50	$4 50
Sheets, black, No. 10	5 50	5 50
Canada plates, dull, 52 sheets	4 75	4 75
Canada Plates, all bright.	6 30	6 50
Apollo brand. 10¾ oz. galvanized	6 95	6 95
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 45	7 35
Gorbal's Best, No. 28	7 75	7 50
Colborne Crown, No. 28	7 25	6 75
Premiar, No. 28 U.S.	6 50	6 75
Premier, 10¾ oz.	6 80	7 00

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	65
Kearney & Foot, Arcade	65
J. Barton Smith, Eagle	65
McClelland, Globe	65
Black Diamond	65
Delta Files	65
Nicholson	55
Globe	60
Vulcan	65
Disston	..

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$30 00	....
1¼ in.	30 00	....
1½ in.	30 00	24 00
1¾ in.	29 00	21 00
2 in.	31 00	20 00
2¾ in.	33 00	.....
2½ in.	35 00	26 50
3 in.	40 00	31 00
3¼ in.	45 00	36 00
3½ in	50 00	39 00
4 in.	60 00	49 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.23
Royalite, per gal., bulk	.10½
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Union thread cutting oil antiseptic	.70
Acme cutting oil, antiseptic	.39½
Imperial quenching oil	.39½
Petroleum fuel oil	.12¾

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30-10%
Standard	40%
Cut leather lacing, No. 1	$1.40
Leather in sides	1.20

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke.	
Connelsville Foundry Coke	....
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	....
Best Slack	....

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.18
Peerless	.18
Grand	.17
Superior	.17
X L C R	.16
Atlas	.16
X Empire	.15
Ideal	.15
X press	.14
COLORED	
Lion	.12½
Standard	.11
No. 1	.11
Popular	.10
Keen	.09
WOOL PACKING	
Arrow	.24
Axle	.18
Anvil	.14
Anchor	.11
WASHED WIPERS	
Select White	.12
Mixed colored	.10
Dark Colored	.09

This list subject to trade discount for quantity

ANODES

Nickel	.48 to .52
Cobalt	1.75 to 2.00
Copper	.39 to .41
Tin	.49 to .56
Zinc	.18 to .20

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 in.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.35
Emery in kegs, American.	.06
Pumice, ground	.05
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.06 to .08
Emery composition	.08 to .09
Rouge, silver	.35 to .50
Rouge, nickel and brass	.15 to .25

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$12 00	$12 00
Sheets, 3½ lbs. sq. ft.	11 75	11 75
Sheets, 4 to 6 lbs. sq. ft.	11 50	11 50

Cut sheets, ½c per lb. extra.

Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.17
Cobalt sulphate	.70
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.12
Nickel carbonate	.35
Nickel sulphate	.17
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.55
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.41
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents

Montreal, Que., Dec. 4, 1916.—Increased activity and higher prices continue to be the leading features of the general industrial situation. Indications that future munition work will be still further restricted to purely Ally resources, are expected to have a stimulating effect on Canadian trade generally. Railroad congestion continues and several points are suffering more pronounced inconvenience since the close of navigation.

Pig Iron

Maximum prices have not been reached yet, additional advances being expected. Inquiries for large shipments, both domestic and foreign are being constantly received, resulting in a correspondingly unsettled condition. Recent advances range from 50c to $3 a ton; bessemer and basic coming under the higher figure. Bessemer is now quoted at $35.95 and basic at $30.95 advance on No. 2 foundry is about $28 per ton.

Steel

No relaxation is noted in the general steel situation and activity is undiminished, with prices on commodities still advancing. Coke continues to be a factor in the high cost of production, the week's advance of $1 on furnace spot, bringing the current price to $8 per ton. The heavy demand for billets and sheet bars continues to tax the capacity of producers and considerable difficulty is still experienced in securing positions on early future delivery owing to the heavy business booked by the mills. Iron and steel bars are very active, the price on the former showing an upward tendency the New York quotation having advanced $4 per ton. Despite the high prices and distant deliveries, the demand for plates continues very strong, producers working to capacity. The Pittsburg quotation on tank plates is now $4.50, an advance on the week of $10 per ton. Higher prices on rails is looked for in the near future. A general advance in sheet prices has lately been made, and the same condition prevails as in other directions, that is, inability of mills to supply the demand. The advance averages about $5 per ton, the base for blue annealed, Pittsburg being $3.75 and on galvanized $6.25 per hundred, with corrugated 5c per hundred higher. Wire and wire products have undergone a further advance of $3 per ton, thus raising the base price of nails to $3 per keg Pittsburg. Wrought iron pipe is in great demand but owing to the pressure on the mills, delivery is quite distant. The situation on the local market is comparatively unchanged with higher prices pending.

Metals

The general situation is devoid of features and an easier market is the rule. Copper is quieter but continues very firm. Tin is dull and easier. Spelter is fairly active and stronger. Lead is developing additional strength owing to an evident scarcity. Antimony is quiet and aluminum is firm.

Copper.—The market is comparatively quiet but sufficient volume is passing to maintain a very strong situation; the general tone indicating a further upward tendency, owing to the heavy inquiry for future positions and the inability of producers to supply the urgent requirements of those consumers who are in need of early metal. While there is no abatement in production and increased facilities are continually being added, the supply is still below the demand and delivery as far ahead as nine months is now being placed. The situation abroad is very strong, being guided more by the tone of the New York market than actual conditions. London prices have improved slightly while the quotations on the New York market are firm on lake, but higher on electrolytic and castings. Local dealers are quoting last week's prices, 37c on lake and electrolytic, and 36c on castings.

Tin.—An easier situation is develop-

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department of Trade and Commerce, Ottawa, is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL

Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE

Valparaiso, British Consul General.

COLOMBIA

Bagota, British Consul General.

ECUADOR

Quito, British Consul General.
Guayquil, British Consul.

EGYPT

Alexandria, British Consul General.

FRANCE

Havre, British Consul General.
Marseilles, British Consul General.

INDIA

Calcutta, Director General of Commercial Intelligence.

ITALY

Genoa, British Consul General.
Milan, British Consul.

MEXICO

Mexico, British Consul General.

NETHERLANDS

Amsterdam, British Consul.

PANAMA

Colon, British Consul.
Panama, British Vice-Consul.

PERU

Lima, British Vice-Consul.

PORTUGAL

Lisbon, British Consul.

RUSSIA

Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN

Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN

Stockholm, British Consul.

SWITZERLAND

Geneva, British Consul.

URUGUAY

Monte Video, British Vice-Consul.

VENEZUELA

Caracas, British Vice-Consul.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya, Ploshch 9, Petrograd.
L. D. Wilgress, Canadian Government Commercial Agent, Bukhgolza Ulitza No. 4, Omsk, Siberia.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

AUSTRALIA, B. Millin, Exchange Building, Sydney, N.S.W.

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.
R. H. Curry, Nassau, Bahamas.

NORWAY AND DENMARK.

C. E. Sontum, Grubbeged No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

ing in tin, owing to reduced consumption. It seems apparent that much of the recent buying of tin has been for the accumulation of safety stocks on the part of consumers; thus resulting in the present quiet state of the market. The situation on the London market is also quieter and quotations have declined. New York is now quoting 45⅛c, a drop on the week of ⅜c per lb. Local dealers report a steady market with prices unchanged at 46c per lb.

Spelter.—The business for the week has been fairly active, the present condition being firm. The supply of ore has recently been curtailed owing to the scarcity of power at the mines. Further interruptions along these lines, due to the approach of cold weather, may possibly affect the market, and make higher prices probable. A firmer market prevails in London, and New York is ⅜c stronger, the quotation being 13¼c per lb. Dealers here are quoting last week's price of 14c, but report a higher tendency on a strong market.

Lead.—Owing to a shortage in the lead supply, and increased inquiries, a stronger market is developing with quotations stiffening. While the trust price remains unchanged, outside figures have advanced 25c per hundred, New York quoting 7½c per lb. The local situation is very firm, prices however, being steady at 9½c per lb.

Antimony.—The market is quiet but firm and the general situation is unchanged. Prices are well maintained at last week's quotation of 15c per lb.

Aluminum.—No change in the situation with quotations steady at 70c per lb.

Machine Tools and Supplies

Business in the machine tool industry is gradually assuming more normal conditions but sufficient volume is passing to maintain considerable activity, the outstanding feature being the requirements of munition manufacturers. While the bulk of this class of equipment has already been placed, there are always orders for replacements on new lots, in small quantities, being received. Much interest is being centered in the advance in prices in the machine tool lines. However, with the steel industry in its present abnormal condition, these advances are quite natural. The supply situation continues active, but is influenced by the general upward trend of prices.

Scrap

The scrap situation continues to reflect the upward movement of steel prices and the prevailing strength of metals. Activity is shown in all old metals and advances are noted in the following:—No. 1 machine compositions are now 22c, turnings 18c, new brass clippings 18c, and heavy melting steel 13 cents; these having advanced one cent during the week. No. 1 brass turnings are ½c higher, being quoted at 16c per lb.

Toronto, Ont., Dec. 5.—The industrial situation continues to show steady improvement, due for the most part to substantial war orders, which are increasing in volume as the manufacturers become more familiar with the class of goods required and are able to develop their output. Scarcity of labor and raw materials, however, is restricting capacity production, and the situation in this respect is not showing much indication of any marked improvement. The tendency, unfortunately, is rather the reverse, and it is a difficult problem to solve. Exception, however, may be made in regard to the production of munitions, where the greatest effort is being made to increase the output owing to urgent requirements of the situation. Production of munitions during the past few months has shown a substantial improvement, and the industry is on a far more efficient basis than was formerly the case.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Steel

A shortage of coke is the latest development in the steel trade, and unless immediate relief can be obtained there is a possibility of some furnaces having to suspend operations. The condition is due principally to the shortage of cars, accentuated by the large consumption of coke. The situation is undoubtedly serious, for even if some furnaces have to be banked, the output of steel would, of course, fall off, resulting in a greater scarcity of steel, already sufficiently acute. Every effort is, of course, being made to provide more cars, and it is to be hoped that no serious results will follow, as every pound of steel produced is needed. Prices of steel products continue to climb, helped to some extent by the steady advance in pig iron, but also on account of the extraordinary heavy demand, which is steadily increasing. The market could hardly be firmer, as the mills have their output sold for practically twelve months, with no sign of any falling off in demand. Both steel and iron bars have again advanced, being now quoted at 3.75c and 3.50c respectively. Prices of lapwelded boiler tubes are up again for sizes, ranging from 3 ins. to 4 ins. diameter inclusive. Prices are likely to go still higher at an early date, as the mills are largely sold up through 1917, premiums being readily paid on early delivery. The situation in plates is more acute, as the demand is increasing and deliveries are getting more distant. Wire nails have advanced, being now quoted at $4.35 per keg. Smooth steel wire is 15c higher, and is now $4.70 per 100 lbs., No. 0-9 gauge.

The market for black and galvanized sheets is irregular and prices largely nominal owing to the scarcity of sheet bars and consequent decline in production. Prices of black sheets continue high, and there is little possibility of a decline owing to the high and increasing cost of raw materials, car shortage and scarcity of labor. A further advance from the prices given in the current quotations may be looked for at an early date.

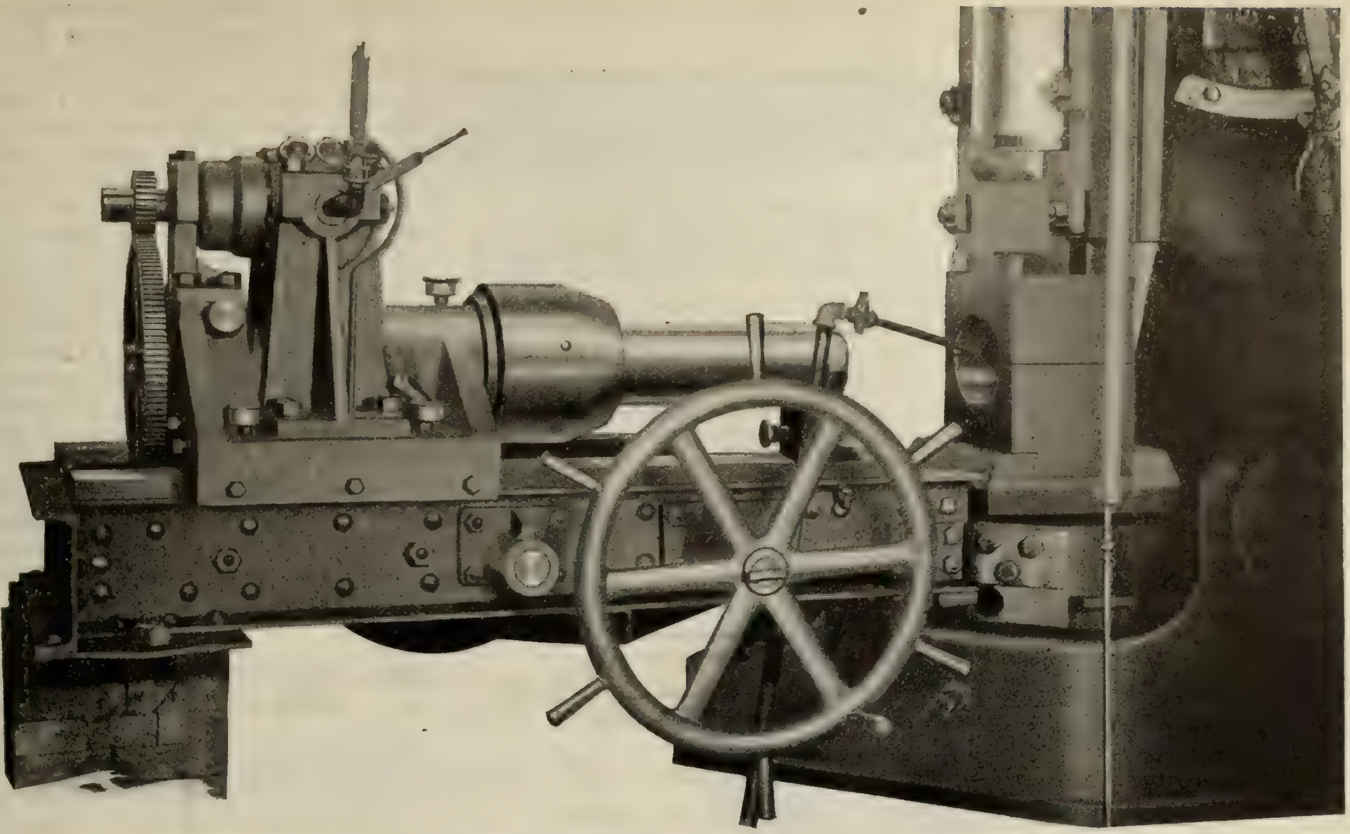
Prices of steel products in the United States continue to advance, and the demand is as strong as ever. Enormous tonnages of material, principally shell steel, are being booked for export. One large steel concern has already booked considerable tonnage for the first quarter of 1918. Steel bars have advanced to 3c Pittsburgh. Bessemer and open-hearth billets and open-hearth sheet bars are now being quoted at $55 per ton Pittsburgh, representing an advance of $2.50 per ton since last week. Forging billets have advanced $2, and are now quoted at $80 per ton Pittsburgh. Chicago warehouse prices on bars, plates, and shapes have advanced $7 per ton, making bars 3.60c, plates 4.35c, and structural shapes, 3.70c per pound.

Pig Iron

Prices of domestic pig iron have been withdrawn pending an improvement in the coke situation. New and higher prices will probably be announced shortly. The market is very strong and the consumption of steel-making pig iron is increasing in tonnage. Practically all U. S. brands of pig iron have made further advances of approximately $5 per ton. The following are a few which have advanced:—Grey forge, $28.95, and Bessemer, $34.45 per ton Pittsburgh; Basic, Valley furnace, $30 per ton; Lake Superior charcoal iron, $28. and standard low phosphorus, Philadelphia, $50 per ton.

Scrap

The market continues strong, particularly for copper scrap, which has advanced 1c per pound. Machine composition, composition turnings, and brass turnings are also higher. Heavy melting



Whelan Hammer Nosing Apparatus

4.5" 60 Pounders 6" H.E.

THE Whelan Nose Apparatus has been designed with the sole object of giving an absolutely uniform and concentric nose, and at the same time of leaving the inside radius true with the main body of the shell. The shell is held at the base by means of a Collet Chuck, and is revolved by a reversing air motor, which is also used to open and close the chuck.

The carriage travels on plain gibbed ways, and is fed up to the hammer by means of the large pilot wheel geared 3 to 1 into rack on carriage.

The frame is of steel sections, the ways also are of machinery steel, accurately planed.

Our confidence in this apparatus is justified because in one shop has nosed over 35,000 shells without a spoil or a breakdown.

This method eliminates inside profiling, and the nose of the shell after coming from the hammer, when put in a lathe, runs just as true as the body.

The A. R. WILLIAMS Machinery Co., Limited

66 Front St. W. - Toronto

steel continues firm at unchanged prices.

Machine Tools

The outlook in the machine tool business continues bright, and local dealers report satisfactory conditions. A number of inquiries have been received by local machinery houses for machine tools for 4.5 in. and 6 in. shells, in view of further orders for these sizes which are expected to be placed shortly. There is a heavy demand for tool-making equipment, but the supply is light and deliveries very slow. Miscellaneous machinery for ordinary purposes is more active, and the demand is improving. Canadian machine tool builders are exceptionally busy, and have enough orders on hand to keep them busy for many months. The local machinery house which recently purchased a munitions plant in the U. S., is now ready to take orders.

Supplies

Prices on all machine shop supplies are very firm, and advances have been made on a number of lines. Wood screws have advanced about 12 per cent. Wrenches are about 15 per cent. higher. Stove bolts now carry a discount of 55 per cent., as against 60 per cent. formerly. The Stanley Rule & Level Co. have raised their prices on boxwood rules 10 per cent. Globe, angle and check valves now carry a discount of 30 per cent. for standard quality and 25 per cent. for high grade. Prices of cotton and wool waste have advanced again, white waste being 2c higher, colored ¼c, wool packing 1c to 4c, and washed wipers 1c, above the old prices. Motor gasoline is unchanged at 25½c, but higher grade gasoline as used by rubber manufacturers has advanced 2c, and is quoted at 33½c per gallon.

Metals

A firmer tone characterizes the metal markets generally, the principal feature being a further advance in copper, although prices for prompt metal are entirely nominal. Lead is also higher, as was expected, the market being strong on the advance made by the independent producers. The tin situation is unchanged, while spelter is also in the same position. There is nothing of particular importance to note with regard to either antimony or aluminum.

Copper.—With practically the entire output of copper sold up for the next six months, it follows that the position of this metal is an exceptionally strong one; in fact, the situation is without precedent in the history of the trade. The demand for copper is as insistent as ever, and is absorbing the entire production of the mining companies. Copper has advanced 1c locally, lake and electrolytic being quoted at 37c, and castings at 36c per pound.

Tin.—Prices are firm, but the market is inclined to dullness and buying is less active than during preceding weeks. Local quotation unchanged at 48c per pound.

Spelter.—The market is firm, with a tendency to higher prices. Production has fallen off, due to shortage of power in the principal mining districts, which will tend to stiffen the market. There is a fair demand for spelter, but producers are well booked ahead, and are not anxious to sell. Local prices, 14½c per pound.

Lead.—A scarcity of lead for prompt and December delivery has developed, and quotations have advanced. There is a good demand for lead, but the scarcity is restricting sales. The "Trust" is still quoting 7c New York, although independent producers have advanced their prices to 7.40c New York. Lead has advanced ½c locally, and is now quoted at 9.50c per pound.

Antimony.—The market is firm and steady, with a fair demand. Local price, 18c per pound.

Aluminum.—The market is quiet but firm, with quotation unchanged at 68c per pound.

◆

SHIPYARDS ACTIVE

EXTRAVAGANT claims have been made relating to the tonnage of steel vessels being turned out by United States Shipyards, but the figures given out by the Government as of September 1st this year are striking enough. Nearly-deserted shipyards have sprung into feverish activity.

Thirty-six yards covering both coasts as well as inland ports, report 397 steel vessels now building or under contract, aggregating 1,092,310 gross tons. By far the bulk of this tonnage is pledged for delivery during the current year, ending June 30, 1917. All these vessels are being constructed in privately-owned yards and include only merchant vessels. The naval programme recently adopted, will naturally still further increase the activity of their shipbuilding industry. English shipyards are gradually being made more available to furnish mercantile tonnage, and the latest reports indicate 440 mercantile vessels of all classes under construction. aggregating a little over 1,500,000 tons. While figures are not available, it is reported that German shipyards have their entire capacity contracted for two years ahead.

◆

SCIENTIFIC SIDE OF CANADIAN INDUSTRIES

AT the recent annual dinner of Toronto Branch of the Canadian Manufacturers' Association, Arthur D. Little, head of a well-known Montreal laboratory, gave an address on "The Relations of Research to Industrial Developement." It was a comprehensive resumé of the wonders in industry which had followed chemical and other scientific research from the time of the steam engine to the latest electrical or chemical appliance. He attributed the failure of two-thirds of the 250,000 corporations in the United States to failure to utilize scientific results in manufacture.

Among the many things he proposed to manufacturers was the control of quality of raw materials, the finding of substitutes for raw materials unobtainable or difficult to procure, the control of processes, the standardization of product and the reduction or elimination of waste. In some industries, and Mr. Little specified the lumbering industry, the potential values of waste were greater than the values of known products to date.

◆

PORT OF MONTREAL CUSTOMS AND INLAND REVENUE

BOTH customs and inland revenue receipts for the port of Montreal during November are so high that they are the second largest in the history of the port. The inland revenue receipts of $1,306,000 were only exceeded in the first month of the war, and last year November had only a total of $927,779.83.

The receipts for November, 1915, in customs dues, reached only $2,187,491.04, as compared with $3,017,253.16 last month. May of this year with a total of $3,226,108.03, was the largest month in the history of the port. A comparison of the receipts during the months of navigation in Montreal shows a tremendous difference between 1915 and 1916, as the following figures witness:—

May	$1,855,000.95	$3,226,108.05
June	1,925,575.13	2,827,827.53
July	1,657,479.20	2,666,150.77
August ...	1,809,775.63	2,815,680.97
September	1,900,774.90	2,779,447.05
October ..	1,674,477.47	2,929,357.20
November.	2,187,491.04	3,017,253.16
	$13,010,574.32	$20,261,824.73

Thus this port, during seven months, has contributed to the revenue of the Dominion Government, $7,251,250.41 more than during the same period last year.

◆

Trail Zinc Refinery.—A large sample of the first bar of commercial zinc produced at the Consolidated Smelting Co's. refinery at Trail was recently exhibited in Toronto. The metal was pronounced of excellent quality. While the refinery's product is said to be very satisfactory the output of zinc is not yet up to estimates.

TAPER THREADS EASILY CUT

With a Geometric Taper Threading Die Head one gets the same rapid production and superior finish that mark all Geometric threads. The chasers follow the taper of the work automatically, and release the work at the end of the cut. Head is withdrawn without touching the finished threads.

Geometric Taper Threading Die Heads are adapted to Screw Machine and Turret Lathe. When not cutting taper threads, the Head can be removed, leaving the machine free for other work. Made to order, specially suited to requirements of machine and work. Employed very generally on fuse work.

Give the Geometric finish to your taper threads.

It will cost you nothing to get our quotation on your specifications. May we have them?

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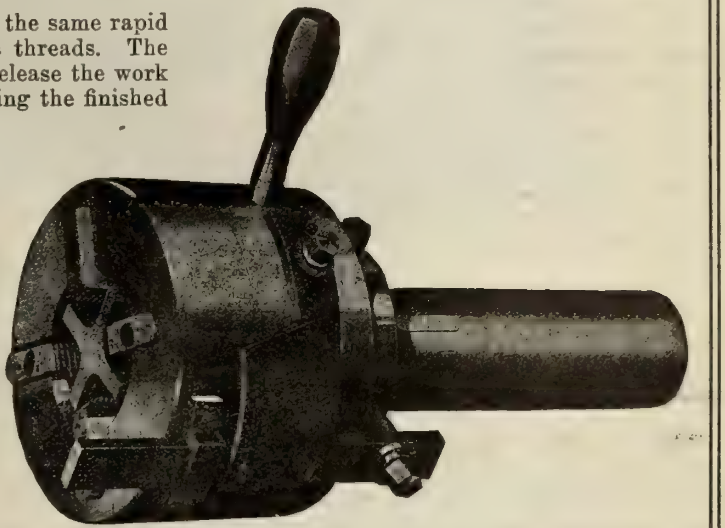
NEW HAVEN, CONN., U.S.A.

Canadian Agents:— Williams & Wilson, Ltd., Montreal,
The A. R. Williams Machinery Co., Ltd., Toronto,
Winnipeg and St. John, N.B.



A Geometric Taper Threading Die Head.

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Manufacturers of

SHELL FORGINGS

We have the Equipment and Experience and can execute orders for

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For any size Shells. Can execute orders promptly.

SPECIAL FORGINGS—We can make any forging that can be made under Drop Hammers.
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INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Cornwall, Ont.—The Canadian Cotton Co. will shortly begin the erection of an extension to their mill here.

Trail, B.C.—The Consolidated Mining & Smelting Co., is erecting an addition to its electrolytic zinc plant, 165 x 200 ft.

Edmonton, Alta.—The Public School Board, will increase the capacity of the school machine shop. F. Brody is secretary.

Millerton, N.B.—The New Brunswick Pulp & Paper Co. propose rebuilding their mill, which was destroyed by fire some time ago.

New Toronto, Ont.—Brown's Copper & Brass Rolling Mills, Ltd., are building a new sheet mill and a reclaiming plant. The foundations are completed and the buildings are being constructed.

Vancouver, B.C.—The Vulcan Ironworks and Schaake Machine Works propose moving their plants from New Westminster to Vancouver. The Schaake Machine Works have leased a site on False Creek.

New Toronto, Ont.—The Dominion Abrasive Wheel Co., who sold their factory here to the Brown's Copper & Brass Rolling Mills, will build a new factory at Mimico at a cost of about $65,000. Mr. Sawyer is the manager.

The Northern Antimony Smelting Co., has been incorporated with a capital of $2,000,000 to operate antimony mines at Lake George, N.B. The property was leased about a year ago by the Canadian Antimony Co., to New Brunswick Metals Ltd. for three years. Later it was rumored that Nova Scotia interests were negotiating for their purchase by new capital.

Sarnia, Ont.—It is reported in Sarnia that the Imperial Oil Co. will in the near future start construction work on a new refinery to be erected at Dartmouth, N.S., across the water from Halifax. It is stated that the refinery at Dartmouth will be supplied from fields in Mexico and Texas, and that oil will be brought up in tank steamers. The steamers Iocolite, Royalite, and Sarnolite will operate on the ocean this winter and will return to the lakes in the spring.

Hamilton, Ont.—The Canadian Desmon-Stephen Mfg. Co., has been incorporated with a capital of $50,000, and head offices in Hamilton. It is an American concern, with headquarters at Urbana, Ohio, and manufactures steam ejectors, grinding wheel machinery and such articles. The Canadian Company has opened an office on Market stereet, and will carry on its Canadian business from there, but for the present will not do any manufacturing in Canada. When it does build, a Canadian factory will be located in Hamilton.

Trenton, Ont.—Representatives of the Imperial Munitions Board, Ottawa, have a staff here overseeing the erection of about 60 buildings on a site of 140 acres, on the east side of the Trent River, and on property formerly owned by Gilmour Doon Co. and the Gilmour Lumber Co. The Gaylord Engineering & Construction Co., of Scranton, Pa., and Binghamton, N.Y., have about 400 men at work erecting 28 buildings, and the Pratt Engineering Co., of New York, are preparing to erect as many more, and there is another contract for more buildings under consideration. The plant will be operated by the British Chemical Co., which has recently been incorporated at Ottawa.

Municipal

Brantford, Ont.—The Town Council contemplate installing a water filtration plant.

Dartmouth, N.S.—The Town Council propose making extensions to the water and sewerage systems, at an estimated cost of $6,800.

Hepworth, Ont.—It is proposed to submit a by-law to the ratepayers in the near future to authorize the installation of an electric light and power plant.

London, Ont.—The City Council has decided not to submit the proposed by-law to spend $20,000 on the municipal paving plant, but to take a plebiscite at the January elections.

Whitby, Ont.—The ratepayers on Monday voted against the proposed agreement with the Canadian Tractor Co., the by-law being defeated by an adverse majority of 102.

Hamilton, Ont. — By-laws will be voted on at the January elections to raise $5,869,286 for a hydro-electric radial from Port Credit to St. Catharines and $362,500 for new pumps.

Port Arthur, Ont.—The citizens will vote at the January elections on a by-law to authorize a contract with the Hydro-Electric Commission to develop, construct and acquire Dog Lake Power. It is estimated that about 30,000 h.p. will be developed.

North Bay, Ont.—By-laws will be voted on by the ratepayers on Dec. 11, to grant a $15,000 loan and $5,000 bonus to the Dominion Rubber Cloak Co., Toronto; also free site and building, not to cost more than $15,000 to the North Bay Toy Co.

Fort William, Ont.—In the event of the City Council favoring the development, of power at Dog Lake, they will be asked to submit a by-law to the ratepayers, the idea being to make Fort William a partner with Port Arthur in the proposed hydro development.

Elmira, Ont. — A by-law was submitted to the ratepayers of Elmira on Dec. 1, to grant certain concessions to the Consolidated Rubber Co., to establish a branch factory here. The proposal practically carried unanimously, only seven votes being cast against it.

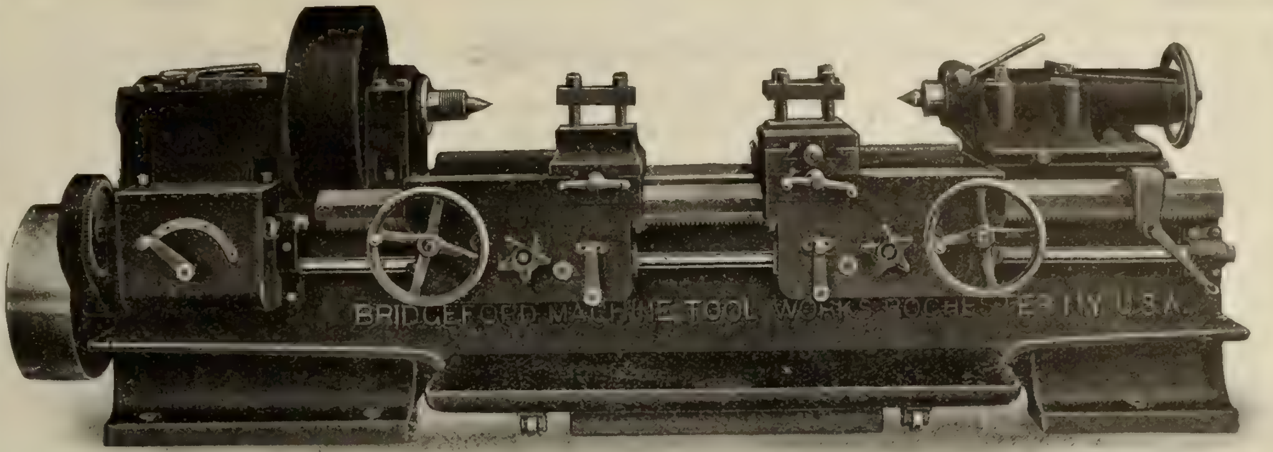
Chatham, Ont.—Ratepayers will be asked at the January elections to endorse debentures to the extent of $45,000 to provide for extensions that have been made and are being planned to the Chatham Hydro system. A large increase in customers from 600 to 1,350, has also been responsible for a large share of the increase.

Building Notes

Toronto, Ont.—It is proposed to erect a new Masonic Temple at the corner of Davenport Road and Yonge Street to cost about $200,000.

Tenders

Toronto, Ont.—Tenders will be received, addressed to the chairman, Board of Control, City Hall, Toronto, up to January 16, 1917, for the installation of a 40 million Imperial gallon centrifugal sewage pump at the main sewage pumping



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Simplicity, power of drive and convenience of operation ensure a maximum output. Complicated mechanism is a constant peril to efficiency. "Bridgeford" quality does not include this complicated mechanism.

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Write now.

Bridgeford Machine Tool Works

237 Mill Street *Heavy Lathe Specialists for 20 Years* **Rochester, N. Y.**

station, Toronto. Specifications and forms of tender may be obtained at the Works Department, Room 6, City Hall.

Winnipeg, Man. — Tenders addressed to the undersigned will be received up to December 18, for the construction of 9½ miles of 5 ft. 6 in. reinforced construction pipe. Plans, specifications and form of tender can be secured on application to the district Commissioners accompanied by certified cheque for $20. R. D. Waugh, chairman of Winnipeg Water District Commissioners, 901 Boyd Building, Winnipeg.

Ottawa, Ont.—Tenders will be received up to January 15, 1917, for the construction of a reinforced concrete lighthouse tower and fog alarm building combined, and a wooden dwelling at Point Abino, Township of Bertie, Welland County, in the Province of Ontario. Plans, specifications, form of contract and schedule of wages, can be seen, and forms of tender procured, at the Department of Marine, Ottawa; at the Harbor Master's Office, Toronto, and at the post offices, Welland, Port Colborne, St. Catharines, Bridgeburg, Hamilton and Brantford.

General Industrial

Bracebridge, Ont.—The Beacon Match Co. proposes to erect a plant here to cost $45,000.

Delhi, Ont.—The Sovereign Co., mitt and robe factory was destroyed by fire on Dec. 1. Bruce Whitehead is the manager.

Port Arthur, Ont.—The mayor and city clerk have been authorized by the City Council to sign an agreement with James Richardson & Sons, who propose to build an elevator in Port Arthur. The elevator will cost about $700,000.

New Toronto, Ont.—Work has been started on the erection of a factory building here, for the Dupont Fabrikoid Co. of Toronto, manufacturers of leather goods. The building will cost $75,000 and machinery to cost $175,000 will be installed.

Personal

C. R. Kennedy, manager of the A. R. Williams Machinery Co., of Vancouver, Ltd., is visiting Toronto for a few days on business.

Norman S. Thresher, who recently joined the staff of the Western Dry Dock & Shipbuilding Co., Port Arthur, Ont., has assumed the position of purchasing agent for the company in the United States, with office at 350 Rockefeller Bldg., Cleveland, Ohio.

Railways—Bridges

Oakville, Ont.—The ratepayers will vote on a Hydro-Radial by-law at the municipal elections on New Year's Day.

Hamilton, Ont.—The proposed cost of the Hydro-Radial System for Clinton township is placed at $473,746, and for Beamsville at $51,469.

St. Catharines, Ont.—The Township Council of Louth on November 27 gave two readings to the Port Credit-St. Catharines Hydro-Radial by-law and passed it on to a vote of the ratepayers on New Year's Day. Louth's share of the cost will be $553,000.

New Incorporations

The Canadian Foundry & Machine Co., of Calgary, Alta., has been incorporated with a capital of $100,000.

Canadian Aeroplanes, Ltd., has been incorporated at Ottawa, with a capital of $500,000, to manufacture aeroplanes, sea-planes, etc., at Toronto. The incorporators are R. H. Parmenter, A. J. Thomson, and William S. Morlock, all of Toronto.

Universal Asbestos Co. has been incorporated at Ottawa, with a capital of $50,000, to manufacture asbestos products of all kinds at Sherbrooke, Que. Incorporators are Harry R. Fraser, F. Samuel Rugg, and H. M. Terrill, all of Sherbrooke.

Bala Electric Light & Power Co. has been incorporated at Toronto, with a capital of $25,000 to operate an electric power plant at Bala, Ont. The provisional directors are John P. Weeks, Gordon B. Jackson, and A. G. Tudhope, all of Bala, Ont.

The Wax & Glassine Paper Co., has been incorporated at Ottawa, with a capital of $225,000, to manufacture pulp and paper, and pulp products, at Cookshire, Que. Incorporators are Robert A. Pringle, Thomas A. Burgess, and Louis Cote, all of Ottawa.

International Mfg. Co., has been incorporated at Ottawa, with a capital of $1,000,000, to manufacture munitions of all kinds, with head office at Ottawa. The incorporators are John A. Harriss, Rufus L. Patterson, and Alfred O. Hoyt, all of New York city.

The Sault Shipping Co. has been incorporated at Ottawa, with a capital of $300,000, to build and operate steamships, with head offices at Sault Ste. Marie, Ont. Incorporators are Alex. Taylor, Rex E. Nicholson, and Joseph E. Gibson, all of Toronto.

Canada Truck Co. has been incorporated at Ottawa, with a capital of $4,900,000, to manufacture automobiles and motor trucks, etc., with head office at Montreal. Incorporators are Richard E. Harman, John W. Blair, and Francis Y. Laverty, all of Montreal.

The D. Burtch Mfg. Co. has been incorporated at Ottawa, with a capital of $50,000, to manufacture dairy and farming machinery, with head office at Toronto, Ont. Incorporators are James McMillan, Delbert Burtch, and Rupert K. Grimshaw, all of Toronto.

Kenyon Copper Mines, Ltd. have been incorporated at Toronto, with a capital of $1,250,000, to acquire and develop mineral lands and deposits, with head office at Toronto. Provincial directors are Kenneth F. Mackenzie, Arthur L. Reid, and H. A. Thompson.

Hudson Copper Co. has been incorporated at Toronto, with a capital of $2,000,000 to acquire and develop mineral lands and deposits, with head office at Thessalon, Ont. Provisional directors are Robert H. Wilson, Robert E. Laidlaw, and Edgar & Raney, all of Toronto.

The Central Development Co. has been incorporated at Ottawa, with a capital of $250,000, to acquire and develop oil and natural gas properties, with head-office at Chatham, Ont. Incorporators are R. L. Pattinson, William G. Ryan, and Edgar Raney, all of Toronto.

Canadian Mining Corporation, Ltd., has been incorporated at Ottawa, with a capital of £1,660,000, to carry on the business of a mining, milling and reduction company, with head office at Toronto. The incorporators are Kenneth D. Mackenzie, W. Walter Perry, and Charles H. C. Leggott, all of Toronto.

Bissel Carpet Sweeper Company of Canada, Ltd., has been incorporated at Ottawa with a capital of $100,000, to manufacture carpet sweepers and vacuum sweepers at Niagara Falls, Ont. Incorporators are Willis B. Sturrup, James W. Bicknell, and Aubrey T. Maher, all of Toronto.

The Canadian Desmond-Stephen Mfg. Co., has been incorporated at Ottawa with a capital of $50,000, to manufacture automatic steam injectors and ejectors, abrasive wheels and grinding machinery at Hamilton, Ont. The incorporators are A. Hope Gibson, Gabriel H. Levy, and Charles H. Higgins, all of Hamilton.

Marine

Sarnia, Ont.—A new iron range light showing the way into the St. Clair River from Lake Huron is now being erected. The light will be constructed of steel, and will replace the wooden structure destroyed when the Port Huron and Duluth Steamship Line freight sheds were burned.

Wood-Working

St. Stephen, N.B.—Haley & Sons are in the market for woodworking machinery for their new factory.

Contracts Awarded

London, Ont.—The Dominion Government has awarded a contract to M. J. Hogan of Port Burwell for the construction of a new concrete pier protecting the west side of Port Stanley harbor. The contract price was $135,000 and the work will be undertaken early in the spring.

Trade Gossip

The Roelofson Elevator Works of Galt, Ont., have been awarded a contract for a freight elevator to be installed at the Canada Starch Co. plant, Fort William, Ont.

Montreal, Que.—It is reported that the Canadian Car & Foundry Co. and the Canadian Steel Foundries, Ltd., have been awarded a contract for forgings to the value of approximately $14,000,000.

Open Regina Branch.—G. E. Carpenter, Winnipeg, secretary of the Canadian Manufacturers' Association, reports that a Regina section has been inaugurated, with J. P. Cook, of the North-West Iron Works, as chairman.

Connaught Tunnel Open.—The Connaught tunnel, between Rogers' Pass and the Glacier, in the Rockies, which eliminates a very steep grade on the C. P. R. and renders unnecessary a large system of snow sheds, was opened for traffic on Friday.

Merritton, Ont.—The Riordon Pulp & Paper Co. recently commenced the production of bleached sulphite at their Merritton mill. The first run was of a very excellent quality, according to the management. The demand for this kind of sulphite pulp is very much in excess of what can be supplied just now.

Insured Navigation Has Closed.—Lake navigation—that is, regularly in-

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Canadian Machinery and Manufacturing News is published weekly. Representing, as it does, the industrial life and activities of Canada, it should prove of very considerable value to those who wish to buy Canadian products, and to those who may wish to sell in Canada.

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sured transportation—closed on Nov. 30, but managers of fleets with Duluth connections say pressure for iron ore down the lake is reported so great that shipments probably will continue until the ice stops boats there or at the Sault. Even January 1 is set as the final stoppage of all boats on Lake Superior, ice permitting.

The Ohio Iron & Metal Co., of Chicago, Ill., dealers in iron and steel scrap, have opened a branch office at 505 Transportation Building, Montreal, in charge of John M. Zehner, formerly with the Canadian Fairbanks-Morse Co. The Ohio Iron & Metal Co. also have branch offices in Pittsburg, Cleveland and St. Louis.

Shipbuilding to Foreign Account.—In the British House of Commons on Nov 30, Chiozza Money inquired if Vancouver and Montreal shipyards, were building cargo steamers for Norwegian account; if it was in the national interest for British colonial yards to build ships for neutrals when it was so difficult for British shipowners to get deliveries. Bonar Law replied that the Government was communicating with Ottawa on the subject.

New English Electric Steel Furnace.—The Greaves-Etchells electric steel furnace is the name of a new type designed by two Sheffield engineers to meet the requirements of the Sheffield steel industry, according to the London *Iron and Coal Trades Review.* Its construction has now been taken over by the Furnace Construction Co., of Sheffield and a dozen such furnaces are being negotiated for. The new furnace uses 3-phase current, but only two top electrodes.

Shortage of Coke.—Officials of the Steel Company of Canada, Hamilton, stated on Friday that operations of that concern would be brought to a temporary stop owing to coke shortage. The plant is running under reduced tonnage in the hope that relief will come without closing down, but owing to the scarcity of coal cars and the heavy movement of coal from the mines to the lower lake ports, no improvement of the situation is anticipated until navigation closes.

Ontario Labour Bureau.—A good record was established by the Ontario Government Public Employment Bureau in the first week of its existence. A statement was given out on Saturday by Dr. Riddell, Superintendent of Labour for Ontario covering applications received up to Friday as follows: Number of applicants for munitions work in Toronto to date, 374, made up as follows: Married women, 164; single women, 153; widows, 51; deserted 6. The age limit of the applicants was: In teens, 28; in twenties, 117; in thirties, 124; in forties, 68; in fifties, 13; in sixties, 1; omitted to give age, 23. The number to seek work in factories was 158; already in munitions factory, 55; new workers, 58, house workers, 41, shops, 28; professional women of different kinds, nurses, and teachers, 10; office, 16. Of the applicants those willing to go out of town numbers 52; would go out of town, but prefer to be in Toronto, 21; Government inspectors, 23; matrons, 10.

British Firms Order Canadian Metals.—The value of the work which is being done by the Commercial Intelligence branch of the Trade and Commerce Department, Ottawa is illustrated in the result which has followed the publication by the Department of one inquiry from a British firm, asking for Canadian metals. A Montreal company answered the inquiry and received an order immediately amounting to $123,000, followed soon after by a second order amounting to $427,000 making a total of $550,000 in three months.

B.C. Shell Orders.—British Columbia munition plants have just received orders calling for the manufacture of 30,000 18 pdr. high explosive shells per week for the first half of next year. Practically all of the Coast machine shops were operating double shifts on the same class of shell up to the end of August. The contracts above mentioned will amount in value to over $1,250,000. Twelve thousand of the new shells will be produced weekly in Vancouver, ten thousand in New Westminster, and eight thousand in Victoria. The Vancouver Engineering Works will handle the bulk of the Vancouver order.

To Pool Lumber Exports.—The lumber exporting interests of British Columbia on Nov. 30, perfected an arrangement which they are confident will shortly restore the provincial lumber export trade to substantial proportions. With one exception all the mills have agreed to consolidate or pool their output for export, which will be handled by the Canadian Trading Co., and organization incorporated in the province some time ago. Through its connections in London and San Francisco, the Canadian Trading Co. is able to guarantee tonnage for lumber shipments within a very short time, and it also has chartered all the vessels now being built in British Columbia yards for the lumber trade, with one exception.

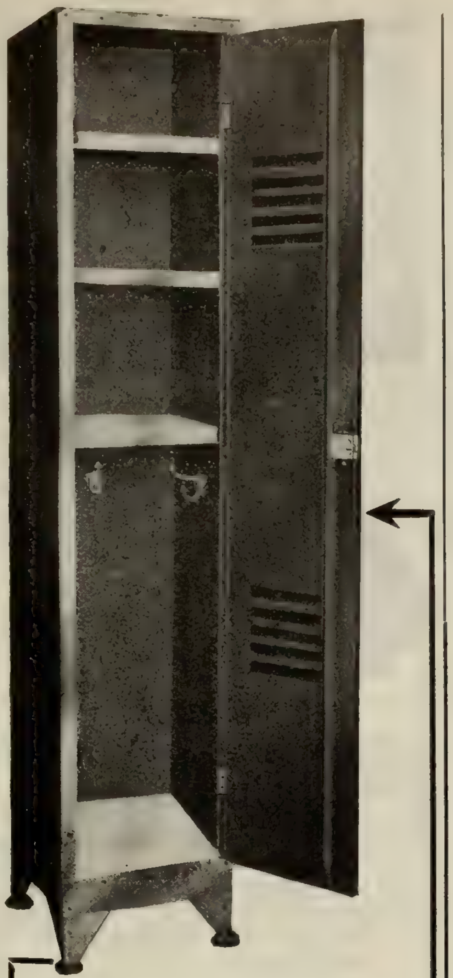
Toronto Labor Bureau Record.—One thousand and fifty-six persons supplied with positions during November is the record of the Toronto Civic Labor Bureau. It constitutes a new high-water mark for this department, which is under the direction of the Property Commissioner. It is all the more remarkable because there have been no large orders for men during the month. All but sixty have been placed in factories in the city. As compared with last month's figures, 602 positions were filled in October and 560 in September. Commissioner Chisholm accounts for the increase by the fact that there has been a large influx of men looking for factory positions from all parts of the country. Every province in the Dominion is represented in last month's list. That a number of Chinese were among the applicants is evidence that there was also a fair sprinkling of different nationalities on it.

World's Output of Graphite.—Interest in graphite at present is widespread. According to the Canadian Mining Institute Bulletin the two principal forms in which the mineral is found are amorphous and crystalline, the former being very common. The world's production statistics for 1912, the latest available, are as follows:

	Tons
Ceylon	36,660
Canada	2,060
South Africa	42
Austria	50,017
Madagascar	3,011
United States	3,835
Mexico	3,158
Korea and Japan	8,363
Germany	13,814
Italy	14,517
Sweden	87
Norway	285
France	661
Total	136,510

Paper Companies Merge.—By the completion of a merger between the Bryant Paper Co., of Kalamazoo; the Oxford Paper Co., of Rumford Falls, Maine, and the Partington Pulp and Paper Co., of St. John, N.B., the latter corporation, with its extensive pulp plants passed to the control of the American companies. The sum of $3,500,000 is estimated as the cost of the deal. The new company will be known as the Nashwaak Pulp and Paper Co. and will maintain its head office in New York City. The following officers were elected: President, P. J. Chisholm, St. John, N.B.; Vice-president, L.M. Bickford, New York; Treasurer, F. E. Tufts, St. John; Secretary, H. H. Drummond, St. John.

Montreal, Que. — It is understood that the Sherwin-Williams Co., propose erecting a large plant for the manufacture of dyes, after the war. The plant is destined primarily to capture a portion of the dye trade formerly



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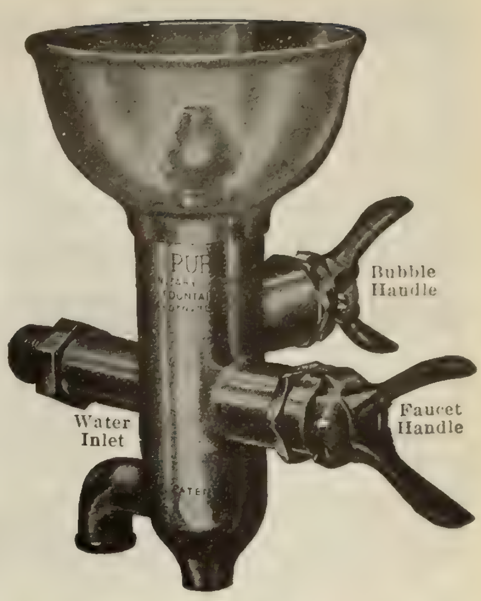

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A Puro Sanitary Drinking Fountain will cut that water bill 35%. We can prove that it has done that for others.

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In a word, it is the only sanitary Drinking Fountain that is really safe, sanitary, simple, automatic in control, and easy to attach.

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YOUR WATER SUPPLY
Puro Sanitary Drinking Fountain Company
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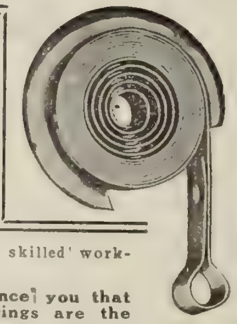

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held by Germany throughout the British Empire. It is stated that the trade of Canada alone in this respect would not warrant the building of a factory. Ultimate capacity will, of course, depend upon a satisfactory tariff, which now seems assured. Canadian supplies at present come largely from the U.S., and this branch of trade has been found to be so important that the company is even now erecting in Chicago a large plant. This will supply the Canadian needs of the company until such time as a plant is built here. The company is at present manufacturing a complete line of colors in connection with its paint plant, having started with two lines only. The product has been found so satisfactory as to lead to the decisions referred to.

Catalogues

Horizontal Boring Machines.—Catalogue illustrating and describing three types of horizontal boring and milling machines made by Webster & Bennett, Ltd., Coventry, England. The catalogue contains a specification covering each type of machine accompanied by a table giving the principal dimensions and shipping weight for each size. Particulars of extra attachments are also given. The illustrations are full page and show clearly the general design of each type and the different styles included in the various types of machines.

Multiple Drilling Machines made by Webster & Bennett, Ltd., Coventry, England. This catalogue describes and illustrates a varied and an interesting line of mutiple drilling machines, including gang drilling, multiple, two and four spindle drilling machines. Also two and four spindle tapping and boring machines, while sensitive drilling machines are also described and illustrated. A specification is included for each type of machines accompanied by a table giving the principal dimensions and other particulars.

Arc Lamp Carbons. — The Electrical Engineering & Equipment Co., London, England, have issued a new catalogue, A. B. 1, dealing with an extensive line of arc lamp carbons, carbon brushes, battery carbons and other similar products. Among the arc lamp carbons listed is a special line for cinematograph work, of various qualities. As the carbon brushes are made in various grades, a summary of brush characteristics is given for each grade with remarks stating the class of work for which each is best suited. In this connection there are also a series of characteristic curves and particulars covering the various grades. Other carbon products listed, include brushes for special work, plates, rods, blocks, contacts, carbon tubes, etc. The catalogue is fully illustrated and contains nine complete price lists.

Cushman Chucks. — The Cushman Check Co., Hartford, Conn., are distributing to the trade their 1917 catalogue containing new list prices adopted in August of this year. The catalogue features an interesting and extensive line of chucks and portable face-plate jaws. In addition to the prices, a brief description is given of each type of chuck, while tables are included, giving the principal dimensions for each size. The catalogue is fully illustrated.

Gold Metal Sawing Machines made by the Newton Machine Tool Works, Philadelphia, Pa., Catalogue No. 51, just off the press, briefly describes the company's latest designs and sizes of cold metal sawing machines and also some of prominent designs and sizes of other machines which they manufacture. A general specification is included for the cold saw machines, and there are also dimension tables giving the principal dimensions and capacities of the various sizes. The other machines dealt with include various types of milling, slotting, planing and boring machines. In this section of the catalogue the principal dimensions of each type of machine are also given. The catalogue is fully illustrated and well gotten up, the half-tones being unusually distinct.

Book Review

The Canadian Trade Index for 1916-1918, compiled and published by the Canadian Manufacturers' Association, Inc., Toronto, price $5. In the latest edition of this publication a number of new ideas have been embodied and the value of the book considerably enhanced. Two features have been added in this edition, which will be of great convenience to the users of this book. The first of these is a continuous alphabetical list giving the correct name and address of every manufacturer appearing in the classified section, together with the various lines, branches, export representatives, etc., of the firms where this information has been available. In the second feature the French index of headings has been supplemented by the addition of the English headings, which appear in alphabetical order in the classified section. In this edition a large number of changes have been made in former headings to make them more descriptive and more easily found. Over two thousand new headings have been added and the names of firms appearing in this index for the first time number between two and three thousand, making a total of 7,500.

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6½ H.P. WESTINGHOUSE AND 1/3 H.P. Toronto & Hamilton Electric Co. 60-cycle motors, in first-class order. Geo. H. Lees & Co., Hamilton. (17)

BROWN-BOGGS MARKING MACHINE FOR 4.5 shells. Has been used for short time only, and is in good condition. Box 248, Canadian Machinery. (24)

FOR SALE—TWO C.M.C. TURRETS—SPECIALLY built for inside boring for 6" shells; almost new. These are offered for sale subject to special terms as to delivery, and at price to be arranged. Taylor-Forbes Co., Ltd., Guelph. (19)

ONE REED TURRET LATHE, 8' BED, swing, 28"; 4 2" holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 241, Canadian Machinery.

FOR SALE — HOT SAW AND MILLING machine, Ajax. New; never used. Address Canadian Warren Axe & Tool Co., St. Catharines, Ont.

FOR SALE—45 H.P. GAS PRODUCER AND engine, complete. Good condition. For particulars write Canadian Warren Axe & Tool Co., Ltd., St. Catharines, Ont.

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

Wanted

A Photographer

Young man with experience in photographing machinery. One possessing technical education preferred. A knowledge of advertising would prove valuable. When applying, give full particulars re experience, age, where employed now, salary expected. Splendid opening for hustler. Replies will be treated in strictest confidence. Address Box 249, Canadian Machinery.

BRASS RODS, 1¼, 1½, 1¾ UP TO TEN FT. Brass tubings, 2⅜ o.d., with ¼ wall; all lengths to ten feet. Louis Lovitz, 186 Markham St., Toronto. Telephone College 5711. (17)

FOR SALE—TWELVE H.P. GAS OR GASOline Engine. Goold, Shapley & Muir Ideal. In first-class condition. Cheap. Stedman Brothers, Ltd., Brantford, Ont. (21)

FOR SALE—FIVE THOUSAND FEET OF 1" black piping. Newell Mfg. Co., Prescott, Ont. (18)

BAND SAW—COWAN & CO. MAKE, 30" Iron Frame. Post Machine 29½" x 33", Iron Tilting Table and Saw Guard, including Brazing Tools, setter for Filing, etc., has had very little use. Whaley, Royce & Co., Limited, 237 Yonge St., Toronto, Ont. (23)

WE CAN GIVE EARLY DELIVERY ON difficult fixture cutting, also on gauges and jigs. We have a large shop and the finest equipment. Apply Box 235, Canadian Machinery.

FOR SALE — IMMEDIATE SHIPMENT — New Heavy Duty Shell Boring Lathe for manufacture of 6" High Explosive Shells. Write for complete specification. Wm. Hamilton Co., Ltd., Peterboro, Ont. (20)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

FOR SALE—1 40 H.P. ROBB, ARMSTRONG high-speed engine; 1 4 x 1 Marsh deep well steam pump, and 1 Barton generator, 80 lamp capacity, with switch-board. All in good order and cheap for quick sale. Richards-Wilcox Canadian Co., Ltd., London. (20)

FOR SALE.—ONE BROWN-BOGGS MARKing Machine, suitable for 6" Mark XVI. or Mark III. English Shells. Only object in selling is that other methods of marking have been adopted. Price on application. Taylor-Forbes Co., Ltd., Guelph. (14)

1 VERTICAL, SINGLE ACTION, DOUBLE cylinder hydraulic pump, 6" stroke, all ready to connect up; almost new; price $75. McGregor & McIntyre, 1139 Shaw Street, Toronto. (tf)

FOR SALE FIFTEEN HEAVY CAST IRON columns, from thirteen to seventeen feet long. Columns tapered and have good heavy base and top. Also four roof trusses. Sixty feet long. Ten feet in centre, eight foot at ends. Will cut columns to suit purchaser. Woodside Bros., Port Arthur, Ont. (2)

WANTED

WANTED — BORING MILL, 30" TO 42" table; state make, condition, time used, lowest price, and send cut to Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (21)

WANTED — THREE TURRET LATHES suitable for steel sockets, also Thread Millers suitable for milling outside thread of sockets. Give price and particulars to Steel Furnishing Co., New Glasgow, N.S. (19)

SITUATIONS WANTED

SUPERINTENDENT, DESIROUS OF change, 18 pdr. shrapnel, and 6" H. E. shells. Box 247, Canadian Machinery. (26)

EXPERT FOUNDRYMAN FAMILIAR with all modern foundry appliances, desires position as foreman or assistant in gray or malleable iron foundry. Box 250, Canadian Machinery. (25)

COMPTROLLER, OFFICE MANAGER, chief accountant, credit man, executive ability. Twenty years' experience. Now holding responsible position. Desirous negotiating with large manufacturing industry offering good future prospects for equal services. Address Box 244, Canadian Machinery.

SUPERINTENDENT WITH PROVEN MEchanical and executive ability desires position as same, or one of equal grade. Wide experience with well known firms manufacturing high explosive shells, rifles, electrical machinery and instruments, light and heavy sheet metal and plate products. Have satisfactorily supervised installation and organized new plants for widely varied lines of product. Address P.O. Box 122, Dartmouth, Nova Scotia. (25)

SITUATIONS VACANT

FIRST CLASS GRIDLEY AUTOMATIC men wanted to set up Gridley automatic machines, also operators for same, highest wages paid, only first class mechanics need apply. Apply 47 Richmond St. East, Toronto. (24)

WANTED—NIGHT SUPERINTENDENT TO take charge of factory making 4.5 sockets. Apply Box 237, Canadian Machinery.

FOREMAN TOOL-MAKER WANTED — TO take charge of tool room in plant manufacturing 4.5 sockets and other munition work. Apply Box 236, Canadian Machinery.

WANTED — EXPERIENCED STEEL works draftsman for Nova Scotia. Give full particulars, including salary, permanency. Apply Box 234, Canadian Machinery. (17)

ALL-ROUND MACHINISTS WANTED FOR tool-room; highest wages paid. A. R. Ormsby Co., Limited, 48 Abell Strett, Toronto. (21)

WANTED — FIRST-CLASS MACHINIST able to take charge of our repair shop. Apply Hull Iron & Steel Foundries, Ltd., Hull, Que. (23)

MECHANICAL DRAUGHTSMAN WANTED for tracing and detailing on general machine work, also opening for man with experience on plate and structural work. Box 245 Canadian Machinery. (23)

SPLENDID OPPORTUNITY FOR YOUNG man about twenty-one, well educated and with some mechanical knowledge, who desires to learn the machinery business. Apply in first instance with full particulars as to experience, etc., to Box 243 Canadian Machinery.

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

For Sale--Warner & Swasey Turret Lathes--From Stock

Ten (10) 16" No. 2, Geared Friction Head Universal Turret Lathes, only used a few months—equal to new.

Williams & Wilson, Limited

320 St. James St. Montreal, P.Q.

Wanted!

We will pay highest market price for Shell End Scrap, any tonnage.

Write

HULL IRON & STEEL FOUNDRIES, Limited

HULL - - - QUEBEC

For Sale Cheap

1—Box Girder Type Overhead Hand Power Crane, 48′ 6″ span, 5 tons capacity; complete, less the Hoist. This is a good Crane for Foundry, Boiler Shop, Storehouse, Stone Yard, etc.

1—Brantford (Gas) Bake Oven and 4 Racks.

1—Linderman 2-Spindle Boring Machine.

1—26″ Drill, London Machine Tool Company.

1—Bowser 40 Gal. Varnish or Oil Pump and Tank.

11—New 1-13/16″ High Speed Twist Drills, No. 5 Morse Taper Shank.

30—Used 1-13/16″ High Speed Twist Drills, No. 5 Morse Taper Shank.

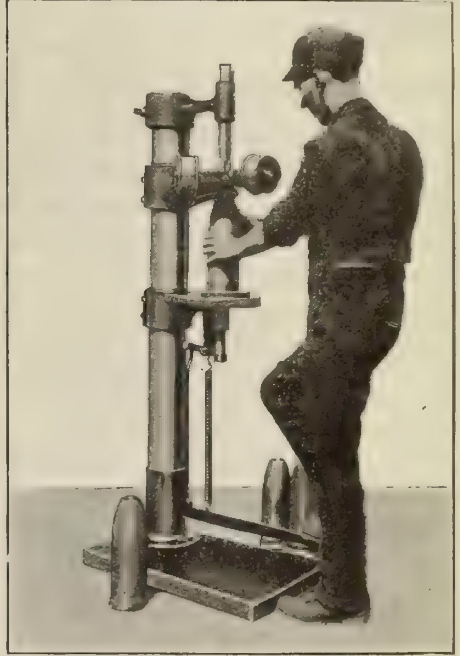
M. BEATTY & SONS
Limited
Welland, Ont.

MONARCH
Milling Machine
(Made in Canada)

For Milling the three slots in the nose of

Mark 7 Shells

Adjustable to take any size shell from 4.5 to 9.2 inclusive.



ONE MOVEMENT of foot lever clamps the shell and feeds the three cutters in to the right depth.

CAPACITY ON 4.5—6 to 8 shells per minute. Actual cutting time is simply — "zip" and the three slots are finished.

THE MACHINE is complete with High Speed Cutters and drive pulleys which should run at about 550 revolutions per minute. It can be driven by three 2-inch belts, either from overhead counter or line shaft. The clamping device does not interfere with copper band, and altogether it will be found to be a very satisfactory tool—CONVENIENT and ACCURATE.

For further particulars address

H. W. PETRIE, LTD.
FRONT STREET WEST, TORONTO
Sole Selling Agents for Canada

For Sale (Subject to Prior Sale)

15-TON LOCOMOTIVE CRANE

Manufactured by Balmforth Bros., of Rodley, England

Specifications:

Four wheel 4′-8½″ gauge locomotive crane with 38′ boom capable of lifting and swinging safely when properly ballasted, and running on good substantial track the following loads with booms dropped to different radii:—

30,000	pounds	at	10	feet	radius	(Minimum radius)
26,250	"	"	12	"	"	
20,000	"	"	15	"	"	
14,000	"	"	20	"	"	
11,000	"	"	25	"	"	
9,000	"	"	30	"	"	
7,000	"	"	35	"	"	
6,000	"	"	40	"	"	(Maximum radius)

Crane is fitted with rail clamps to give higher capacity, if wanted. The crane has a draw bar pull of 7,600 pounds. Ballast for lower truck 5 tons. Crane weighs 25 tons, 10 cwt.

Steel Shafting ranging from 6 15-16 to 9 15-16 by 28 ft. 250 tons steel rails. 20 lb. 10 Trucks; 36″ gauge.

1 100 H.P. Marine Boiler, with valves complete. As good as new. Price $550.00.

1 Concrete Mixer on wheels, with engine attached Price **$450.00.** Maker, Gould, Shapley & Muir, Brantford, Ont.

34 Lengths New Pipe, 20″ Bell and Spigot Class 2.

RICHARD JAMES, 704 POWER BUILDING
MONTREAL - - QUE.

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Telegrams and Long Distance Telephone Messages are not uncommon among the replies to ads in our Classified Advertising Section.

The MacLean Business & Class Publications in Canada

TO SELL or buy from Canada such lines as machinery, hardware, food products, dry goods, books and stationery, paper, printing machinery and supplies and general merchandise of almost every description, raw or manufactured, use or consult the MacLean Business and Class Publications, as per list below. For special information, write the publishers. Concerning the quality of the MacLean publications, let this copy of CANADIAN MACHINERY which you hold in your hands speak for all. The MacLean list of 14 publications is as follows:—

The Canadian Grocer (Est. 1886)
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Dry Goods Review (Est. 1889)
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Canadian Machinery (Est. 1905)
Serving the Machinery, Metal-Working, Iron and Steel, Foundry and Allied Trades. Published weekly.

The Power House (Est. 1907)
Serving the Operating and Consulting Engineers and Power Superintendents, Devoted to the Generation, Transmission and Application of Steam, Gas, Electric, Air and Water Power; and to the operation of Refrigerating Machinery. Published monthly.

Bookseller and Stationer (Est. 1884)
Serving the Book, Stationery, Fancy Goods and Associated Trades. Published monthly.

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Serving the Manufacturers of Sanitary, Heating and Ventilating Machinery, Systems and Equipments, and those installing them. Published semi-monthly.

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For over 20 years the MacLean Publishing Company has maintained a fully-staffed London office, and has rendered British and Continental manufacturers, shippers and traders an invaluable service in many directions.

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Specimen copies of the MacLean publications will be cheerfully forwarded to all asking for them.
Address us at London or Toronto.

The MacLean Publishing Co., Limited
143-153 University Avenue Toronto, Canada

Machine Tools in Stock Immediate Shipment

NEW ENGINE LATHES.

16″ x 7′ Oliver Three-step Cone, Double Back-geared, Quick-change Gear, Oil Pump and Pan.
18″ x 8′ Giddings & Lewis Three-step Cone, Double Back-geared, Geared Feed.
18″ x 8′ Stevens Four-step Cone, Single Back-geared, Standard Change Gears.
18″ x 8′ South Bend Four-step Cone, Single back Geared.
22″ x 10′ Milwaukee Three-step Cone, Double Back-geared, Geared Feed.

SECOND-HAND ENGINE LATHES.

17″ x 8′ Greaves Klusman Four-step Cone, Single Back-geared, Geared Feed.
18″ x 8′ Mueller Four-step Cone, Single Back-geared.
18″ x 10′ Lodge & Davis, Four-step Cone, Single Back-geared, Taper Attachment.
20″ x 10′ Flather Four-step Cone, Single Back-geared.
20″ x 5′ Reed Four-step Cone, Single Back-geared.
30″ x 10′ Vilter Three-step Cone, Friction Geared Head, with Heavy Hexagon Power Belt Turret.
36″ x 10′ Fay & Scott Five-step Cone, Single Back-geared.
36″ x 12′ New Haven Five-step Cone, Single Back Gear, Quick-change Gear.

MISCELLANEOUS.

New 3′ Dreses High Duty Plain Radial Drill.
New 6″ Peerless High-speed Hack Saw Machines
New D4 Rock River Splitting Shear.
New Yankee Twist Drill Grinder.
New 5″ Ford Smith Hack Saws.
New 6″ Ford Smith Hack Saw.
S.H. 12″ Avey Single Spindle Ball-bearing Sensitive Drill.
S.H. No. 22 Garvin Vertical Milling Machine.
S.H. Foote-Burt Four-spindle Sensitive Drill.

Write, Phone or Wire for full Specifications and Prices.

H. W. Petrie of Montreal, Limited
327 St. James St., Montreal, Que.

BIG SALE
OF
Lathe Chucks

100 Second-hand Lathe Chucks from 10 to 36 inch, Independent, at $1.00 per inch.

1—16″ Smith & Mills Back-geared Shaper.	$ 400
1—24 Smith & Mills Shift Belt Shaper..	300
1—24 Barker Geared Shaper, new........	450
1—24 Gould & Eberhardt Back-geared Shaper	500
1—2½ ft. Muller Radial Cone Type........	525
1—24 x 48 x 16 ft. McCabe Double Spindle Lathe	1,400
8—No. 18 Bliss Inclinable Power Presses, 1½ in. stroke ....each	125
1—No. 3 Garvin Hand Miller	275
1—17 x 8 American Quick-change Gear Lathe	700
1—21 x 8 LeBlond Heavy Duty Lathe.....	700
1—25 H.P. Gen. Elec. A.C. Motor, 60 cyc., 1,200 R.P.M., 3-phase and start........	350
1—35 H.P. Crocker Wheeler D.C. Motor, 220 volt, 700 R.P.M.	425
1—60 H.P. General Electric, D.C., 220 Volt, 1,000 R.P.M., near new	600
1—100 H.P. Westinghouse D.C. Motor, 220 V., 690-1000 R.P.M., Type S.............	900
1—110 H.P. Westinghouse D.C. Motor, 220 V., 690-1000 R.P.M., Type S.............	950

Morris Benjamin
220 Centre Street New York

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works Limited
CHATHAM, ONTARIO

Machine Tools For Sale

In stock for immediate delivery:

LATHES.

4—13 x 6 Worcester (new).
1—18 x 8 Mueller (new).
2—16 x 8 Style A, Hamilton (new).
1—20 x 10 P.C., C.R. (new).
2—14 x 6 Style A Hamilton Tool Room Lathes (new).
1—9 x 12 Porter Cable (new)

TURRET LATHES.

2—21-inch Style H Gisholt, taper attachment.
1—2 x 24 J. & L. Flat Turret.

BENCH MILLER.

1—Sloan & Chace (new).

BENCH LATHES.

A variety of new and used bench lathes with collets.

GRINDERS.

2—No. 1 Cutter and Reamer Grinders (new).
2—7 x 32 Norton Plain Grinders.
2—16 x 36 Bridgeport Plain Grinders.
1—No. 1 Wilmarth & Morman Surface Grinder (new).
1—3/16 to 2 x 2 Internal Water Attach (new).

SHAPERS.

1—Double Head Traveling Head Bement-Miles.
1—10″ Single Head, Traveling Head, Pratt & Whitney.
1—16″ Double Head, Traveling Head, Bement.
1—32″ Triple Geared Shaper (new).

BORING MILL.

1—84″ Cincinnati, like new.

MILLING MACHINE.

1 No. 2 Plain Cincinnati.

DRILL PRESSES.

1—3 Spindle Avey, like new.
1—24″ Sliding Head Aurora, B.G.
1—36″ Sliding Head Aurora, B.G.

SCREW MACHINES.

2—No. 2 B & O (new).
1—1 inch Pierce (new).
2—1½″ B & O (new).
1—No. 4 Foster.

STRONG & HERY COMPANY
225 STATE ST., ROCHESTER, N.Y.

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

TOOLS
FOR
IMMEDIATE SHIPMENT

2—Lucas Horizontal Boring, Drilling and Milling Machines.
1—No. 1 Kearney & Trecker Plain Milling Machine.
2—No. 2 Kearney & Trecker Plain Milling Machines.
1—32″ x 24″ LeBlond Heavy Duty Lathe.
2—4¼″ Gridley Automatic Screw Machines.
1—36″ x 16′ Springfield Machine Tool Co. Lathe, 8′ centers.
1—No. 2 Brown & Sharpe Universal Grinder, 12″ x 30″ centers.
1—56″ x 66″ x 27′ Gray Planer, 4 heads, Gray Patent Speed Variator.
65—No. 2 Plain Head Hand Screw Machines, 1 1-16″ capacity.
1—72″ Pond Double Swivel Head Vertical Boring Mill.
1—16″ x 8′ LeBlond Quick-change Lathe.
1—22″ Barnes Upright Drill, back-geared and power feed.
1—14″ Sellers Slotter.
1—48″ Gould & Eberhardt Automatic Gear Cutter.
1—20″ 4-spindle Barnes Multiple Drill.
1—15″ Gleason Semi-automatic Bevel Gear Planer.
2—16″ x 6′ LeBlond Quick-change Lathes, with taper attachment.
1—16″ x 6′ LeBlond Quick-change Lathe.
1—14″ x 6′ American Lathe.
1—14″ x 6′ Gleason Lathe.
1—Brown & Sharpe Vertical Chucking Machine.
1—No. 2 Bardons & Oliver Turret Lathe.
2—Wilmarth & Morman Drill Grinders.
1—No. 2 LaPointe Double Broaching Machine.
2—Jones & Lamson Double Spindle Machines.

The
Biggs-Watterson Co.
Cleveland, O.
Branches: Detroit, Cincinnati

WHAT'S IN A WORD?

"Co-operation" in a want ad. page is one of the necessities of modern times. Half of our worries will be over—the other half will not happen—when we learn to "get together." Co-operation in a want ad. page of your own trade paper is "something most devoutly to be wished for." The daily paper want column may get you a man in a rush—but if you want to reach the man to fill an executive job—to organize, to manage; if you want to dispose of a lathe, a drill or a press; if you want to buy them; if you want to dispose of your business or want to get a partner; if you want anything or want to dispose of anything, CO-OPERATE in this section.

CANADIAN MACHINERY
Classified Advertising Section
143 University Ave., Toronto, Can.

DESIRABLE MACHINES

GRINDERS

Two No. 1½ Landis Internal
New 10" x 24" Norton Plain Cylindrical
No. 2 Bath Universal, 10" x 36"
Two No. 2 Brown & Sharpe Surface
Springfield Surface, working surface 19" x 50"
Saxon Surface, working surface 8" x 18"
Whitney Surface, working surface 6" x 12"
No. 6A Bryant Hole and Face
Two Style "BX" Wilmarth & Morman new Grinders
No. 3 Brown & Sharpe Cutter and Reamer
Warner & Swasey Cock
No. 2 Garvin Cutter and Reamer
No. 1 Brown & Sharpe Internal
Two No. 1 Cincinnati Universal Cutter and Tool
10" x 84" Brown Roll Grinder
Three American Surface Die Grinders

BORING MILLS

10'-16' Niles Vertical, two heads
10' Betts Vertical, two heads
66" Betts Vertical, two heads
60" Baush Vertical, two heads
60" Niles Vertical, two heads
60" Bement Vertical, one head
Niles Horizontal, 9" bar
No. 1 Barrett Horizontal, 3¾" bar
Betts Horizontal, 3" bar
Rockford Horizontal, Drilling and Boring Machine, 2 1-16" bar

DRILLING MACHINES

Ten Foote-Burt No. 25 High Duty Drills
4 spindle Bickford, 1¼" spindles
7 spindle Foote-Burt, ¾" spindles
Three 6 ft. Niles Semi-Universal Radial
5 ft. Western Full Universal Radial
5 ft. Box Radial
5 ft. Bement Radial
4½ ft. Bickford Radial
4 ft. Niles Radial
4 ft. Gang Radial
Two 3½ ft. Gang Radial
3 ft. Baush Radial
3 ft. Universal Drill Co. Plain Radial
[illegible] Radial

New York Machinery Exchange

Offices: 50 Church St., NEW YORK

MACHINE SHOPS AND WAREHOUSES:

222-234 Culver Avenue **63-83 Pollock Avenue**
JERSEY CITY

NEW MACHINERY

2 No. 2 Rockford Universal Milling Machines, Jan. delivery.
2 No. 2 Rockford Plain Milling Machines, Jan. delivery.
1 No. 24 Oesterlein Plain Milling Machine, all automatic feeds, Dec. delivery.
1 No. 3 Brown & Sharpe Plain Milling Machine. Stock.
1 No. 2 Kempsmith Plain Milling Machine. Dec. delivery.
1 No. 3 Wilmarth & Morman Wet Tool Grinder.
5 18x8 Cisco Lathes, quick change gear. In stock.
1—13x5 South Bend Lathe. In stock.
1—14x6 Carroll-Jamieson Lathe, Q.C.G., taper attachment, relieving attachment, draw in collet. January delivery.
2—1½ American Plain Milling Machines. In stock.
3 No. 1 Dow Milling Machines, plain. In stock.
3 No. 1 Bickford Hand Milling Machines. In stock.
2 No. 1 Standard Hand Milling Machines. In stock.
1—No. 1½ Valley City Universal Milling Machine. Jan. delivery.
1—No. 1½ Valley City Plain Milling Machine. Dec. delivery.
10—No. 6 Standard Universal Tool and Cutter Grinders. In stock.
1 Style W.P.L. Wilmarth & Morman Drill Grinder. In stock.
1—20-in. Ohio Back Geared Shaper. In stock.
2 No. 1 Wilmarth & Morman Universal Grinders. Jan. delivery.
1 No. 2 Wilmarth & Morman Surface Grinder. Jan. delivery.
1—28-in. Smith & Mills Triple Geared Shaper.
2 32-in. Smith & Mills Triple Geared Shapers.
2 16-in. Smith & Mills Back Geared Shapers.
1—14x6 Neat Lathe, C.R., P.C.F.
1 24x10 Advance Lathe, C.R., P.C.F., H.S., Q.C.G., D.B.G.
1—16x6 Advance Lathe, Q.C.G., D.B.G.
4—19x8 Sidney Lathes, Q.C.G., C.R.
6—21x8 Sidney Lathes, Q.C.G., C.R.

60" Betts Boring Mill, 2 swivel heads, used. Guaranteed perfect condition. Complete. 10 H.P., 250 Volt D.C. Motor.

New Lists Just Issued. Write for a Copy.

The Simmons Machine Co., Inc.

981 Broadway **1001 Singer Bldg.**
Albany, N. Y. **New York City**

Quick Delivery

1—24 x 20 Rathe old style second-hand Lathe, good condition..	$ 350.00
4 22 x 16 Davis Lathes, second-hand, double back-geared, quick-change gear, compound rest; used six months; good as new .... each	1,050.00
2—18 x 7 Reed-Prentice Lathes, second-hand, geared head, flat turret lathe, automatic stops, pan and piping, fitted with 4.5 air chucks for shells; practically new ....each	1,150.00
2 13 x 6 Seneca Falls Lathes, new, with compound rest....each	400.00
4 9 x 4 Seneca Falls Lathes, new, with compound rest....each	215.00
1—14 x 6 Cisco Lathe, new, with compound rest, swings 16⅝"	635.00
3—18 x 8 Cisco Lathe, new, with compound rest, swings 20⅝" .... each	960.00
4—4½" Davis Cutting-off Machines, practically new, fitted with 3 Jaw Chucks .... each	450.00
2 4½" Davis Cutting-off Machines, practically new, fitted with 4.5 Air Chucks and vertical forming slide ....each	450.00
2 6" Davis Cutting-off Machines, practically new, fitted with 4.5 Air Chucks and vertical forming slide ....each	600.00
6 Holden-Morgan Thread Millers, designed for thread on 3" shells, to be sold in one lot for	2,500.00
2 West Tire Setter Bending Machines, second-hand ....each	750.00
2 Watson-Stillman 1½ x 2 Pumps, 1,200 cu. in. at 2,100 pounds pressure; second-hand ....each	550.00
1 Lea Simplex 4½" Cold Saw, second-hand	250.00
1 50-pound Kane & Roach Blacksmith Hammer	165.00
1—18" Disc Grinder and Press, second-hand	160.00
1—Waterbury Farrell Sprue Cutter, second-hand	100.00
1 30 x 30 x 8 Wilson Single Head Planer; good as new........	1,000.00
1—225 light Onondaga Direct Current Generator; second-hand...	100.00
4—Barnes Self-oiling All-geared Drilling Machines; new.	
1 Sipp Single Spindle Ball-bearing Drill; new.	
1 Sipp Two-spindle Ball-bearing Drill; new.	
1 Sipp Three-spindle Ball-bearing Drill; new.	
1 Sipp Four-spindle Ball-bearing Drill; new	
1 Standard Hand Miller, Whitney type; new	250.00
2 No. 0 Rockford Plain Millers; new ....each	425.00

THE H. A. SMITH MACHINERY COMPANY

384 West Fayette Street - Syracuse, N.Y.

High-Grade

MACHINE TOOLS

The list below is a small portion of our present stock. Write for complete lists.

13" x 7½" Carroll-Jamieson; new.
15" x 6' Carroll-Jamieson, Quick-change; new.
15" x 8' Carroll-Jamieson, Quick-change; new.
14" x 10' Prentice, Taper Attachment.
9 -17" x 8' New National Quick-change.
12—17" x 8' New Sidney, D.B.G., Quick-change, Swing 19".
2- 18" x 10' Rahn Mayer.
3—19" x 8' New Sidney, D.B.G., Quick-change, Swing 21".
20" x 8' Prentice, Taper Attachment.
20" x 10' Blaisdell.
4—28" x 10' 6" Johnson, Taper Attachment.
10—26"-48" x 14' New style McCabe Double Spindle, Heavy Pattern New Lathes.
26"-48" x 18' New style McCabe Double Spindle, Heavy Pattern New Lathes.
32" x 12' New Rahn Larmon.
24" Gisholt, Motor-driven.
2" x 24" Jones & Lamson.
14" x 5' Bridgeport Turret.
1" x 8" New Pierce Screw Machine.
42" x 42" x 10' Fitchburg Planer, 2 heads.
22" x 22" x 6' Powell Planer.
18" x 18" x 5' Pond Planer.
No. 210 Heald Wet Grinder.
20" Cincinnati B.G. Shaper.
24" Flather B.G. Shaper.
28" Snyder Drill, square table, 29½".
36" Baker Bros. Tapping and Boring Drill.

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Recess Adapters

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Capacity 200 per hour

Machine is equipped with automatic chuck, special High Speed Steel Tool, oil pan and pump. Ready for operation. Takes up little floor space, 14 x 24.

Will produce a recess absolutely smooth and to correct size.

NOTHING TO EQUAL IT.

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12 x 44 in. Modern Plain Grinder.
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18 in. 30 x 96 in. Morton Gap Grinder.
No. 3 Landis Universal Grinder.
No. 2 Oesterlein Universal and Cutter Grinder.
No. 6-x Diamond Disc Grinder 14-in. Ring Wheel Chuck, one end.
No. 120 Gardner Disc Grinder, used four months.
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15 in. Gleason Bevel Gear Generator.
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1—72 in. Niles-Bement-Pond Heavy Type Vertical Boring and Turning Mills, Motor-Driven, 220 Volts D.C.
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36 in. Niles Vertical Boring and Turning Mill, 2 swivel heads.
Betts Horizontal Boring Machine, 3 ft. Bar, 48 in. Swing.
Special Horizontal Boring and Facing Mill, 20 in. Swing, 42 in. between heads.
Beaman & Smith 2-spindle Boring and Facing Mill (Horizontal).
No. 2 Barrett Cylinder Borer with 5-in. spindle.
34 in. Colburn Vertical Turret Boring Mill, 4-jaw chuck, thread cutting attachment.

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No. 0 Pratt & Whitney Plain Milling Machine.
No. 2 Kempsmith Plain Miller.
No. 3 Becker-Brainard Universal Miller, Cone Driven, Gear Feed.
No. 2 Cincinnati Plain Miller, single pulley drive.
No. 3 Cincinnati Universal Miller with vertical and spiral attachment.
No. 9 Bement Vertical Milling Machine; fine condition.

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Generator, 36 Amp. 15 K.W., 1,800 volts r.p.m.
15 H.P. General Electric Motor, 220 volts, A.C.
20 H.P. Westinghouse Motor, 220 volts, A.C., 3-phase, 60-cycle, 1,200 r.p.m.
25 H.P. General Electric Motor, 220 volts, A.C., 3-phase, 60 cycle, 1,200 r.p.m.
100 H.P. Form K Motor, 550 volts, 3-phase, 25-cycle, 750 r.p.m., with base and pulley; used 60 days.

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24 x 24 in. x 6 ft. Pease Planer, one head or cross-rail.
30 x 30 in. x 8 ft. Lodge & Davis Planer, one head on cross rail.
36 x 36 in. x 14 ft. Niles Planer, one head.
56 x 36 in. x 8 ft. Putnam Planer, two heads on crossed rail.
72 x 57 in. x 17 ft. Gleason Planer, two heads on cross rail.

SCREW MACHINES.

2—6-A Potter & Johnson Automatic Chucking Lathes.
2—No. 1 Foster Hand Screw Machines, wire feed and auto chuck; fine condition.
No. 2 Pierce.
No. 2 Bardons & Oliver Screw Machine.
2-in. Cleveland Automatic.
No. 3 Stecher Screw Machine.
No. 3 National Acme Automatic Screw Machine 4 spindles, ⅞-in. capacity.
4—No. 54 National Acme 4-Spindle Auto Screw Machines.
No. 5 Warner & Swasey Screw Machine, 2¼-in. capacity.
8—5A Potter & Johnson Automatic Chucking Lathes.
No. 53 National Acme Auto Screw Machine, single pulley drive, one inch capacity, fully equipped; almost new.
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8—21 in. Gisholt Turret Lathes, belt driven.
Lodge & Davis Turret Lathe, power feed to turret, 18 in. swing, 2 in. hollow spindle.
10—13 in. Gisholt Turret Lathes.
14 in. Davis Turret Lathe, cone drive.
15—Reed Prentice Semi-Automatic Manufacturing Lathes, oil pans, pumps and regular equipment.

ENGINE LATHES.

5—Cataract Precision Lathes.
11 in. x 5 ft. Star Lathe, foot and belt drive.
18 in. x 6 ft. Bradford, arranged for motor drive.
18 in. x 6 ft. Bradford, belt drive.
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26 x 48 in. McCabe Double Spindle, 14 and 18 ft. Beds.
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42" Gisholt, one turret and one swivel head.
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62" Bement, horizontal.

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No. M-1 Natco 8-spindles.
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30" x 9" G. & E. Auto, for spur and bevel.
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14" x 20" B. & S. Universal.
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12" x 5' Davis, c.r.
14" x 6' Fairbanks, c.r., taper.
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16" x 6' Sebastian, p.r.
16" x 10' Greaves & Klusman, c.r.
17" x 10' Blaisdell, c.r.
18" x 6' Bradford, c.r., taper.
18" x 8' L. & S., pat. head, c.r., taper.
18" x 10' Bradford, c.r., taper.
18" x 12' Barker, c.r.
20" x 10' Flather, c.r.
20" x 14' Blaisdell, c.r.
21" x 12' New Haven, c.r.
21" x 12' Bradford, c.r., taper.
24" x 12' New Haven, c.r.
24" x 13' New Haven, c.r.
30" x 27' Reed, c.r., taper.
32" x 16' Blaisdell, c.r.
36" x 22' Lodge & Shipley, geared head, q.c.g., motor drive with motor.
68" x 20' Fifield, c.r., t.b.g.

MILLING MACHINES

No. 4 LeBlond, plain.
No. 13 P. & W., Lincoln
No. 4-B Becker Vertical.
No. 5 Becker Vertical.

PLANERS

22" x 22" x 4' New Haven, one head.
30" x 30" x 12' Cincinnati, two heads.
36" x 36" x 12' Powell, single head, arranged for two.
36" x 36" x 16' Sellers, one head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.
42" x 36" x 12' Cincinnati, two heads.

PRESSES

No. 20 Bliss, O.B., Inc.
No. 3 Walsh O.B. Inc.
No. 174 Consolidated, double crank.

SHAPERS

14" Pratt & Whitney.
14" Smith & Mills.
16" Gould & Eberhardt.
16" American.

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No. 1 Chicago automatic.
1 3-16" Hartford Automatic.
⅞" Cleveland Automatic.
2" Cleveland automatic.
2¾" Cleveland automatic.
1" B. & S., plain.
16" P. & W., plain.

TURRET LATHES

16" Lodge & Shipley.
25" Niles.
No. 2 Warner & Swasey Hollow Hexagon.
2" x 24" Jones & Lamson.
24" Gisholt, spindle capacity 6¼".
3" x 36" Jones & Lamson, chucking outfit.

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Centering Machine, No. 1 Whitton.
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Newton Vertical Type Continuous

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24" Gisholts 6¼" Hole, Pan Pump
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No. 6-A Model "2" Potter & Johnson Auto
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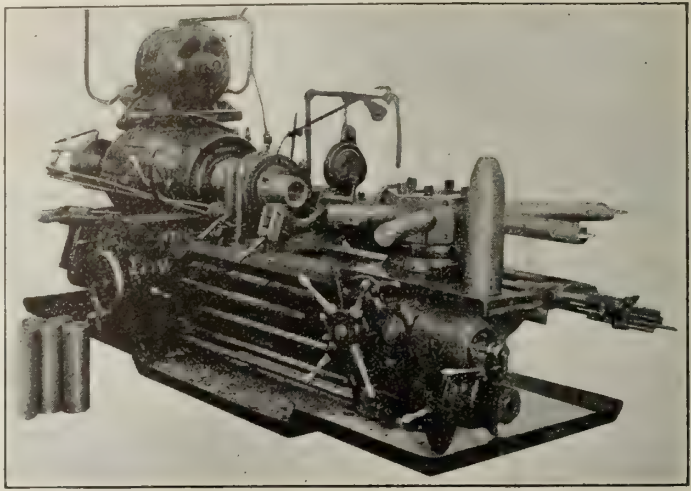

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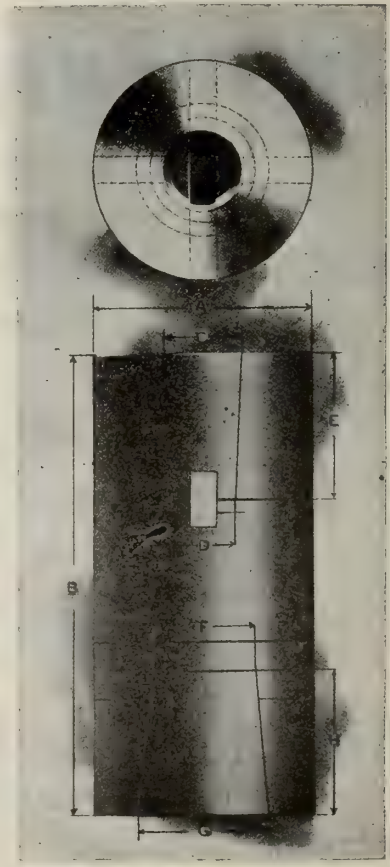

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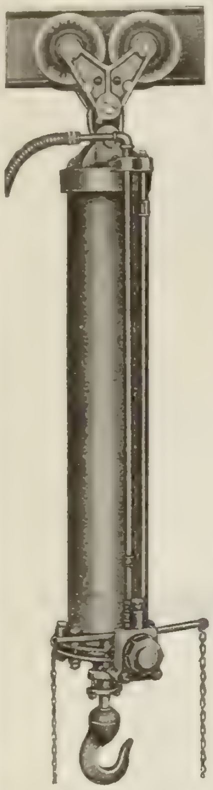

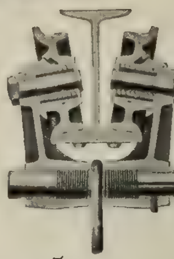

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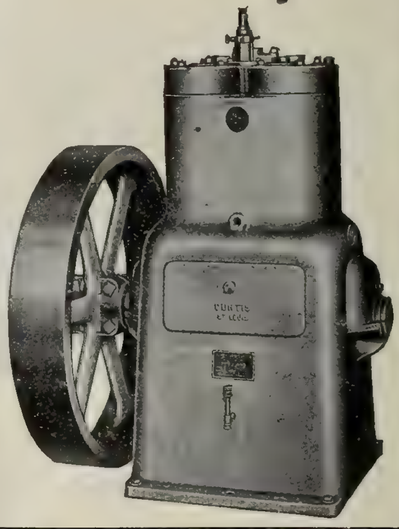

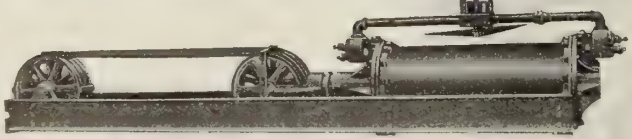

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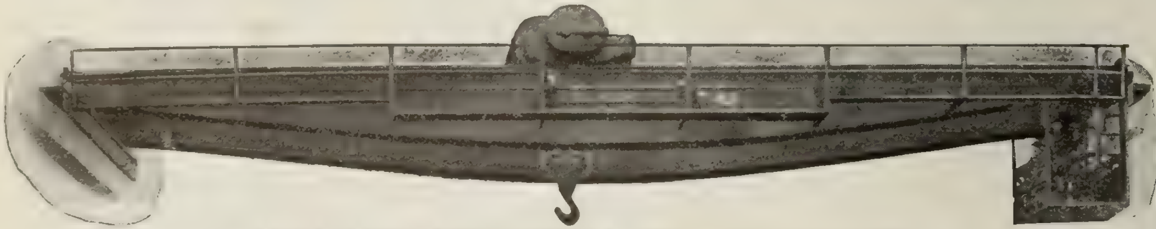

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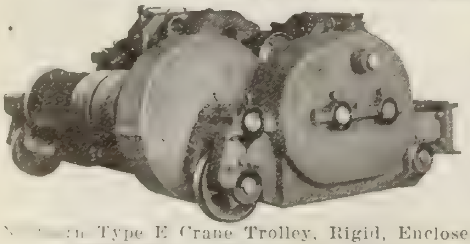

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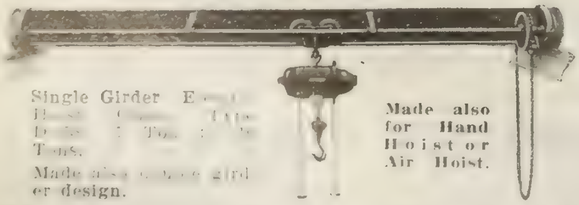

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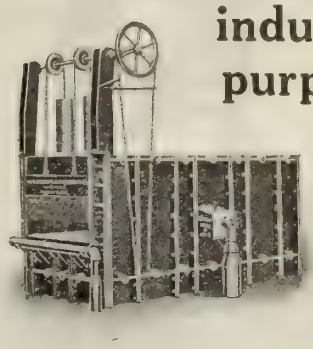

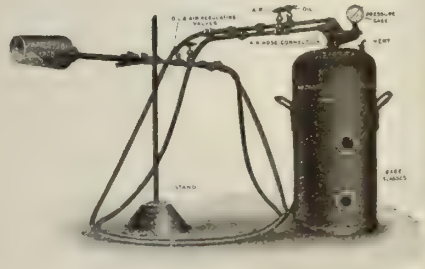

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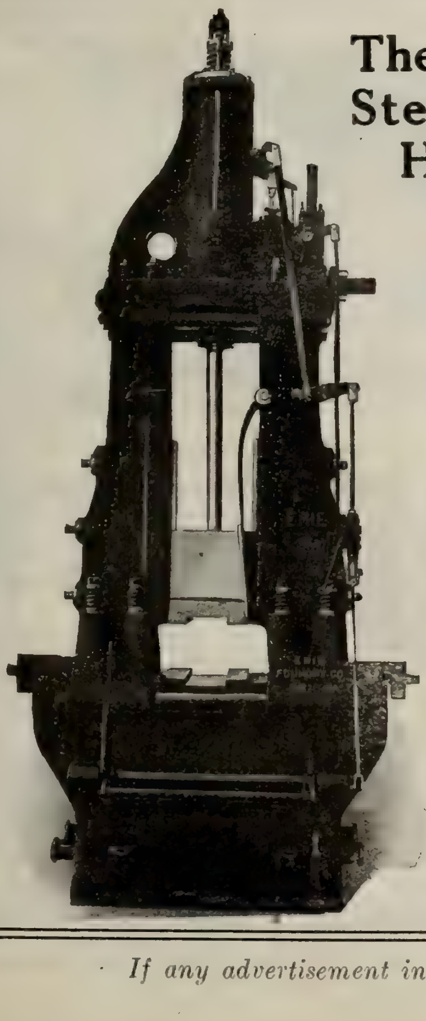

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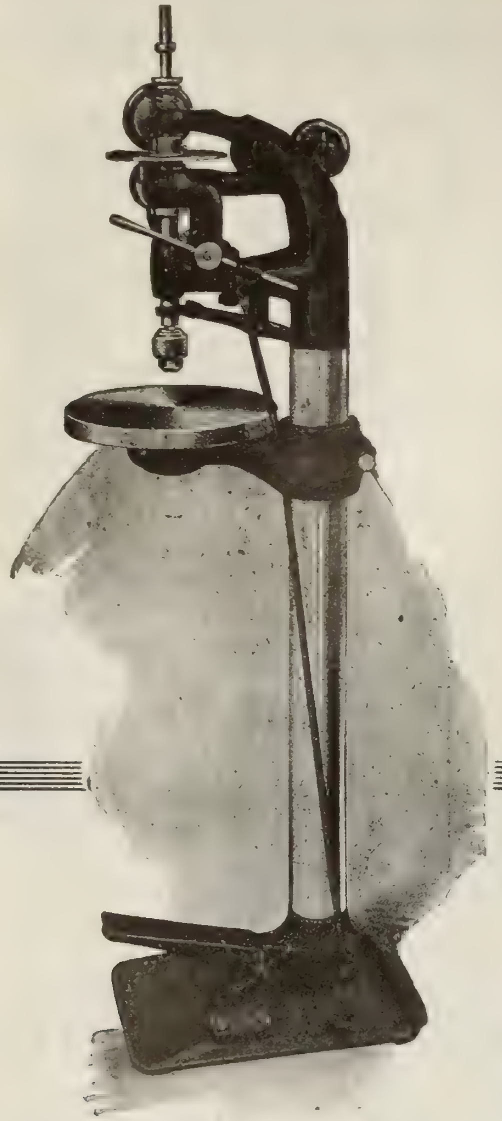

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Ovens carried in stock and built to meet requirements of manufacturers.

Builders of All-Steel Oven Trucks with Roller Bearings.

Canadian Representatives: The A. R. WILLIAMS MACHINERY COMPANY, Ltd.
ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER

SHEET METAL STAMPINGS

Dominion Forge & Stamping Co., Limited
WALKERVILLE ONTARIO

DROP FORGINGS

Our facilities and equipment enable us to give you a top-notch quality at a very reasonable price.

AUTOMOBILE FENDERS, HOODS AND GASOLINE TANKS

TURNER TURRET?

If it is a question of drilling, reaming, threading, undercutting, facing, underboring, etc., the Turner Turret will accomplish these at a great saving. One reason for the saving is that 4, 5 and 6 operations may be completed without resetting tools. Good reason, isn't it? But that isn't the only reason.

Trunnion Chucks make working on several sides possible with one chucking.

Turret is suspended within rigid, accurate case. Detent located in case and fits adjustable socket in turret.

Turner Machine Company
Danbury Conn. U.S.A.

Incorporated with

Turner, Atherton & Company, Limited
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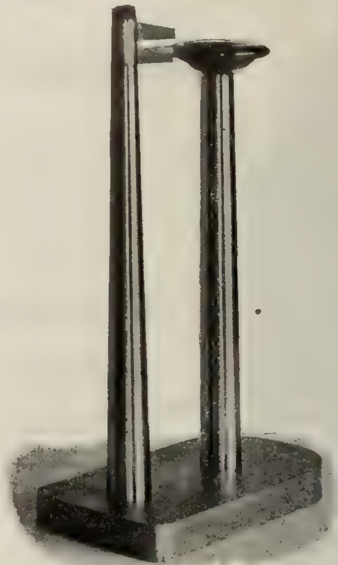
Gauges, Tools, Fixtures, Jigs, Dies

SLOCUM – AVRAM – SLOCUM MANAGEMENT

That Are Right



Your requirements can be no more exacting than those we have made.

Our factory is equipped with new and modern machinery.

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531 West 21st St., New York, N.Y.

Bottom Tap Ladles

for steel. With or without gearing (Spur or worm). Heavy plate shells; cast steel trunnions; improved adjustable bottom - tap rig of rigid construction. **Send for new catalog No. 122.**

1703

Complete Foundry Equipmen's

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FOUNDRY EQUIPMENT CO
HARVEY-ILL. U. S. A.
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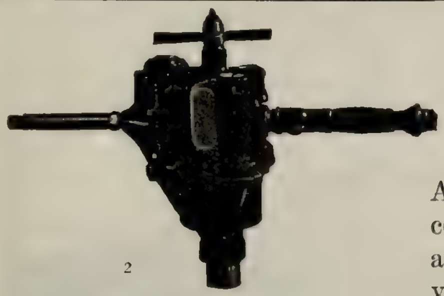
Cranes of all Types

Shell Makers Assistants



1. Little David Grinder

2. Little David Drill

Portable Pneumatic Tools

A Portable Grinder of the "Little David" type in your plant. Can you conceive of the many uses to which you can put it? Think, while you are reading this, how many steps you could save, how many operations you could perform with this Pneumatic Grinder. The "Little David" tools are for the most difficult work. They do it so thoroughly. The lower illustration is of our Reversible Drill. A most useful tool and one that can be adapted to any work.

Write for further information.

Canadian Ingersoll-Rand Company, Limited

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Works: Sherbrooke, Que.

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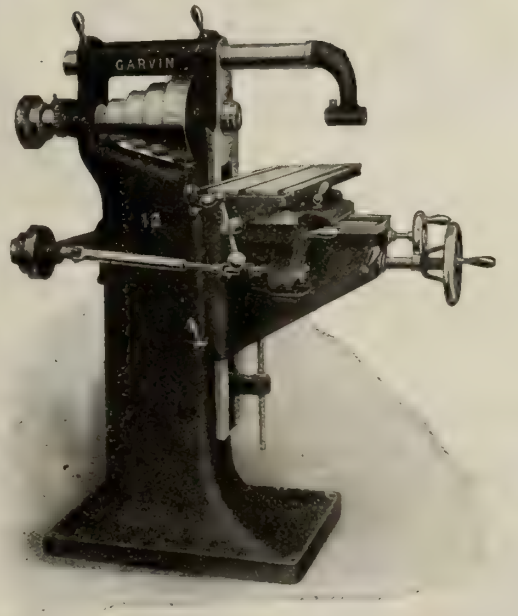
NO. 12 PLAIN MILLING MACHINE



No. 12 Plain Milling Machine—Use Code Abrade

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rapidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments . . . . .18 x 6 x 15 in.

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Manufactured by

THE GARVIN MACHINE COMPANY

Spring and Varrick Streets (***Visitors Welcome***) **50 Years New York City**

He got it—and it was an Aloxite Wheel

HE wanted a wheel for a special internal job—grinding hardened steel sleeves. ¶ The wheel had to cut free and fast and clean, holding its shape so as to insure absolute accuracy—a wheel that was positively uniform; that would show long life and increase his production. He got it—

It was an Aloxite Wheel

Getting in touch with Carborundum service brings you in touch with the right wheel in the right place

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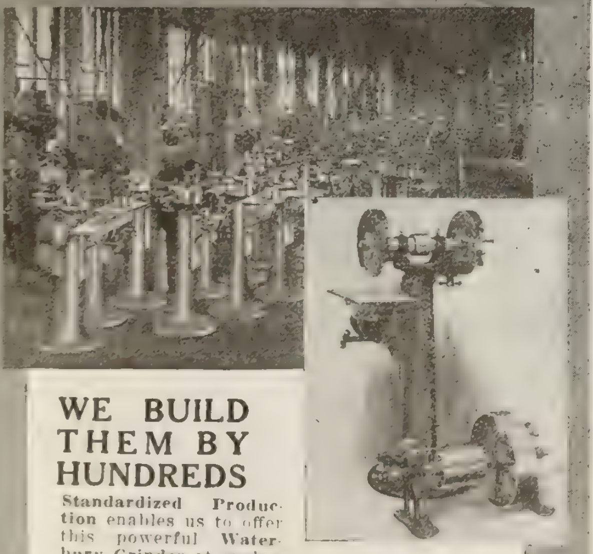

WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only

$75

Complete

The Blake & Johnson Co., Waterbury, Conn.

Assuming that you want a grinder that is better than the average—

A grinder with massive table, micrometer adjustments, very long knee and gibs, and extra heavy head- and tailstock—it will pay you to investigate the

Standard No. 6 Universal Grinding Machine

In addition, you'll find that the headstock is fitted with large bearing for chuck spindle and with special bronze bearings of navy specifications, spindle is tapped and tapered, bored to take wheel arbors and bearings are 1 in. in dia. and 2¾ in. long, and an exceptionally simple and sturdy countershaft with self-lubricating bearings.

Start the investigation by sending for the full details—to-day.

Simmons Machine Co., Inc.

1001 Singer Bldg., New York City
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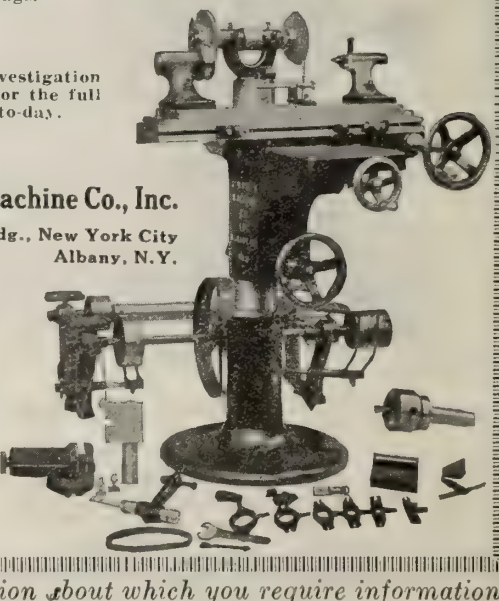
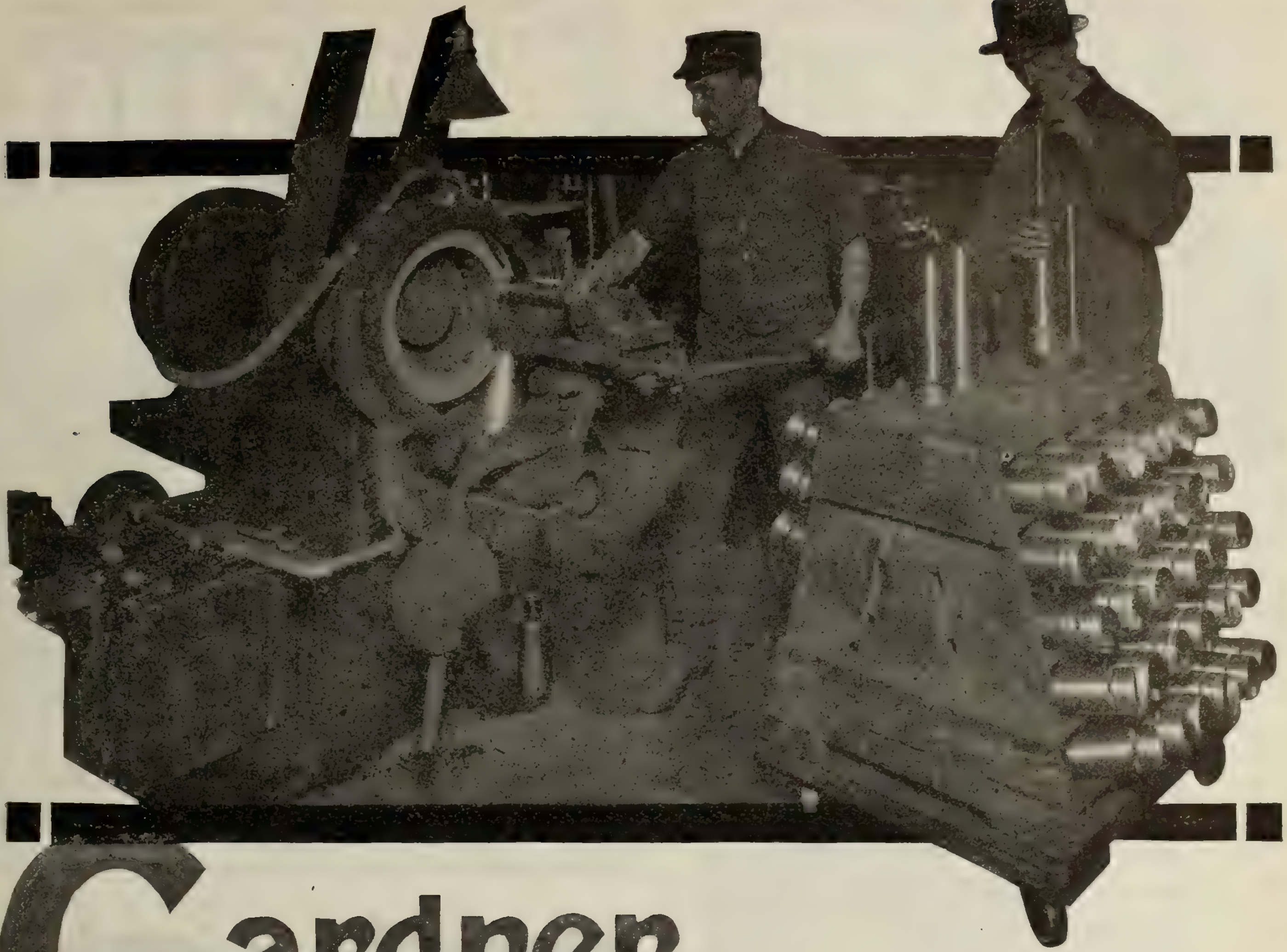
The world is Our Field





Gardner Grinders

Illustration shows a grinder developed especially for removing the hub or centre projection from the ends of shells. This machine is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates. We build a much more powerful grinder to be used for these same operations on 6-inch shells.

Features :

High-grade Babbitt Bearings and Lever Feed.

Rapid clamping of Shell into "V" fixture.

Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.

Can be equipped and operated at both ends for double output.

Output, according to size of projection to be removed from 40 to 100 per hour. Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever-feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments. Weight, 4,500 lbs.

For further particulars write:

The Gardner Machine Company, Beloit, Wis., U.S.A.

We Can Help You

If you can machine your own castings we have a proposal to make that will greatly benefit you.

We will supply you with a complete set of castings for:

Boring Lathes
Base Boring Lathes
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Band Pressers for 4.5″, 5.6″ and
High Explosive Shells

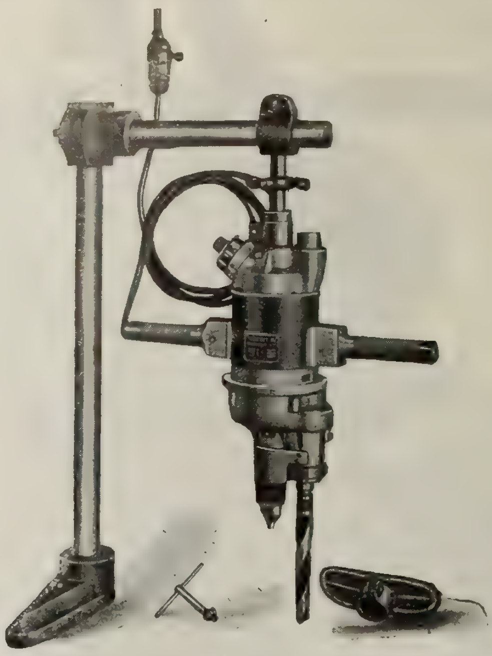
The Marsh & Henthorn quality is stamped on our products which distinguishes them amongst all others as the best.

It is for our mutual welfare.

Let us get together.

Marsh & Henthorn
BELLEVILLE ∴ ONTARIO

Stow Two Speed Two Spindle Drill



The only tool of its kind on the market. Fills a long-felt want. Will cut your cost.

We make drills of every size.

STOW MFG. CO., Binghamton, N.Y., U.S.A.
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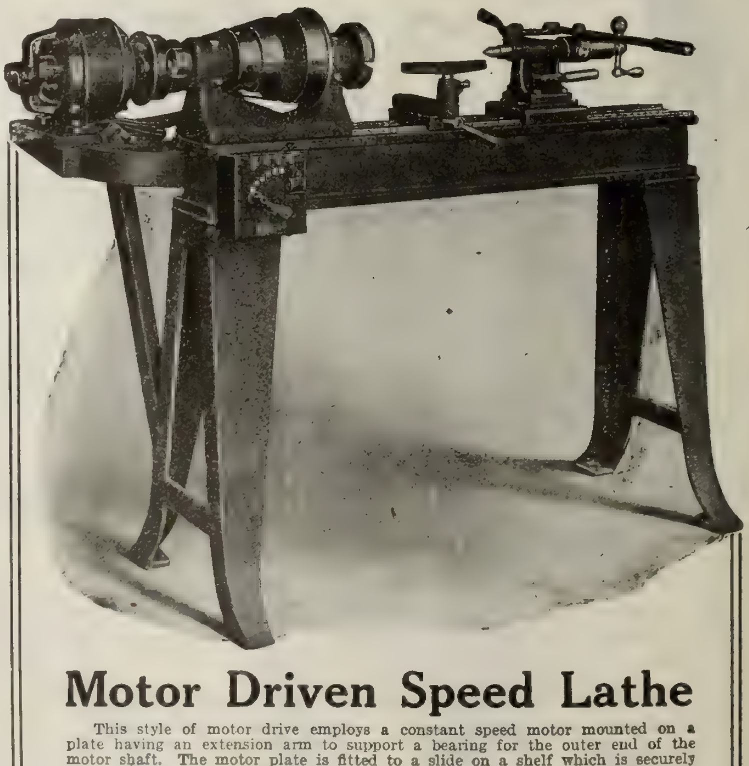
Oldest Portable Tool Manufacturers in America.



Motor Driven Speed Lathe

This style of motor drive employs a constant speed motor mounted on a plate having an extension arm to support a bearing for the outer end of the motor shaft. The motor plate is fitted to a slide on a shelf which is securely fastened to the back of the lathe bed. The motor plate is moved by means of a screw which tightens or loosens the belt. A four-step cone pulley on the motor shaft is belted to a four-step cone pulley on the spindle. This gives the same speed variation as when a countershaft is used, and by means of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is crossed-braced and all clamping levers are above the ways.

J. G. BLOUNT CO. - Everett, Mass., U.S.A.

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Recording Gauges

are unique in their extreme simplicity of construction. The continuous night and day records obtained with these recorders show the actual pressure maintained throughout the twenty-four hours.

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Prompt Delivery

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Eliminate All Guesswork

Make sure you are getting the quality and standard you are paying for. Our International Bureau of Inspection, Tests and Consultations is at your disposal.

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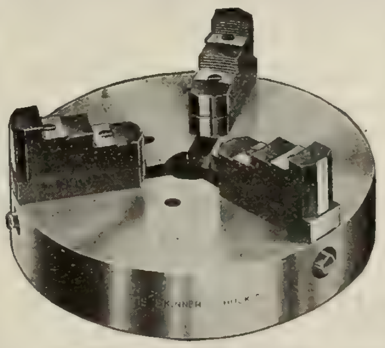
TORONTO, WINNIPEG, EDMONTON, VANCOUVER, NEW GLASGOW.

Skinner Universal Chuck



Reversible Jaws—Fig. No. 300-J.

Geared Screw Type

Has a stronger gripping power than any similar chuck made. For extremely accurate work this chuck has no equal. It is made also in the Combination pattern with three or four jaws.
Printed matter supplied upon request.

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N. Y. Office, 94 Reade St.
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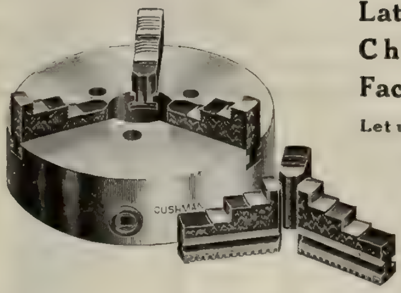
San Francisco Office, Rialto Bldg.

Cushman Chucks



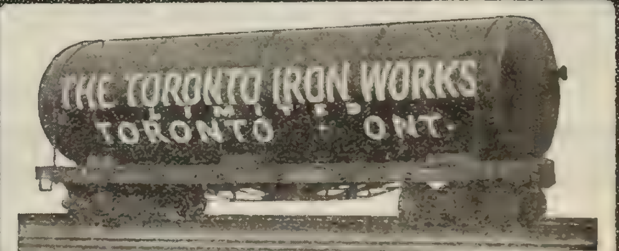
Lathe Chucks, Drill Chucks, Portable Face Plate Jaws.

Let us send you our catalog.

The Cushman Chuck Co.

Hartford, Conn., U.S.A.

RIVETED STEEL TANKS FOR EVERY PURPOSE



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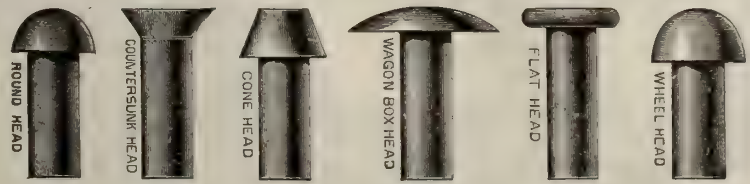

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PARMENTER & BULLOCH CO., LTD.

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The COST of FUEL?

This is an important question. But what you can get out of it is far more important and this depends on how you utilize it, which in turn is governed by your furnace design and operation.

LET US HANDLE YOUR FURNACE PROBLEMS.

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FURNACE ENGINEERS AND CONTRACTORS
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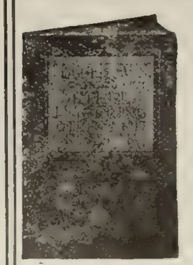

STOP If It's Steel Lettering Stamps and Dies MATTHEWS HAS IT.

Ask for our catalog through which we wish to solicit your valued order. We own and operate the largest and most modernly equipped shop in the United States for manufacturing all classes of steel lettering dies and kindred marking devices.

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Dept. C Pittsburgh, Pa.

Distributors for Canada
The Canadian Fairbanks-Morse Co., Ltd.
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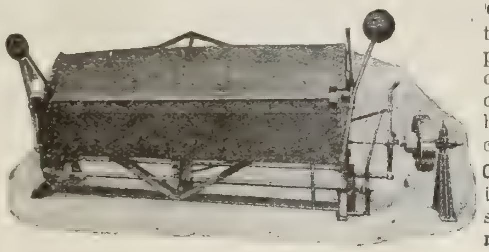
Chicago Steel Bending Brakes

We are exclusive Manufacturers of Steel Bending Brakes, and our product shows it.



Only about three horsepower is required to operate this brake full capacity.

Catalog giving full description mailed upon request.

10 ft. for 10 Ga.

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The Asa S. Cook Company
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Rivet Machines
WITH
Absolutely Accurate Automatic Feed

In sizes to work blanks up to 6 inches long, 7/16 in. diameter stock. Capacity from 80 to 200 rivets per minute, according to size.

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ARMSTRONG TOOL HOLDERS
Won The
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THE HIGHEST POSSIBLE AWARD AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

DROP FORGED OF STEEL
ARMSTRONG
PATENT TOOL HOLDER

THEY ALWAYS MAKE GOOD

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"The Tool Holder People"
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Allen Safety Set Screws

Made by a patent process which increases the strength of the metal over 30%.

All sizes from ¼" to 1" carried in stock by Williams & Wilson, Montreal, Canada.

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"Maintenance of Quality"

is our motto, and our experience in the manufacture of belting since the year 1856 should be invaluable to you. Let us tell you all about this friction faced belting. The price will appeal to you.

Write to-day.

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THISTLE BRAND
BELTING CO
MONTREAL CANADA
IMPORTERS

EFFICIENT EQUIPMENT

for general machine shop operation requiring pressure up to 25 tons and centering capacity up to 38 inches. For driving mandrels, bending and straightening, broaching, embossing with dies, setting bushings and many other everyday manufacturing jobs, there is an ATLAS PRESS. All sizes for all purposes.

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ATLAS PRESS CO.
330 N. Park St.
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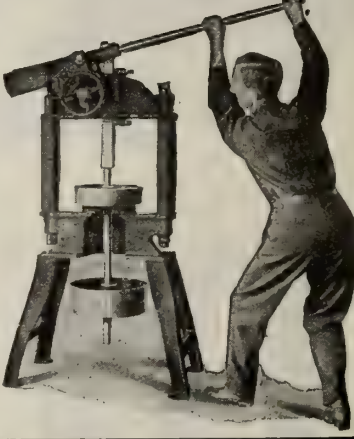

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STEEL TUBING
BUTTED & BRAZED
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CANADIAN METAL PRODUCTS. Limited,
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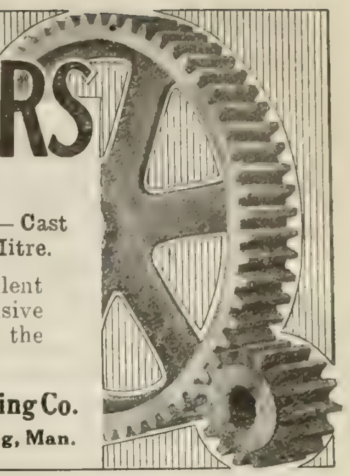

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Try our W-G Rawhide Silent Gear. The only exclusive gear-cutting plant in the West.

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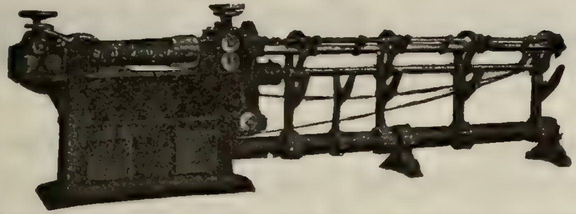

THE WIRE IS PERFECTLY STRAIGHT

and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

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Formerly John Adt & Son. Established 1866.
Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

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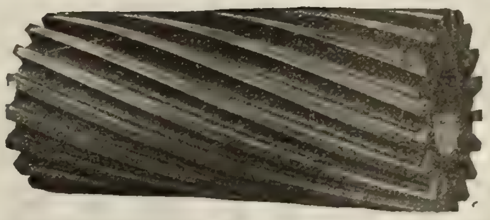

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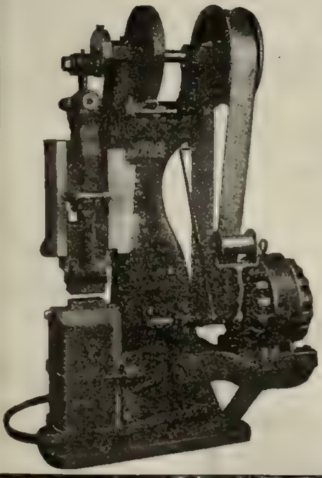

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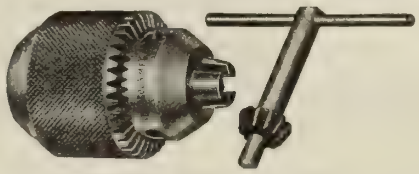
IMPROVED DRILL CHUCK



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To any pattern
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VERY POWERFUL, RIGID AND ACCURATE.
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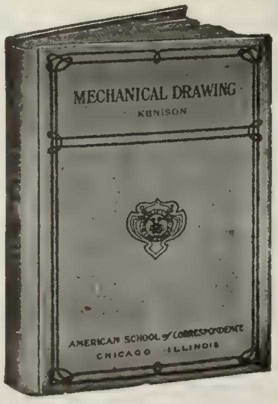

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Baird Machine Co., Bridgeport, Conn.
Bawden Machine Co., Toronto, Ont.
Cook, Asa S., Hartford, Conn.
Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
H. W. Petrie, Toronto.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.
Roelfson Machine & Tool Co., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.

AUTOMATIC WOOD SCREW MACHINES
Asa S. Cook Co., Hartford, Conn.

BABBITT METAL
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Canada Metal Co., Toronto.
Foss & Hill Machy Co., Montreal.
Hoyt Metal Co., Toronto.
Magnolia Metal Co., Montreal.
H. W. Petrie, Toronto.
Tallman Brass & Metal Co., Hamilton.

BALL BEARINGS
Canadian Fairbanks-Morse Co., Montreal.
Chapman Double Ball Bearing Company, Toronto.
Lyman Tube & Supply Co., Montreal, Que.
R. E. T. Pringle, Ltd., Toronto, Ont.

BALL BURNISHING MACHINES
H. W. Petrie, Toronto.

BARRELS, STEEL SHOP
Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

BARS, BORING
Charles F. Elmes Eng. Works, Chicago, Ill.
Niles-Bement-Pond Co., New York.
Webber Bros. Mach. Co., Toronto, Ont.

BELLS, MARINE
Ontario Specialties, Ltd., Ottawa, Can.

BELT LACERS
Clipper Belt Lacer Co., Grand Rapids, Mich

BELT DRESSING AND CEMENT

BELT LACING, LEATHER
Aikenhead Hardware Co., Toronto, Ont.
Foss & Hill Machy Co., Montreal.
Graton & Knight Mfg. Co., Worcester, Mass.

BELTING, CHAIN
Canadian Fairbanks-Morse Co., Montreal.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

BELTING, LEATHER
Canadian Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Graton & Knight Mfg. Co., Worcester, Mass.
Main Belting Co., Montreal.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Strong & Hery, Rochester, N.Y.

BELTING, STITCHED COTTON DUCK
Dominion Belting Co., Hamilton, Ont.
Main Belting Co., Montreal.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

BENCH LEGS, STEEL
New Britain Mach. Co., New Britain, Conn.

BENCH DRAWERS, FRICTIONLESS
New Britain Mach. Co., New Britain, Conn.

BENDING MACHINERY
John Bertram & Sons Co., Dundas.
Bertrams, Limited, Edinburgh, Scotland.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Berlin, Canada.
Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Charles F. Elmes Eng. Works, Chicago.
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo, O.
Steel Bending Brake Works, Chatham, Ont.

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Matthews, Jas. H., & Co., Pittsburgh, Pa.

BINS, STEEL
Dennis Wire & Iron Works, London, Canada.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke.
Toronto Iron Works, Ltd., Toronto, Ont.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
H. W. Petrie, Ltd., Montreal.
R. E. T. Pringle, Ltd., Toronto, Ont.

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L'Air Liquide Society, Montreal, Toronto.

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Wickes Bros., Saginaw, Mich.

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Geo. A. Joyce Co., Ltd., New York, N.Y.

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MacKinnon, Holmes Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Wickes Brothers, Saginaw, Mich.

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Jno. F. Allen Co., New York.

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Aikenhead Hardware Co., Toronto, Ont.
Canada Machinery Corp., Galt, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

BOLTS
Aikenhead Hardware Co., Toronto, Ont.
Cumming & Son, J. W., New Glasgow, Canada.
Galt Machine Screw Co., Galt, Ont.
London Bolt & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machinery Co., Toronto.

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Victor Tool Co., Waynesboro, Pa.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghampton, N.Y.

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Canada Machinery Corp., Galt, Ont.
Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Roelofson Machine & Tool Co., Toronto, Ont.
Stow Mfg. Co., Binghampton, N.Y.

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Cumming & Son, J. W., New Glasgow, Canada.

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Foss & Hill Machy Co., Montreal.
Niles-Bement-Pond Co., New York.
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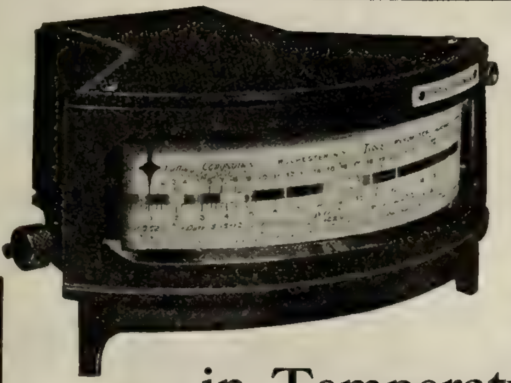

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H. W. Petrie, Toronto.
Turner Machine Co., Danbury, Conn.

DRILLING MACHINES, SENSITIVE
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
R. E. T. Pringle, Ltd., Toronto, Ont.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rockford Driling Mach. Co., Rockford, Ill.
A. R. Williams Machy. Co., Toronto.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy. Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

DRILLS CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Celfor Tool Co., Buchanan Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
L. S. Starrett Co., Athol, Mass.

DRILLS, CORNER (PNEUMATIC)
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Independent Pneumatic Tool Co., Chicago.
Lachapelle, J. D., & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.
R. E. T. Pringle, Ltd., Toronto, Ont.
United States Electrical Tool Co., Cincinnati, O.
A. R. Williams Machy. Co., Toronto.

DRILLS, HIGH SPEED
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Can. Fairbanks-Morse Co., Cleveland.
H. A. Drury Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Morse Twist Drill & Machine Co., New Bedford.
W. F. & John Barnes Co., Rockford, Ill.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, MULTIPLE SPINDLE
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.

DRILLS, PNEUMATIC
John F. Allen Co., New York.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York.
R. E. T. Pringle, Ltd., Toronto, Ont.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago.
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy Co., Montreal.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy Co., Montreal.
Morse Twist Drill and Machine Co., New Bedford.

DRILLS, TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong. Whitworth of Canada, Ltd., Montreal.
Boker & Co., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Celfor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill and Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

DRINKING FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

DRYING APPLIANCES
Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.

DUMP CARS
Can. Fairbanks-Morse Co., Montreal.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

DUST ARRESTERS (FOR TUMBLING MILLS
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

DYNAMOS AND ELECTRICAL SUPPLIES
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Lancashire Dynamo and Motor Co., Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

ELEVATOR ENCLOSURES
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ont.

ELEVATORS AND BUCKETS
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Whiting Foundry Equipment Co., Harvey, Ill.

ELEVATING AND CONVEYING MACHINERY
Banfield, Edwin J., Toronto.
Can. Matthews Gravity Carrier Co., Toronto, Ont.

EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Stow Mfg. Co., Binghamton, N.Y.

EMERY AND EMERY WHEELS
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Mach. Co., Hamilton, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.

EMERY WHEELS, DRESSERS AND STANDS
Can. Desmond-Stephan Mfg. Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Norton Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

ENGINES, BALANCED VALVE
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Plessisville Foundry Co., Plessisville, Que.

ENGINES, GAS AND GASOLINE
Can. Fairbanks-Morse Co., Montreal.
Lachapelle, J. D., & Co., Montreal, Que.
H. W. Petrie, Toronto.

ENGINES, HORIZONTAL AND VERTICAL
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
H. W. Petrie, Toronto.

FANS
Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.

FAUCETS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

FENCE, IRON FACTORY
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Canada.

FILES
Aikenhead Hardware Co., Toronto, Ont.
Delta File Works, Philadelphia, Pa.
Nicholson File Co., Port Hope, Ont.

FIRE ESCAPES
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Ont.

FISH PLATES
Can. Steel Foundries, Ltd., Montreal, Que.

FITTINGS, HYDRAULIC
Hydraulic Press Mfg. Co., Mount Gilead, O.

FLEXIBLE SHAFTS
R. E. T. Pringle, Ltd., Toronto, Ont.
Stow Mfg. Co., Binghamton, N.Y.

FORGES, HAND, ETC.
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE
Bliss, E. W., Co., Brooklyn, N.Y.
Canadian Billings & Spencer, Ltd., Welland.
Cumming & Son, J. W., New Glasgow, Canada.
Dom. Forge & Stpg. Co., Walkerville, Ont.
Hammond Steel & Forging Co., Syracuse, N.Y.
McKay, James Co., Pittsburgh, Pa.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
J. H. Williams & Co., Brooklyn, N.Y.

FORGINGS, SPECIAL HAMMER
Hammond Steel & Forging Co., Syracuse, N.Y.

FORGING HAMMERS, BELT-DRIVEN
Bliss, E. W., Co., Brooklyn, N Y.
J. H. Williams & Co., Brooklyn, N.Y.

FORGING HAMMERS, STEAM OR AIR
Erie Foundry Co., Erie, Pa.

FORGING MACHINERY
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Erie Foundry Co., Erie, Pa.
Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

FRICTION CLUTCH PULLEYS, ETC.
American Pulley Co., Philadelphia, Pa.
Baird Machine Co., Bridgeport, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Toronto.

FRICTION LEATHERS
Graton & Knight Mfg. Co., Montreal.

FURNACES, ANNEALING, ETC.
Can. Hoskins, Ltd., Walkerville, Ont.
Lachapelle, J. D., & Co., Montreal, Que.
Mechanical Engineering Co., Montreal.
Northern Crane Works, Ltd., Walkerville, Ont.
Rockwell Co., W. S., New York, N.Y.
Whiting Foundry Equipment Co., Harvey Ill.

FURNACES, BLAST
Toronto Iron Works, Ltd., Toronto.

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Bawden Machine Co., Toronto, Ont.
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Foundry & Mach. Co., Montreal, Que.
Garvin Machine Co., New York.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Hartford, Conn.
Stenotype Co., Indianapolis, Ind.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GEAR BLANKS
Brown Engineering Corp., Toronto, Ont.
Can. Steel Foundries, Ltd., Montreal, Que.
Lyman Tube & Supply Co., Montreal, Que.
Webber Bros. Mach. Co., Toronto, Ont.

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Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Hamilton Gear & Machine Co., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
The Smart-Turner Machine Co., Hamilton.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.

GEAR TURNING MACHINES, BEND
Bridgeford Mach. Tool Works, Rochester, N.Y.

GEARS, CUT, MORTISE, ANGLE, WORM
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co.. Hamilton. Ont.
Winnipeg Gear & Engr. Co., Winnipeg, Man.

GEARS, RAWHIDE
Hamilton Gear & Machine Co., Toronto.
Gardner, Robt. & Son, Montreal.
Grant Gear Works, Boston, Mass.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.
Winnipeg Gear & Engr. Co., Winnipeg, Man.

GENERATORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Lancashire Dynamo & Motor Co., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Wickes Brothers, Saginaw, Mich.
A. R. Williams Machy Co., Toronto.

GRAIN FOR POLISHING
Norton Co., Worcester, Mass.

GRAPHITE
Aikenhead Hardware Co., Toronto, Ont.

GRAVITY CARRIERS
Can. Matthews Gravity Carrier Co., Toronto, Ont.

GREASES (SEE LUBRICANTS)

GRINDERS, AUTOMATIC KNIFE
W. H. Banfield & Son, Toronto.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock Walker Machinery Co., Toronto, Ont.

GRINDERS, CENTRE, PEDESTAL AND BENCH
Blake & Johnson Co., Waterbury, Conn.
Canada Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Dominion Machy. Co., Toronto, Ont.
Ford-Smith Mach; Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock Walker Machinery Co., Toronto, Ont.
Gray Mfg. & Machine Co., Toronto.
Niles-Bement Pond Co., New York.
Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.

GRINDERS, CUTTER
Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Pratt & Whitney Co., Dundas, Ont.

GRINDERS, DIE CHASER
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

GRINDERS, DRILL
Aikenhead Hardware Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
United States Electric Tool Co., Cincinnati, O.

GRINDERS, CYLINDER, INTERNAL
Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Greenfield Machine Co., Greenfield, Mass.
Modern Tool Co., Erie, Pa.
R. E. T. Pringle, Ltd., Toronto, Ont.

GRINDERS, PNEUMATIC
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

GRINDERS, PORTABLE, ELECTRIC, HAND TOOL, POST, FLOOR AND BENCH
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Dominion Machy. Co., Toronto, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago.
Norton Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machy. Co., Toronto.

GRINDERS, TOOL AND HOLDER
Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Greenfield Machine Co., Greenfield, Mass.
H. W. Petrie, Ltd., Montreal.
Tabor Mfg. Co., Philadelphia, Pa.

GRINDERS, UNIVERSAL, PLAIN
Modern Tool Co., Erie, Pa.

GRINDERS, VERTICAL SURFACE
Brown & Sharpe Mfg. Co., Providence, R.I.
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Stenotype Co., Indianapolis, Ind.

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Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.

GRINDING WHEELS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Carborundum Co., Niagara Falls.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Norton Co., Worcester, Mass.
H. W. Petrie, Toronto.

GRINDING WHEEL DRESSERS
Can. Desmond-Stephan Mfg. Co., Hamilton, Ont.

GUARDS, WINDOW AND MACHINE
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Canada.
Ford-Smith Mach. Co., Hamilton, Ont.
New Britain Mach. Co., New Britain, Conn.

HACK SAW BLADES
Aikenhead Hardware Co., Toronto, Ont.
Boker & Co., H., Montreal, Que.
Diamond Saw & Stamping Works, Buffalo, N.Y.
Foss & Hill Machy. Co., Montreal.
H. W. Petrie, Ltd., Montreal.
Racine Tool & Machine Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
Victor Saw Works, Ltd., Hamilton, Canada.
Zenith Coal & Steel Products, Montreal, Que.

HACK SAW FRAMES
Aikenhead Hardware Co., Toronto, Ont.
Garvin Machine Co., New York City.

HACK SAW MACHINERY
Garlock Walker Machinery Co., Toronto, Ont.
Peerless Machine Co., Racine, Wis.

HAMMERS, AIR
Erie Foundry Co., Erie, Pa.

HAMMERS, DROP AND BELT-DRIVEN
Beaudry & Co., 8 Oliver St., Boston, Mass.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canadian Billings & Spencer, Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
High Speed Hammer Co., Rochester, N.Y.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.

HAMMERS, HELVE POWER
Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.

HAMMERS, POWER
Beaudry & Co., 8 Oliver St., Boston, Mass.
Erie Foundry Co., Erie, Pa.

HAMMERS, CHIPPING, CAULKING, PNEUMATIC
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
R. E. T. Pringle, Ltd., Toronto, Ont.

HAMMERS, MARKING
Matthews, Jas. H. & Co., Pittsburgh, Pa.

HAMMERS, MOTOR-DRIVEN
Beaudry & Co., 8 Oliver St., Boston, Mass.

HAMMERS, NAIL MACHINES
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

HAMMERS, STEAM
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.

HAND LEATHERS OR PADS
Graton & Knight Mfg. Co., Montreal.

HANGERS
Baird Machine Co., Bridgeport, Conn.
Dodge Mfg. Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
The Smart-Turner Machine Co., Hamilton.

HARDNESS TESTING INSTRUMENTS
Shore Instrument & Mfg. Co., New York.

HEATING AND VENTILATING ENGINEERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

HEAT GAUGES, HARDENING AND ANNEALING
Shore Instrument & Mfg. Co., New York.

HINGE MACHINERY
Baird Machine Co., Bridgeport, Conn.

HINGES
London Bolt & Hinge Works, London, Ont.

HOISTING AND CONVEYING MACHINERY
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Jenckes Mach. Co., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
H. W. Petrie, Ltd., Montreal.
Whiting Foundry Equipment Co., Harvey, Ill.

HOISTS, CHAIN, ELECTRIC AND PNEUMATIC
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Jenckes Mach. Co., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

HOISTS, ELECTRIC
Darling Bros., Ltd., Montreal, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Northern Crane Works, Walkerville, Ont.

HOLDERS, STEEL DIE FOR MARKING
Matthews, Jas. H. & Co., Pittsburg, Pa.

HOPPERS
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

HOSE, PNEUMATIC
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

HOLDERS FOR DIES AND DRILLS
Wells Bros. Co. of Canada, Galt, Ont.

HYDRAULIC MACHINERY
Dominion Machinery Co., Toronto.
Charles F. Elmes Eng. Works, Chicago.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.

IMPELLERS
Ontario Specialties, Ltd., Ottawa, Can.

INDICATORS, SPEED
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
L. S. Starrett Co., Athol, Mass.

INDEX CENTRES
Fred C. Dickow, Chicago, Ill.
Garvin Machine Co., New York.

IRON ORE
Hanna & Co., M. A., Cleveland, O.

JACKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.
Norton, A. O. Coaticook, Que.
H. W. Petrie, Toronto.

JACKS, HYDRAULIC
Charles F. Elmes Eng. Works, Chicago.

JACKS, PNEUMATIC
Northern Crane Works, Walkerville.

JACKS, PIT AND TRACK
Can. Fairbanks-Morse Co., Montreal.
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JAWS, FACE PLATE
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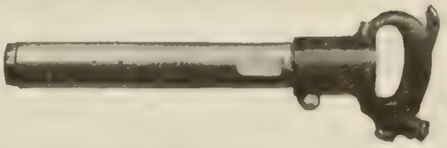
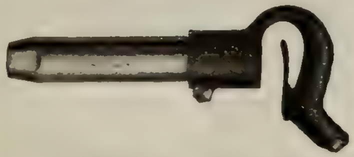
CLEVELAND RIVETING, CHIPPING, CALKING AND BEADING HAMMERS

MOST POWERFUL AND EFFICIENT AIR TOOLS ON THE MARKET

Cleveland Riveters are made in 20 styles and sizes with driving capacities of ¼-in. to 1½-in. rivets in Boilers, Tanks, Stacks, etc.



They have an enviable record for durability and economy in service.



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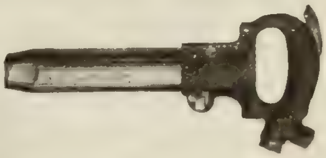
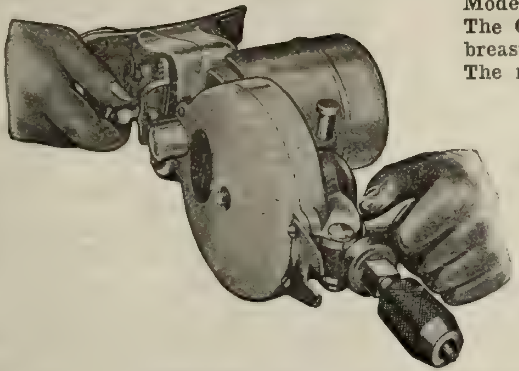
are made in 20 styles and sizes to suit all classes of work. They are ideal tools for foundries, as they have high speed, no recoil and are practically dust-proof.



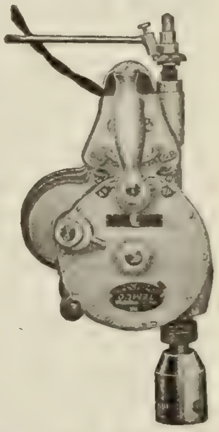
In stock: Riveting and Chipping Hammers, Air Drills, Corner Drills, Sand Rammers, Portable Grinders, Bowes Couplings, Chisels, Rivet Sets, etc.

PORTABLE ELECTRIC DRILLS



Model "B" Drill illustrated, shows compactness of design. The Casing, Switch and Gear Covers are aluminum; the breast plate, motor-head and handle supports are of steel. The machine is light in weight, convenient in shape; has high speed; operates on either A.C. or D.C. currents and runs either forward or reverse as desired. Model "C" has two speeds and in construction is similar to Model B.

Bulletins mailed on request.



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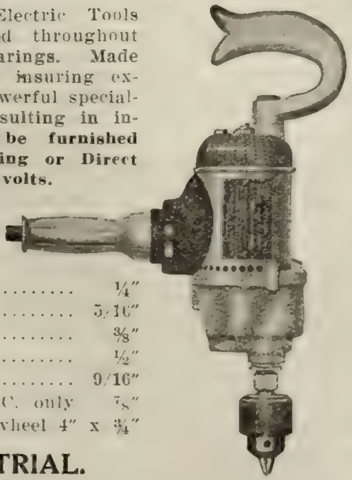
Thor UNIVERSAL Electric Drills

Licensed Under Burke Universal Motor Patent

The only Portable Electric Tools made that are equipped throughout with ball and roller bearings. Made with aluminum cylinder insuring extreme lightness and a powerful specially constructed motor resulting in increased capacity. **Can be furnished with Universal, Alternating or Direct current motor 110 or 220 volts.**



000	Drilling Capacity	¼"
00	" "	5/16"
0	" "	⅜"
01	" "	½"
1	" "	9/16"
2	" " D.C. only	⅞"
No. 6	Electric Grinder, wheel 4" x	¾"

SHIPPED ON TRIAL.

Independent Pnematic Tool Company

Office: 334 St. James Street, MONTREAL, QUE.
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U. S. Electric Drills and Grinders

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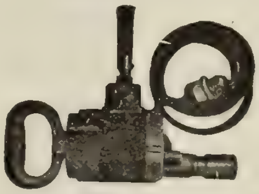


They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.

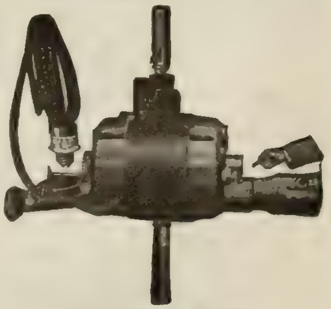
3 SIZES

3-16 inch,	W.G.T.	6 lbs.
¼ inch,	W.G.T.	9 lbs.
⅜ inch,	W.G.T.	12 lbs.

All motors wound for 110 or 220 volts.

Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.



½ inch—2 SPEED.
Speed, 400-750 R.P.M.

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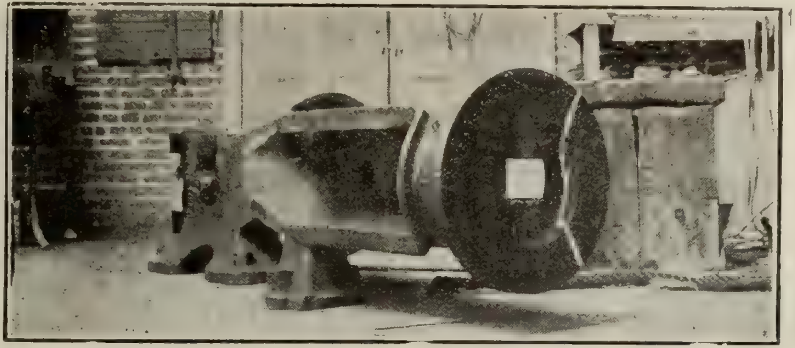

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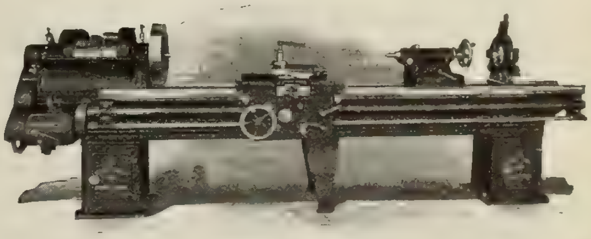

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Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Oliver Machy. Co., Grand Rapids, Mich.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
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Steptoe, The John Co., Cincinnati, Ohio.
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Sheldons, Ltd., Galt, Ont.
Niles-Bement-Pond Co., New York.

PLIERS

Aikenhead Hardware Co., Toronto, Ont.
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PLUG MILLERS

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Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
Atlas Press Co., Kalamazoo, Mich.

PRESSES, BROACHING, FORGING AND FLANGING

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E. W. Bliss Co., Brooklyn, N.Y.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

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Toledo Machine & Tool Co., Toledo, O.

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Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

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Wm. R. Perrin, Ltd., Toronto.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago, Ill.
Can. Fairbanks-Morse Co., Montreal.
Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Niles-Bement-Pond Co., New York.
Wm. R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

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John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
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H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
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Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
Garlock-Walker Machinery Co., Toronto, Ont.
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Dodge Mfg. Co., Toronto, Ont.
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The Smart-Turner Mach. Co., Hamilton.
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Smart-Turner Mach. Co., Hamilton.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
Darling Bros., Ltd., Montreal, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

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Darling Bros., Ltd., Montreal, Que.
Hydraulic Press Mfg. Co., Mount Gilead, O.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

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Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
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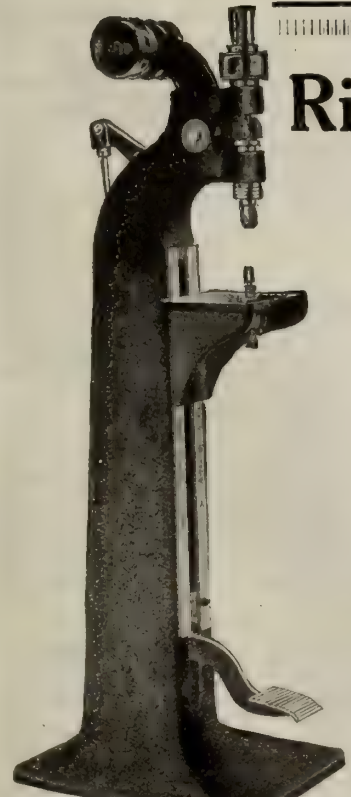

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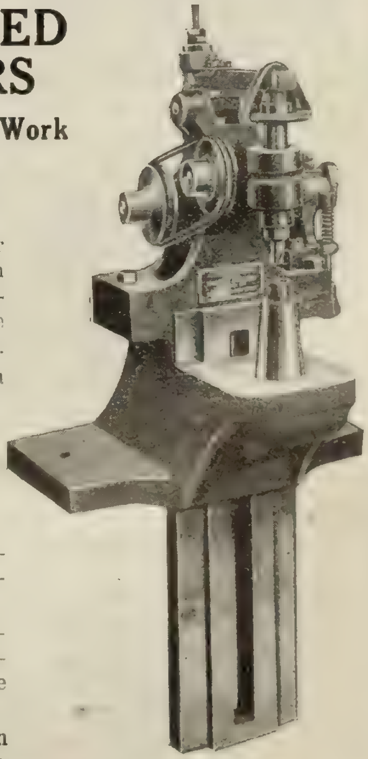

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A weekly newspaper devoted to the machinery and manufacturing interests.

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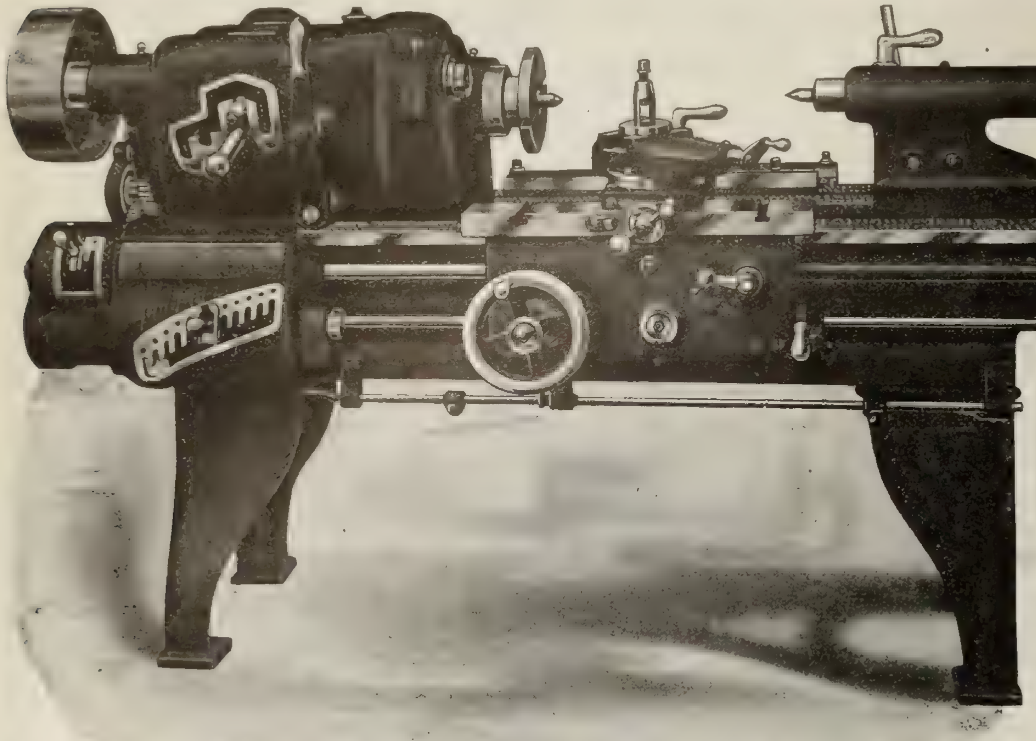

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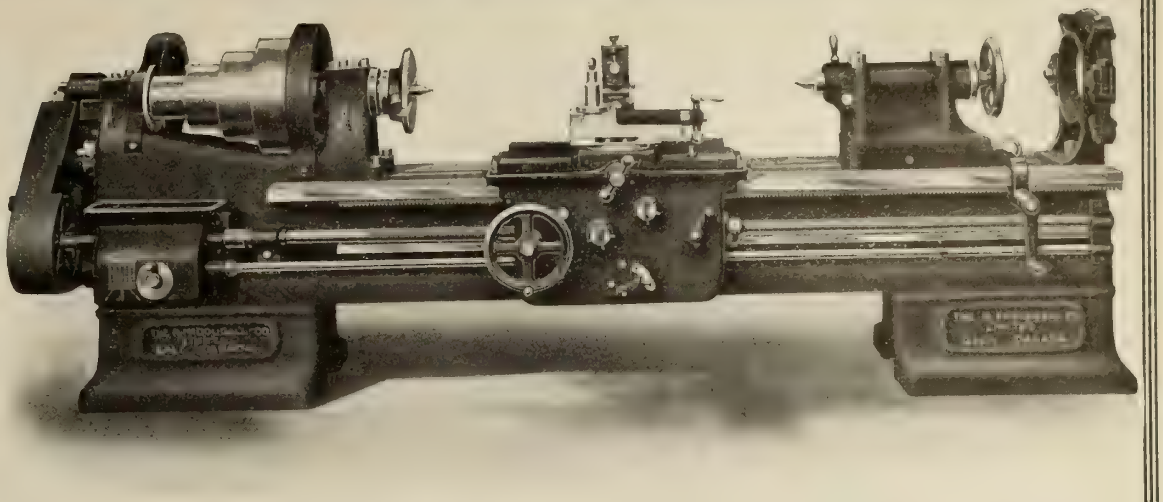
16, 18, 20, 22 and 26 inch Swing.



ARE-MAC-DEE IS A GUARANTEE

Big Shells require Lathes which are built to stand the strain of high speed production.

McDOUGALL Lathes are built right and of the best materials. They will easily handle any thing up to the limits of their rated capacity.

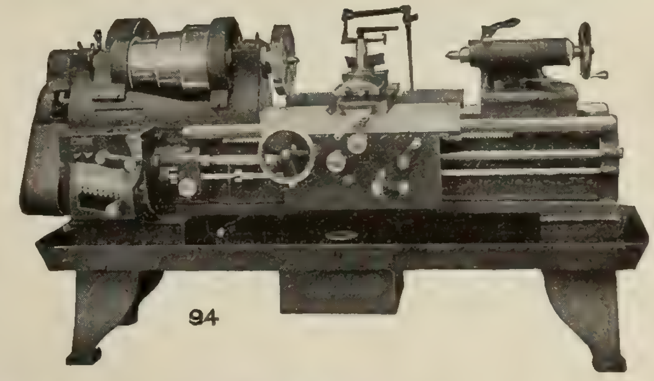
Furnished with all the regular attachments of modern machine tool practice.

The R. McDougall Company, Limited
Manufacturers
GALT, Ont., Canada

The Canadian Fairbanks-Morse Co., Limited, Sales Agents.

THE FOSS & HILL MACHINERY CO.

305 St. James Street **Montreal, Que.**



MACHINE TOOLS AND SUPPLIES

Large Assortment of Machine Tools Always Carried

Full Line of Shell Machinery

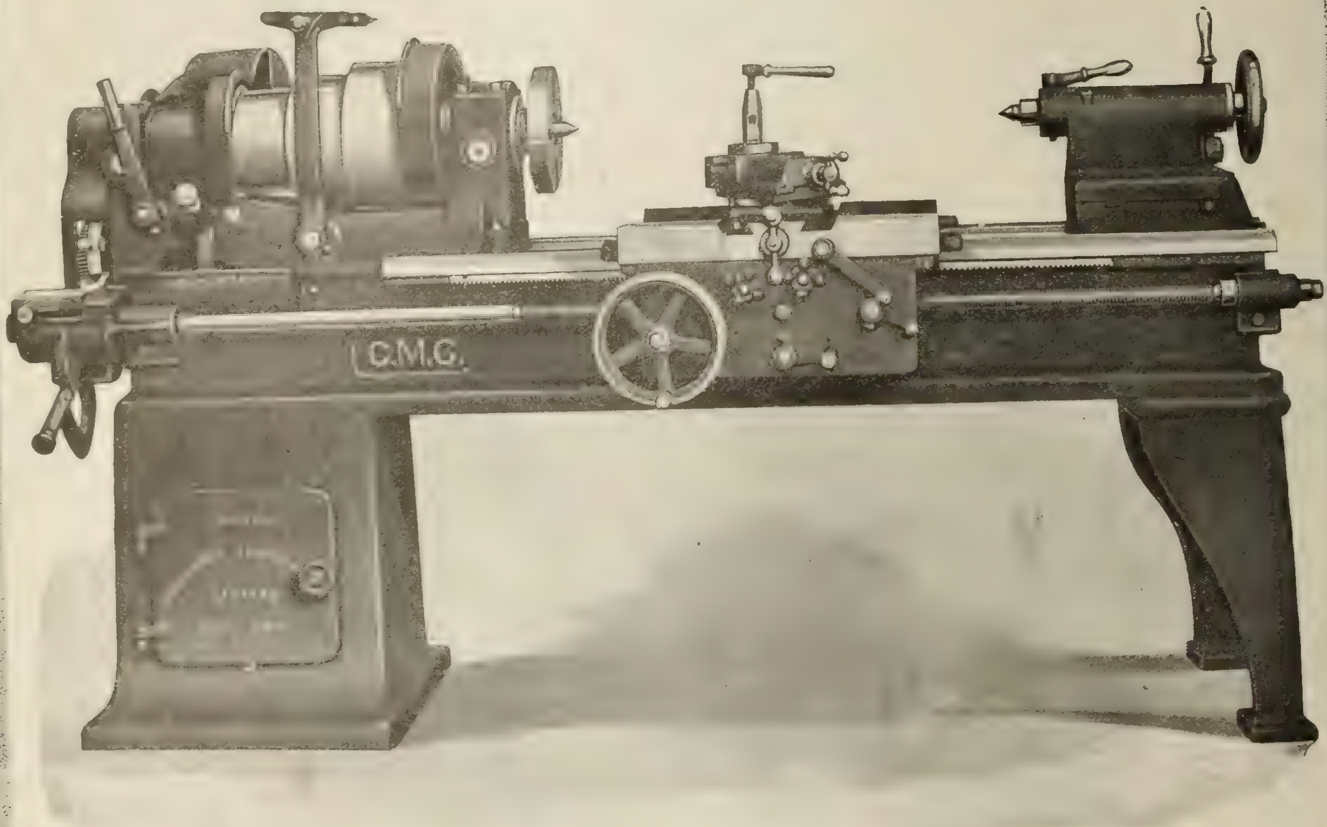
SEND FOR OUR STOCK LIST.

ACCURACY

C.M.C.

RIGIDITY

A modern high-speed tool of unusual strength and precision



Engine Lathe
with
Quick Change Gears
Size 16 inch and 18 inch

The Heavy Deep Band gives maximum stiffness under the cut. The saddle is substantial throughout, with great strength in the bridge.

Headstock is of the three-step cone double back geared type, with extra wide belt.

Belt Shifter saves time, and the extra construction makes for a maximum of safety.

Our circular describes the machine in full detail. Send for a copy.

For convenience of the Trade we have opened Showrooms in Toronto at Brock Avenue Subway, where a full line of our Machinery can be inspected.

CANADA MACHINERY CORPORATION
LIMITED
GALT, ONTARIO

Builders of Machine Tools and Woodworking Machinery

STRENGTH

C.M.C.

RAPIDITY

EDITORIAL INDEX PAGE—95 BUYER'S DIRECTORY PAGE 81 ADVERTISING INDEX PAGE—96

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied field. Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XVI—No. 24 Publication Office: Toronto, December 14, 1916 Subscription Price $3.00 per Year

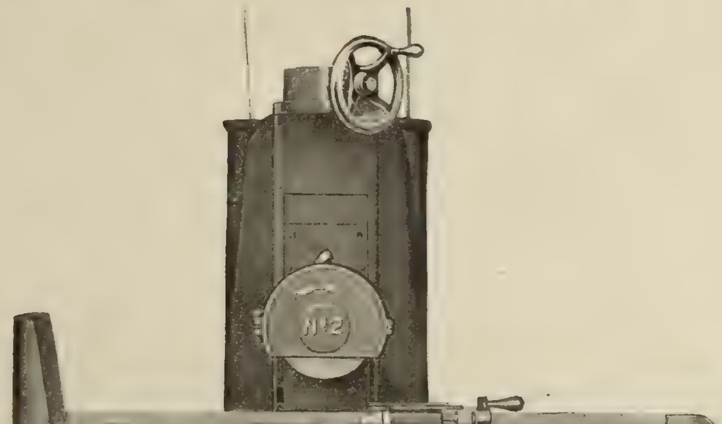
"AMERICAN"

No. 2 Surface Grinding Machine

A new type of automatic grinder for grinding and finishing dies, punches, gages and work of like nature.

All belts are enclosed, giving the machine a neat and trim appearance and protecting the workman.

Send for descriptive circular.



The machine is of unusually heavy design and unequalled as a rapid work producer.

All slides and working surfaces are provided with covers, protecting them from dirt and grit.

Prices and delivery dates on application.

Capacity, 18" x 6" x 9"

AMERICAN MACHINE TOOL COMPANY

HACKETTSTOWN, N.J., U.S.A.

NEW YORK OFFICE:
50 Church Street

CABLE ADDRESS:
Railgaz, New York

REAMERS
ALWAYS UP TO SIZE

Make sure that all your reamed holes are smooth and accurate.

Parts of P. & W. Solid Adjustable Blade Reamers.

USE P. & W. SOLID ADJUSTABLE BLADE REAMERS

Unexcelled for Design, Simplicity and Ease of Adjustment.

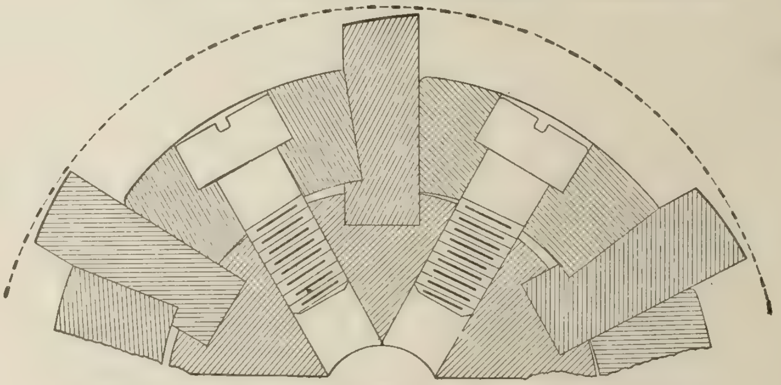
1. The eccentrically relieved blades are stronger than others, do not chatter and produce a smoother hole.

2. The hand, shell and fluted chucking reamers have interchangeable nuts, screws and wrenches.

3. The bottom of a hole can readily be faced.

4. By a simple adjustment of the blades the reamer can easily be set to size without regrinding.

REDUCE YOUR REAMING COSTS
Write for catalog, "Small Tools," showing our complete line.



Section showing construction of P. & W. Adjustable Blade Reamers.

Place a trial order with our nearest store.

Pratt & Whitney Company of Canada, Limited

DUNDAS
Ontario

MONTREAL
723 Drummond Bldg.

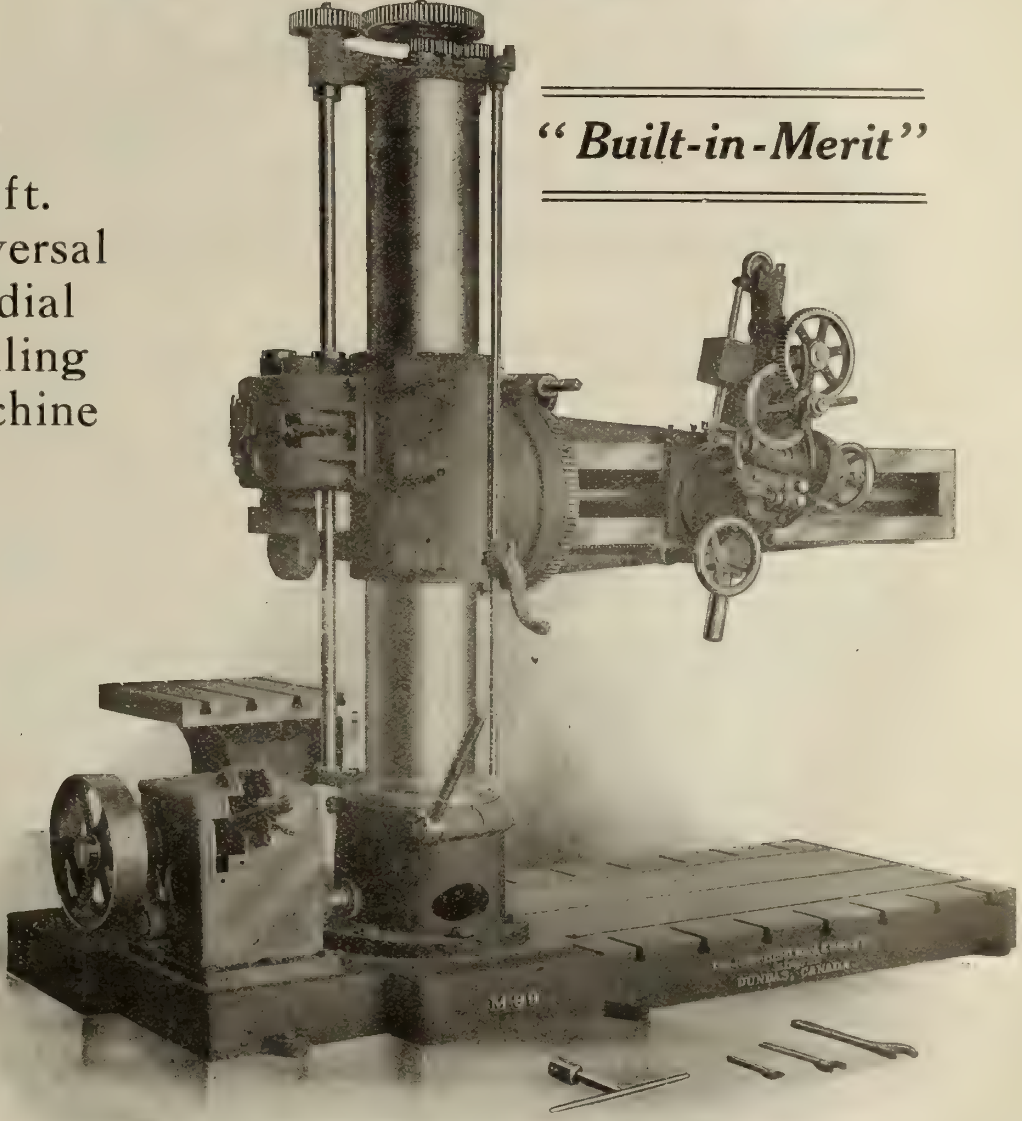
WINNIPEG
1205 McArthur Bldg.

VANCOUVER
B.C. Equipment Co.

BERTRAM
MACHINE
TOOLS

"Built-in-Merit"

6 ft.
Universal
Radial
Drilling
Machine



DROP US A LINE FOR PHOTOGRAPHS AND FULL DETAILS
on any machine or machines in which you are interested

The John Bertram & Sons Company
Limited

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

TORONTO December 14, 1916

Medicine or Food—Which?

L. F. Hamilton, Advertising Manager, National Tube Company, in a recent issue of *Advertising and Selling,* has this to say about keeping the vitality of a business at highest ebb:

> "Roughly speaking, there are two viewpoints toward advertising:
>
> "(1) As a necessary evil—like medicine—which is to be taken only when we are sick—and then under protest, with sundry curses and mental reservations.
>
> "(2) As a business food—three square meals a day for 365 days. "The average man isn't always equally hungry—but he eats three meals a day, believing that such systematic eating will be more productive of good health than any feast and famine policy.
>
> "This company takes the latter view toward advertising. Once a year the whole question is very carefully gone over, conditions in various fields investigated and a policy effective for one year is evolved—and a program made. While the program may be subject to slight changes, the policy proper is not changed during that year.
>
> "We might elaborate much more fully in this connection—but what would be the use? It all comes back to the fundamental viewpoint toward advertising—that is, is it a business medicine or a business food?
>
> "Speaking generally, we believe it is thoroughly recognized that the successful advertisers are those who take the viewpoint that advertising is a business food."

Is your business being systematically, regularly and adequately fed and nourished with advertising? If not, why not start the new year right? Let us get together and plan a campaign for you.

Rates and full information on request, also copy of our book, "Selling your product to the Machinery and Metal Working Industries of Canada."

CANADIAN MACHINERY
and Manufacturing News
143-153 University Avenue, Toronto

Quality **Service**

Courtesy in Business

* * *

Fittingly framed and hanging in the Offices of one of the most important Public Service Corporations on this North American Continent is the following

'Did you say Please and Thank you?'

Broad minded men direct the destiny of that Corporation, men who know that public or private enterprises to be lastingly successful must operate for the public good.

Quality and Service are the two important factors in our business life today, but Courtesy is the door through which they must enter.

We are large producers of Hamilton Pig Iron and our output of Open Hearth Steel Blooms and Billets, Iron and Steel Bars of all shapes and size runs into enormous tonnage.

The products of our mills include practically everything that can be manufactured from Iron and Steel and these we distribute to thousands of satisfied customers.

Our business is an extensive one and a successful one. The World is our market: but our prosperity and success in the future, as in the past, depend upon the continued confidence, co-operation and good-will of the people we serve.

The Steel Company of Canada, Limited

HAMILTON TORONTO MONTREAL WINNIPEG

STEEL

for SHRAPNEL SHELLS AND SHELL BLANKS

Only Company in Canada producing steel ingots by the "HARMET" Liquid Process.

REASONS WHY THESE INGOTS ARE SUPERIOR TO THE ORDINARY KIND:

1. Prevention of cracks, due to shrinkage; of internal stresses and resulting cracks and fissures.

2. Early cessation in the crystallization of the metal, and the production of fine crystallization of the metal, without cleavage planes.

3. Lessening of segregation, i.e., reduction of tendency to carbon and other impurities to concentrate in the central and upper parts of the ingot.

4. Prevention of "Pipes" or interior cavities, and thus preservation of absolute solidity in the ingot.

5. Improvement in physical properties.
6. Reduction in waste of ingot.

WE CAN SUPPLY FORGINGS OF ALL SHAPES AND SIZES MADE OF ORDINARY OR "HARMET" FLUID COMPRESSED OPEN-HEARTH STEEL ON THE SHORTEST NOTICE.

Nova Scotia Steel and Coal Company

Limited

Head Office:
NEW GLASGOW,
N.S.

Western Sales Office,
Room 14 Windsor Hotel,
MONTREAL

WOLFRAM
MADE IN THE U.S.A.
HIGH SPEED STEEL
TRADE MARK

Wolfram Cobalt High-Speed Steel, BEST FOR TURNING SHRAPNEL. Vulcan Hot Piercing Steel, FOR ALL KINDS OF HOT WORK. Vulcan Regal No. 2 Steel, FOR BRASS FINISHINGS. Vulcan Special "W" Steel, For Special Taps and Dies. Vulcan Non-Shrinkable Steel, For Intricate Dies. Vulcan Special Vanadium Steel Does Twice the Work of Regular Carbon Steels.

VULCAN CRUCIBLE STEEL COMPANY

ALIQUIPPA, PA.

Red Cut Superior High Speed Steel

Quality First

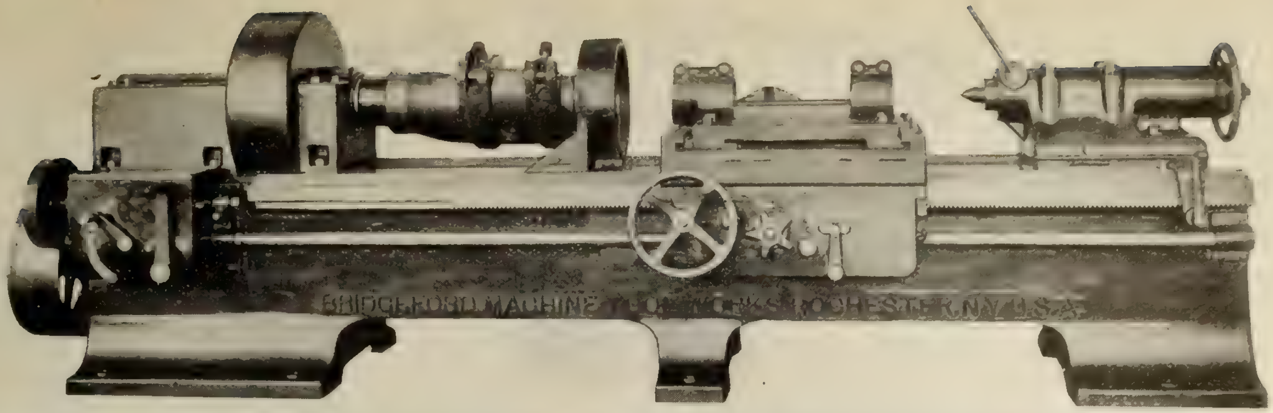
THE BEST FOR MACHINING ALL HARD MATERIALS

Are your tools made of **Red Cut**?

Send for folder

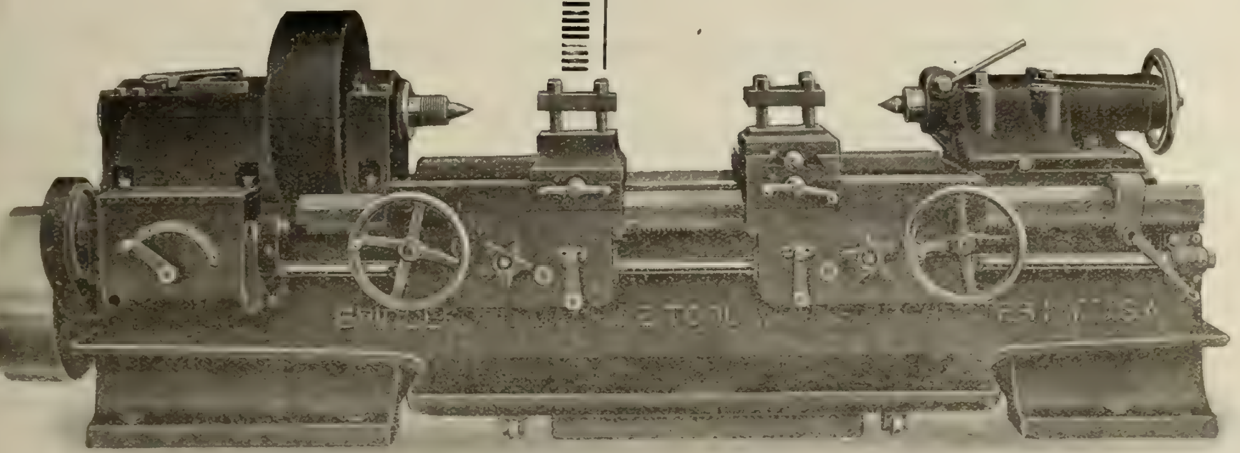
VANADIUM-ALLOYS STEEL COMPANY

PITTSBURGH, PA.
Works at Latrobe, Pa.



Two of the Bridgeford Lathes

A study of the illustrations would reveal more to you than a word picture in writing These lathes are before you for your strict criticism. Past experience has proven that they will stand any test you may put them to. Those who have them verify all our claims with enthusiasm.



"BRIDGEFORD"
Means Increased Production.

Upper Illustration Boring Lathe of exceptional strength. It is of the low swing type, having specially designed carriage with auxiliary hand feed for internal profile. Carries $5\frac{1}{2}$" steel bar with male taper; 3 speed changes, automobile style. All speed and feed gearing are of steel, hardened, running in oil bath.

Lower Illustration — Bridgeford Heavy Duty Plain Turning Machine. Powerful drive and convenience of operation feature this machine. Strength, giant strength, together with exceptional speed and simplicity of operation, make this machine most desirable and economic.

Heavy Lathe Specialists for 20 years.

Let us have your inquiry. We can satisfy you on delivery.

Bridgeford Machine Tool Works

237 Mill Street
Rochester, N.Y.

STELLITE

MADE IN CANADA
STELLITE

High Speed Tool Metal

Cutting tools that have that marvelous lasting power are made of Stellite. This material is not a steel, it contains no iron—it is Stellite. Heat has no effect on the cutting edge. Stellite tools cut just as well when red hot as when cool. Run steel tools that way, you know what happens. They burn up—lose their temper. Stellite has no temper.

It is an alloy so hard and tough that it will perform every operation at a higher speed than is possible with the best high-speed steel tool.

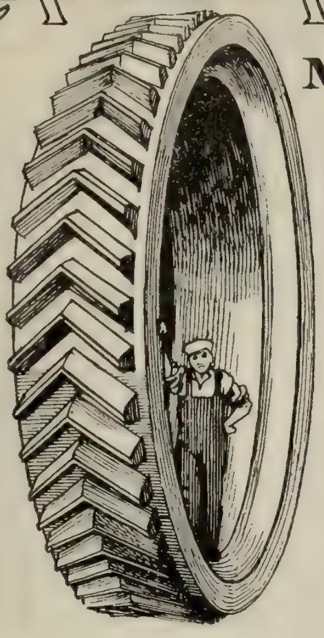
Try it out on your most difficult operation, only speed up the machine more. The result will convince you of its merit and you will agree, as a great many others have done, that it is better than the best steel and that it will pay you.

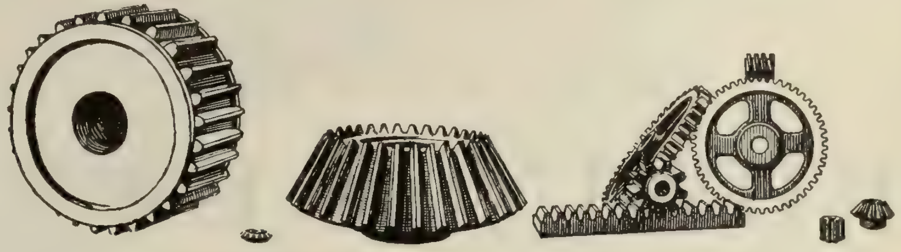
Made in Canada by
THE DELORO MINING AND REDUCTION CO., LIMITED
DELORO, ONTARIO

The Canadian B. K. Morton Co., Limited
SOLE SELLING AGENTS FOR CANADA AND NEWFOUNDLAND
49 Common St., MONTREAL, QUE. 86 Richmond St. East, TORONTO, ONT.

CANADIAN STEEL FOUNDRIES, LIMITED
MONTREAL & WELLAND.

Machine - moulded Gears made without the use of patterns, insuring quick delivery in case of breakdown.





ECONOMY

Rapid production is dependent on the use of

Economical Tools and Steel.

It is safer NOT to specify High Speed Steel but

Demand "TYR," the Economy Steel.

(MADE IN CANADA)

Armstrong, Whitworth of Canada, Limited
OFFICES: 22 Victoria Square, Montreal, P. Q.
Dominion Bank Building, Toronto, Ont.
WORKS: Longueuil, P. Q.

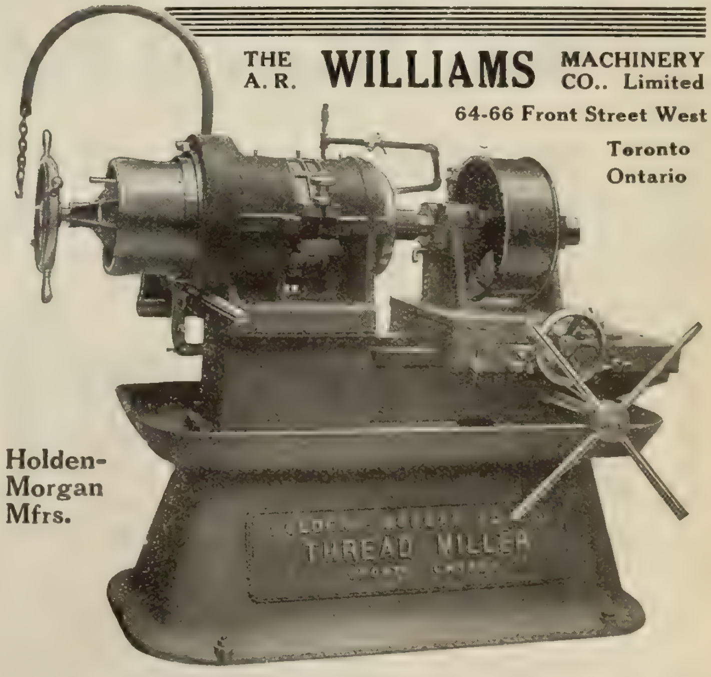
The Life of a Thread Miller

Depends not upon the amount of work it does, but the ease and thoroughness with which the work is done. These Thread Millers are noted for these qualities. Its quality of work is unrivalled. Our Service Department will give you all the particulars.

Write us!

THE A. R. WILLIAMS MACHINERY CO., Limited
64-66 Front Street West
Toronto
Ontario

Holden-Morgan Mfrs.



BASE PLUGS

Machined to Government Specification

Have in stock for immediate shipment machined plugs for 4.5", 5" and 6" High Explosive Shells.

Capacity 3,000 per day. Write for prices.

EDWIN J. BANFIELD

STAIR BLDG. ∴ TORONTO, ONT.

Manufacturer of Plug Milling Machines for All Sizes of Shells

---

Atlas Crucible Steel Company

DUNKIRK, New York, U.S.A.

Manufacturers of High-Grade Steel Specialties

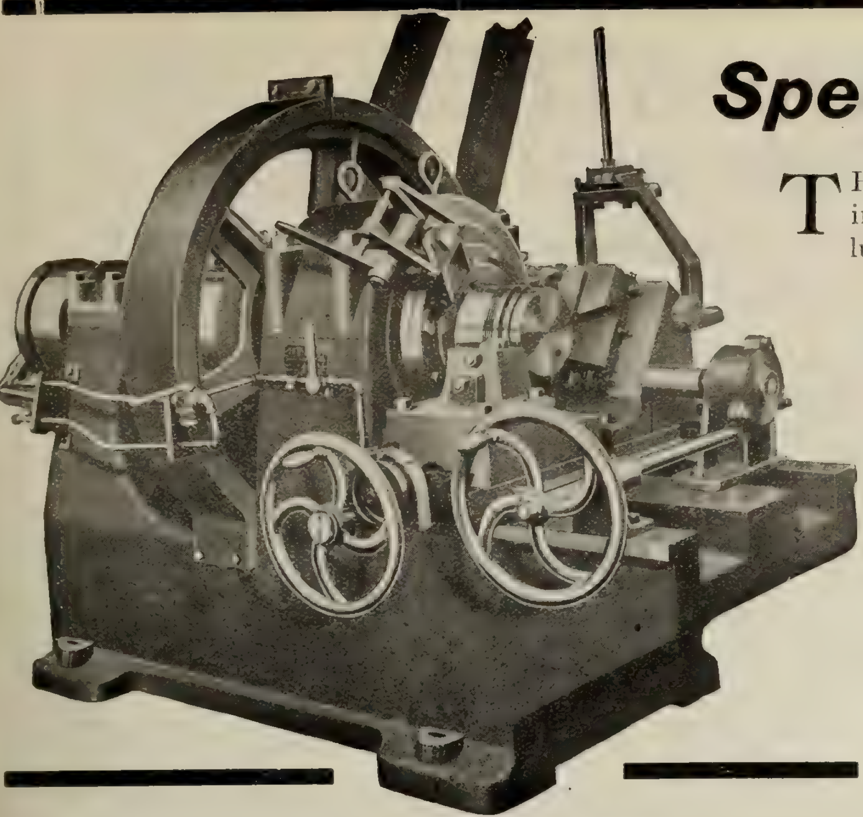
High Speed Steel, Atlas LXX	**Carbon Tool Steel**
High Speed Steel, Atlas LX	**"Deward" Oil Tempering, Non-Skrinking**
Chrome Vanadium Steel	

"When ordering steel, it is important to state purpose for which steel is to be used.'

"Quality is remembered long after the price is forgotten."

"Atlas Steels" are all the name implies for STRENGTH, PRODUCTION, DURABILITY and SATISFIED CUSTOMERS.

PROMPT DELIVERIES



Speed—Accuracy

THE two most important factors in shell-making. The former is desirable, the latter absolutely necessary. Both are assured by the use of *Jenckes Single Purpose Lathes for Shell Work.*

Illustration shows the latest addition to this famous line—a Banding Lathe for 8" shells. Note the liberal proportions, the general appearance of sturdiness. They mean an extra measure of long and efficient service.

These machines are also manufactured for 18 pdr., 4.5", 5", 6", 8", 9.2", 12" and 14" shells; are tooled when required for the mm. sizes corresponding to Russian and French ammunition.

THE JENCKES MACHINE COMPANY, LIMITED

WORKS: Sherbrooke, Que.
St. Catharines, Ont.

SALES OFFICES:

727 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.

PIG IRON

M·A HANNA &Co

"Victoria" Foundry and Malleable, made by The Canadian Furnace Co., Port Colborne, Ont., Canada

M.A.HANNA&Co. Sales Agents: CLEVELAND, O., U.S.A.

Sisco Extra Special High Speed **Tool Steels**

Made in Sweden from best Swedish Charcoal Iron.

LARGE STOCK ON HAND.

Swedish Steel and Importing Co., Limited, Montreal

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO, LIMITED, SHEFFIELD, ENGLAND

Sole Agents for Canada:

H. BOKER & CO., Inc.
(Formerly Hermann Boker & Co.)
332 St. James Street, Montreal, P.Q.

Established 1837 Incorporated 1914

Special Vanadium Steel Piercing Die Forgings

For Hot or Cold Work

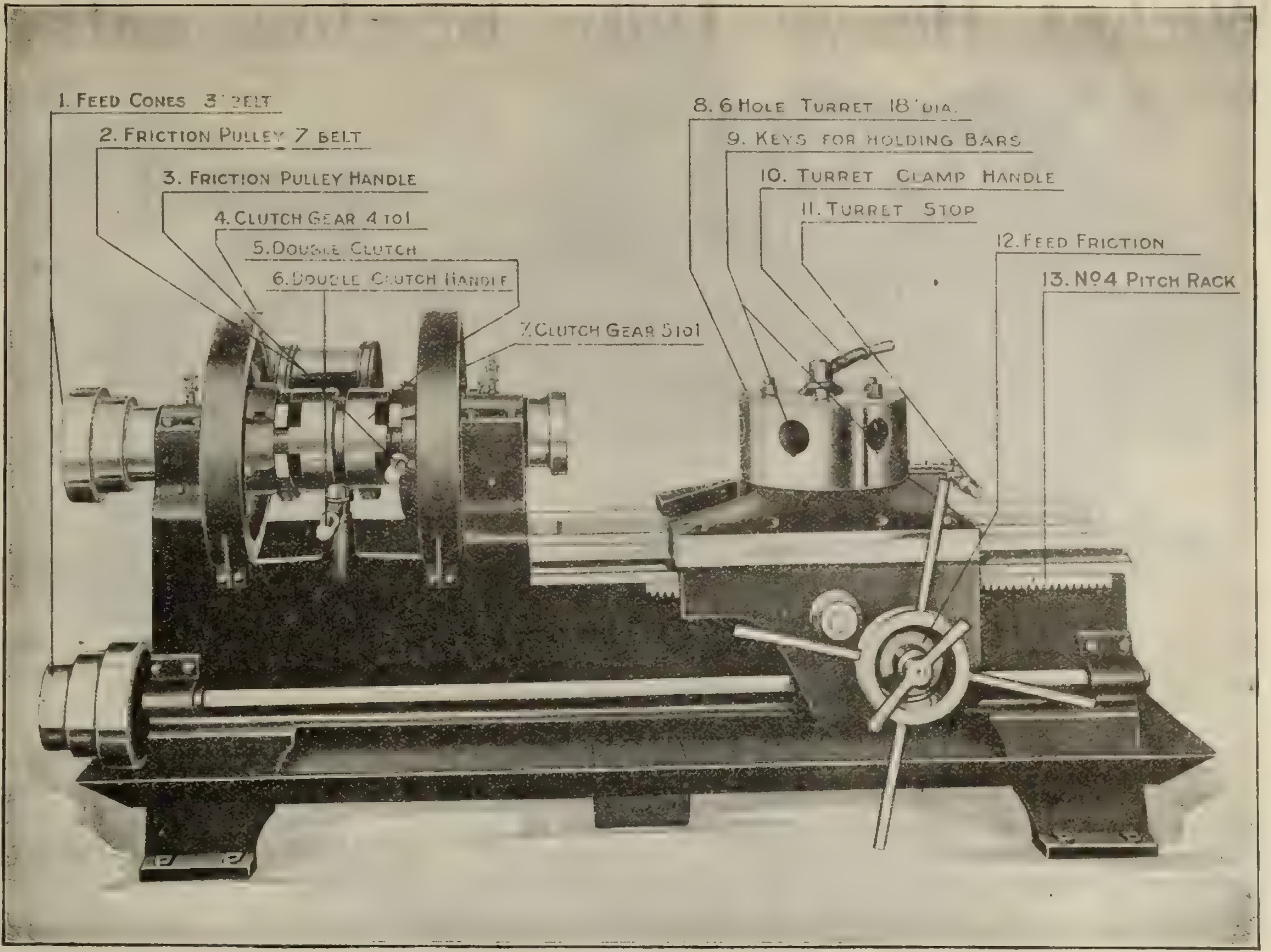
Made from High-Grade Special Vanadium Tool Steel and hammer-forged in any size.

These forgings cut down your machining costs 100% and give you a tougher, more durable Die than you have ever had. Punches made to match the dies. Send us your Blue Prints.

Hammond Steel Co., Inc.
SYRACUSE, N.Y., U.S.A.

Fine Tool Steels, Specialists in Manufacture of High Grade Hammered Forgings, Hammered Alloy Steels, Weldless Rings—Special Shapes, Die Blocks

Mention this paper when writing advertisers. It will identify the proposition about which you require information.


1. Feed Cones 3" Belt
2. Friction Pulley 7" belt
3. Friction Pulley Handle
4. Clutch Gear 4 to 1
5. Double Clutch
6. Double Clutch Handle
7. Clutch Gear 5 to 1
8. 6 Hole Turret 18" dia.
9. Keys for holding Bars
10. Turret Clamp Handle
11. Turret Stop
12. Feed Friction
13. No 4 Pitch Rack

SPECIAL SHELL LATHE

For boring and turning shells from 9.2 down. Above cut shows bed turret for boring operations. We have them in stock for both boring and turning.

Among other good features, note the following:—

No. 1—3" belt on feed.
" 2—7" belt and 75 H.P. friction.
" 8—18" turret.
" 9—Keys for boring bars.
" 12—External Feed friction.
" 13—Four-pitch rack.

Note ratio of gearing.
Note Sheet Steel Oil Pan.
No countershaft required.
Bronze bearings throughout.
Sight feed oilers.
Hardened and ground thrust collars.
An overplus of strength throughout.
Workmanship guaranteed.

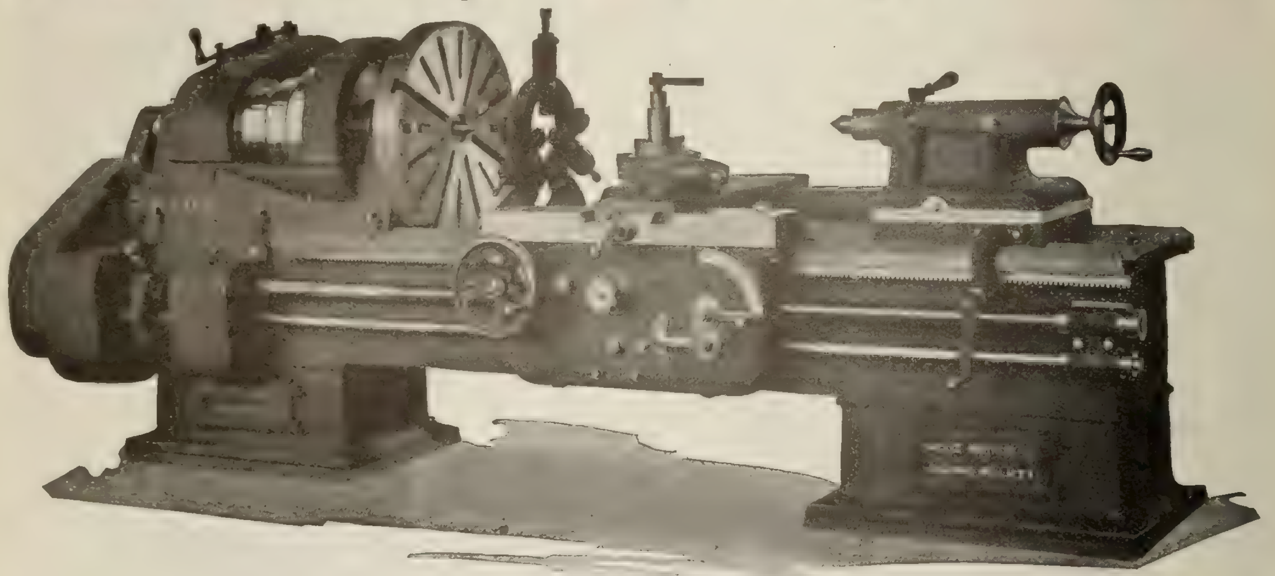
This lathe will give you satisfaction.

Immediate Shipment From Stock

(Subject to Prior Sale)

The Foundry & Machine Co., Limited
1167 Carriere Road
Montreal, Canada

Wickes Heavy Duty Engine Lathe



The Wickes 26" Heavy Duty Lathe.

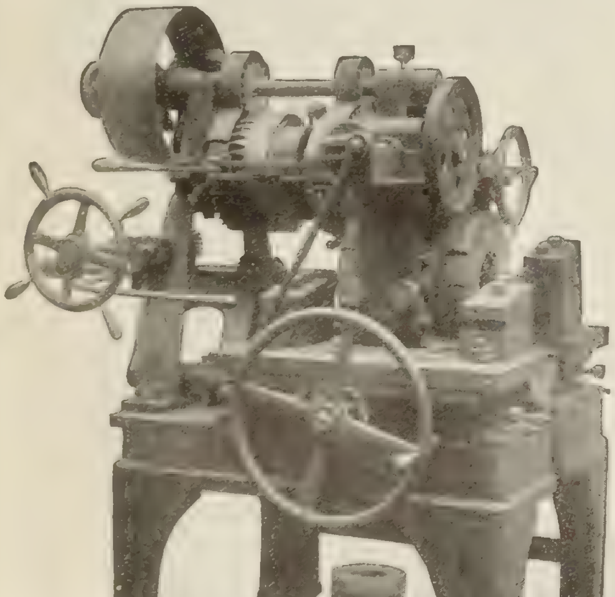
Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.

This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.

Let us tell you about this lathe and our 20", 32", also our 17" Rapid Production Lathe for Automobile and other work.

We can make prompt shipment.

WICKES BROTHERS **Saginaw, Michigan**



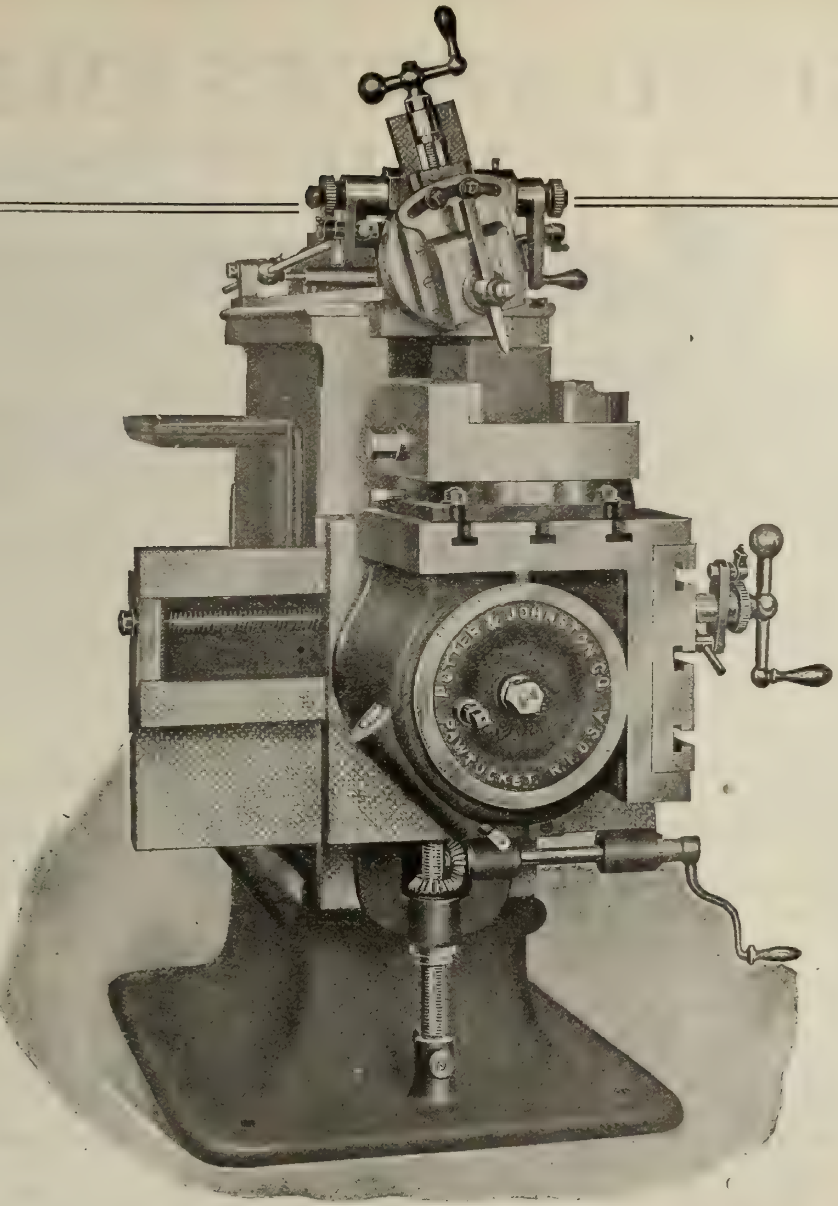
CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2" Shell Ingots and Forgings.

Cut shows 6" machine as arranged for cutting off both ends of 6" forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA



Potter & Johnston 15-inch Universal Shaping Machine

Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices **Potter & Johnston Machine Co.,** Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

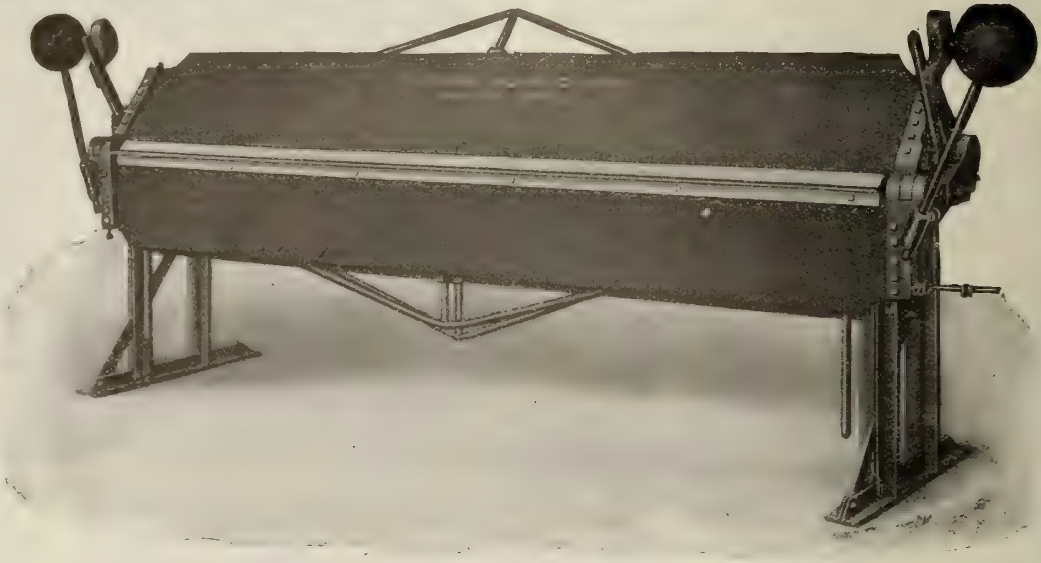
Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

A GOOD INVESTMENT

A "B.B." STEEL BRAKE

FOR a Cheap Brake the "B.B." Steel Plate Machine is the best investment you can make. It is especially designed for rapid forming of sheets, and is suitable for a large variety of work, such as can be accomplished on an ordinary Cornice Brake. We can furnish these Brakes for bending all sizes and gauges of metal.

Write for Catalogue if Interested.



"ALWAYS, EVERYWHERE, SPECIFY 'B.B.' QUALITY."

The Brown-Boggs Co., Limited, Hamilton, Canada

Tinsmiths' Tools, Sheet Metal Working Machinery, Dies, etc.

Western Representatives: MESSRS. BISSETT & WEBB, LIMITED, WINNIPEG AND EDMONTON

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO.

LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

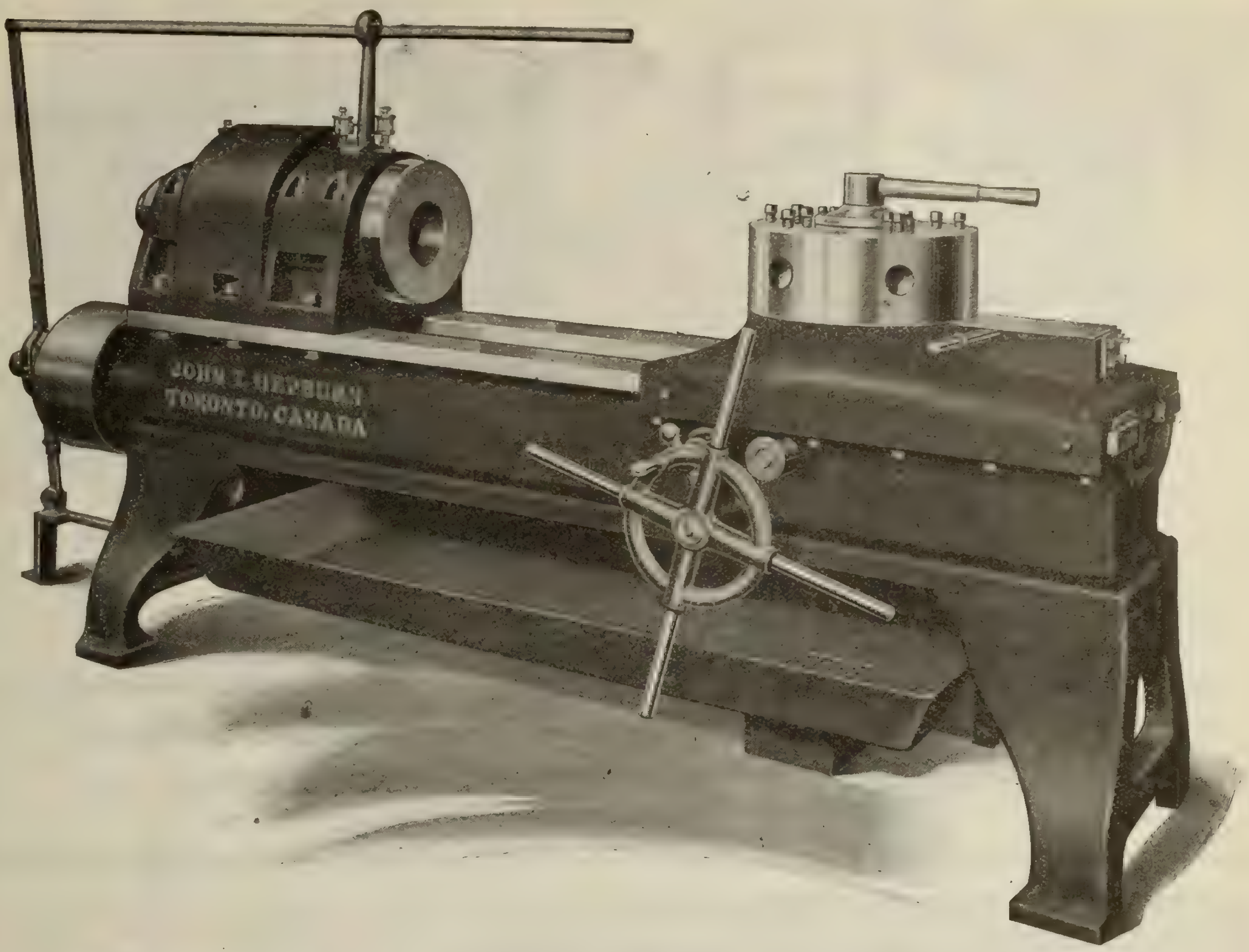
WE HAVE AT TORONTO FOR IMMEDIATE DELIVERY:

New **Davis 6" Cutting-off Machines,** fully equipped, size of hole in spindle 6⅞".
New **Giddings & Lewis** 18" x 8' Heavy Duty Engine Lathes, 3-step Cone, Double Back Gears, regular equipment.
New Heavy Duty Lathes for turning 8" and 9.2" Shells.
Thor pneumatic hammers and drills.
Appleton Grinder—Challenge No. 1—slightly used.

Special 16,000 lb. 40" Boring Lathes for 6" Projectiles.
Immediate Delivery—Special Price—Write for Cuts, etc.
Good Delivery now on Lodge & Shipley 24" Lathes.
Ask for information about machines for any operation on 3", 4.5", 5", 6", 8" or 9.2" Projectiles.—Our Experience is at Your Service.

Canadian Representatives for: American Wood Working Machinery Co., Rochester, N.Y. Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio. M. L. Andrews Co., Cincinnati, Ohio.

METAL and WOODWORKING MACHINERY of all Kinds



There are Two Sides to a Lathe

Inside

THE inside is what the outside relies on for its speed, accuracy and efficiency. The quality of steel in the construction, the exact unity of operation, the perfect proportion—these all go to make a foundation upon which the outside is built. These features are all required to give a turning lathe of this calibre a strength of motion that would give a critic entire confidence.

John T. Hepburn, Ltd.
18 to 60 Van Horne St., Toronto, Canada

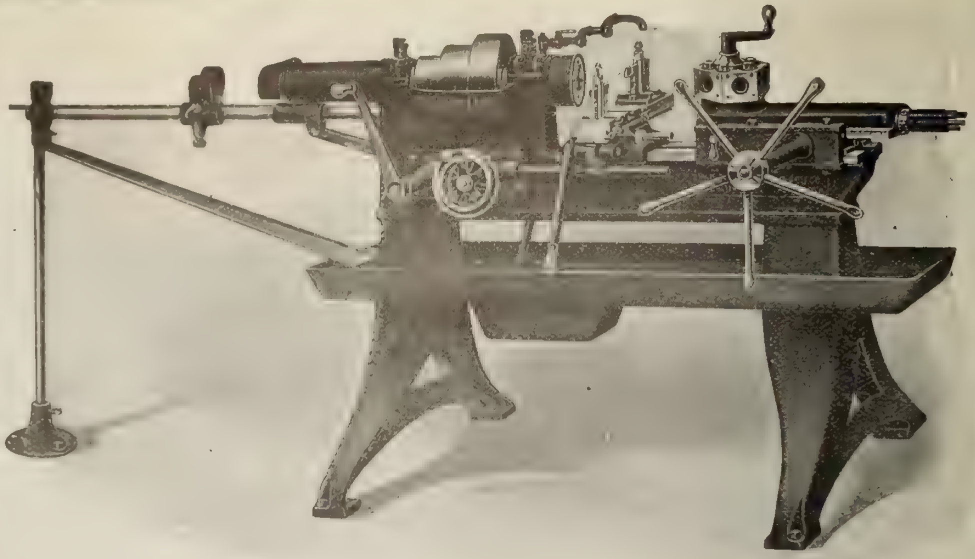
Outside

A STUDY of the illustration will reveal considerable of the perfection of this turning lathe. The headstock, centre rest and tail stock all give that confidence in its immense strength which only high-grade machines can give. Simplicity and convenience of design feature this machine. No dangerous, intricate mechanism. Enclosed gears, oil pan, and strainer. Inquire regarding further particulars.

John T. Hepburn, Ltd.
18 to 60 Van Horne St., Toronto, Canada

Every Feature to secure strength and stiffness on the heavy cuts is embodied in

Millholland 1"x7" Screw Machine



The Bed is of box construction, well ribbed, and with the headstock cast solid.

The Headstock is made with plain head three-step cone. The steps of the cone pulley are of large diameter and wide face and are so proportioned as to transmit the maximum power with proper spindle speeds.

The Spindle, high-carbon steel with hardened and ground thrust washers.

The Cut-off Slide, with broad, flat, well-gibbed bearings.

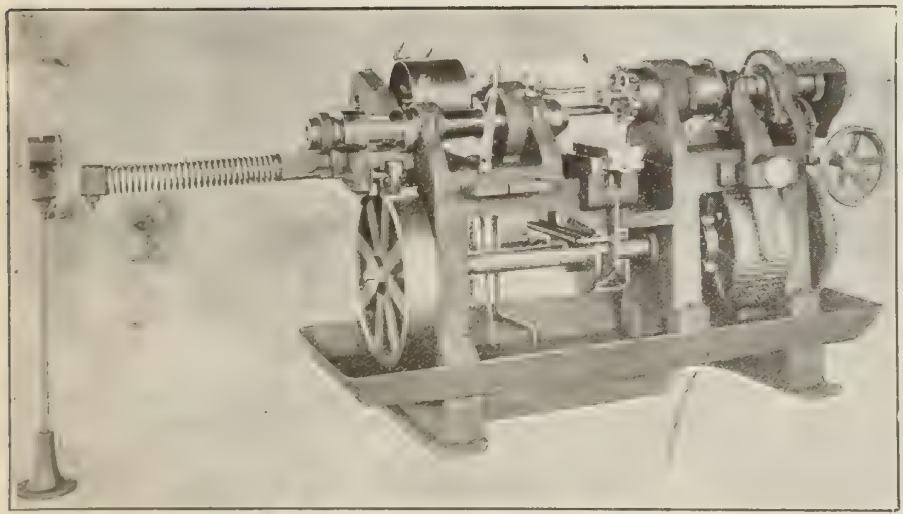
The Turret is of heavy construction and mounted on a large steel stud.

The Automatic Chuck and Bar Feed, operated by the long lever on the front of the bed, grips or releases the work instantly. The operator with one movement opens the chuck and feeds the bar without stopping the machine.

DROP A LINE FOR FULL DETAILS AND SPECIFICATIONS.

Manufactured by

W. K. Millholland
Machine Company
INDIANAPOLIS, IND.



No complicated mechanism or a system of cams that are difficult to determine and arrange on this machine

The rigidity of the machine has not been sacrificed for the flexible features which are embodied in the Chicago Automatic. Alignment is correct and there are no parts where excessive wear takes place—therefore, **accurate production** is assured during the long life of the machine.

In less than six weeks we can place Chicagos in your plant ready for production

The Chicago
Automatic
Screw Machine

Spindle speeds suitable to different sizes and kinds of stock within the capacity of the machine are obtained by changing two gears on the spindle head.

TEN YEARS OF EXTENSIVE MANUFACTURE OF ONE PRODUCT—AUTOMATICS—STAND BEHIND EVERY MACHINE.

They must satisfy you before we consider them sold.

Write us about all the features now.

THE JOHN MACNAB MACHINERY COMPANY
NEW YORK CITY, U.S.A.
European Representatives: John Macnab, Hyde, England

Peerless HIGH SPEED
PEERLESS MACHINE CO. RACINE WIS U.S.A.

"100% Better, Faster and More Reliable

than any Sawing Machine we have ever used; we have had almost all makes of Sawing Machines manufactured."

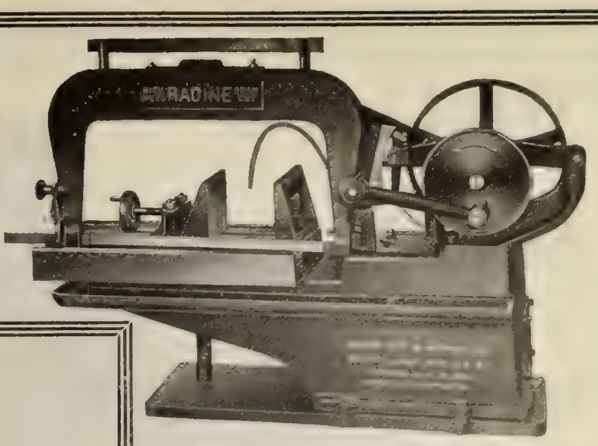
Just what a customer in Toledo, Ohio, reports after a thirty days' trial.

You don't have to take anybody's word for it, try it out under your own conditions. You are under no obligations if it fails—remember we also pay the freight both ways.

Not only 100% more production, but saves 100% floor space. These problems have handicapped many manufacturers for some time. They can now readily be solved by the Peerless High Speed Heavy Duty Metal Cutting Saw.

Write us for complete description and references. Some of these machines may be working in your vicinity.

Peerless Machine Co., 1607 Racine St., Racine, Wis.



Racine Metal-Cutters

Combining the excellent materials and expert workmanship that gives you an economic, speedy and strong metal cutter. Ease of motion is the result of scientific knowledge of the requirements of the machine. The saw frame guide is made of the best grade of semi-steel and will hold the saw absolutely rigid. The positive automatic Lifting Device, the Combination Vise, the Cooling System, etc., are features you should learn more about. These machines fit in anywhere.

Inquire for specifications, etc.

RACINE TOOL & MACHINE CO.
15 Melbourne Ave. Racine, Wis., U.S.A.

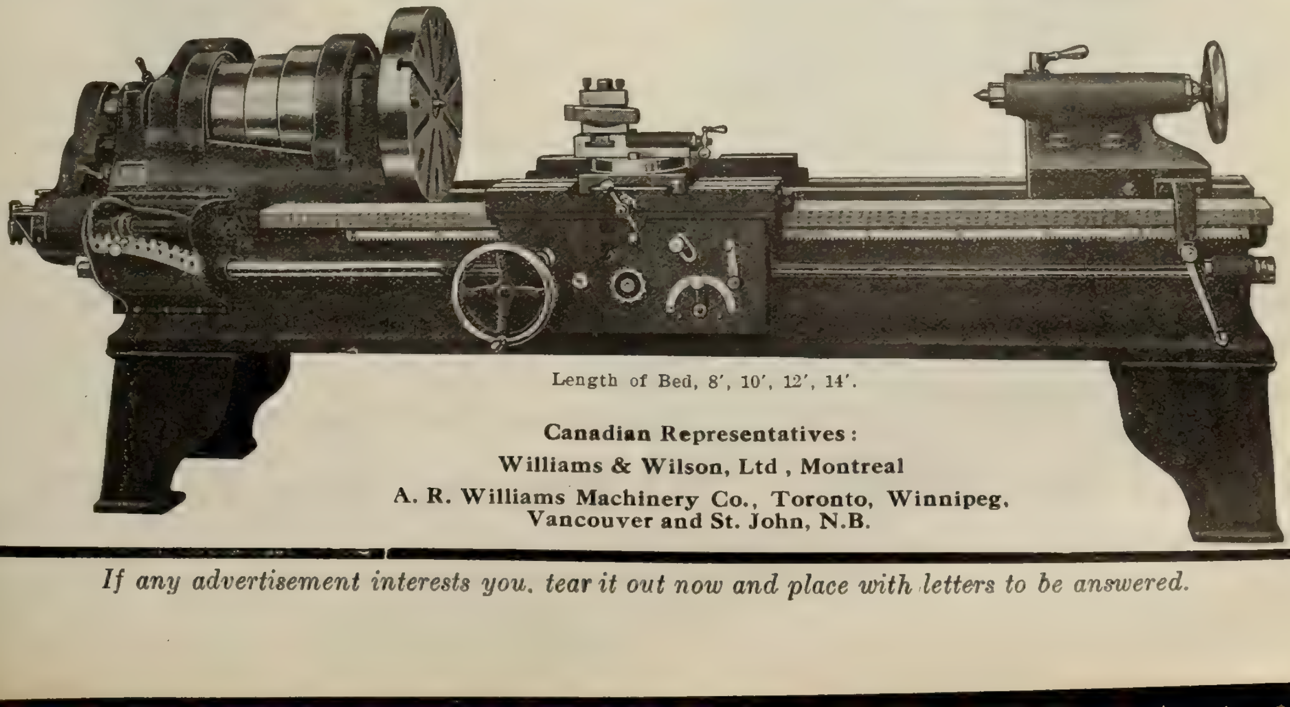
Davenport 22-Inch Lathe — For Extra Heavy Service

These lathes are built exceptionally rigid and heavy. No feature has been omitted, to secure great strength and power. The bed, the headstock, the tailstock, the carriage—every detail has been designed and constructed with a view to driving the heaviest cut that any tool will stand up against. At present we can make quick deliveries on this machine.

Built with ordinary change gears unless otherwise specified.

Write at once for Bulletin. It gives full details of construction.

DAVENPORT LOCOMOTIVE WORKS
DAVENPORT, IOWA



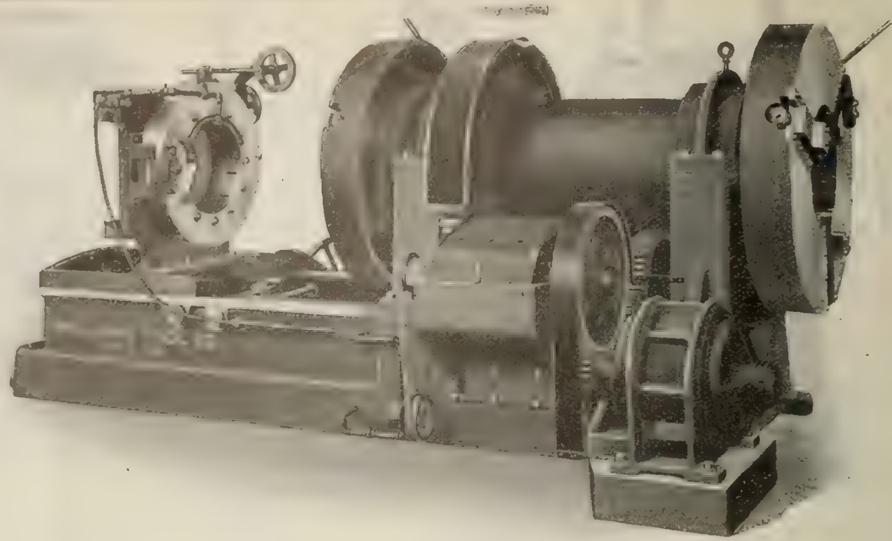
Length of Bed, 8', 10', 12', 14'.

Canadian Representatives:
Williams & Wilson, Ltd , Montreal
A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver and St. John, N.B.

If any advertisement interests you, tear it out now and place with letters to be answered.

WILLIAMS PIPE MACHINES

Received Highest Award at Panama Exposition



The Following Letter Explains Why:

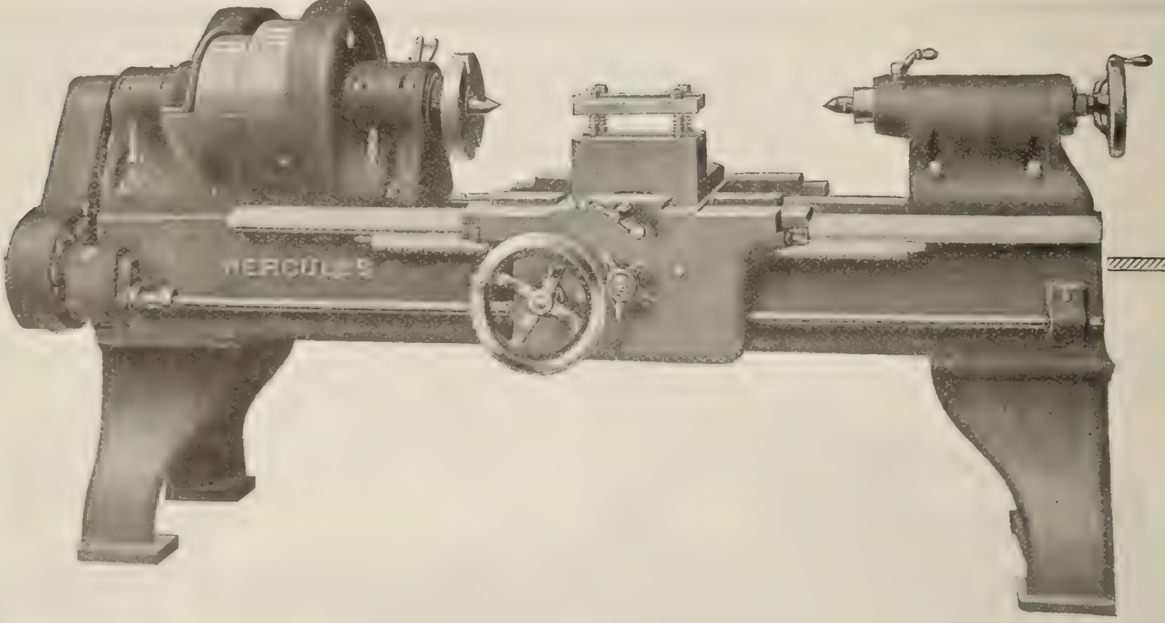
Williams Tool Co., Erie, Pa.: Rochester, N.Y., 12-3-14.

Gentlemen:—We are so pleased with our No. 3 Pipe Machine, and it is doing such splendid work for us at a minimum of expense that we are now considering the advisability of displacing two smaller machines for one of your No. 1½ or No. 2 motor drive.

The machines which we would displace, if we make a change, are belt drive, are (names of two of the oldest and best known machines on the market) equipped with nipple holders, extra dies, etc. Both of these machines are still in fairly good condition. On what basis could we make an exchange with you?

Yours very truly, SAMUEL SLOAN & CO.

WILLIAMS TOOL CO. - - - ERIE, PA.



There's Nothing Fancy About the "Hercules," but—

when it comes to turning—well, just watch it. When you have a tough job of straight or taper turning the very absence of frills and special attachments is a decided advantage. That's the idea behind a "Hercules"—a lathe that can handle work requiring sheer strength and power. Its extreme simplicity avoids confusion in operation and facilitates quick handling. When you realize that the majority of lathe work is plain turning, there are possibilities in the "Hercules" well worth considering. Early deliveries. Write us now.

Investigate our Turret Screw Machines

Himoff Machine Co., 128 Mott St., New York City

The Ford-Smith Machine Company

SIMPLICITY DESIGN DURABILITY WORKMANSHIP

Ford-Smith

27" x 19" x 7½"

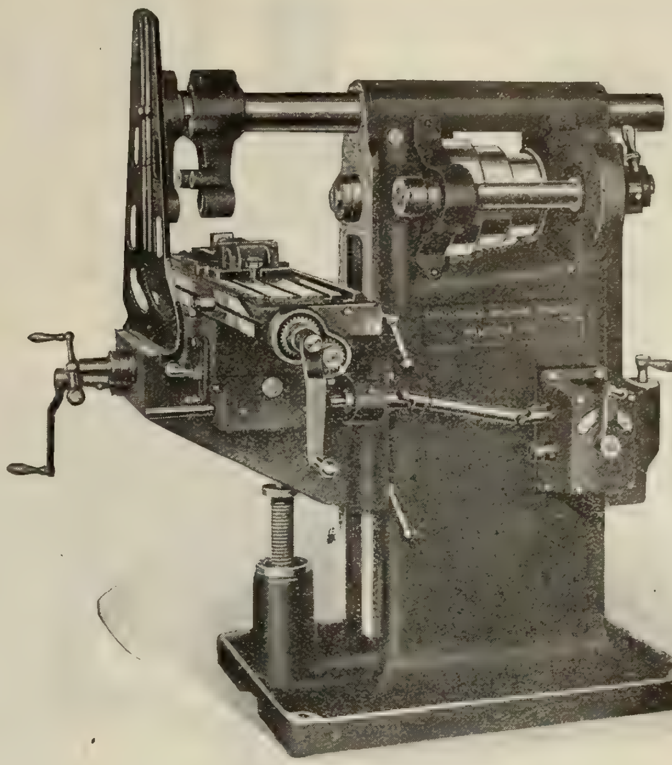
Milling Machines

We can make interesting deliveries on these machines, either through our regular dealers or direct from our plant.

Our Catalog illustrates various features exclusive with Ford-Smith Millers and will be gladly forwarded on request.

THE FORD-SMITH MACHINE COMPANY, LIMITED

HAMILTON - CANADA



KEMPSMITH

UNIVERSAL MILLING MACHINES

Are built in three standard sizes. They embody every worth-while feature to be found on a tool room Milling Machine

We call especial attention to the Dividing Head which is part of the regular equipment of every Universal Miller.

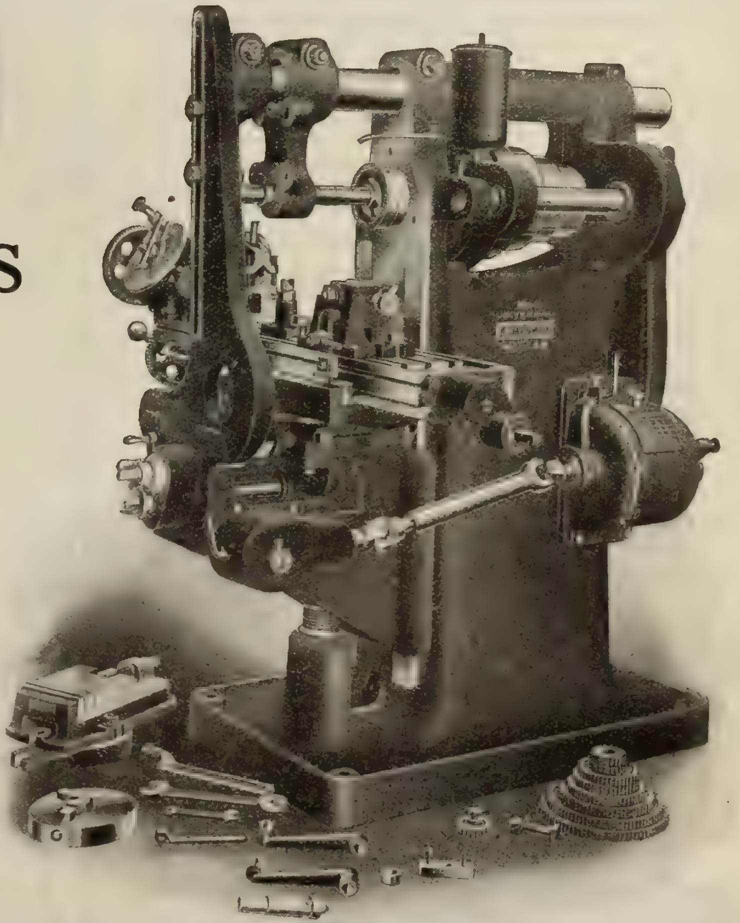
The Kempsmith Dividing Head is compact and rigid, unusually convenient in operation and so constructed as to maintain its accuracy under heavy service.

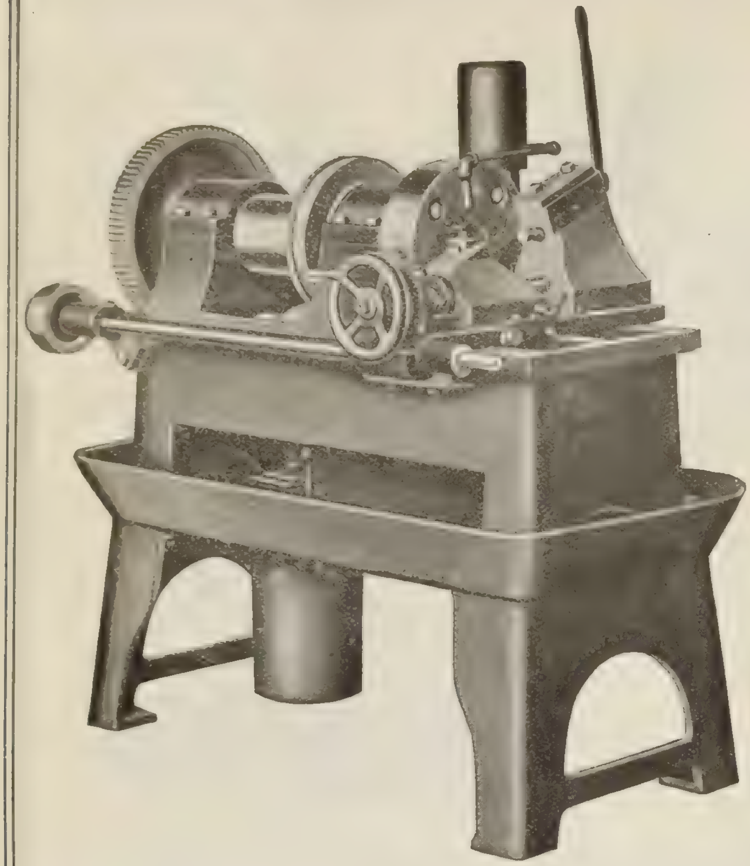
We publish a thirty-two page book elaborately illustrating and describing this Dividing Head. A copy will be sent free on request. Just ask for "Dividing Head Book."

Kempsmith Manufacturing Co.

MILWAUKEE, U. S. A.

Agents:—Foss & Hill Machinery Co., Montreal
General Supply Company, Toronto and Ottawa
Western Supply and Equipment Co., Calgary





Globe Cutting-off Machine

For bars up to 3½″ diameter

IT requires strength for work of this kind and if you will look closely at the illustration you will see that the "beef" is in the right place—where it counts in reducing repair bill and operation cost.

The "Globe" is of the low-swing type; having self-oiling main bearings; pump for circulating compound. The chip pan is very easily cleaned.

We can equip the large machines for shell work, for cutting-off, facing, copper band-turning, waving and undercutting.

We also have machines for 4.5″, 6″, 8″ and 9.2″ shell work.

Watch for our 6″ machine in Annual Review No:

Globe Electric Machine Co., Ltd.

119-121-123 Mary Street
HAMILTON - CANADA

You can drive high speed drills up to 2½″ diameter

with the new box-column type

Heavy Duty "Rockford"

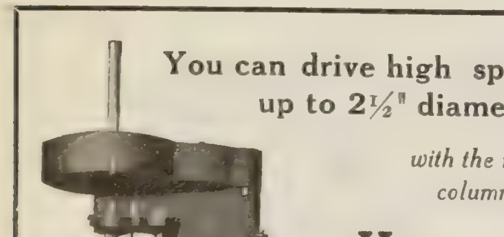
Drilling Machine

This Rockford machine tool meets the most exacting requirements.

It is **STRONG, RIGID, ACCURATE AND FAST,** with individual features. Built in three styles.

ROCKFORD DRILLING MACHINE CO.

ROCKFORD, ILL., U. S. A.



Rockford Machines Cut Costs.

The BARNES DRILLS

TRADE WF AND JC MARK

Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

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A Reciprocal Christmas Gift For Your Men

The Starrett Book
Price 50 Cents.

HAVE you decided on what present you are going to give your employees for Christmas? Don't give them some little useless gift. A practical remembrance will please them more—something that can be used to help them increase their efficiency. Give them

The STARRETT BOOK

for Christmas—they will appreciate it. This book is practical, not theoretical—written by Howard P. Fairfield, Assistant Professor of Machine Construction, Worcester Polytechnic Institute. Describes machine shop practice in such a way that machinists can understand and profit by it.

Co-operate with your men—by helping them you help yourself. A book which every employer should read as well as his mechanics.

The Starrett Book is handsomely bound. Illustrations showing precision tools or machinists at work on nearly every page. Shows how to read drawings—gives an accurate knowledge of laying out work. Describes the use of fine mechanical precision instruments—contains many useful tables of frequent value in shop work. Practical problems on lengths of belts, pulley sizes, mensuration and engineering formulas.

The book is just brimful of useful information for the mechanic. List price 50c.

Tear off the coupon and get your order in early.

The L. S. Starrett Company

World's Greatest Tool Makers

ATHOL, MASSACHUSETTS
U.S.A.

BY INVITATION MEMBER OF

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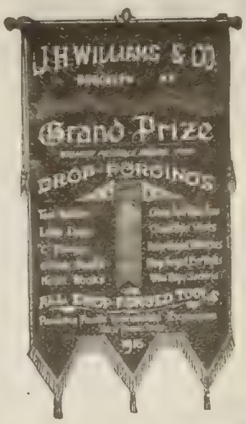
Drop-Forged Tools for the Machine Shop

Suitable Design
Dependable Construction
Sufficient Performance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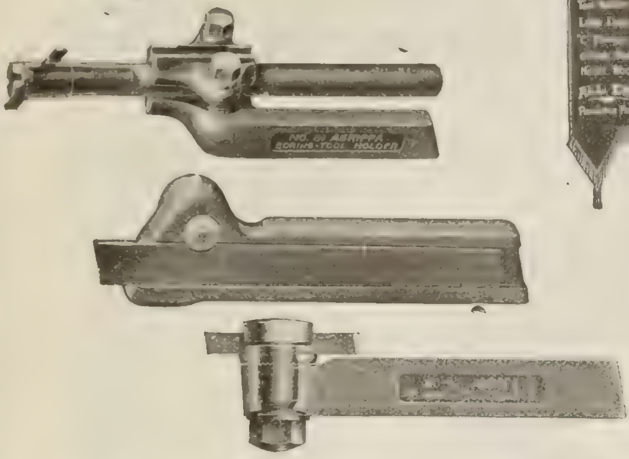
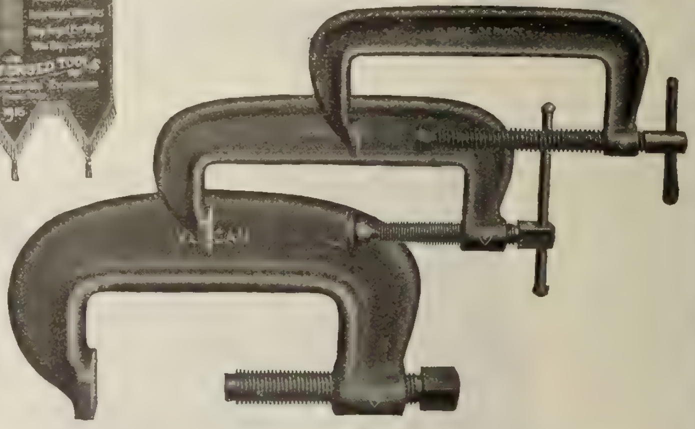
Grand Prize
DROP FORGINGS
ALL DROP FORGED TOOLS

Safety, strength and
ultimate economy back
up our guarantee.





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J. H. WILLIAMS & CO.
45 RICHARDS STREET BROOKLYN, N.Y. CITY
THE WRENCH PEOPLE

Leading dealers supply all "VULCAN" and "AGRIPPA" tools.

Gauges, Tools, Fixtures, Jigs, Dies

That Are Right

NO MATTER HOW EXACTING YOUR REQUIREMENTS ARE WE CAN MEET THEM.

Our factory is equipped with new and modern machinery.

Slocum, Avram & Slocum Laboratories, Inc.
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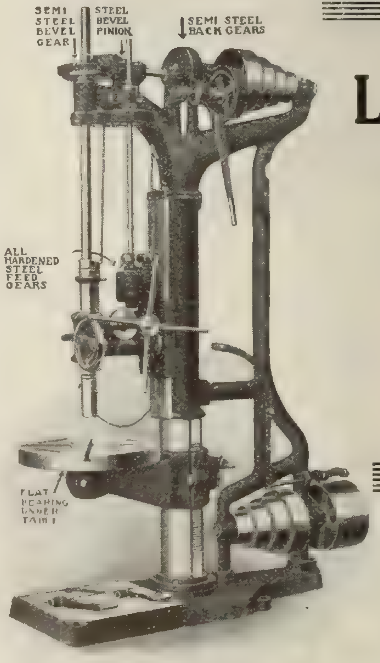

SEMI STEEL BEVEL GEAR
STEEL BEVEL PINION
SEMI STEEL BACK GEARS
ALL HARDENED STEEL FEED GEARS
FLAT BEARING UNDER TABLE

Lower Your Production Cost!

Aurora

Drilling Machine

Strength is the word that distinguishes this machine. Special care has been used in bringing this Drill up to its present point of efficiency. If you are in the market for drills which must have speed and accuracy consult us. This is an ideal machine for HIGH EXPLOSIVE SHELLS. Inquire—we have the goods.

Stationary head sizes—20", 21".
Sliding head sizes—22", 24".

The Aurora Tool Works
Aurora, Indiana, U.S.A.

Rivet Speed

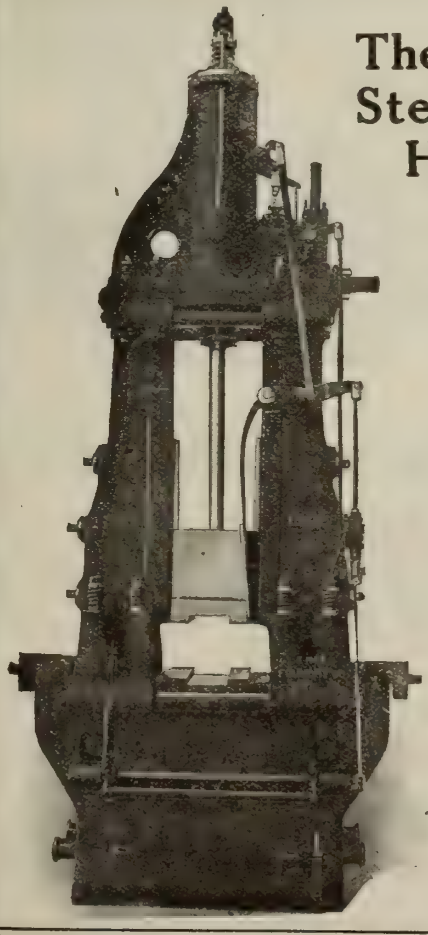
One every second is a speed which this Grant Rivet machine will keep up indefinitely, in any degree of tightness or looseness desired. Each rivet is finished with perfectly shaped head, polished and with no hammer marks showing.

We claim this is the only machine manufactured that will accomplish this feat. Our claims are unchallenged. By writing for our catalogues you may obtain full information regarding the ability of this machine.

We are rivet machine specialists. Get in touch with us

Grant Man'fg. & Machine Company

Holland Avenue - - Bridgeport, Conn., U.S.A.



The "ERIE" Steam Drop Hammer

is the last word in Hammer construction. Ask any user.

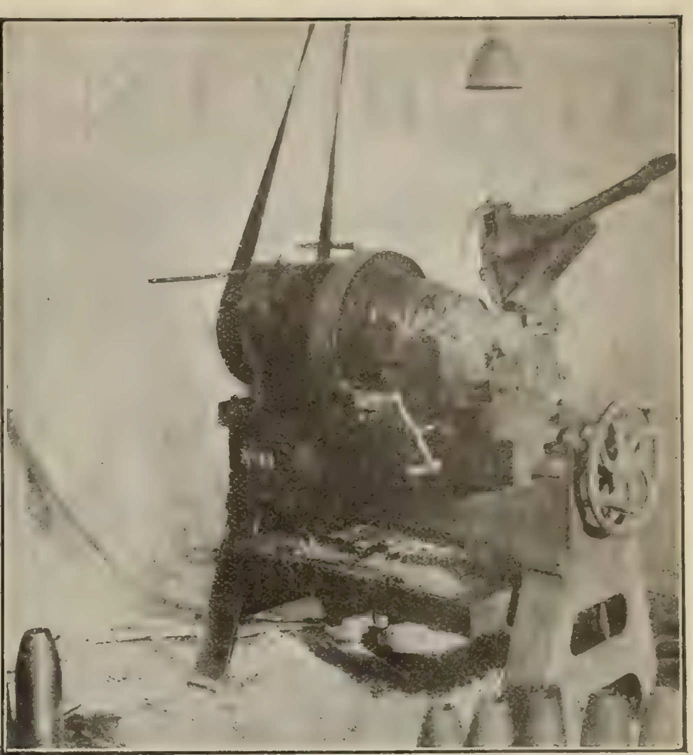
A list will be supplied upon request.

We also build Trimming Presses.

Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

Erie Foundry Co.

ERIE, PA.



For Waving

IF you are in a position to machine your own castings, get our proposal to supply complete set of castings for

Boring Lathes,
Base Boring,
Lathes for Waving,
Band Turning Lathe,
Band Turning Presses
 for 4.5", 5" and 6" H.E. Shells.

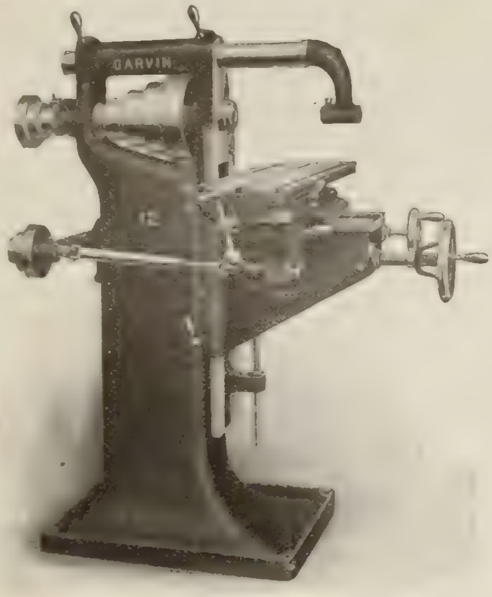
We have made a study of this feature and as a profitable method of getting what you want the way you want it, this feature has rare possibilities.

Marsh & Henthorn

BELLEVILLE, ONTARIO, CANADA

GARVIN

NO. 12 PLAIN MILLING MACHINE



No. 12 Plain Milling Machine—Use Code Abrade

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rapidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments . . . . .18 x 6 x 15 in.

For Further Information { ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog.

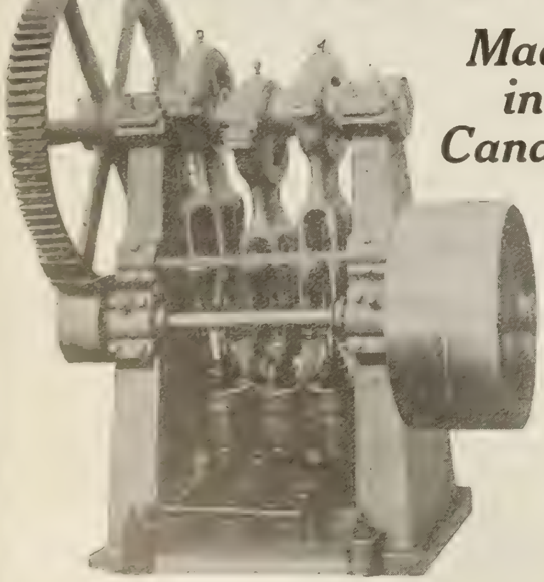
Manufactured by

THE GARVIN MACHINE COMPANY

Spring and Varrick Streets *(Visitors Welcome)* **50 Years New York City**

PRESSES

Made in Canada

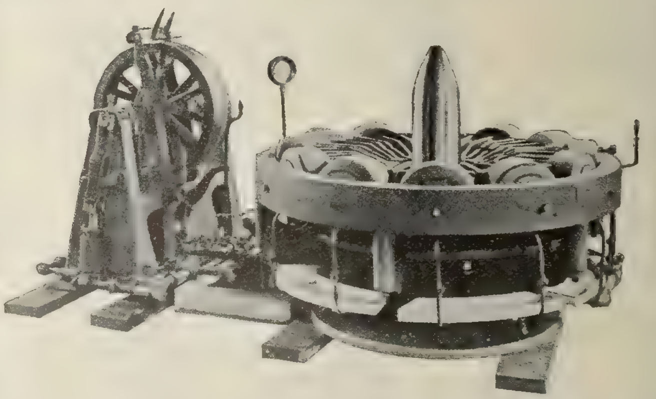


Hydraulic Presses, Pumps and Accumulators for all purposes.

WRITE FOR PRICES AND DELIVERIES

WILLIAM R. PERRIN, Limited

TORONTO, CANADA



The New "West" Banding Press

For 9.2" and 8" shells

12 Cylinders; Ample Power; Ample Strength; Reasonable Price.

NO ACCUMULATOR REQUIRED.

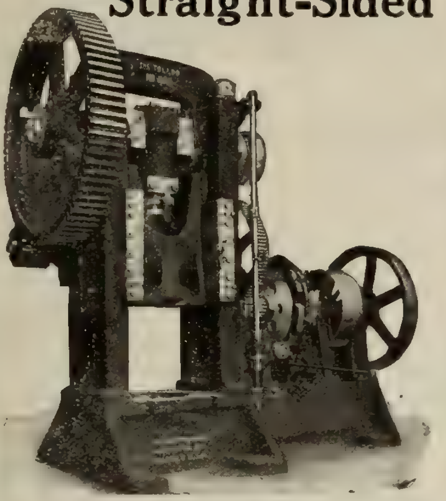
The West Tire Setter Co.

255 Mill Street, Rochester, N.Y.

Unusual Strength of Construction and the Quality of Material and Workmanship render the

"TOLEDO"

Straight-Sided Presses



the logical selection for maintaining accuracy in hard service and for sustaining low operating costs on hot or cold trimming of drop forgings; in combination cutting and drawing, reducing, punching, piercing, shaping, stamping and embossing in the manufacture of automobiles, hardware, steel cars, electrical instruments and a wide range of work.

Presses for every purpose.

The Toledo Machine & Tool Co.
TOLEDO, OHIO

A Combination of Rigidity, Accuracy, Simplicity and Ease of Operation

Bodies are inclinable and convenient for handling dies and material. Slides are long and well gibbed.

BLISS

Inclinable Power Presses

reduce the maintenance cost of both machine and tools.

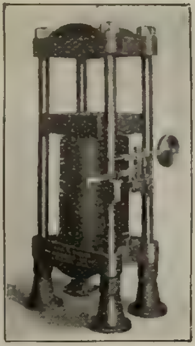
Built in eighteen sizes.

Adapted for many operations in the manufacture of tin cans, pieced tinware, metal packages, brass goods, electrical goods, trimmings, etc.

Catalog 2-G, decribing them, sent on request.

E. W. Bliss Co., No. 20 Adams Street
Brooklyn, N.Y., U.S.A.

Chicago Office: Peoples Gas Co., Bldg.
Detroit Office: Dime Bank Building



Elmes Hydraulic Press No. 676

With ¾-in. Automatic Lever Operating Valve No. 677-A

This press is of steel and semi-steel construction, and the stands which support the press are threaded at the ends to receive the steel columns and have holes for fastening to the floor. The platen is guided by the columns.

The operating valve is attached to the cylinder, and is designed with a weight to be set for the pressure desired, and releases automatically. To start the ram up, the lever is pushed down; upon the ram reaching the desired pressure, the lever automatically releases (acting as a safety valve as well), causing the ram to descend. Valve body is made of bronze, and other parts are made of tool steel and machine steel. If desired a hydraulic gauge can be attached to show the various pressures, although with this valve it is not necessary.

Write for our Hydraulic Machinery Catalogue.

Charles F. Elmes Engineering Works 217 N. Morgan St.
Chicago, U.S.A.

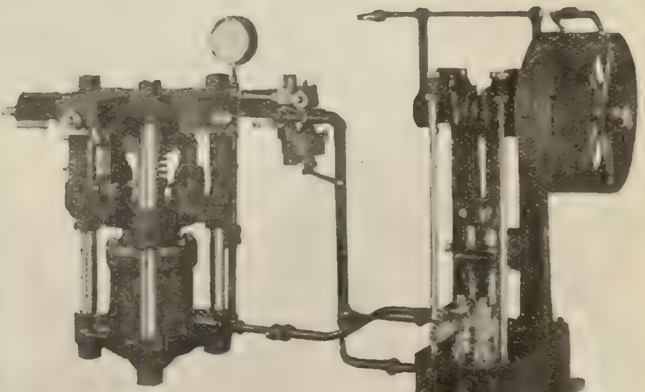
Over 50 years' experience building hydraulic machinery.

A very rapid worker—

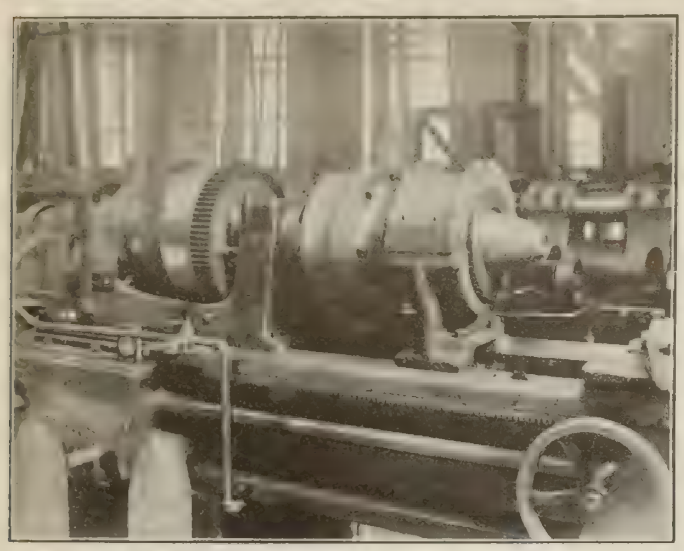
In fact the operation of this press is so rapid that it is impossible for human operators to handle the work to and from as quickly as it completes its operations. It is impossible to utilize its full capacity.

"Metalwood" Horizontal Banding Press for Shells from 3 to 5 in.

Press is combination of Hydraulic and toggle with means of adjustment both for amount of pressure applied and stroke. Has six concentric dies coming to a common centre forming a complete circle when closed to required diameter of hand.
All working parts are fully enclosed, at the same time easily accessible for changing of dies. Toggles are arranged with adjustment so that pressure delivered on dies can be varied to suit the pressure or pressures applied on hydraulic cylinder. 2,500 lb. approximate pressure required, developing 120 tons on 9" ram.



Metalwood Manufacturing Co.
Leib and Wight Sts., DETROIT, MICH.



Cut shows Chuck on nosing operation. This is one of over two hundred in this Canadian plant.

A Big Efficiency Unit in Your Shell Plant

A. J. LAVOIE'S

LOW PRESSURE

Compressed Air Chuck

This chuck can be applied to any make of lathe, without alteration to the machine, and will increase production from 25% to 75%. It grips and releases the shell while in motion—no need to stop your machine.

It is a single unit combination attached to the face plate of lathe, supported by an additional heavy duty bearing, thus making a heavy duty lathe out of a light machine. A small lever operates the chuck. Will operate with a pressure of 60 lbs. per sq. in.

This chuck is *built on the duplicate part system. It is simple, effective and fool-proof.*

It grips the shell in a predetermined position. The jaws will not slip on the shell. It has shell interior and exterior adjustable stops.

A trial on one of your lathes will convince you that this is THE Chuck for shell work.

MANUFACTURED BY

The Montreal General Tool Co.

673-5 Notre Dame Street, Maisonneuve, Montreal, P.Q.

Also manufacturers of shell tools, and special machine attachments of all kinds made to order.

The "IDEAL" Die

for

Shrapnel

Quick, accurate work in threading Fuse Plugs for Shrapnel Shells is essential if you would make maximum profits. Your field is unlimited and your output governs your income. **Why not give the special type "C" Ideal Die a hard trial at this work and see if it will not boost production for you?**

Let the "IDEAL" cut the threads that bind you to low production. They will fit your machines. Circular on request.

"IDEAL" is a *different* die. The head revolves around a stationary cam, thereby utilizing the belt power or cutting strain as opening power. Chasers are supported directly back of cutting strain, which will remove any tendency to bell out and cause taper threads.

The Ideal Tool & Mfg. Company

BEAVER FALLS PA., U.S.A.

A. M. ELLICOTT CO., MONTREAL, QUEBEC

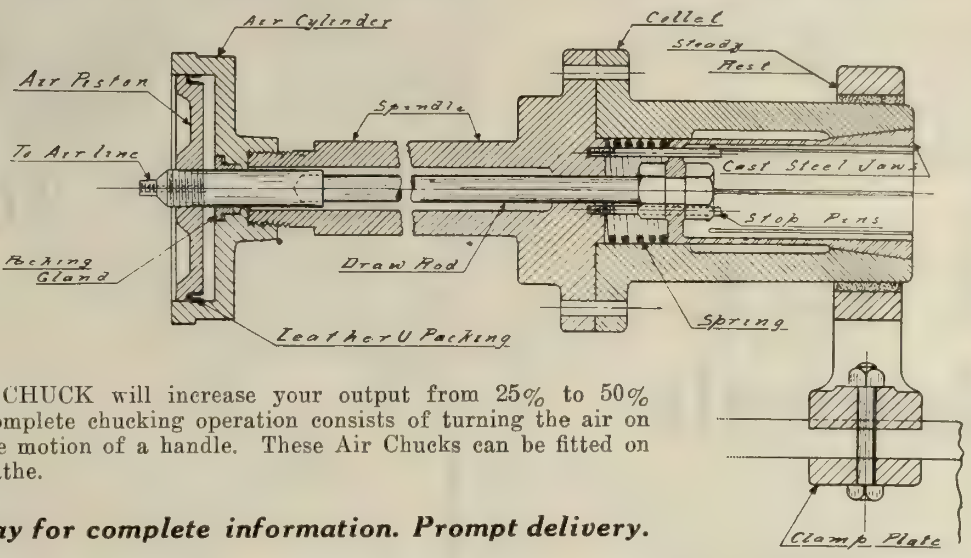
Distributors for Province of Quebec and Ottawa

Get Out Your Watch and Time Your Chucking

With most screw chucks you have to use brute force or the hammer to tighten, and even then your shell is not always rigid.

H.E.W. AIR COLLET CHUCK IS RIGID

Saves Time


Air Cylinder
Collet
Steady Rest
Air Piston
Spindle
To Air line
Cast Steel Jaws
Stop Pins
Packing Gland
Draw Rod
Spring
Leather U Packing
Clamp Plate

Saves Money

H.E.W. AIR CHUCK will increase your output from 25% to 50% because the complete chucking operation consists of turning the air on and off, by the motion of a handle. These Air Chucks can be fitted on almost any Lathe.

Write to-day for complete information. Prompt delivery.

HYDE ENGINEERING WORKS

P.O. BOX 1164

27 William St., MONTREAL

Do Away With Friction Losses in Chucks

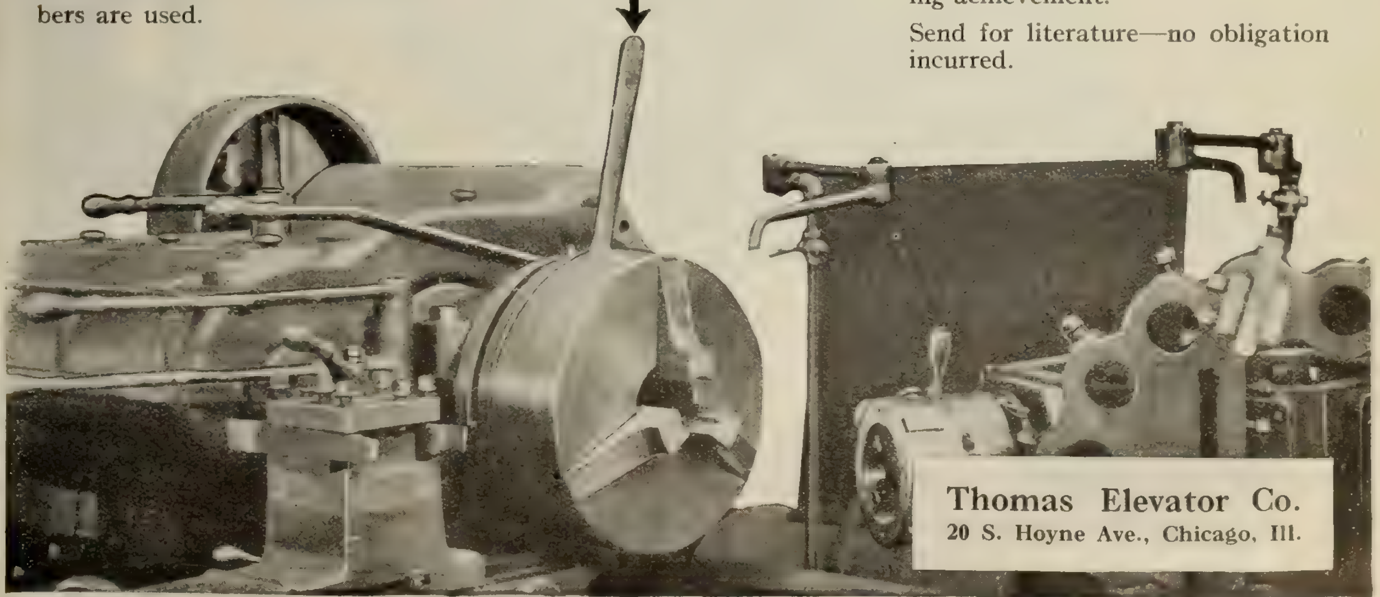
by using

Barker Wrenchless Chucks

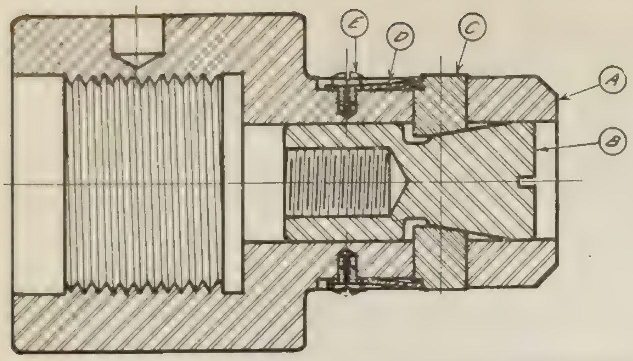
In transmitting the movement from the cam to the jaws of a Barker Wrenchless Chuck a leverage principle is involved which eliminates to a large extent the tremendous frictional loss incurred in chucks where scrolls or similar wedging members are used.

Operating mechanism combined with the chuck proper forms a single unit—no time lost in mounting—quick acting—opened and closed while the machine is in motion—these and many other vital points on this new but established departure in chucks may rightfully be considered a striking achievement.

Send for literature—no obligation incurred.



Thomas Elevator Co.
20 S. Hoyne Ave., Chicago, Ill.



M. E. C. Mandrels

The M.E.C. Mandrels prove an ideal assistant and once used will be indispensable for your shell work. They are for finished or rough work, doing the work in that satisfactory, efficient manner you so desire.

A study of the above drawing will reveal to you more than words. It is a "silent story" of its own superiority.

The M.E.C. Mandrels are being used very extensively in Canada, Great Britain, France, Russia and India, and are daily proving their sterling character.

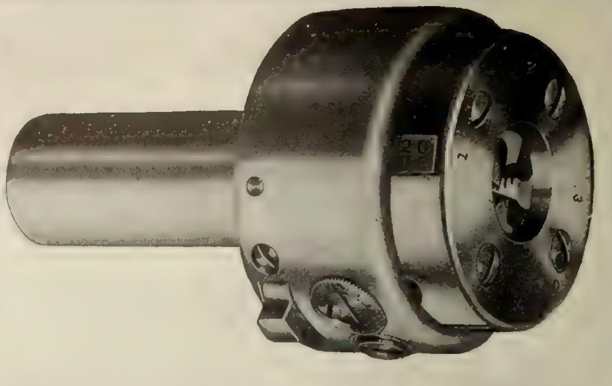
Acquaint us with your particular difficulty.

Manufacturers Equipment Co.

Canadian Agents:
A. R. Williams
Machinery Company
Winnipeg, Man.

Foreign Agents: C. W. Burton Griffiths & Co., Ludgate Circus, Ludgate Hill, London, Eng.

175-179 N. Jefferson St., Chicago, Ill. U.S.A.



Desirable Threads

Are easily obtainable with an H. & G. Automatic Self-opening Die Head.

The Chasers are set and held in place by a steel cam which, once adjusted, locks. No stopping or changing required to keep to size. There are a good many other features on this Die Head.

"Write us!—write now."

EASTERN MACHINE SCREW CORP.
NEW HAVEN, CONN., U.S.A.

H & G

---

16 in. Lever POST DRILL

A Giant Little Machine For Light Drilling.

Will drill up to 7/8 inch.

The Feed Lever Socket is adjustable on the feed shaft, to provide for setting the lever in the most convenient position for the operator.

An adjustable friction is provided for the feed shaft, which acts as a balance to the weight of the spindle.

Bevel Gears, Feed Pinion and Rack are all machine cut, working smoothly and without noise.

Drills to centre of 16-inch circle.

Run of feed 5¼ inches.

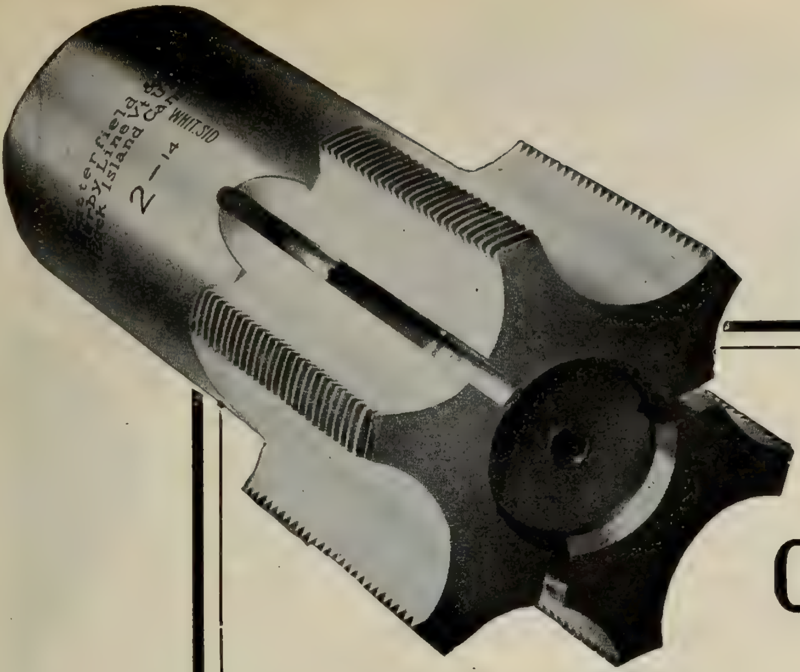
Greatest distance between drill spindle and table, 22 inches.

Spindle bored for ½-inch shank twist drills.

Speed of countershaft for average work, 300 per minute.

A. B. Jardine & Co.

Hespeler, Ontario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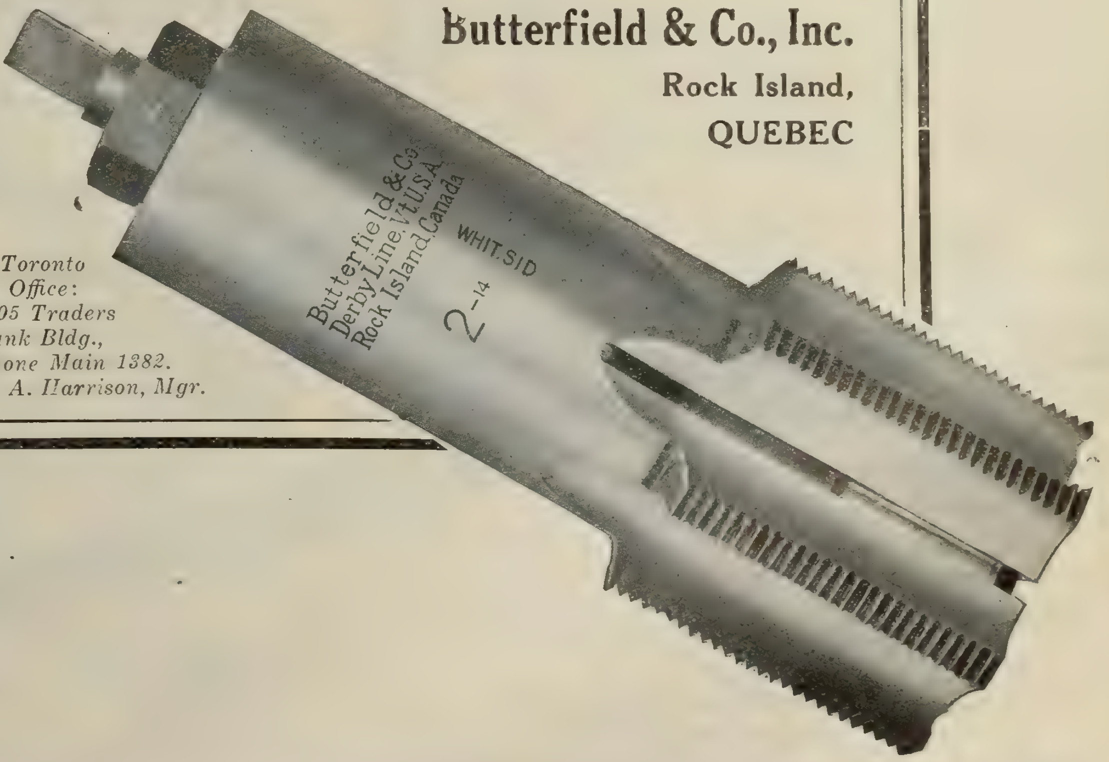
ON TIME!

These Butterfield High-Power Tools will help you get out your rush work on time. They are built to stand up under the heavy strain of exceptional production. Look at them! See their strength! Their compact, rigid design. We have developed this line of Taps especially for shrapnel and shell work.

The name "Butterfield" on your taps, dies and reamers is a guarantee of quality—a mark of superiority. We build into every one the experience of thirty-five years devoted to the manufacture of high-grade tools.

That is what makes Butterfield quality. We have a new catalog. Let us send you a copy.

Butterfield & Co., Inc.
Rock Island,
QUEBEC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Phone Main 1382.
H. A. Harrison, Mgr.

Using Them for Fifty Years

Many firms have been using the "Famous Five" Files for half a century.

Their efficiency has become a tradition, because the constant improvement of their cutting qualities has kept abreast of the demands of modern shop practice.

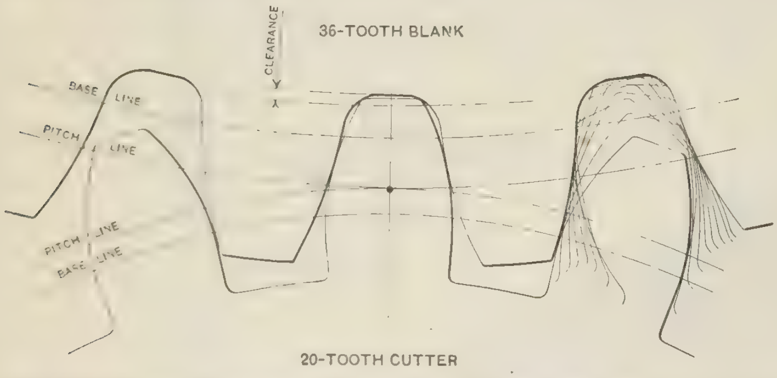
Specify them when ordering. They are:

KEARNEY & FOOT **GREAT WESTERN**
AMERICAN **ARCADE** **GLOBE**

(Made in Canada)

THE NICHOLSON FILE COMPANY, Port Hope, Ontario

(Dealers Everywhere)



CUT GEARS

WE have a gear department with modern equipment, and make a specialty of custom work.

By our process of cutting gears, the tooth bears on its whole face, making it wear longer and run smoother.

Write for Quotations.

BROWN ENGINEERING CORP., LTD.
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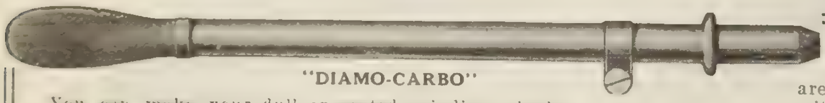
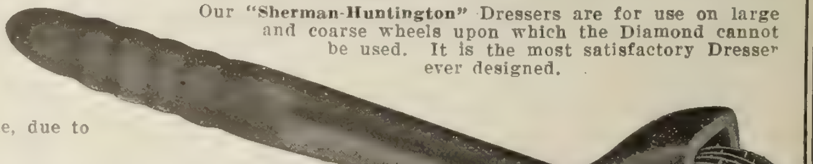




"DIAMO-CARBO"

You can make your dull or coated grinding wheels like new in efficiency by dressing them with

DESMOND-STEPHAN GRINDING WHEEL DRESSERS

and you will eliminate delayed production and lost time, due to the loss of their cutting properties.

Insist upon having your dealer supply you with one of our tools for trial. If he cannot write us and we will send any of them on approval.

The Canadian Desmond-Stephan Mfg. Company
HAMILTON, ONTARIO

Our **"Diamo-Carbo"** Dressers are the economical substitute for the Black Diamond Dressers. They are so low-priced that each grinding stand may be provided with its own dresser.

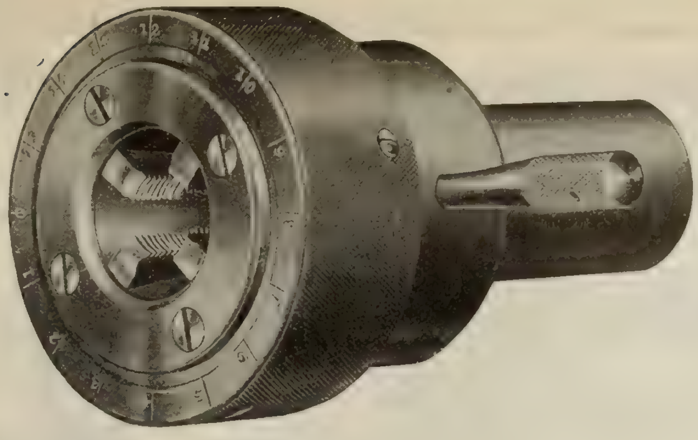
Our **"Sherman-Huntington"** Dressers are for use on large and coarse wheels upon which the Diamond cannot be used. It is the most satisfactory Dresser ever designed.

"SHERMAN-HUNTINGTON"

Alfred Herbert, Ltd., Coventry, Agents for Great Britain.

Mention this paper when writing advertisers. It will identify the proposition about which you require information.

Murchey Taps, Dies



6", 8", 9.2" Shells

Murchey Collapsing Taps and Automatic Self-Opening Dies are daily proving their sterling worth in 75per cent. of the munition shops in Canada and United States. We can tap any hole from 1″ to 12″. The chasers on these tools are the money saving elements. They are of high-speed steel and can be easily adjusted to compensate for any wear.

Benefit by our experience and the actual experiences of shell plants now in operation. Facts convince. Write us and we will tell you something. Send us your blueprints. We will co-operate with you.

MURCHEY MACHINE & TOOL COMPANY

Fenwick Freres & Company,
15 Rue Fenelon, Paris, France

75 Porter Street, Detroit, Mich.

Coats Machine & Tool Co., London, S.W.,
England, Glasgow, Newcastle-on-Tyne

Assuming that you want a grinder that is better than the average—

A grinder with massive table, micrometer adjustments, very long knee and gibs, and extra heavy head- and tailstock—it will pay you to investigate the

Standard No. 6
Universal Grinding Machine

In addition, you'll find that the headstock is fitted with large bearing for chuck spindle and with special bronze bearings of navy specifications, spindle is tapped and tapered, bored to take wheel arbors and bearings are 1 in. in dia. and 2¾ in. long, and an exceptionally simple and sturdy countershaft with self-lubricating bearings.

Start the investigation by sending for the full details—to-day.

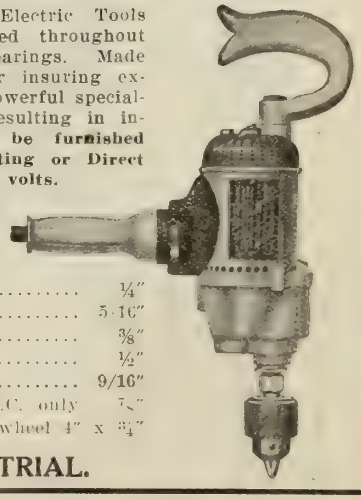
Simmons Machine Co., Inc.

1001 Singer Bldg., New York City
981 Broadway, Albany, N.Y.

Thor UNIVERSAL Electric Drills

Licensed Under Burke Universal Motor Patent

The only Portable Electric Tools made that are equipped throughout with ball and roller bearings. Made with aluminum cylinder insuring extreme lightness and a powerful specially constructed motor resulting in increased capacity. **Can be furnished with Universal, Alternating or Direct current motor 110 or 220 volts.**



000	Drilling Capacity	....	¼″
00	" "	....	5-16″
0	" "	....	⅜″
01	" "	....	½″
1	" "	....	9/16″
2	" "	D.C. only	⅞″
No. 6 Electric Grinder, wheel 4″ x ¾″			

SHIPPED ON TRIAL.

Independent Pneumatic Tool Company

Office: 334 St. James Street, MONTREAL, QUE.

Toronto: 32 Front St. E; Winnipeg: 123 Bannatyne Ave., E.
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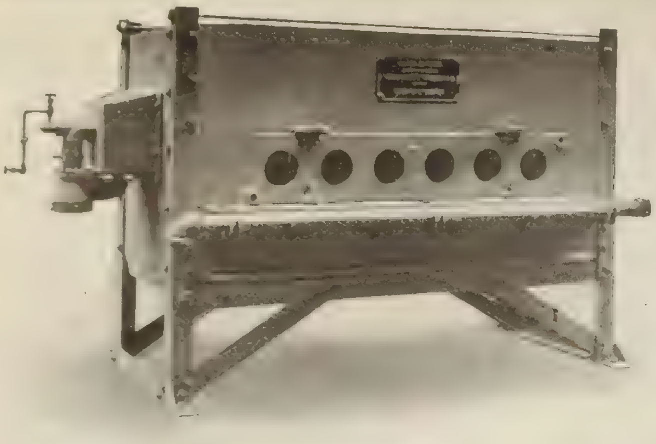
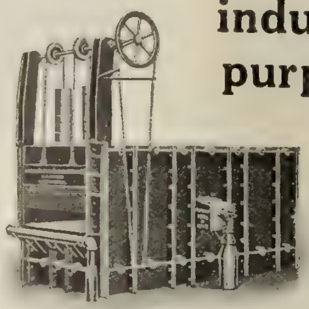


"Mecol" Furnaces

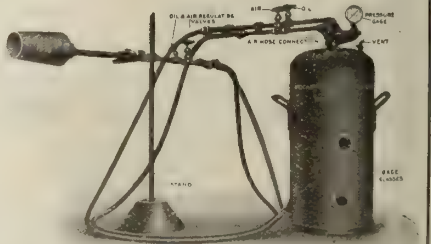
Designed and Built in Canada for all industrial purposes



What the use of Oil instead of Coal-fired Furnaces means to you—

A Clean Workshop without Smoke or Soot.
Only half the furnace space necessary.
Less than half first cost of furnaces.
No chimneys or flues required.
Instantaneous and perfect control of temperature.
Higher temperatures obtained.
No heaters, coal or ash handlers required.
No coal or ash piles.
Less waste of fuel and less time required to bring furnaces up to working heat.
No waste of fuel after work is done, as supply is shut off instantly.

Write for full particulars.



MECHANICAL ENGINEERING COMPANY, LIMITED
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WHITING AIR HOISTS

Most convenient for the many quick, short lifts about the average shop.

Valve stem does not pass through air chamber and therefore no packings are required.

Automatic cutoff guards against waste of air.

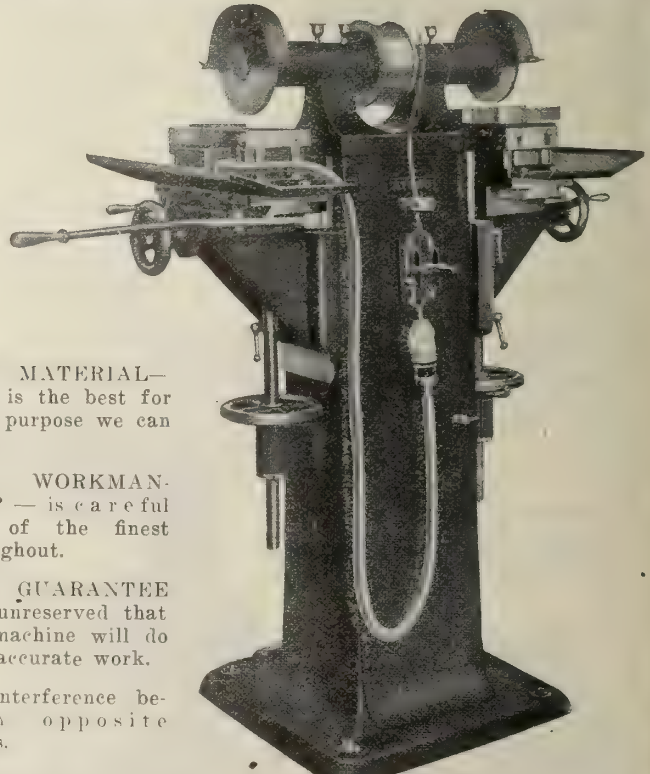
All details the result of many years' study in manufacturing and operating cranes and hoists of all kinds.

Send for catalog 119.

Complete Foundry Equipments. Cranes of all Types.

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.

The "Steno" Duplex Surface Grinder



THE MATERIAL—used is the best for each purpose we can get.

THE WORKMANSHIP — is careful and of the finest throughout.

OUR GUARANTEE—is unreserved that the machine will do fine, accurate work.

No interference between opposite tables.

THE STENOTYPE COMPANY, INDIANAPOLIS, INDIANA, U.S.A.

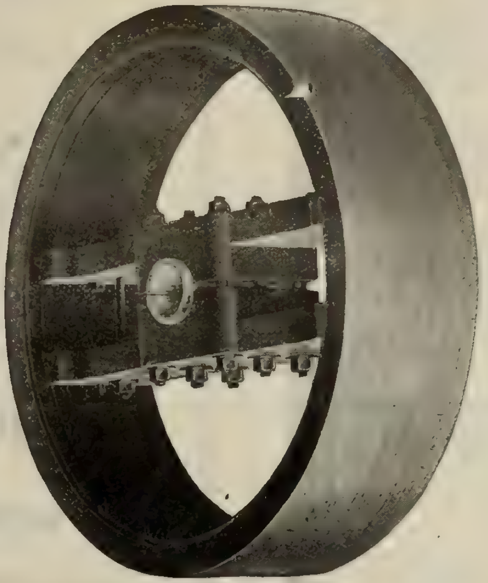
Manufacturers of the "STENO" Duplex Surface Grinder, the "STENO" 1" x 7" Turret Hand Screw Machine and "STENO" Milling Cutters, Reamers, Fixtures, Jigs and Gauges.

PULLEYS

No Keys

No Set Screws

In Perfect Balance



Lighter

Stronger

Better Belt Surface

The Dodge Standard Wood Split Pulley

The Wood Split Pulley is better than either cast iron split pulleys or steel split pulleys for the following reasons—

The wood pulley is lighter, stronger, better balanced, and provides a very much better belt surface. It costs 33 1-3% less money and provides 50% more returns in horse-power value. It may be run at very much higher speeds with no danger of bursting—also it may be had quicker and in a greater range of sizes.

It costs less to get—less to put on—and less to keep.

We make approximately 300 Dodge pulleys every day—everybody uses them.

There are more Dodge pulleys making ammunition than any other kind—you can get them quick.

Every pulley is thoroughly nailed. Every pulley is guaranteed for Double Belts.

We are Canada's greatest pulley makers.

If you have not our Books, write us.

DODGE MANUFACTURING COMPANY

Toronto - - Montreal

Steady Improvement for 20 Years

Twenty years ago, the first AMERICAN Steel Split Pulley was the best belt pulley on the market—because it was *steel.* In those 20 years it has proved that it wears longer, delivers more power and consumes less energy, because it fans a minimum amount of air as it revolves and allows only a minimum belt slip.

But the steel pulley that we make now differs from that of 20 years ago. With each year improvements were made — nothing radical—but *improvements* nevertheless.

To-day the three million AMERICAN Steel Split Pulleys that have been marketed are the best evidence of unassailable pulley quality.

Addressing us direct, or communicating with the nearest AMERICAN Pulley dealer, will bring you pulley facts vital to your business.

AMERICAN STEEL SPLIT PULLEY

Over 60,000 pulleys—3 inches to 120 inches in diameter stocked at centres named below, and additional thousands stocked by over 200 dealers insure prompt deliveries. Write for quotations and delivery dates.

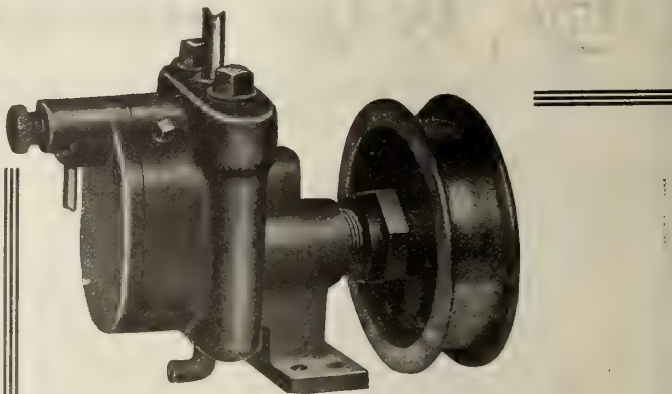
American Pulley Co.
4200-60 Wissahickon Ave.
Philadelphia, U.S.A.
New York, 33-35 Greene St. Boston, 165 Pearl St. Chicago, 114-116 S. Clinton St. Seattle, 536 First Ave., S. WILLIAMS & WILSON, LTD., Montreal. The A. R. Williams Machinery Co., Ltd., St. John, N.B., Toronto, Winnipeg, Vancouver.

Preparedness—

THE watchword of the day. Start now and be ready for the big business that is coming.

SPECIAL machinery and equipment is our forte. We ask the opportunity of having our engineers solve your problems.

LYMBURNER, LIMITED
360 St. Paul St.
MONTREAL, CANADA



Oil Pumps

Less to Buy
Less to Install

Because of these features they are worthy of your notice. Besides these features it enables you increase your output by allowing you to speed up your machines. Oil comes out in a steady, non-pulsating flow. This is a reversing pump. We make the one-way pumps as well. Inquire.

C. F. Roper & Company
Hopedale, Mass., U.S.A.

Cost has absolutely nothing to do with the service a belt will render you.

LEVIATHAN AND ANACONDA
ELEVATING
TRANSMITTING
CONVEYING
BELTING

LEVIATHAN
AND
ANACONDA

cost less than some, and more than others, but are guaranteed to deliver more service per dollar of cost than any other belts of any kind—rubber, balata, fabric or leather.

It will pay you to investigate before you spend another dollar for belts.

Write us now about your particular belt troubles.

Main Belting Co. of Canada
LIMITED
10½ St. Peter St., Montreal

WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE.

ECONOMIC WATER OIL

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the **COST** of your **CUTTING MIXTURE** BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with **30 to 50** gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be **satisfactory**, but will produce very **ECONOMIC RESULTS.**

One TRIAL ORDER will prove our STATEMENT.

Made in Canada

Canadian Economic Lubricant Co.
LIMITED
1040-1042 Durocher St. MONTREAL

CHAPMAN

DOUBLE BALL BEARINGS

Chapman Double Ball Bearings fit any adjustable hanger and the change can be made with but little delay to you.

Used in over 2,000 Canadian Factories. They have other good points too. Ask us to send full details.

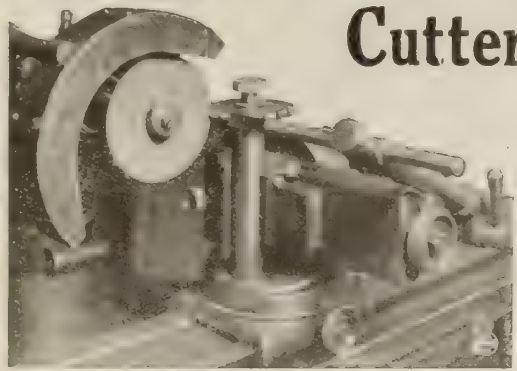
The ordinary line shafting consumes from 15 to 60 % of power developed—

But the line shafting that's equipped with Chapman Double Ball Bearing will save 75 per cent of the friction loads making an average total saving of power from 15 to 30 per cent.

The Chapman Double Ball Bearing Company of Canada, Ltd.
339-351 Sorauren Ave., TORONTO, Canada

TRANSMISSION BALL BEARING CO., Inc.
32 Wells St., Buffalo, N. Y.

Wheels for Grinding Cutters



Set-up for Ordinary Form Cutter

The wheel for grinding cutters must be of a soft, free-cutting grade; the cut must be light, and never forced.

The wheels most commonly used are about 46 grain, grades J and K; the coolest cutting abrasive is Alundum. Wheels finer than 60 grain should never be used for cutter grinding of either high speed or carbon steel. Fine wheels are more likely to burn the work than coarser wheels.

Form cutters are usually ground with a saucer or dish wheel. They are held on a short arbor, as illustrated here, and ground on the face only. It is important that the operator keeps the cutting edge in a radial line to retain the shape. In this particular type of cutter, it is necessary to do the grinding with the tooth-rest on the back of the cutting tooth instead of on the face.

Cutters of the side mill type are ground on the top in exactly the same manner as the plain cutter. A cup wheel is employed for grinding the sides, the cutter being held on the edge of a special arbor, as shown in the illustration. For plain milling cutters, the wheels most used are Alundum 3846 J and K, although 3860 I, vitrified and silicate, is a popular grain and grade in saucer shapes, such as Brown & Sharpe No. 60.

One of the most popular wheels for grinding gear cutters is saucer shape Alundum 3846 K. Another good wheel is Alundum 3850 J. In the smaller diameters 3860 K is commonly used.

On inserted tooth milling cutters, 3846 J and K are the most popular wheels, and under certain conditions 3836 I meets the requirements.

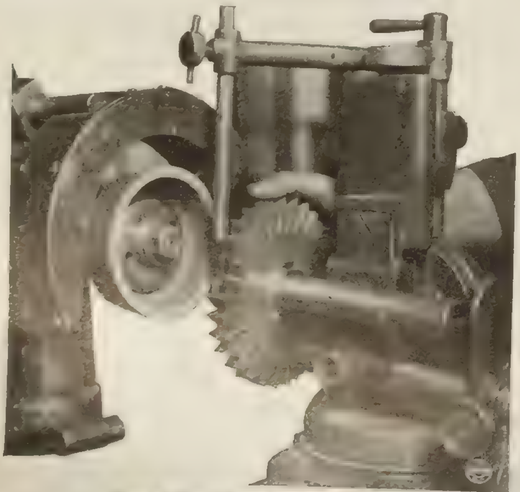
NORTON COMPANY

WORCESTER, MASS., U.S.A.

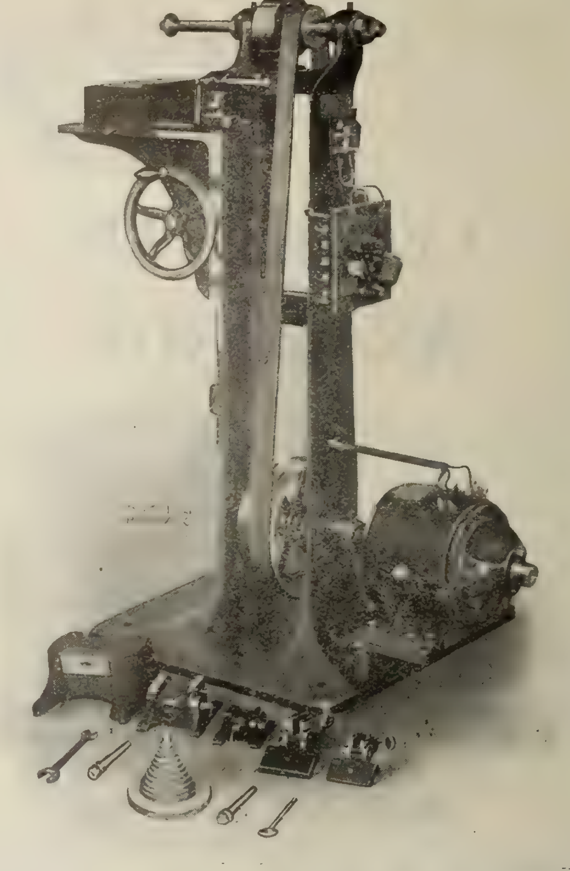
Canadian Agents—THE CANADIAN FAIRBANKS-MORSE CO. Ltd., Montreal, Toronto, Quebec, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. ANDREWS & SON, Quebec, P.Q.

Electric Furnace Plants:

NIAGARA FALLS, New York CHIPPAWA, Ontario, Canada



Set-up for Grinding Side Mill. 829



Chaser Grinder

BELT-DRIVEN
MOTOR-DRIVEN

How is your die grinding method operating? How are your dies acting after grinding? That last question looms up big in the overhead charges of your toolroom. Nine-tenths of all die trouble is due to imperfect grinding, and a sure, efficient and quick way to eliminate all die trouble caused by grinding is to instal a Modern Grinder.

Special attachments for grinding Spring Dies, Pipe Dies, Reamers, Shear Blades, Spiral and End Mills, Milling Cutters, etc., can be furnished along with its regular equipment.

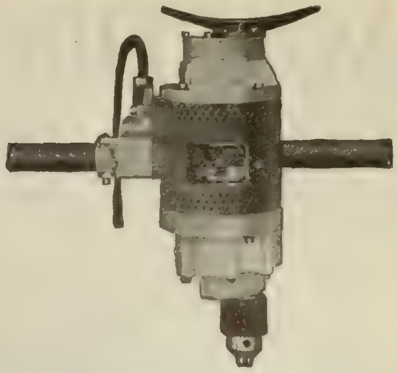
Bulletin C.G. will tell you all about it.

MODERN TOOL COMPANY

State and Peach Streets ∴ Erie, Penna.
New York Office Chicago Office Detroit Office
F. WESLEY PARKER, *Resident Engineer and Export Agent,*
2 Rector Street, New York.

Speed and Backbone—

The troubles which render ordinary electric tools unreliable have been eliminated in the construction of



Van Dorn PORTABLE ELECTRIC Drills

These tools are built for hard, continuous service, and to stay out of the repair shop.

Oversize parts, special positive acting switch and fan-cooled motor keep Van Dorn Drills, Reamers and Grinder on the job under conditions that disable ordinary tools.

We can save you money—write for the facts.

R. E. T. Pringle, Limited

Manufacturers' Agents

OFFICES:

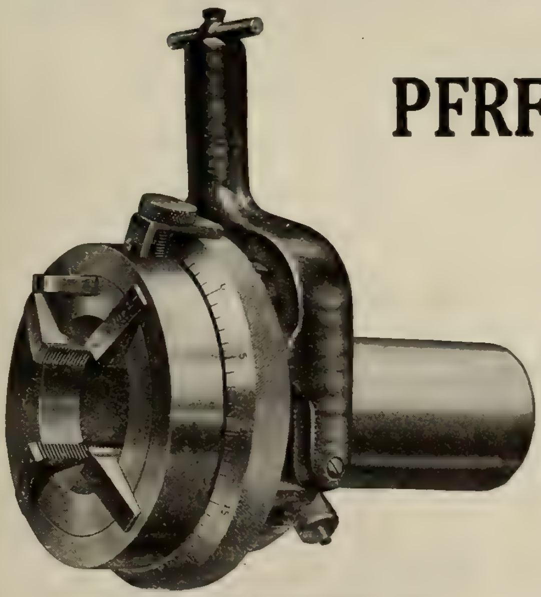
Tyrrell Building, 95 King St. East, Toronto

809 Unity Bldg. - Montreal, Que.
3402 Osler Ave. - Vancouver, B.C.

WELLS SELF-OPENING DIES

CUT

PFRFECT SCREW THREADS



WELLS SELF-OPENING DIE has both face and hand trip.

The Wells Self-Opening Die cuts the thread with a fine shearing cut, then opens with a quick, positive snap.

Adaptability

The Wells Self-Opening Die can be used on screw machines, lathes, automatics, drill presses and bolt cutters.

Chaser Principle

The Wells Self-Opening Die embodies an entirely new principle of design. The chasers are about four times as long as the threaded portions and are supported throughout their entire length and width by the solid sides of the slots in the body. They cannot squirm away from the work. Wear is reduced to a minimum throughout. Adjustment is simple, positive and accurate.

A large number of these Dies in stock for Immediate Shipment.

Wells Brothers Company of Canada, Ltd.

GALT, ONTARIO

Sales Agents: The Canadian Fairbanks-Morse Company, Limited, Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary

MACHINERY STOCK LIST

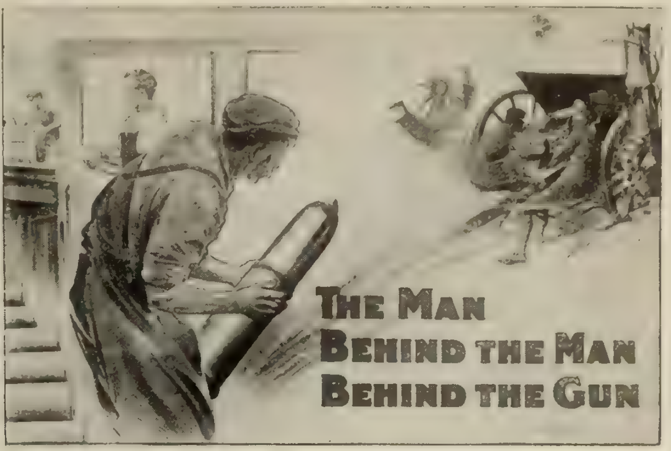
Machines (Suitable for Manufacture of Munitions) Available from Stock and for Prompt Shipment

Quantity.	Description.	Selling Price	In stock at.	Remarks.
	ENGINE LATHES—			
1	10" x 5' Seneca Falls Engine Lathe, with foot treadle and countershaft	$ 225.00	Toronto	Used
1	Von Wyck 15" x 8' Screw-cutting Engine Lathe for foot or power, complete with countershaft, change gears, etc.	675.00	Toronto	Used
2	American 16" x 6' Engine Lathes, with quick-change gears	1,650.00	Montreal	New
4	18" x 8' Barnes Engine Lathes, with regular equipment	800.00	Toronto	New
2	Springfield 18' x 8" Engine Lathes, with double back gear and quick-change gears	1,800.00	Toronto	New
6	Walcott 18" x 8" Engine Lathes, with quick-change gears and double back gear	1,275.00	Montreal	New
1	Walcott 20" x 8' Engine Lathe with quick-change gears and double back gear	1,550.00	Montreal	Used
1	Hendey 20" x 8' Engine Lathe with quick-change gears and double back gear	1,000.00	Toronto	Used
10	Fairbanks Heavy Duty Single Purpose Manufacturing Lathes, 16" x 7' beds, equal to 26" Standard Engine Lathe	1,200.00	Niagara Falls	New
1	Fairbanks Heavy Duty Engine Lathe, 16" x 9' beds, equal to 26" Standard Engine Lathe	1,300.00	Niagara Falls	New
7	Fairbanks Heavy Duty Single Purpose Manufacturing Lathes, 20" x 9' beds, equal to 30" Standard Engine Lathe each	1.400.00	Toronto	New
1	Rand-Carpenter Screw-cutting Engine Lathe, 20" x 10', complete with face-plates, countershaft and regular equipment	950.00	Toronto	Used
12	Milwaukee Engine Lathes, 24" x 10', double back gears and quick-change gears each	2,000.00	Shipment Dec. 15th	New
2	McDougall Lathes, 16" x 6', with quick-change gears and double back gears, also taper attachment each	945.00	January shipment	New
2	McDougall Engine Lathes, 18" x 8', with double back gears and quick-change gears each	988.00	January shipment	New
3	McDougall Engine Lathes, 20" x 10', with double back gears and quick-change gears each	1,102.00	January shipment	New
3	McDougall Engine Lathes, 22" x 10', with double back gears and quick-change gears each	1,432.00	January shipment	New
3	McDougall Engine Lathes, 26" x 12', with double back gears and quick-change gears each	2.021.00	January shipment	New
	TURRET LATHES—			
1	Gisholt Turret Lathe, Type "A", 3¾" spindle bore, 16" swing	2,000.00	Toronto	New
1	Gisholt Turret Lathe, with 6¼" spindle bore, 25" swing, Type "A"	3.360.00	Toronto	New
12	Gisholt Standard Turret Lathes, 21" swing, 3½" bore F.O.B. Madison	2,750.00	Dec. 1st shipment	New
10	Gisholt Standard Turret Lathes, 24" swing, 6¼" bore	3,300.00	F.O.B. Madison	New
4	"Hare" Shell Boring Lathes, for 4.5", 5" or 6" shells, 8" double belt, 6½" hole in spindle, 8½" x 12" front bearing, 20" turret with 6' 3" holes; weight 8,000 lbs. each	2.000.00	Dec. 1st shipment	New
	AUTOMATICS—			
1	National Acme Automatic Machine, capacity ⅞", four-spindle	1.175.00	Toronto	Used
6	Potter & Johnson Automatic Machines, including motor and chucks, 4 H.P. motors, 220 volts, 3 phase the lot	12,000.00	F.O.B point in Ontario	Used
	SCREW MACHINES—			
16	Foster No. 2 Geared Friction Head Screw Machines, capacity 1 1-16", automatic chuck and wire feed; code word "DUOBINICAL" each	815.00	Toronto	New
22	Foster No. 3 Geared Friction Head Screw Machines, capacity 1 5-16", automatic chuck and wire feed; code word "DUOBINICAL" each	990.00	1 week shipment	New
4	Snurr & Kamen No. 4 Geared Friction Head Screw Machines, 1⅞" hole in spindle, 16" swin. wire feed capacity 1⅝", automatic chuck capacity 2¾" each	1.315 00	Toronto	New
6	Warner Swasey No. 2 Plain Head Screw Machines each	775.00	New York; immediate shipment	Used
	DRILLING MACHINES—			
7	Avey No. ½ High speed Bench Drills, ball-bearing, speed 12,000 R.P.M., capacity ⅜" F.O.B. Cincinnati	140.00	3 weeks shipment	New
1	Avey No. 2 Single Spindle Sensitive Drill, column type, 29-32" F.O.B. Cincinnati	155.00	3 weeks shipment	New
1	Avey No. 2 Three-spindle Sensitive Drill, column type, 29-32" F.O.B. Cincinnati	355.00	3 weeks shipment	New
4	"Perfect" No. 15 Sensitive Bench Drills, ½"	55.00	Toronto	New
5	"Perfect" No. 16 Sensitive Bench Drills, each	45.00	Toronto	New
1	"Perfect" No. 17 Sensitive Bench Drill, 5-16, each	30.00	Toronto	New
1	Langelier No. 1 Drill, F.O.B. Providence	90 00	1 week's shipment	New
1	Langelier No. 2 Drill, F.O.B. Providence	140 00	1 week's shipment	New
9	Barnes No. 7 15" plain vertical drills each	96.00	Toronto	New
4	Milwaukee 20" plain vertical drills; 1" capacity each	117.00	Toronto	New
1	Type DU ½" capacity Portable Electric Drill; universal motor	100.00	Toronto	New
1	Type CU ⅜" capacity Portable Electric Drill; universal motor	82.00	Toronto	New
4	Type EU ⅞" capacity Portable Electric Drill; universal motor	140.00	Toronto	New
	GRINDERS—			
1	Gisholt Universal Tool Grinder	545.00	In transit	New
4	[illegible] No. 1 Universal Tool and Cutter Grinders	....	January shipment	New
4	[illegible] No. 1 Universal Tool and Cutter Grinders	....	February shipment	New
1	[illegible] Universal Tool and Cutter Grinder	600.00	6 weeks	New
1	Wilmarth & Morman No. 3 Universal Grinder F.O.B. Toronto	1,497.00	In transit	New
2	Wilmarth & Morman No. 1 Surface Grinders	360.00	F.O.B. Toronto	New
1	[illegible] Improved Center Grinder	18.00	Toronto	New
	MILLING MACHINES—			
[illegible]	[illegible] Hand Bench Millers F.O.B. Conneaut	120.00	3 weeks shipment	New
1	Pratt & Whitney No. [illegible] Plain Milling Machine	954.00	Toronto	New
1	Brown & Sharpe No. 1½ Universal Milling Machine with vertical attachment	2,320.00	In transit	Used

The Canadian Fairbanks-Morse Co., Limited, Toronto

High Explosive Shell Manufacture

Staff Article



The equipment, methods and devices, employed in the machining of the larger and more powerful types of high explosive shell are given practical exemplification in the accompanying article. It will be easily noticeable and appreciated that weight and structural rigidity as regards the former, and high degree display of ingenuity with respect to the latter, constitute the essentials of successful production achievement. The experience of the plant under review bears out the inference so drawn, to quite a remarkable extent.

MACHINING 9.2-IN. SHELL

WITH the production of the smaller sized shells on a well-established manufacturing basis, attention is for the most part being centered on the developments towards an equally satisfactory state of affairs as regards the larger types. With the knowledge gained from previous experience, the progress record on the larger shells is comparatively rapid. Owing to heavier weight and increased dimensions, methods and devices employed vary considerably from those in vogue for the smaller sizes.

Cutting-off and Centering

In the machining of the 9.2 in. shells, it is always advisable to commence working from the rough bore of the forging, as this portion offers the greatest difficulties for accurate tooling operations. If this practice is not adhered to, the possibilities of trouble are numerous. The first operation on the shells after they are received in the shop, is to try out and lay off the centre on the nose end; and as the accuracy of the subsequent machining depends very largely upon this preliminary work, much care is exercised in obtaining a point that will coincide with the central line of the rough bore. To accomplish this, the shell is placed upon a large mandrel that is secured to a heavy surface plate in a horizontal position. This mandrel is somewhat smaller than the bore, and is provided with a bolt in the outer end to prevent the shell riding up on the inner nose profile. When the shell is in position, the end is marked with chalk, and by means of a surface gauge, lines are scribed across the end, the shell being turned through an angle of 90 degrees as each line is marked.

The first machining operation is to cut off the open end, which is performed in three Williams Tool Co. cutting-off machines. Two tools are used, that at the rear being V-shaped, 5-16 inch wide, and the front one being ⅜ inch. square nosed. Drilling and countersinking for the lathe centre is the next operation, and it is essential that the drilled hole should be placed in the exact position, as it would be very difficult to alter it

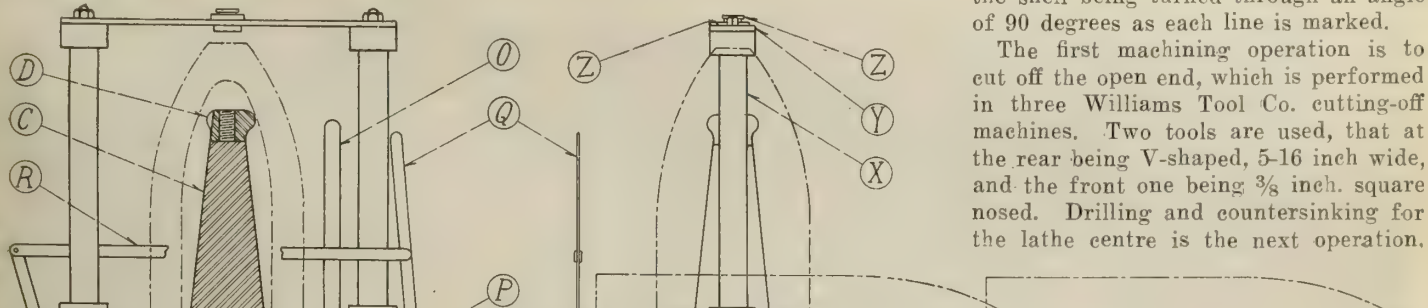


FIG. 1. DETAIL OF CENTERING JIG ATTACHED TO BASE OF "BARNES" DRILL.

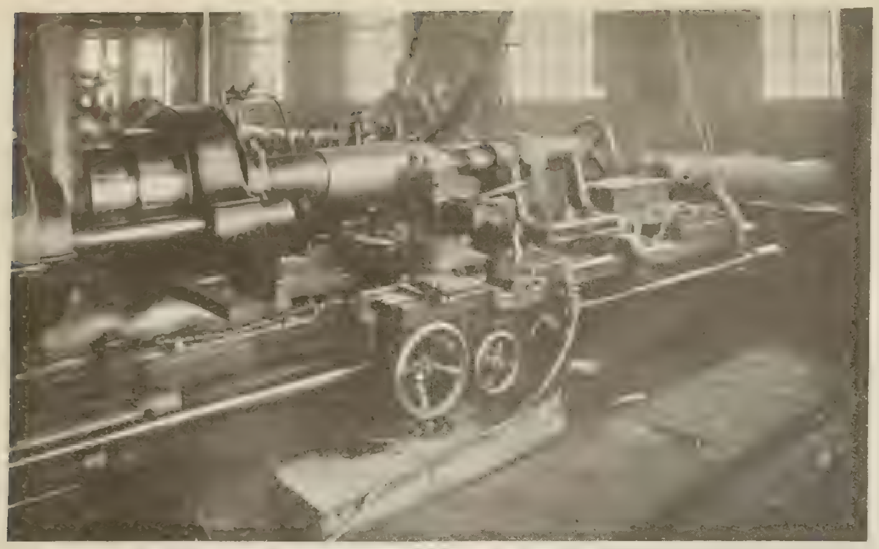


FIG. 2. FINISHING BODY AND ROUGHING PROFILE ON "NILES-BEMENT-POND" (BERTRAM) HEAVY DUTY LATHE.

afterwards. The fixture used for this purpose is secured to the base plate of a Barnes drill and is shown in Fig. 1. The frame A which is secured to the base plate, carries the tilting piece B, in which is secured the centre post C, upon which the shell is placed. Threaded to the upper end of this post is the three point steel cap D that bears upon the inner profile of the shell. In the lower end of the post, a chamber is provided for the wedge pin E, which operates the three blocks F, used in centering the base of the shell; the vertical motion of the wedge pin being controlled by the piece G, secured to the end of the foot treadle H. When the treadle is pushed down, it is locked in position by means of the spring bolt K, held in the bracket L. To retain the fixture in a central position the spring pin M, is provided.

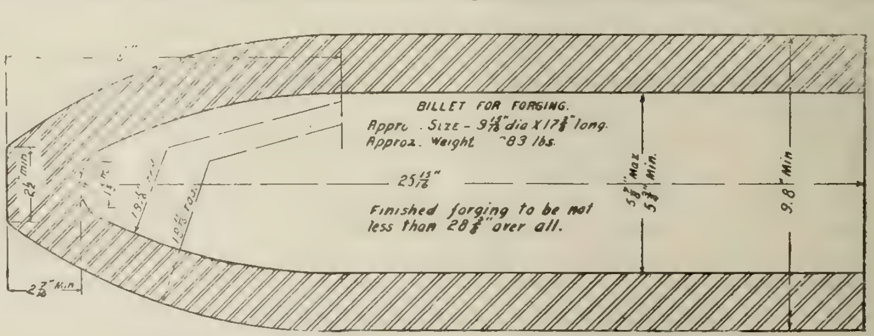


FIG. 1. FORGING SIZES FOR 9.2 IN. HOWITZER SHELL.

To remove the shell from the jig, the pin M, is disengaged, and the central portion revolved on the trunnions by means of the rod O, and, when in a horizontal position, the pins P, operated by the lever Q and the link R, engage with the two holes S, one on either side. On one side of the fixture is an angle iron framework T that supports a number of brackets U, carrying cast iron rollers V, that facilitate the placing or removal of the heavy shells. The bolt W is to aid in locating for central position. Secured in either side of the main frame casting are the two rods carrying the cross bar Y, in which are the drill bushes. Two of these are employed, one for the drill and the other for the countersink. By using the try-out centering method previously described, the inside parallel portion is checked with the contour for concentricity.

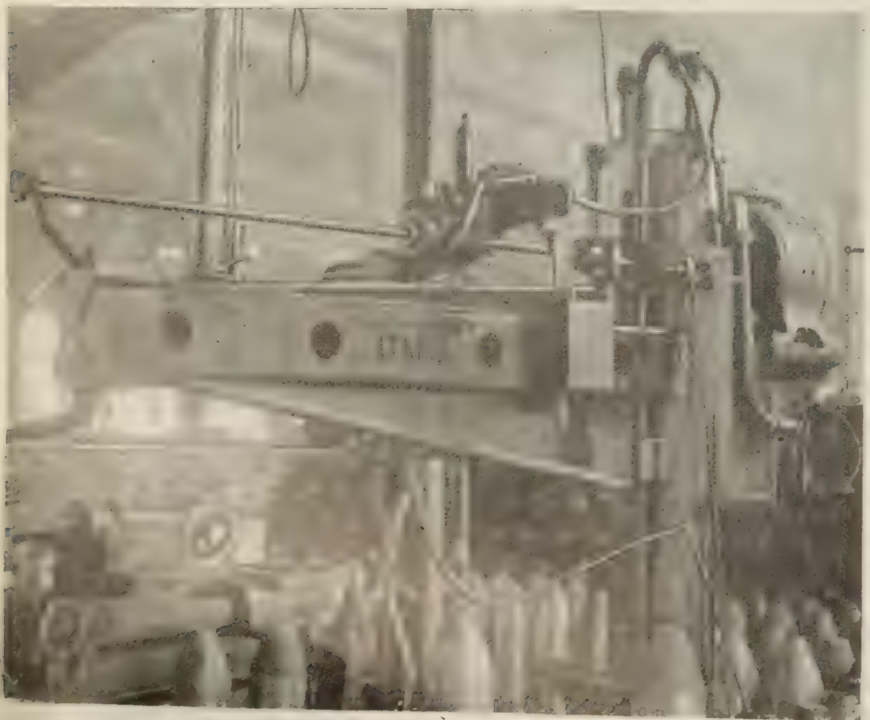


FIG. 4. DRILLING OUT NOSE OF SHELL ON A 6 FT. "C.M.C." RADIAL DRILL.

Outside Turning and Nose Drilling

After the centre has been put in the nose, the shells are taken to the lathe for outside turning. This operation is performed on seven Niles-Bement-Pond, and two Canadian Fairbanks-Morse heavy duty lathes, one of the former being shown in Fig. 2. The parallel portion is rough turned and then finished to a diameter of 9.155 inches with a high and low tolerance of 0.010 inch The profile for the nose is also roughed off at this time, being accomplished by means of a radius bar of the desired length of 18.4 inches, the point where the contour leaves the straight part being 10⅝ inches back from the nose end. The profiling device is so arranged that the cutting can be performed in either direction; when cutting from the nose, the radius bar disengages from the central controlling pin at the desired point, or, when cutting in the opposite direction, the bar will engage the pin at the proper time, the continued traverse of the saddle causing the cross slide to be drawn in as the moving end of the link passes through the arc formed by its radius. This bar can be seen below the shell and at the back of the saddle. The shell is driven by an expanding arbor, operated by means of a tapered key located in the body of the arbor. The average output on the lathes is about fourteen shells in ten hours.

Following the turning of the body, the nose is drilled out with a 1 11-16-inch drill. Two C.M.C. six-foot radial drills are used in this operation. On the baseplate of the machine two vertical arbors are located at an equal distance from the centre of the swinging arm, as this method permits the work

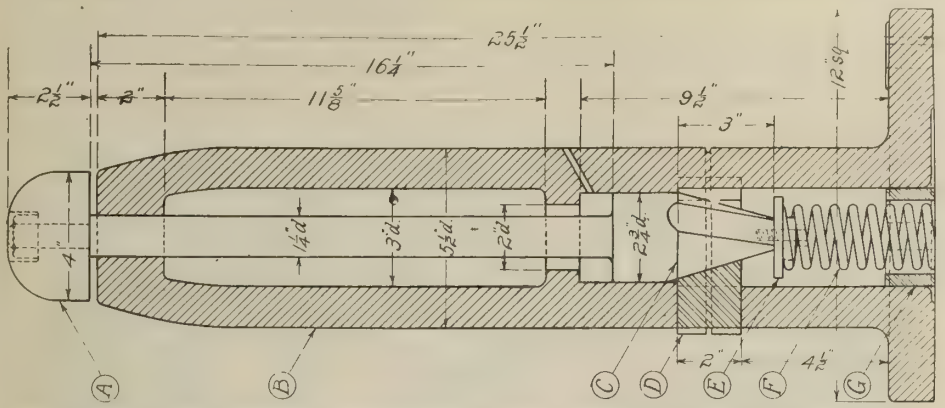


FIG. 5. DRILL JIG FOR HOLDING SHELL WHEN DRILLING NOSE.

being done on one shell while the one just completed is being removed and another placed in position in readiness for drilling. As the drilling is performed through the centre used for rough turning, no guiding bushings are required, but a special centralizing device is employed in connection with the upright post to hold the shell firmly while the metal is being drilled. Fig. 5 shows a cut of this arrangement, the post proper being secured to the baseplate of the machine, and the operating parts of the device contained within the piece B. Passing through the centre is the spindle C, to the upper end of which the semi-spherical piece A is secured.

The lower end of this central spindle is wedge-shaped to force the three jaws D out against the inner wall of the shell, near the open end. Bolted to the lower end of the spindle is the flanged collar E, which provides a support for the upper end of the releasing spring F, the bottom of which is kept central by means of the bush G. It will readily be seen that the device is practically automatic in its action, and the greater the pressure placed upon the drill, the greater will be the holding power of the gripping jaws. The cut, Fig. 4, shows the operation of drilling of the shell nose. A number of trucks are used in moving the shells from one location to another.

Inside Boring

The next operation, that of boring and forming the inside nose contour, is effected on several Niles-Bement-Pond heavy projectile lathes; a group of these being shown in Fig. 6. The shells are held in a special chuck secured to the faceplate of the lathe, and the roughing out is accomplished with a three-blade, inserted, notched tooth cutter, the operation being performed at a cutting speed of 70 feet per minute, and a feed of 7-32 inch. per revolution. A copious supply of cutting lubricant is always available, as the liquid from all the drip pans beneath the heavy machines is carried back to a central well, from which it is again forced to the various tools; by this method, sufficient volume of the lubricant is always at hand to wash out the cuttings from the interior of the shell. For the finishing cut on the inside bore, a two-bladed floating cutter is used; the heads in which these cutters are inserted being secured in the end of the heavy boring bar. A feature of these cutters is their readjustment after once becoming worn below the original size. Thin liners are inserted between the two cutters and are held in position with pins that pass through the liners and into the blind holes in the back of each blade. When the boring is completed, the open end is faced off by means of a box cutter held in the boring bar, the length being determined from the inside profile.

The special chucking fixture used on the heavy boring lathes is shown in Fig. 7. The main casting, that containing the operating mechanism, is firmly secured to the face plate of the lathe, a boss on the back of the chuck fitting into a recess in the plate to retain the fixture in a central position. Three equidistant jaws E, are provided, these having two shell gripping surfaces four inches long and three inches wide. To prevent displacement of the jaws, distance pieces F are keyed and otherwise secured to the conic sections of the outer casting. The lateral movement of the jaws is controlled by the position of the spider D, the legs of which fit into cor-

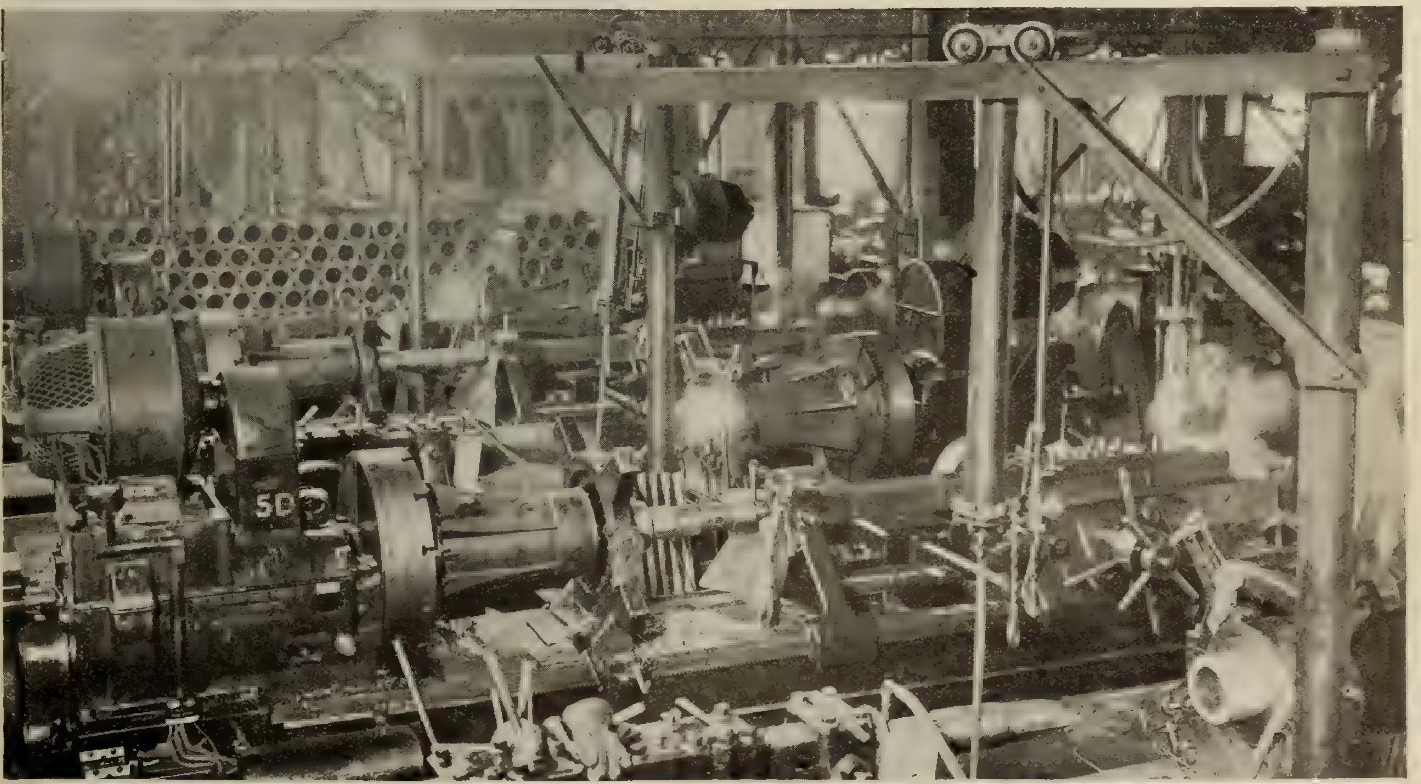


FIG. 6. BATTERY OF FIVE LARGE NILES-BEMENT-POND (BERTRAM) PROJECTILE BORING LATHES.

responding slots on the inner end of each of the three jaws. When the shell is in the fixture, the jaws are drawn back by driving in the tapered key B, acting on the gib C and the back of the slot in the spider D. A circular spring is provided to free the jaws from the surface of the shell.

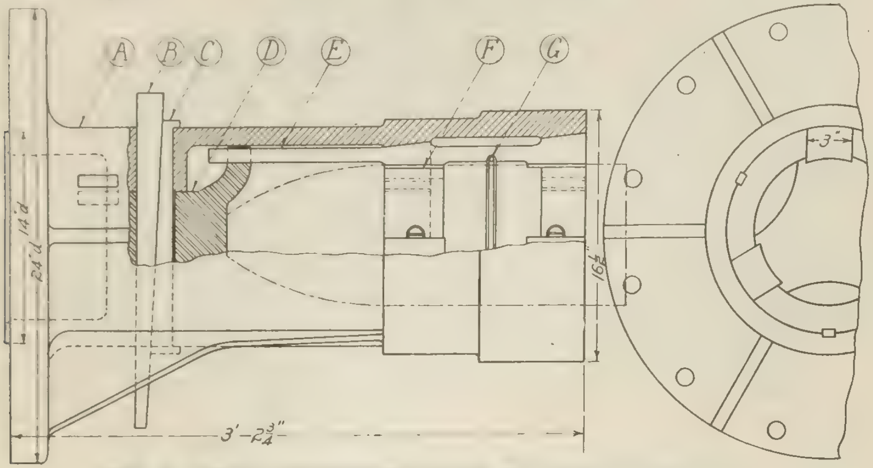


FIG. 7. HEAVY THREE-JAW CHUCK FOR SHELL BORING.

A highly interesting feature in connection with the accurate and efficient maintenance of the inside boring and profiling cutters is the method adopted in this plant for grinding same. A cut of the device is shown in Fig. 8. The operation is very simple, yet highly satisfactory. The large cast iron bracket A, is securely bolted to the frame of the machine and carries the movable portion of the device. The slide B operates at right angles to the axis of the grinding shaft, and is adjusted for radius distance by means of the hand wheel G. The quadrant C revolves in a horizontal direction through an angle of about 30 degress upon the central pin located in the slide B. The movement of the quadrant is obtained by the handle I, which passes through a swivel nut secured to the quadrant; the inner end of the screw being pivoted to the main casting A. The housing block D, which carries the work spindle, has a movement tangential to the central radius of the quadrant C. This piece D is operated along the slide by the hand wheel H, and is used when roughing off the cutter and also for finishing the parallel portion back of the profile. F is one of the cutter heads; F is shown in position, while E is a small groove pulley for revolving the work spindle, if desired. When any set of cutters becomes dull, thin liners are inserted at the back of each blade and ground back to the exact shape and size in this special grinding attachment, thus increasing the life and effectiveness of the cutters.

Finishing the Nose

With the exception of the size of the shell and the method of holding, the operations on the nose are identical with those of the smaller shells; that is, boring to a diameter of 1.909 inches, facing and chamfering, and tapping with a two-inch fourteen-thread tap, right-handed. For this operation a Murchey collapsible tap is used, and is shown in operation in Fig. 9. An alternative method may be adopted, that of the separate bushing, and when it is found that the hole in the nose is too large, this practice is generally followed. In the latter case, the rough nose of the screwed-in bush requires to be turned off. This operation is performed while the shell is held in a special chuck, similar to those used on the boring lathes, and the nose cleaned off with a box cutter held in the saddle fixture or tail stock spindle. Fig. 11 shows a cut of the Barret heavy projectile lathe used for this purpose. In the lower foreground is clearly seen the pipe carrying the used lubricant from the drip pans to the central well, from which it is pumped back to the various boring machines Three Bullard special purpose machines are working on boring and tapping the nose, and the average output is about six per hour.

For turning the outside nose contour, twelve Earle lathes are used, eight on roughing and four on finishing. The method adopted is the same as that described when the profile was first roughed off by the use of the radius bar. These machines have a capacity of 25 roughed in ten hours, and 50 profiles finished in the like time; the latter process being completed in half the time that it takes to rough it.

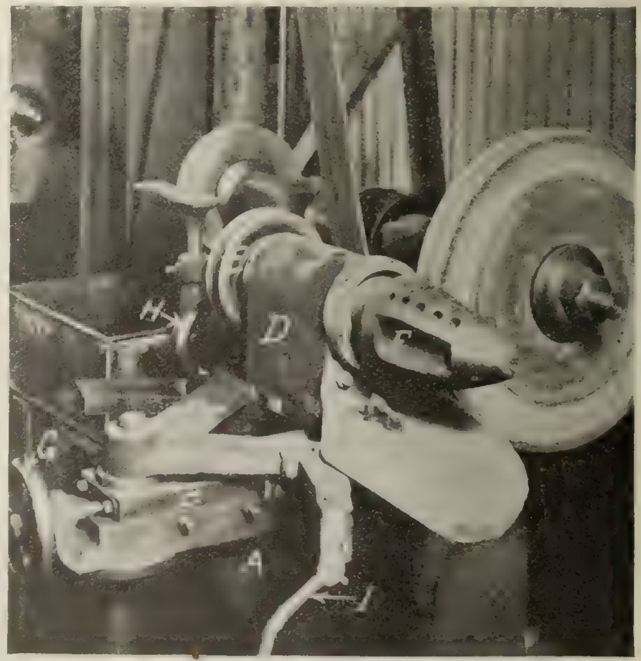


FIG. 8. RADIUS GRINDING ATTACHMENT FOR INSIDE PROFILE CUTTER.

Preparing Rifling Band Groove

After the shells have been weighed, the groove for the copper rifling band is put in. Three Niles-Bement-Pond lathes fitted with special waving attachments (developed in the shop) are employed on this operation; each having an output of five shells per hour. While the results obtained are practically the same as those on the smaller shells, the device used in making the waving ribs is deserving of special reference; a sketch of this highly interesting attachment is, therefore, shown in Fig. 10. The large gear B, which is firmly bolted to the faceplate of the lathe, meshes with the pinion C, the latter being keyed to the back shaft of the fixture; one end of this shaft D being carried in the bracket E secured to the bed of the lathe. To the rear of the saddle is secured the bracket G, by which the motion is transmitted at right angles through the bevel gears H and I; the gear H being fitted with a special bush, carrying the feather for driving purposes.

On the forward end of the front of the saddle is the bracket K supporting one end of the clutch operating shaft, to the outer end of which is secured the control lever S. The upper end of the bracket T is provided with two notches that govern the release and working positions of the clutch lever. A similar bracket (minus the upright portion) supports the back end of the shaft to which is secured the fork L, which operates the clutch M. The nut N is for taking the end thrust of the clutch. To the piece O secured firmly to the saddle is attached the sliding tool block R, the side movement of which is controlled by the action of the eccentric P, revolved by the shaft G, and bearing against the roller Q, contact being maintained by means of the heavy spring T; the tension of the latter being governed by the adjustment of the set screw through the lug S. Roughing out the groove is accomplished by the tool W, undercutting is performed by means of the tool V, and the waving is completed with the tool U. The first two tooling operations are done with the clutch in the release position, it being placed in gear when waving is in progress. The gear ratio is 9 to 1, this being the number of oscillations of the waving attachment during one revolution of the shell.

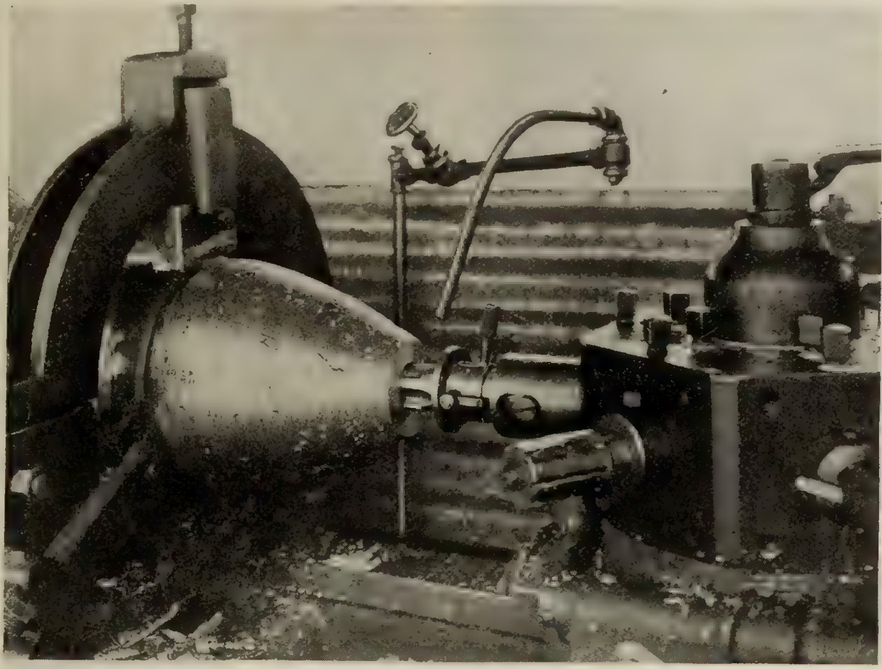


FIG. 9. THREADING SHELL NOSE WITH "MURCHEY" COLLAPSIBLE TAP.

Finishing Base and Nose Threads

The base is now prepared for the adapters. While held in a chuck, the interior of the shell is re-bored to a diameter of 7 inches for a depth of 0.62-inch, leaving a square shoulder for the bearing of the adapter. For threading the base, two Holden-Morgan and two Lees-Bradner thread millers are used, the shells being placed in the machine from the rear and secured in position by means of a removable clamp fastened to the back end of the hollow spindle. The threads are milled in to a depth of 2.28 inches from the shoulder, and are 8 per inch, left hand. The object of the left hand thread is to eliminate the possibility of the displacement of the adapter during the flight of the shell, after it has been discharged from the gun. As the rifling of the gun bore has a right hand direction, the action of the shell revolving about its central axis will therefore have the tendency to keep the adapter firmly secured in position.

For the drilling of the grub screw hole through the nose of the shell, three small sensitive drills have been arranged together, fitted with one large table, making the whole into one unit. Owing to the weight of these shells and the difficulty in placing them in and taking them out of jigs, the light but serviceable device was constructed, as shown in Fig. 12, it being easily placed in position with the minimum amount of labor on the part of the drill press operator. When the shell has been placed on the drill table, the light jig is dropped over it and the nose pushed into position by means of the screw E, passing through the end of the frame which is reinforced by the plate F. The piece B turned out to fit the nose of the shell and carrying the drill bush G, is secured to the opposite end of the frame, which is of 1½ by ½ inch bar iron. The feet of the jig are so arranged that the height to the centre line is equal to the radius of the shell. Following the drilling of the small hole, the nose is sized to exact dimensions by means of a Murchey tap held in the spindle of an upright drill press.

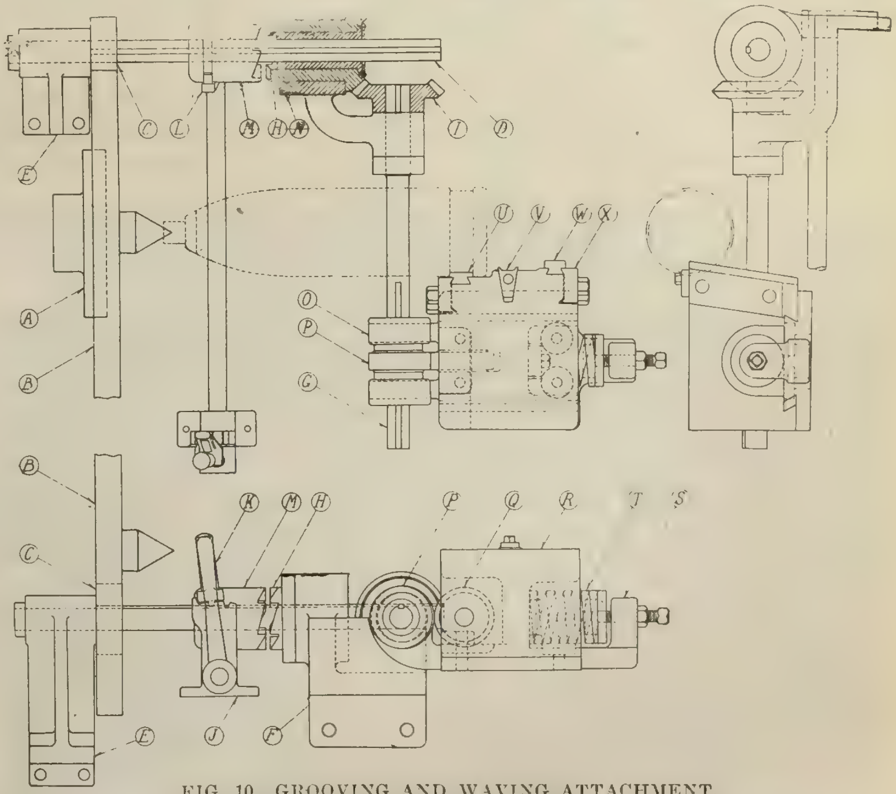


FIG. 10 GROOVING AND WAVING ATTACHMENT.

Preliminary Inspection and Internal Grinding

With the machining of the shell bodies practically finished, they are given a preliminary inspection, to check faults or errors in dimensions and workmanship. Before the adapters are fitted, the interior is carefully examined to see that no rough or uneven spots exist to cause subsequent trouble. It is a well-known fact that shells have been prematurely exploded after being discharged from the gun, often resulting in serious mishap where not intended. It is claimed that this effect results from the ignition of the high explosive by the heat generated through the friction between the inside surface of the shell and the contents therein. Immediately a projectile is discharged, two motions are set up; that of its forward passage through the gun chamber, and the motion about its own axis—caused by the copper band making its way through the rifling of the gun bore. The friction created by the forward thrust is not so great, as the charge practically fills the entire shell; but owing to the sudden twist of the latter the momentum of the outer portion—or shell body—is considerably

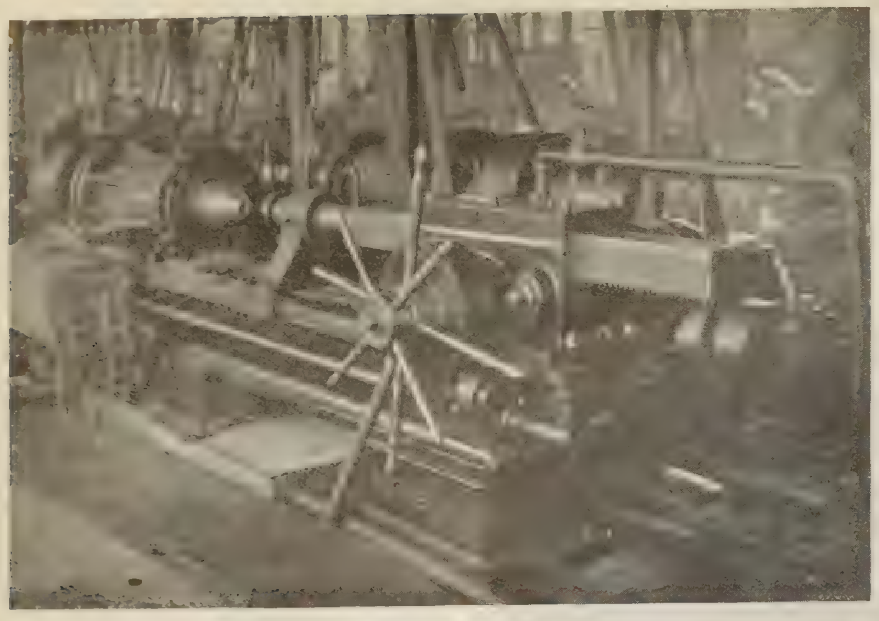


FIG. 11. SOCKET AND NOSE FINISHING ON "BARRETT" HEAVY PROJECTILE LATHE.

greater than that of the charge within. This is reasonably presumed to be the chief cause of many prematurely exploded shells. On this account, if for none other, it is essential that the interior of the shell should be as free from ridges and ragged tool marks as it is possible to make it.

Internal Grinding Device

To accomplish this, a device designed by the foreman of the shop has been proven highly efficient, and has solved a problem that formerly caused considerable worry. The effectiveness of the arrangement is no more remarkable than its simplicity. An old lathe serves as a groundwork, the spindle being fitted with a head upon which two arms are securely bolted, care being taken that the overall distance of the bolt heads is not greater than the bore of the shell, if these are permitted to enter the bore. To the outer end of these arms, which are of a suitable length and made of 1¾ by ⅜ inch bar iron, are attached small blocks of broken grinding wheels, dressed off to fit the arc of the shell interior, and embedded in position with lead. In the operation of this device care must be exercised in starting up the machine, as it is absolutely necessary to have the grinding blocks inside the shell before the spindle is revolved. This is very obvious when it is understood that the spindle revolves at a speed of about 2,300 turns per minute, and with the arms about 12 inches long, the centrifugal force would cause the blocks and arms to take a sudden and undesired flight to some other portion of the shop. However, by the introduction of a couple of links, this danger has been practically eliminated.

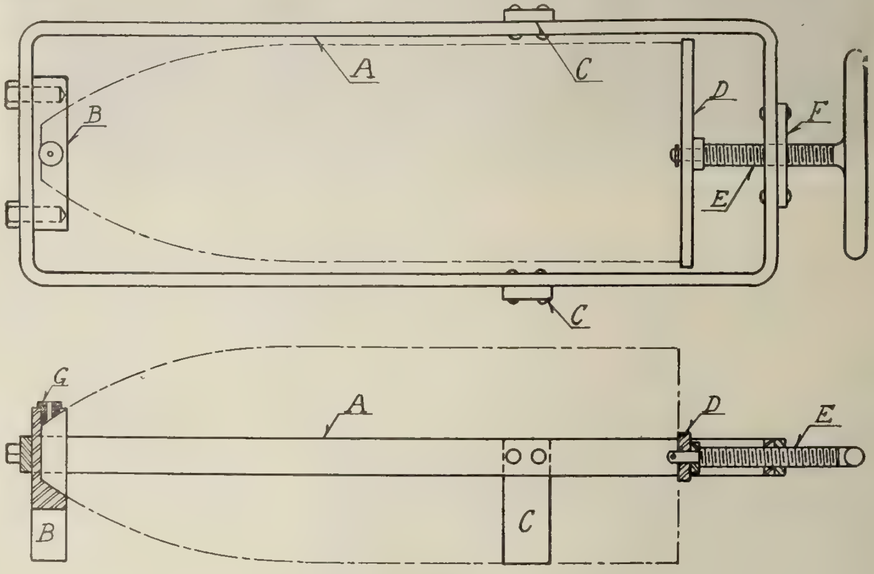


FIG. 12. DRILL JIG FOR GRUB SCREW HOLE.

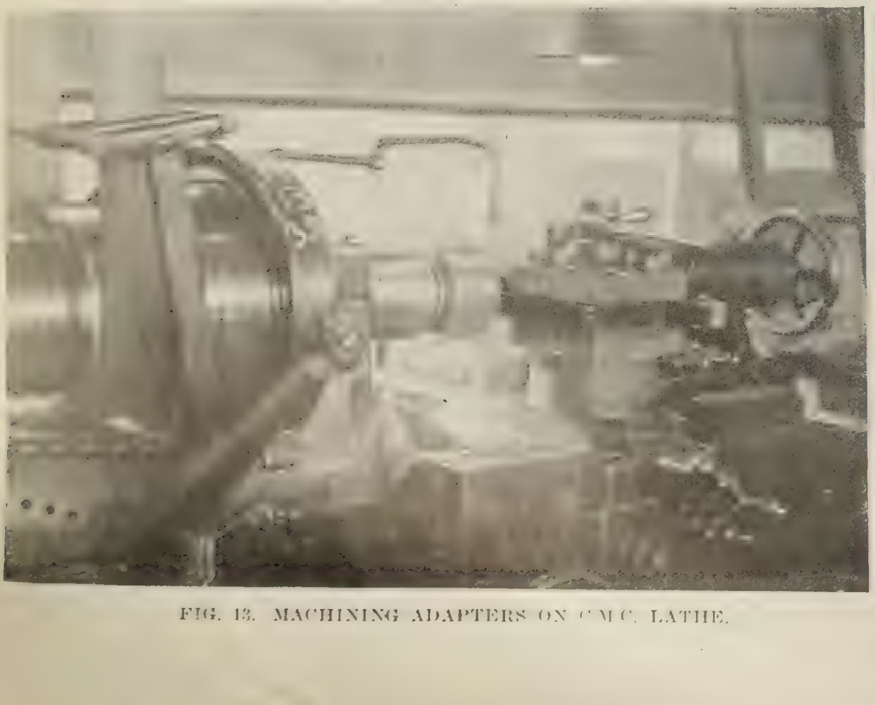


FIG. 13. MACHINING ADAPTERS ON C.M.C. LATHE.

Fit and Apply Adapters

Before further operations are possible on the shell proper, the adapters are required to be fitted, and therefore a brief description of the machining of these parts may be here given. A section on the upper gallery of the shop is reserved for this purpose—a portion of the floor extending out over the main shop and under the crane runway, thus providing excellent facilities for the receiving of the rough forgings and the removal of the finished adapters to the assembly floor below. Two ¾-inch holes are drilled in the large end to a depth of nearly an inch, the centre distance being 3.85 inches. These holes, which are for the screwing in and out of the adapter are also utilized as a driving medium when turning to diameter and facing to length. The machining is done on several C.M.C. engine lathes fitted with four tool turrets on the saddle, each tool being reserved for a certain operation. The pilot or smaller diameter at the nose is turned to a diameter of 6.485 inches with a limit of 0.005 inch either way; the thread diameter being turned to 6.675 inches (with the same tolerance), for a distance from the end of about 2⅞ inches. The shoulder is squared off and cut into a diameter equal to that of the pilot for thread clearance. The diameter of the large collar should be 7 inches with a low limit of 0.01 inch. This operation is shown in Fig. 13. After being turned, the adapters are placed in a chuck on a C.M.C. lathe and the back faced off to a thickness of 3½ inches. The threads are then milled on two Lees-Bradner machines, the threads being eight per inch and left hand; this operation is shown in Fig. 14.

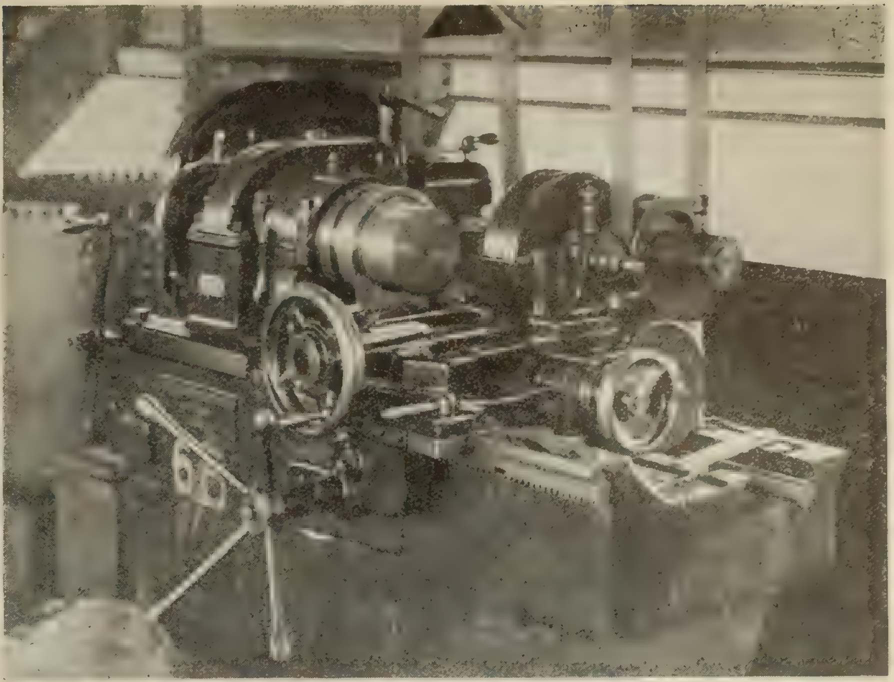


FIG. 14. MILLING ADAPTER THREADS ON LEES-BRADNER MACHINES.

Being now ready for assembling, the shells are firmly held (base upwards), in a special floor stand, the top of them being about 40 inches from the floor. The shoulder of the base plate or adapter, is marked with colored chalk and screwed in part way with a small single ended wrench; the last five or six turns by means of a double ended wrench having a radius of over 5 feet. As the adapter is reaching its final position, it often requires from six to eight men to operate the wrench, the driving pins of which are hardened and tempered. Before the adapter is removed, chalk marks are placed on the base as a guide for the following setting. The adapter is then taken out and the shoulder examined to see if it has been down on the seat, and, if passed by the inspector, it and the threads are given a coat of Pettman cement, the adapter being afterwards screwed to its former position. Two floor stands are used, and under good working conditions each one can fit and apply fifty adapters in ten hours. Following the application of the adapter, the shells are placed in the lathe to have the base faced off and the corner rounded, the radius of the latter being 0.2 inch. Three Niles lathes are used on this operation, each having a capacity of seven per hour.

Press-on and Turn Copper Band

The shells are now ready to receive the copper band, the ribs having been nicked as in the smaller sizes for the free escape of the air between the ridges as the band is being forced into position. Before being placed in the press, the copper bands are heated in an oilfired furnace to a dull red, or about 1,200 degrees F., being placed immediately thereafter over the base of the shell, in line with the groove, and hammered in several places to prevent slipping when dropped in the press. Several applications of the pressure (2,000 lbs. per square inch), are given, the shell being turned slightly between each. For the turning of the copper bands, three Warden-King band turners are employed, one of these being reserved as a spare, two being able to cope with the present output of the shop.

A view of this operation is shown in

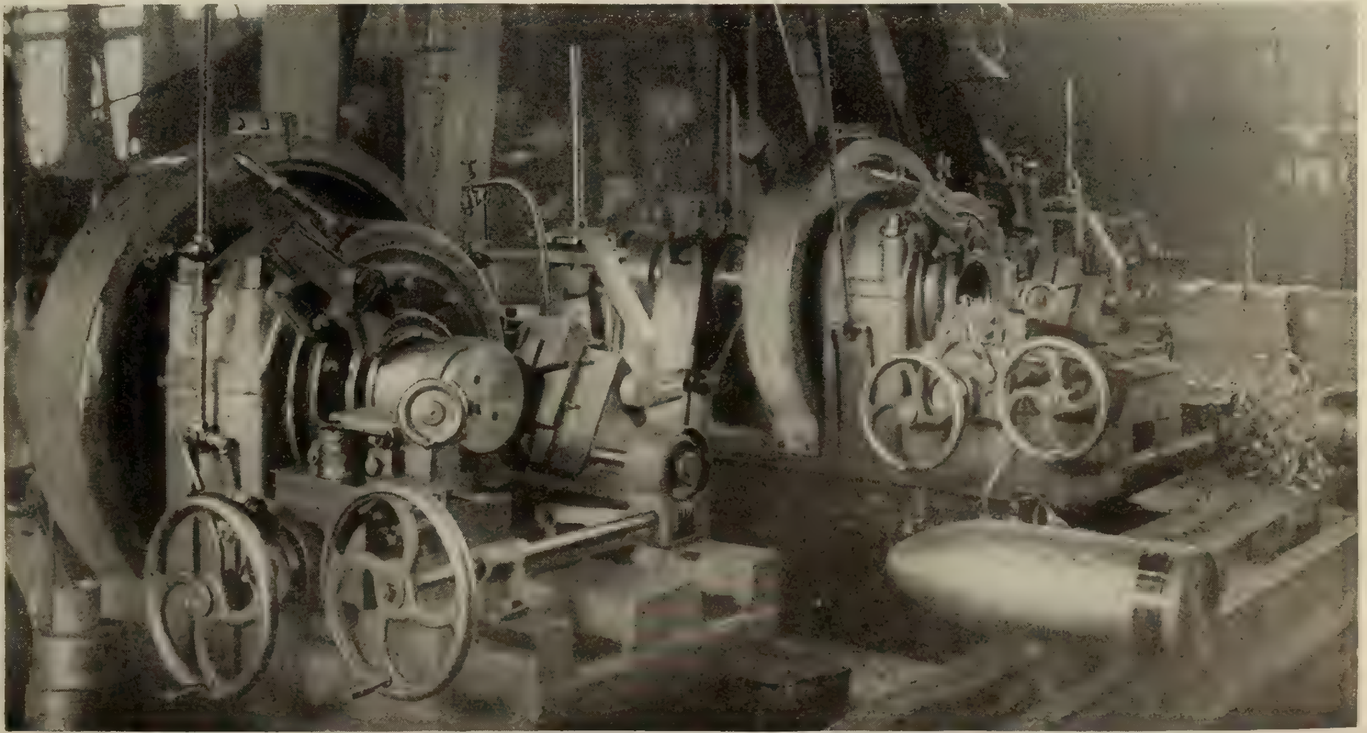


FIG. 15. TURNING COPPER BANDS ON "WARDEN-KING" MACHINES.

Fig. 15, two of the machines being seen, with the air operating cylinder of the third in the extreme background. These machines are driven by a 10-inch double belt. The handle at the back in a vertical position operates the straddle bracket pivoted on the rear point of the saddle, this bracket carrying the two side cutting tools for facing the edges of the copper bands. The wheel at the left operates the cross slide, cutting the forward portion of the band with a broad nosed tool. The handle at the right operates the back slide by means of a worm and worm wheel connecting with a rack and pinion; the tool in this slide finishing the contour of the copper band to the desired shape and size. The small wheel directly above the right hand large one is for operating the undercutting tool, while the fixture secured to the cap of the front bearing is for gauging the location of the shell when being placed in the chuck, the valve for the operation of which is shown to the left and above the cross feed wheel. The runway shown at the lower left is typical of those installed in various sections of the shop, a number of these being provided with narrow cast iron rollers. Three men are engaged on these machines, one taking the finished work from the chuck while the other two place the next one in position and operate the various wheels and levers. The capacity of each of these machines is approximately twenty shells per hour.

Final Operations and Inspection

Following the turning of the copper bands, the shells are gauged and stamped, after which they are washed in a hot soda bath and rinsed in clear cold water, the heat of the shells being sufficient to dry the interior before it is varnished. However, before the varnishing process, the inside is thoroughly wiped out with a cotton rag to remove any dirt or moisture that may still exist. The shells are then passed on to be varnished, which is accomplished by means of spraying, the supply of varnish being contained in a small tank about 10 feet from the floor. Final inspection, stamping, greasing, and packing in readiness for shipping, follow in course.

* * *

NO BLACKLIST MADE OF CANADIAN FIRMS

A REVISED list of firms in the United States and elsewhere which have been blacklisted by the British Government, has been received by the Canadian Government. It is substantially the same as the former list which comprised some eighty American firms, but with some changes and additions. Representations have been made to the Government from various sources that the British blacklist should also be enforced as regards Canadian trade. It is not generally understood that although copies of the list are on file in the Canadian Trade and Commerce Department, it does not apply in any sense to Canada, and that Canadian firms are free to trade unrestrictedly with whomsoever they will.

As far as can be learned, there is no intention on the part of the Government to make any change in this arrangement with which Canadian merchants are well satisfied. No Canadian blacklist has yet been established and such action will not be taken without careful consideration.

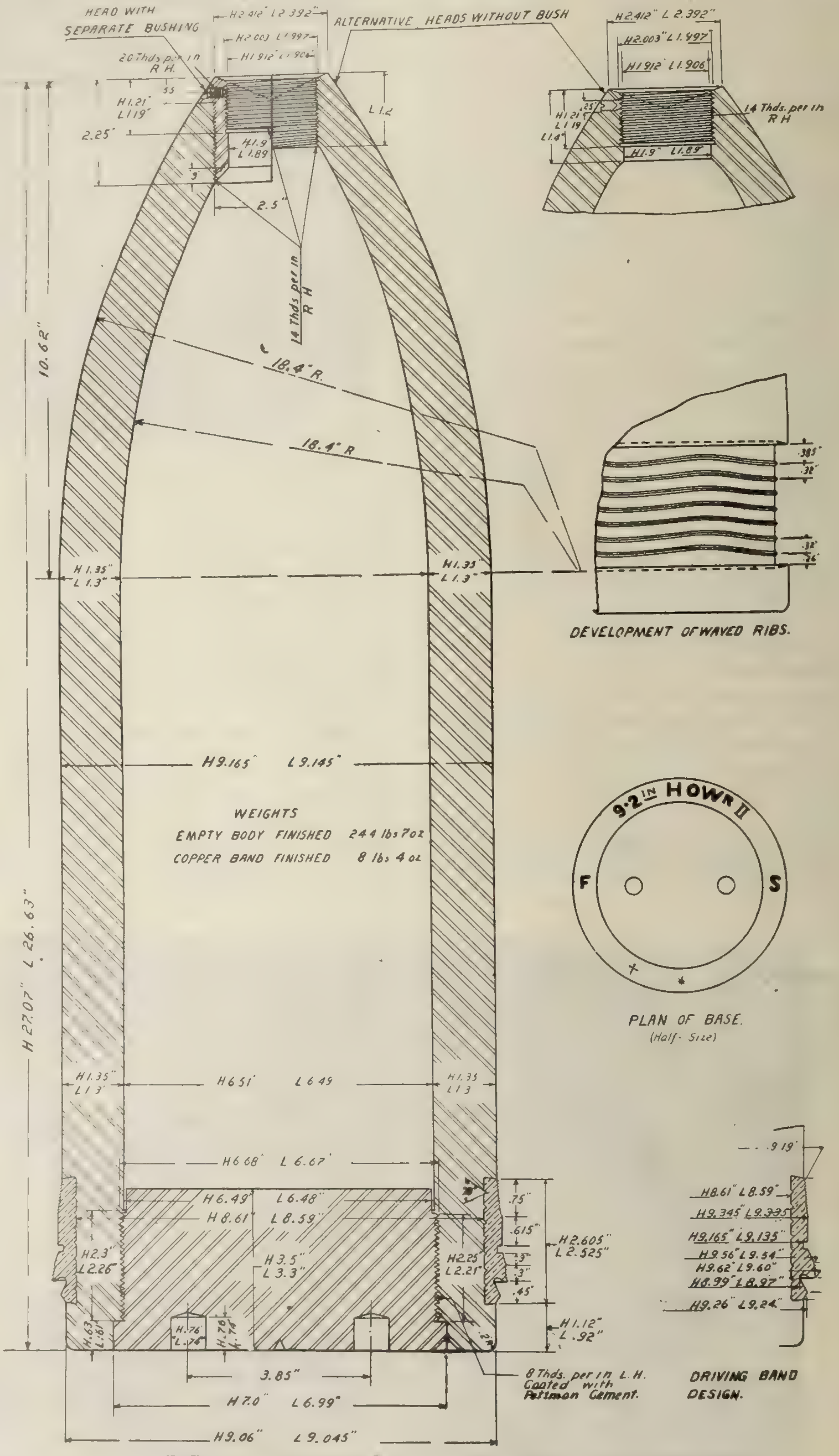

HEAD WITH SEPARATE BUSHING
ALTERNATIVE HEADS WITHOUT BUSH
H2.412" L2.392"
H2.003" L1.997"
H1.912" L1.906"
14 Thds. per in RH
H1.9" L1.89"
H1.21" L1.19"
L1.4"
.25"
20 Thds. per in R.H.
2.25"
2.5"
L1.2
14 Thds. per in R H
18.4" R.
18.4" R
10.62"
H1.35" L1.3"
DEVELOPMENT OF WAVED RIBS.
.385"
.38"
.56"
H9.165" L9.145"
WEIGHTS
EMPTY BODY FINISHED 244 lbs 7 oz
COPPER BAND FINISHED 8 lbs 4 oz
9.2 IN HOWR II
F
S
PLAN OF BASE.
(Half-Size)
H27.07" L26.63"
H6.51" L6.49
H6.68" L6.67"
H6.49" L6.48"
H8.61" L8.59"
H3.5" L3.3"
H2.3" L2.26"
H2.25" L2.21"
H2.605" L2.525"
.75"
.615"
.45"
H1.12" L.92"
H.63 L.61
H.76 L.74
3.85"
H7.0" L6.99"
H9.06" L9.045"
8 Thds. per in L.H. Coated with Pettman Cement.
.919"
H8.61" L8.59"
H9.345" L9.335
H9.165" L9.135"
H9.56" L9.54"
H9.62" L9.60"
H8.99" L8.97"
H9.26" L9.24"
DRIVING BAND DESIGN.

FIG. 16. TYPICAL 9.2 IN. MACHINED HIGH EXPLOSIVE SHELL

IT appears that with the addition of zinc to aluminum the tensile strength gradually rises to 15.5 tons per square inch at 30.0 per cent. zinc. There is then a steady fall to 11.0 tons, with 96 per cent. zinc, and with further additions the decrease in strength is very rapid.

The ductility of aluminum is lowered by zinc, falling to 5.0 per cent., when 10 per cent. of zinc is present. All alloys containing more than 10 per cent. of zinc give approximately the same ductility, namely, about 2.5 per cent.

EDITORAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions—Your Co-operation is Invited

MACHINISTS INSTRUCTION COURSE—X.

by J. Davies.

WHILE the completely equipped modern engine lathe is capable of performing a large variety of work, it is, like any other machine, limited by the variety and nature of what might be termed accessory or small tool equipment. The making of many subsidiary devices is the duty of the tool room and includes such items as mandrils, arbors, centers, chucks, drivers, etc.

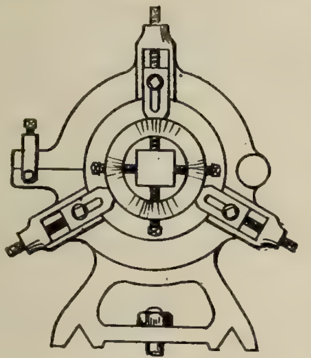


FIG. 38.

Lathe Methods and Devices

On some classes of work such as turning bearings on a square shaft, or where it is not advisable to spot the shaft for a steady rest a device called a steady rest sleeve or a cat head is used. This is a loose sleeve that slips over the shaft and is fastened and adjusted by means of set screws so that the outer surface runs true, see Fig. 38. After it has been set true, the jaws of the steady rest are set to it as already described.

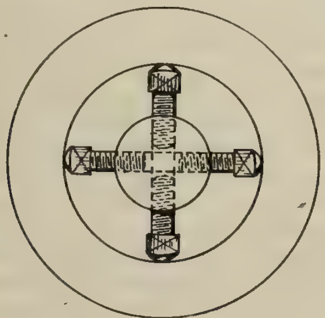
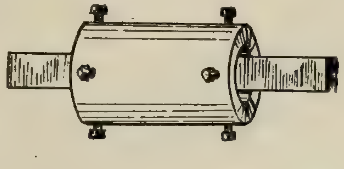


FIG. 39.

A modified form of cat head or spider as it is sometimes called is shown in Fig. 39, consisting of a short piece cut from a round bar and fitted with set screws as shown. It is used for carrying cored or bored work and is set by screwing the heads of the screws against the work until true. One advantage of this device is that if the cored hole should not be true the work can be set to remedy this, so that there will be an equal amount of metal all around the hole when finished, that is if there is sufficient stock on the outside to turn off. In cast iron work with a tapered cored hole or a small cored hole the above device would not be practicable. Sometimes work of this kind is cast with a bridge across the hole which is cut out after the work is completed, or a couple of notches like very short key seats are cut opposite each other and a piece of wrought iron is driven in, marked off and centred.



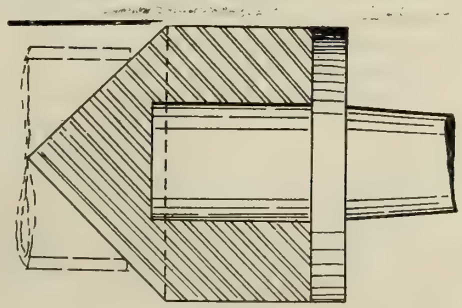


FIG. 40.

Pipe Centers

In turning the outside of wrought iron pipes or similar work, a pipe center is probably the most convenient. Many types of pipe centers are in existance but in principle they nearly all consist of a steel piece similar in form to an ordinary center, but of slightly larger diameter than the pipe. In the back end, true with the point, a hole is formed, so that the center may be supported by, and revolve on a flanged stem fitted to the tailstock spindle in the ordinary way. See Fig. 40

The Use of Mandrils

Mandrils are a very necessary part of the equipment of every lathe and probably the most abused. On account of not having sufficient number it is a common practice to keep turning them down from one size to another to suit the different jobs as they come along and often one mandril is used to drive another one out with. It is a generally admitted fact that a complete set of mandrils properly made, hardened and ground is a profitable investment, yet not ten per cent. of our machine shops possess anything like a complete set.

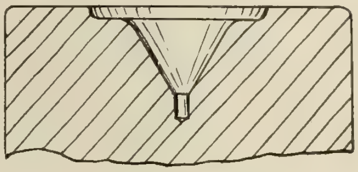


FIG. 41.

Mandrils are commonly used on bored work up to 3 or 4 in. dia. The best mandrils are solid, made from tool steel, hardened and ground. They are turned a little small at each end and a flat machined on one side for the lathe dog. The center holes should be very carefully made so as to fit the lathe centers, and not be injured in driving in and out of the work. Fig. 41 shows a properly designed end for lathe mandril; the edge of the center hole is well rounded, and recessed slightly below the surface, so that the center hole is not damaged in any way while forcing the mandril.

One end of the mandril should be a push fit in the standard gauge ring of its size, tapering upward at a rate of .001 in. per inch of length for ordinary machine shop work. For specially fine work and tool room use, a taper of .0005 in. per inch is sufficient. Despite the fact that mandrils should be kept perfectly true, the careful lathe hand will always test them before using. It is little trouble and saves much spoiled work.

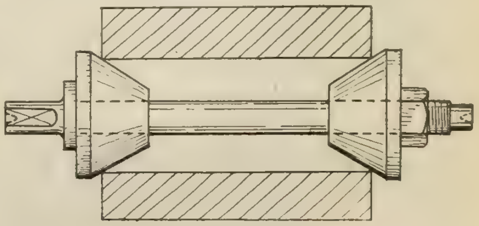


FIG. 42.

Use Care in Driving

Mandrils may become untrue from

wear of the centers, or they may be sprung driving them into the work. Before driving them in to the work coat them with oil and do not forget that you have to get them out again. If the work is a good fit very little driving is necessary; a hand hammer and a block of hard wood is sufficient for small work. Judgment must be used however, and the mandril driven in tight enough to carry the work, taking care to preserve the center. In using mandril on work such as a large pulley with a small hole, do not put the dog on the mandril if it can be avoided, but drive direct from the work by a pin fastened on to the face plate. Stamp the size of the mandril on the large end to identify it. Always clean out the center holes of the mandril before putting it into the lathe and be careful not to cut up the mandril when facing bosses, etc., with the tool.

There are many types of expanding mandrils on the market, useful in many respects, and cheaper than solid mandrils where there is work of many different sizes, but for accurate work or repetition work the solid mandril is the best.

Adjustable Cone Mandril

Another form of mandril is the cone mandril, it consists of two cones made to slide on a parallel shaft. The cones are prevented from turning round by a key, and the work is held between them when they are tightened up by a nut Fig. 42. Work that is intended for a mandril of this kind should be slightly chamfered at each end when boring to make it run true. This mandril will accomodate a large number of sizes, but is not to be recommended where very accurate work is required.

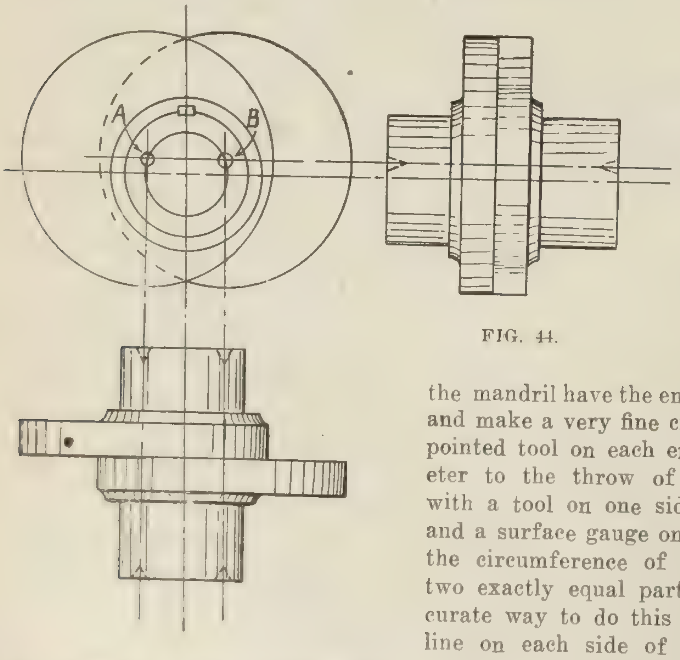


FIG. 44.

A very useful little mandril is one especially made for facing nuts. It is usually made very short and the thread which is a little shorter than the thickness of the nuts, is undercut next to the shoulder to make sure that the nut goes right up to the shoulder Fig. 43.

The best nut mandrils are those that have some kind of equalizing washer, so that the nut centers itself true with the threads and not with the face of the nut, as would be the case if the nut were not tapped square, and was then faced on a mandril with a solid collar—the high spot on the face of the nut, pressing hard against the collar on the mandril, rocks the nut on the thread, consequently the nut is not faced true with the threads, this being overcome by the use of some form of equalizing washer.

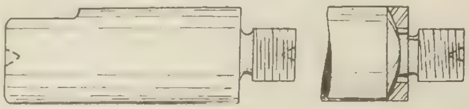


FIG. 43.

Special Mandrils

There are many other forms of mandrils made for special jobs, one of which is probably the best method of handling the work it was designed for, i.e. turning locomotive and similar eccentric sheaves. The mandril is turned a close fit for the eccentric sheave, which is keyed on to the mandril, centres of the sheaves being made in the ends of the mandril.

To facilitate marking off the centres in the proper place, when turning the mandril have the ends flat and smooth and make a very fine circle with a sharp pointed tool on each end equal in diameter to the throw of eccentric. Then with a tool on one side of the mandril and a surface gauge on the other, divide the circumference of the mandril into two exactly equal parts. The most accurate way to do this is to make a fine line on each side of the mandril, one with the tool and the other with the surface gauge, then pull the lathe half way round until the line made with the surface gauge comes exactly opposite the tool, and the line made with the tool comes exactly opposite the surface gauge, adjusting the height of the surface gauge until these two lines exactly change places, when the circumference will be divided into two equal parts.

Now mark two lines at each end of the shaft, one on each side, and the place the mandril on vee—blocks on the surface plate or marking off table, having the four lines in the same plane, or all the same height, then with the surface gauge draw an horizontal line through the centers. Draw another line parallel to this center line, being a distance away from it equal to lap and lead of valve. The two points A and B, Fig. 44, where this second line cuts the circle, are the locations of the centers in each end of the mandril.

IMPERIAL MEASURE CANADA'S STANDARD

THAT certain standards of weights and measures used in the United States, and which are frequently used in Canada, are not legal, is the statement contained in a Bulletin issued by the Trade and Commerce Department containing a synopsis of Canadian laws respecting the sale of food and other commodities. The purpose of the pamphlet is to help reduce the cost of living, in one way, that of familiarizing Canadians with the legal weights which they may demand in the articles they buy.

With further reference to the matter of United States standards in use here, the Bulletin states that these are as a rule about 20 per cent. smaller than the legal standards in Canada, that is, the Imperial pint, quart and gallon. The Bulletin gives the regulations applying to a long list of food and forage commodities, fuel, etc. It also gives the general standards of measurement such as that the standard pound, avoirdupois, must consist of 7,000 grains, and the standard gallon shall be of such a size as to contain 10 pounds of distilled water under certain prescribed conditions, etc.

* * *

A PATENT has recently been taken out by an English inventor, for a new petrol substitute, the constituents of which are cheap and entirely obtainable in that country. The fuel consists essentially of a solution of ethane and its higher gaseous homologues or isologues in paraffin oil or other liquid hydro-carbon under pressure. Coal gas produced by the low temperature distillation of coal is washed with paraffin oil or other liquid hydro-carbon under pressure and at a low temperature, and the solution of hydrocarbon gases so obtained is delivered under pressure into drums. For use, the solution of gases is drawn off from the bottom of the drum, and is delivered into the carburetter through a small orifice, without wire-drawing, so as to obtain the full atomising effect of the dissolved gases. The paraffin oil is partly or entirely volatilised in the carburetter, according to the proportion of dissolved gases.

CONTEMPORARY WAR ARTICLES

Embracing Information and Data Drawn from a Variety of Sources Relative to and Arising from the Prosecution of this Many-Sided European War

THE MANUFACTURE OF TUNGSTEN

WHEN the present war broke out the manufacturers of high-speed tool steel found themselves in much the same unfortunate position as the users of dye-stuffs, says *The Engineer*, cut off from their supply of tungsten, which forms an important ingredient in high-speed steel alloys. Like the dye-stuff industry, the manufacture of tungsten up to that time had been almost exclusively in the hands of the Germans, a firm at Frankfort having a virtual monopoly in this valuable commodity.

How this unsatisfactory state of affairs came about, and how long it would have continued but for the war, need not be discussed at this time, but it is almost certain that any attempt at manufacturing tungsten in Great Britain would have been met with such overwhelming competition from the German producers by price cutting that it would have had little chance of ultimate success unless a high tariff had been put upon the enemy product. The war has, however, taught us many lessons, which it is to be hoped the nation will not readily forget, and not the least is the necessity of preventing a foreign nation from obtaining a monopoly in any vital branch of industry. Such an industry is that of the production of the ingredients for such an essential as high-speed steel, the tungsten contents of which in the best qualities vary between 18 per cent. and 20 per cent.

Tungsten Features

Tungsten is not found in nature in the metallic form, but as an oxide known as Wolfram, in which it occurs in combination with oxides of iron, manganese and calcium. For alloying with other metals the oxygen must be removed, either from the tungsten oxide after separation from the other oxides in the ore, or by removing the combined oxides and producing directly an alloy of tungsten and iron known as ferro-tungsten. This alloy has been produced in France, and to a small extent in Britain, but it is not sufficiently pure for the purpose of high-grade tool steel.

Following the outbreak of war, the Government instituted an inquiry by experts, including Lord Moulton, into the supply of this metal, and the means of securing it in adequate quantities, and signified its approval of a co-operative scheme by the leading high-speed steel makers for manufacturing tungsten in this country. A committee of these firms was formed, and with the assistance of Julius L. F. Vogel—who had acquired experience in the manufacture of tungsten on a small scale—decided to erect a factory for the purpose in a district which afforded the best possible facilities for obtaining the necessary ingredient, hydrochloric acid.

Manufacturing Concern Constituted

Thirty-one firms, the combined output of which in high-speed steel amounted to from 70 per cent. to 80 per cent. of the total manufactured before the war, took up shares in the concern. The company was given the title of High-Speed Steel Alloys, Ltd., and the following gentlemen were made directors: Messrs. Arthur Balfour, A. J. Hobson, Frederick Best, W. Clark, H. H. Smith-Carrington, C. K. Everitt, and W. F. Osborn. The erection of the works was commenced about the end of 1914, and by July, 1915, the production was begun. In September, 1915, the British Government took control of all Wolfram ore within the Empire and divided it amongst the makers of tungsten and ferro-tungsten. To assist in increasing the output of ore within the Empire the company purchased mines in Burma, which have been placed under the control of Dr. W. R. Jones, who was formerly in charge of the Indian Survey. Ore is also obtained from Australia, and it is hoped that before long South Africa will be another source of supply.

The works of the company are now in full swing. The factory occupies a site of about six acres, adjacent to two lines of railway. The raw materials consist of Wolfram ore, fuel, alkali, and hydrochloric acid, which are delivered on to a siding. The process of manufacture consists essentially in removing the tungsten oxide from the ore, recovering it in a highly pure state, and then in reducing this oxide to metal. Of eight departments employing some 160 hands, six are employed in the preparation of the tungsten oxide, and the remainder in producing the metal in the form of a very fine powder.

Plant Data

The warehouse building for the storage of the ore, is equipped with an electric crane for unloading the ore direct from railway wagons; also a grinding and mixing plant by which the ore is crushed, ground, screened, and mixed with soda. There is also in this building a magnetic separator for dividing the tungsten ore from the tin ore, but a new building for grinding, roasting, and magnetic separation of the ore is almost ready for work. The next department contains reverberatory coal-fired furnaces for roasting the mixed ore and soda, a process which occupies from two to three hours. The furnaces are arranged to economize floor space, and keep the fuel and furnace products on opposite sides, as well as to give easy flue connections to the common chimney. In the third department the furnace product is broken up and conveyed automatically into the next section. This department is served by an overhead crane, and the main shafting is run under the floor to give a free passage for the crane. The boiler-house adjoins this department.

Next, the furnace product is boiled with water, and the tungsten, which has been rendered soluble by the action of the soda, is removed from the other constituents of the ore by filtration. All the tungsten is thus collected as tungstate of soda, and passes to the succeeding department. Here the material is treated with acid, and the bright yellow oxide resulting is collected and taken to the next department, where the oxide is dried and prepared for reduction to a metallic state by mixing it with powdered anthracite coal. The mixture is then placed in crucibles, which are heated in coke stoves to reduce the tungsten.

The last named process will, however, shortly be improved upon, as a new continuous furnace, heated by gas from two Wilson bituminous gas producers, is now being erected. This will no doubt prove a great improvement and reduce the cost of manufacture. The reduced metal is afterwards washed in dish-shaped trays and dried, yielding the final product in the shape of a fine chocolate colored powder of 98 to 99 per cent. purity. This is packed in tin-lined wooden boxes containing about 200 lbs. ready for delivery.

For driving the machinery in the different departments, electric energy is used, but a steam boiler and engine are installed for driving some of the plant. Excellent, well-equipped and ventilated laboratories with a qualified staff of chemists under a chief metallurgist, are a very important feature of the works, for the making of daily assays of the raw materials and finished products.

The various promoting firms are to be congratulated upon the success which they have already achieved, in helping themselves by this co-operative arrangement whereby the producers are the users, and vice versa. The firms connected with this enterprise have helped in a very considerable degree to produce munitions for the Allied Powers in quantities which would otherwise have been quite out of the question, and are thus doing a large share in winning the war. On this account the company deserves every possible encouragement from both the Government and the Empire. Arthur Balfour, the chairman, has worked indefatigably to bring about the success of the undertaking, and has been ably supported by A. J. Hobson, the vice-chairman, and the staff.

THE HUMAN ELEMENT IN FACTORIES*

By B. S. Rowntree.**

WELFARE work may be defined as "the humanizing of industrial conditions." There are many employers who fully recognize that their responsibility to workers extends beyond the Factory Acts, but others still regard them impersonally as dividend-producing machines, readily replaced if prematurely worn out. Such ideas should not be encouraged. There never was a time in our national history when the elimination of waste was more important. To-day there is urgent need for every one of us to do his best and to co-operate for the common welfare.

Not only adequate wages, but reasonable hours of work, and care for the conditions in factories, and for the well-being of workers in their leisure hours, are in the interests of employer and employee alike. In the old days, when industry was conducted in small factories, the employer knew his workers personally, and took an interest in their welfare, but to-day, with enormous factories employing thousands of hands, this intimate contact cannot so well be maintained. Hence it has come about that "welfare departments" have been established in many factories, and hundreds of welfare supervisors have been appointed since the war began. The staff of such a department assists in engaging employees, and in selecting those suitable for the work in hand, investigates grievances and cases of dismissal, gives advice to employers regarding the provision of hygienic conditions, and of canteens, recreation rooms, suitable lodgings, etc. In some cases, the efforts of welfare supervisors have revolutionized conditions in factories, bringing about greatly improved relations between the workers and the management, and materially assisting output.

Of National Value

Such work is of national value. Workers will never be contented when they are asked constantly to work for longer hours than their physique can support, when they are unable to obtain sufficient and nourishing food, and when they have neither leisure nor opportunity for recreation. There are many factors which materially influence the operators; neglect to provide proper heating and ventilation or adequate and suitable illumination, inevitably has a prejudicial effect on the work done. The experience of the Ministry of Munitions has shown that the removal of such defects has had a beneficial influence on the quality and output of work, and some striking figures have been published in their recent bulletins on this subject.

Scientific methods of using labor to the fullest advantage, with a view to securing the maximum output, are not only necessary now, but of vital importance to our industrial future. The nation has never before experienced such a period of industrial pressure, and no one can foresee how serious might be the future consequences to the physique of the country of long-continued severe industrial fatigue. We must learn how to use human effort in the most scientific and humane manner, and the experience now being gained should be of the utmost value in time to come.

Needless to say, good results can only be obtained by steady, persistent effort, and by a steady campaign of education both of employers and employees. We must patiently strive to gain the confidence of the workers, and to explain how modern improvements and more scientific methods can do much to economize their labor and give quicker and better results. These and similar problems of common interest can only be solved by closer co-operation, frank discussion, and more cordial relations between master and man. No method of conducting industry is satisfactory which leads to a waste of human effort, and unless workers are happy and contented and well, they do not and cannot put forth their best efforts.

CADMIUM IN SPELTER

AS to what is the maximum percentage of cadmium permissible in spelter, destined for the manufacture of cartridge brass, the best American authorities on brass-making say they do not know, states Professor Ingalls in an addition to his paper read at the last meeting of the Institute of Metals. Cartridge brass has been made successfully with spelter containing as much as 0.3 per cent. cadmium. Cartridge brass is ordinarily cast at a temperature considerably above the boiling point of zinc, which is far above the boiling point of cadmium, and it is generally impossible to find any cadmium in the brass, by the most careful analytical work, not even where the constituent spelter contains 0.3 to 0.4 per cent. cadmium.

There is no doubt that large amounts of cadmium, say, 1 or 2 per cent., make brass brittle, but it is hard to keep so much cadmium in brass anyhow. There is no reliable information at present respecting the effect of small amounts of cadmium in brass, and the evidence on this point is extremely conflicting. So far as the author knows, it has been definitely established that cadmium is injurious only in spelter to be used for sheet rolling, for galvanizing telephone and telegraph wires, and for making ornamental slush castings. The Zinc Committee of the American Society for Testing Materials commits itself no further.

WAR DESTRUCTION OF SHIPPING

IT has been estimated by marine authorities that the destruction to shipping as a result of hostilities during the twenty-eight months of war ended December 1 amounted to 1,948 vessels, having a total gross tonnage of 3,627,082. The record includes all losses due to submarine warfare, mine explosions, gunfire and similar causes affecting the merchant shipping of the world, and is based upon all available sources of information concerning sinkings, including cable despatches and mail advices received from time to time.

Estimated at the current value of old tonnage, the total destruction represents a loss of more than $400,000,000, but, as it would be impossible to replace the vessels under present conditions of shipbuilding at $100 per ton deadweight on an average, the actual loss is much larger. This is without taking into consideration the value of cargoes destroyed with the ships.

November losses were the heaviest that have occurred in any one month during the current year, amounting to 120 vessels, with an aggregate gross tonnage of 285,357, or more than was destroyed in August and September together. Losses during the last eleven months have amounted to 1,749,079 tons, compared with 1,878,003 tons in the preceding seventeen months. During the last eight months the losses have been 1,372,598 tons, a figure which will probably be increased by later reports of November sinkings. The total is complete except for November, reports of losses being delayed sometimes until well into the succeeding month. The following table shows the number of vessels and the tonnage destroyed during each of the last eight months:

	Number.	Gross tons.
November	120	285,357
October	134	239,526
September	101	154,688
August	100	130,262
July	145	102,522
June	64	126,369
May	63	118,094
April	90	214,880
Totals	817	1,372,598

The average monthly rate of destruction since the beginning of the war has been something less than 130,000 tons, so that the November destruction is more than twice the average.

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*From a paper read at a meeting of the Circle of Scientific, Technical, and Trade Journalists, on November 14.

**Director of Welfare Dept., Minister of Munitions.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

VERTICAL SURFACE GRINDER

THE vertical surface grinder shown in the illustration, although designed and used primarily for plain surfacing, can readily be adapted to circular grinding. The machine is the latest product of the Reed-Prentice Co., Worcester, Mass. The grinder is of rigid construction. The wheel head casting, of heavy goose-neck pattern, although separable from the column, may be considered integral with it, as the joint is a press fit and securely locked. The column is supported by the heavy base casting and is provided with a positive locking device. Vertical adjustment can be made upon its release, allowing work of varying thickness to be ground. The raising and lowering of the head is accomplished by either hand or power feed through a worm and rack.

The wheel spindle revolves in a nickel-babbitt bearing 3 ins. in diameter by 8 ins. long. The bearing box is tapered, allowing an easy means of take-up by the adjustment of lock nuts at top and bottom of sleeve. The upper end of the spindle is supported in a radial ball bearing of large proportions for absorbing the thrust while the wheel is cutting. Whatever back lash there might be is taken care of by a heavy coiled spring and two ball thrust collars. The drive to the spindle is through a 3-in. silent chain to a splined shaft mounted on bearings, making a "floating" drive to the wheel spindle, which is thus relieved of all side strain and vibration.

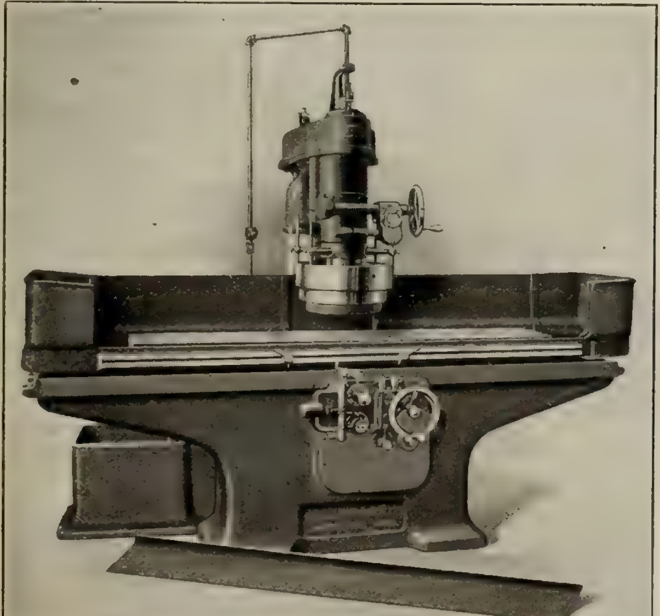
The wheel feed is controlled by a graduated hand wheel, which raises and lowers the spindle sleeve in its housing through a distance of 3 inches. This is more than ample for any grinding operation. Power feed can also be used, the feed ranging from .0002 ins. to .005 ins. The wheel chuck, which has a soft composition lining, concentrically closes over the wheel. A vertical adjustment of the wheel in the chuck is provided, so that the wheel may be used down to its last half inch without fear of crushing. With this method, a metallic band is no longer necessary in the construction of the wheel, a convenience which the user will appreciate.

The table bed is carefully braced and ribbed to insure permanent accuracy and alignment; the table has likewise been taken care of by the same means. The ways are provided with lubricating rolls, which are fed from reservoirs distributed the entire length of the bed. There are six table speeds ranging from 2 to 12½ feet per minute, the speeds being controlled by levers at the apron. Any feed may be instantly obtained even while the machine is operating.

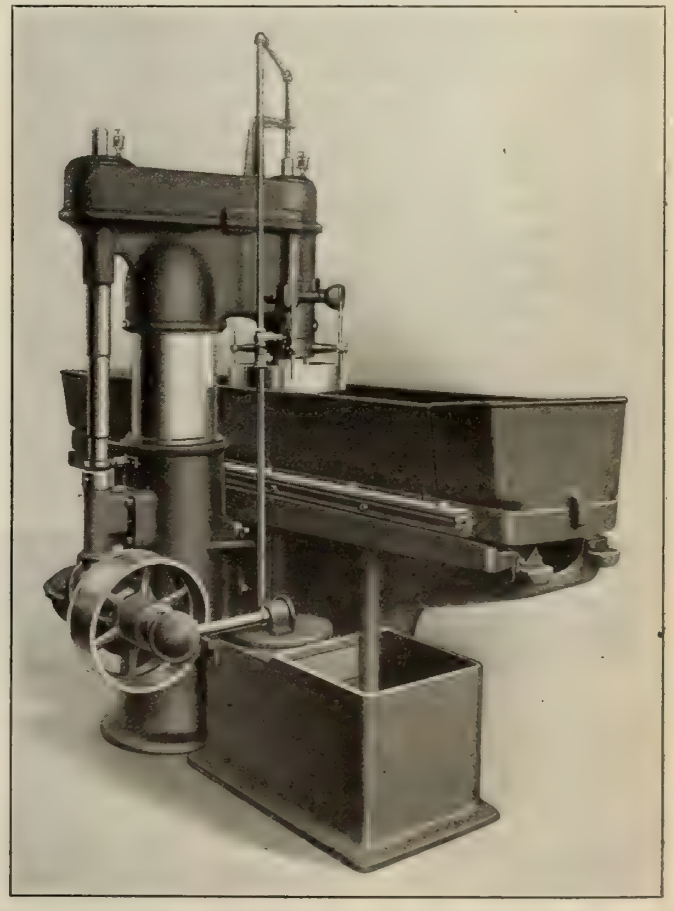
Ample water or compound can be supplied at the same time to both the outside and inside of the wheel; the latter being reached through the hollow spindle. By this means the surface of the work is kept clean at all times. Guards surrounding the table return the lubricant to the large tank at the rear of the machine, where it is again put into service by a centrifugal pump of large capacity.

The rectangular magnetic chuck is easily applied to the table. These chucks are completely waterproof, and are not subject to short circuits. The rotary chuck may be either magnetic or plain, and is dust and water-proof. The mechanism which does the driving is located outside of the water guards. Tilting the chuck permits concave surfaces to be ground, such as are frequently required on cutters, circular saws, etc. The power provision is, we understand, such that heavy cuts can be maintained without affecting the machine's capability of turning out work of the greatest precision. Data relative to leading dimensions, space occupied, weight, etc., follow:—

Table working surface, 12 ins. x 78 ins.; top of table to under side of grinding wheel, maximum (new wheel), 15 ins.; table traverse, 78 ins.; rectangular



VERTICAL SURFACE GRINDER—FRONT VIEW.



VERTICAL SURFACE GRINDER—REAR VIEW.

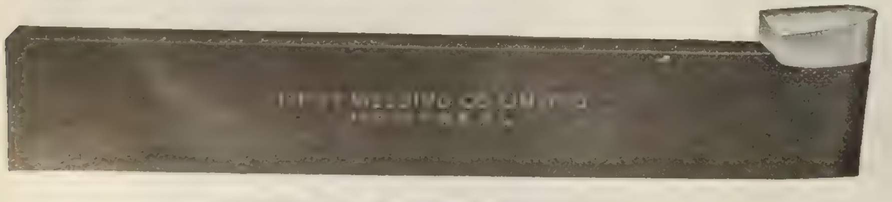
magnetic chuck working surface, 12 ins. x 60 ins.; height, 4 ins.; rotary chuck (plain), 16 ins. in diameter and 10 ins. high; wheel, 14 ins. in diameter, 4 ins. high, 1½ ins. rim; spindle speed, 1,050 r.p.m.; floor space, 5 ft. x 16 ft.; weight, 8,700 lbs.

* * *

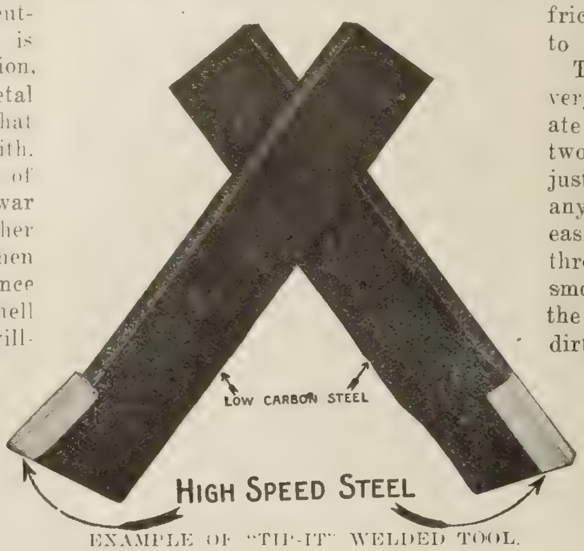
"TIP-IT" WELDING PROCESS

DURING the past two years many interesting developments have taken place in the metal working industry, for the more rapid and economic production of manufactured articles; more especially those pertaining to shells and their component parts. One of the chief factors in all machining operations is the maintenance of the cutting tools; and as high speed steel is indispensable for maximum production, the economic treatment of this metal has been one of the many problems that shell makers have had to contend with. The abnormal demands for this class of steel during the early period of the war and the shortage of supply, together with the small quantity of tungsten then available, resulted in a sharp advance in prices. Without alternative, shell makers were compelled, and also willing, to "pay the piper." However, with the lapse of time, various means were devised by which the high initial cost of tool steel was in large measure overcome. Many forms of welded points were brought into service with more or less success, the practice generally followed being that of electric welding.

Realizing that, in many respects, this process of welding injured the nature of the steel, one of the tool hardeners in a large Montreal shell shop continued experimenting to evolve a means of uniting the two steels by some other method, and finally succeeded in obtaining a suitable flux and means of application which has proved entirely satisfactory. This is now known as the "Tip-It Welding Process," and a plant for the manufacture of these tools has recently been established in Montreal. It was the original intention of the parties interested to furnish the flux to the trade, and install the necessary equipment for the welding of the tools, but owing to the difficulty of firms acquiring the knack of successful application, the business is now exclusively handled by the makers of the compound. By this method the amount of scrap steel about a plant can be reduced to the minimum, as the smallest pieces can be profitably used for tipping the various sized tools. The process of welding depends largely on the careful preparation of the pieces to be united, the high speed steel being slowly pre-heated and then quickly raised in a separate chamber to a welding temperature, the shanks being meantime heated in an open forge. The actual welding is done under a steady pressure of over two tons per sq. inch. When once welded, it is impossible to separate the parts, and it is claimed that the compound not only welds the metals, but actually penetrates the steel and improves the nature of same, cases being on record where welded tips have given better service than the steel from which it was cut. The accompanying cuts show the style of weld and the proportion of high speed steel used to that of the entire tool, the bulk of the latter being of low carbon steel. J. R. Baxter & Co., Montreal, are selling agents for these tools.



EXAMPLE OF "TIP-IT" WELDED TOOL.

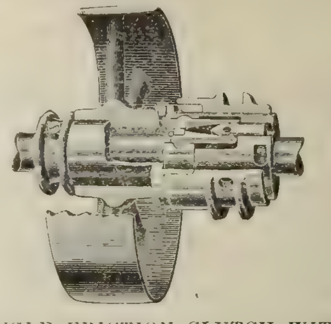


EXAMPLE OF "TIP-IT" WELDED TOOL.

* * *

COMPACT FRICTION CLUTCH

THE friction clutch shown in the accompanying illustration is specially adapted for use as a part of any machine on account of its small size, and when modified to meet the requirements of individual machine tool builders is equally as satisfactory as the standard types. The Johnson clutch, as will be observed from illustration, consists of a body fastened to the shaft, carrying a split ring in which are inserted a pair of levers. A curve-shaped wedge, which is made a part of the shipper sleeve, forces the levers apart, expanding the ring and bringing its outer surface into frictional contact with the inner surface of the friction cup, the hub of which is made to suit requirements.



SINGLE FRICTION CLUTCH WITH PULLEY.

The leverage is so compounded that very slight pressure is sufficient to operate the clutch. One screw which moves two taper blocks set into the levers adjusts the contact of the ring and cup to any required degree, the screw being easily reached with a screwdriver through a hole in the friction cup. The smooth shipper sleeve entirely covers the working parts, protecting them from dirt, etc.

These clutches are manufactured by the Carlyle Johnson Machine Co., Manchester, Conn., and have been extensively adopted on various types of automatic machines, besides being well suited for line and countershaft service. A double clutch is also made which occupies very little more space than the single type illustrated, and has two friction cups with hubs on which can be mounted pulleys, cones, gears, etc., of various widths and diameters.

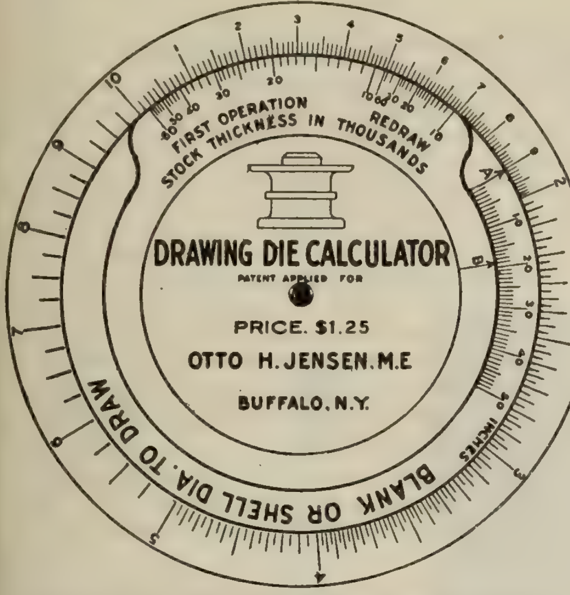
* * *

DRAWING DIE CALCULATOR

HERETOFORE very meagre information has been available regarding the design of double action drawing and combination. In attempting to draw sheet steel shells with one or more operations, it is most essential to select each operation so that the reduction can be made to the very limit without undue breakage. For example, the material commercially known as "deep drawn stock" will permit of a specific reduction, either when first converted into a shell, or when a shell is drawn into one of smaller diameter. If the reduction, however, is exceeded, the life will be taken out of the stock and the article will break during the operation.

Otto H. Jensen, Buffalo, N.Y., has departed from the old-time cut and try methods and has perfected a drawing die calculator, by the use of which anyone can readily determine the correct amount of reduction for given conditions. The instrument, as illustrated, is in the form of a circular slide rule, founded upon actual results obtained through lengthy experiment.

The blank diameter is first calculated in the usual manner, after which the three revolving discs are easily set according to thickness of stock, etc., and the required data immediately indicated both for first operations and redraws.



REVOLVING DISC DEVICE FOR CALCULATING DRAWING DIE DIMENSIONS.

* * *

SURFACE GRINDERS FOR GAUGE AND DIE WORK

THE accompanying illustrations show two surface grinders, recent products of the American Machine Tool Co., New York, the smaller of the two, Fig. 1, being a hand machine while Fig. 2 shows an automatic machine. Referring to Fig. 1, this machine is of extra heavy construction, and has adjustable gibs on all sliding surfaces. Hand wheels on traverse feed and raising screw are each provided with indicator and graduated to one-thousandth of an inch.

The wheel spindle is of crucible steel, accurately ground and fitted to reamed and scraped bearings of generous proportions. These bearings are carried in solid bosses without caps, the front bearing being tapered to fit spindle and the rear one split on one side for adjustment. The spindle is carried in a slide which works on a rigid upright provided with scraped ways.

The platen is moved endwise by a crank fitted to the square end of a shaft operating a pinion, which in turn meshes with a rack on the bottom side of the platen, giving a quick travel without binding at any point as when a lever movement is used.

The countershaft, shown inverted in cut is provided with belt tightener, and the regular equipment includes a set of wrenches and one emery wheel. The machine will grind 9 in. x 6 in. x 5 in., front spindle bearing 1¼ in. x 5 in., rear ⅞ in. x 2¾ in.; surface of platen 15 in. x 5 in.; spindle adjustment above platen 1 in. to 7½ in.; floor space, 27 in. x 33 in.; weight, 500 lbs. uncrated.

The machine shown in Fig. 2 is a new type of automatic grinder for grinding and finishing dies, punches, gauges and similar work. The hardened and ground spindle runs in tapered split phosphor-bronze bearings and carries a wheel of 7 in. dia. x ½ in. face. The belt drive is on the double loop principle, which provides increased lap to the pulley. All slides and working surfaces are provided with covers, protecting them from grit and foreign matter.

The feed mechanism box is bolted to the main frame, the feed gear having spur gears only, with bronze bearings for shafts. The table is 46 in. long and 8 in. wide with ample dust guards, and provides a working surface 18 in. x 6 in. The table travel is automatic, with adjustable dogs and automatic feed to traverse movement, which can be thrown out at any desired point by a stop; the traverse feed is from 0 in. to ⅜ in. at each reversal.

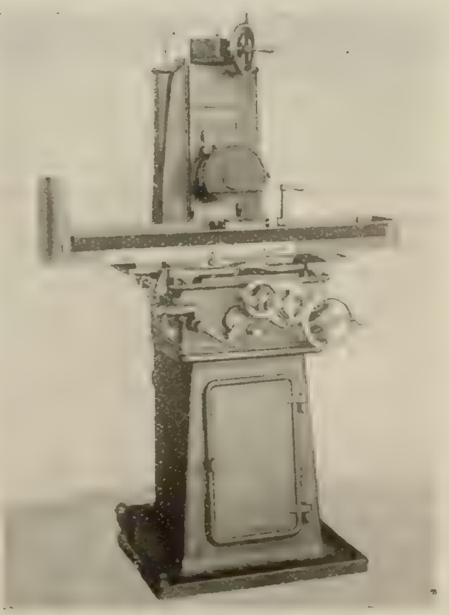


FIG. 2. AUTOMATIC SURFACE GRINDER.

Using a 7 in. wheel, this machine will grind work 18 in. long, 6 in. wide and 9 in. high. Floor space required is 65 in. x 30 in. and regular equipment includes one vise with hardened jaws, one 7 in. wheel, wrenches and countershaft, the latter having tight and loose pulleys 8 in. dia. x 3¼ in. face, with drive pulley 16 in. x 2¼ in.; net weight with countershaft 1,490 lbs.

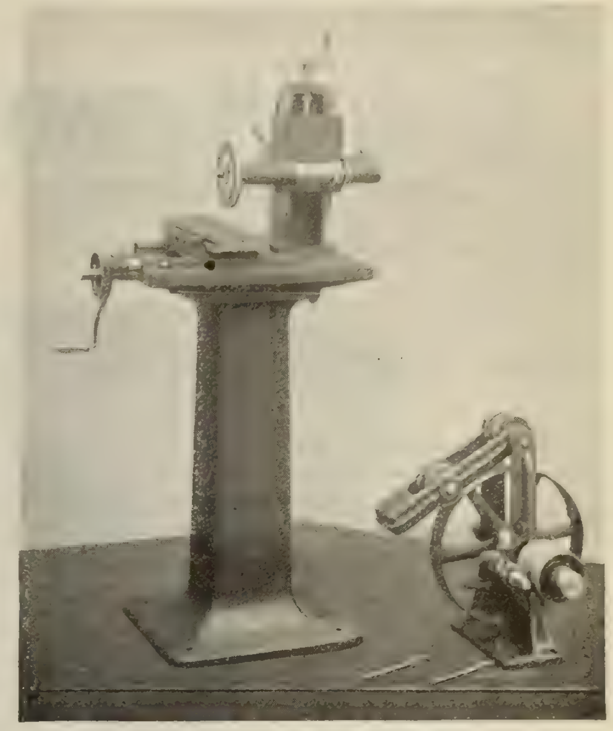


FIG. 1. SURFACE GRINDER FOR SMALL PARTS.

* * *

AMONGST the newer zinc alloys must be mentioned those of aluminum-zinc, which are being largely used for light castings in the automobile industry. For this purpose the alloys contain usually from 10 to 20 per cent. of zinc, with the addition of a small quantity of copper.

* * *

Request for Enlightenment.—We take the following from our contemporary *The Chief Steward*:—

Gents.:—The gas engine you sent me stops when theres nothing the matter with it thats the trouble. It wouldnt bee so bad if it stopped for some reason and anybody knows theres reasons enough for it to stop. I received the book which you sent me which is named "What Makes the Gasoline Engine Go." I can't read it because whats the use reading it when I don't care what makes the gasoline go as long as it goes which mine don't only occasionally, what I want to know is What Makes the Gasoline Engine Stop. If you got a book called that send me one. I want to know what makes my gasoline stop when everything is o k and nothing is the matter except that it must be a rotten engine.

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CANADIAN MUNITIONS PRODUCTION OUTLOOK

THE return of J. W. Flavelle, chairman of the Imperial Munitions Board from a two months' visit to the Old Country is expected to give an added stimulus to munitions production by our metal-working plants, with, at the same time, a quite generous assurance that, at least, while the war lasts, contracts will be readily available to all who show aptitude and expedition in filling them. Needless to say, the Chairman of the Board has made good use of his opportunity of conferring with those in direct contact with the munitions situation in Britain, and his giving expression to the circumstance of the fitness of our quality output, is matter for satisfaction to both our plant executives and our operators. It would seem, however, that we do not yet sufficiently realize the magnitude of this war undertaking, and therefore the responsibility laid upon us, to not only measure up to the time-schedule quantity required, but to improve on the latter by every known art and artifice, and through the utilization of all available operative help, both male and female.

While perhaps some uncertainty exists as regards raw material purchases in the United States and elsewhere, there is ample evidence that, so far as finished shells are concerned, purchases outside the Empire will no longer be made. In the United States, existing contracts for shells are due to expire as a whole by the end of June, 1917, many of them as a matter of fact expiring at the end of March. While the war lasts, raw materials entering into the manufacture of shells will doubtless be in more or less demand from abroad, although in perhaps gradually decreasing quantity; nevertheless, heavy tonnages of steel, not to speak of metals, such as copper, etc., have been placed with United States steel mills for delivery right up to the end of 1917.

With the desire to accelerate production of shells in Canada, a corresponding demand is bound to ensue for both shell forging and shell machining equipment, and with the gradual elimination of the United States shell producer, less difficulty should be experienced in securing good delivery on either standard or special machines. Not the least important factor as far as the latter is concerned has been the congested condition of the railroad transportation facilities, and while through a combination of circumstances, of which perhaps recruiting of the regular help for overseas service is not the least, to this phase of munitions production, the Munitions Board might profitably turn to attention with a view to modifying to a worth-while extent the prevailing disability.

* * *

BRITAIN'S NEW WAR ADMINISTRATION

THE passing-up of Mr. Asquith, and his replacement as British Premier by Mr. Lloyd-George, have, it may be asserted, created world-wide interest, so much so that, during the past week, the daily air, land and sea routine of the actual combatants has been relegated to second place. Two and a half years of war has demonstrated beyond question that, in the administration and direction of each and all of its departmental features, there lies a man's job; in addition, the bringing of the gigantic conflict to its logical conclusion, gives clear indication that a succession of men, rather than otherwise, must needs lay hold of the reins. This latter, we take it, is responsible for a recreated British Administration, and while the means employed to establish the newly fledged regime have, according to report, a more or less sordid side, the time was actually ripe for a more vigorous and determined effort to win the war than in recent months has been in evidence.

This war before it can be brought to a successful termination for the Allies will involve a more or less lengthy series of relays—administrative in London and on the various battle fronts, just as much so as the necessity exists for such a plan being operative in the fighting line. While, therefore, great expectations have been aroused—largely due to Mr. Lloyd-George's personality and his already war record, there is just the possibility that many of them will remain unrealized when his stepping-out time comes, and the next man in line takes hold. Without being pessimistic, it may truthfully be said that it is still "A Long, Long Way to Tipperary," and if Britain's new Premier and his colleagues develop lines of supplementary activities as effective as those formulated by their predecessors in office, the fact that several reconstituted Ministries may yet be needed to realize final victory will in no way detract from any sectional achievement toward that end that our most recently created adminstration may establish.

* * *

LACK OF SHIPBUILDING ENCOURAGEMENT

AN interesting sidelight is thrown on the shipbuilding situation in Great Britain, with reference of course to the increasing shortage of tonnage, through the opinion expressed by a well-known British ship broker in the course of a recent interview. He says:

"Every time a German submarine sinks a British ship, the owner gets the money for it, but he does not spend this on buying a new ship to replace the one lost. Why? Because the Government does not encourage shipbuilding in any shape or form, and the British shipowner has no facilities at present for procuring new ships. I could name half a dozen shipowners who, since the war, have sold all their boats and retired from business. These are old and experienced men—a great loss to the British shipping world. They were able to get very good prices for their ships, but were not tempted to continue in the shipping business in face of the many difficulties and the grave lack of Government support for post-war competition with the rest of the world. When these experienced shipowners drop out of British shipping it is a very serious thing for the Empire."

INDUSTRIAL NOTABILITIES

ERVIN W. SAWYER, general manager and treasurer, Dominion Abrasive Wheel Co., Mimico, Ont., was born in Sterling, Mass., August 23, 1865, son of Edrick Sawyer and Augusta (Stuart) Sawyer. He was educated at public schools, Princeton, Mass., and began his business career as an apprentice to the Sterling Pottery Co., West Sterling, Mass., serving in that capacity from 1880 to 1883. Following this he joined the Sterling Emery Wheel Co., and remained with them until 1894, being plant foreman for some considerable time previous to severing his connection.

ERVIN W. SAWYER.

Developing still further his intimacy with abrasives production, he became in succession, foreman with the Springfield Emery Wheel Co., Bridgeport, Conn., 1894-1897; superintendent, Safety Emery Wheel Co., Springfield, Ohio, 1897-1910; and director and general manager, Dominion Abrasive Wheel Co., Mimico, Ont., 1910. In the latter connection, it may be stated, that to his progressive business efforts, the new plant there covering a site of three acres is largely due.

Mr. Sawyer married Katherine Melville, daughter of Thomas Melville, Charleston, N.H., in February, 1885, the family consisting of one son and one daughter. He is a member of the Canadian Manufacturers' Association, a member of the A.F. & A.M., and Congregationalist in religious creed. His residence is Parkview Mansions, Toronto.

—Photo. courtesy British & Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh		$29 95
Lake Superior, charcoal, Chicago		28 00
Standard low phos., Philadelphia		50 00
Bessemer, Pittsburgh		34 45
Basic, Valley furnace		30 00
	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton		
Victoria	40 00	38 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.50
Steel bars, base, Toronto	3.75
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.35
Steel bars, base, Montreal	4.00
Twisted reinforcing bars, base	3.55
Bessemer rails, heavy, at mill	...
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.65
Small shapes	3.85
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.60
Bars, 2 in. and up	4.00
Structural shapes	3.70
Plates	4.35

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs.	
	C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$37 00	$38 00
Electrolytic copper	37 00	38 50
Castings, copper	36 00	37 50
Tin	46 00	47 00
Spelter	14 00	14 50
Lead	10 00	9 50
Antimony	15 00	18 00
Aluminum	70 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$5 00	$5 00
Heads	5 35	5 25
Tank plates, 3-16 in.	5 25	5 25

WROUGHT PIPE

Prices in effect Dec. 6, 1916.

Buttweld

Per 100 feet.	Black.	Galv.
⅛ in.	$ 4 00	$ 5 50
¼ in. and ⅜ in.	3 42	5 55
½ in.	4 42	5 99
¾ in.	5 41	7 53
1 in.	7 99	11 14
1¼ in.	10 81	15 07
1½ in.	12 93	18 01
2 in.	17 39	24 24
2½ in.	27 50	38 32
3 in.	35 96	50 11
3¼ in.	45 08	62 10
4 in.	53 41	73 58

Lapweld

2 in.	$20 35	$26 83
2½ in.	30 42	40 66
3 in.	39 78	53 17
3½ in.	49 68	66 70
4 in.	58 86	79 03
4½ in.	68 58	92 08
5 in.	79 92	107 30
6 in.	103 70	139 20
7 in.	138 00	182 10
8 in. x 25 lbs. per ft.	145 00	191 30
8 in. x 25 lbs. per ft.	167 00	220 30
9 in.	200 10	263 90
10 in. x 32 lbs. per ft.	185 60	244 80
10 in. x 40 lbs. per ft.	239 00	315 00

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$22 25	$23 50
Copper, crucible	26 25	27 00
Copper, heavy	26 25	27 00
Copper wire	26 25	27 00
No. 1 machine compos'n	22 00	22 00
No. 1 compos'n turnings	18 00	19 00
New Brass clippings	17 25	19 00
No. 1 brass turnings	15 25	16 00
Steel, low phos.	14 00	18 00
Heavy melting steel	13 00	14 00
No. 1 machine cast iron	15 00	16 00
Steel turnings	7 00	7 00
Boiler plate	12 00	10 50
Rails	14 75	15 00
Axles, wrought iron	19 00	24 00
Tires, steel	12 00	11 00
Rails	13 75	14 00
Shafting	16 75	20 00
Malleable scrap	10 25	11 00
Pipe, wrought	10 50	9 00
Stove plate	12 00	12 50
Heavy lead	7 50	7 75
Tea lead	6 00	5 50
Scrap zinc	8 25	8 50
Aluminum	35 00	35 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	35
Stove bolts	55
Plate washers	20
Machine bolts, 7-16 and over	15
Machine bolts, ⅜ and less	25
Blank bolts	15
Bolt ends	15
Machine screws, fl. & rd. hd., steel	27½
Machine screws, o. & fil. hd., steel.	10
Machine screws, fl. & rd. hd., brass,	net
Machine screws, o. & fil. hd., brass,	net
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts, hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	30
Boiler rivets, base ¾-in. and larger	$5.25
Structural rivets, as above	5.15
Wood screws, flat, bright	.75
Wood screws, O. & R., bright	.70
Wood screws, flat, brass	.42½
Wood screws, O. & R., brass	.40
Wood screws, flat, bronze	.35
Wood screws, O. & R., bronze	.32½

MILLED PRODUCTS

	Per Cent.
Set screws	40
Sq. & Hex. Head Cap Screws	30
Rd. & Fil. Head Cap Screws	15
Flat & But. Hd. Cap Screws	plus 15
Fin. & semi-fin. nuts up to 1 in.	30
Fin. & semi-fin., nuts over 1 in.	25
Studs	15
Taper pins	45
Coupling bolts	plus 15
Planer head bolts, without fillet	15
Planer head bolts, with fillet	net
Planer head bolt nuts, up to 1 in.	30
Planer head bolt nuts, over 1 in.	25
Planer bolt washers	plus 10
Hollow set screws	list plus 40
Collar screws	list plus 20
Thumb screws	20
Thumb nuts	70
Patch bolts	add 65
Cold pressed nuts to 1½ in.	add $3.50
Cold pressed nuts over 1½ in.	add $2.00

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$55 00
Open-hearth billets, Pittsburgh	55 00
O. H. sheet bars, Pittsburgh	55 00
Forging billets, Pittsburgh	80 00
Wire rods, Pittsburgh	70 00

NAILS AND SPIKES

Standard steel wire nails, base	$4 75	$4 70
Cut nails	4 00	4 00
Miscellaneous wire nails		**65%**
Pressed spikes, ⅝ diam., 100 lbs		$4 10

MISCELLANEOUS

Solder, guaranteed	0.30
Solder, strictly	0.27
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medals, per lb.	0.20
Tarred slaters' paper, per roll	0.95
Gasoline, per gal., bulk	0.26½
Benzine, per gal, bulk	0.25½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	1.12
Linseed oil, boiled, single bbls.	1.15
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	8 00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.12
Pure Manila rope	0.22½
Transmission rope, Manila	0.26½
Drilling cables, Manila	0.24½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes	35
S.S. drills, 1/16 in. and larger	50
Standard drills to 1½ in.	50
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	20
3-fluted drills over 1½ in.	10
Bit stock	50
Ratchet drills	20
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	25
Sockets	30
Sleeves	40
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, add 5 per cent.; B and C, 12½ per cent.; cast iron, 40; standard bushings, 50 per cent.; headers, 60; flanged unions, 45; malleable bushings, 50; nipples, 70; malleable, lipped unions, 55.

SHEETS.

	Montreal	Toronto
Sheets, Black, No. 28	$5 00	$4 75
Sheets, black, No. 10	5 50	5 50
Canada plates, dull, 52 sheets	5 75	5 75
Canada Plates, all bright	6 30	6 50
Apollc brand, 10¾ oz. galvanized	7 25	7 25
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 45	7 35
Gorbal's Best, No. 28	7 75	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 70	7 20
Premier, 10¾ oz.	7 00	7 50

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch.	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	60 & 2½
Kearney & Foot, Arcade	60 & 2½
J. Barton Smith, Eagle	60 & 2½
McClelland, Globe	60 & 2½
Black Diamond	50
Delta Files	47½
Nicholson	50
Globe	57½
Vulcan	57½
Disston	60 & 2½

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$30 00	....
1¼ in.	30 00	....
1½ in.	30 00	24 00
1¾ in.	29 00	21 00
2 in.	33 00	20 00
2¾ in.	33 00	.....
2½ in.	35 75	26 50
3 in.	48 50	30 00
3¼ in.	54 50	36 00
3½ in.	59 50	30 00
4 in.	65 50	49 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.23
Royalite, per gal., bulk	.11
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Union thread cutting oil antiseptic	.70
Acme cutting oil, antiseptic	.39½
Imperial quenching oil	.39½
Petroleum fuel oil	.12¾

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30-10%
Standard	40%
Cut leather lacing, No. 1	$1.40
Leather in sides	1.20

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke.	
Connelsville Foundry Coke	....
Yough Steam Lump Coal	....
Pittsburgh Steam Lump Coal	....
Best Slack	....

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.18
Peerless	.18
Grand	.17
Superior	.17
X L C R	.16
Atlas	.16
X Empire	.15
Ideal	.15
X press	.14
COLORED	
Lion	.12½
Standard	.11
No. 1	.11
Popular	.10
Keen	.09
WOOL PACKING	
Arrow	.24
Axle	.18
Anvil	.14
Anchor	.11
WASHED WIPERS	
Select White	.12
Mixed colored	.10
Dark Colored	.09

This list subject to trade discount for quantity

ANODES

Nickel	.50 to .54
Cobalt	1.75 to 2.00
Copper	.44 to .46
Tin	.49 to .56
Zinc	.23 to .25

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 in.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.35
Emery in kegs, American	.06
Pumice, ground	.04
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.07 to .08
Emery composition	.08 to .09
Rouge, silver	.35 to .50
Rouge, powder	.30 to .35

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$12 00	$12 50
Sheets, 3½ lbs. sq. ft.	11 75	12 25
Sheets, 4 to 6 lbs. sq. ft.	11 50	12 00

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.17
Cobalt sulphate	.70
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.12
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.55
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.41
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents

Montreal, Que., Dec. 11, 1916.—Marked activity continues to feature the general industrial situation, with the steel market still in the front position. Favorable weather has been contributing materially to the transportation of supplies, as navigation is not yet definitely closed.

Pig Iron

The pig iron situation is still featured by an upward trend of prices, this week's advance ranging from $2 to $5 per ton. The Pittsburg quotation on Bessemer is now $37.95 and basic $32.95 per ton. Canadian quotations have practically been withdrawn, but dealers here are asking the nominal price of $40 for Victoria.

Steel

The upward movement, while not so pronounced as last week, still continues to feature the steel situation, and higher altitudes still are more than probable. One of the factors figuring largely in present conditions is the scarcity of raw materials. Again, owing to transportation difficulties, the mills are often seriously handicapped, delivery being very uncertain. The situation would be even more acute but for the unusually mild weather prevailing, and which has kept navigation open later than former years. Pig iron still continues to advance, thus affecting all lines of manufactured articles. Billets and sheet bars are very active, the demand being quite heavy; sheet bars are now quoted at $62 Pittsburg, and the quotation on forging billets is now $80. Iron bars have advanced ¼c per pound, the price being now $3.25 per hundred. The local quotation on steel bars is now $4, being an advance of $2 per ton. Steel rails are active, with prices due for an advance. The situation in sheets would indicate a further advance over that noted this week.

The demand for sheets is very heavy, with the mills unable to cope with requirements. The advance on black sheets is about $10 per ton, while that on blue annealed and galvanized is about $5 per ton. The current Pittsburg quotations are respectively $5, $4, and $6.50 per hundred. The local changes on sheets this week are 50c per hundred, the quotation for No. 28 gauge being now $5. It is almost impossible to obtain dull plates, and dealers here are asking $5.75. Apollo brand 10¾ ounces. Galvanized has advanced to $7.25, being 35c per hundred higher than last week. An advance on spikes and bolts, ranging from $10 to $15 per ton, has also taken place.

While wire and wire products have been steady of late, the outlook would indicate an early advance. A $2 a ton advance has recently been placed on rivets, the quotation being now $4.25 on structural and $4.35 on boiler rivets. The exceptional demand for tubular goods, together with high labor cost, has resulted in advances in pipe and tubes; the local revision of boiler tube quotations showing an advance of from 8 to 20 per cent. Two-inch is now $33; 2½-inch, $35.75; 3-inch, $48.50; 3¼-inch, $54.50; 3½-inch, $59.50; and 4-inch, $65.50.

Metals

The general tone of the metal market is well maintained and prices are holding firm. Copper is a little quiet, but the business is sufficient to keep this metal in a very strong position. Tin is a little unsteady, a weak tendency being apparent. Spelter is quiet following the recent activity, the situation showing an undertone of weakness. The feature of the week is the further strength of lead, which has shown a sharp advance. Antimony and aluminum are steady and unchanged.

Copper.—While the general tone of the market is quiet, the strength remains, prices being well maintained. The recent advance has apparently developed a shortage among the smaller producers and dealers, probably with the expectation that further advances were in order. With the tendency continuing towards firmness, there is a possibility that some copper may be uncovered for early delivery. There appears to be a movement on foot to merge several of the large producing interests for the object of securing better control of export matters. The market abroad continues steady. New York has advanced during the week, being 1c stronger. The present nominal quotations are 35c for lake, 35¾c for electrolytic, and 33½c for castings. Local conditions are unchanged, with prices very firm at 37c for lake and electrolytic, and 36c for castings.

Tin.—The market at present is reacting on a light demand, and prices are becoming easier. The supply however, is not great and a return to activity may result in a return of former quotations. London reports a further decline in strength, quotations having fallen off at the rate of about $23 per ton. The New York market has declined about 1⅜ cents, the nominal quotation at present being 43¾ cents per pound. The situation here is weaker, although prices are being maintained but with an easier undertone, dealers are quoting 46 cents per pound.

Spelter.—The meantime market is quiet, but the general strength is well maintained. Producers are inclined to think that existing conditions do not warrant a decline, and are not taking an active part in current negotiations, believing that consumers requirements for the winter months will mean an early buying movement. The market abroad is firm, but New York has declined to 12⅛ cents, a drop on the week of 1⅛ cents per pound. The situation here is quiet, prices are maintained, however at 14 cents per pound.

Lead.—The scarcity of early metal and the continued demand has resulted in a very strong lead market. During the early part of the week the situation was a little unsettled owing to the fact that a wide range of price quotations existed between the leading and outside interests, but the action of the Trust in advancing prices has steadied the market. Business has been curtailed owing to shortage in supply. London market is firm. The recent advance on the New York market of ½ cent per pound has placed the quotations at 7½ cents for "Trust" and 8 cents for "independent" metal. Owing to general conditions, local dealers are asking higher prices, the week's advance of ½ cent making the quotation 10 cents per pound.

Antimony.—The market is very quiet on a poor demand. The local situation is dull, but dealers are still quoting 15 cents per pound.

Aluminum.—No change is noted; prices being firm at 70 cents per pound.

Machine Tools and Supplies

A fair amount of activity continues throughout the machine tool industry, some impetus being expected, following the action of the British Government in confining the manufacture of shells more closely within her own and her Dominion boundaries. This will result in many shell plants increasing their capacity, as in all probability the output may require to be increased owing to the curtailment in other directions. The demand for tools of all description is very good, although deliveries are not too prompt. The abnormal condition that prevails in the steel and metal markets, together with the high labor cost is reflected in the high cost of machine tool equipment. The demand for supplies continues active.

Scrap

The market in old material is very firm and active. Quotations are generally strong with the exception of copper and brass, which have declined ¾ of a cent. Old light copper is now 22¼ cents, with other copper at 26¼ cents per pound. Brass clippings are quoted 17¼ cents, and turnings at 15¼ cents per pound. All other prices are as quoted last week.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Toronto, Ont., Dec. 12. — Recent events indicate that unlimited orders for munitions are assured for Canada and that these will be sufficient to keep the various plants operating at capacity for an indefinite period. It appears that this country is still behind on deliveries and therefore every effort must be made to bring the output of shells up to the required amount. The necessity of this is obvious but it can only be obtained by the fullest use of labor —male and female, and materials at our disposal. The munitions industry has developed into one of the greatest importance, not only in point of financial expenditure but as a material help to the cause of the Allies. Two new large munitions plants are being constructed, one in Ontario, and one near Montreal, while many plants already established are steadily increasing their output. The value of such an effort is incalculable.

Steel

As anticipated the coke situation has been relieved, and there is less fear of a shut down at the furnaces in the meantime, although conditions are such that there may be a recurrence of the trouble particularly during extreme cold weather outlook in the steel trade is exceedingly favorable as regards volume of business but prices are reaching a dangerous level and show every indication of going considerably higher. The demand for steel continues very heavy, the mills being unable to take care of the required tonnage notwithstanding a steady increase in output. The Steel Company of Canada are building another open-hearth furnace, and it is understood that the Dominion Steel Corporation propose making important improvements to their plant at Sidney with a view to increasing the output as well as lowering the cost of production. The market is very strong and prices are still climbing. Wrought pipe has advanced about 5 per cent., affecting both lapweld and buttweld classifications. Prices on steel bars are largely nominal and are subject to mill acceptance only. Bar iron is in better demand as it is being used as a substitute for steel bars in many cases, owing to the backward delivery on the latter material. A further advance in tubes is looked for owing to the very heavy demand in the primary market, makers being sold up for practically a year ahead. The situation in plates is getting tighter, the mills being sold far ahead with prices steadily advancing. Wire nails have advanced 35 cents and are now quoted at $4.70 per keg base. Smooth steel wire No. 0-9 is 35c higher and is now quoted at $5. per 100 lbs. base.

Scarcity of semi-finished material particularly sheet bars is becoming very serious. Many sheet mills in the U.S. are compelled to shut down for a day or two every week, on account of inability to obtain bars, and buyers of sheets are also embarrassed. Prices are advancing and 5c per pound seems to be the minimum for No. 28 black, while galvanized is selling freely at from 6.5c to 7c. Buyers of sheet bars state that the shortage of same is due largely to the use of very large tonnage of steel in manufacturing shells. Prices on black and galvanized sheets in the local market have advanced, but are nominal owing to the unsettled situation. No. 28 black are quoted at $4.75, and a further advance is looked for in the near future, but No. 10 are unchanged in the meantime. Premier galvanized, No. 28, U.S. are now quoted at $7.20 and Premier 10¾ oz. at $7.50 per 100 lbs.

An interesting development of more or less recent date in the steel trade in the United States is the increase in the number of electric furnaces being installed to supplement the output from other sources. The scarcity of steel, especially that made by the crucible process is calling for a large supply manufactured by the electrical process. The mills are in a sold-up condition, some of the larger steel companies not quoting on any of their products, except on specified orders. The market continues very strong and higher prices on nearly everything in iron and steel are likely before the first of the New Year. Steel bars are unchanged at 3c, but iron bars are higher, being now quoted at 3.25c Pittsburg. Chicago warehouse prices have made a further advance and are now as follows:—Steel bars 3.60c; steel bars, 2 in. and up 4c; structural shapes 3.70c and plates 4.35c per pound. The unfilled orders of the U.S. Steel Corporation for the month ending Nov. 30 were 11,088,542 tons, an increase of 1,042,282 tons over the preceding month.

Pig Iron

Quotations on domestic pig irons are still withdrawn and no information is yet available as to when new prices will be issued. That they will be advanced is a certainty, but, how much, it is difficult to say. It is understood that a Canadian foundry interest in Ontario recently purchased 27,000 tons of basic pig iron in Buffalo at $30 per ton, furnace, which is now a minimum for that grade of iron.

Scrap

Prices of scrap continue to advance and the market is more active than for some time past. Prices of heavy melting steel, rolling mill scrap, old rails and axles are higher, same being in good demand. Foundry grades of scrap which in general have been relatively low as compared with pig iron are showing indications of an adjustment to higher levels. Scrap copper, brass and compositions, have made a further advance of 1c per lb. while lead and zinc are also higher. Steel turnings are in good supply and the market easy. The embargo on the export of this material to the States will again go into effect on Jan. 1.

Machine Tools

From, all indications it would appear that an extended period of activity may be looked for in the machine tool market. The necessity of increased production of munitions means extensions to plants and consequently a continued demand for more equipment. Greater efficiency is demanded and to obtain this much worn out machinery will of necessity have to be scrapped and new equipment installed in its place. Business has been steady during the week, a number of enquiries having been received for standard engine lathes for munitions and ordinary purposes. There is no sign of any decline in prices, in fact, indications point to further advances. An eastern U.S. builder of single and multiple drilling machines has advanced prices about 10 per cent., and a manufacturer of drill and surface grinders has made an increase of 7½ per cent. on his product.

Supplies

Higher prices continue to be the rule owing to the increase in cost of raw materials. Makers of pipe fittings have issued a new list of discounts which are as follows: Malleable A, list plus 5 p.c.; B and C, 12½ p.c. off list; cast iron, 40 p.c.; cast and malleable bushings, 50 p.c., and nipples 70 p.c. Chucks on the new list, are now list plus 30 per cent. as against list plus 15 per cent. formerly. The new discount on sprocket chains is 40 per cent., being an advance of 20 per cent. Coe's monkey wrenches are now net list, and list, and circular saws are now 35 per cent. off. A number of brands of files now carry a discount of 60 and 2½ per cent. as compared with 65 per cent. formerly. The increase in crude oil has caused an advance of ½c on coal oil, but gasoline is unchanged.

Metals

The outstanding feature in the metal markets continues to be the strong copper situation. Quotations on this metal have again advanced locally, although nominal. The tin market is easier due to a decline in London, but the position of this metal is fairly strong and a reaction may take place. Spelter is also easier, the demand having fallen off; quotations are unchanged. The strength which recently developed in the lead market has been well maintained, but there has been no further advance in prices. The antimony and aluminum markets are featureless with prices unchanged. Solders have declined.

Copper.—Although the primary market is quieter there is no sign of weakness, the dullness being due to the scarcity of nearby and first quarter metal. It is understood that none of the leading sellers have any copper for delivery before the third quarter of 1917, and metal is difficult to obtain from any source before that time. The market is very firm locally and prices have advanced 1c per pound, electrolytic being quoted at 38½c, lake 38c and castings 37½c per pound.

Tin.—A declining market in London has been reflected locally, and tin is down 1c, being quoted at 47c per pound.

Spelter. — Further weakness has developed in the market due to lack of interest on the part of buyers. Local quotations are unchanged at 14½c per pound.

Lead.—An active demand for lead in the primary market has developed being induced by the steady price advances of independent producers, and the scarcity of metal for either December or January delivery. The leading interest has raised its price to 7½c New York for prompt metal, and 8c lead is likely before the end of this year. Local prices are very firm and unchanged in the meantime at 9½c per pound.

Aluminum.—The market is devoid of interest and quotations are unchanged at 68c per pound.

Antimony.—The market is dull and unchanged with hardly any business doing. Local price 18c per pound.

Solders.—The recent weakness in the tin market has resulted in lower prices on solders which have declined 2c per pound.

* * *

NICKEL COINAGE

A PROPOSAL whereby the Dominion can make $5,000,000 to $10,000,000 by substituting nickel for silver coins has been submitted to the federal authorities at Ottawa by Professor Leacock of McGill University. The professor, explaining his scheme, points out that silver is only a token to-day and can be replaced by nickel or tin or celluloid for that matter. He would call in the $20,000,000 of silver coins in circulation and sell the metal in them as bullion. There is about 70 cents' worth of silver in a dollar's worth of coins. Nickel is worth fifty cents a pound, and the total coinage could be replaced for $350,000. The cost of coinage would be offset by the saving now and in the future in buying nickel instead of silver. The professor proposes that the banks should act as agencies in exchanging the nickel for the silver coins. He undertakes to carry out the scheme himself without salary. He suggests that the original recoinage should bear the stamp:—"War money of Canada, 1917," and it would act as a monument of Canada's national thrift.

* * *

The National-Acme Mfg. Co., of Montreal, Cleveland and Windsor, Vt., has been taken over by an Eastern U. S. banking firm, and it is expected that the new company will be capitalized at $25,000,000, but the name of the concern will not be changed. The company manufactures multiple-spindle and single-spindle screw machines, and also machine screws. At the Montreal plant an extension of 4,500 sq. ft. floor space was recently completed, and an additional 9,000 sq. ft. is now being made.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department of Trade and Commerce, Ottawa, is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL
Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE
Valparaiso, British Consul General.

COLOMBIA
Bagota, British Consul General.

ECUADOR
Quito, British Consul General.
Guayquil, British Consul.

EGYPT
Alexandria, British Consul General.

FRANCE
Havre, British Consul General.
Marseilles, British Consul General.

INDIA
Calcutta, Director General of Commercial Intelligence.

ITALY
Genoa, British Consul General.
Milan, British Consul.

MEXICO
Mexico, British Consul General.

NETHERLANDS
Amsterdam, British Consul.

PANAMA
Colon, British Consul.
Panama, British Vice-Consul.

PERU
Lima, British Vice-Consul.

PORTUGAL
Lisbon, British Consul.

RUSSIA
Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN
Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN
Stockholm, British Consul.

SWITZERLAND
Geneva, British Consul.

URUGUAY
Monte Video, British Vice-Consul.

VENEZUELA
Caracas, British Vice-Consul.

Canadian Commercial Intelligence Service

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC
H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALIA
D. H. Ross, Stock Exchange Building, Melbourne. Cable address, Canadian.

BRITISH WEST INDIES
E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA
J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA
Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE
Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN
G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND
Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA
C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya, Ploshch 9, Petrograd.
L. D. Wilgress, Canadian Government Commercial Agent, Bukhgolza Ulitza No. 4, Omsk, Siberia.

NEWFOUNDLAND
W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND
W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA
W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM
Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

AUSTRALIA, B. Millin, Exchange Building, Sydney, N.S.W.

BRITISH WEST INDIES
Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.
R. H. Curry, Nassau, Bahamas.

NORWAY AND DENMARK.
C. E. Sontum, Grubbeged No. 4, Christiania, Norway. Cable address, Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Hamilton, Ont.—The Canadian Shovel & Tool Co. are building an extension to their plant.

Norwood, Ont. — W. C. Harrison's electric power plant was recently damaged by fire.

Owen Sound, Ont.—The Canadian Malleable Iron Co. are building an extension to their plant.

Toronto, Ont.—The Toronto Laundry Machine Co. are building an extension to their plant at a cost of $7,000.

Toronto, Ont—The Canada Steamship Lines have established a machine, woodworking and repair shop on the Yonge street wharf.

Renfrew, Ont.—Work has commenced on a machine shop for Mr. Low, of this town. The new plant is located near the Renfrew Electric Mfg. Co. factory.

Toronto, Ont.—A building permit has been issued for the construction of a boiler house on Mowat avenue, for the Russell Motor Car Co., to cost $1,200.

Sarnia, Ont.—It is understood here that the Mueller Mfg. Co. propose making considerable extensions to their factory to take care of the increase in demand for their brass products.

Campbellford, Ont. — The Dickson Bridge Works Co's. plant which is engaged in the manufacture of six inch shells was totally destroyed by fire last Sunday night. The loss is estimated at $60,000, mostly covered by insurance.

Belleville, Ont.—The Mineral Products Co. has been organized to develop a fluorspar property, which has been discovered at Madoc, near here. Chas. R. Ross will be manager of the company, and Charles Campbell, of Boston, is financially interested.

Oakville, Ont.—The Acme Rubber Co. propose establishing a factory here to make motor tires and belting. It is proposed to lease the Ware Building at first, and build a factory later. The town has been asked to guarantee bonds to the extent of $50,000. J. H. L. Patterson, of Toronto, is president of the company.

Welland, Ont.—The Canadian Steel Foundries, Ltd., here, have let a contract to Ryan & Gardner to build two open hearth furnaces and an extension 100 feet long to their machine shop. One new open-hearth furnace has lately been completed and with the above will double the capacity of the plant. The total extension will cost about half a million dollars.

Montreal, Que. — The International Manufacturing Co., which was recently incorporated at Ottawa with a capital of $1,000,000, is a subsidiary of the International Fuse & Arms Co., of New York. A munitions plant will be erected in Montreal by Anglins, Ltd., of this city.

Millerton, N.B.—The New Brunswick Pulp & Paper Co. will shortly begin the construction of a new pulp mill which will have a capacity of 20 tons of wood pulp per day. The new mill will be erected on the site of the old mill which was destroyed by fire nearly two years ago. J. D. Volckman will be in charge of the new plant. Thos. L. Tomlines, of Watertown, N.Y., is the consulting engineer.

Chatham, Ont.—There is a probability that the Hayes Wheel Works will be converted into a munition factory. It is reported here that the Government has awarded a contract for the manufacture of fifty thousand shells to be completed before the first of June and that work will be commenced as soon as machinery can be installed. It is understood that considerable additions will be made to the present plant.

Floating Drydock Projected.—Arrangements have been completed for the construction of a large floating drydock at Vancouver. The structure will be a 16,000-ton, double-section dock, capable of handling a boat of 18,000 tons, which is the measure of maximum requirements on the Pacific to-day. The company is the Vancouver Drydocks, Ltd., with Charles Meek, of Vancouver, as the moving spirit. Bonds to the amount of two million dollars have been sold to Breed, Elliott & Harrison, of Cincinnati. A ship repair and shipbuilding plant is a part of the plan decided upon. Contracts for construction and machinery are being let, and the company announces that it will have the dock in operation within a year. There will be subsidy aid from the Governments of both the Dominion of Canada and the Province of British Columbia, on the ground that the dock will be a commercial and naval asset.

Electrical

Brigden, Ont.—The Town Council are considering installing a Hydro-Electric system.

St. Mary's, Ont.—A Hydro power by-law will be submitted to the electorate on January 1.

Stratford, Ont.—By unanimous vote at a special meeting on Dec. 7, the City Council gave the third reading to the Hydro by-law, and it will be voted upon by the ratepayers on January 1.

Galt, Ont.—A by-law has been passed by the City Council authorizing the submission to the ratepayers at the January election of the question as to the Hydro-Electric municipalities going into the Chippewa Falls project.

Oil Springs, Ont.—The Council has passed the necessary by-law for the purpose of installing hydro-electric power, and a by-law to issue debentures to pay for same. The by-laws will be voted on by the ratepayers at the coming elections in January.

Petrolea, Ont. — The Town Council passed the by-law relating to the extension of hydro plants at Niagara and the electors will have a chance to vote at the coming municipal election on the question, which involves the principle of public ownership.

Fergus, Ont.—The Town Council has passed a by-law, to be voted on by the ratepayers on New Year's Day, to ascertain their opinion whether they are in favor of the Hydro-Electric Commission of Ontario acquiring the right to supply more power than it can generate under its existing contracts.

Stratford, Ont. — North Easthope Council at its last meeting decided to take no action regarding the request by the Hydro-Radial Railway Association and the Hydro-Electric Power Commission to submit a Hydro-Radial by-law at the January elections. This township is the only municipality, with the exception of Waterloo township, on the main line from Toronto to London, which has not passed the necessary by-law.

Walkerville, Ont.—The members of the Town Council decided to allow the ratepayers to vote on the by-law drawn up by the Ontario Hydro-Electric Commission to approve of a $9,000,000 project to develop 200,000 additional horsepower at Chippewa Creek. The vote is on the distinct understanding that none

Munitions! Munitions!

Extract from an Evening Newspaper

The Tragedy of Bucharest

Munitions, Munitions, Munitions, are the words of an unanswered cry from Roumania and Russia. That cry explains the reason why Roumania and Russia failed to defend Bucharest.

THE IMPORTANCE OF MUNITION MANUFACTURE CANNOT POSSIBLY BE BROUGHT MORE FORCIBLY TO THE ATTENTION OF CANADIAN MANUFACTURERS THAN BY "THE TRAGEDY OF BUCHAREST."

MANUFACTURERS WHO DEVOTE THEIR ATTENTION TO THIS BRANCH OF INDUSTRY ARE PERFORMING A VERY IMPORTANT PATRIOTIC DUTY, SECOND ONLY TO THAT PERFORMED BY THE MEN IN THE FRONT LINE.

Our Service Department

Recognizing the importance of this industry, we established a Service Department to collect all available data in connection with the various operations in the manufacture of Shrapnel and High Explosives, and are able to present in precise form complete information on the best methods of manufacture, and to provide the necessary skill and engineering help to any manufacturer who desires to enter this important work.

In the development of our Service Department it was found that the lack of proper buildings and manufacturing facilities has deterred many from going into this business, and in order to overcome this difficulty in some measure we have secured rights on several large properties with suitable factory buildings, and now have the following available for immediate possession:

AT COBOURG.

The plant of the Provincial Steel Co., covering 15 acres, main factory 80 by 500 ft. Separate administration buildings. Railway Sidings from the main lines of the Canadian Northern Ry., Grand Trunk, and Canadian Pacific Railway.

AT ST. CATHARINES.

The plant of the Russell Jennings Co., 150 ft. frontage by 515 ft., with suitable concrete buildings, 50 by 150 ft., with Grand Trunk Siding into the property.

Another Opportunity

Besides the plant of the Union Switch & Signal Co., just purchased, we have secured another complete munition plant for the manufacture of ten thousand Shrapnel per day—another of the Pittsburg group.

WRITE US ABOUT SUITABLE PLANT, FULLY EQUIPPED, AND LET OUR EXPERTS HELP YOU TO GET STARTED TO ANSWER THE IMPORTANT CALL.

The A. R. Williams Machinery Co., Limited

TORONTO - - ONTARIO

If any advertisement interests you, tear it out now and place with letters to be answered.

of the power will be exported. The people may also vote on the project to establish a Hydro-Electric system of radial railways.

Municipal

Blenheim, Ont.—The Town Council are considering the purchase of a chemical fire engine.

Vernon, B.C.—Ratepayers voted favorably on a by-law to raise money for extensions to the electric light system.

Tilbury, Ont.—The Township Council of Tilbury North have passed a by-law to build a pumping plant at an estimated cost of $6,320.

St. Catharines, Ont.—By a vote of five to three the Council decided not to submit to the ratepayers the question with regard to Hydro power supply.

Newcastle, N.S.—The Town Council are unable to get delivery of a motor-driven pump ordered some month ago, so may cancel the contract and call new tenders.

Arcola, Sask.—A by-law is being prepared for submission to the ratepayers authorizing a sale of debentures for the purpose of purchasing the electric light and power plant.

Port Credit, Ont.—The debenture by-law to enable the village to purchase the electric plant of the Port Credit Land Co. was confirmed at council meeting, December 4. Debentures are to be brought out immediately.

Saskatoon, Sask.—The City is in receipt of a letter from Laurie & Lamb of Montreal, urging the early selection of a site for the location of the incinerator which they have the contract to build.

Montreal, Que.—Bion J. Arnold, Chicago, has been engaged to report on the Tramways situation in this city, with reference to a renewal of the Montreal Tramways Co. franchise, and the City Council has voted $10,000 to cover the cost of getting the expert's report.

Waterloo, Ont.—At a special meeting the City Council decided to submit two by-laws to the ratepayers at the municipal elections on New Year's Day, one providing for the purchase of the Snider dam and land surrounding, adjacent to the Waterloo Park, by granting the owners exemption from taxation on mill property in King street for a period of fifteen years, and the other on the question of the new Hydro power development scheme.

General Industrial

Renfrew, Ont.—The Barnet Mfg. Co.'s plant will be re-opened early in the New Year.

London, Ont.—Hunt Bros. will build a flour mill and elevator here to cost about $100,000.

Bridgeburg, Ont.—The Gilray Stretcher Co.'s factory was damaged by fire recently, the loss being estimated at $600.

Hamilton, Ont.—John Ranston's grist mill at Cayuga, was destroyed by fire on Dec. 7. The loss is estimated at $10,000.

Arnprior, Ont.—J. F. Munro, of Pembroke, Ont., is interested in a syndicate which proposes establishing a factory here.

Hamilton, Ont.—The Cummer-Dowswell Co., manufacturer of washing machines, etc., will erect an addition to its plant to cost $16,000.

Toronto, Ont.—The Kilgour Davenport Co., will build an addition to their factory at 44 Osler Avenue to cost $8,500. A building permit has been issued.

Quebec, Que.—A serious fire badly damaged the tannery of A. Falardeau, Caron and St. Helen streets, on Dec. 5 The fire was caused by an explosion among the varnishes and acids in the upper story. It is believed the damage will reach $35,000.

Peterborough, Ont.—Fire on Monday night completely destroyed the Quaker Oats Co. mill here. The cause of the fire is attributed to spontaneous combustion in a drying-room adjoining the boiler house. The buildings and stock were valued at $1,600,000, and the loss is said to be covered by insurance.

North Bay, Ont.—The toy factory by-law was carried on Monday by a majority of 159. The concession granted by the town was a free site and building amounting to $15,000, and the usual exemption of taxes, excluding school taxes, for a period of five years. Work will commence immediately on the erection of the building as soon as the site is secured.

Woodstock, Ont—The local tannery, which has been under the control of the Hamilton Oak Tanning Co., holders of a large mortgage on the property, has been disposed of to the Breithaupt Leather Co., Kitchener, Ont. The purchasers intend to materially increase the business, and already have made arrangements to ship in some $200,000 worth of hides.

Tenders

Toronto, Ont.—Tenders will be received, addressed to the chairman, Board of Control, City Hall, Toronto, up to January 16,1917, for the installation of a 40 million Imperial gallon centrifugal sewage pump at the main sewage pumping station, Toronto. Specifications and forms of tender may be obtained at the Works Department, Room 6, City Hall.

Winnipeg, Man. — Tenders addressed to the undersigned will be received up to December 18, for the construction of 9½ miles of 5 ft. 6 in. reinforced construction pipe. Plans, specifications and form of tender can be secured on application to the district commissioners accompanied by certified cheque for $20. R. D. Waugh, chairman of Winnipeg Water District Commissioners, 901 Boyd Building, Winnipeg.

Ottawa, Ont.—Tenders will be received up to January 15, 1917, for the construction of a reinforced concrete lighthouse tower and fog alarm building combined, and a wooden dwelling at Point Abino, township of Bertie, Welland County, in the Province of Ontario. Plans, specifications, form of contract and schedule of wages, can be seen, and forms of tender procured, at the Department of Marine, Ottawa; at the Harbor Master's Office, Toronto, and at the post offices, Welland, Port Colborne, St. Catharines, Bridgeburg, Hamilton and Brantford.

Personal

Lord Shaughnessy, president of the C. P. R., has returned to Montreal from England.

Prof. Frederick S. Kirkpatrick, of Queen's University, Kingston, Ont., has been appointed a member of the Advisory Council on Scientific and Industrial Research.

Wm. M. Ackworth, a British railway expert, who is on the Commission to investigate Canadian railway matters in place of Sir George Paish, has arrived at Ottawa.

Prof. A. B. Macallum, University of Toronto, has been appointed Administrative Chairman of the Advisory Council for Industrial and Scientific Research with a salary of $10,000.

H. S. Southworth has left Steel & Radiation Co., Toronto, to take up the position of sales manager for "Stellite" as manufactured by the Deloro Mining & Reduction Co., Toronto.

A. P. Ridley has assumed the position of manager of the Reliance Machine Co., Toronto, succeeding **Almon Hare**, who

Aikenhead's DUMORE GRINDER

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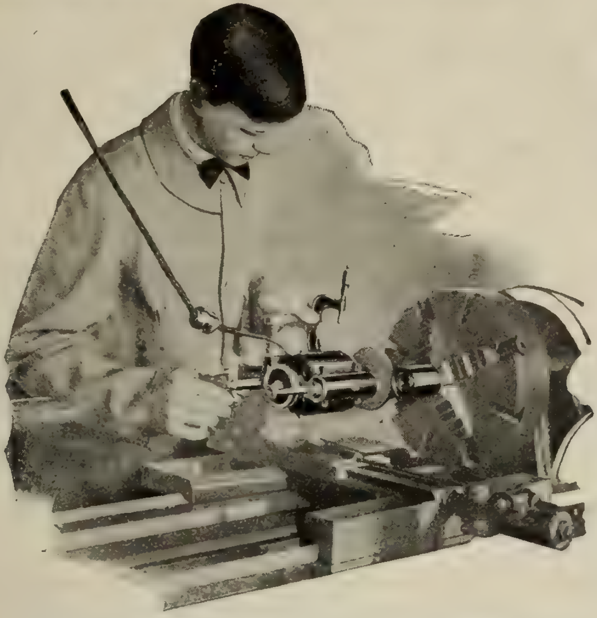

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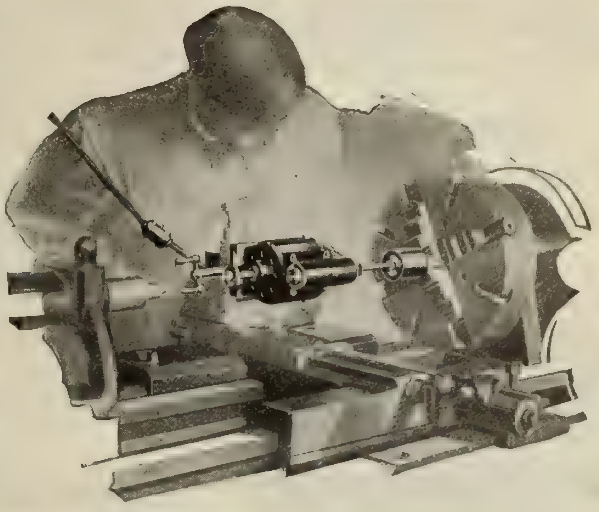

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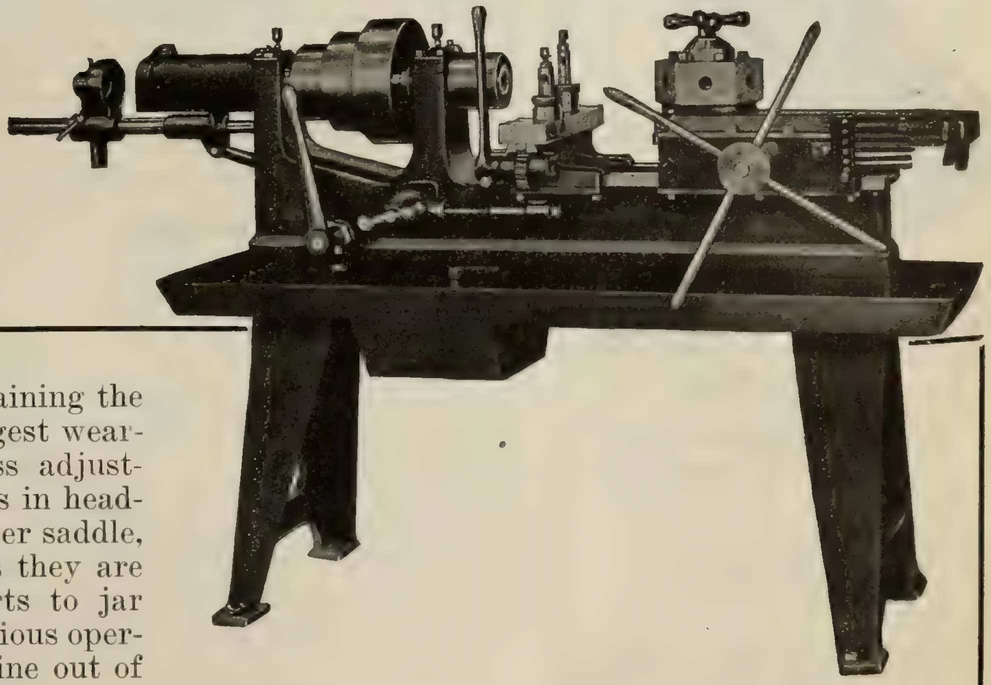
The Stecher No. 4B Hand Screw Machine



Built with a view to obtaining the greatest rigidity and largest wearing surfaces. All useless adjustments, such as taper gibs in headstock boxes and gibs under saddle, have been eliminated, as they are just so many extra parts to jar loose, and excuses for curious operators to throw the machine out of adjustment.

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WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

There are many cases where each punch has turned out over 2,000 shells.

It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

Hawkridge Brothers Company
303 Congress St., BOSTON, MASS.
U. S. A.

has been appointed chief engineer of the J. A. Brady Foundry Co., Chicago.

R. D. Keag, general manager of Yarrows, Ltd., Esquimalt branch, who recently died, was widely known and esteemed both in Canada and Scotland, having had a very extensive experience.

Joseph Wesley Flavelle, chairman of the Imperial Munitions Board, has arrived in Ottawa from England. Mr. Flavelle went to London to consult with the Minister of Munitions on matters affecting the production of shells in Canada.

Thomas G. Mathison, of Toronto, has been appointed chief engineer on the General Staff of the Dominion Public Works Department of Toronto. Mr. Mathison has been in the service of the department for five years. He is president of the Dominion Public Works Association of Toronto.

Contracts Awarded

Toronto, Ont.—The Board of Control has awarded contracts for the following materials:—Brass work for house services, H. Mueller Mfg. Co., Sarnia; special castings, Reid & Brown Structural Steel & Iron Works; double stop-cock boxes, the Dominion Wheel & Foundries, Ltd.; 6-in. valve boxes, 4-in. valve boxes, iron castings of manholes, gullies, etc., John T. Hepburn Co., Standard Foundry Co., Reid & Brown, Don Foundry Co., Dominion Wheel & Foundries; pipe fittings and valves, James Robertson Co., James Morrison Brass Mfg. Co.

Wood-Working

Granby, Que.—The Myer's Box Co. will build an addition to its factory, to cost approximately $10,000.

Wiarton, Ont. — The lumber mill, owned by Johnson, Hunter & Crawford, has been destroyed by fire, the loss being estimated at $10,000.

Flesherton, Ont.—Fire, which originated at the furnace, destroyed the drying kiln at W. Henry's planing mill, on Dec. 5. There was no insurance.

Marine

Sarnia, Ont.—The Reid Wrecking Co. is preparing to raise the steamer Frontier, which lies at the bottom of the River Thames, at Chatham, where it sank a few months ago. The boat is owned by A. R. Bartlett, Windsor.

Toronto, Ont.—The Canada Steamship Lines propose keeping the "Macassa" in service between Toronto and Hamilton, as long as possible, owing to the large amount of freight offering and shortage of cars. The steamer Dalhousie City will also continue in commission as long as possible.

Toronto, Ont.—The following steamers of the Canada Steamship Lines will winter in Toronto: Passenger—Cayuga, Chippewa, Corona, Chicora, Toronto, Kingston, Modjeska, Macassa, and Belleville. Freight—City of Hamilton, City of Ottawa, Joyland, Oatland, Haddington, Fairfax, Cadillac, besides ten barges and two tugs.

Winnipeg, Man.—It is understood here that a dock, capable of accommodating ocean-going vessels, has now been completed at Port Nelson, on Hudson Bay. It is 3,000 feet out from shore, and connected with the mainland by a steel trestle, over which trains will be running next summer to reach the ships. Grain elevators and warehouses will be located on the new dock.

Temiskaming, Ont.—The entire fleet of the Temiskaming Navigation Co., together with wharves, and all other equipment, has been purchased by R. Gibbons. The boats Meteor and Temiskaming will probably be taken into the Government shipyards on the Lake Shore Road for the winter to undergo repairs. It is the intention of the new owner to convert the Silverland into a tug, while the Jubilee will continue in the capacity of a tug.

Toronto, Ont.—The Canada Steamship Lines have arranged to place another steamer on the New York-Bermuda line, controlled by the company. The new steamer is the Trasosmontes, which will run in connection with the steamer Bermudian. The new vessel is a Portuguese craft, most modern in every detail. The company will also add to its fleet plying on the New York-West Indies-South American route. The freighters Canadian and McKinstry, which have just made their final trips on the Great Lakes with grain cargoes, are now on their way to New York to receive their initial cargoes.

North Vancouver, B.C.—Good progress is being made on the motorship Mabel Brown, at the Wallace Shipyards, and it is expected that she will leave the ways within the next fifteen or twenty days. The boat is being built for the Canadian West Coast Navigation Co., and when completed will be one of the finest craft of the kind on the coast. The Wallace Shipyards are hurrying the work on another vessel, the Geraldine Wolvin, a sister ship of the Mabel Brown, and it is expected that this boat will be ready for launching towards the latter part of January. About this time another vessel, which is being built at Victoria by the Cameron, Genoa Mills Shipbuilders, Ltd., will also be ready to take to the water.

Trade Gossip

Crude Oil Price Advanced.—Pennsylvania crude oil was advanced 15 cents by the purchasing agencies on Dec. 7, making $2.75 a barrel paid producers, the highest price ever reached in the history of the oil industry.

Ottawa, Ont.—The Michipicoten Power and Paper Co. has been incorporated, with head office in Toronto and capitalization of $6,500,000, and will buy from Lewis Miller Wood, of Toronto, lands, pulpwood areas, and water-power rights.

U. S. Steel Tonnage.—Unfilled orders of the U. S. Steel Corporation for the month ending November 30 last were 11,088,542 tons, an increase of 1,043,282 tons over the preceding month. This establishes a new record for unfilled orders of the corporation.

Locomotives for Russia—The Russian Government has distributed additional orders for 157 locomotives among the American, Baldwin and Canadian Locomotive Companies. Both the American and Baldwin Works will construct 66 locomotives each; the other 25 will be built in Canada.

The Turbine Equipment Co., C.P.R. Building, Toronto, has been awarded a contract by the town of Mimico, Ont., to supply and install three "De Laval" pumps at the sewage disposal plant. Two pumps will be direct connected to Canadian Westinghouse motors and the third unit to a 40-h.p. gasoline engine.

Powder Co. for Canada.—The plant of the Atlas Powder Co., at Mount Carbon, Pa., where high explosives were manufactured for the French Government for eighteen months following the opening of the war, is being dismantled. The machinery, vats and tanks are being removed to Canada, where they will be used for the same purpose.

War Orders Enormous.—Since the outbreak of war, Imperial purchases in Canada total an enormous sum. It is estimated that orders placed for the Imperial Government in Canada since August, 1914, amount to over a billion dollars. These orders were placed through the Government, Imperial Munitions Board and War Purchasing Commission and were for munitions, military equipment, foodstuffs and fodder.

The Sault Shipping Co., a newly-incorporated concern, has purchased from the Lake Commerce, Ltd., of Toronto, the steel steamer Valcartier, formerly the W. H. Mack. The price was not announced. The boat will be delivered to the new owners at the close of navigation, and will be operated next season under the management of the Al-

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In providing for the Health of my Fellow Workmen.
In Light and Air and sanitary Working Conditions.
In clean, fresh drinking water for everybody.
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PURO SANITARY DRINKING FOUNTAIN
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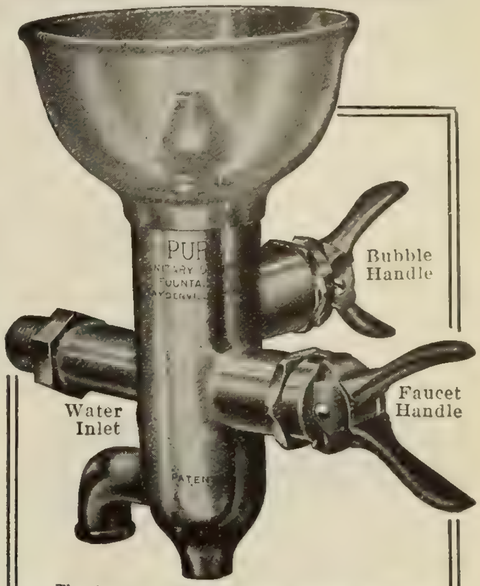

The loss of a man through impure drinking water is a crime that "the front office" must bear.

An ugly statement, isn't it? But true, absolutely.

When a man comes to work in your factory he puts his health in your keeping.

Are you willing to take chances on such a trust?

Impure drinking conditions are responsible for more tragedies than any machine ever built.

Apply the "Safety First" Principles to your water supply; don't deny your men a clean, fresh drink of water.

Conserve their health and they will improve your profits; make yourself as worthy of the name of "employer."

Install the Gold Medal winner Puro in your plant, office and shop alike.

The only Sanitary Drinking Fountain that is safe, sanitary, simple, automatic in control and easily attached.

Let us tell you just what it will cost you to

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This should not be a puzzle if your product or commodity is one purchased by the general public, and if your constituency of buyers is found everywhere in Canada.

The one medium of quality and of national circulation is

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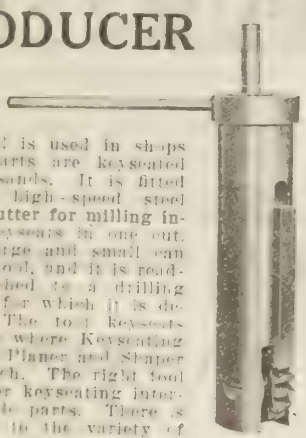
This tool is used in shops where parts are keyseated by thousands. It is fitted with a high-speed steel rotary cutter for milling internal keyseats in one cut. Shops large and small can use the tool, and it is readily attached to a drilling machine for which it is designed. The tool keyseats in places where Keyseating Machine, Planer and Shaper can't reach. The right tool to use for keyseating interchangeable parts. There is no limit to the variety of work possible to be key-
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Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria.

goma Steel Corporation at Sault Ste. Marie, Ont.

Munition Experts Coming to Canada.—Forty young men selected by the British Government as munitions experts have arrived in New York on the steamship Orduna, from Liverpool. They will be assigned to the various factories in the United States and Canada where munitions for the Entente Governments are being manufactured under contract, and will pass on the output before it is delivered for shipment.

Copper Trading Forbidden.—Except for the fulfillment of current contracts, the importation of copper into Great Britain, or dealings in copper without a special permit are prohibited by the British Government. The order also prohibits the use of copper for manufacturing purposes, except in the case of pending contracts, and direct inventories made of all stock of raw copper, the returns to be made not later than Dec. 16.

American Shipbuilding—The Bureau of Navigation of the U.S. Department of Commerce reports that American shipbuilding had its greatest month in November, when one hundred vessels were completed, the gross tonnage of which was 82,552. All but two will sail under the Stars and Stripes. With respect to shipbuilding, the United States is busying itself, as is the case with the Maritime countries of the Old World. The war is taking a heavy toll of shipping, but this loss is stimulating the builders to greater efforts. There will be many ships on the seas to carry the world's commerce after peace comes.

Collingwood, Ont.—The agreement entered into by the directors for the sale of the Collingwood Shipbuilding Co.'s assets to Messrs. H. B. Smith, R. M. Wolvin and Capt. J. W. Norcross, was confirmed at a special meeting of the shareholders held here on Dec. 6. The capital of the company is $1,300,000, for which the syndicate will give $650,000 in fully paid-up shares, and $1.950,000 of ten year bonds, bearing 6 per cent The formal transfer will take effect on January 2 next. The deal includes the transfer of the yards and plant here, also the company's interest in the shipyard at Kingston, where the Government graving dock is under lease.

Marine Insurance Higher.—Advices from New York state that marine war risk insurance has made another substantial increase. Five per cent. is charged on all United Kingdom business whether passenger or tramp steamers. Last rates were 3 per cent., with fractional higher and lower quotations. Mediterranean risks cannot be placed under 7 per cent., while 10 per cent. is expected to be the general rate. London rates are up to 5 per cent. on Transatlantic risks, an increase from 3 per cent. Mediterranean rates are firm at 7 per cent. for belligerent vessels, and 10 per cent. for neutrals. An explanation of the higher rates on neutrals is given in the low percentage of armed belligerent ships sunk.

To Improve Plant of Dominion Steel.—Mark Workman, who returned recently from Pittsburg, stated that it was true that large sums of money would have to be spent from time to time on betterments by the Dominion Steel Corporation, but he added that this expenditure would be fully met by revenue and not taken from capital. Asked as to his mission to Pittsburg, the president of the Steel Corporation replied that he had improvements in mind at the Sydney plant, and that with such an end in view he and several officials had gone to the Iron City to get pointers. He explained that the changes at the Sydney works were intended to increase the annual output as well as to decrease the cost of steel. Word from Sydney was to the effect that everything is going well, that the coal situation is better, and that the outlook generally is exceedingly favorable.

Hydro-Radial By-laws.—All of the 25 municipalities except one, concerned in the construction of the proposed Port Credit, St. Catharines and Bridgeburg radial line, have taken the necessary steps to submit the by-law to its ratepayers at the municipal elections on New Year's Day. In West Flamboro Township, where the election of the new council by acclamation is expected, it is desired that the voting on the by-law be delayed until later in January. The municipal councils which have prepared to submit the by-law are: Townships of Toronto, Trafalgar, Nelson, East Flamboro, Boston, Saltfleet, North Grimsby, Clinton, South Grantham; the villages of Grimsby and Beamsville, towns of Oakville and Burlington, cities of Hamilton and St. Catharines, townships of Crowland, Humberstone and Bertee; villages of Port Colborne, Humberstone and Fort Erie; town of Welland and Bridgeburg.

The Turbine Equipment Co., Toronto have obtained a contract from the Town of Cornwall, Ont., to supply and instal two 10-in. De Laval single-stage pumps, each of which will have a capacity of 3½ million gallons a day against 180 ft head when operating individually; 7 million gallons a day against 180 ft. head when operating in parallel, and 4½ million gallons a day against 310 ft. head when connected up in series. This installation is somewhat unique, inasmuch as the pumps will be driven by hydraulic turbines, which will be supplied by the Wm. Kennedy Co., of Owen Sound. The speed of these turbines will be 200 r.p.m., and to enable a speed of 1,650 r.p.m. being attained on the pumps a set of De Laval double helical reduction gears will be used between each turbine and pump. The contract price of the pumps was $10,075, which includes a few valves and some piping. The price of the hydraulic turbines was $5,000 each.

High Price of Steel.—Advices from New York state that the average steel prices have passed $70 per long ton for the first time in the history of the steel trade. Steel beams rose from $3 per hundred to $3.25 and lifted the index price for the eight leading steel products to $70.53. On top of this is the declaration from certain iron and steel experts that the top has not yet been reached, although the speed of the upward movement shows signs of being checked. The high prices have had no discernible effect on the buyers. Railroads a few months ago could have placed rail orders at lower prices, and could have obtained delivery by the middle of 1917. Now they have to pay much more and cannot obtain delivery until the spring of 1918. Meantime, many attractive foreign orders are available, but the mills are not bidding for them because they are already working at capacity and have a vast amount of unfilled orders.

The Toronto Iron Works report a heavy demand for oil fuel storage tanks. Among the orders received recently being the following: The Fess Oil Burners of Canada, five 8,000 gallon storage tanks for installation in the Robert Simpson Mail Order Building on Mutual Street; the Robert Simpson Apartment House on Bleeker Street; The Flint Varnish Co., Perth Avenue; Clarke & Clarke, Christie Street: and in Earl Grey School, Toronto. The town of Chatham, N.B., one each standard 12,000 gallon and 5,000 gallon storage tanks; the Metal Drawing Co., St. Catharines, two 6,000 gallon tanks; the Canadian Bronze Co., Montreal, one 10,000 gallon tank; the Northwestern Brass Co., Winnipeg, one 10,000 gallon tank; the Goodyear Tire & Rubber Goods Co., Toronto, one 10,000 gallon tank; the National Mfg. Co., Brockville, one 7,000 gallon tank. The Dominion Steel Foundry Co., Hamilton, have duplicated an order for one 12,000 gallon vertical storage tank.

New Incorporations

The Pinene Co. has been incorporated at Toronto, with a capital of $150,000, to manufacture wood, coal, oil, and peat products of all kinds at Cobalt, Ont. Incorporators are: A. S. Holmes, Adam N. Davis and J. W. Mahon, all of Cobalt, Ont.

STEEL CASTINGS

We are in a position to make immediate delivery of all kinds of steel castings, 100 lbs. and heavier.

Send us your next order.

Dominion Steel Foundry Co., Ltd.
Hamilton, Ont.

We are qualified Tool, Die, Jig, Gauge and Fixture Makers.
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Windsor Machine & Tool Works.
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We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.
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Display rates on application.

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FOR SALE—TWO BAKER DRILLS NO. 310, with pumps; almost new. 1 Colburn drill No. 14, with pumps; standard. Alton Foundry Co., Alton, Ont. (22)

BROWN-BOGGS MARKING MACHINE FOR 4.5 shells. Has been used for short time only, and is in good condition. Box 248, Canadian Machinery. (24)

ONE REED TURRET LATHE, 8' BED, swing, 28"; 4 2" holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 241, Canadian Machinery.

FOR SALE—45 H.P. GAS PRODUCER AND engine, complete. Good condition. For particulars write Canadian Warren Axe & Tool Co., Ltd., St. Catharines, Ont.

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

FOR SALE.—ONE BROWN-BOGGS MARKing Machine, suitable for 6" Mark XVI. or Mark III. English Shells. Only object in selling is that other methods of marking have been adopted. Price on application. Taylor-Forbes Co., Ltd., Guelph. (14)

1 VERTICAL, SINGLE ACTION, DOUBLE cylinder hydraulic pump, 6" stroke, all ready to connect up; almost new; price $75. McGregor & McIntyre, 1139 Shaw Street, Toronto. (tf)

FOR SALE—FIFTEEN HEAVY CAST IRON columns, from thirteen to seventeen feet long. Columns tapered and have good heavy base and top. Also four roof trusses. Sixty feet long. Ten feet in centre, eight foot at ends. Will cut columns to suit purchaser. Woodside Bros., Port Arthur, Ont. (2)

FOR SALE — IMMEDIATE SHIPMENT — New Heavy Duty Shell Boring Lathe for manufacture of 6" High Explosive Shells. Write for complete specification. Wm. Hamilton Co., Ltd., Peterboro, Ont. (20)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

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DOUBLE-END FEATHERSTONE AXLE cutting off machine with countershaft and equipment adapted for cutting off two 4.5 forgings at once. Bargain $500. Medicine Hat Pump & Brass Mfg. Co., Ltd., Medicine Hat, Alberta. (tf)

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SHRAPNEL SOCKET AND ADAPTER machinery, turret lathes, boring machines, cutting-off machines and thread millers tooled for operation. Globe Electric Machine Co., Hamilton. (tf)

WANTED

WANTED — BORING MILL, 30" TO 42" table; state make, condition, time used, lowest price, and send cut to Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (21)

WANTED — THREE TURRET LATHES suitable for steel sockets, also Thread Millers suitable for milling outside thread of sockets. Give price and particulars to Steel Furnishing Co., New Glasgow, N.S. (19)

WANTED—COMPLETE SET OF DRAWings or blue prints of Universal grinder, with all attachments. Box 251, Canadian Machinery. (1)

WANTED POWER-DRIVEN ROLLER S' long, suitable to roll ¼" steel plates; state make, condition, time used. Give price and particulars to L'Air Liquide Society, corner First Ave. and Ernest St., Maisonneuve, Montreal.

WANTED—SMALL SCREW-CUTTING ENgine lathe 12" or 13" x 5' or 6' bed, automatic feed, power cross feed, compound rest; must be cheap and lathe in good working order; give full particulars in first letter. J. W. M., Suite 34, Thelmo Mansions, Burnett St., Winnipeg, Man. (24)

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FOR SALE

WARNER & SWASEY TURRET LATHES FROM STOCK

Ten (10) 16 inch No. 2, Geared Friction Head Universal Turret Lathes, only used a few months—equal to new.

Williams & Wilson
Limited
320 St. James St., Montreal, P.O.

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Stelko High Speed Steel, the latest and best out, the only **high speed steel** containing **Treoxide,** the new discovery, 20 per cent. better than tungsten. All sizes delivered promptly, annealed or unannealed.

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ALL IN GOOD CONDITION—ALTERNATING CURRENT.

H.P.	R.P.M.	Volts	Base	Pulley	Maker
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75	600	2,200	No	No	Can. General Elec.
50	600	2,200	No	No	Can. General Elec.
30	900	2,200	No	No	Jones & Moore.
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Starters with all Motors.

All in good condition. If interested close prices will be quoted.

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New 3' Dreses High Duty Plain Radial Drill.
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Milling Machine
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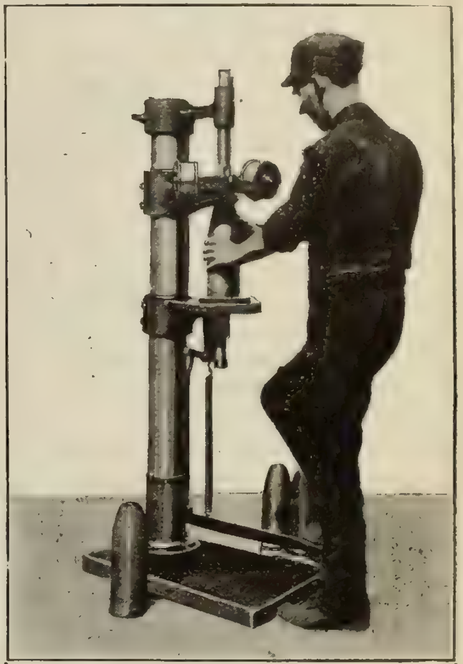
For Milling the three slots in the nose of

Mark 7 Shells

Adjustable to take any size shell from 4.5 to 9.2 inclusive.



ONE MOVEMENT of foot lever clamps the shell and feeds the three cutters in to the right depth.

CAPACITY ON 4.5—6 to 8 shells per minute. Actual cutting time is simply — "zip" and the three slots are finished.

THE MACHINE is complete with High Speed Cutters and drive pulleys which should run at about 550 revolutions per minute. It can be driven by three 2-inch belts, either from overhead counter or line shaft. The clamping device does not interfere with copper band, and altogether it will be found to be a very satisfactory tool—CONVENIENT and ACCURATE.

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10′-16′ Niles Vertical, two heads
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6′ Dreses Full Universal, with motor
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Two 2½′ Prentice Plain
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65—No. 2 Plain Head Hand Screw Machines, 1 1-16" capacity.
1—72" Pond Double Swivel Head Vertical Boring Mill.
1—16" x 8' LeBlond Quick-change Lathe.
1—22" Barnes Upright Drill, back-geared and power feed.
1—14" Sellers Slotter.
1—48" Gould & Eberhardt Automatic Gear Cutter.
1—20" 4-spindle Barnes Multiple Drill.
1—15" Gleason Semi-automatic Bevel Gear Planer.
2—16" x 6' LeBlond Quick-change Lathes, with taper attachment.
1—16" x 6' LeBlond Quick-change Lathe.
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2—21-inch Style H Gisholt, taper attachment.
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1—Sloan & Chace (new).

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A variety of new and used bench lathes with collets.

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1 84" Cincinnati, like new.

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100 Second-hand Lathe Chucks from 10 to 36 inch, Independent, at $1.00 per inch.

1 -16" Smith & Mills Back-geared Shaper.	$ 400
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1 35 H.P. Crocker Wheeler D.C. Motor, 220 volt, 700 R.P.M.	425
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1 Warner & Swasey Profiler.

PLANERS.

1- Pond 62" (widened pattern type), 9' bed.
1 36 x 36 x 10 Industrial Planer. one rail head and one side head.

TURRET LATHES.

1 No. 6 Foster Friction Geared Hand Screw Machine.
1 No. 4 Warner & Swasey Friction Geared Hand Screw Machine.
1 -No. 5 Pearson Hand Screw Machine.
1—1 x 8 Pierce Hand Screw Machine (new).
1 2" Cleveland Automatic Screw Machine (Model A).
2—2" Cleveland Jigger Feed Screw Machines.

AIR COMPRESSORS.

Steam.

1 - 12 x 12 x 12¼ x 12 Ingersoll Rand, Class M.F.1.
1—16 x 18 x 12 D. A. Union, S.L., 2 S. Air Compressor.
1 8 x 8 Westinghouse.

Belt.

2—10 x 10 Bury Hor., Belt-Driven (182 cu. ft.).
1 8 x 8 Ingersoll-Sergent Hor. (100 cu. ft.).
1 8 x 8 Chicago Pneumatic Hor. (100 cu. ft.).

DRILLS AND SLOTTERS.

3 -New 20" Buffalo Drills. W. & L.F.
1 17-spindle Moline.
1 5-spindle Barnes.
1 24" Niles Geared Slotter.

GEAR CUTTERS.

1 12" Becker-Brainard Automatic Gear Cutter.
1 -17" Newark Spur Gear Cutter, Automatic.

PRESSES.

1 No. 64 Toledo, S.S., B.G.
1—No. 95 Consolidated Press.
2 -1200-lb. B. & S. Roll Board Hammers.
1 800 lb. B. & S. Roll Board Hammer.
1—1200-lb. Toledo Roll Board Hammer.
1 No. 10 Zeh & Hahnemann Co. Platen Percussion Screw Power Press. 100 ton pressure.

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1 14 x 6 Cisco Lathe, new, with compound rest, swings 16⅝"	635.00
5 18 x 8 Cisco Lathe, new, with compound rest, swings 20⅝" ... each	960.00
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1—No. 3 Brown & Sharpe Plain Milling Machine. Stock.
1 No. 2 Kempsmith Plain Milling Machine. Dec. delivery.
1 No. 3 Wilmarth & Morman Wet Tool Grinder.
5 -18x8 Cisco Lathes, quick change gear. In stock.
1 13x5 South Bend Lathe. In stock.
1—14x6 Carroll-Jamieson Lathe, Q.C.G., taper attachment, relieving attachment, draw in collet. January delivery.
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3—No. 1 Dow Milling Machines, plain. In stock.
3- No. 1 Bickford Hand Milling Machines. In stock.
2—No. 1 Standard Hand Milling Machines. In stock.
1 No. 1½ Valley City Universal Milling Machine. Jan. delivery.
1 No. 1½ Valley City Plain Milling Machine. Dec. delivery.
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2 -No. 1 Wilmarth & Morman Universal Grinders. Jan. delivery.
1—No. 2 Wilmarth & Morman Surface Grinder. Jan. delivery.
1—28-in. Smith & Mills Triple Geared Shaper.
2 -32-in. Smith & Mills Triple Geared Shapers.
2 -16-in. Smith & Mills Back Geared Shapers.
1—14x6 Neat Lathe, C.R., P.C.F.
1—24x10 Advance Lathe, C.R., P.C.F., H.S., Q.C.G., D.B.G.
1—16x6 Advance Lathe, Q.C.G., D.B.G.
4—19x8 Sidney Lathes, Q.C.G., C.R.
6—21x8 Sidney Lathes, Q.C.G., C.R.

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52" Niles, car wheel boring mill.
62" Bement, horizontal.

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No. 10 Natco 8-spindles.
No. M-1 Natco 8-spindles.
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30" x 9" G. & E. Auto, for spur and bevel.
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36" Walcott, for spur.

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14" x 20" B. & S. Universal.
Gisholt Tool Grinder.
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12" x 5' Davis, c.r.
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16" x 6' Prentice, c.r.
16" x 6' Sebastian, p.r.
16" x 10' Greaves & Klusman, c.r.
17" x 10' Blaisdell, c.r.
18" x 6' Bradford, c.r., taper.
18" x 8' L. & S., pat. head, c.r., taper.
18" x 10' Bradford, c.r., taper.
18" x 12' Barker, c.r.
20" x 10' Flather, c.r.
20" x 14' Blaisdell, c.r.
21" x 12' New Haven, c.r.
21" x 12' Bradford, c.r., taper.
24" x 12' New Haven, c.r.
24" x 13' New Haven, c.r.
30" x 27' Reed, c.r., taper.
32" x 16' Blaisdell, c.r.
36" x 22' Lodge & Shipley, geared head, q.c.g., motor drive with motor.
68" x 20' Fifield, c.r., t.b.g.

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No. 4 LeBlond, plain.
No. 13 P. & W., Lincoln
No. 4-B Becker Vertical.
No. 5 Becker Vertical.

PLANERS

22" x 22" x 4' New Haven, one head.
30" x 30" x 12' Cincinnati, two heads.
36" x 36" x 12' Powell, single head, arranged for two.
36" x 36" x 16' Sellers, one head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.
42" x 36" x 12' Cincinnati, two heads.

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No. 20 Bliss, O.B., Inc.
No. 3 Walsh O.B. Inc.
No. 174 Consolidated, double crank.

SHAPERS

14" Pratt & Whitney.
14" Smith & Mills.
16" Gould & Eberhardt.
16" American.

SCREW MACHINES

No. 1 Chicago automatic.
1 3-16" Hartford Automatic.
⅞" Cleveland Automatic.
2" Cleveland automatic.
2¾" Cleveland automatic.
1" B. & S., plain.
16" P. & W., plain.

TURRET LATHES

16" Lodge & Shipley.
25" Niles.
No. 2 Warner & Swasey Hollow Hexagon.
2" x 24" Jones & Lamson.
24" Gisholt, spindle capacity 6¼".
3" x 36" Jones & Lamson, chucking outfit.

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Centering Machine, No. 1 Whitton.
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18 in. 30 x 96 in. Morton Gap Grinder.
No. 3 Landis Universal Grinder.
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No. 6-x Diamond Disc Grinder 14-in. Ring Wheel Chuck, one end.
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15 in. Gleason Bevel Gear Generator.
20 in. Grand Lees Gear Hobber; good as new.
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1—72 in. Niles-Bement-Pond Heavy Type Vertical Boring and Turning Mills, Motor-Driven, 220 Volts D.C.
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84 in. Sellers Vertical Boring and Turning Mill.
36 in. Niles Vertical Boring and Turning Mill, 2 swivel heads.
Betts Horizontal Boring Machine, 3 ft. Bar, 48 in. Swing.
Special Horizontal Boring and Facing Mill, 20 in. Swing, 42 in. between heads.
Beaman & Smith 2-spindle Boring and Facing Mill (Horizontal).
No. 2 Barrett Cylinder Borer with 5-in. spindle.
34 in. Colburn Vertical Turret Boring Mill, 4-jaw chuck, thread cutting attachment.

MILLING MACHINES.

No. 0 Pratt & Whitney Plain Milling Machine.
No. 2 Kempsmith Plain Miller.
No. 3 Becker-Brainard Universal Miller, Cone Driven, Gear Feed.
No. 2 Cincinnati Plain Miller, single pulley drive.
No. 3 Cincinnati Universal Miller with vertical and spiral attachment.
No. 9 Bement Vertical Milling Machine; fine condition.

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30 x 30 in. x 8 ft. Lodge & Davis Planer, one head on cross rail.
36 x 36 in. x 14 ft. Niles Planer, one head.
56 x 36 in. x 8 ft. Putnam Planer, two heads on crossed rail.
72 x 57 in. x 17 ft. Gleason Planer, two heads on cross rail.

SCREW MACHINES.

2—6-A Potter & Johnson Automatic Chucking Lathes.
2—No. 1 Foster Hand Screw Machines, wire feed and auto chuck; fine condition.
No. 2 Pierce.
No. 2 Bardons & Oliver Screw Machine.
2-in. Cleveland Automatic.
No. 3 Stecher Screw Machine.
No. 3 National Acme Automatic Screw Machine, 4 spindles, ⅞-in. capacity.
4—No. 54 National Acme 4-Spindle Auto Screw Machines.
No. 5 Warner & Swasey Screw Machine. 2¼-in capacity.
8—5A Potter & Johnson Automatic Chucking Lathes.
No. 53 National Acme Auto Screw Machine, single pulley drive, one inch capacity, fully equipped; almost new.
No. 515 National Acme Auto Screw Machine, 9-16 in. capacity.

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3 x 36 in. Jones & Lamson Turret Lathes, patent head type, with chucking equipment; fine condition.
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24 in. Gisholt Turret Lathes.
24 in. Steinle Turret Lathe, single pulley drive, 4-in. hole through spindle, chucking and bar equipment.
8—21 in. Gisholt Turret Lathes, belt driven.
Lodge & Davis Turret Lathe, power feed to turret, 18 in. swing, 2 in. hollow spindle.
10—13 in. Gisholt Turret Lathes.
14 in. Davis Turret Lathe, cone drive.
15—Reed Prentice Semi-Automatic Manufacturing Lathes, oil pans, pumps and regular equipment.

ENGINE LATHES.

5—Cataract Precision Lathes.
11 in. x 5 ft. Star Lathe, foot and belt drive.
18 in. x 6 ft. Bradford, arranged for motor drive.
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1—6-Spindle Foot-Burt, with 18 x 30 in. table.
1—10-Spindle Pratt & Whitney, 3-16 in. capacity, 4 in. circle.
1—10-Spindle Pratt & Whitney, 12 in. table, ½ in. capacity.
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❧

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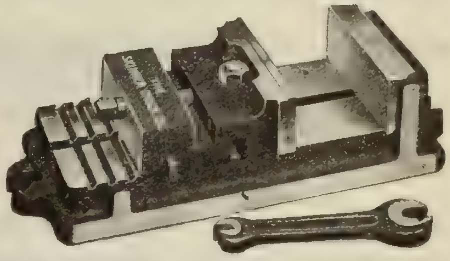

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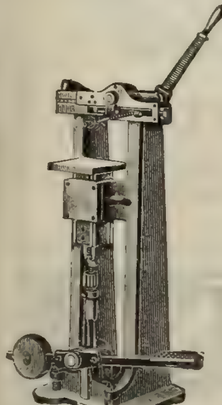

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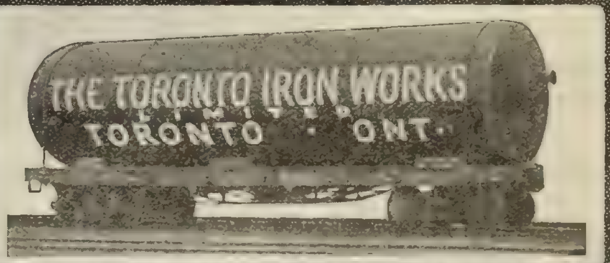

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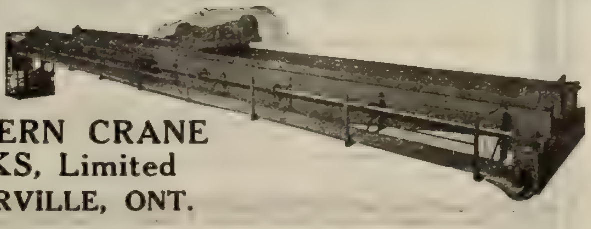

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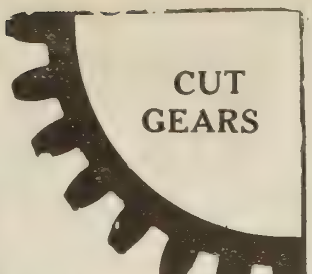

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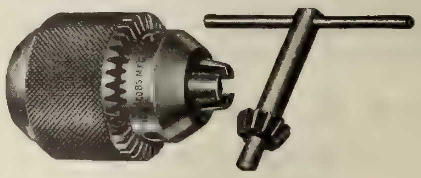

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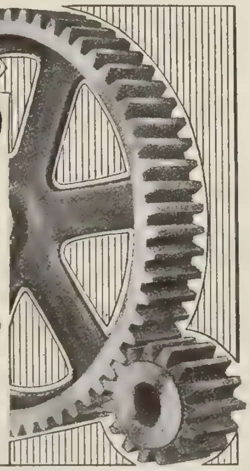

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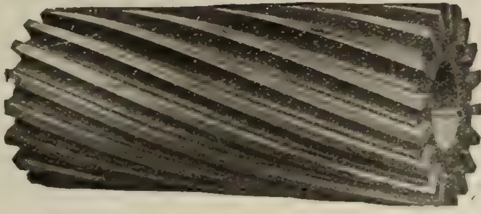

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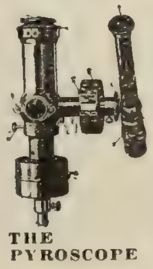
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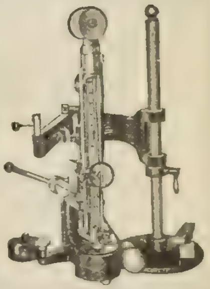
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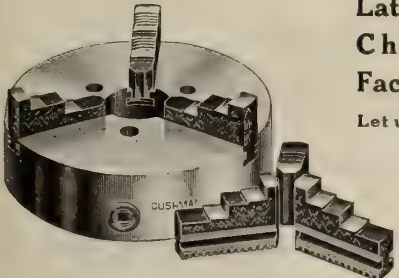

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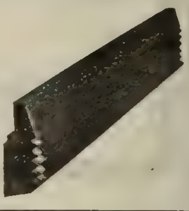

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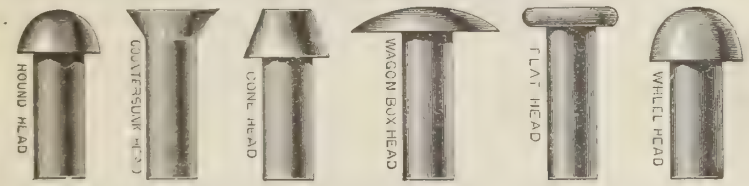

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Garlock-Walker Machinery Co., Toronto, Ont.
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Hurlbut, Rogers Machy. Co., South Sudbury, Mass.
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Foss & Hill Machy. Co., Montreal.
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Modern Tool Co., Erie, Pa.
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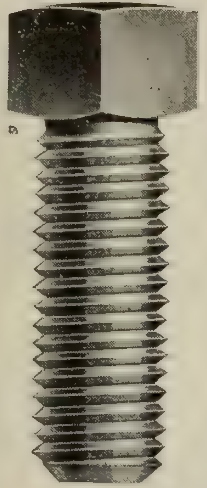

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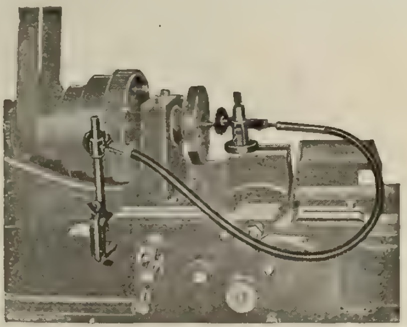

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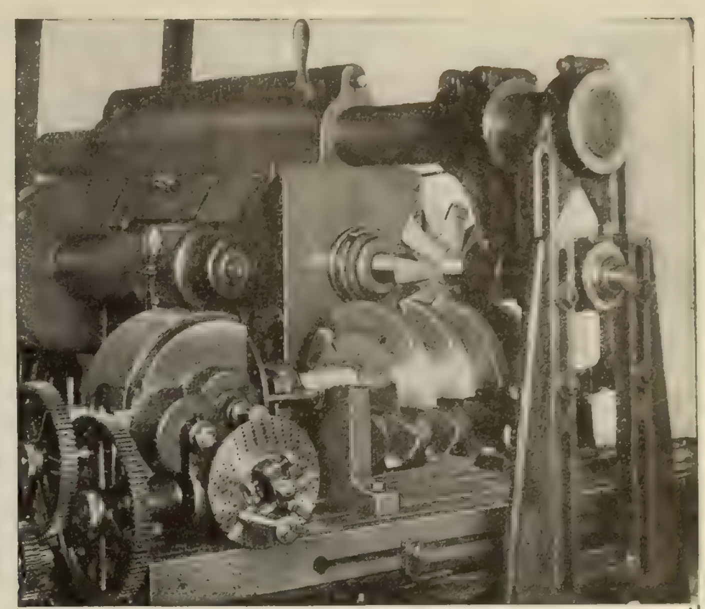

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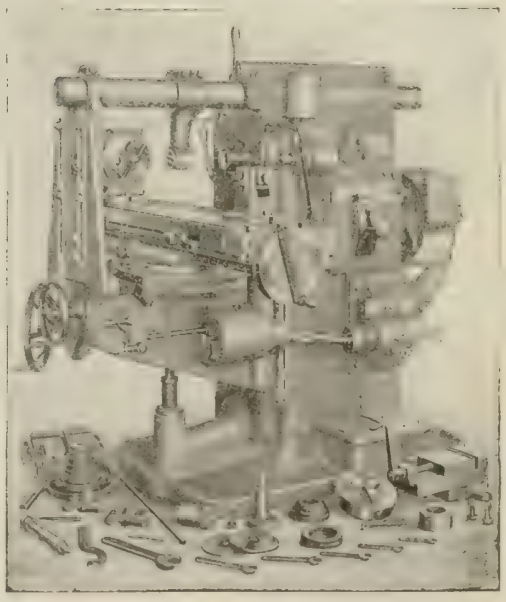

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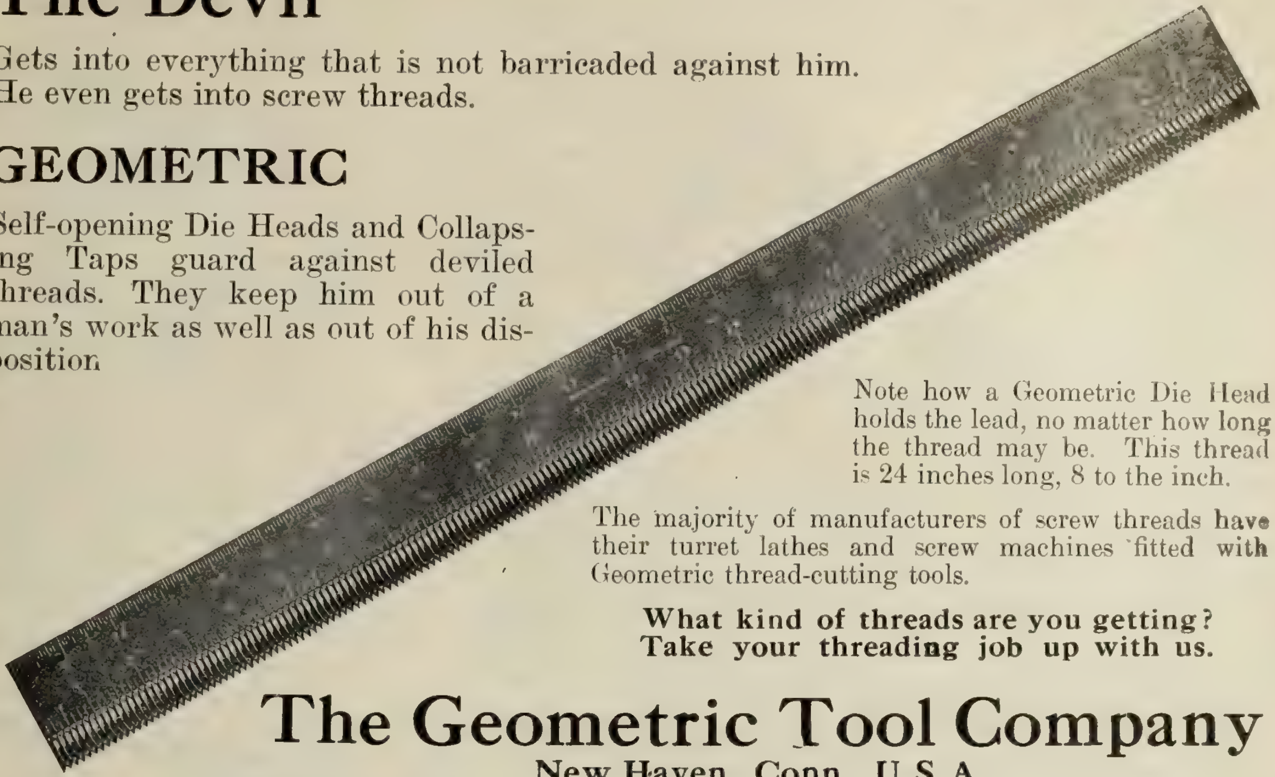

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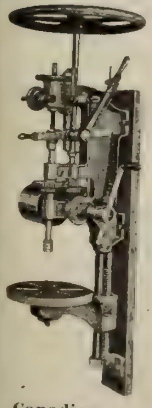

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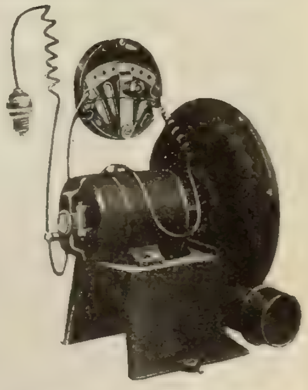

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H. W. Petrie, Toronto.
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D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.

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Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.
Winnipeg Gear & Engr. Co., Winnipeg, Man.

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Philadelphia Gear Works, Philadelphia, Pa.
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A. R. Williams Machy Co., Toronto.

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Norton Co., Worcester, Mass.

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Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont
Grant Mfg. & Machine Co., Toronto
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Morse Twist Drill and Machine Co., New Bedford
New Britain Machine Co., New Britain, Conn.
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H. W. Petrie, Toronto
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Pratt & Whitney Co., Dundas, Ont.

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Landis Machine Co., Waynesboro, Pa.
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Grant Mfg. & Machine Co., Bridgeport, Conn.
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Modern Tool Co., Erie, Pa.
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Foss & Hill Machy. Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago.
Norton Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
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Greenfield Machine Co., Greenfield, Mass.
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Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass
Hall & Sons, John H., Brantford.
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High Speed Hammer Co., Rochester, N.Y.
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Jenckes Mach. Co., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

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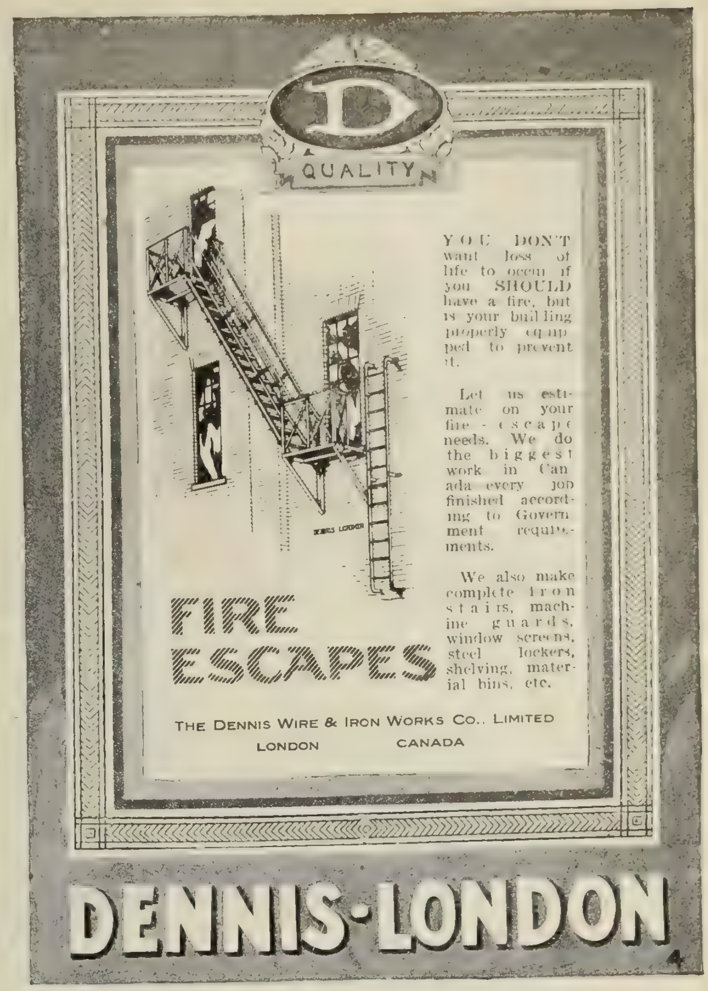

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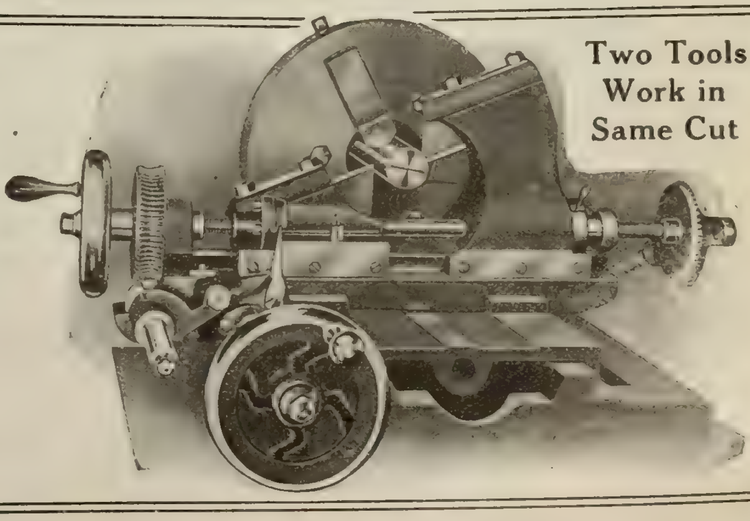

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Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
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Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
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A. R. Williams Machy. Co., Toronto.

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MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.

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Pritchard-Andrews Co., Ottawa, Can.

NIPPLE THREADING MACHINES
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Landis Machine Co., Waynesboro, Pa.

NITROGEN
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.

NOZZLES, SPRAY
Can. Blower & Forge Co., Kitchener, Ont.

NUTS, SEMI-FINISH AND FINISHED
Galt Machine Screw Co., Galt, Ont.

NUT BURRING MACHINES
National Machy. Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

NUT MACHINES (HOT)
National Machy. Co., Tiffin, O.
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NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machy. Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.
Victor Tool Co., Waynesboro, Pa.

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Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machy Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

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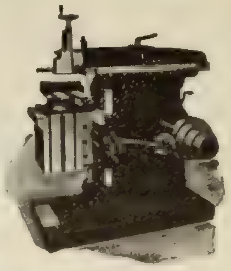

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Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
H. W. Petrie, Toronto.
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Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
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Atlas Press Co., Kalamazoo, Mich.

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Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

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Toledo Machine & Tool Co., Toledo, O.

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Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

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Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Niles-Bement-Pond Co., New York.
Wm. R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
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Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

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Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
Garlock-Walker Machinery Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

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Can. Fairbanks-Morse Co., Montreal.
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Dodge Mfg. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
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Can. Ingersoll-Rand Co., Sherbrooke, Que.
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Pratt & Whitney Co., Dundas, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

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Darling Bros., Ltd., Montreal, Que.
Hydraulic Press Mfg. Co., Mount Gilead, O.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

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Can. Blower & Forge Co., Kitchener, Ont.
Charles F. Elmes Eng. Works, Chicago.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

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Darling Brothers, Montreal.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
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Wm. R. Perrin, Ltd., Toronto.

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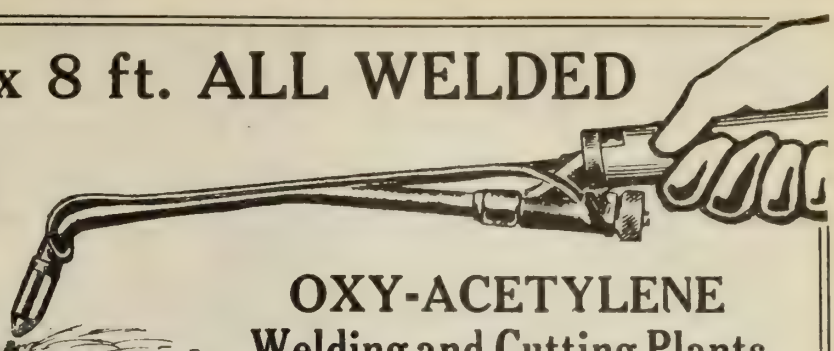

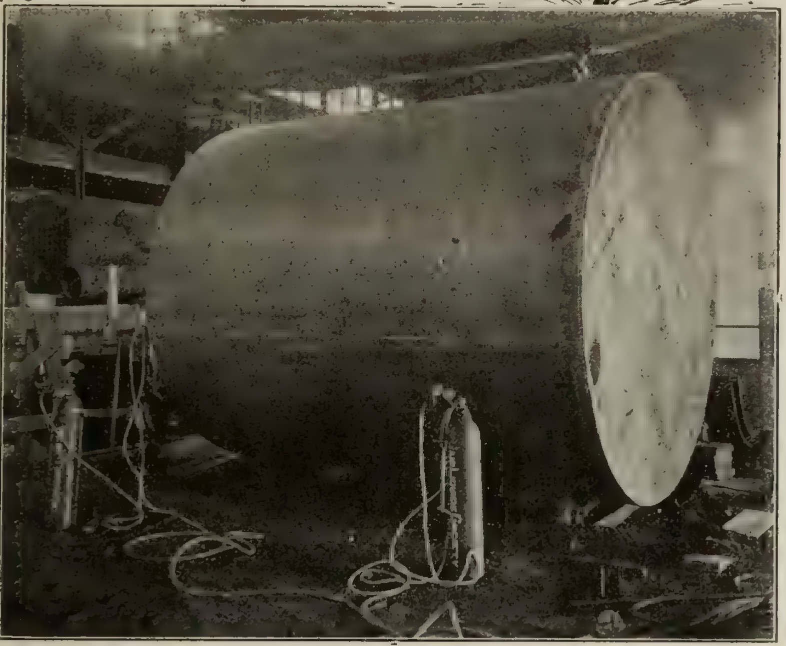

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Gardner, Robt. & Son, Montreal.
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Garvin Machine Co , New York.
A. B Jardine & Co., Hespeler.
Milholland, W. K., Co., Indianapolis, Ind.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
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Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

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Windsor Machine Co., Windsor, Vt.

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Steel Co. of Canada, Ltd , Hamilton, Ont.

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Morse Twist Drill & Machine Co , New Bedford.
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Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

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New York Machinery Co., New York.
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Simmons Machine Co., Albany, N.Y.
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Hendey Machine Co., Torrington, Conn.
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Dodge Mfg. Co., Toronto, Ont.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
A. R. Williams Machy. Co., Toronto.

SHARPENING STONES
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

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Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

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John Bertram & Sons Co., Dundas.
Bertrams, Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.
Wickes Brothers, Saginaw, Mich.

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John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

SHEARS, PNEUMATIC
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Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
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Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Peck, Stow & Wilcox, Cleveland, O.
Steel Bending Brake Works, Ltd., Chatham, Ont.

SHEET METAL STAMPINGS
Dominion Forge & Stpg. Co., Walkerville, Ont.

SHELL BANDING MACHINES, HYDRAULIC
Chapman Double Ball-Bearing Co., Toronto, Ont.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Lymburner, Ltd., Montreal.
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Wm. R., Toronto.
West Tire Setter Co., Rochester, N.Y.

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The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

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High Speed Hammer Co., Rochester, N.Y.

SHELL WASHER
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SHRAPNEL SHELL MARKER
Brown-Boggs Co., Hamilton, Ont.
Noble & Westbrook Mfg. Co., Hartford, Conn.

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Armstrong Bros. Tool Co., Chicago.

SILVER SOLDER
Geo. H. Lees & Co., Hamilton, Ont.

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Aikenhead Hardware Co., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

SLOTTERS
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.

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MacKinnon, Holmes Co., Sherbrooke, Que.

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Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford
J. H. Williams & Co., Brooklyn, N.Y.

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Brown, Boggs & Co., Hamilton, Can.

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Canada Metal Co., Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.

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Banfield, Edwin J., Toronto.
Banfield, W. H., & Sons, Toronto.
Bertram, John, & Sons Co., Dundas.
Bawden Machine Co., Toronto, Ont.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
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Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
Grant Mfg. & Machy. Co., Bridgeport, Conn
John H. Hall & Sons, Brantford.
Himoff Machine Co., New York, N.Y.
Jardine, A. B., & Co., Hespeler.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
D. McKenzie Machinery Co., Guelph, Ont.
Root & Van Dervoort Engr. Co., East Moline, Ill.
Smart-Turner Machine Co., Hamilton, Ont.
Webber Bros. Mach. Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.

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Cleveland Wire Spring Co., Cleveland.
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Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.

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Dennis Wire & Iron Works, London, Canada.

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Canada Machinery Corp., Galt, Ont.

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Pritchard-Andrews Co., Ottawa, Can.

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Zenith Coal & Steel Products, Montreal, Que.

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Union Drawn Steel Co., Hamilton, Ont.

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Can. Fairbanks-Morse Co., Montreal.

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Hawkridge Bros. Co., Boston, Mass.
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Vanadium Alloys Steel Co., Pittsburg, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
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Vanadium Alloys Steel Co., Pittsburgh, Pa.
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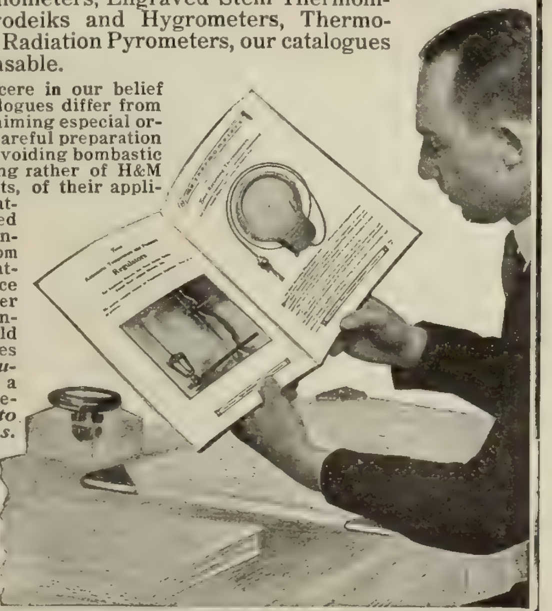

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Niles-Bement-Pond Co., New York.
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H. W. Petrie, Toronto.
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L. S. Starrett Co., Athol, Mass.

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TAPS, COLLAPSIBLE
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Manufacturers Equipment Co., Chicago, Ill.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Victor Tool Co., Waynesboro, Pa.

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Foss & Hill Machy. Co., Montreal.
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Toronto Testing Laboratory, Toronto.

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Garvin Machine Co., New York.
Geometric Tool Co., New Haven, Conn.
Landis Machine Co., Waynesboro, Pa.
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Pratt & Whitney Co., Dundas, Ont.
National Machy. Co., Tiffin, Ohio.
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Modern Tool Co., Erie, Pa.
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Whiting Foundry Equipment Co., Harvey, Ill.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
F. B. Shuster Co., New Haven, Conn.

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Garlock-Walker Machinery Co., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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Garlock-Walker Machinery Co., Toronto.
New Britain Machine Co., New Britain, Conn.
Oliver Machy. Co., Grand Rapids, Mich.
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R. E. T. Pringle, Ltd., Toronto, Ont.
A. R. Williams Machy. Co., Toronto

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Garlock-Walker Machinery Co., Toronto, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

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Garlock-Walker Machinery Co., Toronto, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

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Canadian Billings & Spencer, Ltd., Welland.
Keystone Mfg. Co., Buffalo, N.Y.
Wells Bros. Co. of Canada, Galt, Ont.
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Wells Bros. Co. of Canada, Galt, Ont.
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CANADIAN MACHINERY

AND MANUFACTURING NEWS

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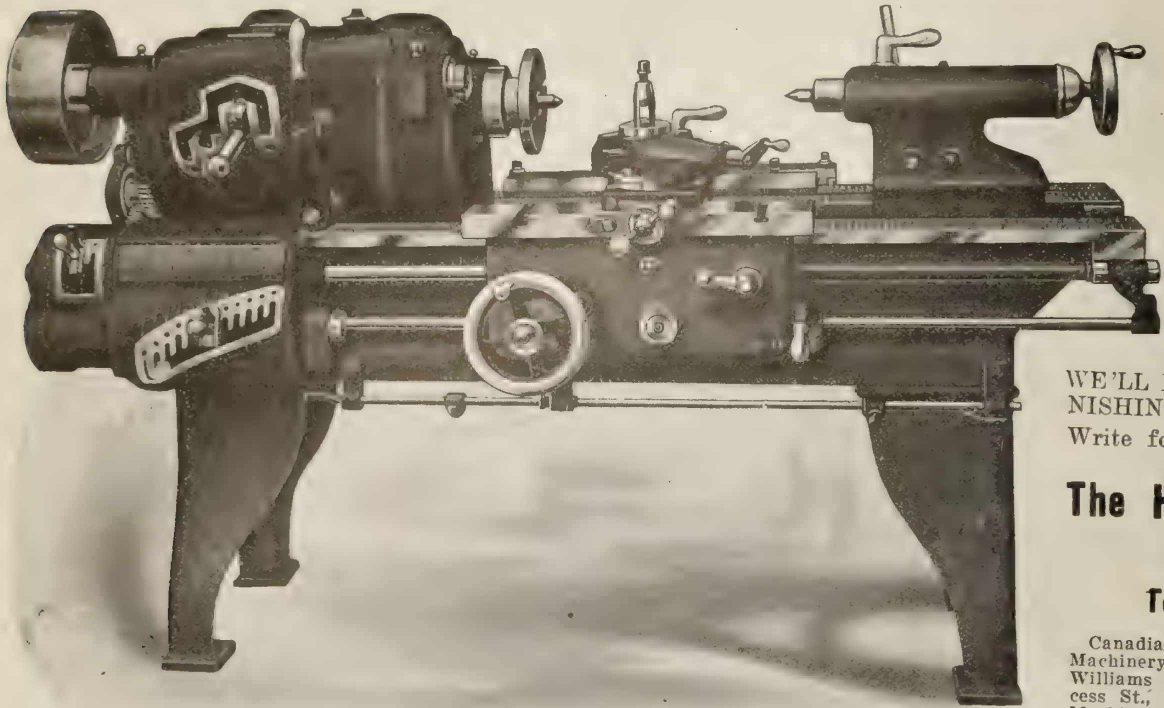

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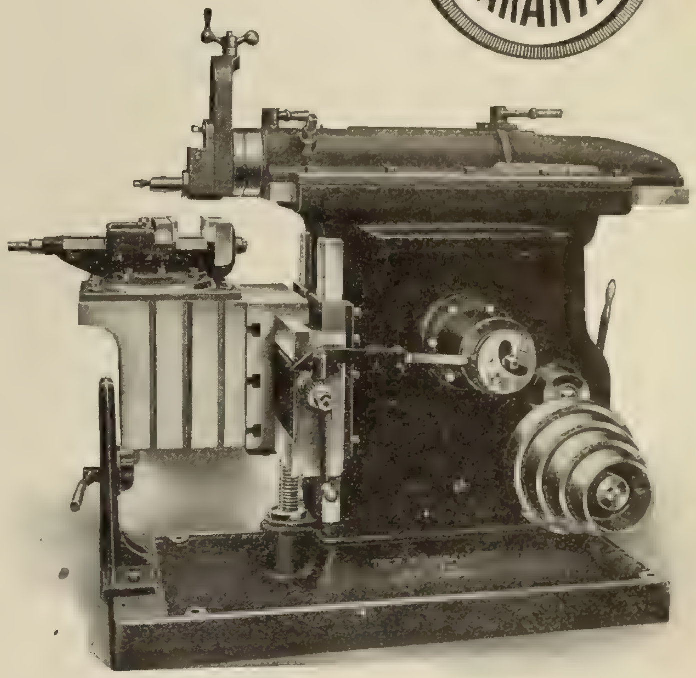

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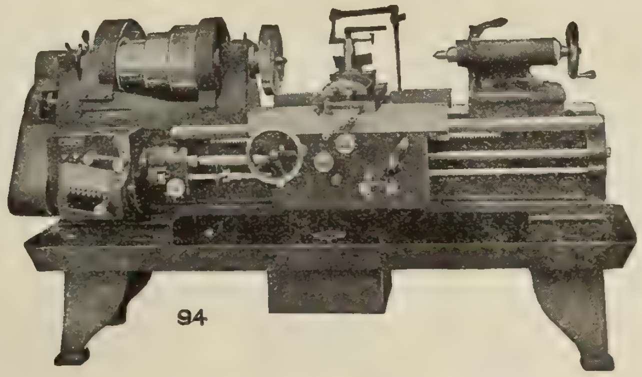

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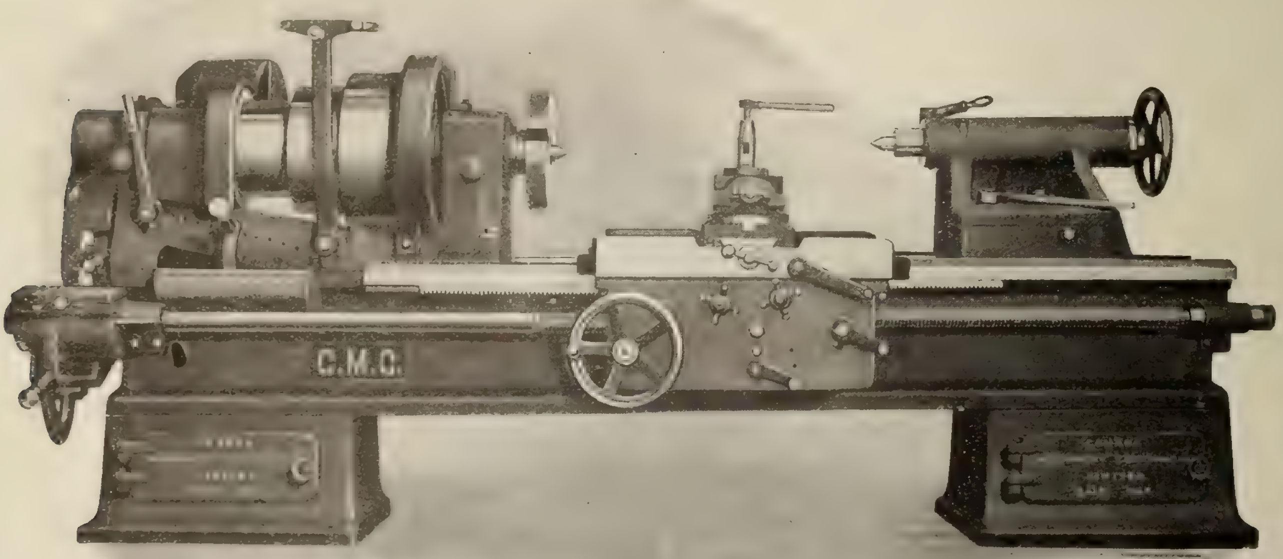

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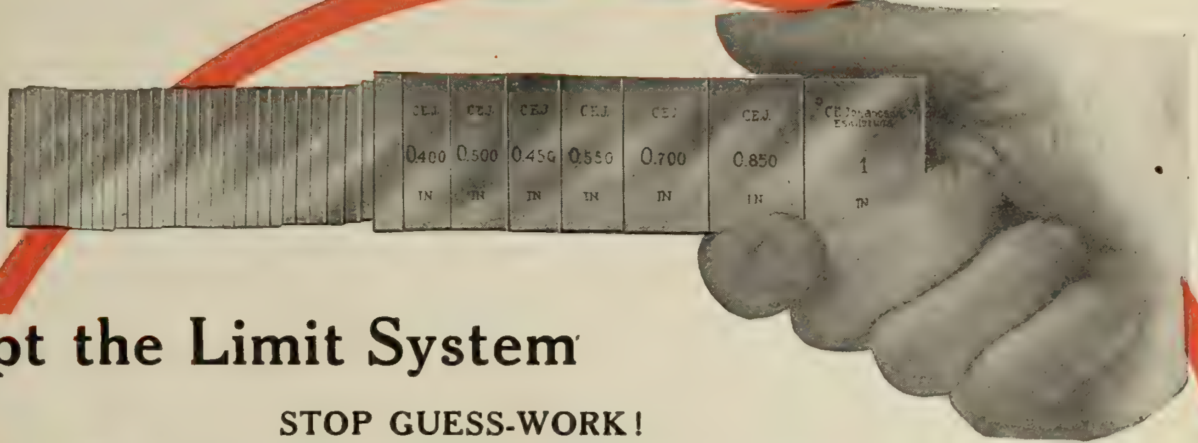

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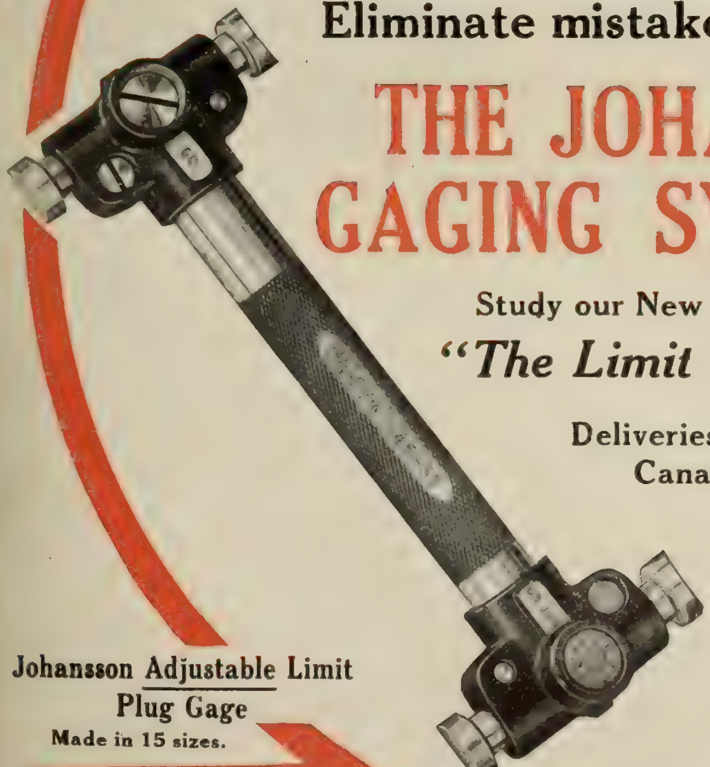

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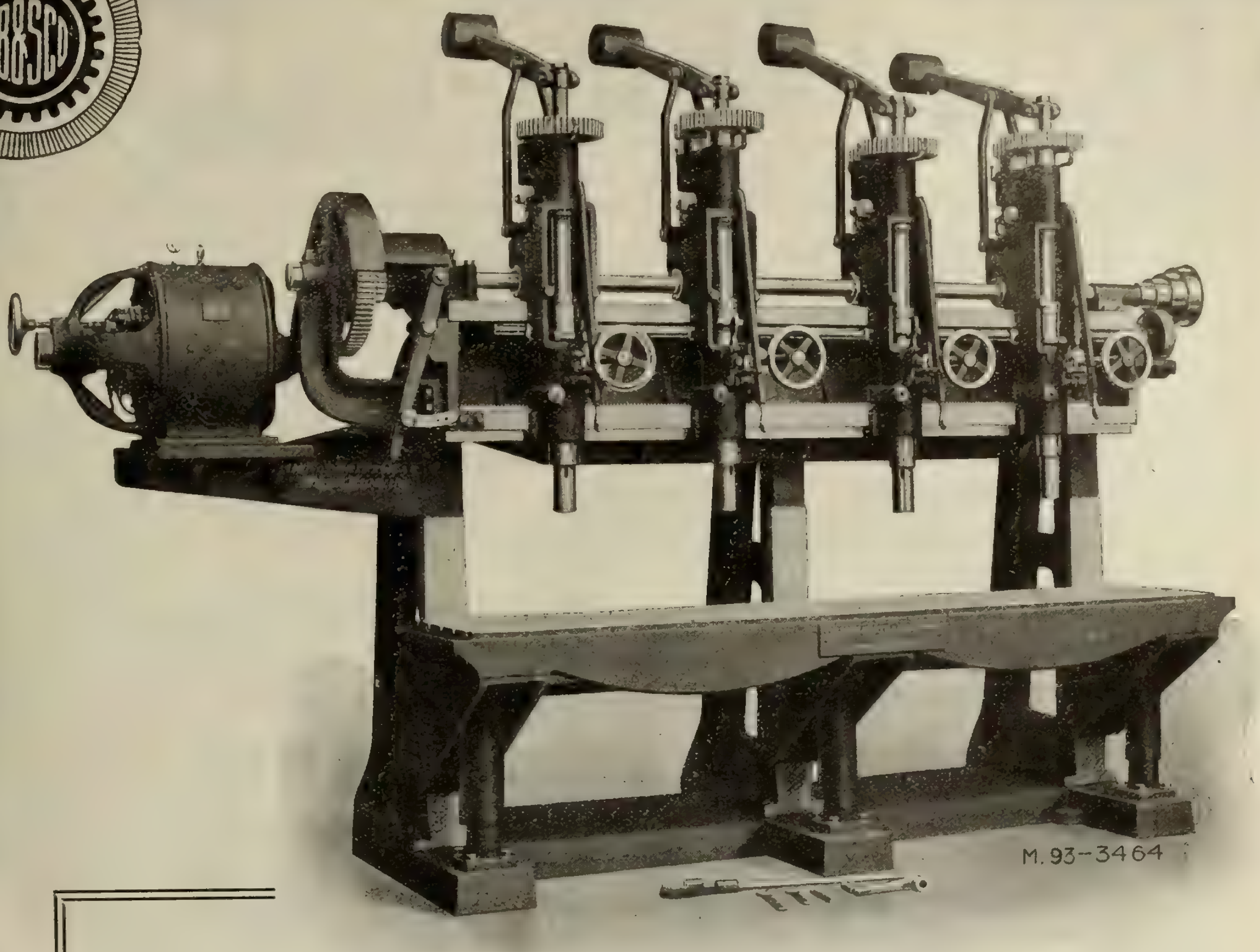

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The Publisher's Page

TORONTO December 21, 1916

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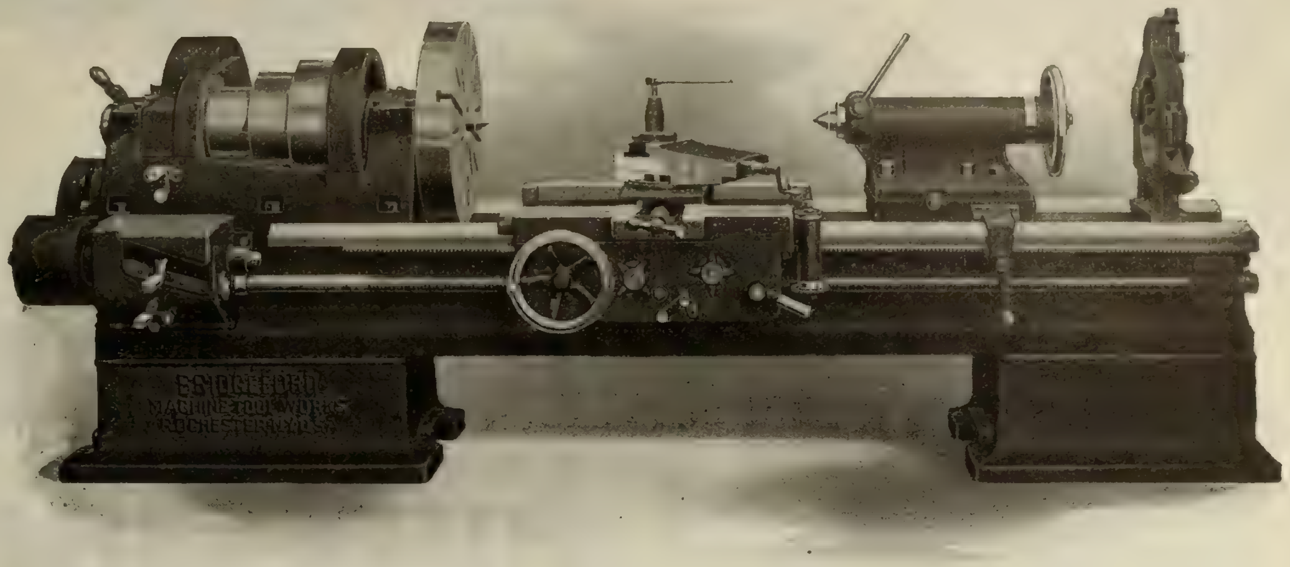

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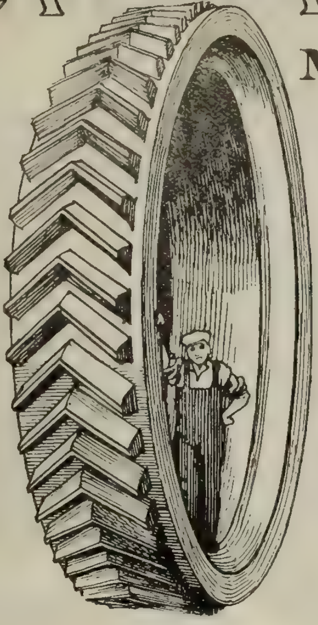

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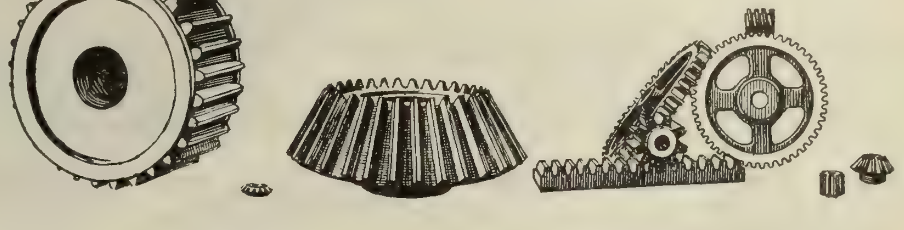

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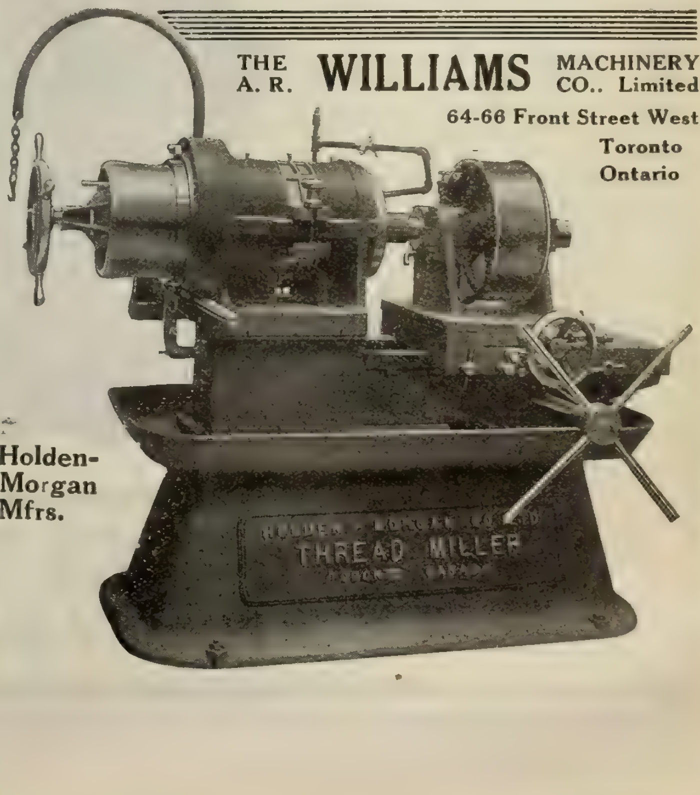

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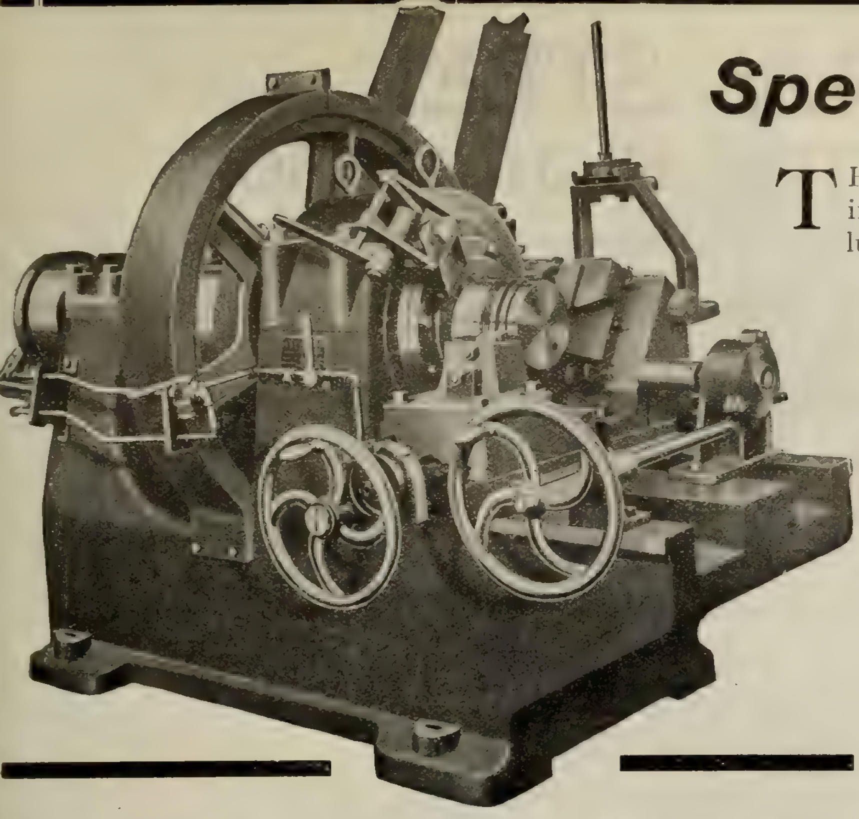

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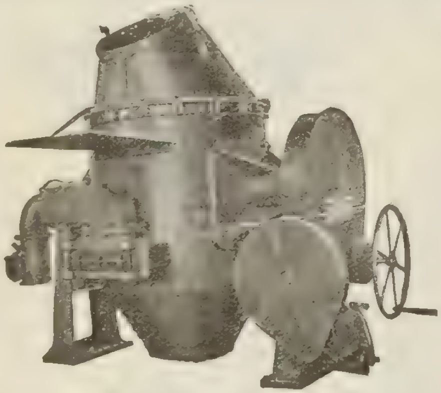

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Montreal Machinery & Supplies, Limited

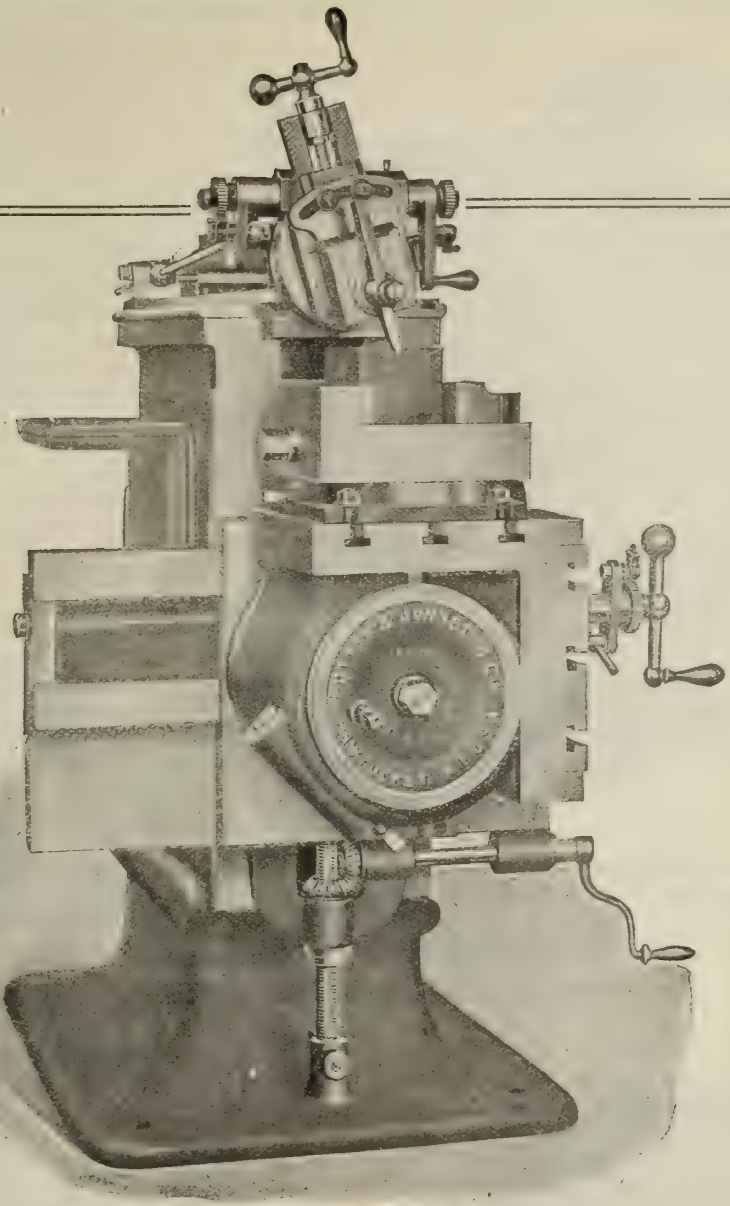
407 McGill Bldg., **MONTREAL, QUE.** 211 McGill Street

CONSULT US FOR REQUIREMENTS OF

Machinery, Machine Tools, Factory and Mill Supplies

We make a specialty of designing and equipping complete munition plants.
Our facilities in this connection will make our service of value to you,

WATCH OUR ADVERTISEMENT FOR FURTHER ANNOUNCEMENTS.



Potter & Johnston 15-inch Universal Shaping Machine

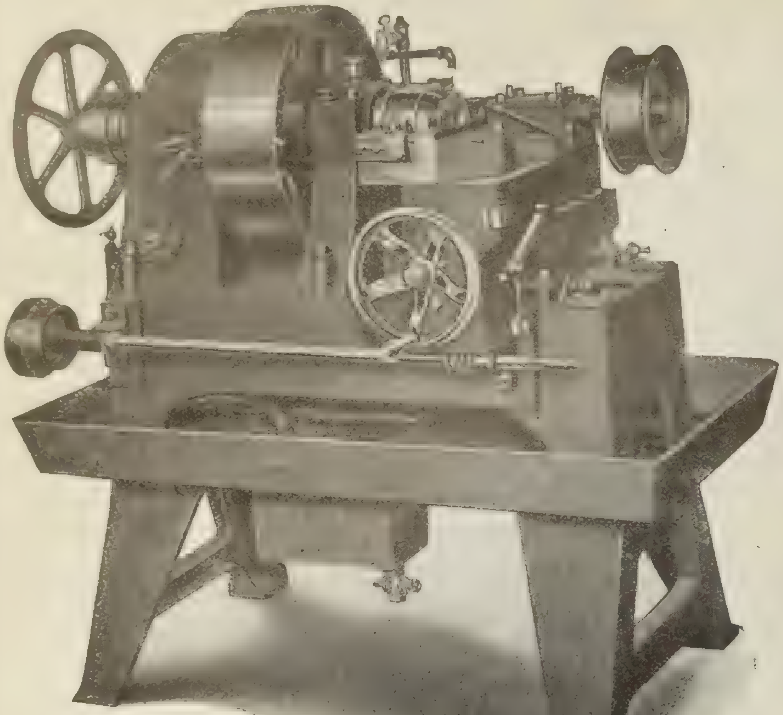
Simplicity of design, convenience, extreme care exercised in their manufacture, and the many universal features of the machines, combine to make the UNIVERSAL SHAPING MACHINES the most efficient and thoroughly reliable tools of their type on the market to-day, and place them in a class by themselves. The above illustration shows our 15" Universal Shaping Machine with Swivel table having auxiliary tilting side, power down feed on any angle, POWER ROTARY FEED for planing internal curves, automatic feed stop, graduated collars on tool head feed screw and table feed screw, swivel vise with graduated base.

WRITE FOR PRICES AND DELIVERIES

Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA



For Turning, Facing and Milling the thread on Gas Check Plugs for 6-inch High Explosive Shells.

THE BANFIELD PLUG MILLER

Patents applied for in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 18″ x 6″, with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10″ x 1½″ flanged pulley. The milling cutter is driven by an 8″ x 2½″ flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft **(all drives direct from main line shaft).** Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

For 18 pdr., 4.5 and 60 pdr. High Explosive Shells, Can furnish machines of same type, but somewhat lighter in construction. Particulars on request.

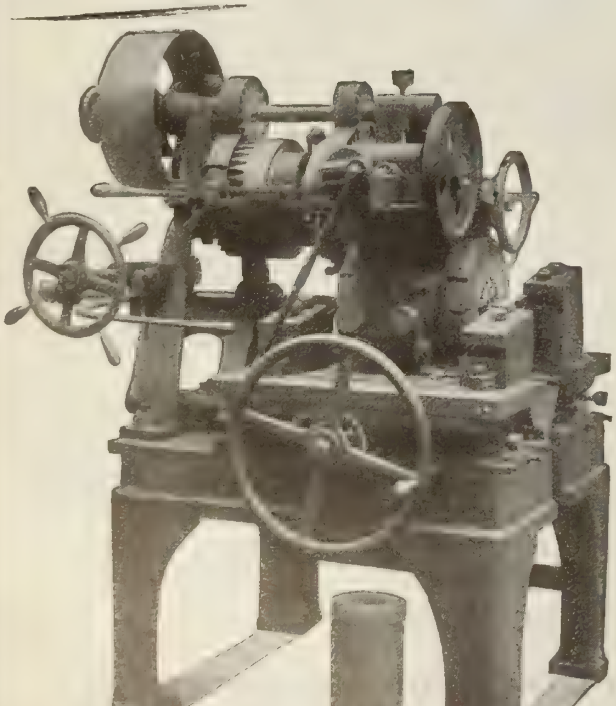
These machines are tooled up for finishing plain machined plugs if desired.

Write for prices and deliveries.

Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield
STAIR BUILDING, TORONTO, ONT.



CUTTING-OFF MACHINES

Quick Delivery

For cutting off and trimming 18 pr. to 9.2″ Shell Ingots and Forgings.

Cut shows 6″ machine as arranged for cutting off both ends of 6″ forging at once, using four tools.
Floor space approximately 4 ft. x 5 ft.
Two speeds with instantaneous change.
Will cut crooked and short Ingots.
No loose collars to put on Billets.
One helper to every three or four machines.

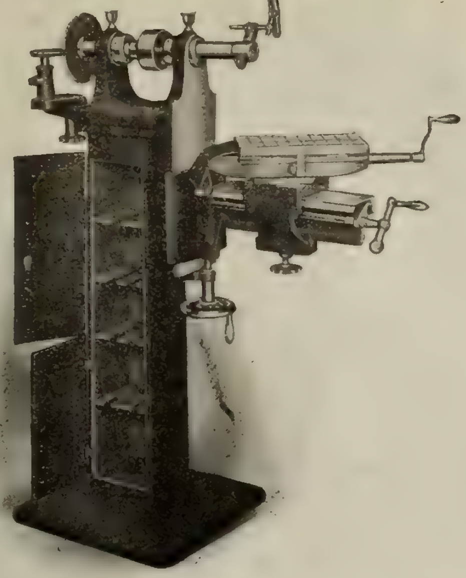
THE
Wm. Kennedy & Sons
LIMITED
OWEN SOUND, CANADA

OBTAIN THE BEST RESULTS

From Cutters and Tools kept Sharp on

GARVIN No. 3 UNIVERSAL
CUTTER AND SURFACE GRINDERS

Simple Light Running Accurate



GARVIN No. 3 Universal Cutter and Surface Grinder.
Use Code—Banish.

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriage is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14 in. x 6 in.; SURFACES, 9½ in. x 6 in.

For Further Information {ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

MANUFACTURED BY

THE GARVIN MACHINE COMPANY

Spring and Varick Streets ***(Visitors Welcome)*** **50 Years New York City**

GAUGES, TOOLS, FIXTURES, JIGS, DIES, etc.

that are right

Slocum, Avram & Slocum Laboratories, Inc.
531 West 21st St., New York, N.Y.

We are especially equipped to manufacture gauges, tools, fixtures, jigs for 80 Mk VII Fuse and 101 Detonator.

WIRE OR WRITE US.

Here's What You Need in Your Shop

because it's an all around machine that can be used to great advantage in place of larger tools costing twice the money.

With it you can cut gears, cams, sprockets, do key seating, profiling, die sinking, drilling, straddle milling and countless other operations.

The machine has ample power for hard work and is built to stand it too. While a big machine is getting ready the "Whitney" has done the job.

Simply send for Catalog A.

The Whitney Mfg. Co.

Hartford, Conn.

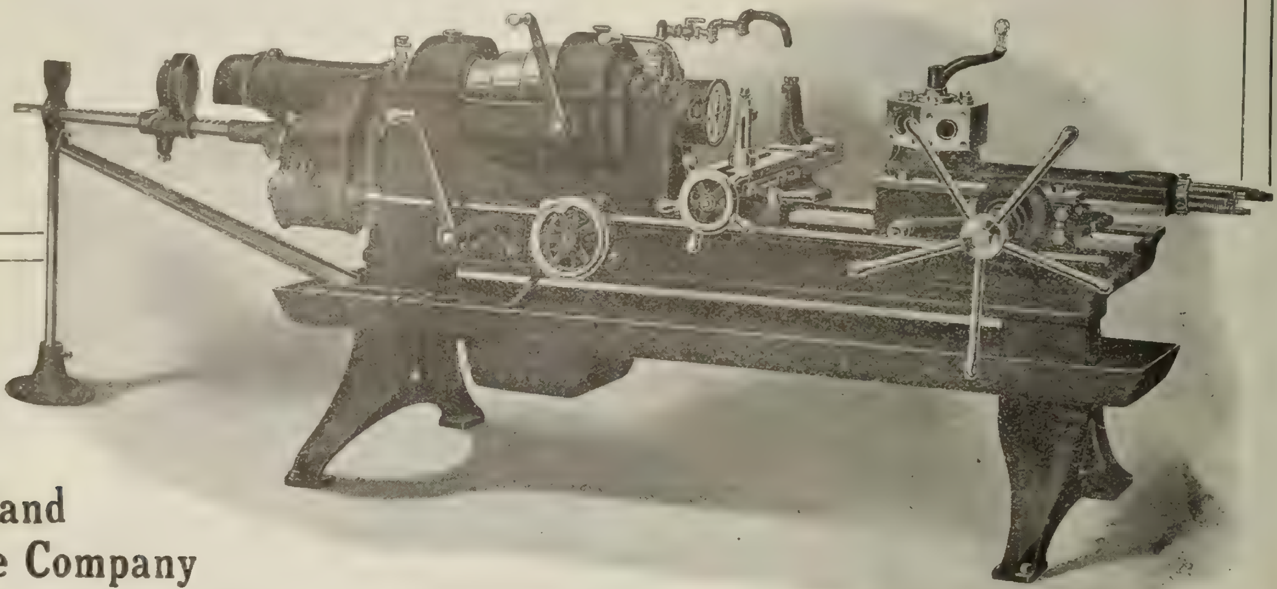
Chains — Keys — Hand Milling Machines

Millholland 1⅝ x 10 Turret Screw Machine

The combined result of two generations of engineering and mechanical experience. While, as a whole, it is no radical departure from established lines of the turret lathe, it has many original features, and with these features are combined well-known devices.

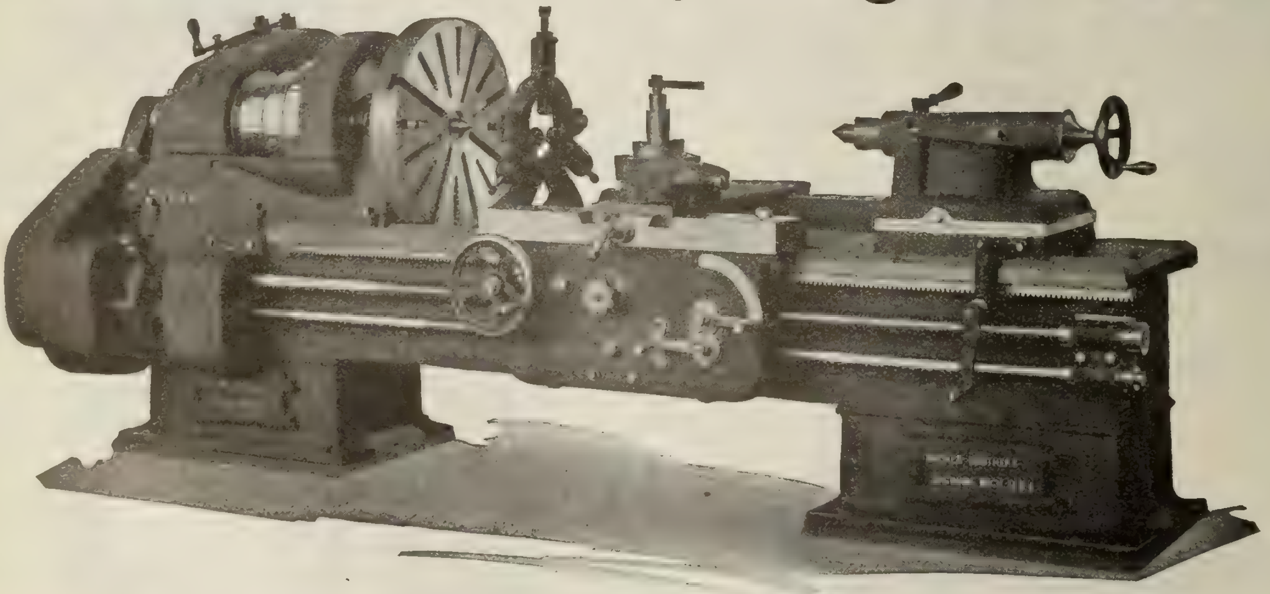
Safety, rigidity, convenience, production and durability are the ideas behind every step in their construction.

Your request will get you full details and specifications by early mail. Make it.



W. K.
Millholland
Machine Company
INDIANAPOLIS, IND., U.S.A.

Wickes Heavy Duty Engine Lathe



The Wickes 26" Heavy Duty Lathe.

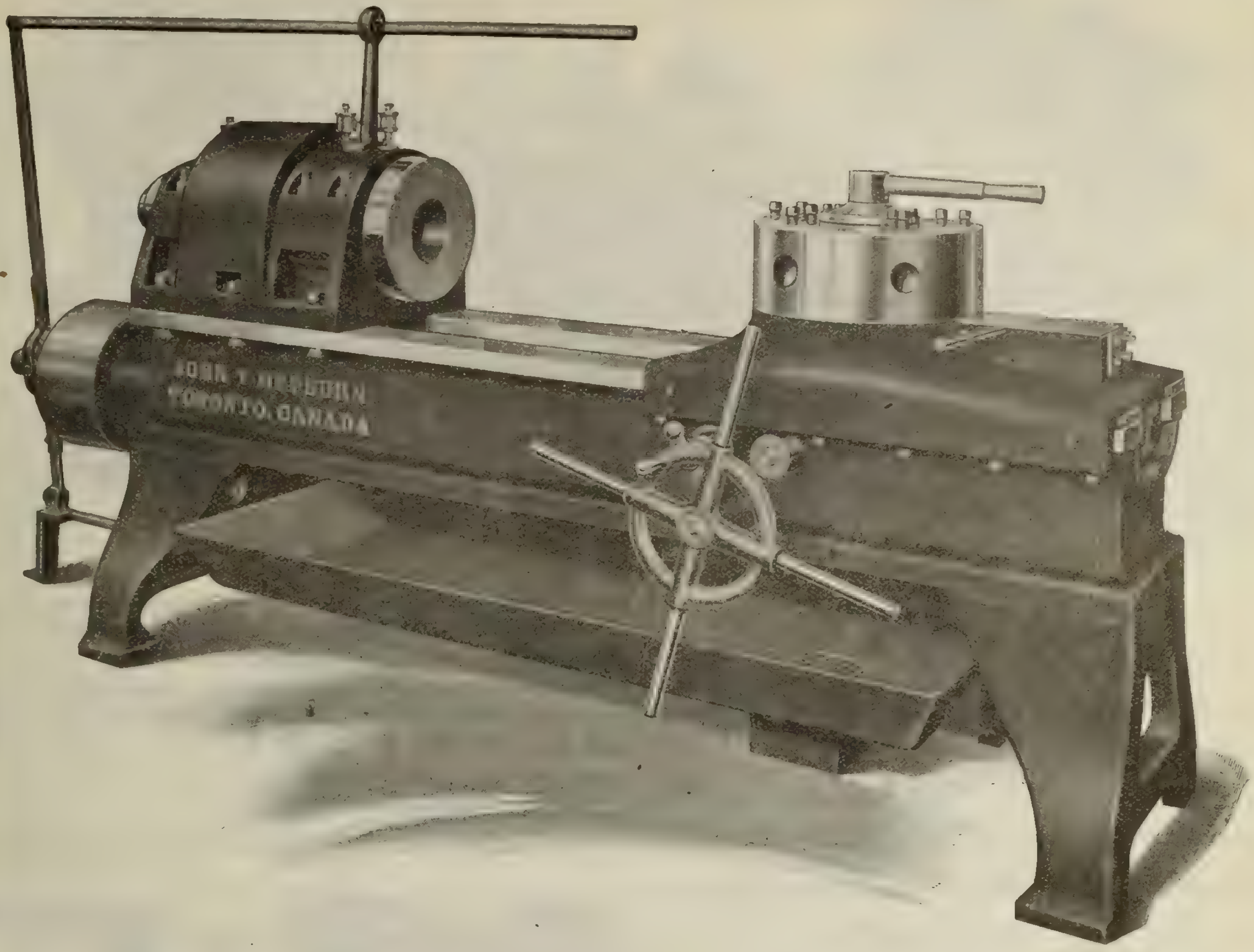
Built in lengths from 8 ft. up. Has 3-step cone, is double back-geared and has double plate apron.

This tool is built for the most severe service; all parts liberal in size; has special ball thrust bearings; steel apron gears; coarse pitch and wide face gears, which are all well guarded.

Let us tell you about this lathe and our 20", 32", also our 17" Rapid Production Lathe for Automobile and other work.

We can make prompt shipment.

WICKES BROTHERS **Saginaw, Michigan**



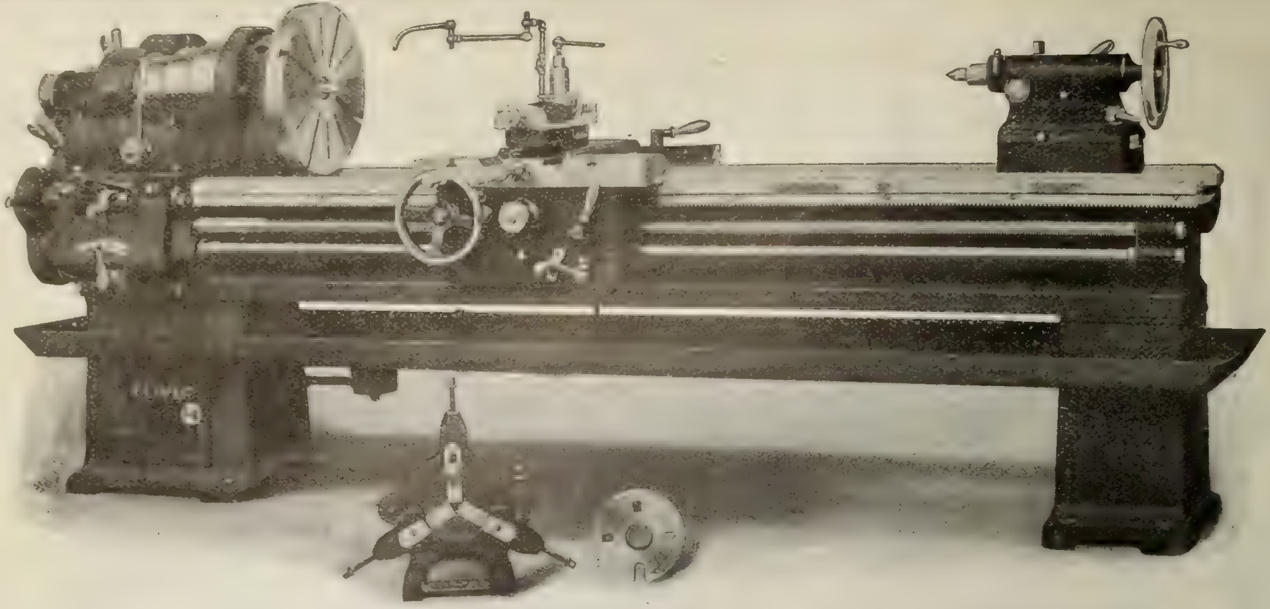
Real Boring Economy

IN your opinion what does boring economy signify? When designing this Hepburn Lathe we tried to put ourselves in your shoes. We tried to imagine the kind of a lathe that would give us the highest possible output per unit and at the same time give unequalled quality of work. Judging by the way in which munition firms are equipping themselves with our lathes, how they are replacing other lathes with the Hepburn, we think we have succeeded in giving you the ideal boring lathe.

The illustration here shown is for boring up to and including 6" shells. Simplicity of construction and operation is marked. Write us for full specifications and remember—immediate delivery.

Also a complete line of Turning and Turning Lathes for 8" and 9.2" shells.

John T. Hepburn Limited
18 to 60 Van Horne Street - Toronto, Ontario



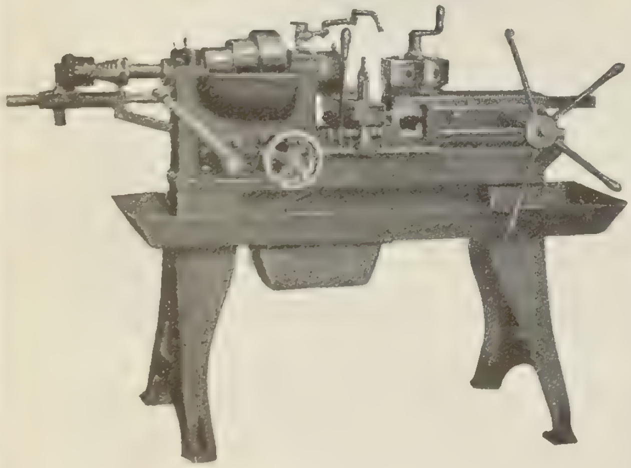
"Oliver" 18-inch Heavy-Duty Engine Lathe, 10-foot bed.

ENGINE LATHES
TURRET LATHES
SCREW MACHINES

DOMINION MACHINERY CO., TORONTO
Agents for Ontario

OLIVER MACHINERY CO.
GRAND RAPIDS, MICH.

The "STENO"
1 in. x 7 in. TURRET HAND
SCREW MACHINE

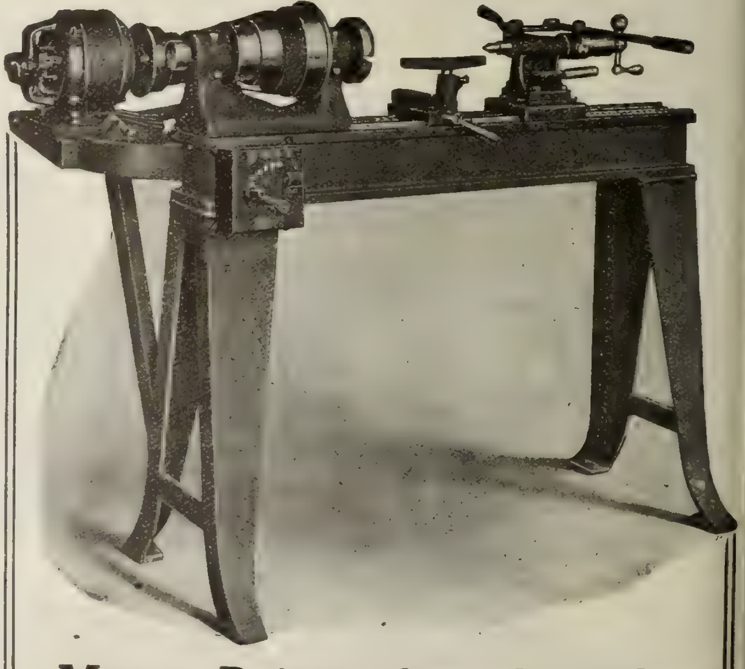


We have excellent facilities for Designing and Making the tools for your special job.

Ask for estimates.

The Stenotype Company Indianapolis, Indiana, U.S.A.

Manufacturers of the "STENO" Duplex Surface Grinder
The "STENO" 1 in. x 7 in. Turret Hand Screw Machine and
"STENO" Milling Cutters Reamers, Fixtures, Jigs and Gauges.

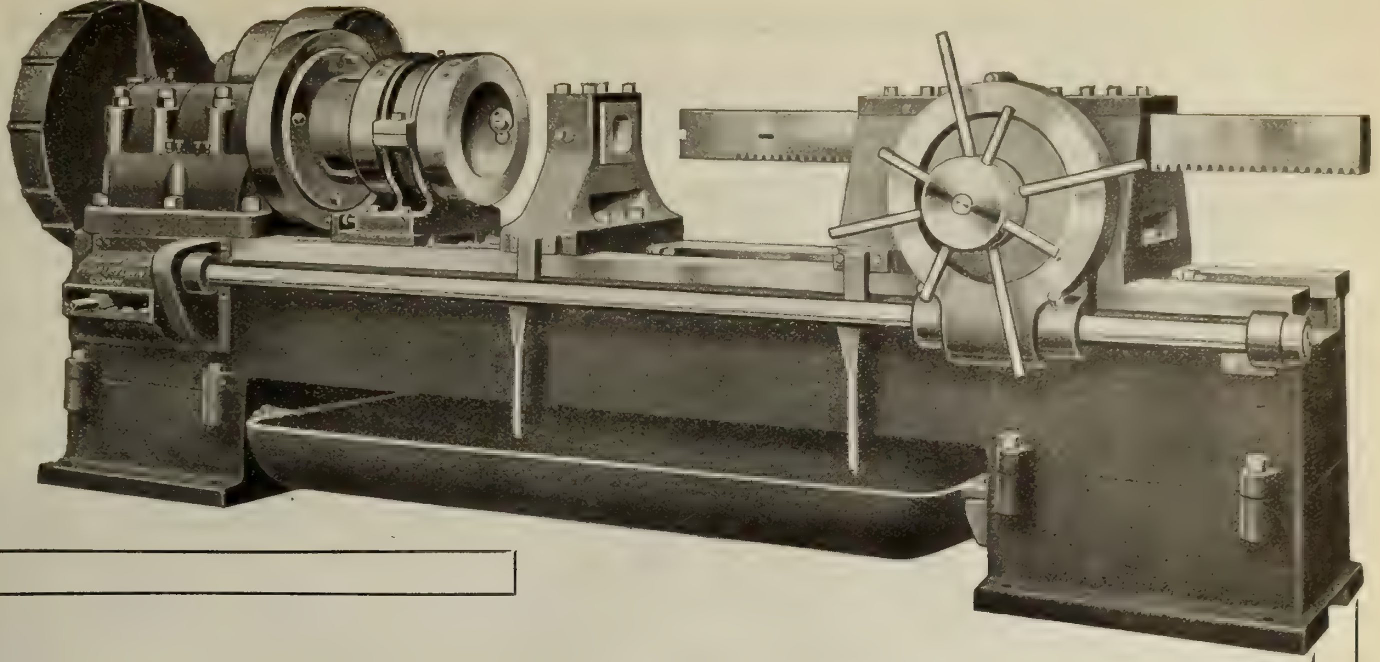


Motor Driven Speed Lathe

This style of motor drive employs a constant speed motor mounted on a plate having an extension arm to support a bearing for the outer end of the motor shaft. The motor plate is fitted to a slide on a shelf which is securely fastened to the back of the lathe bed. The motor plate is moved by means of a screw which tightens or loosens the belt. A four-step cone pulley on the motor shaft is belted to a four-step cone pulley on the spindle. This gives the same speed variation as when a countershaft is used, and by means of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is crossed-braced and all clamping levers are above the ways.

J. G. BLOUNT CO. - Everett, Mass., U.S.A.



Look That Illustration Over

Its very massiveness alone would make it a tower of strength. But massiveness does not necessarily mean strength. Scientific construction, expert knowledge of the requirements of a lathe of this character, highest grade materials and "Connecticut" features all combined with massiveness, have made this lathe one of rare quality and strength.

Note the headstock, centre rest, tailstock. For a 9.2″ turning or boring operation the strength is easily seen here. The enclosed gearing, the heavy bed, the oil pan, and the legs are further features worthy of your notice.

The illustration is a High Duty Lathe with pot chuck and boring tailstock. The same headstock is also used for turning operations, with carriage in place of steady rest, and screw tailstock in place of rack feed.

The "Connecticut" method of boring large shells gives the most rapid production per unit. Other methods may cost less to install but they cannot give you the results "Connecticut" gives. Remember that when inquiring.

Diam. of spindle 6″.
2 step cone.
2 speed countershaft.
5½ inch Square Boring Rack.

W. & B. DOUGLAS, Inc., Manufacturers

Agents:
Canadian Fairbanks-Morse Co., Limited - Toronto

MIDDLETOWN
Connecticut - - U.S.A.

Agents:
Williams & Wilson Limited, Montreal

If any advertisement interests you, tear it out now and place with letters to be answered.

He got it—and it was an Aloxite Wheel

HE wanted a wheel for a special internal job—grinding hardened steel sleeves. ¶ The wheel had to cut free and fast and clean, holding its shape so as to insure absolute accuracy—a wheel that was positively uniform; that would show long life and increase his production. He got it—

It was an Aloxite Wheel

Getting in touch with Carborundum service brings you in touch with the right wheel in the right place

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

NEW YORK CHICAGO BOSTON PHILADELPHIA PITTSBURGH CLEVELAND CINCINNATI MILWAUKEE GRAND RAPIDS

WE BUILD THEM BY HUNDREDS

Standardized. Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable practical grinding outfit.

only

$75

Complete

The Blake & Johnson Co., Waterbury, Conn.

Assuming that you want a grinder that is better than the average—

A grinder with massive table, micrometer adjustments, very long knee and gibs, and extra heavy head- and tailstock—it will pay you to investigate the

Standard No. 6
Universal Grinding Machine

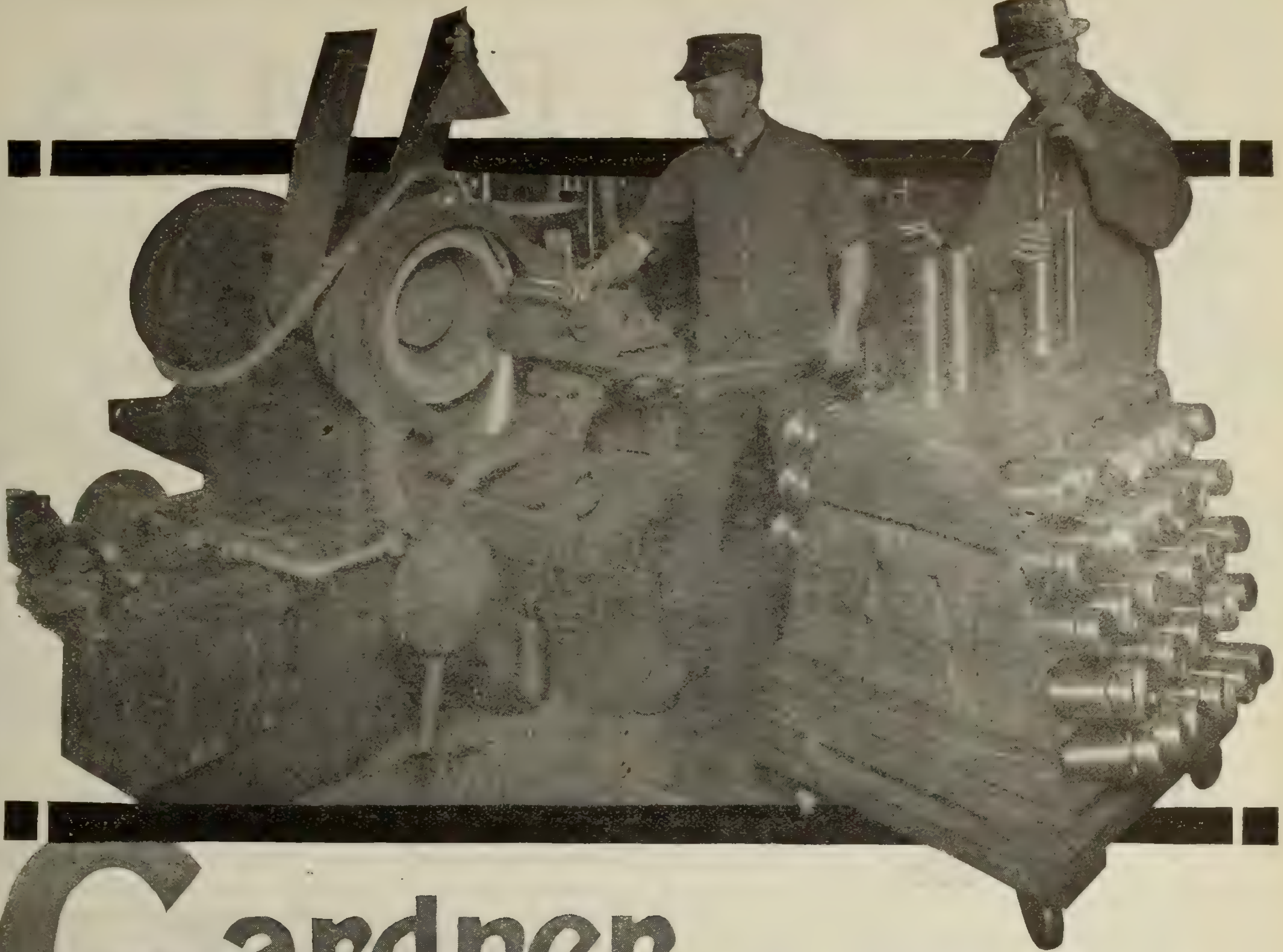
In addition, you'll find that the headstock is fitted with large bearing for chuck spindle and with special bronze bearings of navy specifications, spindle is tapped and tapered, bored to take wheel arbors and bearings are 1 in. in dia. and 2¾ in. long, and an exceptionally simple and sturdy countershaft with self-lubricating bearings.

Start the investigation by sending for the full details—to-day.

Simmons Machine Co., Inc.

1001 Singer Bldg., New York City
981 Broadway. Albany, N.Y.

The World Over



Gardner Grinders

Illustration shows a grinder developed especially for removing the hub or centre projection from the ends of shells. This machine is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates. We build a much more powerful grinder to be used for these same operations on 6-inch shells.

Features :

High-grade Babbitt Bearings and Lever Feed.

Rapid clamping of Shell into "V" fixture.

Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.

Can be equipped and operated at both ends for double output.

Output, according to size of projection to be removed from 40 to 100 per hour. Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever-feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments. Weight, 4,500 lbs.

For further particulars write:

■ The Gardner Machine Company, Beloit, Wis, U.S.A. ■

Band Turning Lathe

The finished product depends largely on the quality of the castings that form the completed lathe. You know that.

We have an interesting and greatly profitable proposition to give you if you can machine your own castings. We will supply complete sets of castings for Boring Lathes, Base Boring Lathes, Lathes for Waving, Band Turning Lathes, Band Turning Presses for 4.5", 5" and 6" H.E. Shells. These castings are of the same quality our own machines are made from.

Get further particulars.

Marsh & Henthorn
BELLEVILLE, ONT. CANADA

ELMES

Hydraulic Machinery

Started 1857

Which means experience and responsibility.

Charles F. Elmes Engineering Works
217 No. Morgan St., CHICAGO, ILL.

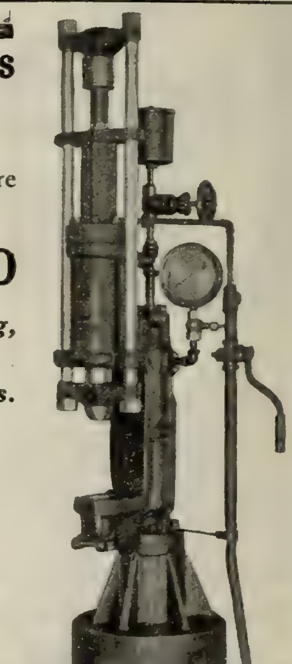
Three Machines In One

No tool in your shop is more efficient than this

METALWOOD

Combination Forcing, Broaching and Straightening Press.

It is one of the handiest of shop tools for all work such as pressing in bushings, broaching, and the straightening of small shapes. Auxiliary tables and fixtures not shown in illustration. Once installed, a multitude of special uses for the machine keep suggesting themselves and its speed makes it a **great producer.**

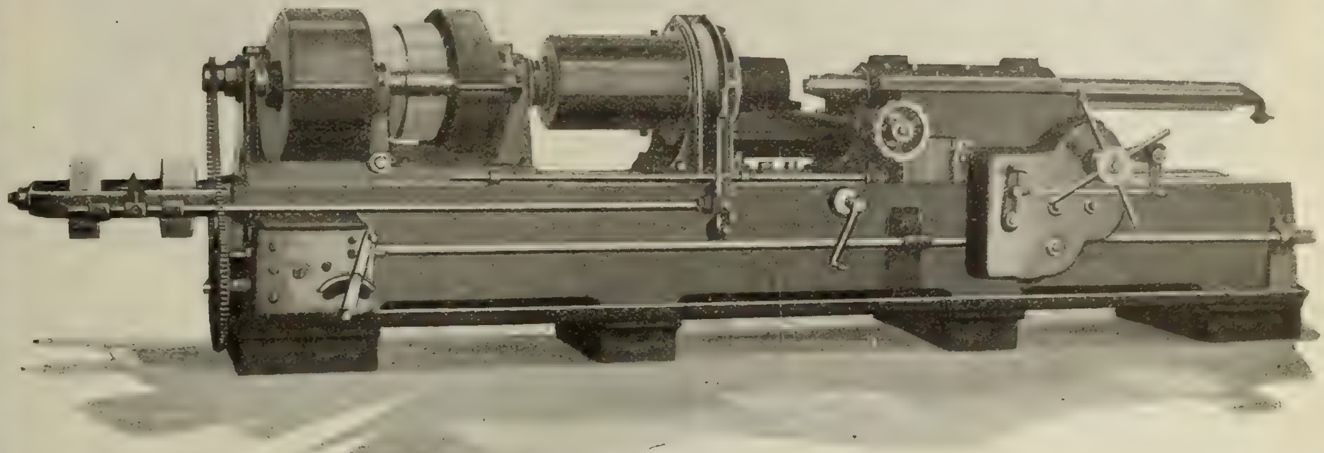


Metalwood Mfg. Co.

Leib & Wight Sts.,
DETROIT, MICH.

GARLOCK-WALKER MACHINERY CO., LIMITED
32 Front Street West TORONTO Telephone Main 5346

For INTERIOR Roughing and Finishing by Profile Attachment or by Removable Form Cutters, on 8-in., 9.2-in., 12 in. Projectiles



G. & L. HEAVY BORING LATHE

Front Spindle Bearing $5\frac{15}{16}$ in. x 10 in. Steel Spindle. Double Back Geared. Quick Return to Boring Bar Carriage. Machine Complete Ready for use, without Cutters. Weight, 16,000 lbs.

METAL AND WOODWORKING MACHINERY OF ALL KINDS

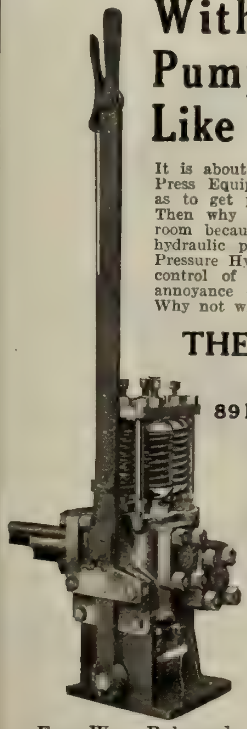
HYDRAULIC MG MACHINERY

A Hydraulic Press Equipment With Poor Hydraulic Pumps and Valves is Like a Currentless Motor.

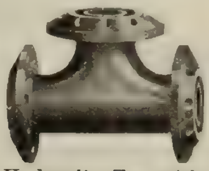
It is about as easy to control the operation of Hydraulic Press Equipment with poor Hydraulic Pumps and Valves as to get power from an electric motor without current. Then why continue to experience difficulty in your press room because of poorly designed, inefficient, low pressure hydraulic pumps and valves when "Mount Gilead" High Pressure Hydraulic Pumps and Valves will give you perfect control of presses, ease of operation, and save you the annoyance of constant trouble and excessive repair bills. Why not write us to-day?

THE HYDRAULIC PRESS MFG. CO.
89 Lincoln Ave., Mount Gilead, O., U.S.A.

Eastern Office: Room 1105-R, 39-41 Cortlandt St., New York City. Canadian Agents: A. R. Williams Machinery Co., Ltd., Toronto, Ont., and St. John, N.B.; Canadian Fairbanks-Morse Co., Toronto and Montreal; McLean & Barker, Southam Bldg., Montreal; Canadian Equipment & Supply Co., Edmonton, Alberta.



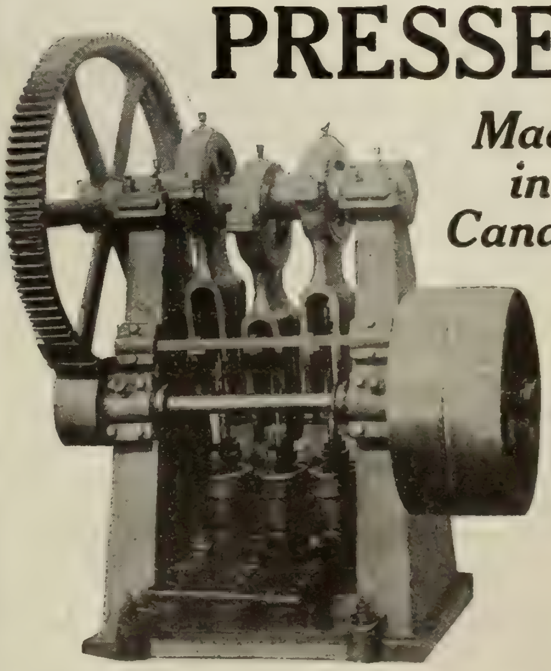
Four-Way Balanced Poppet Operating Valve.



Hydraulic Tee with Flanged Connections.

PRESSES

Made in Canada



Hydraulic Presses, Pumps and Accumulators for all purposes.

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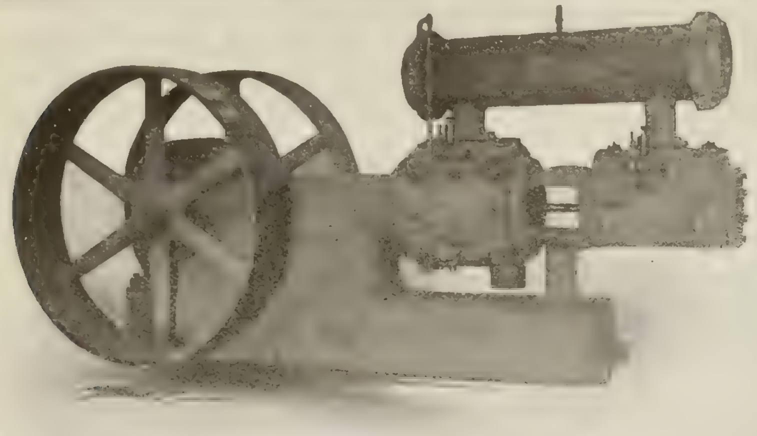
TORONTO, CANADA



Compressors

Maximum Power
Minimum Co

We do not mean that this is a "cheap" compressor. But we do claim that the first cost is as near its only cost as is possible in a piece of machinery. Its operating cost is where the saving comes in. Being built on scientific exactness it embodies features of great simplicity, but powerful construction. Made in sizes suitable for any purpose. Power or direct-connected steam.

For small plants we build compressors giving pressures from 10 to 100 lbs. With short belt drive attachment, compressors require much less space, but no matter how small, they all embody that "maximum power, minimum cost feature." Any of our offices will give you full information.

Canadian Ingersoll Rand
Company, Limited
Commercial Union Bldg., Montreal, Canada

Works at Sherbrooke, Quebec, Canada

Sydney **Timmins**
Toronto **Winnipeg**
Cobalt **Nelson**
Vancouver

A New Thing in Shell Gauges

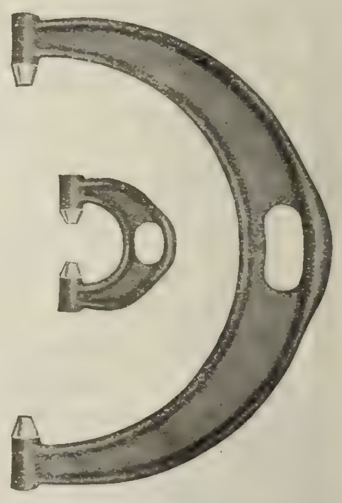
A snap gauge for calipering all outside diameters, with absolute accuracy.

Can be furnished suitable for waving, grooving, rough or finish turning—all sizes of shells, from 9.2" down.

Note the improvement on this gauge for holding.

In ordering, specify diameter and part to be calipered.

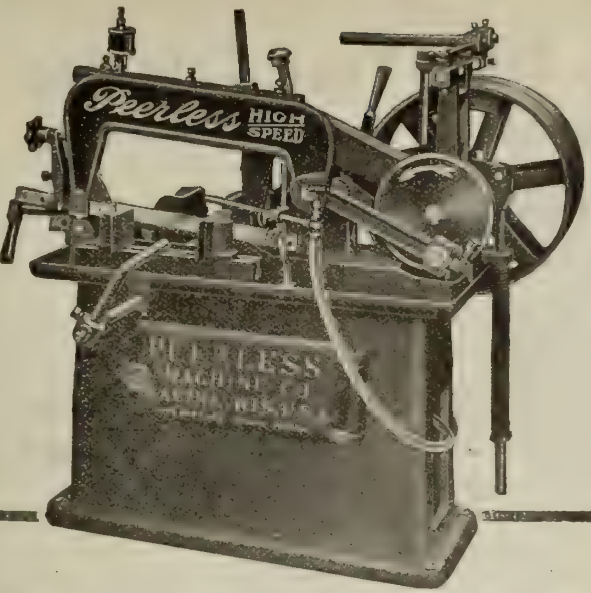
Immediate shipment can be made from stock.



Note the hole for handling when using.

Save the Operators' Fingers

The Foundry & Machine Co., Limited
1167 Carriere Road
MONTREAL, CANADA



"100% Better, Faster and More Reliable

than any Sawing Machine we have ever used; we have had almost all makes of Sawing Machines manufactured."

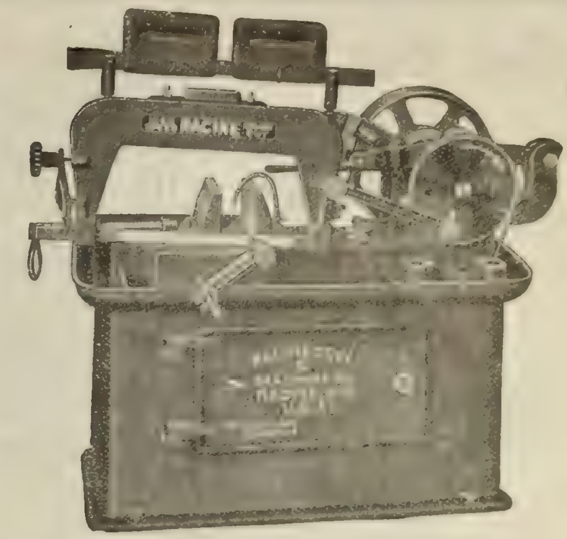
Just what a customer in Toledo, Ohio, reports after a thirty days' trial.

You don't have to take anybody's word for it, try it out under your own conditions. You are under no obligations if it fails—remember we also pay the freight both ways.

Not only 100% more production, but saves 100% floor space. These problems have handicapped many manufacturers for some time. They can now readily be solved by the Peerless High Speed Heavy Duty Metal Cutting Saw.

Write us for complete description and references. Some of these machines may be working in your vicinity.

Peerless Machine Co., 1607 Racine St., Racine, Wis.



Speed

Racine Tool & Machine Co
15 Melbourne Ave.
RACINE, WIS., U.S.A.

Speed and ease of operation is a very difficult combination to obtain. Once you see a Racine Metal Cutting Machine in operation this fact impresses you. Ease of operation means less repair. More speed means greater output. See the advantage of the two? Imagine one in your plant—then write us for particulars.

Two Cuts at One Time

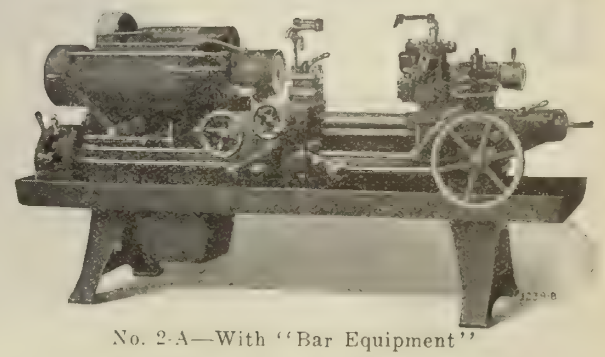
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

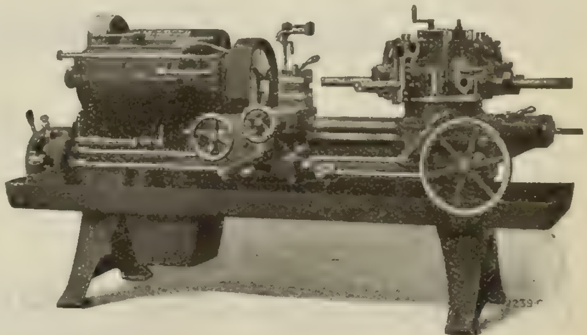
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



No. 2-A—With "Bar Equipment"



No. 2-A—With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal; Benson Bros., Sydney and Melbourne, Australia

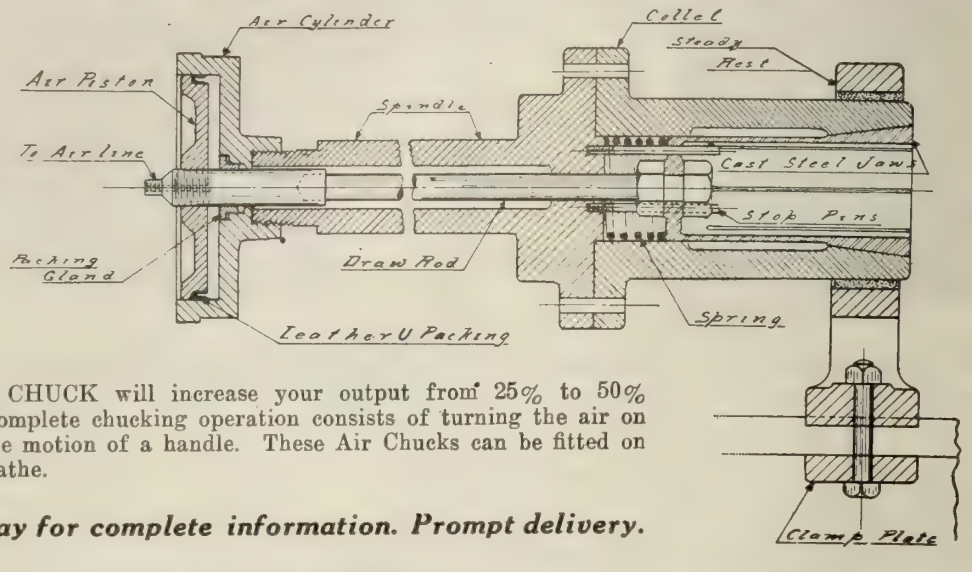
Get Out Your Watch and Time Your Chucking

With most screw chucks you have to use brute force or the hammer to tighten, and even then your shell is not always rigid.

H.E.W. AIR COLLET CHUCK IS RIGID

Saves Time

Saves Money



H.E.W. AIR CHUCK will increase your output from 25% to 50% because the complete chucking operation consists of turning the air on and off, by the motion of a handle. These Air Chucks can be fitted on almost any Lathe.

Write to-day for complete information. Prompt delivery.

HYDE ENGINEERING WORKS

P.O. BOX 1164 **27 William St., MONTREAL**

Die **Speed**

Self-Opening and Adjustable Die Heads

Modern Tool Co.

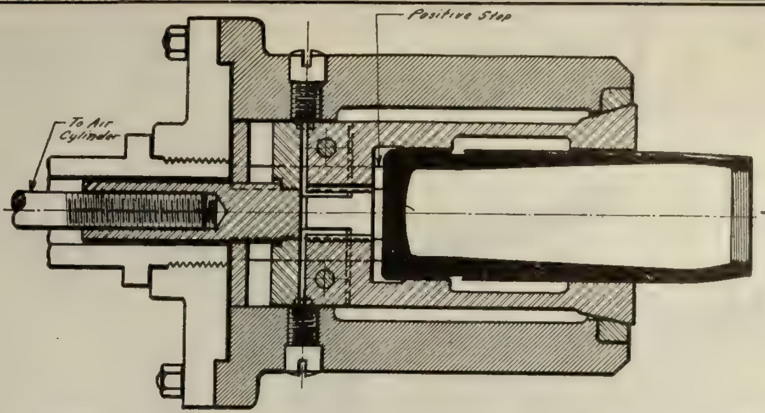
State and Peach Sts. Erie, Penna.

New York Office Chicago Office Detroit Office

F. W. Parker, Resident Engineer and Export Agent, 2 Rector St., N.Y.

***Canadian Agents:* RUDEL-BELNAP, Toronto, Montreal**

Made in a single style that will cut all threads, coarse or fine, of standard or special pitch and pipe threads of any diameter or length within the capacity of the Die. All Die Heads may be cleaned without dissembling the head. Modern Die Heads have proved to be "oil on the troubled water of die-dom." Write now for information regarding the multitudinous uses of Modern Self-opening Die Heads for threading time fuse parts and base plugs.



M. E. C. Collet Chucks

They stand up under the strain of rush work. They cannot do any poor work. The mechanism of the "M.E.C." Collet Chucks are built just one way and any hasty or imperfect chucking is an unknown quantity with an M.E.C. Collet Chuck. They are air operated, of the hinge type and are adaptable to rough or finished boring operations. They are successfully and extensively used in Canada, Great Britain, Russia, France and India. That stamps this tool as a standard adjunct of the lathe. Let us hear from you.

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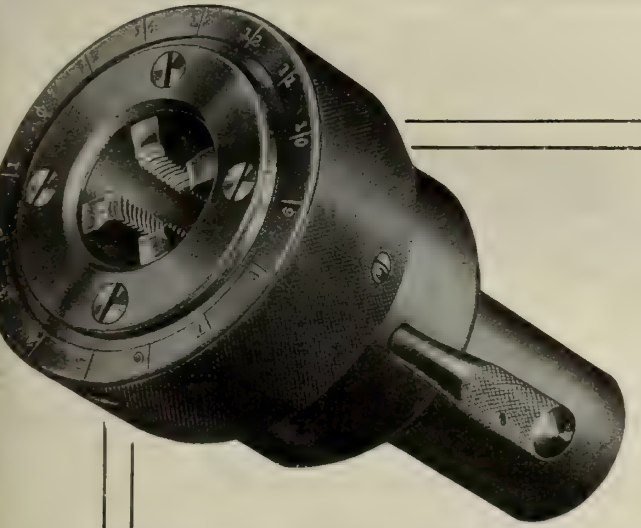

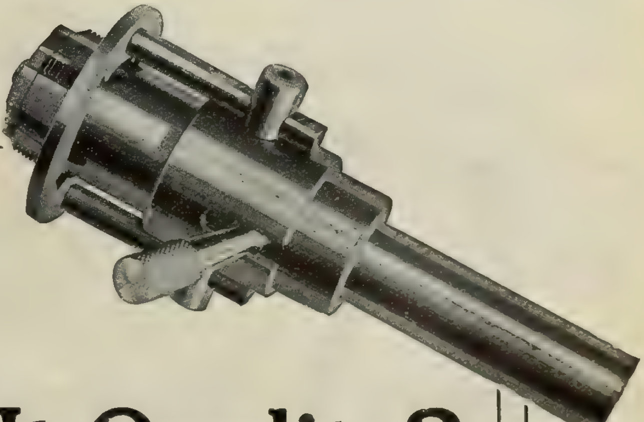

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Re-chucking, which is such a danger for absolute accuracy, is eliminated. Murchey tools mean increased production at less cost. That is what you want. We give it. Let us get together.

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Claxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne

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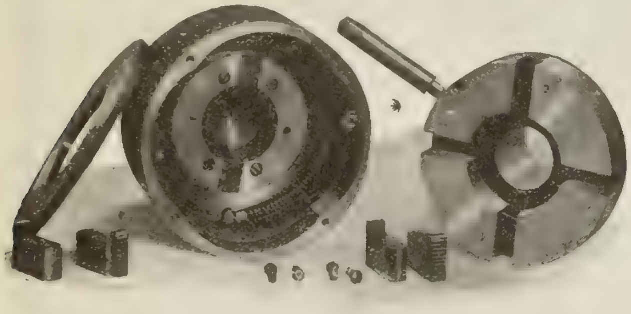

"IDEAL" is a *different* die. The head revolves around a stationary cam, thereby utilizing the belt power or cutting strain as opening power. Chasers are supported directly back of cutting strain, which will remove any tendency to bell out and cause taper threads.

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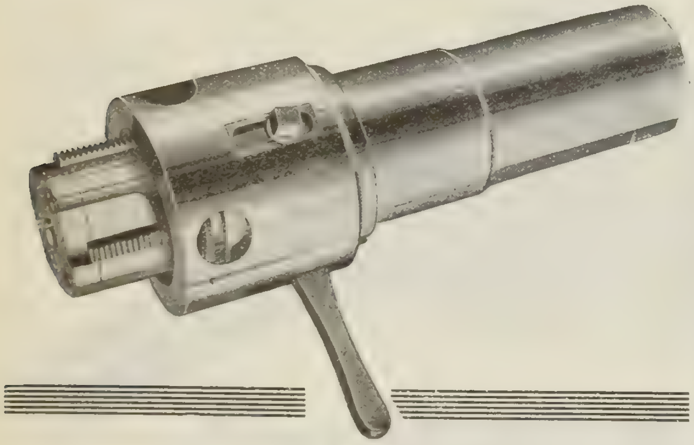

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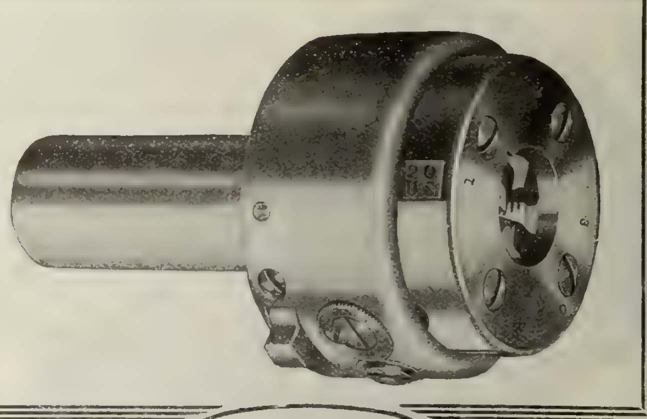

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The **chasers** are set and held in place by a steel cam, which, once adjusted, locks; there is no stoppage or changing in size. The **quick release** not only insures the cutting of the thread to a given point every time, but permits cutting right up to a shoulder when necessary.

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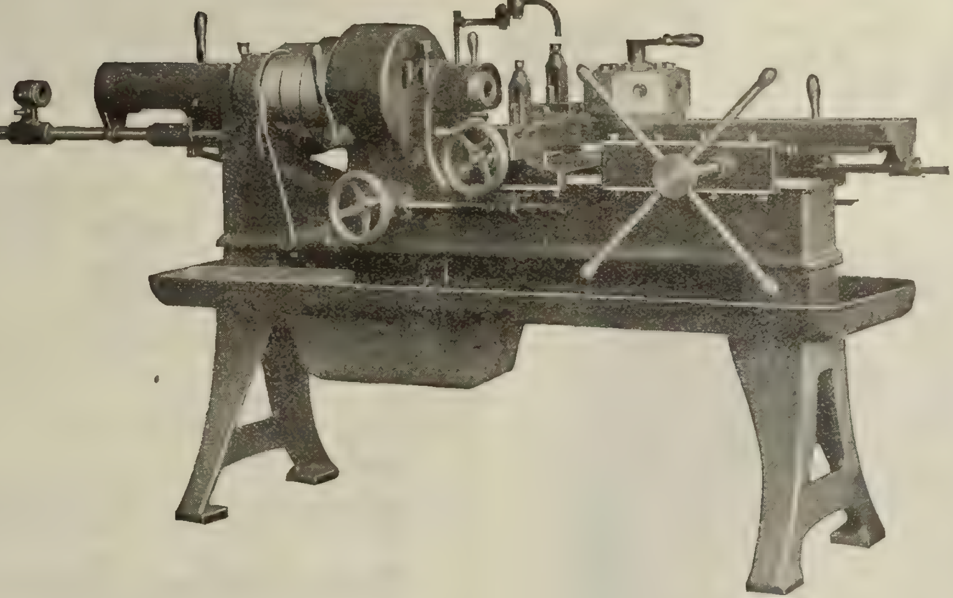

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REGULAR EQUIPMENT—Wire Feed, Automatic Chuck Oil Pump, Pan, Double Friction Countershaft, and one Collet within capacity of the machine.

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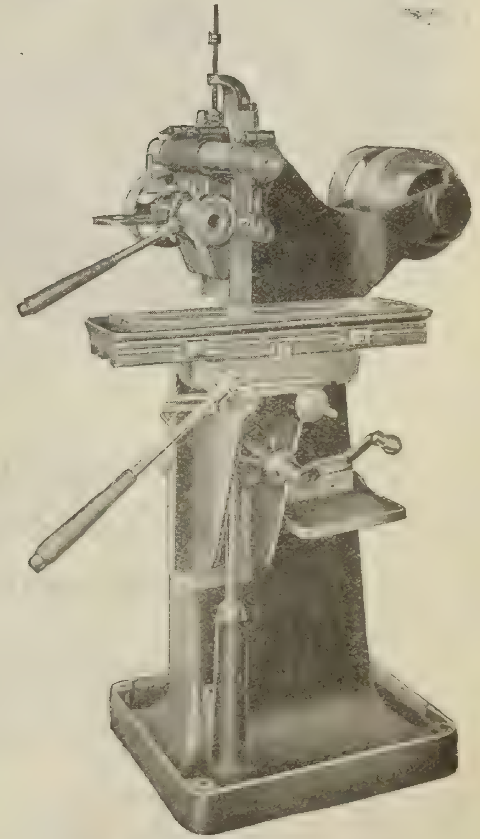

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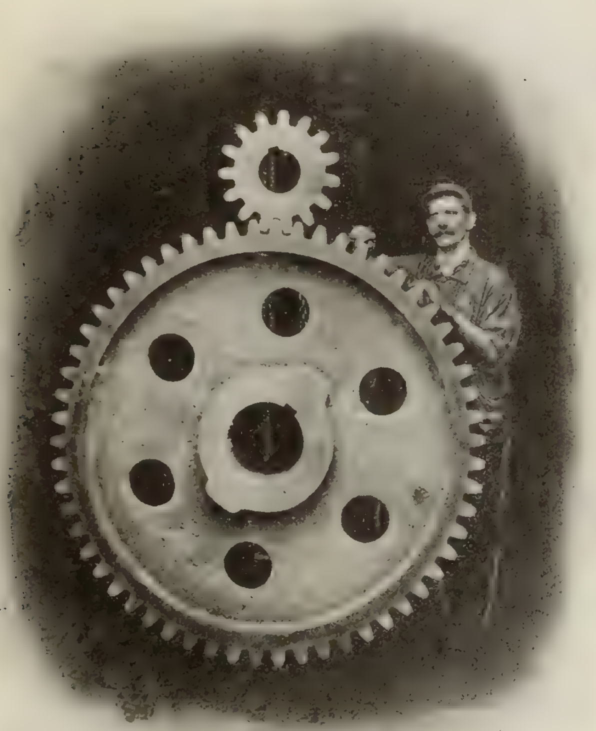

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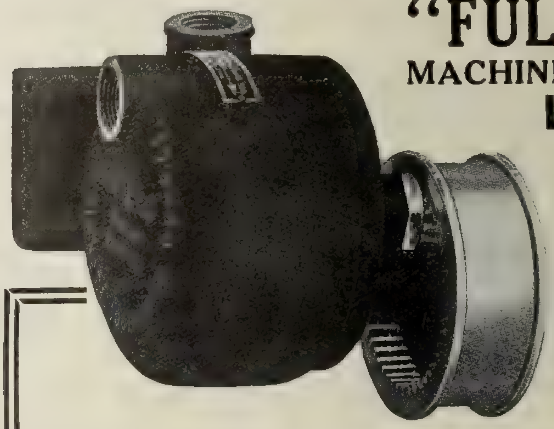

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You can drive your machines faster

but your cutting tools won't stand it — the speed burns them up.

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The "FULFLO" Machine Tool Lubricant Pump supplies a good "HEAVY" stream of compound sufficient to carry away all the heat.

No gears or other close-fitting parts to be affected by the grit, dirt, or small chips that are always present in the coolant. No clogging.

The only working part is the impellor. Since no check valve, reverse valve or any other kind of valve is present in the pump or pipe, other than the stop cock, the usual valve troubles are eliminated.

Easily attached to any machine. **Insist that the new machines you buy be equipped with the "FULFLO."**

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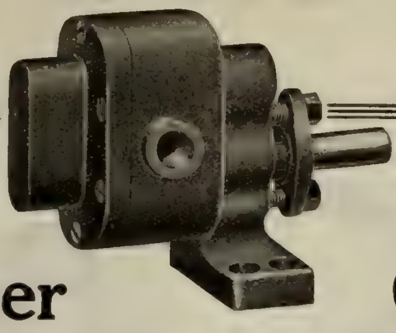

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To the progressive foreman or manager who is ever on the alert to get away from the "good enough" stage and enter into the "best" class this pump has a direct appeal. this is a one-way pump, giving a free, steady flow that is absolutely free from that undesirable pulsating flow so common.

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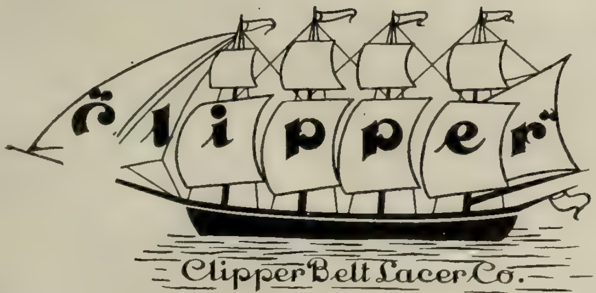

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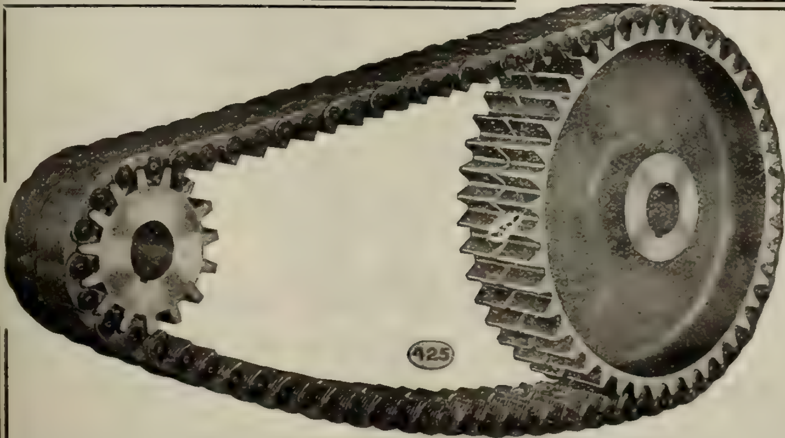

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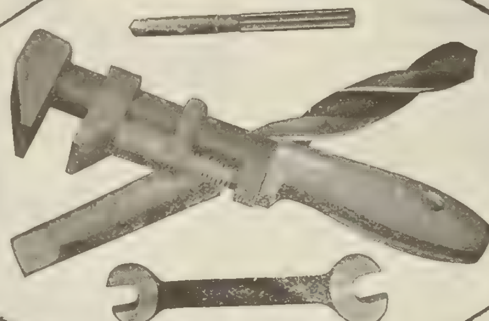

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ESTABLISHED 1854
CANADIAN OFFICE AND FACTORY ∴ ∴ ST. CATHARINES, ONTARIO

More Production — Greater Accuracy — Less Globe Breakage — Happier Men

That sums up the argument on this lamp bracket. Three frictional universal joints that can't wear out and are adjustable for any desired tension give the reason.

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Any workman will do more and better work if his light is always in just the right place and under instant control.

The Searchlight Bracket

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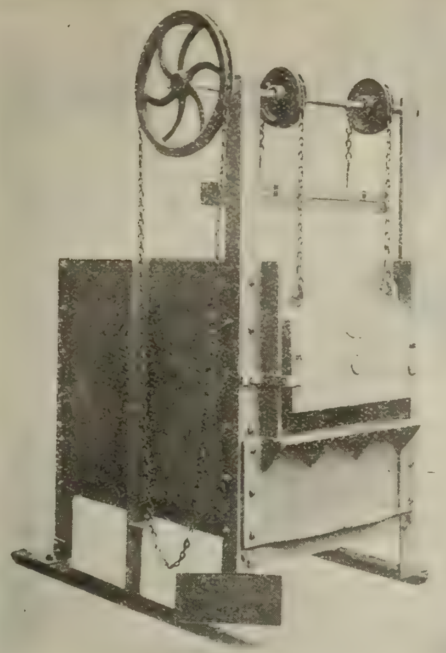

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It's economy—requires one-half the space; costs less than half; no chimneys or flues required; instantaneous and perfect control of temperature; higher temperature obtained; no coal or ash handlers required; no coal or ash piles; less waste of fuel, because it is shut off instantly; requires much less time to get the required heat. Can you afford to lose the advantages of this oil Furnace?

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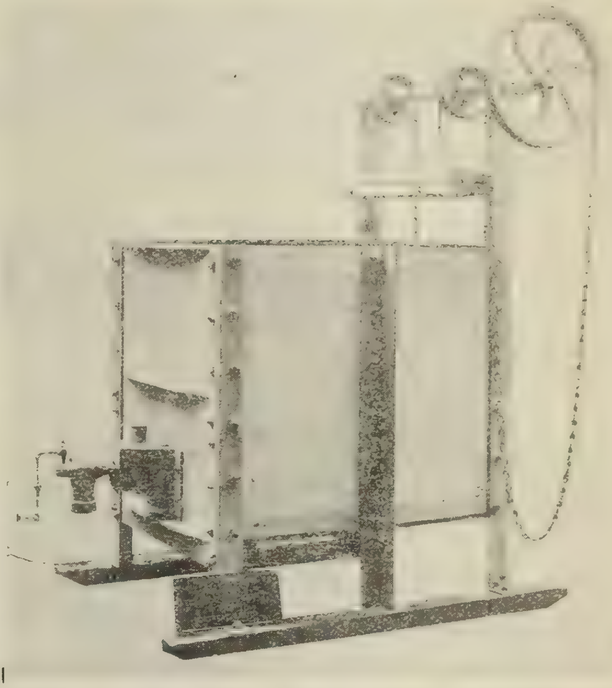

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The steel in them is made from our own formulas, which have been proven best after years of investigation and practical experience.

They are nicely balanced.

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GREAT WESTERN
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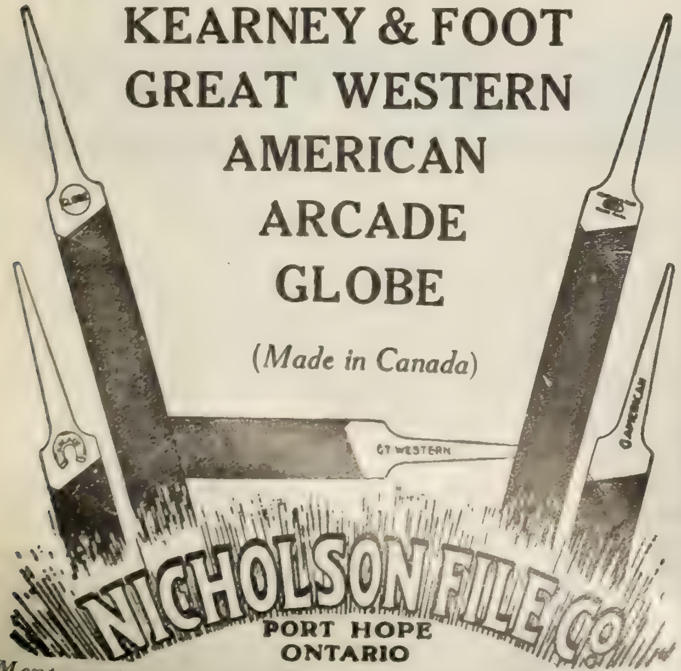

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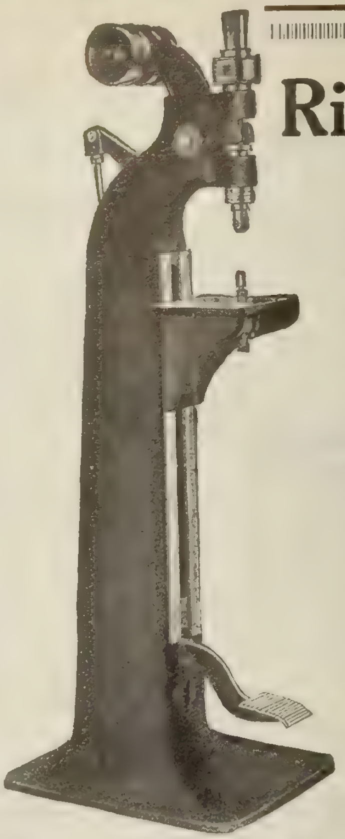

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One every second is a speed which this Grant Rivet machine will keep up indefinitely, in any degree of tightness or looseness desired. Each rivet is finished with perfectly shaped head, polished and with no hammer marks showing.

We claim this is the only machine manufactured that will accomplish this feat. Our claims are unchallenged. By writing for our catalogues you may obtain full information regarding the ability of this machine.

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For High Speed Work

FEATURES:

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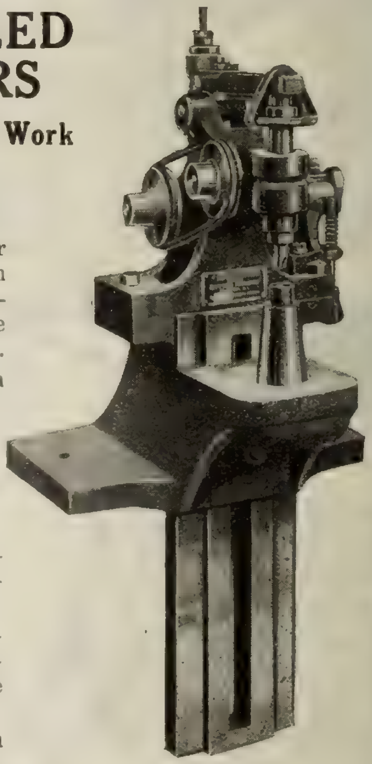
No riveting too intricate for us; no riveting which our machine cannot accomplish.

Send for our **High Speed Hammer Book.**



THE HIGH SPEED HAMMER CO.
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MADE IN CANADA
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High Speed Tool Metal

Cutting tools that have that marvelous lasting power are made of Stellite. This material is not a steel, it contains no iron—it is Stellite. Heat has no effect on the cutting edge. Stellite tools cut just as well when red hot as when cool. Run steel tools that way, you know what happens. They burn up—lose their temper. Stellite has no temper.

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Try it out on your most difficult operation, only speed up the machine more. The result will convince you of its merit and you will agree, as a great many others have done, that it is better than the best steel and that it will pay you.

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While wheels that are successful on high-speed steels will usually work satisfactorily on carbon steels, it has been demonstrated that the very best wheel for carbon steel may be far from satisfactory on high-speed steel.

A twist drill ground for steel may catch and "hog in" on brass, especially at the back of the hole where it breaks through. To prevent this, grind the lead or rake from the cutting edge.

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WORCESTER, MASS., U.S.A.

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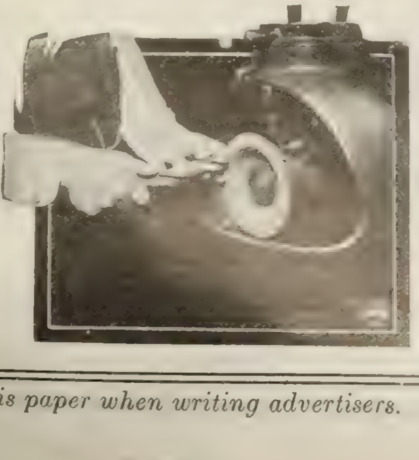

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A list will be supplied upon request.

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Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

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Portable Electric Drills, Reamers and Grinders

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They consume current only when working and any lamp socket is a source of power. You will find hundreds of uses for them around your shop and they are dependable. Special fan-cooled Van Dorn motor has 100% overload capacity. Van Dorn make-and-break switch acts so quickly that it practically eliminates the sticking and fusing of contacts. Phosphor bronze and ball bearing. Gears cut and hardened. All parts 100% oversize.

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Increase Production
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Cut Perfect Threads

all at one and the same time.

Do you want us to prove it? We are ready.

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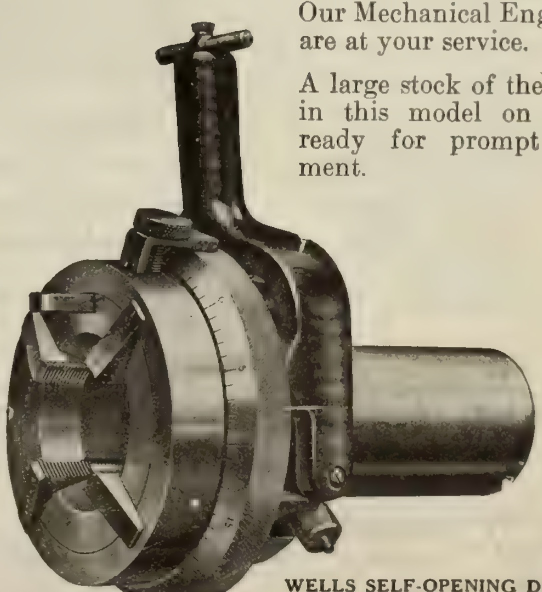
A large stock of these dies in this model on hand, ready for prompt shipment.



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MODEL V.

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You'll find what you want here:

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Let us quote on your requirements.

The Canadian Fairbanks - Morse Co., Limited

Canada's Departmental House for Mechanical Goods.

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CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

Applied Machine Design--Belt Driven Centrifugal Pump

By D. O. Barrett, M.E.

A consideration of the engineering problems involved, together with a description of the manufacturing methods employed to produce a thoroughly serviceable machine in quantity, expeditiously, and at minimum over-all cost; a desirable combination achievement.

THE cuts, Figs. 1 and 2 illustrate the subject matter of this article, a 1¼ ins. belt-driven centrifugal pump. As shown in the assembly view, an auxiliary geared pump is driven from the end of the shaft by a pin clutch. This geared pump has both suction and delivery of ½ in. pipe, and is a stock article, not coming within the scope of this discussion. Its combination with the centrifugal was to enable the handling of two separate liquids, when and where desirable. The larger pump was designed primarily for the circulation of cooling water through the jackets of internal combustion engines. It was often desirable, to conform to underwriter specifications, to bury the main fuel tank some distance from the engine room, and pump the fuel up to the engine carburetor, the excess merely overflowing back to the large tank. In this way only a very small quantity of fuel was in the engine room at any one time. Should gravity feed be allowable or were gas to be used as fuel, this pump was simply omitted, and being atached at any time if desired. In the view of the dismantled parts, the interior of the body is shown quite clearly, also the shape of the impeller.

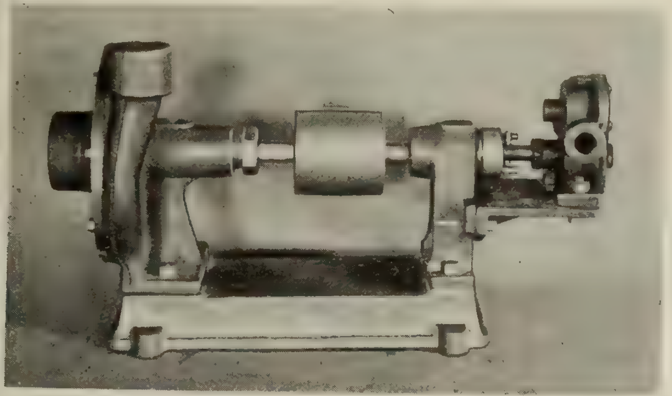


FIG. 1. CENTRIFUGAL PUMP ASSEMBLED.

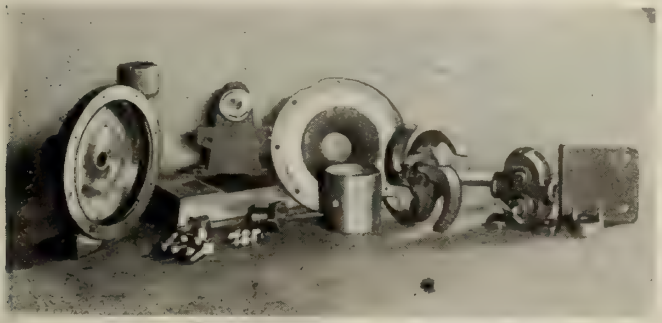


FIG 2. CENTRIFUGAL PUMP KNOCK-DOWN.

These pumps were required in quite large quantities, and before taking up their manufacture, quotations were secured from all known builders. Many of the pumps submitted were of excellent design and construction, and, in fact, their quality militated against their use, because for our particular purpose it was absolutely necessary to secure a pump of low cost yet capable of handling large quantities of water at a fairly low head. It was therefore decided to design and build a pump similar perhaps to many of those now on the market, but with a minimum of shop operations, thus reducing the first cost. To this end all lathe operations such as facing were eliminated, to be replaced by the cheaper yet equally serviceable method, disk grinding. All hand fitting was also to be done away with, or, where necessary, of such a character that skilled labor was unnecessary.

Pump Base

Taking up the design of the various parts, we will consider first, the base, Fig. 3. This was constructed as light as possible and ribbed to present a neat and finished appearance. The four pads on the top were raised slightly in order to be finished by grinding, the piece being merely held against the disk by hand. A metal pattern was, of course, used. The four tapped holes in the pads were jig drilled, the flat jig plate being merely clamped down to conform to the outer surfaces.

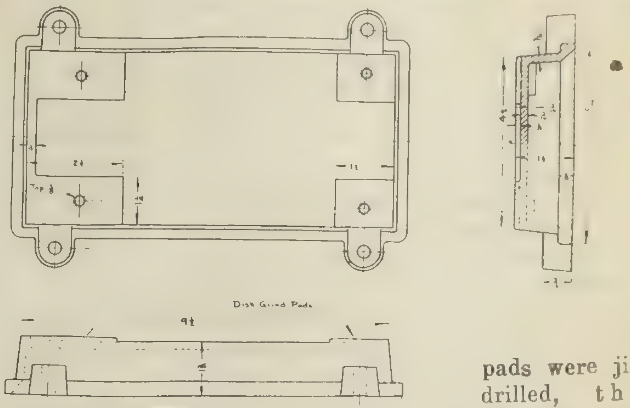


FIG. 3.

Pump Body

The body, Fig. 4, was, of course, the most intricate casting used. While there was nothing particularly difficult in its construction, it was the only piece in which it was necessary to use a dry sand core. Due to the fact that the outlet was offset slightly from the center of the main portion, it was necessary to part the pattern accordingly. This was done in order to keep the flange at the top of the outlet below the face of the casting, so as not to interfere with the disk grinding operation. A hardwood pattern was used for this piece, with a taper print the size of the face opening attached. The core was made in one piece necessitating, of course, a split core box along

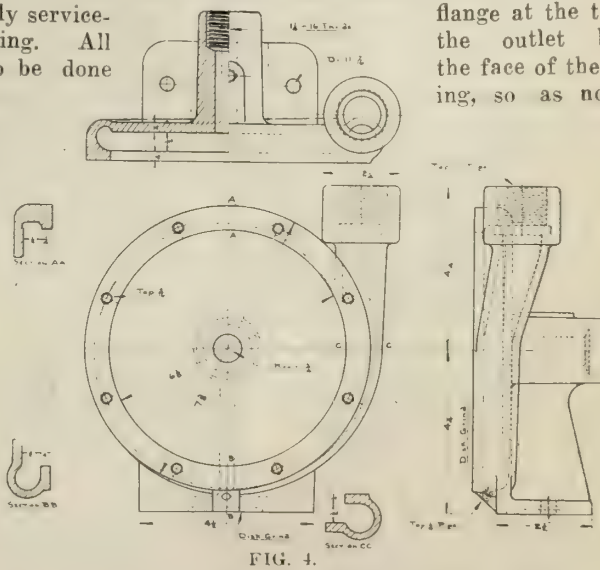


FIG. 4.

the same lines as the pattern. After ramming the core in the box, one half was removed and the core bedded in green sand, after which it was turned over and the other half of the box removed. A print was also provided for the outlet. It will be noticed that there was a ring cored around just below the pipe thread; this was for clearance when tapping. A fine grade of core sand was used and the core coated in order to secure a smooth surface at the back against which the impeller runs. Ordinarily, this face is finished in the lathe, but, by exercising a little care in the foundry, no trouble was experienced in getting a smooth finish, and one sufficiently plain for minimum clearance for the impeller.

As only 1-16 ins. clearance was allowed between the ends of the impeller arms and the inside of the body, it was necessary that these be fairly central with each other. It will be noticed that the interior outlines of the case start from the outlet opening with the 1-16 ins. clearance and gradually increase in sectional area and clearance around again to the outlet, and opening into same with a gradual curve. For the guidance of the pattern-maker, sections were given through the four points so that templates might be made accordingly. The inside contour of the case is a gradual increase in order that there may be no eddy currents formed as the water leaves the tips of the impeller arms and continues its journey around to the outlet. There must also be a minimum of clearance between the impeller and the case and cover, otherwise there will be an appreciable amount of slippage or "lost motion." Ordinarily, the water as it leaves the outlet opening and enters the discharge pipe should have a velocity of approximately 10 feet per second.

In disk grinding the face of the casting, it was merely held by hand, after which it was clamped to the table by a quick-acting clamp and the base ground square with the face, using the swinging table. After the grinding operations, the pieces were taken to the screw machine and chucked on the inside, using a three-jaw scroll chuck. The ¾ ins. hole for the shaft was then drilled and reamed, and the end tapped for the packing gland. The jig shown in Fig. 5 took care of all drilling with the exception of the ¼ in. pipe tap for the grease cup, the location of this not being particular. The casting was centered by being dropped over the ¾ in. central clamping bolt, and held by the nut and washer. A narrow planed surface at the bottom squared up the base. Into the tapped boss at the side of the jig was screwed a long cold drawn steel handle so that it was unnecessary to clamp the jig even when tapping the 1¼ ins. hole for the outlet. Removable bushings were used for the tapped holes for the end plate. When drilling the drain hole in the bottom, the jig was set on an angle plate. For best results, these should be handled in a three-spindle gang drill arranged for tapping, so that it would be unnecessary to change the speed of any of the spindles; in the present case, however, the work was done in a single-spindle press of the usual type.

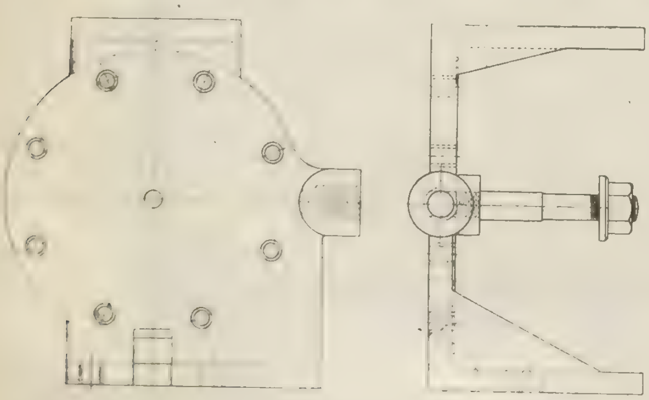


FIG. 5.

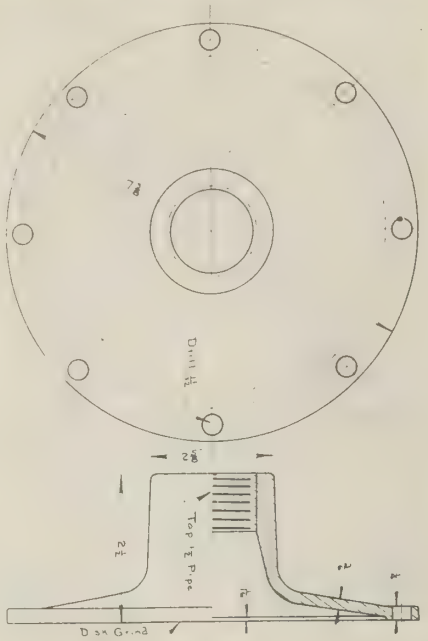


FIG. 6.

End Plate

Fig. 6 shows the end plate, the face of which was also disk ground. For drilling, the same jig as for the body is used with the exception that a hardened steel cone is dropped over the central bolt, this centering the piece with respect to the inner curved surface. After the holes around the outer edge are drilled, it is dropped over pins corresponding to these holes, these pins being located in a flat plate clamped to the drill press table and central with the spindle. It was not necessary to clamp the plate when tapping, the pressure being all downward. A four fluted drill was first run through, followed by the pipe tap. As the castings were rather light in both cases, the pipe taps were of the interrupted thread type, these requiring much less power to drive, due to the fewer cutting points. A metal pattern was, of course, used, with the name of the concern in raised letters around the edge.

Impeller

The impeller, Fig. 7 was disk-ground on the one side and then clamped in a self-centering fixture to the face plate of the screw machine, where the central hole for the shaft was tapped. The shaft was provided with a shoulder, this making positive drive and being much quicker than keyseating and doing away with all hand fitting. The central raised points are for the purpose of cutting into the incoming stream of water and leading it down to the impeler arms. It will be noticed that there are four small holes leading into a groove entirely around the back. This was for the purpose of balancing the pressure which, quite naturally, would tend to force the impeller in against the body. To prevent same from rubbing against the end plate, the

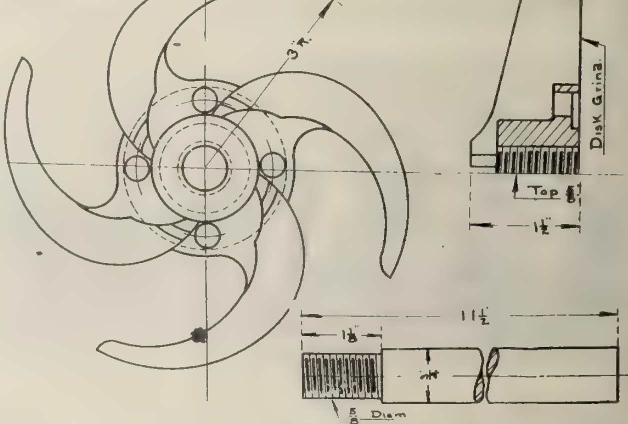


FIG. 7.

collar at the outer end of the shaft is provided, enabling any end motion to be taken up. When assembling, the amount of this end play, or clearance, of the impeller in the body, is determined before bolting on the end plate; should this be too great, the end plate is simply ground off the necessary amount.

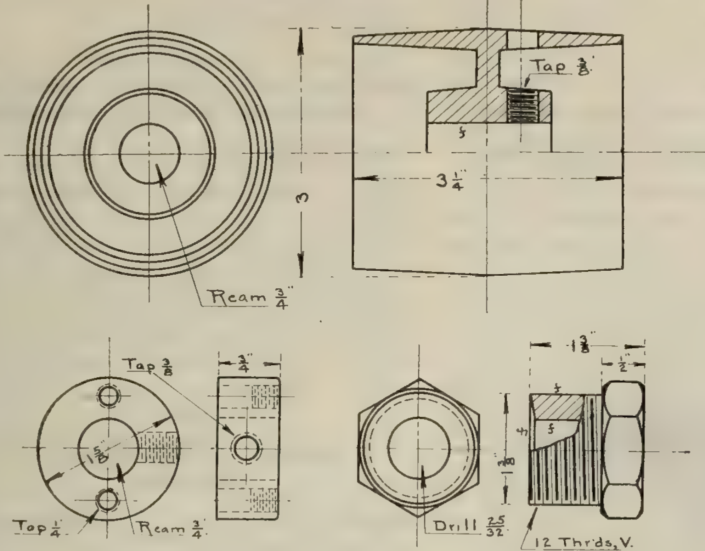


FIG. 8.

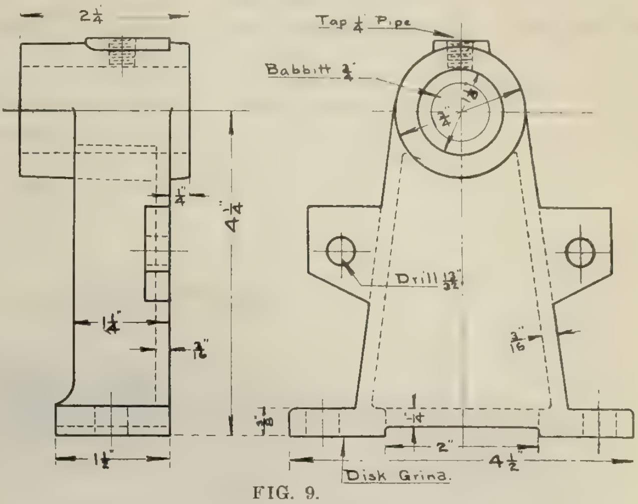


FIG. 9.

Pulley and Collar

The pulley in Fig. 8 was cast in green sand from a split metal pattern, although the intention was to eventually cast these in a heavy split metal chill, dumping out the castings as soon as set and before chilling occurred. By thus dumping out quickly and covering up with sand so as to cool off slowly, no trouble was experienced in the machining due to hardness. The chill was to form the outside surface with dry sand cores dropped in for the inside and also to form an easy method of gating. To date, the chill method has not been used, but experience which the writer has had with other similar parts would indicate that it should be a complete success. Special soft jaws were used in the screw machine for holding while drilling and reaming for the shaft hole. No machine work was done on the outside, as these came fairly smooth, and it was only necessary to grind off a slight fin due to the parting in the mold. A 3-inch single ply belt was used to drive the pump. No particular features are encountered in either the collar or packing gland as both are plain screw machine jobs.

Outer Bearing

The outer bearing, Fig. 9, was drilled in a plain jig, and babbitted after assembling the other parts on the base. After pouring the babbitt directly on the regular shaft, the bearing was removed from the base and an expansion reamer run through the hole for shaft clearance. Compression grease cups were used at each end of the shaft and no grooves were cut in the bearings.

Bracket

The bracket in Fig. 10 was also jig drilled similar to the outer bearing. Due to the flexible drive used for the auxiliary pump, it was not necessary for this to be in perfect alignment with the shaft, as the drive worked equally well in either case. This consists merely of two ¼ in. pins tapped into the collar on the end of the shaft, and a pin of the same size driven through the shaft of the gear pump.

A complete bill of material is given covering all the parts used in the construction of the pump. No originality whatever is claimed in the design as the problem was purely a manufacturing one. The capacity of the pump ranged from 25 to 40 gallons of water per minute under the average head encountered in internal combustion engine work, the speed varying from 1,000 to 1,500 revolutions per minute. While the writer is not privileged to give out any figures on the cost of production of the above article, suffice it to say that it was much less than what any other similar pump could be purchased for, and that the expense for patterns and the few simple jigs was amply taken care of on the first lot.

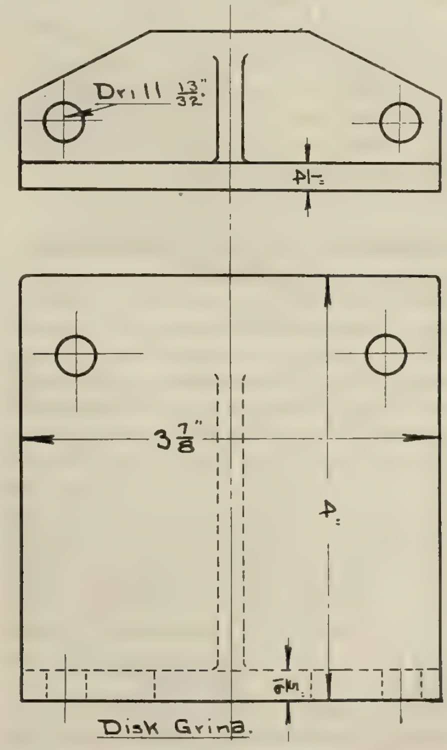


FIG. 10.

BILL OF MATERIAL.

Part.	No. Used	Material	Size
Base	1	Cast iron	
Body	1	. “	
End plate	1	“	
Impeller	1	“	
Pulley	1	“	3x3x¾
Outer bearing	1	“	¾
Packing gland	1	“	¾
Shaft	1	C. R. S.	¾x11½
Collar	1	“	1⅝x¾
Cap screws	8	For end plate	5-16x¾
Cap screws	4	E.P. and body to base	⅜x¾
Set screws	.	Hollow head	⅜x¾
Grease cups	2		¼
Packing	.	For shaft	3-16x6
Babbitt	.	For outer bearing	
		Extras.	
Geared pump	1	Cast iron	½
Bracket	1	“	
Machine bolts	4	“	⅜x1
Driving pins	2	C. R. S.	¼x¾
Shaft pin	1	“	¼x1¼

A METHOD of protecting iron by enameling is described in the "Foundry Journal," as follows: The metal is first pickled in hydrochloric acid to free it from foundry scale, then washed thoroughly and dried. The first coating applied is composed of 34 parts silica, 2 parts soda, and 15 parts borax, mixed in water. The metal thus coated is exposed for 10 to 15 min. in a dull-red-hot retort. A second coating is then applied, consisting of 34 parts feldspar, 19 silica, 24 borax, 16 oxide of tin, 4 flourspar, 9 soda and 3 saltpeter. This mixture is first melted in a crucible, then ground to a fine paste in a little water and applied with a brush. The coated piece is then again subjected to white heat in a muffle.

CANADIAN GOVERNMENT RAILWAYS SNOW PLOWS

A CONTRACT for 20 steel snow plows is now being executed by the Canadian Car & Foundry Co. for the Canadian Government railways. With the exception of one or two minor alterations, these will be duplicates of those built recently for the Intercolonial Railway. The leading truck is of 30 ton capacity, being specially designed with inside bearings only, on the axles, the clearance on the outside of the truck not being sufficient to allow for outside boxes. Tender type of journal boxes are used, equipped with Davis cast steel wheels 28 in. dia. The rear truck is of the standard 30-ton freight car type, having 33-in. cast iron wheels and M.C.B. axles.

SNOW PLOW FOR CANADIAN GOVERNMENT RAILWAYS BUILT BY CANADIAN CAR & FOUNDRY CO., MONTREAL.

The alterations referred to include a modification of the side wings which are now built with curved instead of straight plates, resulting in a better clearance of the snow when in action. Compressed air is used for operating the side wings. Ice cutters are now fitted in front of the wheels of the leading truck for the purpose of removing ice from rails at intersections where it is necessary to lift apron of nose. These cutters are carried in guides attached to the forward end of the leading truck frame and are raised and lowered by compressed air. The large drawbar casting which projects from the nose of the plow has been extended more than in previous designs so that plows may be coupled together, nose to nose, with greater ease than heretofore.

The overall length of the plow is 32 ft. 1 in.; width over side sills, 8 ft. 9 in.; height, rail to top of cupola, 14 ft. 10 in.; approximate weight, 60,700 lbs.

FINANCING CANADIAN WAR ORDERS

AT a meeting of leading bankers with the Minister of Finance at Ottawa on Dec. 15 arrangements were made for financing British war purchases in Canada during the next year. They will probably aggregate two hundred and fifty million dollars. Canadian war expenditure will probably amount to the same sum, and as borrowing in the British market is now out of the question the financing will have to be done largely in Canada. Sir Thos. White is optimistic as to the situation, but national economy and national savings are necessary. With the co-operation of the banks a national savings campaign is to be insituted. Among those present were E. L. Pease, president of the bankers' association; Sir Frederick Williams-Taylor, John Aird, Clarence Bogert, H. Richardson, G. P. Scholfield, E. F. Hebden and D. M. Finnie. Previous war credits in Canada for Great Britain amount to $150,000,000.

FEMALE LABOR IN MACHINE SHOPS

AS is well known, women and girls have been employed in the machine shops of Europe to a large extent since the outbreak of the war, on account of the need of the men at the front. The *Travelers' Standard* states that this change in industrial conditions has made it necessary to revise certain of the rules and regulations prevailing in such shops for the guidance of the employees. Following is a list of special rules that have been adopted by the Scottish Iron Trades Employers' Insurance Association, Ltd., for use in machine shops in which women are employed:

1.—No female worker shall be allowed to be in machine shops unless her hair is tightly done up, well secured, and confined by a tight-fitting cap of close net or of some other suitable and efficient material.

2.—Further, she must wear a close-fitting overall completely covering the dress—the said overall to fasten at side or back and to include sleeves buttoned or otherwise secured at their ends.

3.—Any machinist found trying a gauge while her machine is running will be liable to instant dismissal.

4.—Belts must be changed by a male supervisor, or a man specially oppointed for that purpose, and not by the ordinary operative.

5.—Machines must not be cleaned under any circumstances whatever while running.

6.—No guards shall be removed from any machine without authority from the supervisor, and such guards are to be replaced and the machine inspected and passed by the supervisor before a restart is made.

FACTORY CONDITIONS IN TORONTO

DR. HASTINGS, in his monthly report to the Toronto Board of Health last week, stated that satisfactory progress was being made in connection with improved hygienic conditions in factories and industries throughout the city. When inspection of industries was first made, in several printing and publishing houses, engraving works, brass works, mills and factories, employees were found innocently subject to inhaling lead and other trade dusts, chemical fumes, fumes from melting pots, etc.

A re-inspection of all such places so far made, shows that devices have been installed, such as hoods, suction fans and blowers, to ensure better protection for the employees. Devices have also been installed in iron and conduit works to control gases formerly allowed to pass into the air to the detriment of nearby residents.

It is further reported that bubbling fountains and individual glasses are also taking the place of the insanitary common drinking cup. Ventilation has also been improved. Only one inspector has been engaged on this work and his report shows that, in 1916, approximately 1,400 factories may be classified as good, as compared with 1,293 in 1915; 552 as fair in 1916, as compared with 418 in 1915; 29 as poor in 1916, as compared with 183 in 1915. One of the chief complaints was lack of provision for expectoration. These cases numbered 1,031 in 1915, but this year there were only 48.

* * *

AFTER a large ladle has been lined with fire brick in the usual manner it should be daubed with a mixture of fire clay and sand or with loam. The daubing should be very thin, its object being merely to interpose a friable material between the brick lining of the ladle and the brass scull that usually forms, thus enabling the latter to be easily removed when cold.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data and Ideas Evolved from Actual Practical Application and Experience

MOULDING A LEAD SAUCER FOR EXPLOSIVES MANUFACTURE

By J. H. Eastham.

A DENSITY of 708 pounds per cubic foot, and specific gravity of 11.35, regarding water as unity, together with its searching qualities when poured at a reasonably high temperature, render lead the most uncertain of the non-ferrous metals; hence the use of loam or dry sand moulds in preference to green sand in most cases where castings of heavy section or considerable depth are required, a case in point being the denitrating tower saucer shown in plan and section at Fig. 1, this piece, 36 in. dia. x 24 in. deep, x 2 in. section, weighing approximately 3,700 lbs.

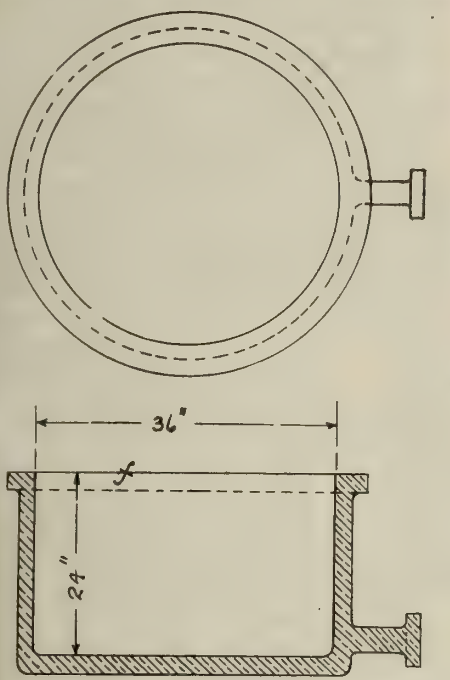


FIG. 1. PLAN AND SECTIONAL VIEWS OF WORK.

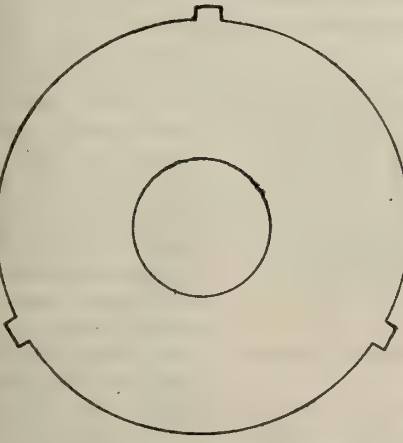


FIG. 2. FOUNDATION PLATE.

Conditions of Production

A concern engaged in the manufacture of explosives, frequently requiring lead castings of this type, but of varying proportions, supplied blue print and pig metal to the foundry receiving the order, with a free hand as to methods of production, at a fixed price per piece on machined castings of good quality and appearance.

To insure good results these castings were for some time swept up in loam by established methods, at considerable cost for rigging, a foundation plate of diameter convenient to the specified area of casting ordered and approximately 3 in. thick, being first made, and set level, a 2 in. spindle inserted in the three-armed socket of usual type. The core foundation and sloping parting necessary to the formation of the lower extremity of the cheek portion of the mould were next swept up on a single course of bricks, the structure being then ready to receive the cheek lifting ring shown at Fig. 3.

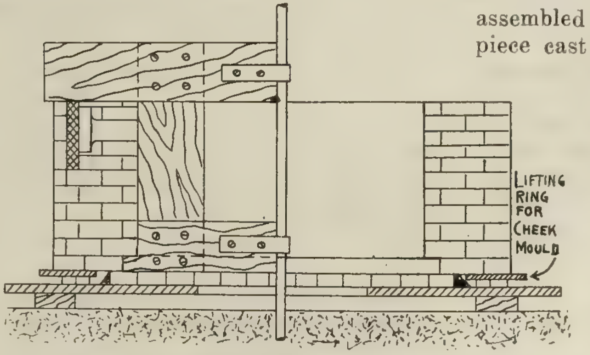


FIG. 4. CHEEK MOULD AND STRICKLE.

The sweep was then bolted to the spindle arms, and the outside face of the mould built up, after which the flanged branch pattern was bedded in at the correct height above the main flange, and drawn outwards, the outside face of the branch flange being covered by a cake core. The mould at this stage is shown in cross section in Fig. 4.

Sweeping the Core

The sweep board was next removed, and the cheek mould hoisted on the stove car. The core sweep was then bolted to the spindle and the core built on a light brick wall, with a circular perforated grating covering the inside cavity one brick depth from the full height, as indicated in Fig. 5.

The spiked plate illustrated in Fig. 6, technically termed the crown or cope plate, with pouring gate and riser perforations, was now swept up, the rounded edge on the seat of the casting being taken care of by a slight increase in the length of the prods on the plate. The three mould sections were afterwards all dried on one carload, blackwashed, assembled as shown in Fig. 7, and the piece cast the following day, 4,500 lbs. of pig lead being melted in a small emergency cupola, and poured from an ordinary sand-lined geared ladle.

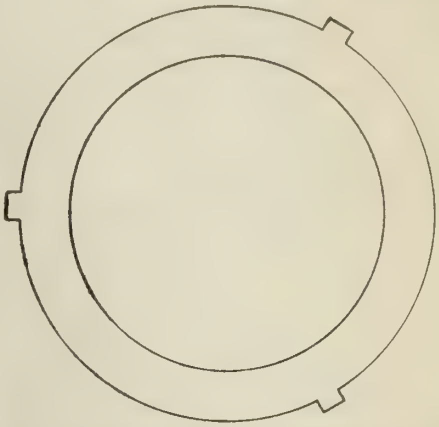


FIG. 3. CHECK MOULD LIFTING RING.

Cost Demands Change of Method

The method just described occupied a moulder and helper about 20 hours on ordinary sizes, exclusive of the time spent on plates and other equipment, and would have served indefinitely, had not competition rendered a heavy curtailment in cost of production imperative, the system of moulding afterwards employed being as follows:—

A pit approximately 48 in. diameter by 34 in. deep, was opened up in the foundry floor, the 2 in. spindle-centre bedded a few

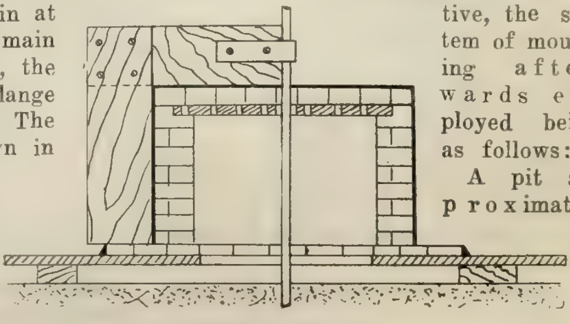


FIG. 5. CORE.

inches below the pit face and rammed hard to secure its rigidity, the spindle inserted, and the sweep A bolted to position as shown by Fig. 8. A runner core, B, was laid level so as to feed the casting by the "bottom pour" system, the runner stick C being rammed up at the same time as the outside face of the mould. The flanged or open end of the saucer being cast upward in this instance, 3/8 in. extra thickness was allowed on the upper face to ensure clean machining as well as to overcome any unevenness on slight shrinkage which might occur on account of the piece being cast open sand.

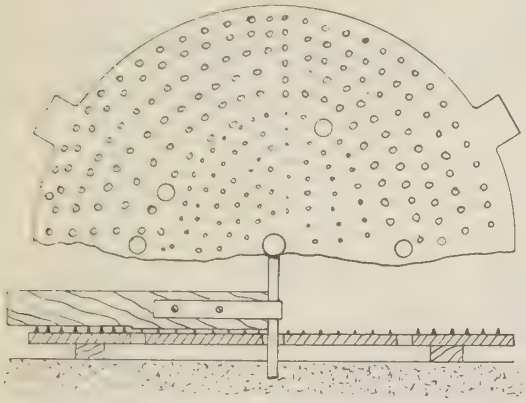


FIG. 6. COPE PLATE AND STRICKLE.

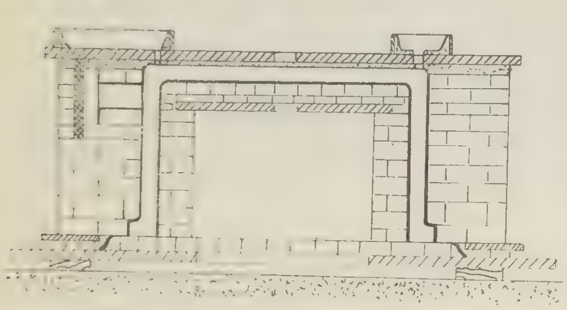


FIG. 7. LOAM MOULD ASSEMBLED.

A heavy, well bound facing sand was prepared, the mould being rubbed over with dry plumbago and afterwards washed with molasses before the application of the charcoal fire used as a skin drying medium.

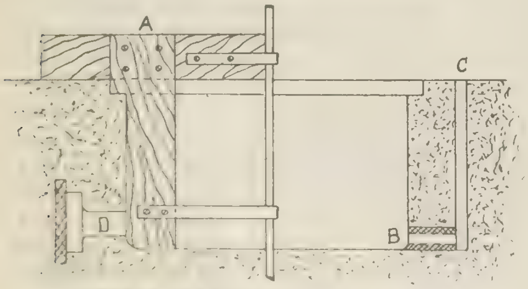


FIG. 8. DRAG MOULD IN SAND.

A Suspended Core

The loam core shown in Fig. 9, built on a cast grid instead of the foundation used in the former method, was now lowered to position, lead spool chaplets 2 in. thick being used at six points on cast iron blocks bedded in as indicated in the cross section view of the finished mould at Fig. 10. The core was finally hooked up to rail sections laid across the mould, this precaution being necessary on account of the certainty of the lead chaplets being melted by the metal during the operation of pouring, with consequent danger of the core sinking. The rails referred to also acted as weight supports, all risk of the core moving being thereby eliminated.

Economies Effected

By this method the moulding time was reduced to ten hours, the time occupied in building the core being about four hours, a saving of six hours on each piece. The castings produced were free from "strikes" or "fins" and of as good quality as those formerly turned out of the expensive loam mould, with its initial cost in rigging.

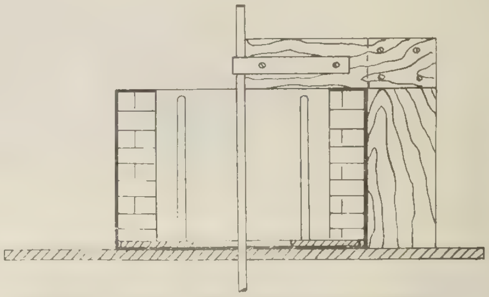


FIG. 9. LOAM CORE FOR SAND MOULD

* * *

Cost of Living.—The cost of living is still going up. According to a Labor Department Bulletin of December 16, the average cost of 29 staple articles in sixty cities in November was $10.05, as compared with $9.30 in October, and $8.02 in November, 1915. In the wholesale prices of 272 commodities, the index figure rose to 198.4 for November, compared with 187.2 for October and 158.7 for November, 1915.

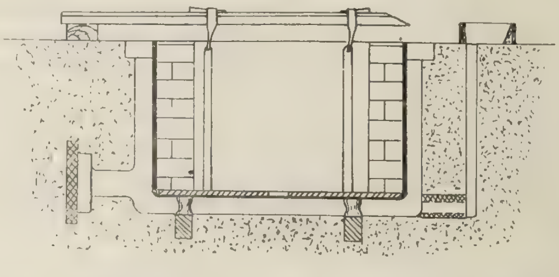


FIG. 10. ASSEMBLED SAND MOULD WITH LOAM CORE.

MELTING STEEL IN THE IRON FOUNDRY CUPOLA

by J. E. Hurst

DURING recent years, the addition of steel to iron foundry mixtures has become quite a common practice. In addition to finding an outlet for comparatively valueless steel scrap, such additions present an easy and effective means to the ironfounder of producing low silicon cast iron.

The process of melting steel in the iron foundry cupola is now fairly well understood. The steel in the cupola in contact with carbon—coke—and in an atmosphere containing carbon monoxide, absorbs increasing amounts of carbon as the temperature rises, exactly as is the case in the cementation and casehardening processes for the treatment of steel. As the carbon content of the steel increases, the melting point correspondingly decreases, and it will readily be seen that the melting point of the steel in the cupola is rapidly reduced by the absorption of carbon to a figure within the temperature range of the cupola. Approximately, the average maximum temperature in the cupola is in the region of from 1,350 deg. to 1,400 deg. Cent., and, therefore, the very fact that the steel is successfully melted indicates that it must have absorbed between 3 to 4 per cent. of carbon. This being the case, it was considered impossible to melt steel alone in the cupola, and if successful, to produce an iron of, say, from 3 to 4 per cent. total carbon, with a low silicon, phosphorus, and, with due care, sulphur contents.

Experimental Data

The following account of an experiment in this connection will doubtless prove of interest. The steel scrap charged into the cupola consisted of borings and turnings, crop ends from 5-in. billets, and miscellaneous scrap, consisting largely of old files and the like. A small proportion of hematite pig iron was added, the object being to ensure melting. It has subsequently been found that this addition was unnecessary. The cupola charges were 560 lbs. each, consisting of scrap in the following proportions: 560 lbs. of steel borings; 280 lbs. of crop ends; 112 lbs. of miscellaneous scrap; 19½ lbs. of hematite No. 3 pig. The mean carbon content of the above charge would be approximately 0.45 per cent.

Limestone and coke were charged as in the usual practice, a slight excess of each being allowed. The blast was started and the charge soon showed signs of melting. The blast pressure as indicated by the gauge was very high—28 in. of water—a fact that was ascribed to the closeness of packing of the charge. The melting continued successfully though at a somewhat slower rate, as would be expected, than is the case in an ordinary pig iron charge. The metal tapped out was very "wild" and emitted showers of sparks; but was readily quietened by the addition of ferro-manganese or ferro-silicon. The molten metal was cast into pig bed and allowed to cool. On breaking the cold metal, which was exceptionally tough, it presented a close white fracture. During melting a thick, black, sluggish slag was formed which from its appearance evidently contained a high percentage of iron. An analysis made of the pig produced gave the following results:—

	Per Cent.
C	3.98
Cr.	——
Si.	0.13
Mn.	0.45
S.	0.071
P.	0.034

Obviously it would be an easy matter to produce any desired silicon content by the addition of ferro-silicon to the molten metal and, with the possible exception of a rather high sulphur content, it will be readily seen by the above analysis that the pig iron produced could be classed alongside of hematite or even cold blast irons.

The total weight of metal charged into the cupola was 7,056 lbs., and the total weight of metal tapped out and recovered from the "dump" was 6,496 lbs., thus showing a fairly heavy loss of 560 lbs., or approximately 8 per cent. It is considered that this heavy loss was due largely to the oxidation of the very fine borings which constituted the major portion of the borings used in the charge. With a heavier class of borings, or such material as plate punchings and cuttings, the extent of this loss can be easily reduced to 3 or 4 per cent. Even with such a heavy loss as that experienced in this particular case, the whole experiment proved to be a paying proposition. If the market value of the original scrap is reckoned to be on an average $14.68 per ton, the total cost of the pig iron produced by the melting of this scrap, including melting costs, labor and standing charges, and also the melting loss, works out at approximately $23 per ton. The market value of the pig iron produced at the present time is at least $31.60 per ton. Undoubtedly a paying proposition.

The two great drawbacks to the melting of steel in this manner are, first, as already pointed out, the excessive loss through oxidation, and secondly, the tendency of largely increasing the sulphur content. By avoiding the very small and fine class of borings, or resorting to some form of briquetting process, the first drawback can be materially reduced to a normal figure. In connection with the sulphur content, the greatest possible care must be taken in the selection of the fuel. The addition of extra limestone together with sand is a most efficacious method of keeping the sulphur content down, and in addition gives a more fluid and manageable slag.

The action of limestone and sand in the reduction of the sulphur content is possibly somewhat similar to that of the blast furnace, in which the sand and limestone react with the oxide of iron, forming a basic double silicate, which at temperatures between 1150 deg. and 1300 deg. Cent. is capable of dissolving sulphur from the iron according to the equation:

$$\underbrace{\mathrm{Fe\,O} + \mathrm{Ca\,O} + \mathrm{Si\,O_2}}_{\text{basic silicate}} + \mathrm{Fe\,Si} = \mathrm{Fe_2\,Si} + \mathrm{Ca\,SO_4}$$

From *The Engineer*, and published by the author with permission of Richard Hornsby & Son.

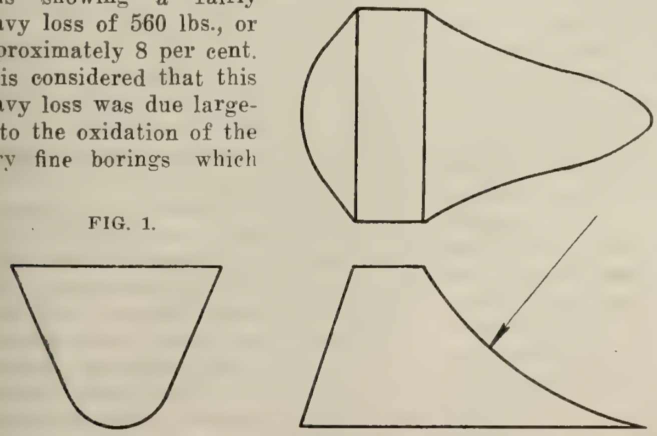


FIG. 1.

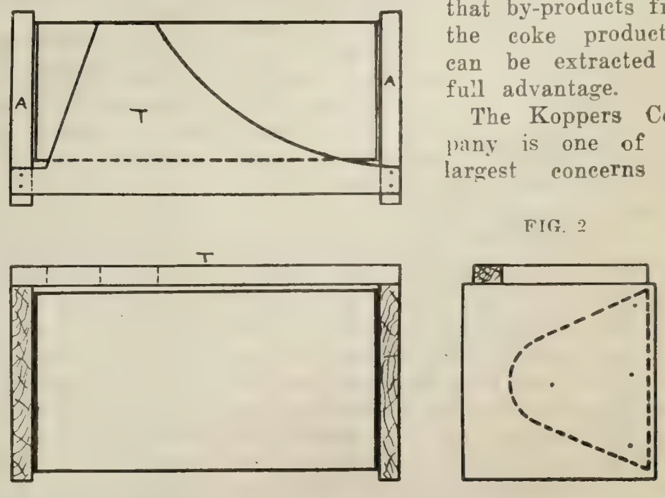


FIG. 2

A PATTERNMAKING KINK.

By A. L. Loy.

WHILE watching the pattern work production on a large engine bed recently, the writer saw the following kink used in getting out one of the rather odd-shaped pieces used in its construction. While there is little new or unusual in its application, yet one will often see journeymen patternmakers doing an almost endless amount of fitting when getting out similarly shaped pieces, and even then it is generally necessary to use a large quantity of putty, and a large fillet to cover up an ill-fitting job.

Fig. 1 shows the piece to be cut out. One end was cut at an angle, while the other was the circumference of a circle. There was, of course, nothing difficult in laying it out on a plane surface, but the trouble arose when trying to saw out these ends, due to the angularity of the sides giving only a line bearing on the saw table. The block was shaped according to the end view and slightly longer than necessary. The end pieces, AA, were nailed on, the nails being place so as not to be hit later by the saw. The template T was then laid out to the desired shape and nailed to these end pieces with its one edge corresponding to the edge of the block. The block was next sawn out, the saw teeth just clearing the template T. When laid in place, the block fitted almost exactly, and the process described above required hardly any more time in its application than does its description, which may at least be of service to some one under similar circumstances.

* * *

CONTRACT PLACED FOR COKE OVENS

CONTRACTS involving a sum said to be between $2,500,000 and $3,000,000 have been let to the H. Koppers Co., Pittsburgh, a by-product ovens concern, by the Dominion Iron & Steel Co., Sydney, N.S., for the construction of a large number of by-product coke ovens. They will be built on the most improved plans, that by-products from the coke production can be extracted to full advantage.

The Koppers Company is one of the largest concerns of its kind in the world, and has received some very large contracts recently for the erection of by-products ovens. To handle the above order, a large force of men will be employed.

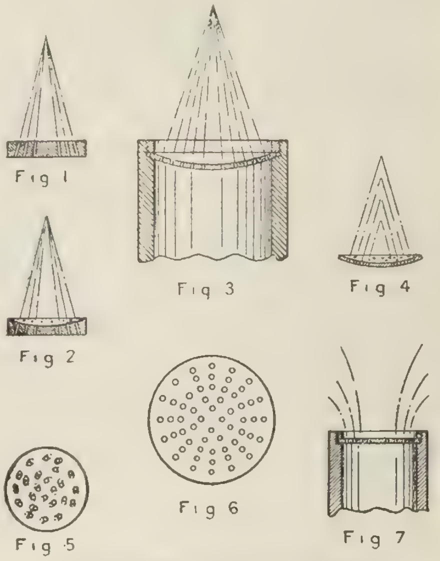
GAS BURNERS FOR INDUSTRIAL WORK

WHEN it is considered that 0.5 per cent. of carbon monoxide in air is sufficient to kill a robust human being, and that 0.1 per cent. is dangerous and that this gas acts as a cumulative poison, the dangers to health caused by improper methods of combustion of gas and defective ventilation are obvious, says the *Engineer*. Many of the objectionable features of gas as a means of heating metal or other cold surfaces are overcome to a degree by mixing the gas with air under slight pressure previous to its arrival at the point of combustion. This gives a form of blow-pipe flame, and it is possible by this method to add to the gas the exact volume of air required for complete oxidation. The result of adding the requisite quantity of air to the gas is to make the mixture explosive, and, to prevent it exploding back into the mains, the mixture must be allowed to pass through and to burn upon a thick gauze or perforated plate. Back explosion is also preventable by increasing the speed at which the gas is flowing through the mains. A combination of the two, namely, a thin perforated plate and the gas flowing at a fairly high speed governs the method adopted in a series of experiments carried out recently by Mr. F. S. Sinnatt and described in the Journal of the Municipal School of Technology, Manchester. The flame obtained by burning gas in this way was carefully examined, with the following results:—

Experiment Data

When the explosive mixture is allowed to burn upon a perforated plate or gauze, each perforation forms a separate flame which is very short, but has a large circumference. In order to burn as much gas as possible on unit surface, the perforations must be made close together, with the result that each small flame will tend to displace those near to it. The flame consequently sprays out as shown in Fig. 7. The spraying becomes a source of danger when the gases are under pressure, for while it is possible for each flame to appear to be burning properly when examined by the eye, yet analysis will show that the gas is escaping unconsumed. The reason for this was found to be that the flames on certain perforations in the plate were not burning properly, and this was especially the case with those perforations near the perimeter when small discs were used.

Further, the author noticed that with any variation in the size of the perforations, especially where some became enlarged and others closed with foreign matter, the length of the flames on different perforations varied, and the surface had peaks which stood out above the remainder of the flame. In cases where the design of the burner was faulty and the gas travelled down a main and then directly on to the perforated plate, the rate at which the gas was flowing through the centre perforations was greater than through those near the perimeter. The flames, therefore, projected in the centre. If any of the above uneven flames are made to impinge against a cold metal surface a part may be extinguished or only partially burned, with the result that the gas escapes combustion. This is aggravated by the fact that the pressure and the composition of commercial fuel gases cannot be maintained at a constant figure, and that the flames are frequently employed in some machine which is subject to more or less violent vibrations.



GAS BURNER APPLICATIONS.

Overcoming Difficulties

Many of the above difficulties are overcome by making the perforated plate or gauze concave on the side upon which the gas is burning, an arrangement which has been patented by Messrs. Wallwin and Sinnatt. The perforations should have a common focus, as in Figs. 1, 2, 3, and 6, which can be varied by varying the degree of concavity of the plate—generally the perforated plates are made in the form of small circular discs, the size varying with the type of burner for which the disc is required, but usually ½ in. in diameter. The perforations in small groups may have a focus of their own as in Fig. 4. The whole of the flames burning on each of the separate perforations are thus made to pass through a common point, or the flames are focused. The effect of this treatment is to overcome within wide limits any variations in the composition of, or the pressure of, the gas. It is nearly impossible for the gas to escape combustion owing to it having to pass through the common focus. The combustion of the gas is in a degree self-induced, and the rate at which the gas burns on the plate is increased by the thorough mixing which occurs. Differences in the size of the perforations cannot influence the flame to the extent they do on a flat perforated plate.

The flame upon a concave perforated plate or "dished disc" assumes a fairly perfect conical form, and after leaving the point of focus the burned gas is in a single stream. The point of focus of the plate may be considered to be the place at which complete combustion for the system will take place, and this may be taken as marking the point at which the flame may be brought into contact with cold surfaces. The distance this point is from the plate may be varied according to the design of the particular machine or plant in which the burning is required. The fact that the whole of the flames pass through the common focus causes that point to assume a maximum flame temperature. The degree of concavity required for different pressures and for fuel gases of different compositions was determined experimentally for the gases which have been burned by the system. The size of the perforations and the thickness of the metal of the plate are factors which influence the concavity necessary for any particular gas. At present the method adopted practically is to use small discs about ½ in. in diameter and to fit these into any type of burner; the number of the discs being varied according to the volume of gas to be consumed.—*The Engineer.*

* * *

Annealing Iron and Steel.—Two points have to be taken into consideration to make annealing really effective—the maintenance of a sufficiently high temperature, and the time period allowed for the changes in the structure of the metal to take place; the mere "drawing the temper" of a piece of metal by bringing it gradually to a red heat and then allowing it to cool gradually not really being annealing. A temperature of about 800 deg. C., continued for eight or ten hours, usually becomes necessary for really efficient annealing, and the use of a closed muffle having a reducing atmosphere is very desirable if oxidation is a matter of importance. Open muffles or ovens probably are easier worked than closed ones, and for some purposes are more economically worked, but the metal is too largely oxidised for many purposes, the oxide having usually to be pickled off.

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions—Your Co-operation is Invited

MACHINISTS' INSTRUCTION COURSE—XI.

By J. Davies.

THE USE of mandrils for turning eccentrics is limited by the amount of the eccentricity and the size of the hole. It is clear that the centre for an eccentric with a large throw and a small hole would be too near the edge of the mandril to be practicable, and in many cases the centre would come outside the mandril altogether; in cases of this kind, also in turning crank shafts, special pieces are bored out a snug fit for the end of the shaft and keyed on or fastened with set screws. These pieces are to receive the centres.

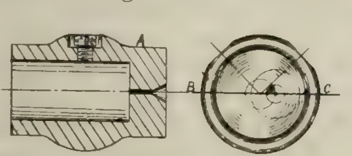


FIG. 45.

How to Mark Off a Web Crank Shaft

The end of the shaft is centred and turned for a short distance the size of the end pieces that are to be used for carrying the centres, also a small portion is turned the same size at each end to sit in the blocks. The shaft is then placed in the vee-blocks on the surface table and the end pieces fastened on in line with the crank arms. The centre of the crank pin and the centre of the shaft are set the same height above the marking-off or surface table with the surface gauge, and a line drawn across the end of the shaft through the centre. The centre of the crank pin is on this line and can be laid off with a pair of dividers from the centre of the shaft.

For turning a large number of crank shafts or eccentric shafts with a very small throw, ⅛ in. and ¼ in., the writer made some special jigs as follows:—

Two pieces of tool steel were bored a push fit for the ends of the shaft, one for each end. Then a piece of cold rolled steel, large enough to allow for turning, was driven into an old flange, after which the flange was faced and bolted to the lathe face plate. The piece driven into the flange is now turned to fit the two pieces already bored, they being the exact size of the cold rolled eccentric shafts, for which we are making the jig. Two holes for set screws are drilled and tapped at right angles to each other in the steel pieces A, Fig. 45. The screws are sunk below the surface and the holes countersunk for a box wrench, to avoid accidents through projecting set screw heads.

The jig piece, A, is now fastened on to the turned mandril by the two set screws, which puts it under working conditions. Face the end true and smooth and make a very fine circle on the end with a sharp pointed tool equal in radius to the required throw of the eccentric shafts to be turned. Draw a horizontal line through the centre right across the face, and where the horizontal line cuts the circle is the centre required.

With this point as a centre make a circle with the dividers for setting up by, slacken the bolts with the faceplate and slide the job to the new centre, setting it very carefully to the circle made round it. Now make the centre with a tool and put in a very small drill to clear the point, repeating the operation with piece No. 2 for the other end.

Both pieces are now exactly alike, the only thing that remains being some ready method of locating them on the shafts in proper relation to each other. This is done by placing them on a short piece of shaft and setting them up by the horizontal lines on the planer or shaper and shaping a flat on one side of each piece, Fig. 46. To use them the jigs are placed on the shafts and the flat spots placed on lathe bed or planer, or any other flat surface, and the set screws tightened up, when the job is ready to be turned. If the ends need turning, of course centres will have to be made in the shaft and the ends turned after the jigs are removed. The same jig pieces can be used for several different throws if the centres are not too close together.

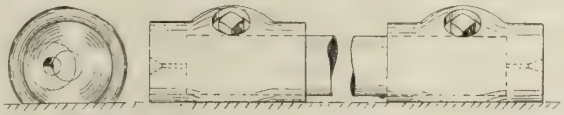


FIG. 46.

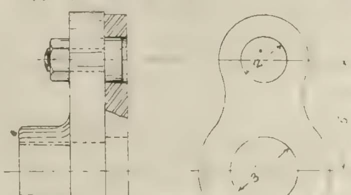


FIG. 47.

Chuck and Faceplate Work

Chucks can be considered as of two classes—independent and universal. The independent chuck is by far the most general of the two, as any kind of work within its capacity can be handled by it, but in special work, particularly repetition work, the universal chuck is a great time saver.

When putting on the chuck, don't start up the lathe and hold the chuck up to the thread, expecting it to catch true—it might, or it might not—with the result that the chuck would be torn out of your hands and hurled across the shop. Clean out the thread inside the chuck and oil the thread on the lathe spindle, start the chuck by hand and then start up the lathe, slowly if the chuck is heavy. Be careful not to bang it up to the end of the thread too hard, because it has to be taken off again. A convenient way to take it off is to place a bar or piece of pipe across the jaws and tighten one jaw on to it, then turn the lathe backwards and bang the bar on to a piece of hard wood resting on the ways.

In chucking the work, arrange to have the jaws opposite the strong part of the casting, if the casting is in any way frail, such as opposite the arms in pulleys, and so on. If the work is heavy, hold it up to the faceplate or chuck from the tailstock centre with a bar, pipe, piece of wood, or anything handy. In setting up the work, take all the surfaces to be machined into consideration and set up the work so that they will all clean up. Don't tighten the jaws too tight, it is surprising how easily a light piece of work can be distorted by the crank. Don't finish one part of the work before roughing out other parts. Rough cut the work all over, and if you judge there is danger of distorting the job ease back the jaws evenly and slightly before taking the finishing cut.

Universal chucks are supposed to tighten true and even on any round piece of work, but they seldom do. Little variations of the chuck can be compensated for by placing pieces of paper or other packing between one or two of the jaws and the work. Special chucks are made in endless variety, and they are generally used for peculiarly shaped jobs, or for repetition work for setting up the work quick and true. They generally consist of a casting, bored and threaded at one end to fit the lathe spindle, and the other end made to hold the work, which is held by set screws or other suitable device.

Bolting Work to the Faceplate

Bolting work to the faceplate affords ample scope for ingenuity. The same plates, clamps and packing pieces as were described under the heading of drilling machine work are generally used. The work must be clamped tight enough to prevent slipping or moving out of its place by the pressure of the tool, a good practice being to place a piece of brown paper between the work and the faceplate, angle plates, special clamps, adjustable jaws, etc.

It often happens when there are a number of pieces all alike that it pays to make some simple device for convenience in setting up. One example will be mentioned. It is required to bore out a number of cranks to dimensions given in Fig. 47, with the centres 5 in. apart. First bore out the 2 in. hole, then make a pin like a large, round-headed bolt to fit hole, with the shank to pass through the slots of the faceplates, leaving the head a little thinner than the crank casting to facilitate calipering. Mark off the first crank, fasten the locating pin through one of the slots in the faceplate and set the 3 in. hole to the marks, checking the accuracy of the marking off by measuring the amount of stock between the two holes.

When the first one is satisfactorily set up, tighten up the locating pin, and if the job is at all likely to be repeated, put a couple of small dowell pins into it so that it can be placed in the same place. Now, by boring the 2-in. hole first and putting it on the locating pins, the distance between the centre is automatically fixed. Modifications of this idea can be used for a variety of jobs.

❖

THEORY AND PRACTICE IN SHELL BORING

ALTHOUGH comparatively little has been written on the subject, says *Herbert's Monthly*, there is hardly another on which such a diversity of practice exists as in the design of tools for boring and bottoming shells of the bottled and loose nose types. Shell boring can be done on lathes of the turret type; it can also be done on simple lathes by interchanging different boring bars in the same tool holder; or, again, by the simplest method of all, the shells may be passed from machine to machine, each of which is provided with one boring bar only. By any system of shell boring, it is, of course, assumed that the outside diameter of the forging has been turned true with the rough bore at a previous operation. This practice is so general that the reasons for it need not be gone into here. The shell may be held in any suitable type of chuck, but we have found that the collet chuck, shown in Fig. 1, is most suitable for shells up to and including the 6 ins. size, which are regularly being dealt with by female labor. This chuck is extremely powerful, and does not require a great amount of effort to tighten.

First Boring Bar

The boring bar for the first operation is shown in Fig. 2; this carries two cutters for boring the parallel portion in the shell. The two cutters are of simple form, made from rectangular black stock, and do not require to be machined. The front cutting edge is provided with suitable top rake, while adjustment for diameter is made by the screws A. In order to simplify setting the cutters to the correct diameter and equi-distant from the centre, the end of the bar is bored up a little way to take the stem of the setting gauge. The gauge is swung round the bar to each cutter in succession; these are adjusted to touch the set screw in the gauge. The size to which the cutters are set is about .020 in. less than the finished bore. On larger shells, three cutters are sometimes employed in place of two where the diameter of the bar permits it.

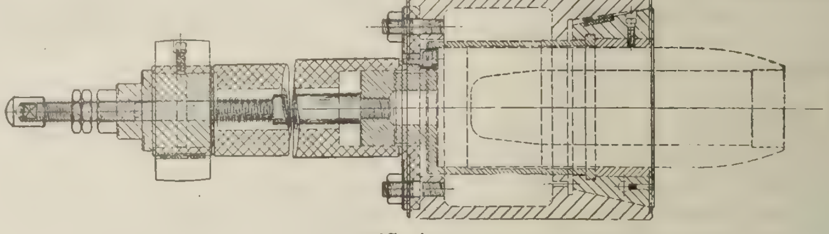


FIG. 1.

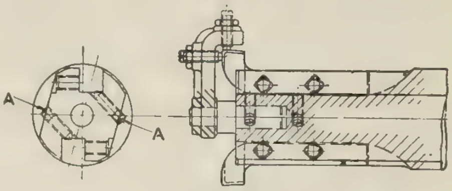


FIG. 2.

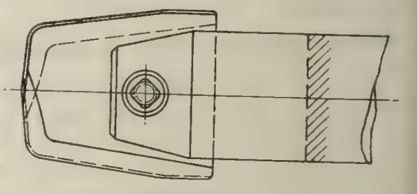


FIG. 3.

Rough boring the parallel portion with a spade tool is bad practice, as it is obviously impossible to grind top rake on a spade tool in the correct direction for rough boring a parallel hole; in addition, the spade tool always tends to follow the rough bore of the forging.

Second Boring Bar

The second bar, Fig. 3, carries a spade tool which differs in one important particular from conventional practice. While being approximately to form, it has the front end made with a point like a flat drill, which makes it a good tool for penetrating; it also has the great advantage that it cuts through the scale gradually, instead of bringing a broad surface on to the rough bottom of the forging, as happens with ordinary spade cutters. The form on this cutter being only approximate, it is easy to grind, and its diameter is a little less than that of the rough bore, so that it only starts cutting when it reaches the bottom of the hole; the stops are set so that this cutter penetrates deep enough to remove all scale.

Third Boring Bar

The third bar, Fig. 4, carries a correctly shaped spade cutter, which, in addition to finishing the bottom of the shell, usually finishes the parallel bore, the cutting action closely resembling that of a reamer. A feed of 10 cuts per inch can be used for finish boring, this leaving an excellent finish, as the cutter removes very little metal. To steady the cutter while working at the bottom of the hole, and to prevent it "chambering," the finish boring bar is provided with a cast iron roller, which runs close behind the cutter, and fits in the finished bore. Four flats are milled on the roller, so as to allow the chips and lubricant to get past. In setting the stops for the finishing operation, the end of the spade cutter should not be allowed to penetrate any appreciable distance beyond that reached by the spade drill, so that the "dead end" of the cutter only comes into operation just at the end of the cut.

There have been a good many attempts to eliminate the dead end in the manufacture of spade cutters, the object being to secure a cutter which penetrates more easily, but it is obvious that with a first spade tool, like that in Fig. 3, the dead end on the finishing spade tool is not objectionable. It is our practice to make the land or dead end about one-tenth to one-eighth of an inch wide which we find is quite satisfactory. Cutters with narrower lands than this wil not stand much heavy work.

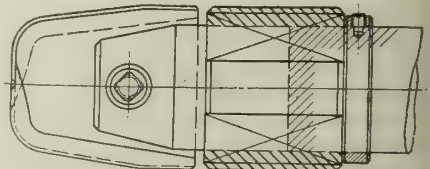


FIG. 4.

Eliminating the Dead End

Three designs which eliminate the dead end are shown in Fig. 5, but they are all open to objection. The cutter A is too weak, and will readily split up the centre. That shown at B is a good cutter for penetrating, but unless very carefully ground leaves a pip at the centre of the bottom, which is objectionable in finishing cutters. The cutter shown at C has no dead end, but is also liable to leave a pip, while owing to the cutting being heavier on one side than the other, has a tendency to chamber the bottom of the hole.

The readers' attention is drawn to the details of the spade tool shown in Fig. 6, which we now use. This design is produced on the Lumsden oscillating grinder, and is cheap to manufacture. The cutting edges are radial, as is usual, but the clearance is obtained in a somewhat different manner from the usual practice. In order to obtain a more obtuse and durable cutting edge, instead of giving the usual 6 degrees clearance, the outside edge is at right angles to the top face, and the heel is removed where it touches the circumscribing circle. This is done for both roughers and finishers, but, in addition, the finisher is circular ground to the size of the hole with a land of about 1/32-in. wide, which lengthens its life and assists in preventing "chambering." The process of circular grinding also provides a convenient and accurate method of finishing the periphery of the cutters to size. Finishing cutters which have worn under size on the periphery are usually converted into roughers.

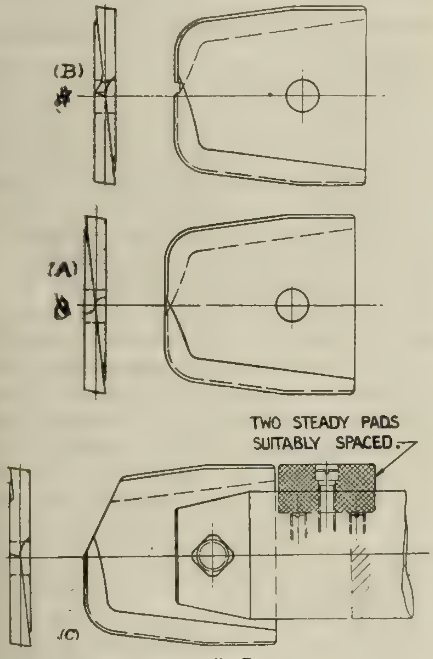


FIG. 5.

It is very good practice, if the lay-out will allow of it, to finish the parallel bore with another bar, exactly like that shown in Fig. 2, leaving the spade cutter, Fig. 4, to do the bottoming only. In this way a finishing spade cutter which has worn under size on the periphery need not be discarded for that reason.

For facing to length and chamfering to suit the bottling die, a bar like that shown in Fig. 7 is used. By using a single point cutter at A it can also be used to bore the thread diameter of shells with loose nose. The pilot roller fits in the finished bore, while a facing cutter and chamfering cutter are clamped in a collar on the bar. A chamfer is often put on shells with loose nose, in order to centre them in the chuck used for the thread milling operation. In shells of the loose nose type the recessing at the back of the thread can be done with a slide of conventional pattern; this operation calls for no comment.

* * *

EFFICIENCY IN METAL POLISHING

By "Abe Winters."

WE read more or less good advice regarding efficiency in the plating department, but very little is written relative to the economical treatment of the metal in the polishing and buffing departments previous to and following the interesting process of electro-plating. The following is based on statements made to the writer by one of the most progressive foremen polishers in the Province of Ontario. His long and varied experience has given him opportunity to study the metal polishing problems from many angles, thereby lending exceptional value to the opinions herein given:—

The Plater and Polisher

The polishing and plating of metals for all ordinary purposes is often unfortunately regarded as being a trade or profession which may ordinarily be mastered by any one man who may be capable of becoming an adept in either one or the other of above-named operations. Under certain restricted conditions this is true, but, generally speaking, a good polisher seldom develops into a good plater, and a man who studies the art of electro-plating until its possibilities have been properly grasped, seldom, if ever, becomes an efficient metal polisher. The two occupations are essentially quite remote from one another, although closely allied. In many industrial plants devoted to the manufacture of polished and plated wares, the polishing and plating is done under the supervision of one man. Such, however, is not the case in plants turning out high-grade lines of metal wares, which have become standard in respect of finish and durability of the electro-plate. These plants have realized the importance of employing foremen for the respective departments who were specialists in their particular branches of the business.

To be successful, these men should not however be averse to actually engaging in the various operations under their supervision when circumstances require it. Wet or soiled hands are not necessarily a brake on a foreman's efficiency. If the polisher is given new parts to polish and does not readily adopt the quickest and best method of finishing the operation, the foreman should be ready and willing to demonstrate the process he wishes employed. If a price is placed on piecework, the foreman should be capable of trying out the time on a given number of pieces and show the men that the work can be finished in the specified time. Foremen who depend on some favorite employee to perform the above duties for them seldom, if ever, become highly efficient and capable of supervising departments in the more modern, systematized industrial plants. The foreman must teach his men to keep their wheels in first-class condition, properly balanced, etc. Many polishers are very careless with the supplies, and consider the operation of balancing their wheels a trivial matter, with the result usually following careless, thoughtless action—inefficiency. They are not responsible for the supplies, and do not intend to use their grey matter in an effort to assist the foreman; therefore it behooves the latter to be on the alert in order to keep the burden rate of his department low. The cause of much carelessness on the part of the polisher when balancing wheels is that he will not take the time to balance them; yet he knows, or at least should know, that unbalanced wheels cause the waste of many dollars' worth of emery and glue in a very short time. If felt wheels, canvas wheels, or bull neck wheels are used, the waste is often extremely expensive and totals to a big sum at the end of a year.

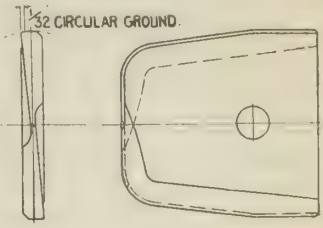


FIG. 6.

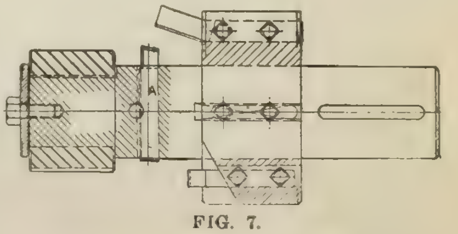


FIG. 7.

The foreman polisher who studies his men, selects the work for them according to their respective abilities, exercises proper discipline, and treats his men as human beings, and with impartiality, can usually maintain a low figure for operating expenses. He must experiment, but thoughtfully. The burden rate and cost rate should always be his guide. He must endeavor to produce the best possible results with the least possible expense, not only at this particular time, when men and material are scarce and costs for labor and supplies run unusually high, but at all times. The foreman should strive to produce the maximum output at the minimum expense to his employer.

Polishing is not, and never has been, regarded as an operation requiring exceptional skill. It is an occupation which necessitates spending the working hours in a more or less distasteful atmosphere. Often the conditions are actually a menace to health; the labor is indeed tedious even on light work. Polishing rooms are not usually as bright and cheery as they should be. Grease, oil and dirt are well known factors in the process of polishing, but their influence on the daily life of the men can be wonderfully modified by consistent thought and attention on the part of the foreman. The sanitary conditions existing in the polishing room should be maintained satisfactorily throughout the year if best results are expected of the men.

Polishing Room Amenities

A suction system of adequate capacity, together with true running lathes, equipped with suction hoods, are very essential if the production of maximum output per day is desired. Air laden with fine particles of metal, emery, dirt, and glue, is not conducive to healthy human organisms. Too many polishing rooms are deficient in ventilation, and a still greater number are without proper and efficient blower systems. The men at the wheel naturally expect the foreman to observe deficiencies and have them corrected. If the men have reason to believe the foreman is an unobservant easy-going kind of chap, they soon learn to take many advantages of his carelessness, and gradually the control of the situation is transferred to the shop committee of the local Polishers' Union. A foreman polisher should divorce himself from the Polishers' Union as soon as he becomes a foreman, and while he may long retain a warm spot in his heart for the organization which at one time dictated to him a programme of action, as a foreman he should execute the orders of his employer with judgment and impartiality.

Much of the foreman's difficulties may be eliminated by special attention being given to the class of supplies he orders. He should try out all samples of wheels and material personally, in order to know the grade best suited to his specific requirements. The supply salesman will invariably tell him that a certain line of supplies are absolutely the best on the market, and name over a half dozen firms who are using the stuff Perhaps he is right, but he seldom has every article up to the standard; therefore, don't take the supply salesman's word, or that of anybody else. The foreman should find out himself. Purchasing agents many times place an order according to first cost—the lowest price. This is wrong. A low price is a poor guide. Expensive goods are also often useless for the purpose, and furnish trouble for the men. High prices cannot be taken as a guarantee of efficiency. A personal test will suffice to give the foreman a basis upon which to figure, as he can then reckon the costs from various angles.

Above all, don't stay in a rut; experiment, think. If you are polishing brass and take it from 120 emery (dry) to the buff, and cannot satisfy yourself that this method is best, try oiling the brass, using a compressed canvas wheel; 95 per cent. of the brass work polished can be treated with less expense in this manner. Felt wheels are often very inferior. They are almost invariably out of true, and the use of compressed canvas as a substitute has frequently lowered the burden rate in the polishing department very noticeably.

When refinishing plated goods, it is excellent economy to have the old plate stripped off by electro-chemical methods in the plating department, thereby saving time, material and labor. Stripping solutions, which permit both steel or brass to be cleaned of old deposits without injury to the base metal, are now in general use, and the polishing department should be benefited by the process.

The above points do not cover the entire range of economic ideas which should be employed in the polishing room, but they are some of the prominent ones, and their adoption will assist the foreman to appreciate further views on polishing room efficiency, which will appear in future issues.

◆

INDUSTRIAL LIGHTING

AS to whether the supply of current in the case of a large industrial establishment should be taken from a private plant on the consumer's premises, or from the public supply, is a question which has often been raised, but never definitely settled. It has again been discussed before a meeting of the Junior Institution of Engineers. The central station man is, or should be, a salesman, and is entitled to use all legitimate means of pushing business. Such items as the first cost of a generating plant, interest and depreciation thereon, and the need of skilled labor to look after it, can readily be used as a means of suggesting to the lay mind that to take the supply off the public supply mains is the only economical thing to do.

This does not necessarily follow, however, and essentially so in the case of establishments where a power plant is put down. The additional cost of making provision in the power plant for supplying the lighting current is commonly such as to render it well worth doing on economical grounds, whether the plant be for the distribution of the power mechanically or electrically. With a supply from his own plant the owner has not to watch possible variations in the annual cost of current due to such causes as minimum or maximum demand, total units consumed, etc., nor to enter into any agreement for a number of years in order to get down to what may appear to be a favorable rate for supply.

Question for Individual Consideration

The whole question must be thought out in an unbiased way, due regard being paid to all the conditions affecting the particular case under consideration. In settling upon a supply from the public service, the factory owner is frequently well in need of independent advice as to agreements for charging, if the most economical arrangement is to be arrived at. When a typical agreement is put forward for consideration before the prospective consumer can be advised as to taking up same, it is necessary to weigh very carefully the several conditions which are commonly sought to be imposed. Such, for instance, are requirements that all the consumer's lighting must be taken from the one source of public supply only, and this for a period of, say, three, five or more years.

Further than this, the rate of supply and system of charging are both fixed for the whole period, regardless of possibilities which might prove advantageous if they were open to be adopted. Supply authorities frequently offer alternative methods of charging, usually a flat rate; a maximum demand system is also one of its several forms. With a combined power and lighting load, it is not unusual for a consumer to be allowed to have a certain proportion of the total units consumed, of perhaps 10 per cent. to 15 per cent., to be allocated to lighting, any proportion above this being charged at a somewhat higher rate. In factories where the load is mainly power, this works out very satisfactorily for the consumer, and likewise, no doubt, to the supply authority.

◆

DOMINION COPPER PRODUCTS CAPITAL INCREASE

THE Dominion Copper Products Co., for the second time in four months, has secured authority to increase its capital, this time from $1,000,000 to $3,500,000. The company is one of two successful subsidiaries organized by the Dominion Bridge Co. since the war began. It started off with a capital of $400,000, which was increased last August to $1,000,000. Now, by supplementary letters patent just issued at Ottawa, authorization is given for an increase to $3,500,000. The other subsidiary, the Montreal Ammunition Co., so far as is known remains with its original capital of $300,000, although that is absurdly small relative to the actual cash investment in the enterprise and the volume of business the company transacts.

It has been conjectured for some time that the Dominion Bridge directors have some plan for the consolidation of the two subsidiaries under consideration. A possible step towards such a consolidation exists is the increase in the capital of the Copper Products Co., which could give its shares in exchange for Ammunition Co. shares on a basis approved by the parent concern, which owns the controlling interest in both.

OCCUPATIONS FOR CRIPPLED SOLDIERS

By Sir Edmund Walker*

THE end of the war is not in sight, but the wounded and otherwise disabled soldiers are coming back, and it is not too early to come to close grips with the problem of finding employment for those who have no claims on previous employers, and of caring for those who are partly or completely disabled.

We have to consider what we owe to the man who has fought to defend our lives, our property and our liberty, and we have to consider how to prevent the disorganization of industrial society when the soldiers come back in large numbers and the making of army supplies has come to an end. We do not wish the soldiers' home-coming to mean, except perhaps temporarily, a cause of industrial disturbance. We want, on the contrary, to find in it a great opportunity to increase the prosperity and happiness of that part of the Empire which they have fought to save.

We shall have lost forever the laboring power of our heroic dead and of those few who are totally disabled. We shall have gained the labor of many women untried before the war; we shall have gained the added strength, physical and mental, of countless soldiers who through the war have "found" themselves; and we shall, in much fewer cases, have returned soldiers who are more or less wrecked physically or mentally, but who are not quite useless to the community.

I presume much of the work to be done by the Military Hospitals Commission leads directly to the larger work of land and industrial settlement. For obvious reasons we shall hope that many of the returned soldiers will take up land. **The manner of selecting such land so that communities of loyal men shall be planted in every province, of caring for the soldier-farmer in his early years of settlement, and of lending him money for improvements, is of prime importance.**

Meantime the Hospitals Commission has, added to its other burdens, the duty of making suitable for work, by training and by the use of newly invented implementa, men who would otherwise in many cases be a charge upon the country and a monument of our ingratitude.

In my younger days the one-legged and one-armed soldier was always present, eloquent of war, and not without a meaning to the community,—"lest we forget." We were used to seeing a bank-messenger with one sleeve pinned to his breast and his handsome commissionaire coat covered with medals.

Handicapped, But Not Disabled

To-day, every employer of labour, manufacturer, merchant, banker, or whatever his calling, should be considering how he can employ a few partly disabled men, and thus do something more in carrying the burdens of the war.

Many a machine shop can use a certain number of one-armed and one-legged men with hardly any loss of efficiency. The Hospitals Commission sends them out better prepared to lessen the effect of their disabilities than the wounded soldiers of other wars.

In a recent campaign to raise money for the British Red Cross, two officers totally blind from the effect of wounds appeared before the public. Both had been trained in the wonderful establishment in England administered by Sir Arthur Pearson. One of these blind officers is now employed as an expert electrician, while the other is a competent actuary and already engaged in soliciting life insurance.

Totally blind men are being trained as stenographers, taking shorthand notes by a system which enables them to be read by touch before being typewritten by the same blind operator. Some of these men are already much more efficient than the average stenographer.

What the peaceful communities at home must bear in mind is that these men are not rendered unfit for useful work but that they are handicapped or forced by the loss of one limb or sense to put more energy into their remaining abilities.

All the ingenuity of this ingenious age should be employed, no matter at what cost, to enable the wounded soldier to earn his own living,—which will not affect any pension he may receive.

When everything that human skill and sympathy can do is done, we shall still have some men to be entirely taken care of by the state. I hope that in creating Soldiers' Homes for these, as well as in finding good work for all not totally disabled, we shall competely revolutionize the past and make the name of Canada shine brightly for its wisdom and its humanity in caring for its crippled heroes.

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*President Canadian Bank of Commerce.

CONSERVATION AT THE FRONT

EXAMPLES of some of the enormous wastages of war are furnished by the statement of a civilian whom business connected with the British War Department recently took to France. Describing a visit to one of the military bases, he says he met with many surprises. The first was to see a huge mound of broken bicycles, odd wheels, parts of tires, etc., on which a number of men and women were hard at work sorting out and taking away the various materials in sections. The good parts were fitted together and reconstituted as bicycles in a factory at another part of the town.

Another scene in that place was a small mountain, about 200 feet square, of old army shoes. They were of different kinds and in all conditions, covered with mud from trenches, some well worn, some new and badly cut, and some almost unrecognizable as shoes—many of them cut or taken from the feet of dead or wounded men. That mound of shoes would have made a strange footnote to "Sartor Resartus." Workers were busy cutting about these shoes, salving the sound pieces and sending them to a factory.

There were many such heaps and shedfuls of other war salvage, which were carefully examined and dissected for further usefulness. The most unexpected of the many instances of these economies was a shedful of damaged binoculars. There was something very grisly about some of these glasses. Some had one lens whole and the other smashed by a bullet which had gone right through. Some of the binoculars had been struck in the centrepiece and completely divided, although all the lenses were uninjured. Others were twisted and flattened as if squeezed by a giant's hand. It is easy to see the great value of these recovered lenses at a time like the present, when the supply of field glasses is one among many army problems.

* * *

With all the new-fangled "whatnots" and the patented "time-savers," thinking still has to be done the old-fashioned way.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

MECHANICAL PLATING BARREL

A PLATING barrel possessing a minimum amount of mechanism with the maximum amount of convenience and efficiency is shown in the accompanying illustrations Figs. 1, 2 and 3, which show a mechanical plater recently brought out by the Connecticut Dynamo & Motor Co., Irvington, N.J. It is built in three sizes—82, 98 and 114 gals., with a barrel 14½ dia. x 24, 30 and 36 in. long respectively.

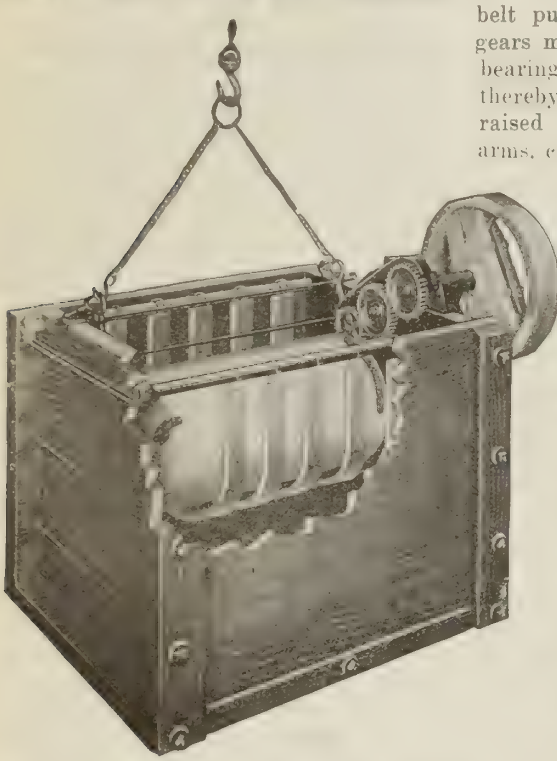


FIG. 1. SECTIONAL VIEW OF PLATING MACHINE SHOWING BARREL IN POSITION SURROUNDED BY ANODES.

The apparatus as shown consists of a tank made of 2-in. Southern cypress, well bolted together and lined with a mixture of asphaltum and pitch. Two styles of barrels are made, that shown in Figs. 1 and 2 being built of a large number of 1 in. thick strips with perforations 3-16 in. square; this barrel is well adapted to the plating of large or medium-sized work and for heavy pieces that would break the panels of weaker barrels. It is obtainable in hexagonal as well as cylindrical form. Fig. 3 shows a hexagonal barrel with panels of Bakelite, a manufactured substance which is eminently suited for the work, being hard, strong, non-conductive, non-absorbing and chemically inert. Its nature is such that very small perforations may be used, enabling work to be plated which is too small to be done in a wooden barrel.

The barrel is revolved by means of a belt pulley driving through a train of gears mounted eccentrically to the main bearing, the gear train being thereby disengaged when in a raised position. Brass lifting arms, covered with hard rubber for insulating purposes are employed to lift the barrel from the solution as well as conveying current to the cathode, or work rod, which consists of a single brass rod which is supported at the bottom of the barrel to insure proper contact between the work and the rod.

The anode rods are of 1¼ in. brass tubing connected together and provided with terminal connections. Either curved or straight anodes may be used with equally good results.

The Rotoplater, as the machine is termed by the makers, has no stuffing boxes to leak, and two speeds of 6 and 11 revs. per min. are obtainable by simply shifting an arm. The barrel being entirely submerged in the solution, it may be filled two-thirds full of work at one charge. Although the barrel can be lifted free of the tank and the work conveyed in it to the washing tank and dryer, it is not removed from its bearings which are thereby properly seated at all times.

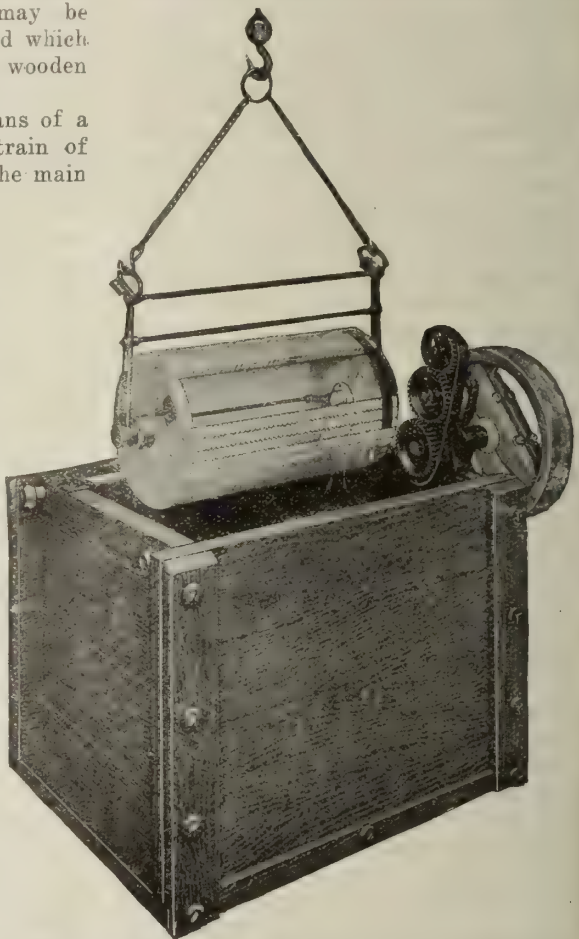


FIG. 2. BARREL RAISED CLEAR OF TANK FOR REMOVING WORK, GIVING ACCESS TO LIQUID.

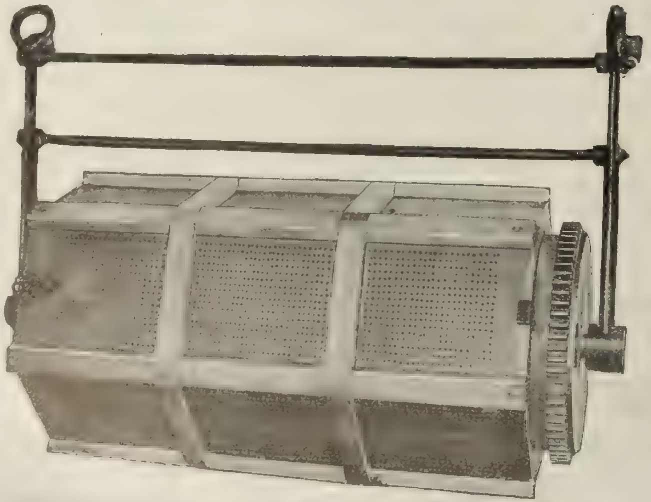


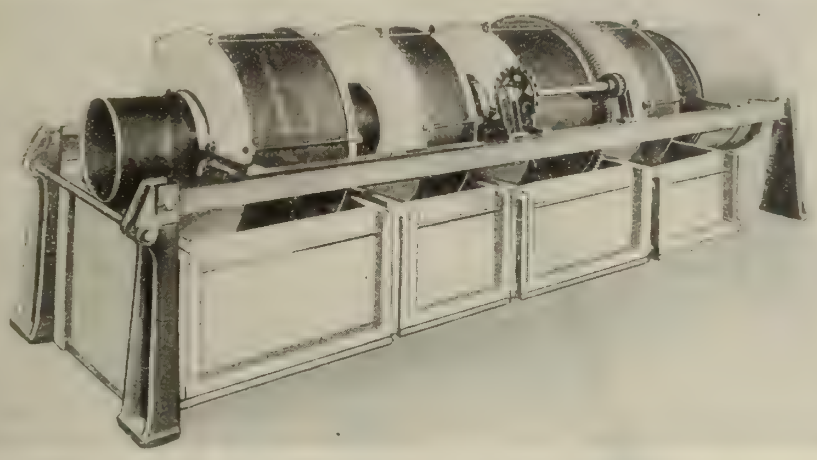
FIG 3 HEXAGONAL BARREL WITH BAKELITE PANELS

The complete outfit includes pulley, lifting chain, block and fall, and can also be supplied with a self-contained motor drive instead of belt pulley.

* * *

AUTOMATIC PICKLING AND CLEANING MACHINE

THE machine shown in the accompanying illustration represents a recent development in apparatus for automatically pickling, cleaning and drying all kinds of small articles of various materials and requiring a number of different solutions. The revolving member consists of a number of perforated drums dipping into tanks containing various solutions, the last drum being the drying section. A speed of 10 rev. per min. is imparted to the drums, which are inclined downward so that the material advances gradually from one end to the other. Pick-up pockets transfer the work from one drum to another, the material going through the machine and being delivered without interruption.



AUTOMATIC PICKLING AND CLEANING MACHINE.

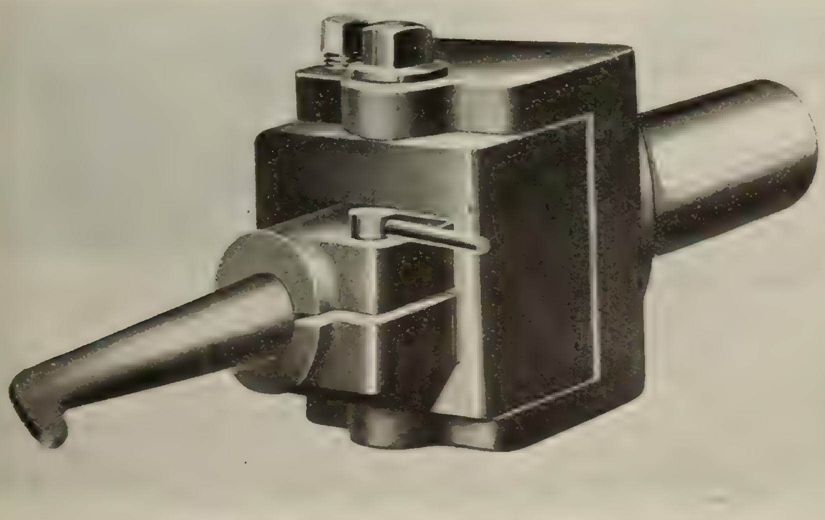
The apparatus can be used for a variety of work, including the removal of scale from cartridge shells, electric light sockets, etc., leaving them clean and dry ready for the next operation; nails, screws and similar small material can likewise be treated in oil. Uniform and increased output is a feature of this apparatus, two men with a medium size machine having as large an output as ten men with a battery of tumbling mills.

The makers of this machine are the U.S. Electro Galvanizing Co., Brooklyn, N.Y.

ADJUSTABLE BORING TOOL

AN adjustable boring tool, designed for using forged cutters on general boring work, is shown in the accompanying illustration. The ½ in. dia. tool is clamped in a split holder forming part of a swivel block, which is mounted in the fork-shaped casting which carries the shank. The clamping arrangement is positive, and enables the tool to be easily adjusted to the required size. When it is required to increase the size of the hole bored, it is only necessary to loosen the collar screw and make a slight adjustment of the set screw, whose point seats on an incline, which forces the swivel block outward and moves the cuttting tool to the point required.

As a result of this swivelling adjustment in a horizontal plane, the cutting point is always level with the centre line. Two sizes of this tool are obtainable having 1 in. and 1¼ in. shanks capable of boring holes of a maximum diameter of 1½ in. and 2 in. respectively. The makers of this tool are the Pierce Machine Tool Co., Chicago.



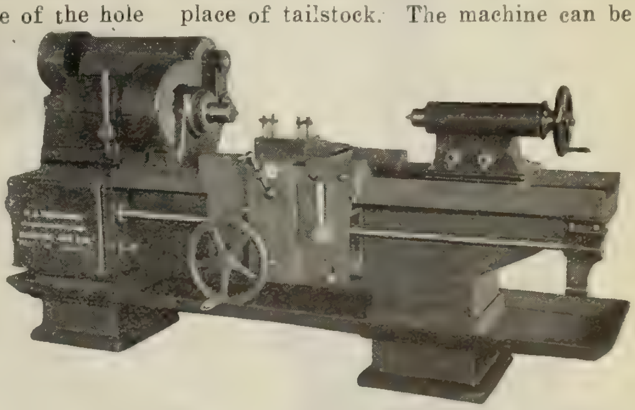
ADJUSTABLE BORING TOOL USING FORGED CUTTERS

GENERAL PURPOSE LATHE

TO meet with the requirements of a lathe for existing demands of munitions work and possessing the constructional features for subsequent adaptation to general purpose uses, H. J. Armstrong, Markdale, Ont., has placed on the market the type of machine here illustrated. In designing, the makers have endeavored to obtain maximum rigidity and large wearing surfaces. The drive is taken on a single pulley and communicated to spindle through cut steel gears and intermediate shaft.

When equipped with full geared head, eight speed changes are obtainable, controlled by levers within easy reach of operator. Provision is made for a complete range of feeds controlled by operator without changing on or off machine of any gears in system.

The apron has double wall. A turret or single boring tool can be supplied in place of tailstock. The machine can be supplied in two sizes, 20 in. for shells up to and including 6-in., and 32 in. for all larger sizes of shells.



GENERAL PURPOSE LATHE.

NOVEL SHEET-SHEARING APPLIANCES

A LINE of cutting tools of maximum strength and minimum weight and possessing sufficient portability to be taken to any part of a job, are being built and marketed by Montgomery, Smith & Co., Ltd., Keynsham, Somerset, Eng., the outstanding feature of the design being the use of rotary cutters which are self-feeding when in use.

The principle of operation is shown in Fig. 1. Two revolving cutters are used, the lower one being freely mounted in a stationary bracket. The upper cutter is carried in a similar bracket which can be be adjusted vertically so as to overlap the cutters more or less according to the gauge of metal being cut. This cutter is driven by a ratchet lever with adjustable stroke connected by links to the and lever. The surfaces of the cutters adjoining the edges are knurled so that movement of the hand lever causes the two cutters to draw the work toward them so that it is sheared, the ratchet allowing the cutters to remain steady while the hand lever returns for another stroke.

To facilitate proper operation of the machine, a setting gauge is supplied, either end of which is placed between the cutters, according to thickness of stock being cut, thus insuring the sheet being cut with the least possible distortion and power. In the case of thin sheets the cutters are set either level or slightly overlapping.

The variable leverage provided by the slotted ratchet lever enables the stroke of the driven cutter to be increased on light work, while partial cuts as in corner work are facilitated by releasing the upper cutter which allows the sheet to be easily withdrawn. The machine illustrated weighs 60 lbs., and has a capacity of 3-16 in. in steel and $\frac{1}{4}$ in. in softer metals, the actual space occupied being $11\frac{1}{2}$ in. x 7 in.

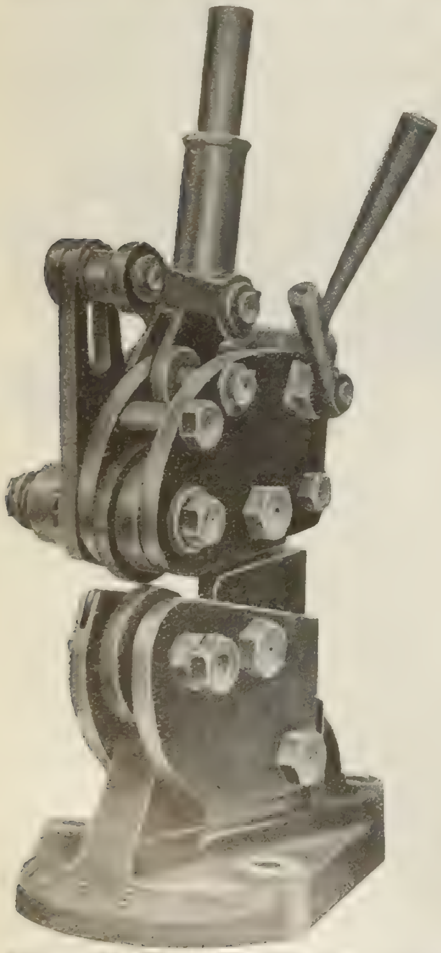


FIG. 1. SELF-FEEDING ROTARY HAND SHEAR.

A combined portable and bench type is shown in Fig. 2, the lower view showing it in use with a bench adapter while the upper shows it floating on the sheet, in which case a guide handle is used which is dispensed with when used as a bench machine. When using this type for corner work, etc., where partial cuts are made, the sheet can be instantly released and withdrawn by simply pulling over the eccentric adjustment screw on top of machine. Lateral adjustment is provided for the cutters, which may be removed for re-grinding when worn. This machine weighs 8 lbs., and cuts to 3-32 in. in steel and $\frac{1}{8}$ in. in softer metal.

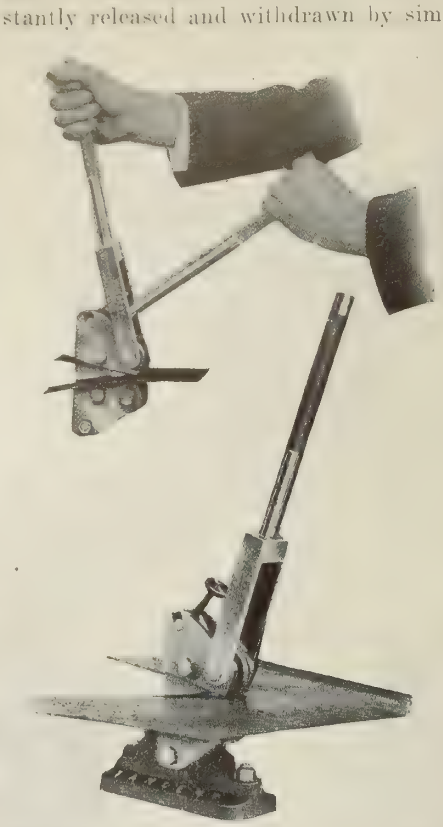


FIG. 2. PORTABLE TYPE OF ROTARY SHEAR.

A special corrugated-sheet cutting tool is made on the same principle, which is self-feeding and cuts either straight, curved or obliquely across corrugated sheets without distortion. It weighs 5 lbs., cuts up to 20 gauge sheets and is compact enough to be carried in the pocket. Double-edged cutters are employed, which remove a feed strip from the stock in front of the cutter as it feeds into the work, this tool being also withdrawn at any point as required.

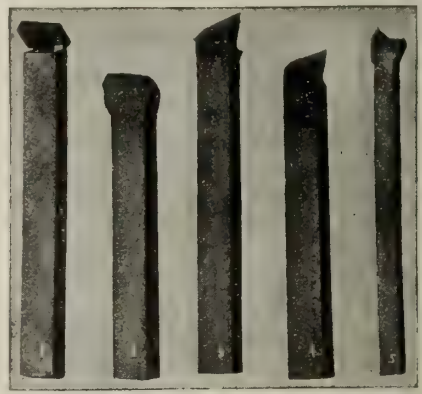
◆

WELDING TOOL STEEL TIPS TO MACHINE STEEL SHANKS

THE present cost of high speed steel has not only made it prohibitive for the average shop to use cutting tools composed wholly of such material, but causes serious loss when worn out tools have to be scrapped. Noticeable economies in this field can be effected by welding high speed steel tips to ordinary machine steel shanks, old worn out tools being cut to size and utilized for tips.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., have developed this process to a considerable degree, using their regular electric arc welding equipment used for welding and repairing castings in ordinary work. The current for this work should be approximately 100 amperes and the voltage for the welding circuit 60-70 volts.

The high-speed steel tip is first "tacked" to the machine steel shank, and the whole preheated. After fluxing with borax, welding is started. After welding, the tool is immediately laid in mica dust to cool gradually. It is then given a first grinding and tempered, after which the finish grinding is accomplished, when the tool is ready for use. The illustration shows the various steps in the process—1, tip "tacked" to shank; 2, tool after welding; 3, after first grinding, and 4, tool ready for use, after tempering and finish grinding. Tool numbered 5, was tested for strength of weld by hammering. As will be seen it broke above the weld. The reinforcing metal which is built out and around the tip serves both to give larger radiating surface and afford a larger conducting path back to the butt of the tool, thus keeping down the temperature at the cutting edge. The machine steel shank may be of any length desired, and of cold, hot rolled, or carbon steel, while the high speed steel tip should be short.



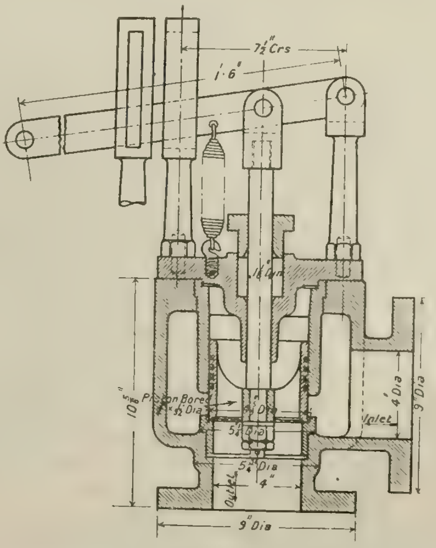
SUCCESSIVE STEPS IN THE PROCESS OF WELDING HIGH-SPEED TIPS.

NORWAY IRON ELECTRODE WITH OTHER ITEMS OF WELDING EQUIPMENT.

The work should not be hurried, but a good operator should be able to make between 25 and 30 welds for tools of 1½ inch cross section, in a day of 9½ hours.

PISTON THROTTLE VALVE

THE throttle valve here featured has been specially designed by Lancaster & Tonge, Pendleton, Manchester, England, for controlling the admission of steam to winding, hauling, and reversing rolling mill engines, with the minimum of exertion on the part of the attendant. As will be seen from the sectional illustration, the valve is of the piston type with a single seating, steam tightness being effected by means of four ordinary piston rings of rectangular section, while it is balanced sufficiently for all practical purposes. In order to give the finest possible regulation of the steam and very gradual admission at first, the seating is formed with an annular collar, the inner surface of which is made slightly tapered, so that the passage for the steam is somewhat constricted until the valve is lifted clear. When used in connection with colliery winding engines, the valve lever is fitted with a weight or spring to cause the valve to close sharply, in case the overwinding gear comes into action.



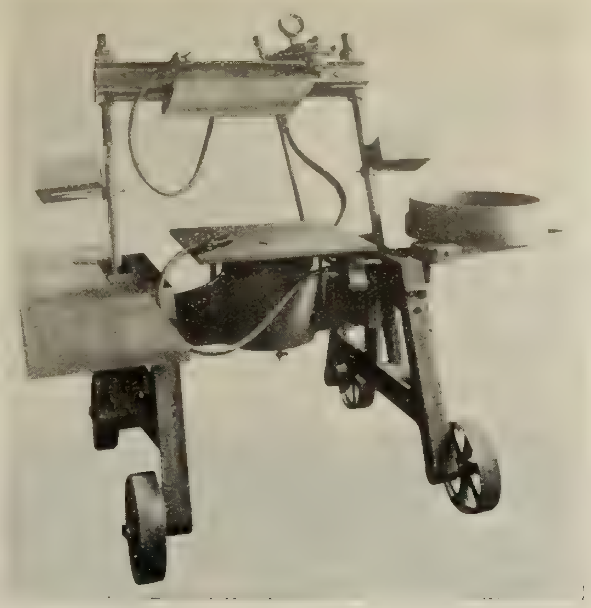
SECTIONAL ELEVATION OF PISTON THROTTLE VALVE.

PNEUMATIC POWER SQUEEZER MOLDING MACHINE

A POWER squeezer of simple construction and efficient operation, designated as model "D," has been placed on the market by the J. F. Webb Mfg. & Supply Co., Davenport, Ia. It is designed to meet the high-speed requirements of present-day foundry operation, being so simplified that risks of breakdown are reduced to a minimum.

The main frame is formed of two side members connected by the cylinder casting, the strain rods which support the upper cross-arm being hinged to the lower part of the side members. The cross-arm carries the operating valve and control apparatus, these being clear of sand and convenient of operation. The maximum air pressure is controlled by an automatic valve which shuts off the air at any required pressure, adjustment being made immediately to any desired pressure.

Five sizes of this machine are built with cylinder diameters ranging from 8 in. to 16 in., and tables 16 in. x 16 in. to 24 in. x 36 in., all of the machines operating with air at 80 lbs. pressure per sq. in., giving total pressures of from 3,800 to 15,360 lbs.



PNEUMATIC POWER SQUEEZER MOLDING MACHINE.

* * *

THE phenomenon of radio-activity is not confined to radium. A product of thorium, known as radio-thorium, is intensely radioactive, but it has a much shorter life than radium, its half period of existence being estimated at only three of four years. Meso-thorium, from which radio-thorium is evolved, is a by-product of the incandescent gas mantle industry, and on account of its relative cheapness as compared with radium it is now being used extensively either by itself or combined with radium, in the production of self-luminous paints.

HIS MAJESTY'S CANADIAN TORPEDO BOAT "GRILSE" AS SPEED PLEASURE YACHT.

A TAIL SEEMED LACKING

DRESSED in the latest and most approved motorcycling costume, with goggles all complete, the motorcyclist gaily toot-tooted his way by Regent's Park towards the Zoo. Suddenly he slackened, dismounted, and said to a small, grubby urchin: "I say, my boy, am I right for the Zoo?"

The boy gasped at so strange a sight, and thought it must be some new animal for the gardens. "You may be all right if they have a spare cage," he said, when he could find his tongue, "but you'd ha' stood a fa' better chance if you'd 'ad a tail!"

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AN ADDITION TO MACHINE SHOP NOMENCLATURE

AN OPPORTUNITY would seem to present itself to some resourceful mind which could evolve a convenient and obvious name for lathe, planer and similar tools in which a low carbon or machine steel shank is fitted with a cutting edge of tool steel welded in place. The necessity for having a suitable name for such tools will become more apparent when the price of tool steel returns to a normal figure again, and the tendency will be for many people to again use the solid tool steel article.

Recent developments serve to show that the design of cutting tools has been reduced to a point where specified forms of tools can be produced by more or less unskilled labor with an accuracy and economy of both labor and material which renders obsolete the combined efforts of high priced lathe-hand and dogmatic blacksmith, each of whom had individual ideas regarding the design and forging of tools respectively.

Progressive shops will, however, find that more than 90 per cent. of their tool requirements can be efficiently met by tools of the "composite" type having a "base" metal shank and a "rare" metal edge. The successful application of non-ferrous metals to cutting work is, so far, confined to an alloy which has earned a considerable degree of success, but the adaptability and universality of production possible with tools of the tipped type presages a widespread use in times to come.

Tool-holder sets with interchangeable tips have attained a justly deserved popularity and the probability of all three types, solid, composite and holder, being handled together in a tool room would seem to be sufficient reason that a single word if possible be adopted as a generic term for tools of this type. The word composite has been used to show the type of word and its distinctive application. A word compounded of recognized words would be preferable to a manufactured word which by nature of its possible obscureness of application would not readily indicate the new type of tool.

THE "GRILSE" NEAR-TRAGEDY

THE fact that H.M.C. torpedo boat Grilse managed to make port after being battered and bruised to the point of foundering with all hands, is due in the first place to her soundness of construction at the hands of her builders, and secondly to the herculean efforts of the crew to keep her afloat by hand pumping and baling, even when all hope of rescue seems to have faded. To those familiar with the appearance of the vessel—a very good idea is to be had from our illustration, and bearing in mind the fact that she is but a converted yacht, it seemed almost like courting disaster to have her put to sea—especially on the Atlantic, in midwinter. If we will have a Department of Naval Service, then let us have the proper vessel constituent to undertake its work. At the moment we can ill-afford to lose the six members of the crew of the Grilse, although it was nip-and-tuck that the loss wasn't fifty-six.

We might have afforded to lose the ship, but not so the men, and it seems to us that, after the recent experience, definite steps should be taken to ensure that the Grilse be put on a service which will harmonize with her original design idea, and that if circumstances demand the presence of a speedy torpedo boat destroyer or destroyers on our coasts, these be procured immediately from Britain, where the matter of half a dozen transferred to Canada would neither minimize the effectiveness of nor impoverish the main auxiliary or supplementary fleets. As has been aptly said, when not a few million dollars are being spent meantime on war-time non-essentials, our Dominion Government would be well advised to divert say a couple of millions to the purchase of a trio of destroyers, the most modernly and effectively armed and the speediest that science and the wit of British marine engineering skill can produce. A low-lying rakish craft with a short, stocky stack or two, and a wireless mast, no matter her speed, if originally designed as a novelty in pleasure yachts, is impossible of conversion to a place in the torpedo boat class, and the man-in-the-street should not be the only possessor of such knowledge.

PEACE PROPOSALS A DISTURBING ELEMENT

THE spectacular announcement by the Central Powers that they are willing and ready to put forward and discuss terms of peace with the Allies has, as might be expected, received a somewhat mixed reception, not only by the latter, but by neutrals as well. Whatever the spirit prompting the proposals and whether their meantime initiation will form the starting point for ultimate cessation of hostilities and all-round satisfaction in territorial and other settlements, are of course matters well beyond even the foresight and skill of most expert diplomacy. Time and tact will necessarily be the all-determining factors, and as regards effect on industrial and commercial enterprise the world over, the former is likely to give opportunity for the display of many disturbing—perhaps panicky demonstrations.

Even already, business has been materially affected, adversely, and this in spite of the fact that well-informed opinion is quite definite on the inopportuneness of peace negotiations So far as we in Canada are concerned, all indications point to our having little more than grasped the full appreciation of our material aid requirement in the prosecution of the war. We have come to realize that even with twenty-nine months of war behind us, the struggle is not more than half way through, therefore anticipating the complementary period our plans bespeak war work rather than peace talk. The business world is experiencing its first peace shock, so to speak, and the probabilities are that there will be many such in the coming year; but as evidences of an approaching termination of hostilities from a variety of reasons, they need not be unwelcome, tending as they will towards a less disturbing readjustment to peace time pursuits than otherwise. Taken at their face value, the peace proposals as meantime put forth add but further incentive to our expressed purpose of still further aiding the Empire and its Allies.

INDUSTRIAL NOTABILITIES

CLAYTON R. BURT, M.E., assistant general manager and director, Russell Motor Car Co.; director, Canada Cycle & Motor Co.; director, Machine & Stamping Co., was born in Lynn, Mass., Dec. 17, 1875, son of Byron S. and Laura Burt, of St. Johnsbury, Vt. He received his education at the Grammar School and the Academy (M.E.), St. Johnsbury, and entered on a business career as apprentice to the Brown & Sharpe Mfg. Co., Providence, R.I., remaining with that firm for twelve years, during which he filled a number of important positions. He went to Europe in 1900 in the interests of B. & S. For eight years, from September, 1905, he was general superintendent of factory, and manager of small tool department of the Barber-Colman Co., Rockford, Ill., for whom he designed and developed the Barber-Colman gear hobbing machine.

CLAYTON R. BURT, M.E.

In August, 1913, Mr. Burt came to Toronto as factory manager of the Russell Motor Car Co., being promoted the following year to the position of assistant general manager and elected to the Board of Directors. During 1914 he travelled in Europe, investigating the manufacture of sleeve type motors. In 1909 he was elected a member of the American Society of Mechanical Engineers, and in 1914 he received membership in the Society of Automobile Engineers, New York City. As might be expected, Mr. Burt's expert mechanical engineering knowledge has been of considerable value to the Russell Motor in their wide variety of munitions production.

He married Carrie A. Eddy, daughter of John F. Eddy, Providence, R.I., August, 1896, the family consisting of two sons. His clubs are: National, Ontario, Lambton Golf and Country, Toronto; his societies—A.F. & A.M., Winnebago Chapter, Crusader Commandry Freeport, Consistory, 32 degree Potentate Mystic Shrine, Tebula Temple, Rockford, Ill., 1913, and his recreations motoring and golf. In matters of religious creed he is Methodist Episcopal. His residence is 312 Indian Road, Toronto, Ont.

—Photo courtesy British and Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$29 95
Lake Superior, charcoal, Chicago	31 75
Standard low phos., Philadelphia	53 00
Bessemer, Pittsburgh	35 95
Basic, Valley furnace	30 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton		
Victoria	40 00	38 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.50
Steel bars, base, Toronto	3.75
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.35
Steel bars, base, Montreal	4.00
Twisted reinforcing bars, base	3.55
Bessemer rails, heavy, at mill	...
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.65
Small shapes	3.85
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.60
Bars, 2 in. and up	4.00
Structural shapes	3.70
Plates	4.35

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs.	
	C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$37 00	$38 00
Electrolytic copper	37 00	38 50
Castings, copper	36 00	37 50
Tin	46 00	47 00
Spelter	14 00	13 50
Lead	10 00	9 50
Antimony	15 00	18 00
Aluminum	70 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$5 00	$5 00
Heads	5 35	5 25
Tank plates, 3-16 in.	5 25	5 25

WROUGHT PIPE

Prices in effect Dec. 6, 1916.

Buttweld

Per 100 feet.	Black.	Galv.
⅛ in.	$ 4 00	$ 5 50
¼ in, and ⅜ in.	3 42	5 55
½ in.	4 42	5 99
¾ in.	5 41	7 53
1 in.	7 99	11 14
1¼ in.	10 81	15 07
1½ in.	12 93	18 01
2 in.	17 39	24 24
2½ in.	27 50	38 32
3 in.	35 96	50 11
3¼ in.	45 08	62 10
4 in.	53 41	73 58

Lapweld

2 in.	$20 35	$26 83
2½ in.	30 42	40 66
3 in.	39 78	53 17
3½ in.	49 68	66 70
4 in.	58 86	79 03
4½ in.	68 58	92 08
5 in.	79 92	107 30
6 in.	103 70	139 20
7 in.	138 00	182 10
8 in. x 25 lbs. per ft.	145 00	191 30
8 in. x 25 lbs. per ft.	167 00	220 30
9 in.	200 10	263 90
10 in. x 32 lbs. per ft.	185 60	244 80
10 in. x 40 lbs. per ft.	239 00	315 00

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$22 25	$23 50
Copper, crucible	26 25	27 00
Copper, heavy	26 25	27 00
Copper wire	26 25	27 00
No. 1 machine compos'n	22 00	22 00
No. 1 compos'n turnings	18 00	19 00
New Brass clippings	17 25	19 00
No. 1 brass turnings	15 25	16 00
Steel, low phos.	14 00	18 00
Heavy melting steel	13 00	14 00
No. 1 machine cast iron	15 00	16 00
Steel turnings	7 00	7 00
Boiler plate	12 00	10 50
Rails	14 75	15 00
Axles, wrought iron	19 00	24 00
Tires, steel	12 00	11 00
Rails	13 75	14 00
Shafting	16 75	20 00
Malleable scrap	10 25	11 00
Pipe, wrought	10 50	9 00
Stove plate	12 00	12 50
Heavy lead	7 50	7 75
Tea lead	6 00	5 50
Scrap zinc	8 25	8 50
Aluminum	35 00	35 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	35
Stove bolts	55
Plate washers	20
Machine bolts, 7-16 and over	15
Machine bolts, ⅜ and less	25
Blank bolts	15
Bolt ends	15
Machine screws, fl. & rd. hd., steel	27½
Machine screws, o. & fil. hd., steel.	10
Machine screws, fl. & rd. hd., brass,	net
Machine screws, o. & fil. hd., brass,	net
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts, hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	30
Boiler rivets, base ¾-in. and larger	$5.25
Structural rivets, as above	5.15
Wood screws, flat, bright	.75
Wood screws, O. & R., bright	.70
Wood screws, flat, brass	.42½
Wood screws, O. & R., brass	.40
Wood screws, flat, bronze	.35
Wood screws, O. & R., bronze	.32½

MILLED PRODUCTS

	Per Cent.
Set screws	40
Sq. & Hex. Head Cap Screws	30
Rd. & Fil. Head Cap Screws	15
Flat & But. Hd. Cap Screws	plus 15
Fin. & semi-fin. nuts up to 1 in.	30
Fin. & semi-fin., nuts over 1 in.	25
Studs	15
Taper pins	45
Coupling bolts	plus 15
Planer head bolts, without fillet	15
Planer head bolts, with fillet	net
Planer head bolt nuts, up to 1 in.	30
Planer head bolt nuts, over 1 in.	25
Planer bolt washers	plus 10
Hollow set screws	list plus 40
Collar screws	list plus 20
Thumb screws	20
Thumb nuts	70
Patch bolts	add 65
Cold pressed nuts to 1½ in.	add $3.50
Cold pressed nuts over 1½ in.	add $2.00

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$55 00
Open-hearth billets, Pittsburgh	55 00
O. H. sheet bars, Pittsburgh	55 00
Forging billets, Pittsburgh	80 00
Wire rods, Pittsburgh	70 00

NAILS AND SPIKES

Standard steel wire nails, base	$4 75	$4 70
Cut nails	4 00	4 00
Miscellaneous wire nails	65%	
Pressed spikes, ⅝ diam., 100 lbs	$4 10	

MISCELLANEOUS

Solder, guaranteed	0.30
Solder, strictly	0.27
Babbitt metals	.11 to .60
Soldering coppers, per lb.	.53
Putty, 100-lb. drums	3.00
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	13.87
Glue, French medal, per lb.	0.25
Tarred slaters' paper, per roll	0.95
Gasoline, per gal., bulk	0.27½
Benzine, per gal., bulk	0.26½
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	1.12
Linseed oil, boiled, single bbls.	1.15
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	8 00
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0 12
Pure Manila rope	0.25½
Transmission rope, Manila	029½
Drilling cables, Manila	0.27½

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	25%

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes	35
S.S. drills, 1/16 in. and larger	50
Standard drills to 1½ in.	50
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	20
3-fluted drills over 1½ in.	10
Bit stock	50
Ratchet drills	20
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	25
Sockets	30
Sleeves	40
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	**list plus 40%**
At warehouse	**list plus 50%**

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, add 5 per cent.; B and C, 12½ per cent.; cast iron, 40; standard bushings, 50 per cent.; headers, 60; flanged unions, 45; malleable bushings, 50; nipples, 70; malleable, lipped unions, 55.

SHEETS.

	Montreal	Toronto
Sheets, Black, No. 28	$5 00	$5 00
Sheets, black, No. 10	5 50	5 50
Canada plates, dull, 52 sheets	5 75	5 75
Canada Plates, all bright.	6 30	6 50
Apollo brand, 10¾ oz. galvanized	7 25	7 25
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 45	7 35
Gorbal's Best, No. 28	7 75	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 70	7 20
Premier, 10¾ oz.	7 00	7 50

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	60
Kearney & Foot, Arcade	60
J. Barton Smith, Eagle	60
McClelland, Globe	60
Black Diamond	50
Delta Files	47½
Nicholson	50
Globe	57½
Vulcan	57½
Disston	60

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$30 00	....
1¼ in.	30 00	....
1½ in.	30 00	24 00
1¾ in.	29 00	21 00
2 in.	33 00	20 00
2¾ in.	33 00	.....
2½ in.	35 75	26 50
3 in.	48 50	30 00
3¼ in.	54 50	36 00
3½ in.	59 50	30 00
4 in.	65 50	49 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.23
Royalite, per gal., bulk	.11
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Union thread cutting oil antiseptic	.70
Acme cutting oil, antiseptic	.39½
Imperial quenching oil	.39½
Petroleum fuel oil	.12¾

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30-10%
Standard	40%
Cut leather lacing, No. 1	$1.40
Leather in sides	1.20

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke.	
Connelsville Foundry Coke	....
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	....
Best Slack	....

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.18
Peerless	.18
Grand	.17
Superior	.17
X L C R	.16
Atlas	.16
X Empire	.15
Ideal	.15
X press	.14
COLORED	
Lion	.12½
Standard	.11
No. 1	.11
Popular	.10
Keen	.09
WOOL PACKING	
Arrow	.24
Axle	.18
Anvil	.14
Anchor	.11
WASHED WIPERS	
Select White	.12
Mixed colored	.10
Dark Colored	.09

This list subject to trade discount for quantity

ANODES

Nickel	.50	to	.54
Cobalt	1.75	to	2.00
Copper	.44	to	.46
Tin	.49	to	.56
Zinc	.23	to	.25

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 in.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt			2.10
Polishing wheels, bullneck.			1.35
Emery in kegs, American			.06
Pumice, ground			.04
Emery glue	.15	to	.20
Tripoli composition	.04	to	.06
Crocus composition	.07	to	.08
Emery composition	.08	to	.09
Rouge, silver	.35	to	.50
Rouge, powder	.30	to	.35

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$12 00	$12 50
Sheets, 3½ lbs. sq. ft.	11 75	12 25
Sheets, 4 to 6 lbs. sq. ft.	11 50	12 00

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.17
Cobalt sulphate	.70
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.12
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.55
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.41
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents

Montreal, Que., Dec. 11, 1916.—The chief thing occupying the attention of commercial and industrial interests at the moment, is the peace proposals of the Central Powers and the possible action to be taken by the Allied Governments. Markets are therefore more or less sensitive, awaiting developments. It is understood that the chairman of the Imperial Munitions Board, returned recently from England, bringing with him large orders for munitions, the placing of which will likely take place when the decision of the Imperial authorities regarding the peace proposals becomes known.

Pig Iron

The market in pig iron has had a quiet week, compared to the activity of the past month and a half, but the upward movement, while not so pronounced is still shown in the new quotations, the advances ranging from $1 to $3 per ton. The local situation is practically an unknown quantity as domestic quotations are for the present withdrawn; dealers here are however, quoting the nominal figure of $40 per ton.

Steel

While the peace talk from abroad has created some uneasiness in the general market, production continues with unabated energy. The market will undoubtedly pass through a short period of anxiety until such time as the policy of the British and Allied Governments has been definitely announced. The advances of the past week have not been so pronounced as those of many preceding periods, all the same, the situation generally is in a very strong position. The cold weather is having a deterring effect upon coke production and the market is again facing a more or less serious shortage, with prices showing an upward tendency. Spot furnace on an advance of 50 cents is quoted at $8.50, the contract price being $5.00. A one dollar advance is also noted on contract foundry, the current price being $7.50 per ton.

Despite the steady increase in production facilities the mills are still unable to cope with the heavy demand, and it is practically impossible to obtain billets or sheet bars for early delivery. Business in plates continues very heavy, many orders for cars having been recently placed. The shipbuilding interests are also heavy inquirers for plates, but delivery is very uncertain. Activities in the Canadian field is assuming large proportions and the requirements of shipping interests look like that it will continue to increase. The heavy demand for shell steel makes it impossible for the sheet mills to obtain their full requirements, and consequently mills are often required to close down for a short period until material is available. The Chicago price on black sheets has advanced $5 per ton. Tin plate mills are booked six months in advance. The demand for wire and wire products continues very heavy, wire rods being hard to get as the mills are able to use most of their output for their own needs. The trade expects a further advance of $3 or upwards at the beginning of the year The wrought iron pipe and boiler tube situation is very active and price advances are expected in the near future. The local situation is unchanged, with the market awaiting the coming developments in the European situation.

Metals

All metals are showing a downward tendency, the activity shown being on the part of sellers, with buyers awaiting further developments. Copper is quiet and easier. Tin is irregular on lower quotations. Spelter has declined on poor demand. Lead is becoming easier. Antimony is firm.

Copper.—The attitude recently taken by the German Government has resulted in the market taking on a quiet tone, but owing to the evident scarcity of prompt metal, the price situation has been little affected. Producers are well sold for future positions, but the general feeling is one of anxiety, as a feature of recent transactions is that of customers reselling much of the metal lately purchased. An easier undertone is apparent, the British and New York quotations having declined. New York prices are now 34 cents for lake, 35 for electrolytic and 32 cents for castings. These prices are from 1 cent to 1½ cents easier than last week. Local conditions are unchanged with prices firm.

Tin.—The week has been somewhat irregular with the tendency in a downward direction. The present supply is however not in excess of demand, and, should peace negotiations fail, a return to former strength is anticipated. London and New York are easier, the latter having declined to 43 cents per pound. Dealers here report an easier undertone on a steady market, but prices are firm at 46 cents per pound.

Spelter.—In the absence of any important buying the market is dull and prices are lower. Production has lately been curtailed due to the reduction in smelter output caused by the cold weather; but this has not had the expected effect of strengthening the situation. However, this market like all others is meantime under nervous tension. A decline of one cent has put the nominal New York quotation at about 11⅛ cents per pound. The market here is quiet but dealers are still quoting last week's price of 14 cents per pound.

Lead.—This market in common with others is affected by conditions abroad, while the recent advance by producers is attracting few buyers, therefore a return to lower levels is shortly expected. The quotation of the independent producers shows a decline of ⅛ cent, the price being 7⅞ cents. Prices here are firm, but with an easier tendency; quotation being 10 cents per pound.

Antimony.—The market is very quiet but prices are well maintained, dealers here still asking 15 cents per pound.

Aluminum.—The conditions are unchanged with prices firm at 70 cents per pound.

Machine Tools and Supplies

The market for machine tools is showing improvement, the demand for equipment having developed a slight increase. Activity is expected to become still further pronounced, as it expected that the Imperial Munitions Board will shortly place additional shell contracts, the filling of which will necessitate increased equipment or the replacement of machinery that has become inefficient owing to excessive wear. Inquiry has been quite active for light tools both of standard and special make. Prices are well maintained owing to the cost of production. Labor continues to be a factor in curtailed production. The market in smaller supplies continues very active, with higher prices evident in many directions.

Scrap

Dealers report a higher tendency in heavy steel scraps and an easier tone in old coppers, but prices are unchanged on a fairly quiet market.

Toronto, Ont., Dec. 19.—While the German peace overtures have been the cause of much discussion in local business circles, it is generally felt that the proposals are more in the nature of a feeler than an exhibition of peaceful intentions. The proposals are purely tentative, and if rejected by the Allies will no doubt be proffered again with revisions in the terms. In any case, the proposals will naturally cause some uncertainty more with regard to the future than at the present time, particularly with regard to making contracts in purchasing machinery or materials. Regardless of these proposals, and very properly so, the Imperial Munitions Board is making arrangements for the distribution of large orders for munitions. The Minister of Finance, in conjunction with the Canadian Bankers' Association, is making arrangements for further large credits on behalf of the British Government for the purchase of Munitions.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Steel

The peace proposals put forward by Germany and Austria have been the cause of considerable discussion in iron and steel circles during the week, but the feeling is prevalent that nothing will come of them at this juncture. The fact that the mills have practically twelve months' business on hand had a steadying influence on the market, and the news did not cause as much excitement as might have been expected. There is, however, some uncertainty as to what may develop in this regard, and this will probably check the strong upward movement in prices, which is certainly desirable. There is little doubt that prices have reached a dangerous level, forced up to some extent by the consumers themselves in their anxiety to get steel. There are no price changes of importance to note this week, and the market is firm. It is understood that Canadian interests contemplate purchasing large tonnages of shell steel in the United States for delivery any time during 1917. This indicates the sold-up condition of our mills. Canadian shipbuilding plants are seeking 20,000 tons of plates in the United States.

High prices continue to feature the market for black sheets, and a further advance on No. 28 gauge has been registered. A shortage of sheet bars and of coal has created a serious situation, and production has fallen off considerably. Manufacturers are also being handicapped by a shortage of cars, due to an embargo on the railways. The mills are advancing their prices, which will affect this market in due course. The market for galvanized sheets is unsettled, but it is doubtful if the recent decline in spelter will affect prices of sheets. Black sheets No. 28 are now quoted at $5 per 100 lbs.

Prices of steel products in the United States have not as yet been affected by Germany's peace proposals, although if actual negotiations for peace are undertaken important developments may be looked for in the steel industry. The market continues strong, and further advances are looked for early in January. The present average of leading steel products is above $70.55 a ton, which is about double the price of two years ago, at this time, for the same products. The demand for ship plates continues very heavy, and while buyers are showing every desire to pay the high prices, the sold-up condition of the leading makers alone prevents the acceptance of all the business that is being offered. There is a great shortage of billets and sheet bars, it being practically impossible to find semi-finished steel for sale at any price. An advance in wire products, probably $2 to $3 a ton, is expected before Jan. 1.

Pig Iron

The market continues very strong, and prices are still withdrawn. While the demand for foundry grades of pig iron is light, prices are very firm, as most furnaces are now producing basic iron for steel-making. Bessemer iron has advanced again, being now quoted at $35.95 a ton, while standard low phosphorus is also higher at $53 a ton, Philadelphia.

Scrap

The market is rather unsettled owing to the peace proposals, but it is by no means demoralized, and might easily develop strength with active buying. Prices sagged during the week, but recovered to their former level. On account of the difficulty in obtaining billets, there is a particular demand for iron and steel car and locomotive axles and steel tires. Low phosphorus scrap is advancing on account of the heavy demand for special grades of steel made by the acid-open-hearth process and very tall prices have to be paid, as both Bessemer and low phosphorus pig iron are very high. There are no price changes to note.

Machine Tools

The machine tool market has been less active during the week, due partly to the approach of the holiday season, and also to a meantime falling off in demand. Most munition plants are now well equipped, but others are either contemplated or under construction, and machinery will be required. Continued activity is looked for during 1917 unless the proposed peace negotiations assume some tangible form, which at present is problematical. Some machine tool builders in the Cleveland district have announced a further advance in prices effective January 1, due to the big increase in cost of labor and raw materials.

Supplies

Business has been very brisk lately, notwithstanding the steady increase in prices affecting practically all lines of machine shop and mill supplies. Files have again advanced, those makes that were carrying a discount of 60 and 2½ per cent. are now 60 per cent. off list. Sandpaper has also advanced, the new discounts being for "B" and "A," 12½ per cent., and on "Diamond" and "Imperial" 20 per cent. off list. Pure Manila rope is up, being now quoted at 25½c per pound basis. Transmission rope and drilling cables are also higher, being quoted at 29½c and 27½c per lb. basis respectively. Canadian crude oil advanced 5c recently to $1.95 per barrel. Gasoline has also advanced 1c, and is now quoted at 27½c per gallon. Glue is also up in price and very scarce, English common sheet glue being quoted at 22c and French Medal at 25c per lb.

Metals

German peace overtures have been the leading feature of the week in the metal markets. There was a reaction in London, but the markets in New York, although quieter, did not decline, with the exception of lead and spelter, which are weaker. Locally the situation is unchanged, and prices, with one exception—spelter, have been well maintained. The reason why the copper market did not break is no doubt due to the fact that there is no spot metal to be had, producers being sold up for several months. Tin is not, strictly speaking, a war metal, so would not be affected to the same extent as copper by peace talk. Spelter has declined, due to the unsettled condition of the market, while antimony and aluminum are both unchanged.

Copper.—The market, although quieter, has not been influenced to any marked degree by the peace proposals, due to the fact that there is practically no metal for sale for earlier delivery than five or six months hence. There was a sharp decline in copper in London, but the market soon recovered. Local quotations are nominal, and are as follows:—Lake 38c, electrolytic 38½c, and castings 37½c per pound.

Tin.—The market is quiet and unchanged here, but lower in London. The peace proposals, although causing considerable interest in the trade, have not affected the situation to any great extent. It has been asserted by leading interests that a termination of the war would result in a sharp advance in tin. Local price, 47c per pound.

Spelter.—Prices have declined locally 1c per pound, the market being weak and demoralized on account of the peace proposals. There is also very little demand and no support to the market. Local quotation, 13½c per pound.

Lead.—Business is very quiet, and the market is dull and easy. Independent producers are not anxious to sell, and it is, therefore, difficult to buy metal. Local quotation unchanged at 9½c per pound.

Antimony.—The market is dull and demand light. Peace proposals have not affected the situation very much. Local price, 18c per pound.

Aluminum.—The market is quiet, but firm, due to the scarcity of ingot metal. Local quotation, 68c per pound.

TRADE INQUIRIES

THE following inquiries relating to Canadian trade have been received by the Department of Trade and Commerce, Ottawa. The names of the firms making these inquiries, with their addresses available on application.

1860. Iron, Steel, etc.—A London firm who already represent an important Canadian manufacturing enterprise, seeks additional agencies in goods saleable in the United Kingdom, more particularly iron, steel and metals.

1861 Magnesite, chrome, graphite, kieselguhr, etc.—A London mineral firm wishes to get into direct touch with Canadian producers of magnesite, chrome, graphite, kieselguhr, and other refractory minerals and earths.

1868. Steel wire rods.—A Cardiff wire rope manufacturing firm wishes to obtain high carbon steel wire rods from Canada.

FRANCE TO REACH OUT

NEXT summer, fifty young Frenchmen will be sent from France to the United States and Canada to study American commercial methods in large banks, factories and shipping firms, and to become acquainted with the American mind and its principal viewpoints. They will stay a month in the United States, visiting in banks, factories and shipping offices at New York, universities and spinning mills in Boston, lumber mills and tanneries in Montreal, canning factories in Chicago, the seat of Government at Washington, iron and steel works at Pittsburgh, the petroleum industry at Philadelphia, grain stores at Baltimore, and "culture in general" at St. Louis. Meanwhile fifty young Americans will be doing exactly the same sort of thing in France with a view to getting ideas concerning French commercial methods and French points of view. It is hoped to establish, after the war, institutes in France and America which will supply all necessary commercial information, display specimens of goods, and in general promote reciprocal economic knowledge between the two countries.

RUSSIA AND AGRICULTURAL IMPLEMENTS

ACCORDING to a report by the British Acting General Consul at Odessa, the Russian Minister of Agriculture, when introducing his departmental estimates in the Duma recently, stated that the lack of labor was making itself severely felt, and that the use of implements and machinery for agricultural purposes in Russia would have to be greatly extended. He referred to the fact that large orders would be placed in other countries, and urged the development of domestic facilities for the manufacture of the equipment required. The situation is summarized as follows:

Although there will evidently be an enormous shortage of agricultural machinery in Russia, it is thought that the prospects of large sales of British machinery are not very promising. Except in large threshing machinery, agricultural oil engines, and fodder-preparing machines, the British type of machinery is unsuited to Russian conditions. Russian manufacturers, with the assistance of the present subsidies and, probably, higher tariffs in the future, will be able rapidly to increase their output and satisfy the needs of the country to a very large extent, thus making it fairly independent of imported goods. Certain types of plows formerly imported are already manufactured in Russia in large quantities, and at an exhibition of agricultural machinery held at Moscow last year, remarkable progress was shown in the manufacture of all types of harvesting machinery. Many large works in Russia now producing war materials can readily be adapted for the manufacture of such heavy machinery as steam threshers, tractors, and oil engines.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department of Trade and Commerce, Ottawa, is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL

Bahia, British Consul.
Rio de Janeiro, British Consul General.

CHILE

Valparaiso, British Consul General.

COLOMBIA

Bagota, British Consul General.

ECUADOR

Quito, British Consul General.
Guayquil, British Consul.

EGYPT

Alexandria, British Consul General.

FRANCE

Havre, British Consul General.
Marseilles, British Consul General.

INDIA

Calcutta, Director General of Commercial Intelligence.

ITALY

Genoa, British Consul General.
Milan, British Consul.

MEXICO

Mexico, British Consul General.

NETHERLANDS

Amsterdam, British Consul.

PANAMA

Colon, British Consul.
Panama, British Vice-Consul.

PERU

Lima, British Vice-Consul.

PORTUGAL

Lisbon, British Consul.

RUSSIA

Moscow, British Consul General.
Petrograd, British Consul.
Vladivostock, British Consul.
Odessa, British Consul General.

SPAIN

Barcelona, British Consul General.
Madrid, British Consul.

SWEDEN

Stockholm, British Consul.

SWITZERLAND

Geneva, British Consul.

URUGUAY

Monte Video, British Vice-Consul.

VENEZUELA

Caracas, British Vice-Consul.

Canadian Commercial Intelligence Service

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC

H. R. Poussette, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALIA

D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA

J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

JAPAN

G. B. Johnson, P. O. Box 109, Yokohoma. Cable address, Canadian.

HOLLAND

Acting Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA

C. F. Just, Canadian Government Commercial Agent, Alexandrivskaya, Ploshch 9, Petrograd.

L. D. Wilgress, Canadian Government Commercial Agent, Bukhgolza Ulitza No. 4, Omsk, Siberia.

NEWFOUNDLAND

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

J. Forsyth Smith, 27-28 Pearl Building, East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

J. T. Lithgow, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

SPECIAL TRADE COMMISSIONER—LUMBER

H. R. McMillan, visiting Europe, Africa, Australasia and the Orient.

CANADIAN COMMERCIAL AGENTS

AUSTRALIA, B. Millin, Exchange Building, Sydney, N.S.W.

BRITISH WEST INDIES

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

NORWAY AND DENMARK.

C. E. Sontum. Grubbeged No. 4, Christiania. Norway. Cable address. Sontums.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM

W. L. Griffith, Secretary, 17 Victoria Street. London, S.W., England.
Cable address, Dominion, London.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Pembroke, Ont—The Pembroke Electric Light Co., Propose building a hydro-electric power plant.

Montreal, Que. — Canadian Allis-Chalmers Ltd., will build a new forging plant at their Rockfield works near here.

St. John, N.B.—The Edward Partington Pulp & Paper Co., contemplate making extensions to their mill.
hours.

Cobourg, Ont.—It is understood that owing to prospects of increased business the Cobourg Steel Co., have under consideration the enlarging of their present plant.

Vancouver, B.C. — It is understood that a new steel plant will probably be established at Eburne, near here. W. H. McLaws president of the Alberta Rolling Mills at Medicine Hat, Alta., is interested in the scheme.

Galt, Ont.—Sheldons Ltd., are building an extension to their plant which will give them 6000 sq. ft., more floor space. The cost is estimated at $18,000 and the contractors are P. H. Secord & Sons, Brantford.

Toronto, Ont.—The Deyo Macey Engine Co., of Binghamton, N.Y., will move to Toronto on January 1. The company manufactures gas engines for farm and commercial use, and has received large war contracts.

Tillsonburg, Ont.—This town has secured a valuable addition to its industrial interests in a branch of the Huntley Manufacturing Co., of Silver Creek, N.Y., builders of cereal milling machinery and machinery for canning factories. It has purchased the property of the Tillsonburg Electric Car Co., and will begin immediately to put buildings in suitable condition.

Fort William, Ont.—Announcement was made on December 13 by officials of the Western Drydock & Shipbuilding Co. that contracts have been closed for the construction of eight steamers. Six of these will be ocean going boats, and two will be 600 ton freighters for the Great Lakes. The capacity of the plant will be doubled. About 600 tons of steel has recently arrived, and work on two of the vessels will commence at once.

Sarnia, Ont.—The plant of the Canadian Woodworkers, in the northern section of this city, has been sold to the H. Lougheed Machinery Co., who expect to have it in operation within a few weeks. The Woodworkers' plant was constructed three years ago, of concrete and steel, and is one of the most modern plants in the city, although it was never completed as a woodworking establishment.

Montreal, Que.—It is understood that important additions will be made to the Canadian Vickers plant here. The extensions will consist of two covered building berths, which, when completed, will double the ship-building accommodation already provided. At present the company has one large berth capable of taking a vessel 600 feet long. The dimensions of one of the new sheds will be 500 feet long and 128 feet wide, and the other will have a length of 400 feet and a width of 100 feet. The sheds will provide for the building of vessels up to approximately 12,000 tons. A commencement has already been made on this new work, which it is anticipated will be completed in March of next year.

Municipal

Lindsay, Ont. — The Town Council are considering the installation of a sewage disposal plant.

Owen Sound, Ont.—The Town Council will submit a by-law in January to authorize the purchase of a motor fire truck at an approximate cost of $6,500.

Chatham, Ont.—A by-law will be voted on by the ratepayers on Jan. 1, to authorize an expenditure of $45,000 on extensions to the hydro-electric system.

Hamilton, Ont.—A by-law will be voted on by the ratepayers on Jan. 1, in connection with the proposed improvement to the waterworks system to cost $362,500.

Beaverton, Ont.—On Jan. 1, a by-law will be voted on to provide for the extra cost of hydro-electric power supplied by the Hydro-Electric Commission. The cost will be $5,000.

Woolwich Township, Ont.—The ratepayers of the Village of St. Jacobs will vote on a by-law on Jan. 1, to raise $6,000 to pay for the cost of a hydro-electric plant.

Welland, Ont.—Town Solicitor J. F. Gross, acting under the instructions of the Council, has given notice of application to the Legislature for a special act annexing to the town of Welland the large factory section in Crowland township bounded on the west by the Welland Canal and on the south by the Humberstone township line. The township is likely to strongly oppose the application. The annexation is proposed as a remedy for the prevalence of crime in this section, the township providing no police protection.

General Industrial

Guelph, Ont.—The Dalyte Lamp Co., will build an addition to its factory to cost $15,000. W. A. Mahoney, is architect.

Toronto, Ont.—A building permit has been issued to the Wm. Neilson Co., Gladstone Ave., for an extension to their factory to cost $5,000.

Toronto, Ont.—The Canadian Carbon Co., has received a permit for the erection of a new factory on Paton road, to be 3-stories high and to cost $23,500.

Ottawa, Ont.—The plant owned by J. H. Connor, manufacturer of washing machines, etc., was recently destroyed by fire with a loss of $25,000. It will be rebulit.

Sarnia, Ont.—The Brooklied Oil Co., composed of Sarnia and Oil Spring men, have bought another well on Dean Farm. This territory is in the township of Brooke, about eight miles east of Oil Springs, and is proving to be a good one. They have 10 producing wells and got last month about 100 barrels.

Tenders

Thorold, Ont.—Tenders will be received by the undersigned until December 30, for the supply of a Turbine pump and electric motor. Specifications can be secured from the undersigned. L. S. O'Connor, Superintendent of Water Works, Thorold, Ont.

Toronto, Ont.—Tenders will be received, addressed to the chairman, Board of Control, City Hall, Toronto, up to January 16, for the installation of a 40 million Imperial gallon centrifugal sewage pump at the main sewage pumping station, Toronto. Specifications and forms of tender may be ob-

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N.B.—Just before going to press our Service Department advises the purchase of another large plant for the manufacture of Shrapnel Cartridge Cases, Shrapnel Brass Sockets and Bullets. Look out for special announcement. (Advertising Manager)

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tained at the Works Department, Room 6, City Hall.

Toronto, Ont.—Tenders addressed to the Secretary-Treasurer of the Board of Education, will be received until Dec. 28, for enlargement of Orde St. School. Supplementary steam heating at Annette St. school. Fire doors, St. Clair Ave. school. Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, Administration Building, Board of Education, College street. W. C. Wilkinson, sec-treasurer, City Hall, Toronto.

Ottawa, Ont.—Tenders will be received up to January 15, for the construction of a reinforced concrete lighthouse tower and fog alarm building combined, and a wooden dwelling at Point Abino, township of Bertie, Welland County, in the Province of Ontario Plans, specifications, form of contract and schedule of wages, can be seen, and forms of tender procured, at the Department of Marine, Ottawa; at the Harbor Master's Office, Toronto, and at the post offices, Welland, Port Colborne, St. Catharines, Bridgeburg, Hamilton and Brantford.

Contracts Awarded

Port Colborne, Ont.—Contract for turbines and generators required for the new plant being erected by the International Nickel Co., has been awarded to the Ridgeway Engine & Dynamo Co., New York.

Chatham, Ont.—The Chatham Paving & Construction Co. has been awarded the contract for the erection of a cooling station for the C.P.R. to be built near the bridge where the C.P.R. crosses the river. The same company has the contract for the remodeling and building of an addition to the Hayes Wheel Co. factory.

Trade Gossip

The Dominion Copper Products Co., of Montreal has increased the capital stock of the concern to $3,500,000.

Montreal Machinery & Supplies, Ltd., have been appointed sole agents in Canada for the Alston Saw & Steel Co., Folcroft, Pa.

Montreal Machinery & Supplies, Ltd., have been appointed Canadian agents for the Rich Tool Co., Chicago, the particular specialties being high-speed drills, reamers, and rivet sets.

Crude Oil Advances.—Crude oil from Canadian fields took another jump at Sarnia on Dec. 13, when the Imperial Oil Co. announced a raise to $1.95 per barrel, an advance of five cents.

The Foundry & Machine Co., Montreal, have bought out the Federal Brass Foundy Co. and are putting up a brick addition to the plant which will be 45 feet square and two storeys high.

Pig Iron Production.—New Zealand authorities are studying the possibility of producing pig iron on a large scale by electricity, as much ore and ample water power are available.

R. E. T. Pringle Ltd., Toronto manufacturers agents, have opened a sales office at 302 Donald Block, Winnipeg, Man., with F. E. Filer in charge; also at 3402 Osler Ave., Vancouver, in charge of Fred Fletcher.

The Turbine Equipment Co., Toronto, have been awarded a contract for centrifugal sewage pumps for the Town of New Toronto, Ont., amounting to $4,250. Two of these will be driven by vertical motors, and the other will be direct connected to a high speed gasoline engine.

Copper in Quebec.—During the past year development work has been taking place on a copper discovery at Newport, County Gaspe, Quebec. Experts, having recommended further development, the properties will be taken over by American interests. High grade ore has been obtained, assays showing as high as 57 per cent. copper.

The E. B. Plewes Co., Winnipeg, has been incorporated as a limited liability company, and is now known as Plewes, Ltd. They are manufacturers' agents, and carry large stocks of hardware and machinery supplies. Their offices and warehouses have been moved from 120 Lombard Street, to 197-199 Princess Street.

The Steel Company of Canada held their Annual Convention at the Royal Connaught Hotel, Hamilton on Dec. 12-13-14, being attended by Company's representatives from all parts of the country. A feature of the convention was a number of interesting papers by various members of the staff and officials.

Advice to Importers.—The Department of Trade and Commerce strongly advises Canadian houses wishing to import by license articles on the British list of prohibited exports to first communicate with them, giving by affidavit the purpose for which the material is required and through whom it is bought. In this way much time will be saved.

Little Opposition to Power Union.—The plan of the Ontario Power Union to

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CANADA

DIEU ET MON DROIT

NATIONAL SERVICE

PUBLIC NOTICE is hereby given under the authority of the "War Measures Act, 1914," that during the first week in January, 1917, an inventory will be made by the Post Office Authorities, of every male between the ages of sixteen and sixty-five, residing in Canada.

National Service Cards and addressed envelopes for their return to Ottawa have been placed in the hands of all Postmasters for distribution amongst the persons required to fill in such cards. Every male person of the prescribed ages is required to fill in and return a card enclosed in an envelope within ten days of its receipt.

Any person who fails to receive a card and envelope may obtain the same upon application to the nearest Postmaster.

R. B. BENNETT,
Director General.

Ottawa, 15th December, 1916.

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Established 1857.
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U.S.A.
Man'f'rs of "Barnes-made" Products
Springs Screw Machine Products. Cold Rolled Steel and Wire

HAVE YOU

read pages 70 to 76 ? Turn to them now and see for yourself whether or not they are of interest.

Canadian Machinery
Classified Advertising Section

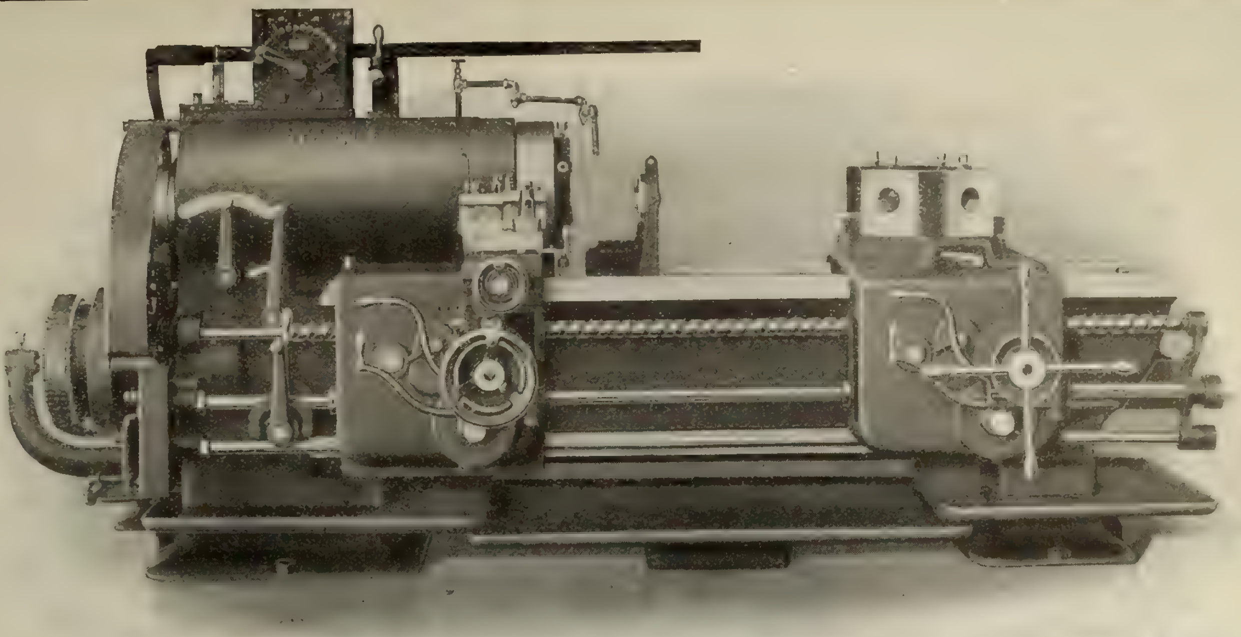
secure from all the municipalities in the Niagara system on the first of the year a verdict upon municipal ownership of Chippewa Creek power development at Niagara Falls, is making excellent progress. According to T. J. Hannigan, secretary of the Union, practically every municipality will vote on the matter.

Canada's Grain Acreage.—A statement issued on December 15 by the Census Bureau gives the results of a grain acreage census taken last summer in the three prairie provinces. As indicating the increase in crop producing areas, it is shown that the total acreage under wheat, barley, oats, rye and flax grew from 8,040,981 in 1906 to 17,100,487 in 1911, and 22,814,591 in 1916. There was thus a gain of 5,714,114 acres, as compared with 1911, and 14,773,610 as compared with 1906.

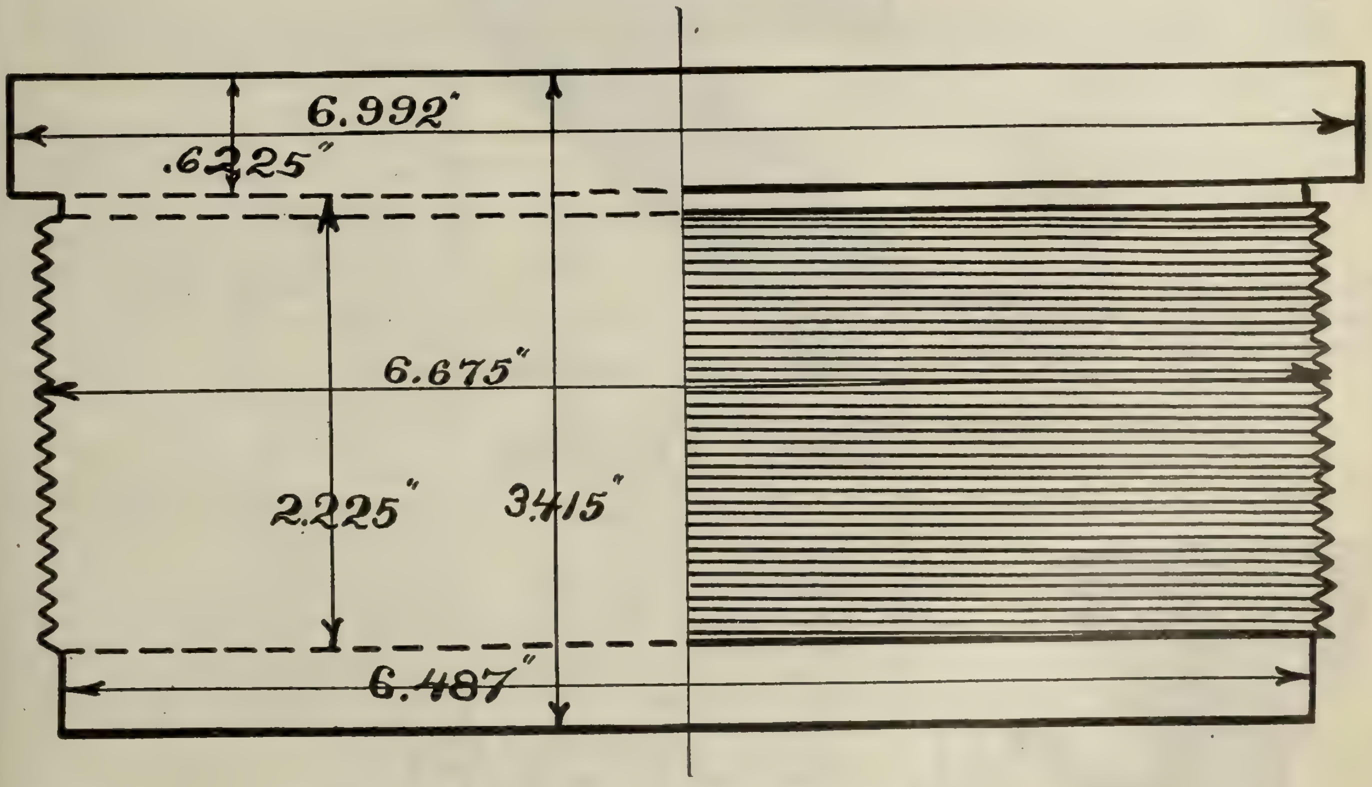
Toronto, Ont. — Five new munition factories will be opened here shortly after the beginning of 1917. One of these factories has a waiting list of 700 women and there are 1,000 more registered at the employment bureau at 164 Bay street. Some of these, however, will not be able to pass the tests required for the arduous work which they would be called upon to do. Dissatisfaction is being expressed at the small wage paid to women inspectors who, at the start, are paid only 15 cents an hour, although later they work up to 18 cents an hour.

Requisition Ships When Required.—An Order-in-Council has been passed at Ottawa providing for the requisitioning of British ships, registered in Canada when required by the Government for the carriage of foodstuffs and other articles of commerce. Such requisitioning is to take effect upon notice of requisition being served by the Minister of Marine on the owner of any ship. Similar provisions were adopted some time ago in Great Britain. The Order-in-Council contains provisions as to whom notice of requisition is to be given and who may, under the authority given him by the Minister of Marine, gave it.

Molybdenite Mining in Quebec.—Within thirty-five miles from Ottawa, at a distance of two miles from the railway station of Quyon, Que., a deposit of molybdenite has been developed by the Canadian-Wood Molybdenite Co. The first shipment of ore was made in April, and since July 1, the shipments have averaged 250 tons a week of ore containing about 2½ per cent. molybdenite, which for the three months ending September 30, will total approximately 75 tons of molybdenite. The ore is now being concentrated partly in Ottawa and partly in Denver, Color-



A General Purpose Turret Lathe used on Ammunition Work



Base Plug for 9.2-Inch Shell

FINISHED COMPLETE ON ABOVE LATHE IN 20 MINUTES

Write for Information.

STEINLE TURRET MACHINE COMPANY

MADISON, WISCONSIN, U.S.A.

[illegible] The product is being shipped to London and to France. A concentrating mill is being put up near the mine.

Ore Shipping Season Broke All Records.—The ore shipping season at Cleveland, Ohio, closed with a record for every month from April to December, and with a total movement that was much bigger than expected and which broke all records. August was the banner month of the season when the shipments were 9,350,140 tons. During the twelve days the docks operated during December, the fleet loaded 1,085,900 tons, which was more than double the record for shipments for December, made in 1909, when the mines sent forward 519,525 tons. The total movement for 1916 was 64,734,198 tons, which is more than 4,000,000 tons greater than the high mark named for shipments early in the season. Conditions generally were favorable for ore men, and the wonderful showing made by the fleet was due very largely to good weather, a marked increase in the stage of water, and wonderful despatch also added materially to the capacity of the fleet.

Personal

L. V. de Bury, formerly president of the B. & S. H. Thompson Co., Montreal has been appointed general sales agent at Montreal of the Dominion Steel Corporation.

L. B. Beale, of Toronto, British Columbia lumber commissioner for Eastern Canada, has returned after nine weeks' absence, during which time he visited practically every lumber mill in the province of British Columbia in the interests of his department.

P. V. G. Mitchell, manager of the White Star-Dominion Line, Montreal, has been appointed an honorary lieutenant-colonel. The appointment comes as a reward for Mr. Mitchell's services in connection with the transport of Canadian troops and supplies overseas.

George S. Rice, chief engineer of the United States Bureau of Mines, Washington, D.C., has been engaged by the Provincial Government of British Columbia to make an investigation of the Coal Creek coal areas of the Crow's Nest Pass Coal Co., near Fernie, B.C.

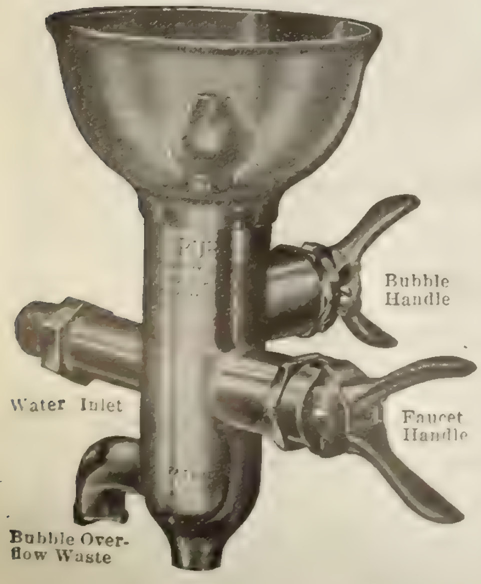
Dr. A. B. Macallum, the new head of the Scientific and Industrial Committee, has tendered his resignation to the University of Toronto. The matter has only been discussed informally in University circles, but it is understood that Dr. Macallum will not sever his relationship immediately.

D. M. Medcalf, chief inspector of boilers for the Province of Ontario, has returned from New York and Washinging, D.C., where he attended meetings called for the purpose of discussing the proposed A.S.M.E. code of boiler rules and regulations. The meeting in Washington was called by the Industrial Commission of Ohio, and the New York meeting by the American Society of Mechanical Engineers.

Fred W. Evans, who has been acting manager of the Canadian Fairbanks-Morse Co's., Toronto office, 26-28 Front street, for the past year has been appointed manager of that office. Mr. Evans has been with the company a number of years, having been associated principally with the machine tool end of the business. He was manager of that department before being appointed acting manager of the Toronto sales office.

W. R. Baker, C.V.O., secretary to the C.P.R. and assistant to the president, has, at his own request, been relieved from his duties and placed on the retired list. **E. Alexander**, formerly assistant secretary to the company, succeeds Mr. Baker. Mr. Baker's association with the company dates from its inception in 1881. From 1883 to 1900 he was general manager of the Manitoba and North-West, but joined the C.P.R. when that road was acquired by the big railway.

3 BIG REASONS WHY YOU NEED
PURO
(MADE IN CANADA)
1. Puro Sanitary Drinking Fountains will give you a *better* water supply *cheaper*.
2. Puro will cut your water bills 15% to 35%.
3. PURO will safeguard the health of your employes and raise the standard of efficiency.
Are not these reasons enough? Then why hesitate longer?
PURO equipment is not expensive—the first cost is *low* and the up keep *nothing*. Easily attached; positively fool-proof. Let us make you a special proposition for a try-out in one of your departments. Write us now—to-day—giving us the number of men; an inquiry will cost you nothing.
"PURO-FY"
YOUR WATER SUPPLY
Puro Sanitary Drinking Fountain Company
143 University Ave.
TORONTO, CANADA



"HAWK'D" CHROME VANADIUM STEEL

Will Give You Exceptional
Shell Forging Production
WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.
Comes to you heat-treated and ready for use.
It does not stick to the work.
There are many cases where each punch has turned out over 2,000 shells.
It means more shells, per machine per day.
STEEL OF EVERY DESCRIPTION.
Hawkridge Brothers Company
303 Congress St., BOSTON, MASS.
U. S. A.

TO SHELL MAKERS

We Specialize on:

(a) Our Patented Nosing Die (4.5"-5" and 6").
(b) Thread and Seating Gauges (all sizes).
(c) Milling Hobs for Milling Nose of all sizes of shells.
(d) Thread and Seating Attachment for Lathes. (Patent Applied for).
(e) Band Turning Tools for 4.5" and 6" shells, Price $25.

(a) If you are changing Nosing Dies every five or ten thousand shells, you are wasting valuable time and money. Try our patented die, and so make your nosing operation continuous.

(b) We guarantee that if our Thread and Seating Gauge passes your shells, that the Government Gauges will also pass them; otherwise we take them back without hesitation. The life of our Gauge is longer than all others. Price $50.

(c) Our Milling Hobs are made by experts, and we specialize on this class of work for all sizes of shells. Price $15.

(d) Which would you rather use?

1 Thread Milling Machine and 4 Hand Seating Tools requiring 5 men for each Shift turning out 150 Shells per Shift at a cost of $18.00	**OR**	1—16" Lathe and 1 Thread and Seating Attachment (Patent Applied For) requiring 1 man for each Shift turning out 150 Shells per Shift at a cost of $4.00

The cost of this attachment is only $120.00, and your engine lathe will be of use after the war work is over.

Toronto Type Foundry Company, Limited

50 Coleman Avenue, Toronto

JAMES McKAY COMPANY, PITTSBURGH, PENNA., U.S.A.

Manufacturers of

SHELL FORGINGS

We have the Equipment and Experience and can execute orders for

Nose Sockets Base Plates Adapter Plates

For any size Shells. Can execute orders promptly.

SPECIAL FORGINGS—**We can make any forging that can be made under Drop Hammers.**
CHAINS AND ACCESSORY FORGINGS—**We have a complete line.**

Address our Representative: **JOHN A. BUCHANAN, King Edward Hotel, Toronto**

Advertisell It!

If you have Machinery which your plant has outgrown—advertisell it.
Or if you have a Factory Building which you have outgrown—advertisell it.
That is, advertise it in our Classified Advertising Section and SELL what you have for sale.

CANADIAN MACHINERY
CLASSIFIED ADVERTISING SECTION
143-153 UNIVERSITY AVENUE - - TORONTO, CANADA

Classified Advertising Section

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order $1.00.
Display rates on application.

FOR SALE

FOR SALE—TWO BAKER DRILLS NO. 310, with pumps, almost new. 1 Colburn drill No. 14, with pumps; standard. Alton Foundry Co., Alton, Ont. (22)

BROWN-BOGGS MARKING MACHINE FOR 4.5 shells. Has been used for short time only, and is in good condition. Box 248, Canadian Machinery. (24)

ONE REED TURRET LATHE, 8' BED, swing, 28"; 4 2" holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 241, Canadian Machinery.

FOR SALE—45 H.P. GAS PRODUCER AND engine, complete. Good condition. For particulars write Canadian Warren Axe & Tool Co., Ltd., St. Catharines, Ont.

FOR SALE — STEEL WATER TOWER, without tank, 94 feet high. Will support tank holding 13,000 gallons. Cost new $1,600.00. Will sell for $350.00 f.o.b. Shawinigan Falls, P.Q. Northern Aluminum Company, Limited.

FOR SALE.—ONE BROWN-BOGGS MARKING Machine, suitable for 6" Mark XVI. or Mark III. English Shells. Only object in selling is that other methods of marking have been adopted. Price on application. Taylor-Forbes Co., Ltd., Guelph. (14)

1 VERTICAL, SINGLE ACTION, DOUBLE cylinder hydraulic pump, 6" stroke, all ready to connect up; almost new; price $75. McGregor & McIntyre, 1139 Shaw Street, Toronto. (tf)

FOR SALE—FIFTEEN HEAVY CAST IRON columns, from thirteen to seventeen feet long. Columns tapered and have good heavy base and top. Also four roof trusses. Sixty feet long. Ten feet in centre, eight foot at ends. Will cut columns to suit purchaser. Woodside Bros., Port Arthur, Ont. (2)

FOR SALE — IMMEDIATE SHIPMENT — New Heavy Duty Shell Boring Lathe for manufacture of 6" High Explosive Shells. Write for complete specification. Wm. Hamilton Co., Ltd., Peterboro, Ont. (20)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

FOR SALE—1 40 H.P. ROBB, ARMSTRONG high-speed engine; 1 4 x 1 Marsh deep well steam pump, and 1 Barton generator, 80 lamp capacity, with switch-board. All in good order and cheap for quick sale. Richards-Wilcox Canadian Co., Ltd., London. (20)

FOR SALE—TWELVE H.P. GAS OR GASOline Engine. Goold, Shapley & Muir Ideal. In first-class condition. Cheap. Stedman Brothers, Ltd., Brantford, Ont. (21)

DOUBLE-END FEATHERSTONE AXLE cutting off machine with countershaft and [illegible] adapted for cutting off two 4.5 [illegible] at once. Bargain $500. Medicine Hat Pump & Brass Mfg. Co., Ltd., Medicine Hat, Alberta. (tf)

BAND SAW—COWAN & CO. MAKE, 30" Iron Frame. Post Machine 20½" x 22" Iron Tilting Table and Saw Guard, [illegible] Brazing Tools, setter for Filing etc., has had very little use. Whaley, Royce & Co., Limited, 237 Yonge St., Toronto, Ont. (23)

WE CAN GIVE EARLY DELIVERY ON difficult fixture cutting, also on gauges and jigs. We have a large shop and the finest equipment. Apply Box 235, Canadian Machinery.

SHRAPNEL SOCKET AND ADAPTER machinery, turret lathes, boring machines, cutting off machines and thread millers tooled for operation. Globe Electric Machine Co., Hamilton. (tf)

FOR SALE—75 H.P. CANADIAN GENERAL Electric motor, 25 cycle, 3 phase, 550 volts, 950 R.P.M.. In first-class condition. Box 258, Canadian Machinery. (26)

ENGINE FOR SALE—50 HORSE-POWER Corliss; no reasonable offer refused if taken at once. Box 387, Chatham, Ont. (2)

WANTED

WANTED, FOR IMMEDIATE DELIVERY, belt ribbon power pump; also detached accumulator to operate one hundred and fifty tons hydraulic press, twelve-inch ram, nosing 4.5 shells. Can use second-hand if in first-class condition. Medicine Hat Pump and Brass Mfg. Co., Medicine Hat, Alta. (25)

ONE AUTOMATIC SCREW MACHINE, capacity up to 1-in.; can use machine having had some service. Canadian Matthew-Gravity Carrier Co., 484 Richmond St. west. Toronto. (2)

WANTED — BORING MILL, 30" TO 42" table; state make, condition, time used, lowest price, and send cut to Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (21)

WANTED — THREE TURRET LATHES suitable for steel sockets, also Thread Millers suitable for milling outside thread of sockets. Give price and particulars to Steel Furnishing Co., New Glasgow, N.S. (19)

WANTED—COMPLETE SET OF DRAWings or blue prints of Universal grinder, with all attachments. Box 251, Canadian Machinery. (1)

WANTED—POWER-DRIVEN ROLLER 8' long, suitable to roll ¼" steel plates: state make, condition, time used. Give price and particulars to L'Air Liquide Society, corner First Ave. and Ernest St., Maisonneuve, Montreal.

WANTED—SMALL SCREW-CUTTING ENgine lathe 12" or 13" x 5' or 6' bed, automatic feed, power cross feed, compound rest: must be cheap and lathe in good working order; give full particulars in first letter. J. W. M., Suite 34, Thelmo Mansions, Burnett St., Winnipeg, Man. (24)

WANTED — THE FOLLOWING EQUIPment for 18-pr. H.E. shells:—2 electric or steam baking ovens, 2 painting machines, 1 banding press and pump, 2 band turning machines, 3 sensitive drills for drilling and tapping grub screw hole, 1 Bowser varnish pump, 1 marking machine. Send quotations to Box 253, Canadian Machinery. (24)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

SITUATIONS WANTED

TOOL MAKER, ACCURATE, GOOD draughtsman, desires responsible position. Box 254, Canadian Machinery. (4)

SUPERINTENDENT, DESIROUS OF change, 18 pdr. shrapnel, and 6" H. E. shells. Box 247, Canadian Machinery. (26)

MECHANICAL ENGINEER. EXPERIenced in eighteen-pounders and six-inch nosed in shells, with twelve years' drawing office, shop and general experience, will be disengaged shortly. Box 252, Canadian Machinery. (25)

EXPERT FOUNDRYMAN FAMILIAR with all modern foundry appliances, desires position as foreman or assistant in gray or malleable iron foundry. Box 250, Canadian Machinery. (25)

SUPERINTENDENT WITH PROVEN MEchanical and executive ability desires position as same, or one of equal grade. Wide experience with well known firms manufacturing high explosive shells, rifles, electrical machinery and instruments, light and heavy sheet metal and plate products. Have satisfactorily supervised installation and organized new plants for widely varied lines of product. Address P.O. Box 122, Dartmouth, Nova Scotia. (25)

SITUATIONS VACANT

TOOLMAKERS AND MECHANICS. APPLY Pease Foundry Co., Brampton; Junction 4341. (3)

WANTED—MAN TO TAKE CHARGE OF machine shop doing repair and new work. Must be up-to-date and able to show results. State experience and salary and when you can start. Apply Box No. 257, Canadian Machinery. (26)

FIRST CLASS GRIDLEY AUTOMATIC men wanted to set up Gridley automatic machines, also operators for same, highest wages paid, only first class mechanics need apply. Apply 47 Richmond St. East, Toronto. (24)

WANTED—NIGHT SUPERINTENDENT TO take charge of factory making 4.5 sockets. Apply Box 237, Canadian Machinery.

WANTED — EXPERIENCED STEEL works draftsman for Nova Scotia. Give full particulars, including salary, permanency. Apply Box 234, Canadian Machinery. (17)

ALL-ROUND MACHINISTS WANTED FOR tool-room; highest wages paid. A. R. Ormsby Co., Limited, 48 Abell Strett, Toronto. (21)

WANTED — FIRST-CLASS MACHINIST able to take charge of our repair shop. Apply Hull Iron & Steel Foundries, Ltd., Hull, Que. (23)

MECHANICAL DRAUGHTSMAN WANTED for tracing and detailing on general machine work, also opening for man with experience on plate and structural work. Box 245 Canadian Machinery. (23)

SPLENDID OPPORTUNITY FOR YOUNG man about twenty-one, well educated and with some mechanical knowledge, who desires to learn the machinery business. Apply in first instance with full particulars as to experience, etc., to Box 243 Canadian Machinery.

WANTED—EXPERIENCED MILL WRIGHT and Machinist to take charge of construction and repair work in growing factory. A man who has had experience as foreman preferred. An excellent opportunity for a first-class man. State when you can start, also experience and salary wanted. Apply Box No. 256, Canadian Machinery. (26)

WANTED—EXPERIENCED MECHANICAL Draftsman; one who has had some experience on machine design and factory layout preferred. Apply stating experience and salary desired to the Goodyear Tire & Rubber Co., Bowmanville, Ont. (26)

WANTED — TECHNICAL ENGINEER — steady, energetic, practical, to learn the business and take charge of the operating and construction departments of a firm manufacturing compressed gases, and apparatus to use such gases. Reply giving experience and salary expected to Box No. 255, Canadian Machinery, 701 E.T. Bank Bldg, Montreal. (26)

Machine Tools For Sale

IN STOCK FOR IMMEDIATE DELIVERY

1-20 x 10 New Haven, plain change, compound rest (new).
1-18 x 8 Mueller Dbl. Back Gear, quick-change (new).
1-16 x 8 Hamilton Quick-change Gear (new).
1-14 x 6 Hamilton Quick-change Gear (new).
1-14 x 6 Hamilton Quick-change Gear, taper attachment (new).
1-14 x 6 Hamilton Quick-change Gear, taper attachment, pan bed (new).
1 14 x 6 Hamilton Plain Quick-change Gear (new).
2 -13 x 6 Worcester Plain Quick-change Gear (new).
1 -9 x 12 Porter Cable, compound rest (new).
1 11 x 5 Blount Speed Lathe (new).

TURRET LATHES.

2-21" Gisholt Style H Turret Lathes.
1-12" W. & S. Plain Turret Lathe.
1-2 x 24 Jones & Lamson Geared Head Flat Turret.

BENCH LATHES.

2-No. 5½ Sloan & Chace, cpd. slide, 3-speed cs., 10 collets (new).

SCREW MACHINES.

1-2" Geared Fric. Head Power Feed to Turret (new).
1 -1½" Geared Fric. Head, Power Feed to Turret (new).
2 1" Plain Head, wire feed (new).
2-9-16" Plain Head, wire feed (new).

BENCH MILLER.

1-No. 2 Sloan & Chace Tool Room, index centers and vise (new).

PUNCH PRESSES.

2-No. 5 Toledo Open-back Presses (new).
2-No. 2½ Toledo Open-back Presses (new).
1-No. 4 Baxendale (new).
1-No. 3 Zeh & Hanneman Inclinable Press.
1-No. 68N Bliss Press.

MILLING MACHINES.

1-No. 12 Garvin Plain Miller (new).
1-No. 0 Rockford Plain Miller (new).
3-Standard Hand Millers, vise and arbors (new).
1 -No 15 Garvin Plain (new).
1-No. 2 Plain Cincinnati.
1-No. 2 P. & W. Lincoln Type.

STRONG & HERY CO.
225 State St. - ROCHESTER, N.Y.

Cullen Machinery Company

Cleveland, Ohio Cincinnati Branch

42 x 42 x 10 Whitcomb planer.
48 x 48 x 12 Hewes and Phillips planer.
12" Industrial slotter.
18′ Dunkirk plate planer.
No. 5 Bath grinder.
12" x 72" Queen City plain Cyl. grinder.
3" bar, Pond Hor. boring and tapping machine. Does not mill: with 18" spindle traverse: 10′ x 12′ floor plate; outboard bearing.
Long & Allstatter style A single end punch; 10" throat; new.
Long & Allstatter style 4 double machine; 7" throat.
Lo-Swing lathe 7" x 84" x 10′; taper and facing attachment.
Industrial locomotive crane: 3T. at 20′ R.4 w.h. Standard G.
L. & S. Q. Ch. 5 step. trip. B.G. lathe.
Two Greaves & Klusman, 16" x 8′ 3 step. Dbl. B.G.

WANTED

36" x 36" x 15′ and all larger planers with 2 or more heads.
Five and six foot radial drills.
Six 8 and 10′ vertical boring mills.
Bending and straightening rolls.
Let us have your specifications of any new or used machinery needed and list with prices any heavy machinery you have for sale.

IMMEDIATE SHIPMENT

Used Machine Tools

72" Pond Double Swivel Head Vertical Boring Mill.
32 x 24′ LeBlond Heavy Duty Lathe, raising blocks to swing 52".
36" x 18′ Fitield Lathe, raising blocks to swing 60".
36" x 16′ Springfield Machine Tool lathe, 8′ centers.
6-Brown & Sharpe No. 13 Gear Cutters, good condition.
3-10 x 36" Norton Grinders, NEW
30" x 30" x 6′ G. A. Gray planer, two heads.
3-3 x 36" Jones & Lamson Double Spindle with chucking equipment.
48" Gould & Eberhardt automatic gear cutter.
Brown & Sharpe vertical chucking machine.
No. 2 Bardons & Oliver Turret Lathe
No. 1 Kearney & Trecker Plain Milling machine.
22" Barnes upright drill, back geared, power feed.

We have other desirable tools in stock for immediate shipment.

Advise us of your requirements. Can make quick shipment NEW HAND SCREW MACHINES.

The
Biggs-Watterson Co.
722 Guardian Bldg.
Cleveland, O.
Branches: Detroit, Cincinnati

Want Ads.

There is someone who is looking for just such a proposition as you have to offer. For two cents a word you can speak across the continent with a condensed advertisement in this paper.

MONARCH

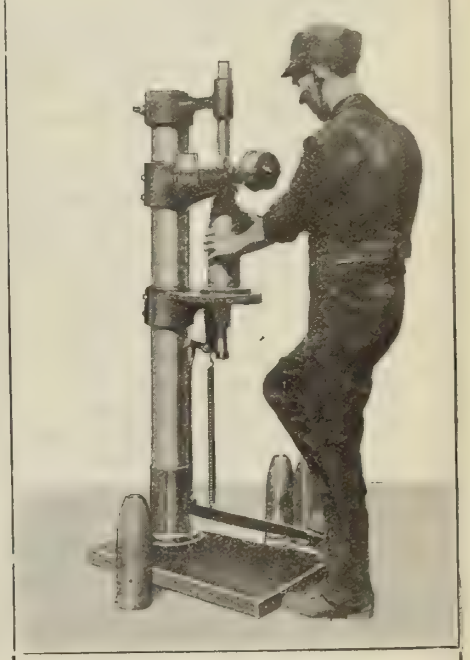
Milling Machine

(Made in Canada)

For Milling the three slots in the nose of

Mark 7 Shells

Adjustable to take any size shell from 4.5 to 9.2 inclusive.



ONE MOVEMENT of foot lever clamps the shell and feeds the three cutters in to the right depth.

CAPACITY ON 4.5—6 to 8 shells per minute. Actual cutting time is simply — "zip" and the three slots are finished.

THE MACHINE is complete with High Speed Cutters and drive pulleys which should run at about 550 revolutions per minute. It can be driven by three 2-inch belts, either from overhead counter or line shaft. The clamping device does not interfere with copper band, and altogether it will be found to be a very satisfactory tool—CONVENIENT and ACCURATE.

For further particulars address

H. W. PETRIE, LTD.
FRONT STREET WEST, TORONTO
Sole Selling Agents for Canada

REBUILT MACHINES

GRINDERS

12" x 42" Landis Universal
12" x 36" Modern Plain Cylindrical
10" x 36" Thompson Universal
3' Pratt & Whitney Vertical Surface
Springfield Surface, table 22" x 50"
Saxon Surface, table 8" x 18"
Whitney Surface, table 6" x 12"
No. 1½ Landis Internal
No. 1 Brown & Sharpe Internal
Two "BX" Wilmarth & Morman, Cutter, Reamer and Drill Grinders, with cylindrical and internal attachments.
No. 2 Garvin Cutter and Reamer
30" Warner & Swasey Cock
10" x 7' Brown Roll

BORING MILLS

10' Betts Vertical, two heads, chasing attachment
66" Betts Vertical, two heads
60" Niles Vertical
60" Baush Vertical, two heads
60" Bement Vertical
36" Bullard Vertical, two heads
Niles Horizontal, 9" bar
Barrett Horizontal, 3¾" bar
Rockford Horizontal, 2 1-16" bar
50" Bement-Miles Car Wheel
48" Niles Car Wheel
Underwood Automobile Cylinder, 3⅝" bar

RADIAL DRILLS

6' Dreses Full Universal, with motor
Three 6' Niles Semi-Universal
5' Western Full Universal, with motor
5' Box Plain
5' Baush Plain
5' Bement-Miles Plain
4½' Bickford Plain, tapping attachment
4' Niles Plain, with motor
4' Dreses Plain
3½' Niles Plain
3½' Baush Plain
Two 3½' Gang Plain
Two 2½' Prentice Plain
2½' Gardham Plain

LONG BED LATHES

114" x 22' Pond, quadruple geared, face plate drive
48" x 24' Enterprise
42" x 20' Putnam
38" x 25½' Fifield
36" x 22' Pond
36" x 20' New Haven
32" x 25' LeBlond quick-change gear
30" x 30' Perkins
28" x 28' Fitchburg
26" x 26' Niles
26" x 24' New Haven

NEW YORK MACHINERY EXCHANGE

50 Church St. - NEW YORK CITY

The Pick of the Country's Stock

Machines that no doubt you have been looking for for many a month will be found in the list below, and can be had for immediate delivery unless otherwise stated.

GRINDERS.

No. 1 Wilmarth & Morman Full Universal Grinder, complete with equipment; brand new	$1,000
Two American Plain Grinders, complete with full equipment and in very good operative condition, swings 8" with water guards, 8¾" without water guards, takes 16" between centers ....each	1,000
No. 2 Woods Full Universal Cutter and Tool Grinder, with complete equipment; brand new: internal grinding attachment	625
No. 184 Wells Universal Cutter and Reamer Grinder; brand new	200
No. 210 Heald Piston Ring Grinder with 8" magnetic chuck, automatic feed; in first-class shape	525
Gisholt Universal Tool Grinder; like new	300
No. 5 Bath Duplex Internal Grinder, complete and in very good condition	1,200
No. 6 Besley Double End Ring Wheel Grinder, with ring wheel chucks; like new	750
Two No. 1 Brown & Sharpe Universal Grinders, about ten years old, but in fine shape ....each	1,000

MILLERS.

Twenty Brand New Whitney Two-step Cone Millers ....each	250
Seven No. 7 Becker Lincoln Millers, in first-class condition......each	225
No. 20 Oesterlein Universal Miller, brand new; delivery March	1,500
No. 2 Cincinnati Universal Miller, complete with full equipment, brand new, all power feeds; delivery March	1,700
No. 2 Becker Full Universal Miller, complete with regular equipment, brand new, no arbor, all power feeds; delivery latter part of this month	2,250
Three No. 3 Burke Bench Milling Machines, straight over arm, complete with arbor, brand new ....each	200
No. 21 Garvin Brand New Plain Miller, back geared	500

LATHES.

57" x 12' Pratt & Whitney Screw-cutting Engine Lathe, triple geared, compound rest, power cross feed, solid spindle	1,200
32" x 8½' Fifield Screw-cutting Engine Lathe, triple geared, compound rest, power cross feed, no gears	700
24" x 16' Lodge & Shipley Quick-change Gear Lathe, taper attachment, 2" hole in spindle, compound rest, power cross feed, lot of equipment	1,550
22" x 16' Niles Screw-cutting Engine Lathe, compound rest, power cross feed, hollow spindle	650
18" x 18' 2" Putnam Screw-cutting Engine Lathe, power cross feed	650
18" x 12' American Quick-change Gear Lathe, compound rest, power cross feed, hollow spindle	1,000
18" x 8' LeBlond Screw-cutting Engine Lathe, compound rest, power cross feed, hollow spindle	750
16" x 8' Lodge & Shipley Screw-cutting Engine Lathe, quick-change gear, taper attachment, compound rest, power cross feed, hollow spindle	750
Three Brand New 14" x 6' Monarch Quick-change Gear Lathes, screw-cutting ....each	600
Three Brand New 13" x 6' Seneca Falls Screw-cutting Lathe, actual swing 14"	485
Two Seneca Falls Brand New Screw-cutting Lathes, same as above, but with draw-in attachment and one ½" collet............each	535
12" x 6' Hendey Tool Room Lathe, quick-change gear, pan bed, compound rest, hand cross feed, automatic stop, hollow spindle, draw-in attachment, six collets	625
12" x 5' Pratt & Whitney Lathe, rise and fall rest, taper attachment, just taken from micrometer department	325
12" x 5' Fairbanks Screw-cutting Lathe, compound rest, power cross feed, hollow spindle	300
Two 12" x 4' Brand New Shepard Quick-change Gear Lathes...each	225

SPECIAL

Fitchburg Lo-Swing Lathe, like new, complete with large equipment	$ 900
24" x 12' Hendey-Norton Lathe, compound rest, power cross feed, hollow spindle, full swing rest with round six-hole tool post, automatic stop, tie bar head, quick-change gear, taper attachment, 18" four-jaw chuck, 24" and 14½" face plates, steady and follow rests; machine has not a scratch on it and is just as good as the day it was delivered from the factory; appearance and condition like new	1,900
24" x 16' Springfield "Ideal" Lathe, detachable, quick-change gear, complete equipment; in first-class condition	1,000
Fifty Heavy Duty Shell Boring Lathes, specially designed for boring and turning shells 8" to 16"; brand new.	

HORIZONTAL BORING MILLS.

Rochester Horizontal Boring, Drilling and Milling Machine, bed plate 6' x 4, boring bar 3⅜" diameter, movement of spindle in saddle 31", minimum distance centre of spindle to floor plate 16", vertical movement of saddle on column 56", horizontal movement of column on bed 76", motor-driven by 6 H.P. electric dynamic 2.1 direct current motor; delivery in April	3,200
Fitchburg Horizontal Boring Mill, Knee Type, 3" bar, table 24 x 30	1,000

VERTICAL AND HORIZONTAL BORING MILLS.

36" Brown & Sharpe Vertical Chucking Machine, 8" square turret head on slide with 4 1¾" holes	550

AUTOMATIC AND HAND SCREW MACHINES.

8½ x 16 Potter & Johnson Automatic, with large equipment, first-class condition	900
⅝" National Acme, 4-spindle two-belt type	450
1" National Acme, 4-spindle two-belt type	650
1½" National Acme, 4-spindle two-belt type	850

Above three National Machines have not been overhauled, but with a few new parts and cleaning can be made first-class.

Eight No. 12½ Brand New Garvin Friction Geared Head Screw Machines, 2" wire feed capacity, automatic feed to turret....each	875
25 Milwaukee Screw Machines, 1½" wire feed capacity, geared friction head ....each	650

Modern Machinery Exchange

OFFICE AND SALESROOMS—182 Centre St., New York City
Shop and Warehouse—52 and 54 Walker St.
NEW YORK CITY
Telephone—Franklin 1816

In Stock For Immediate Delivery

No. 1½ Valley City Universal Miller (new).
No. 1½ Valley City Plain Miller (new).
No. 1½ American Plain Millers (new—3).
U.S. Hand Miller (new).
No. 22 Garvin Vertical, Rotary table (used).
No. 4 LeBlond Plain Miller (used).
No. 2 Garvin Sprocket Miller (used)
No. 6 Whitney Hand Miller (used).
18″ x 8′ Mueller Lathes (2) (new).
14″ x 6-8′ Carroll Jamieson Lathes (7 new).
16″ x 6′ Canedy-Otto (new).

Write us for other equipment.

A.D.White Machinery Co.
108 to 114 North Jefferson St.
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Wanted
A Photographer

Young man with experience in photographing machinery. One possessing technical education preferred. A knowledge of advertising would prove valuable. When applying, give full particulars re experience, age, where employed now, salary expected. Splendid opening for hustler. Replies will be treated in strictest confidence. Address Box 249, Canadian Machinery.

Wanted!

We will pay highest market price for Shell End Scrap, any tonnage.

Write

HULL IRON & STEEL FOUNDRIES, Limited
HULL - - - QUEBEC
(26)

Kindly mention this paper when writing advertisers.

FOR SALE
WARNER & SWASEY TURRET LATHES
FROM STOCK

Ten (10) 16 inch No. 2, Geared Friction Head Universal Turret Lathes, only used **a** few months—equal to new.

Williams & Wilson
Limited
320 St. James St., Montreal, P.O.

WANTED

Heavy and Light Sheet Metal Work wanted on contract.

The Steel Bending Brake Works
Limited
CHATHAM, ONTARIO

FOR SALE

1 -24″ Baker Bros. Heavy Duty Drill Press No. 4 M.T.
1—24″ Foote-Burte Heavy Duty Drill Press No. 5 M.T.
2—D-1 Colburn Heavy Duty Drill Presses, No. 4 M.T.
1—3 ft. Prentice Cone Driven Radial.
1—4 ft. Prentice Cone Driven Radial.
2—24″ Sibley Sliding Head Drills, new.
10—20″ Stationary Head BGPF Drills, new.
1—No. 1½ Hendey Universal Milling Machine.
1—No. 2 Kempsmith Plain Milling Machine, new.
4—21″ Gisholt Turret Lathes, Taper Attachments.
1—20 x 8 Perkins Engine Lathe PR.
1—20 x 12 Perkins Engine Lathe PR.
1—16″ x 7 Oliver Engine Lathe in pan, new.
1—22″ x 22″ x 5′ Flather Planer.
1—12″ Crank Planer.
2—12″ Gleason Single Tool Gear Generators.
1—15″ Gleason Double Tool Gear Generator.
1—No. 5 Becker Vertical Miller, with rotary.
2—No. 4-B Becker Vertical Millers, without rotary.
1—No. 2 Becker Vertical Miller, with rotary.
14—14″ x 6′ Reed-Prentice Geared Head Engine Lathes, new.

Brownell Machinery Co.
Providence, R.I., U.S.A.

If you have a business to dispose of, or are in need of efficient help, try a Want Ad. in Canadian Machinery, and let it assist you in filling your needs.

MACHINE TOOLS

LATHES.

1—28 x 15 Putman Standard Engine Lathe, C.R., S.S., P.F.
1—22 x 14 Putman Standard Engine Lathe, C.R., S.S., P.F.
1—18 x 36 x 10′ LeBlond Extension Bed Engine Lathe.
3—(New) 7 x 60 Fitchburg Lo-Swing Lathes, with 2 tool taper att.
1—(New) 18 x 8 Reed-Prentiss D.B.G. Engine Lathe.
1—18 x 8 Jones & Lamson Engine Lathe.
2—16 x 6 Barnes Engine Lathes.
1—16 x 8 Cincinnati Engine Lathe.
1—16 x 6 Walcott Engine Lathe.
1—16 x 6 Reed Engine Lathe.
1—16 x 8 Porter Engine Lathe.
1—14 x 6 Lodge & Shipley Engine Lathe.

MILLING MACHINES.

1—(New) No. 25 Ohio Milling Machine.
1—No. 3 Chicago Hand Miller.
1—No. 12 P. & W. L.T. Miller.
4—No. 13 P. & W. L.T. Millers.
1—Warner & Swasey Profiler.

GRINDERS.

1—No. 2 Bath Universal Grinder.
2—12 x 36 Landis Plain Geared Head Grinders.
1—No. 5 Springfield Oscillating Surface Grinder.
1—No. 2 Gardner Disc Grinder.
1—No. 34 Gardner Double Disc Grinder.

PLANERS.

1—Pond 62″ (widened pattern type), 9′ bed.
1—36 x 36 x 10 Industrial Planer, one rail head and one side head.

TURRET LATHES.

1—No. 6 Foster Friction Geared Hand Screw Machine.
1—3 x 36 Jones & Lamson, with bar and chucking attachment.
1—2 x 24 Jones & Lamson, with bar and chucking attachment.
2—(New) No. 4 B. & O. Chucking Turret Lathes.
1—(New) No. 4½ B. & O. Hand Screw Machine, wire feed.
1—No. 4 Warner & Swasey Friction Geared Hand Screw Machine.
1—14″ B. & O. Chucking Machine.
1—No. 5 Pearson Hand Screw Machine.
1—1 x 8 Pierce Hand Screw Machine (new).
1—2″ Cleveland Automatic Screw Machine (Model A).
2—2″ Cleveland Jigger Feed Screw Machines.

AIR COMPRESSORS.

Steam

1—12 x 12 x 12¼ x 12 Ingersoll-Rand, Class M.F. 1.
1—16 x 18 x 12 D.A. Union, S.L., 2 S., Air Compressor.
2—8 x 8″ Westinghouse.

Belt.

3—10 x 10 Bury Hor. Belt Driven (182 C.F.)
1—10 x 10 Curtis Vertical D.C., with base (160 C.F.).
1—8 x 8 Ingersoll-Sergent Hor. (100 C.F.).
1—8 x 8 Chicago Pneumatic Hor. (100 C.F.).

DRILLS AND SLOTTERS.

1—(New) No. 61B Harrington Multiple Spindle Drill Press, 19 spindles.
1—(New) No. 51A Harrington Multiple Spindle Drill Press, 10 spindles.
1—(New) No. 51B Harrington Multiple Spindle Drill Press, 8 spindles.
4—(New) No. 61B Harrington Multiple Spindle Drill Presses, 16 to 33 spindles.
3—(New) 26″ Buffalo Drills, W. & L.F.
1—17-spindle Moline.
1—5-spindle Barnes.
1—24″ Niles Geared Slotter.

GEAR CUTTERS.

2—11″ Gleason Gear Generators.
1—12″ Becker-Brainard Automatic Gear Cutter.
1—17″ Newark Spur Gear Cutter.

PRESSES AND HAMMERS.

1—No. 64 Toledo S.S., B.G.
1—No. 95 Consolidated Press.
2—Briscoe S.S., 7″ stroke.
2—1200-lb. B. & S. Roll Board Hammers.
1—800-lb. B. & S. Roll Board Hammer.
1—1200-lb. Toledo Roll Board Hammer.

We carry a large line of Boilers, Pumps, Engines, Generators, etc.

Riverside Machinery Depot
Detroit, Mich.

If any advertisement interests you, tear it out now and place with letters to be answered.

FOR SALE

GRINDERS.

2 12" x 24" Modern Plain, self-contained.
1 12" x 42" Landis Plain, self-contained.
1 No. 3 Landis Universal.
1 No. 2 Oesterlein Universal, Tool and Cutter.
1 No 3 B. & S. 12" x 40" Universal.

GEAR CUTTING MACHINES.

1 15" Gleason Bevel Gear Generator.
1 No. 5A Lees-Bradner Gear Generator.
2 12" Gleason Single Tool Gear Planers.
1 18" B. & S. Automatic Gear Cutter.
1 30" x 8" Flather Automatic Gear Cutter.
1- 36" Fellows Gear Shaper.
1 48" Brainard Automatic Gear Cutter.
1 No. 5 B. & S. 60" x 11" Gear Cutter.

BORING AND TURNING MACHINES.

1 84" Cincinnati Boring and Turning Mill. Motor Driven.
1 24" Bullard Vertical Turret Lathe, with side head.
1 34" Colburn Vertical Turret Boring and Turning Machine.
1—36" B. & S. Vertical Turret Boring Machine.
1 72" Bickford Vertical Boring and Turning Mill.
1 10' Betts Vertical Turning and Boring Mill.

MILLING MACHINES.

5 No. 2½ LeBlond Universal.
1 No. 3 Cincinnati Universal, with vertical and spiral attachments.
1 No. 2 Cincinnati Plain Miller.
1 No. 1½ Hendey Universal.
1 No. 3 Cincinnati Universal.
25—Lees-Bradner Thread Millers, for 3", 4½" and 6" shells.
1 No. 5 Becker Vertical Miller with Rotary Attachment.
2—No. 3 Becker Vertical Millers with Rotary Attachments.
2 No. 12 B. & S. Manufacturing.
1 No. 3 Becker Profiler.
2 -P. & W. Spline Millers.

PLANERS.

1 -24" x 24" x 8' Gray, one ead.
1 24 x 24 x 6' Pease, one head.
1 30 x 30 x 8' Cleveland Openside, one rail, one side head.
1—34 x 30 x 8' New Haven, one head.
1 36 x 36 x 8' Powell, one head.
1 42 x 42 x 10' Whitcomb, two heads.
1 72 x 57 x 17' Gleason, two heads.
1 16' Sellers Plate Planer.

SCREW MACHINES.

1 No. 2 Pierce, 1" capacity.
1 No. 3 Stecher, 1 5-16" capacity.
2 -No. 4 B. & S.
7 No. 4 Smurr & Kamen.
2—P & W., ½" capacity, automatic.
2 No. 53 National Acme Automatics.
4 No 54 National Acme Automatics.
1 No. 56 National Acme Automatics.
3 2¼" Gridleys, single spindle, automatic.

TURRET LATHES.

2 3" x 36" Jones & Lamson, geared head; one with chucking equipment, one with bar and chucking equipment.
1 24" Gisholt.
1 24" Steinle.
8 21" Gisholts.
10 13" Gisholts.

ENGINE LATHES.

1 14" x 6' Hendey Tool Room, with Taper Attachment, Drawing-in Attachment, 9 Collets.
20 14" x 6' Reed Stud Lathes.
2—14" x 6' L. & S.; one with Taper and Draw-in Chuck.
1 18" x 8' National, with Taper.
1—18" x 9' Chard Lathe.
1—20" x 10' LeBlond Lathe.
1—20" x 10' L. & S. Lathe.
15—21" x 8' LeBlond Lathes, with oil pan and pump, turret on carriage, double back-geared, with 3-step cone for 4½" belt, quick-change.
12—21" x 8' LeBlond Heavy Duty Automatic Lathes, with forming attachments, pans and pumps, double tool posts
1—22" x 6' Reed Lathe, taper attachment.
1—24" x 11' New Haven.
1—24" x 25' Reed.
1—24" x 12' Blaisdell.
1—30" x 14' Fifield.
1—32" x 16' Fay & Scott.
25 32" x 16' Pittsburg.
1—36" x 20' New Haven.
1—40" x 20' Fifield.
1—42" x 11' Lodge & Shipley (not screw cutting).
1—28"-48" x 13' Harrington Extension Gap.
1- 48" x 27' Betts, triple-geared.
1 54" x 12' New York.
1—62" x 34' Putnam, triple geared, motor driven.
1 68" x 20' Fifield, triple geared.
1—90" x 30' Stover, triple geared.

DRILLING MACHINES.

5- Colburns D-3.
1—25" Kern Sliding Head with Tapping Attachment.
1- 8-spindle Baush, ½" capacity.
1—12-spindle Gardam, ½" capacity.
1—24-spindle Baush, drilling head 16" x 30", ½" capacity.

Write us for what you want also for what you have for sale.

W. F. DAVIS MACHINE TOOL COMPANY

Chicago, 32 N. Clinton St.; Cincinnati, 3 Greenwood Bldg.; New York, Singer Bldg.; Cleveland, Leader-News Bldg.

Quick Delivery

1—24 x 20 Rahn-[illegible] style second-hand Lathe, good condition..	$ 350.00
4—22 x 16 Davis Lathes, second-hand, double back geared, quick-change gear, compound rest; used six months; good as new .... each	1,050.00
2—18 x 7 Reed-Prentice Lathes, second-hand, geared head, flat turret lathe, automatic stops, pan and piping, fitted with 4.5 air chucks for shells; practically new ....each	1,150.00
2—13 x 6 Seneca Falls Lathes, new, with compound rest....each	460.00
4—9 x 4 Seneca Falls Lathes, new, with compound rest....each	215.00
1—14 x 6 Cisco Lathe, new, with compound rest, swings 16⅝"	635.00
3—18 x 8 Cisco Lathe, new, with compound rest, swings 20⅝" .... each	960.00
4—4½" Davis Cutting-off Machines, practically new, fitted with 3 Jaw Chucks .... each	450.00
2—4½" Davis Cutting-off Machines, practically new, fitted with 4.5 Air Chucks and vertical forming slide ....each	450.00
2—6" Davis Cutting-off Machines, practically new, fitted with 4.5 Air Chucks and vertical forming slide ....each	600.00
6- Holden-Morgan Thread Millers, designed for thread on 3" shells, to be sold in one lot for	2,500.00
2 West Tire Setter Bending Machines, second hand ....each	750.00
2—Watson Stillman 1½ x 2 Pumps, 1,200 cu. in. at 2,100 pounds pressure; second hand ....each	550.00
1 Lea Simplex 4½" Cold Saw, second-hand	260.00
1—50 pound Kane & Roach Blacksmith Hammer	165.00
1 18" Disc Grinder and Press, second hand	160.00
1 -Waterbury Farrell Sprue Cutter, second hand	100.00
1—36 x 30 x 8 Wilson Single Head Planer; good as new.....	1,000.00
1—25 light Onondaga Direct Current Generator; second hand...	100.00
4 Barnes Self-oiling All-geared Drilling Machines; new.	
1—Sipp Single Spindle Ball-bearing Drill; new.	
1—Sipp Two-spindle Ball-bearing Drill; new.	
1—Sipp Three-spindle Ball-bearing Drill; new	
1—Sipp Four-spindle Ball-bearing Drill; new	
1—Standard Hand Miller [illegible] type, new	250.00
2 No. 0 Rockford Plain Millers, new ....each	425.00

THE H. A. SMITH MACHINERY COMPANY

384 West Fayette Street - Syracuse, N.Y.

NEW MACHINERY

AVAILABLE FOR IMMEDIATE DELIVERY

GRINDERS

6—Dumore Portable Grinders, external and internal
1—Wilmarth & Morman Grinder, style W P L
3—No. 1 Wilmarth & Morman Surface Grinder, complete, J-Holder
1—No. 2 Wilmarth & Morman Surface Grinder
1—No. 3 Wilmarth & Morman Surface Grinder
2—No. 1 Wilmarth & Morman Universal Grinders

MILLING MACHINES

1—United States Hand Miller
2—No. 1 Standard Hand Millers, complete
1—No. 1½ Valley City Plain Miller
5—No. 1 Dow Plain Millers
1—No. 24 Oesterlein Plain Miller, all power feeds
2—No. 2 Rockford Plain Millers
2—No. 2 Rockford Universal Millers

SHAPERS

2—16 in. Smith & Mills Plain Crank Shapers
1—16 in. Ohio Shaper
2—16 in. Smith-Mills High Speed Shapers
1—32 in. Smith-Mills Triple Geared Shaper
1—24 in. Queen City Shaper

SPECIAL: 2—30 in. Baush Vertical Boring Mills, Turret head, complete with A.C. 220-volt motor, used, but guaranteed in first-class working order.

This is only a partial list—complete list upon request.

The Simmons Machine Co., Inc.

981 Broadway
Albany, N. Y.

1001 Singer Bldg.
New York City

IMMEDIATE DELIVERY

BORING MILLS.

40" Rogers & Hemphill, two swivel heads.
42" Gisholt, one turret and one swivel head.
52" Niles, car wheel boring mill.
62" Bement, horizontal.

DRILLING MACHINES

34" Barnes, s.h., b.g., p.f.
3½' Industrial Radial.
Avey, 1-spindle, B.B. (new).
Avey, 4-spindle, B.B.
No. 10 Natco 8-spindles.
No. M-1 Natco 8-spindles.
12-spindle Multiple, P. & W.
No. 30 C. Baush, 12-spindle.
Allan, 2 spindles (new).
Allan, 4 spindles (new).

GEAR CUTTERS

30" x 9" G. & E. Auto, for spur and bevel.
24" x 7" G. & E. for spur.
36" Walcott, for spur.

GRINDERS

14" x 20" B. & S. Universal.
Gisholt Tool Grinder.
No 5 Diamond Water Tool.

LATHES

12" x 5' Davis, c.r.
14" x 6' Fairbanks, c.r., taper.
16" x 6' Prentice, c.r.
16" x 6' Sebastian, p.r.
16" x 10' Greaves & Klusman, c.r.
17" x 10' Blaisdell, c.r.
18" x 6' Bradford, c.r., taper.
18" x 8' L. & S., pat. head, c.r., taper.
18" x 10' Bradford, c.r., taper.
18" x 12' Barker, c.r.
20" x 10' Flather, c.r.
20" x 14' Blaisdell, c.r.
21" x 12' New Haven, c.r.
21" x 12' Bradford, c.r., taper.
24" x 12' New Haven, c.r.
24" x 13' New Haven, c.r.
30" x 27' Reed, c.r., taper.
32" x 16' Blaisdell, c.r.
36" x 22' Lodge & Shipley, geared head, q.c.g., motor drive with motor.
68" x 20' Fifield, c.r., t.b.g.

MILLING MACHINES

No. 4 LeBlond, plain.
No. 13 P. & W., Lincoln
No. 4-B Becker Vertical.
No. 5 Becker Vertical.

PLANERS

22" x 22" x 4' New Haven, one head.
30" x 30" x 12' Cincinnati, two heads.
36" x 36" x 12' Powell, single head, arranged for two.
36" x 36" x 16' Sellers, one head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.
42" x 36" x 12' Cincinnati, two heads.

PRESSES

No. 20 Bliss, O.B., Inc.
No. 3 Walsh O.B. Inc.
No. 174 Consolidated, double crank.

SHAPERS

14" Pratt & Whitney.
14" Smith & Mills.
16" Gould & Eberhardt.
16" American.

SCREW MACHINES

No. 1 Chicago automatic.
1 3-16" Hartford Automatic.
⅞" Cleveland Automatic.
2" Cleveland automatic.
2¾" Cleveland automatic.
1" B. & S., plain.
16" P. & W., plain.

TURRET LATHES

16" Lodge & Shipley.
25" Niles.
No. 2 Warner & Swasey Hollow Hexagon.
2" x 24" Jones & Lamson.
24" Gisholt, spindle capacity 6¼".
3" x 36" Jones & Lamson, chucking outfit.

MISCELLANEOUS

Bolt Cutter, 1½" Acme.
Centering Machine, No. 1 Whitton.
No. 3 Burr Cold Saw.
No. 14 Higley Cold Saw.
No. 2 National Oil Separator.
No. 00 Baker Keyseater.
2—100 lb. Bradley Helve Hammers.
No. 80A Grant Rivet Spinner.
Stecher Rivet Spinner.

Write for our Stock List.

Write for our Stock List.

The H. A. Stocker Machinery Company, 566-572 W. Randolph St., CHICAGO, ILL.

FOUR BIG THINGS IN CANADIAN INDUSTRY

BIG BUYING IS GOING ON IN CANADA IN THE METAL-WORKING, MACHINERY, IRON AND STEEL, FOUNDRY, SHIPBUILDING AND POWER FIELDS

Canada's trade for the month of July, 1916, showed an increase of 141 per cent.—imports $63,622,587; exports $104,964,270. Business in Canada is good. The war has aroused an unsuspecting and surprising resourcefulness in Canadian manufacturers. They are making money, extending their plants, buying equipment. They are confident as to the future and are deeply engaged in industrial preparation.

The buyers in the fields mentioned above can be reached through these

FOUR EXCLUSIVE MACLEAN MEDIUMS

CANADIAN MACHINERY

CANADA'S leading industrial paper serving the iron and steel, metal-working and allied industries. It led the world in amount and quality of information, pertaining to shell manufacture. The biggest firms in Canada and the United States regarded it as a text book on the subject. The Australian Shell Committee reproduced its special Shell Number in book form.

CANADIAN MACHINERY was the first Canadian paper to undertake the development of export trade. Its first Export Number (302 pages) created very favorable attention in all allied and neutral countries. Export numbers are published monthly.

On December 30, last, CANADIAN MACHINERY'S Annual Review Number contained 332 pages—a record breaker for Canadian publications.

Leading manufacturers such as John Bertram & Sons, Nova Scotia Steel & Coal Co., The Niles-Bement-Pond Co., the Canada Machinery Corp., and scores of others use regular space in CANADIAN MACHINERY. Equally well known concerns are subscribers.

Its classified advertising section is an indication of the intimate connection enjoyed by CANADIAN MACHINERY. Six pages of classified advertising are carried in each issue.

THE CANADIAN FOUNDRYMAN

SERVES the foundry trade of Canada—an ever-increasing field. Every foundry is busy. One foundry supply dealer said recently that his July business was larger than **for any five months** in any previous year. Labor-saving equipment, as well as supplies and standard lines are being purchased heavily. THE CANADIAN FOUNDRYMAN influences this buying—at a small cost to the firms who are getting the business.

THE POWER HOUSE

SERVES the power field, and the buyer of power equipment in every province in Canada. It serves also the manufacturers of power equipment, as is perceived in the following quotation from a letter from Wm. B. Pierce Co., Sept. 1, 1916:

> "The reason we are increasing this space in the POWER HOUSE is that we have found the POWER HOUSE costs us less per inquiry than any other publication we have used in the power plant field, and that the inquiries are generally from very high-class concerns. The percentage of inquiries that we receive that are turned into sales is unusually high, so that POWER HOUSE also stands first on our list for low cost per sale."

MARINE ENGINEERING OF CANADA

SHIPBUILDING in Canada has received a tremendous impetus as a result of the war. Shipbuilding plants are being built on the Atlantic and Pacific Coasts in considerable number, while established shipyards have more business than they can handle. MARINE ENGINEERING is the only exclusive marine paper published in Canada. Its circulation is among shipbuilders, shipowners, naval architects, government officials, masters and engineers. These men and classes are reached effectively, at small cost, through MARINE ENGINEERING.

Each of these papers has a **National** paid-up circulation thorough in character. Each is an acknowledged **Power** in its own field. Send for specimen copies, advertising and subscription rates.

The MacLean Publishing Company, Limited, 143-153 University Ave., Toronto, Ont.
Also at Montreal Winnipeg New York Chicago Boston Cleveland and London, England

GRAVES
Machinery Exchange

Successors to

The Co-operative Used Machinery Company

PLANERS.

54"x54"x15' Pond, 2 heads; excellent condition	$3,500
42"x42"x10' Whitcomb, 2 heads	2,200
36"x36"x10' Niles, 4 heads	2,000
Also 18 others—all sizes.	

MILLING MACHINES.

Beaman & Smith, planer type, 92" through housings, 72" under rail, three milling heads	4,000
Ingersoll Slab Miller, 60" between housings, table 8' long	4,000
No. 9 Kempsmith, plain, back-geared, table 12x36", power feed	750
Two (2) Pratt & Whitney Vertical, heavy type, spindle 3⅝" dia. table 36"x54", each	1,250
No. 14 Garvin Vertical, excellent condition	1,500

ALSO LARGE STOCK OF EVERY MAKE AND SIZE

ENGINE LATHES.

96"x31' Niles, 16' between centers	5,000
84"x28' Putnam, raising blocks to 120", motor driven	4,500
38"x20' Lodge & Davis, raising blocks to 50"	2,500
Five (5) 24"x12' Lodge & Shipley, each	1,200
Three (3) 24"x10' Lodge & Shipley, each	1,100
Three (3) 20"x8' Lodge & Shipley, each	700
All makes, sizes and descriptions.	

VERTICAL BORING MILLS.

10' Pond, 2 swivel heads	5,500
42" Niles, 2 swivel heads	1,250
Two (2) 30" Bullards (turret heads), each	700
36" Bullard	500

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Beaman & Smith, 5" bar, bores to center of 60"; travel of bar by power 60", motor driven	1,500
3¼" Niles (knee type), 24" feed, rapid traverse, bores to center of 60" without top table. Sellers double spindle, distance between uprights 6", height from top of table to center of bar 16"	500

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6" Jarecki, single pulley drive	350
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No. 10 Stiles pattern, 12"x8" bolster, 5x7 opening in bed	250
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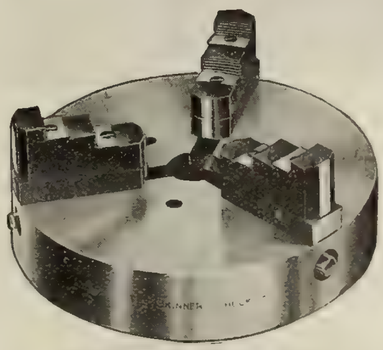

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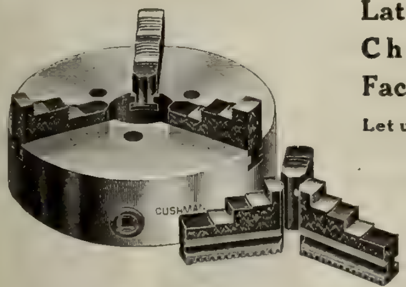

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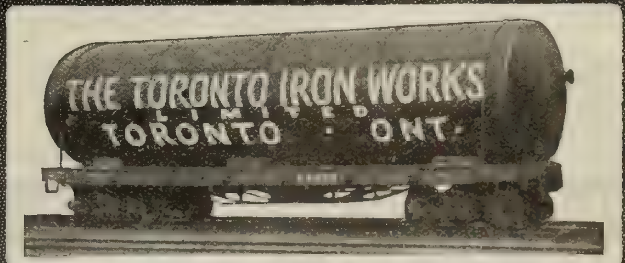

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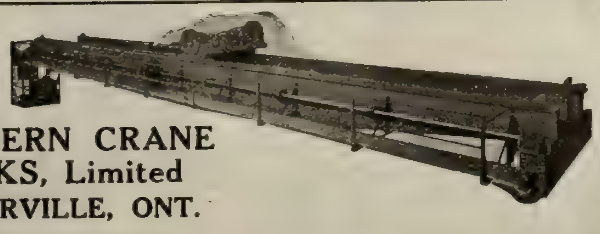

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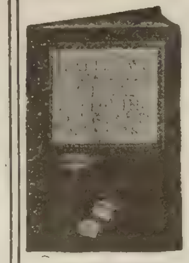

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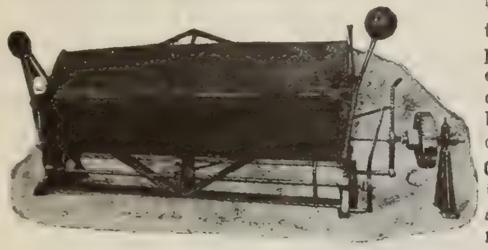

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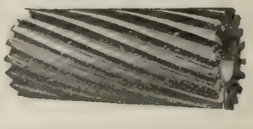

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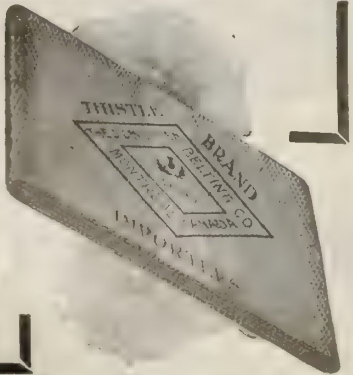

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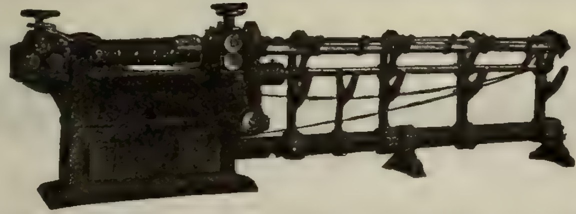

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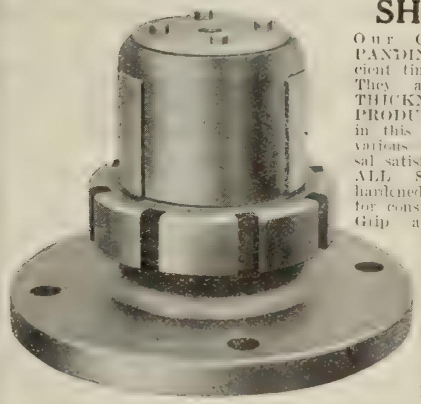

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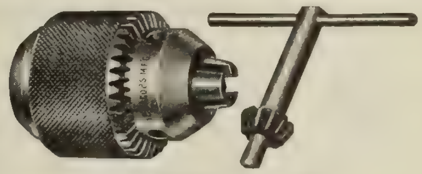

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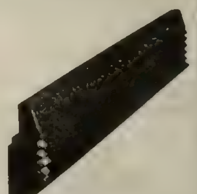

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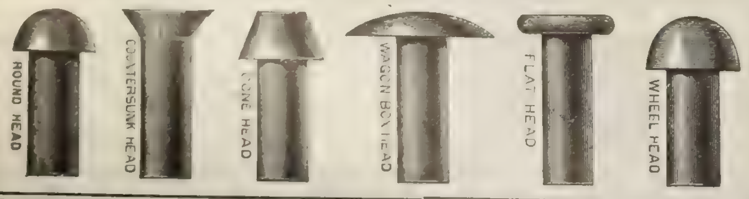

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H. W. Petrie, Toronto.
Stow Mfg. Co., Binghampton, N.Y.

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John Bertram & Sons Co., Dundas.
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Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Roelofson Machine & Tool Co., Toronto, Ont.
Stow Mfg. Co., Binghampton, N.Y.

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Cumming & Son, J. W., New Glasgow, Canada.

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Warner & Swasey Co., Cleveland.
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A. R. Williams Machy. Co., Toronto.

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Marsh & Henthorn, Belleville, Ont.
Sheldons, Limited, Galt, Ont.
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Canada Metal Co., Toronto, Ont.
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Alexander Fleck, Ltd., Ottawa.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Ontario Specialties, Ltd., Ottawa, Can.
Tallman Brass & Metal Co., Hamilton.

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Can. Steel Foundries, Ltd., Montreal, Que.
Alexander Fleck, Ltd., Ottawa.
Gardner, Robt., & Son, Montreal.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound.
Plessisville Foundry Co., Plessisville, Que.
Sheldons, Ltd., Galt, Ont.

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Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Wm. Kennedy & Sons, Ltd., Owen Sound.
Galt Malleable Iron Co., Galt.
Ontario Specialties, Ltd., Ottawa, Can.

CASTINGS, MALLEABLE.

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Cumming & Son, J. W., New Glasgow, Canada.
Galt Malleable Iron Co., Galt.

CASTINGS, NICKEL STEEL.

Hull Iron & Steel Foundries, Ltd., Hull, Quebec.

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Gardner, Robt., & Son, Montreal.
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Hurlbut, Rogers Machy. Co., South Sudbury, Mass.
Niles-Bement-Pond Co., New York.
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H. W. Petrie, Toronto.

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The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Toronto Testing Laboratory, Ltd., Toronto.

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Garvin Machine Co., New York.

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Celfor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Cushman Chuck Co., Hartford, Conn.
Detroit Pneumatic Chuck Co., Detroit, Mich.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
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Manufacturers Equipment Co., Chicago, Ill.
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Montreal General Tool Co., Montreal, Que.
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H. W. Petrie, Toronto.
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Aikenhead Hardware Co., Toronto, Ont.
Whitney Mfg. Co., Hartford, Conn.

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Gardner Machine Co., Beloit, Wis.

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Smart-Turner Machine Co., Hamilton, Ont.
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Northern Crane Works, Walkerville.
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Northern Crane Works, Walkerville.

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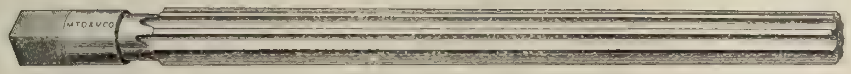

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Foss & Hill Machy. Co., Montreal.
Independent Pneumatic Tool Co., Chicago.
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Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
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Stow Mfg. Co., Binghamton, N.Y.
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H. A. Drury Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Morse Twist Drill & Machine Co., New Bedford.
W. F. & John Barnes Co., Rockford, Ill.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

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Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.

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Morse Twist Drill & Machine Co., New Bedford.

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Garlock-Walker Machinery Co., Toronto, Ont.
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Morse Twist Drill & Machine Co., New Bedford.
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H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

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Foss & Hill Machy Co., Montreal.
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Boker & Co., H., Montreal, Que.
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Cleveland Twist Drill Co., Cleveland.
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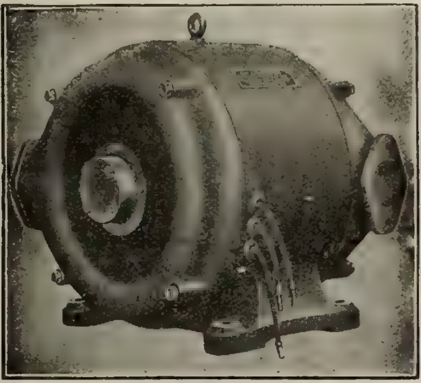

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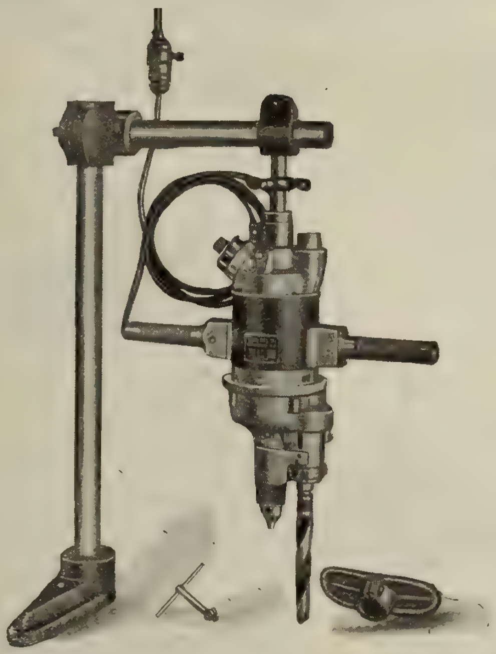

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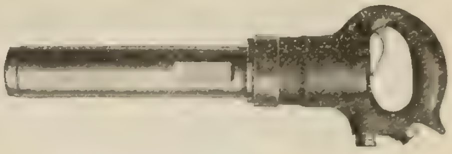

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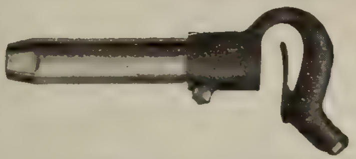

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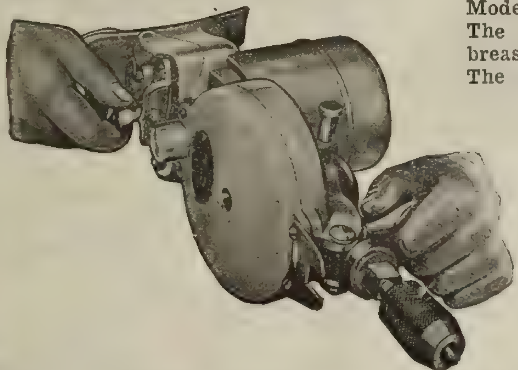

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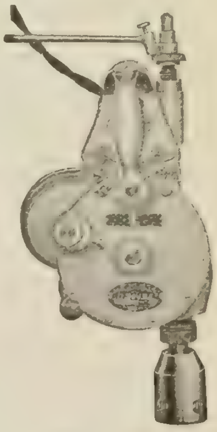

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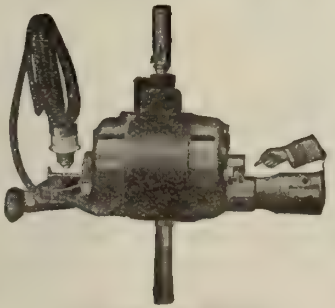

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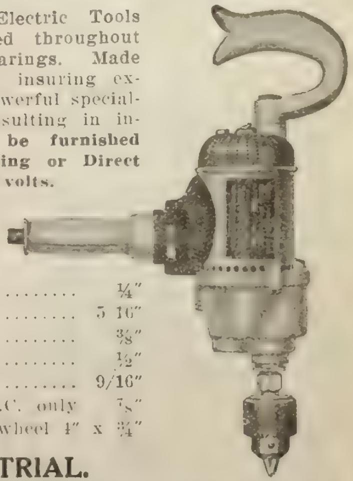

000	Drilling	Capacity	....	¼"
00	"	"	....	5/16"
0	"	"	....	⅜"
01	"	"	....	½"
1	"	"	....	9/16"
2	"	"	D.C. only	⅞"
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LAG SCREW GIMLET POINTERS

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LATHE CHUCKS (SEE CHUCKS)

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Foss & Hill Machy. Co., Montreal.
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Dominion Machinery Co., Toronto.
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Garvin Machine Co., New York.
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Himoff Machine Co., New York.
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Foss & Hill Machy. Co., Montreal.
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Garlock-Walker Machinery Co., Toronto, Ont.
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Gooley & Edlund, Cortland, N.Y.
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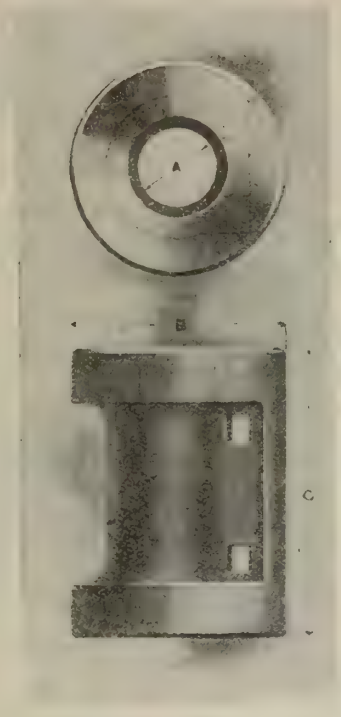

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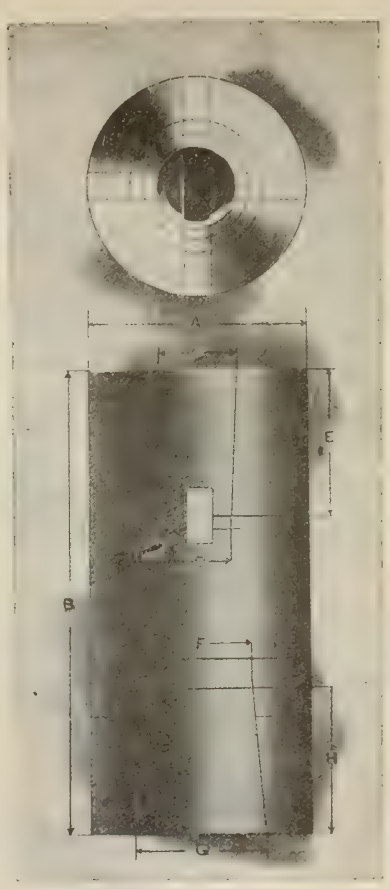

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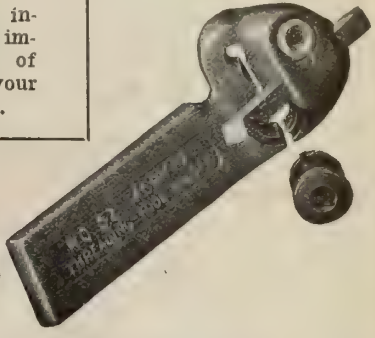

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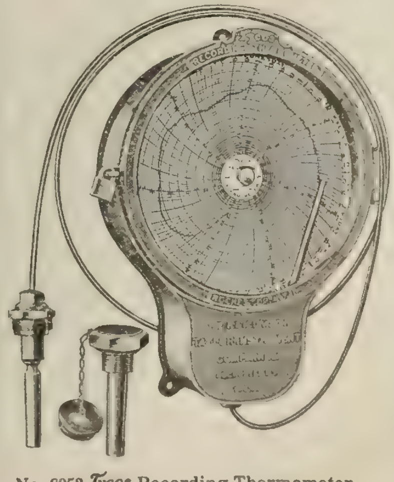

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CANADIAN MACHINERY

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Vol. XVI. TORONTO, DECEMBER 21, 1916 No. 25

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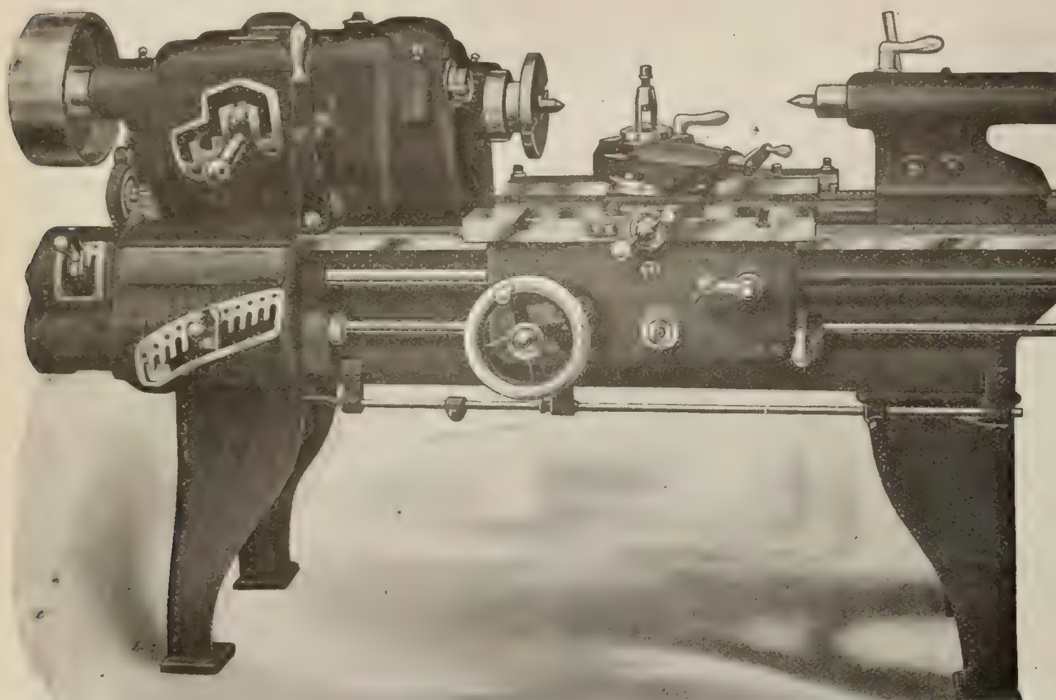

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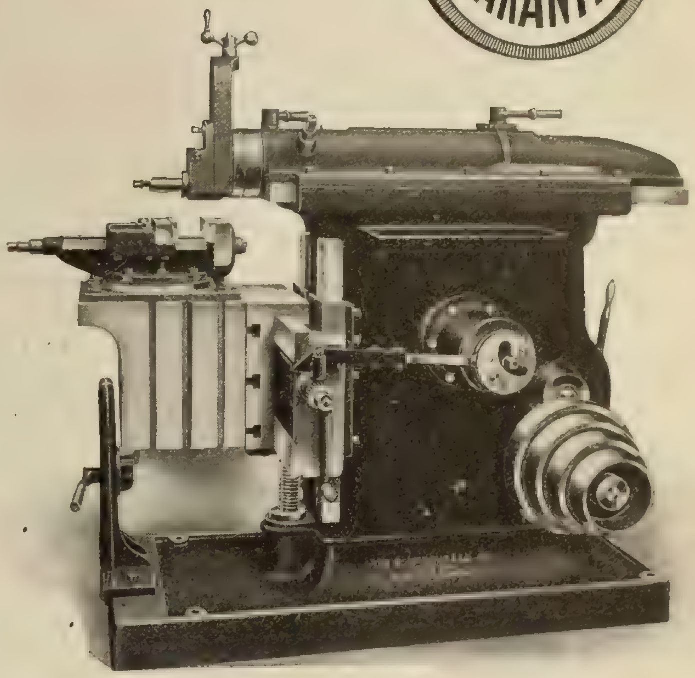

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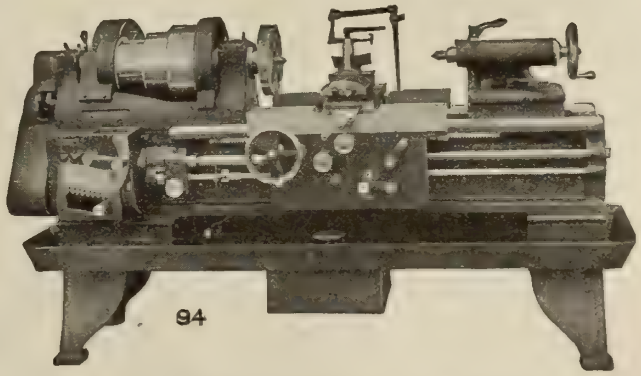

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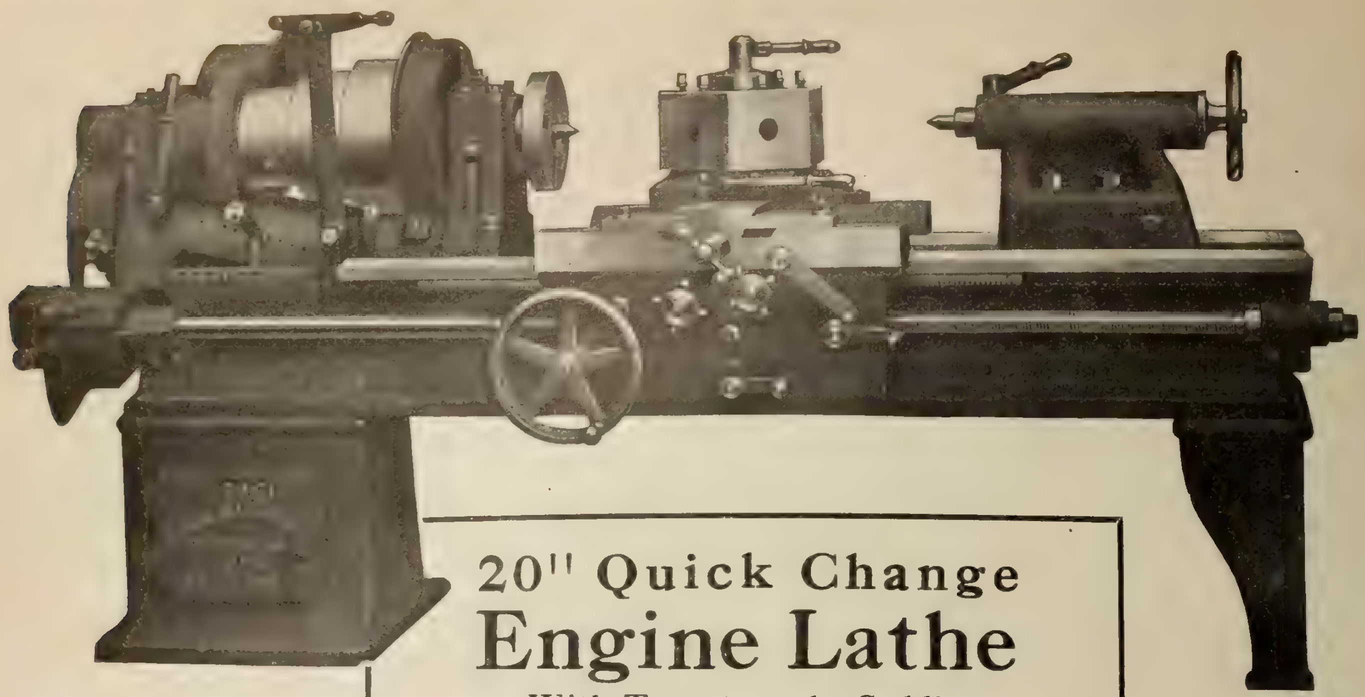

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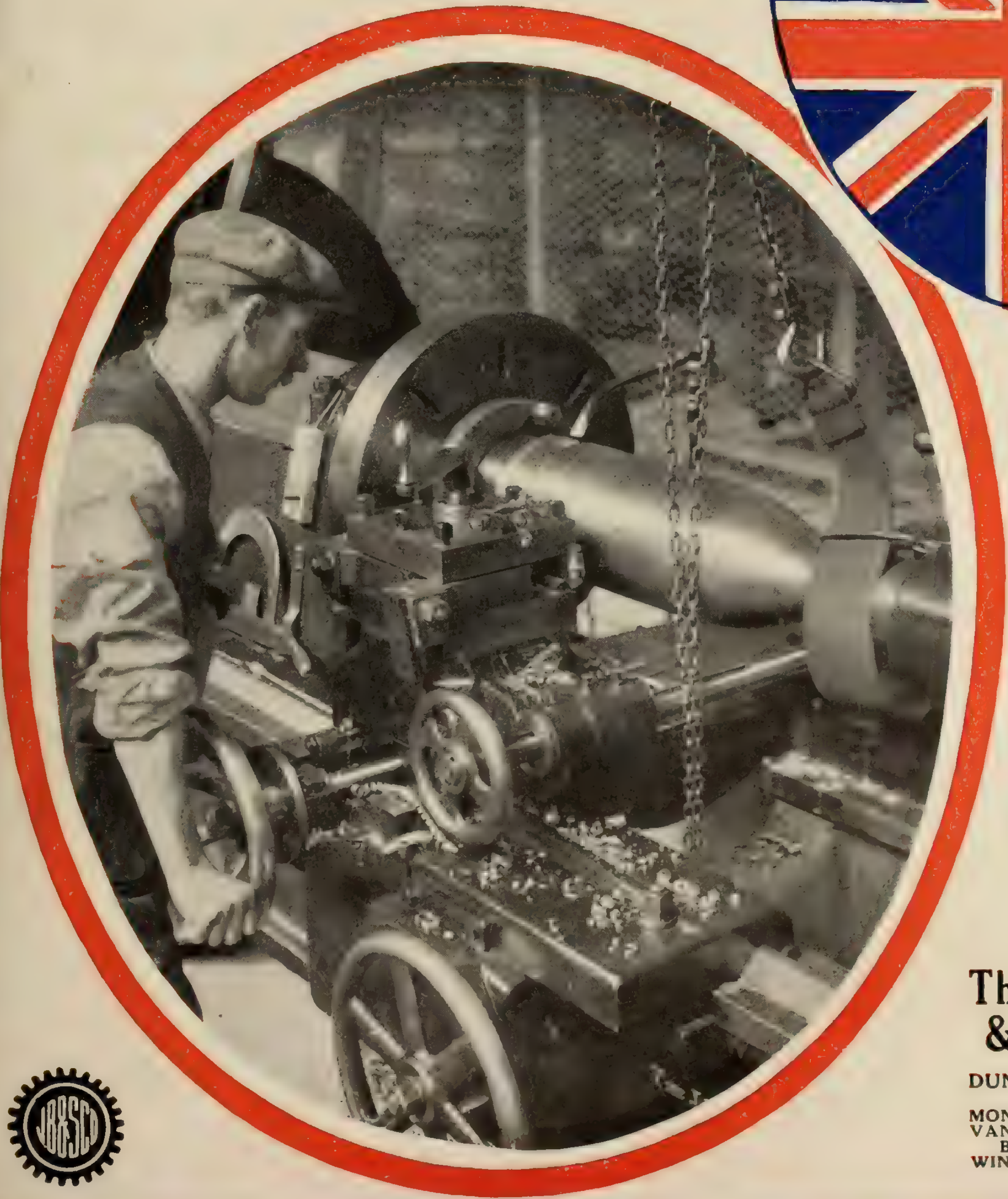

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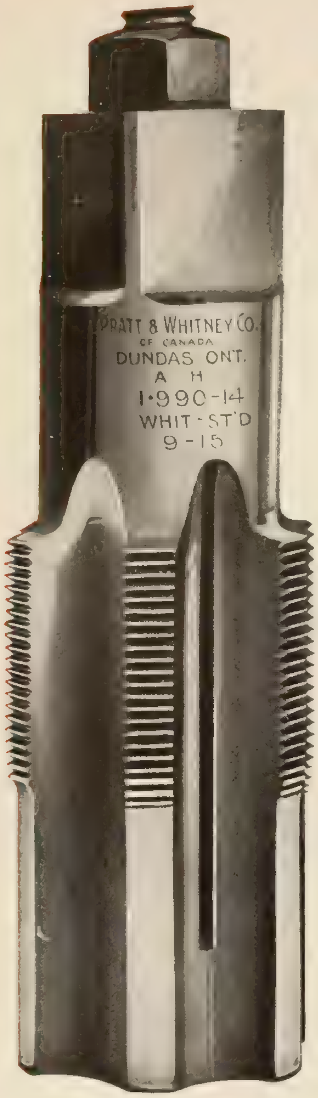
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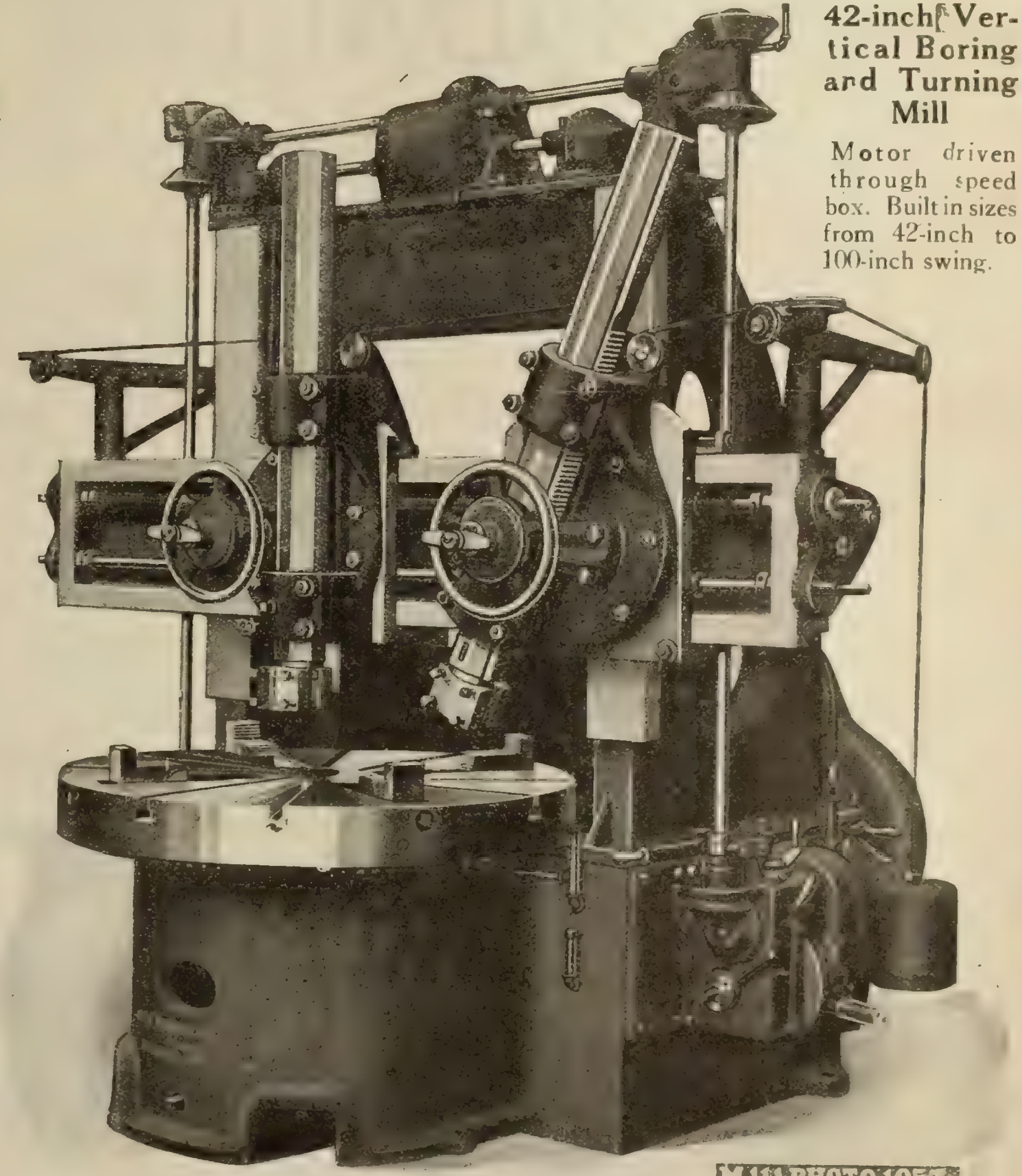

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609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

QUALITY

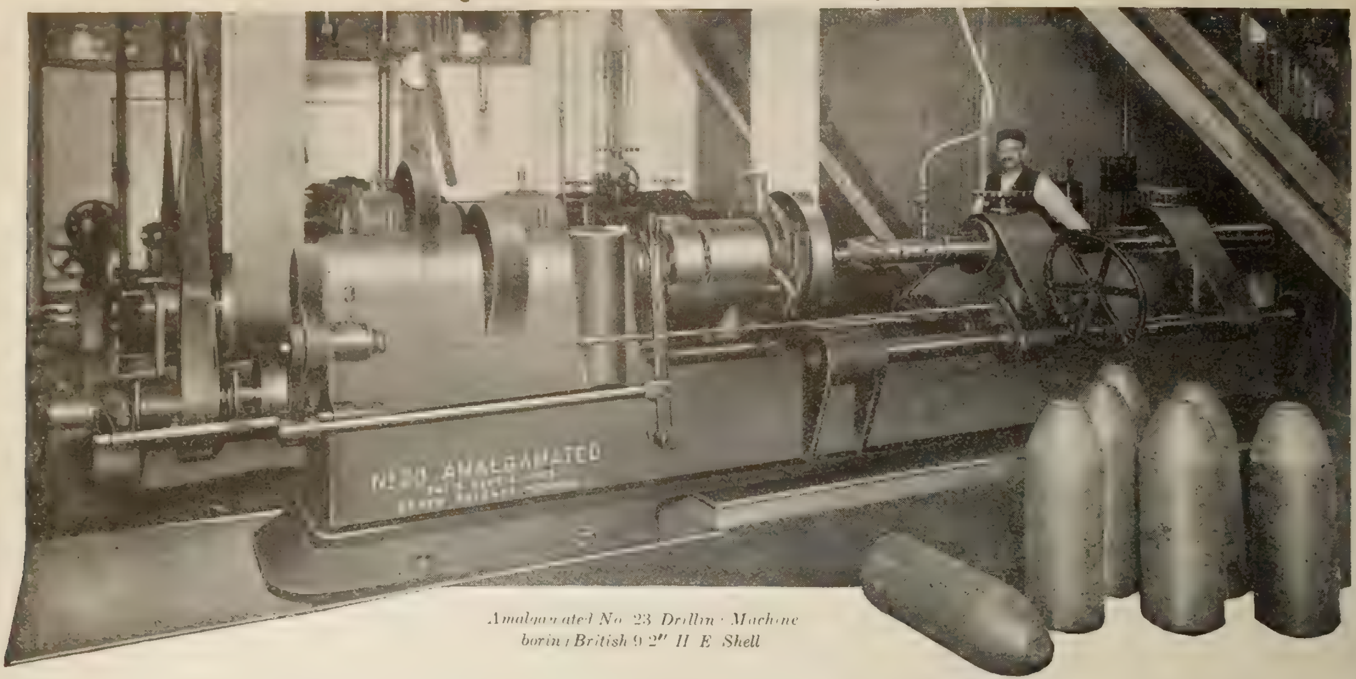
THE leader in every industry, to maintain his lead, must safeguard the quality of his products — Rigid inspection and careful supervision are important factors — To products of iron and steel, this principle applies with tremendous force — It means safety, security and stability — We safeguard the quality of our products, believing quality will be recognized long after the price is forgotten.

THE
STEEL COMPANY
OF
CANADA
LIMITED
HAMILTON MONTREAL

SERVICE

OUR customers must be served. One of the dominating features in any successful business is Service — We succeed only through the good will and good wish of the people we serve — This thought permeates our entire Organization, from the President down — Our employees feel the sense of responsibility this principle implies; and each one directs his efforts to maintain the high standard of service we aim to render.

THE
STEEL COMPANY
OF
CANADA
LIMITED
HAMILTON MONTREAL



Amalgamated No. 23 Drilling Machine boring British 9.2" H. E. Shell

For Fast, Constant Production of

8" and 9.2" Shells—

Amalgamated Machines

are built for quick disposal of the toughest propositions known to modern manufacture, turning and boring large shells, and on these principal operations are daily exceeding the performance of any other machines.

They are simple, powerful, rigid, single-purpose machines. Our form of construction insures absolute rigidity and perfect alignment.

We do more than sell the machines—we maintain a *service department* composed of shell experts, who supervise the installation and give instruction which eliminates the usual delays and enormous expense incidental to the starting of the shell plant.

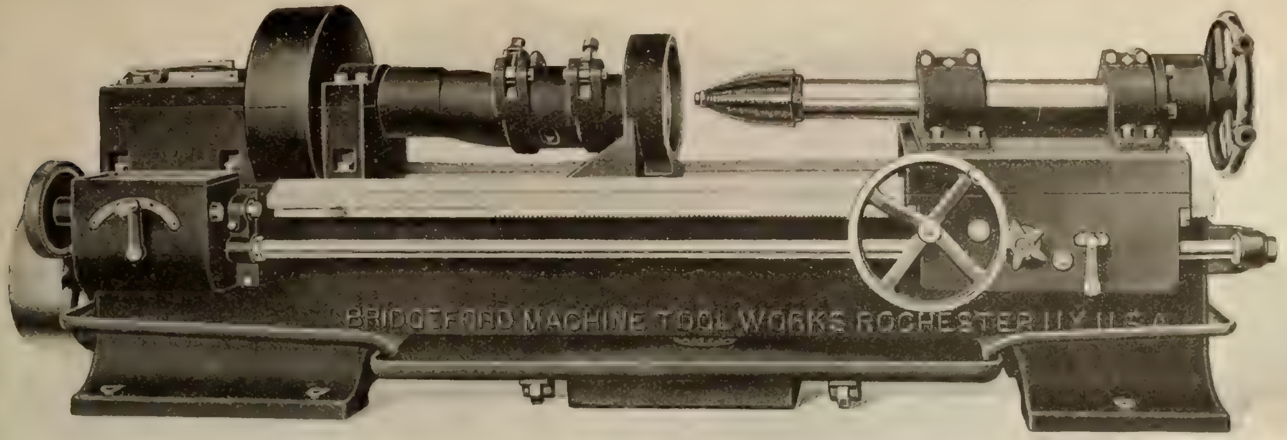
WE ALSO SUPPLY SPECIAL LARGER HEAVIER MACHINES FOR **12**-INCH AND LARGER SHELLS.

Extremely Prompt Shipments

Send for catalog and exact information about delivery and other major points, or telegraph, if you would like representative to see you at once.

Amalgamated Machinery Corporation

72 West Adams Street, Chicago, Ill.



Bridgeford

"For Increased Production"

Illustration below shows the "**Bridgeford**" 27" **heavy duty Lathe** arranged for rough-turning 8", 9.2" or 12" shells. Power is transmitted through 8" driving belt, with three instantaneous speed changes through hardened steel gearing. Main driving gear 6½" face. Four instantaneous feed changes—all through cut steel gearing, running in oil. Leading shell manufacturers have from 70 to 200 of these machines in operation—giving remarkably satisfactory results.

WE can make early deliveries. Write us.

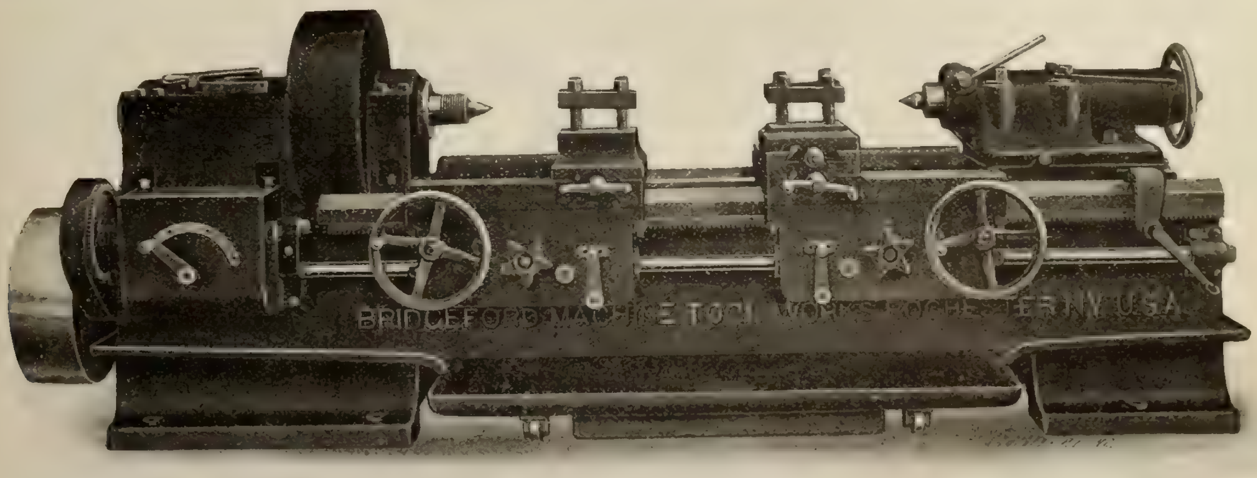
Boring Lathe for 8", 9.2" and Larger Shells

Marvellous for strength, accuracy and production.

A machine of the heavy, low-swing type, having specially designed carriage with auxiliary hand feed for internal profile.

Carries a 5½" steel bar with male taper, allowing for light design of cutter heads; three speed changes—automobile style. All speed gearing is steel, hardened, running in oil bath.

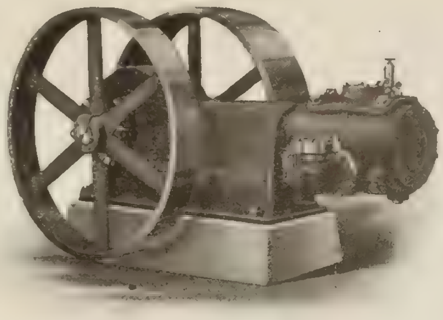
Regular equipment includes water attachment, pump, pan and piping, pot chuck, boring bar and steady rest — everything except cutter heads.



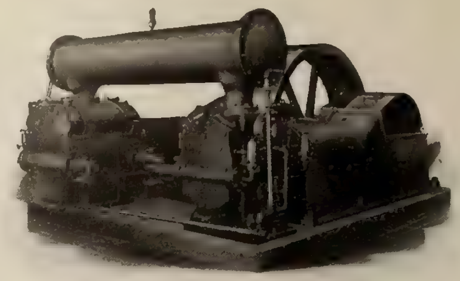
BRIDGEFORD MACHINE TOOL WORKS

HEAVY LATHE SPECIALISTS FOR 20 YEARS

237 MILL STREET ROCHESTER, N. Y.

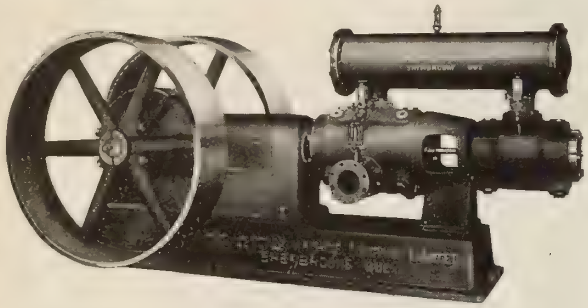


Jenckes Class CB-1 Air Compressor
Single Stage



Jenckes Class DB-2 Air Compressor

Inlet valves are of the Corliss type, the outlet valves of the disc type. Lubrication is of the flood type, that is a continuous flood of oil is flowing over the bearings, crank pins, etc., all the time when the machine is in operation. Machine enclosed. Write for full particulars.



Jenckes Class CB-2 Air Compressor
Two Stage

Our O.B. 1 and O.B. 2 compressors are equipped with disc inlet and outlet valves, which gives them long life and high efficiency, and makes them noiseless running. The machines are entirely enclosed. Lubricating system is of the splash gravity type, and the bearings are extra large.

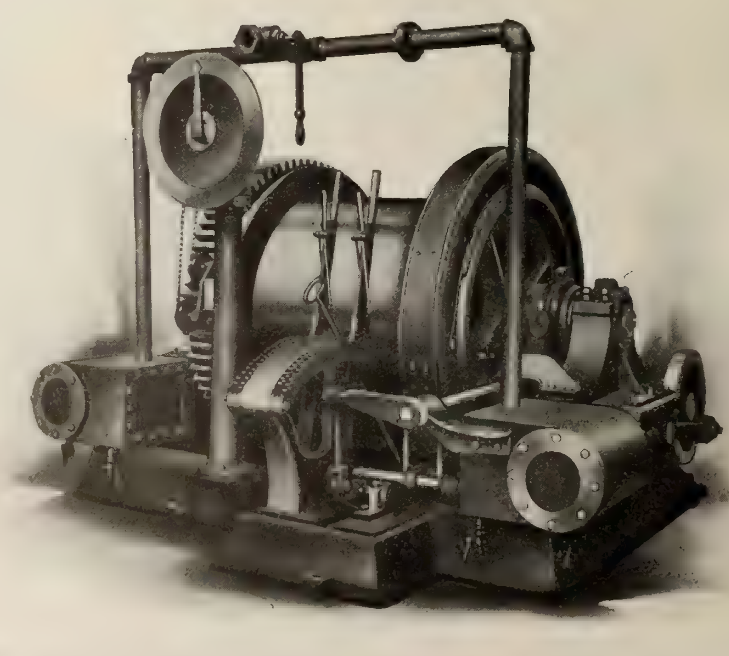
Jenckes Air Compressors

Represent a big step in advance in compressor construction. Big returns on the investment are certain.

Write for full descriptive matter.

Jenckes Mining Hoists

Built in all sizes, from 6" x 8" cylinders to 26" x 48' size with Corliss valves; also corresponding sizes in electric driven hoists.



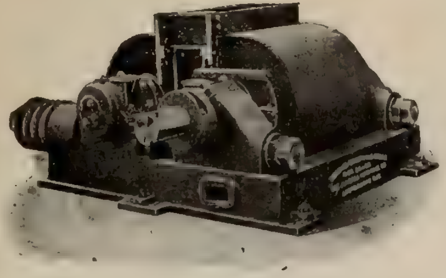
Other Lines

Boilers, Engines, Pulp Mill Machinery, Stamp Mills, Ore Cars and Special Machinery.

Write for Complete Description and Deliveries

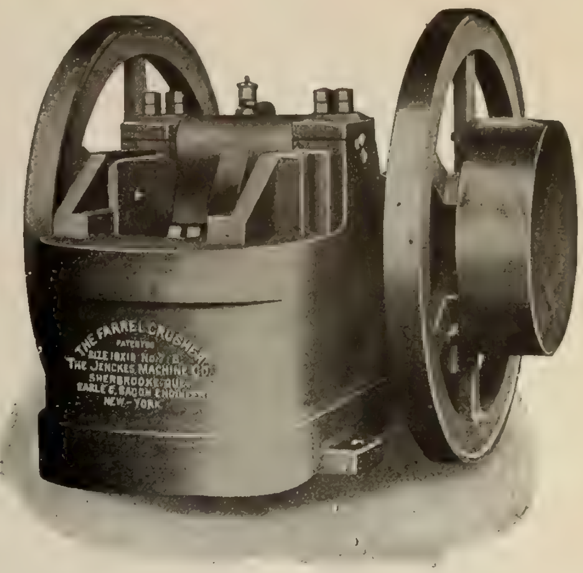
The
JENCKES MACHINE COMPANY, Limited
Works: SHERBROOKE, QUE.,
ST. CATHARINES, ONT.

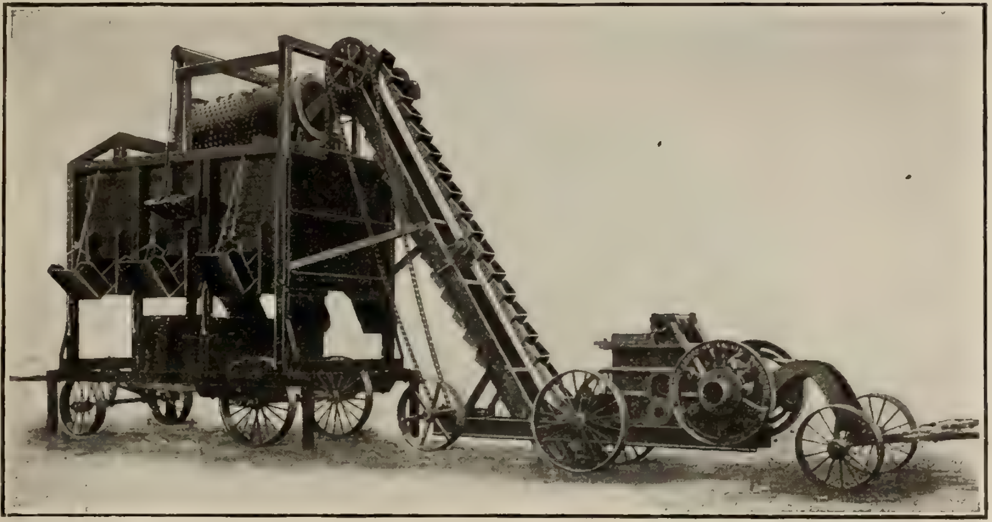
Sales Offices: **621-4 Traders Bank Bldg., Toronto; 908 E.T. Bank Bldg.. Montreal; West Chester Ave., St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver; Nelson, B.C.**



Jenckes Crushing Rolls

Very rugged and substantial. Full range of sizes.



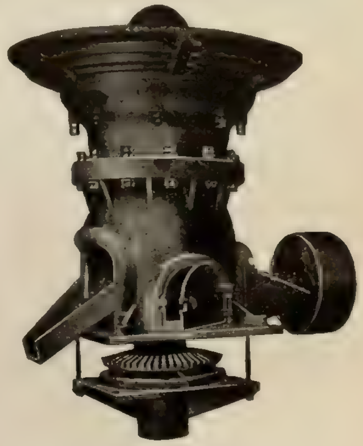


Jenckes Jaw Crushers

Are built in a full range of sizes from our standard patterns, as above.

Jenckes Gyratory Crushers

For coarse or fine crushing. Built in all usual sizes.



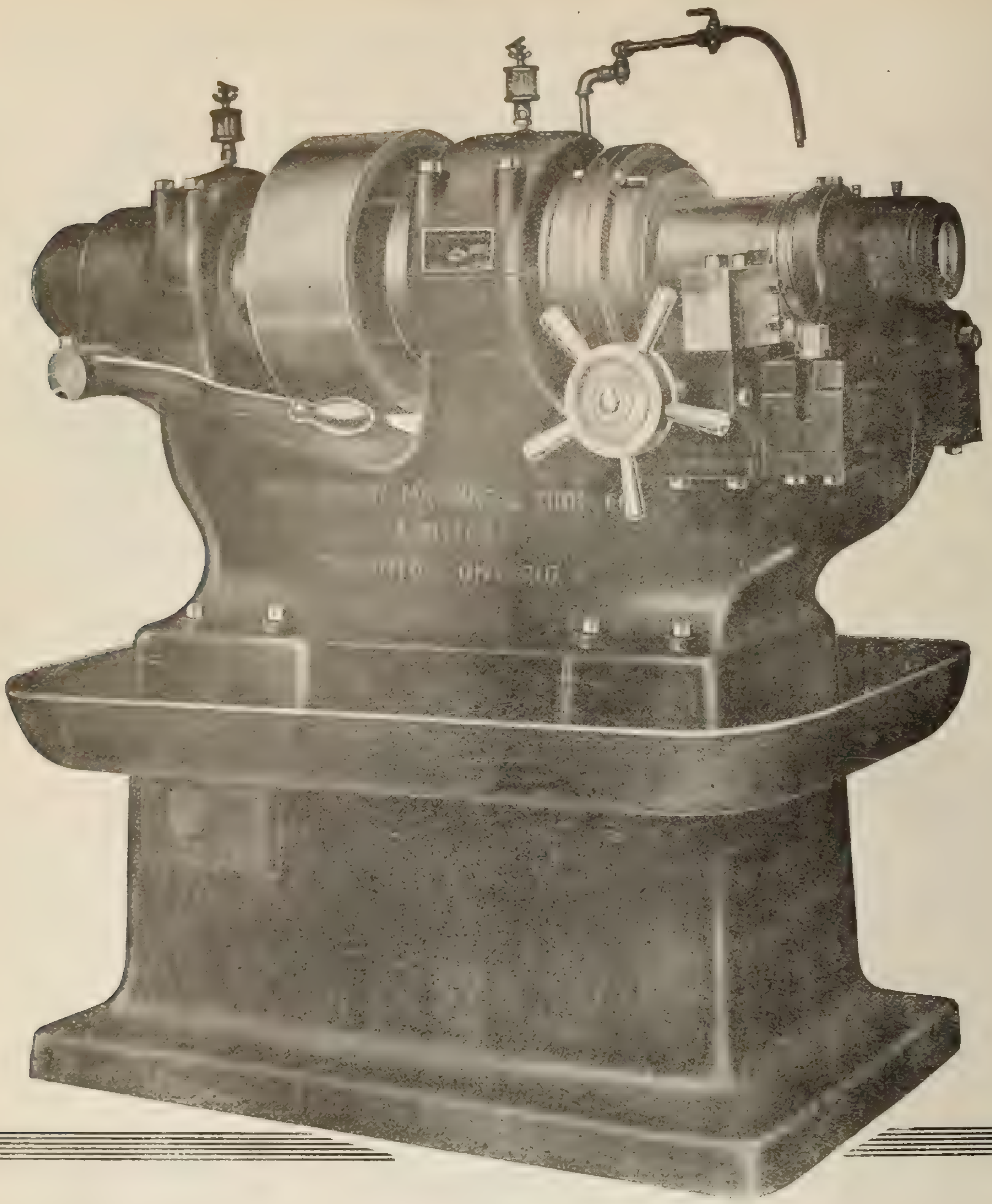
Jenckes Portable Rock Crushing Plant

Designed for crushing all kinds of rock for concrete, macadam work and road-making. The construction is very simple and effective, practically all parts are steel, including the wheels.

Write for full details.

For driving crushing plant, as illustrated above, we furnish a **compact and portable steam plant.** It consists of a 20 h.p. locomotive type boiler with front fittings, stack, etc., mounted on wheels and provided with pole and evener.

The JENCKES MACHINE CO., Limited
Works: SHERBROOKE, QUE.; ST. CATHARINES, ONT., CANADA
CANADIAN SALES OFFICES:
727 Traders Bank Bldg., Toronto; 908 E. T. Bank Bldg., Montreal; West Chester Ave., St. Catharines; Cobalt, Ont.; Exchange Bldg., Vancouver; Nelson, B.C.



6-inch Band Turning Machine

Band Turning Machines

for

15, 18, 60-Pdr. and 4.5 and 6-inch Shells

INTEGRAL (en bloc) construction assures perfect **rigidity,** permanent **accuracy** and desirable compactness.

Chucking with spring collet chuck insures accurate and speedy chucking.

Graduated feed dial, two cutting tools and ample belt power insure output of accurate work in least possible time.

Used by many Canadian Munition plants and giving a remarkable service.

Write for Prices and Deliveries.

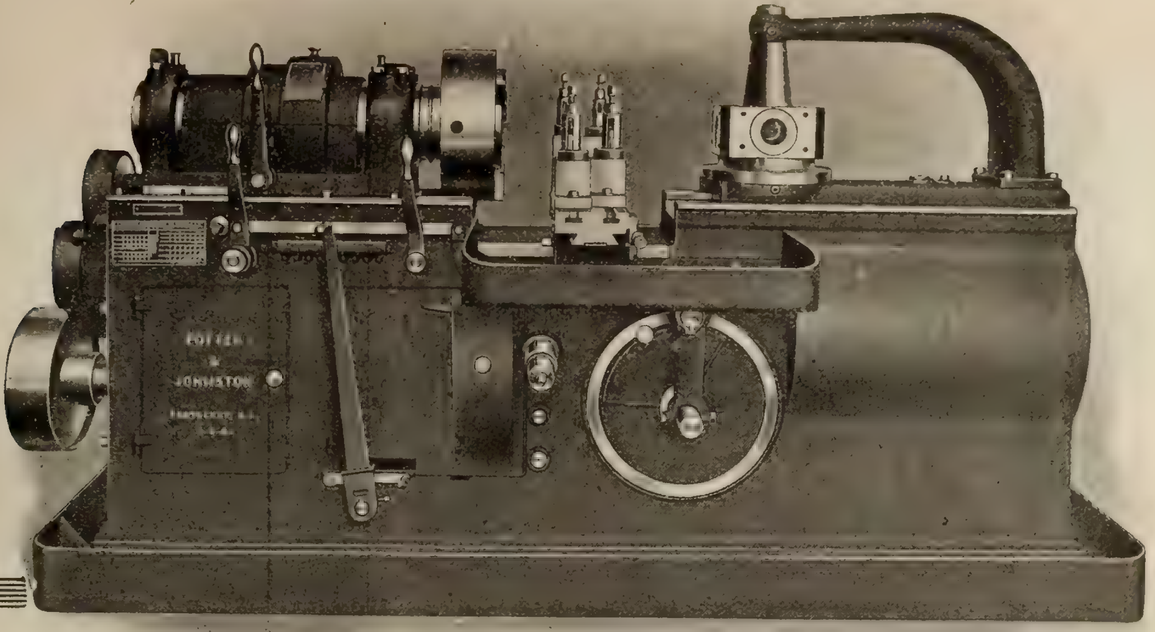
ANNOUNCEMENT

We have now completed our new plant at Galt and are in a position to solicit your orders for special tools, jigs and appliances. The Tool Department equipment is the latest and most modern, all heat treating and hardening done by electric Furnaces.

May we quote you on your requirements.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Offices: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONTARIO, CANADA



6-A Potter & Johnston Automatic Chucking and Turning Machine

6-A Potter & Johnston Automatic Chucking and Turning Machine

- Geared head, having three automatic changes of spindle speeds.
- Geared feed.
- Auxiliary reaming and threading feed.
- Cross slide.
- Automatic back facer bar through spindle.
- 16-inch convertible two and three-jaw scroll chuck.
- Spindle 5¾ inches diameter, hole 3½ inches diameter.

Increased output means reduced cost, *both* are readily obtained on

Potter & Johnston
Manufacturing Automatics

DO IT AUTOMATICALLY

All operations are entirely automatic. One attendant can readily run a battery of two to six machines.

In addition to automatically machining all varieties of castings from iron, bronze or steel, also forgings, the machines are also recommended and are widely used for finishing pieces from bar starch which have previously been cut off to length. This is a highly economical method of producing gear blanks, bushings, studs, etc.

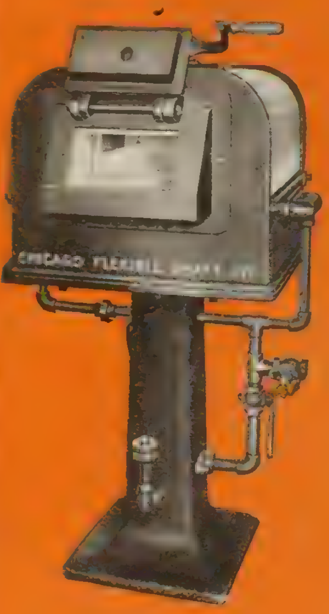
Catalog gives full particulars. Drop a card for it.

Canadian Offices: **POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.**

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, TORONTO, CANADA
Works: GALT, ONT., CANADA

STEWART FURNACES


STEWART NO. 1 OVEN

Stewart No. 1 Oven
Stewart No. 28 Oven

Particularly suited for die and tool hardening, cutters, springs, reamers, knife or shear blades, etc. Have U-shaped bottom slabs, with 1½-inch upward projections, which keep the flame off the work and does away with the expense of replacing muffles and gives a much quicker and livelier heat on less fuel consumption. When so ordered can be arranged for high speed steel.

Specifications

No. 1—Entrance, 5 in. high, 9 in. wide by 13½ in. deep.
Floor space, 28 in.
Gas and air connections, 1¼ in.
Gas consumption, about 90 cubic feet per hour.
Thickness of linings, 4 in.
Net weight, 950 lbs.
Shipping weight, 1.000 lbs.
Price, with blower, $121.55.
Price, without blower, $91.30.

No. 28—Opening, 4 in. high, 8 in. wide, 12 in. deep.
Floor space, 24 in. x 24 in.
Gas and air connections, 1 in.
Gas consumption, about 75 cubic feet per hour.
Net weight, 725 lbs.
Shipping weight, 800 lbs.
Thickness of linings, 3 in.
Price, with blower, $88.55.
Price, without blower, $58.30.

Nº 28 OVEN
CHICAGO FLEXIBLE SHAFT CO.
STEWART NO. 28 OVEN

Stewart No. 10 Cyanide Furnace

Equipment using cyanide of potassium is used extensively by bank note engravers, makers of engraved plates and transfer rolls, cutters, dies, springs, chains, and numerous other steel parts requiring hard surfaces without great depth of case. A furnace of this sort may be used for heating other chemical solutions whose fumes are poisonous and injurious to the workmen, as the hood is connected with an outside flue.

Specifications

Capacity, 10 in. deep, 8¼ in. diameter (inside measurement).
Weight, crated for shipment, 600 lbs.
Gas consumption, about 175 cubic ft. per hour.
Gas and air supply, 1 in.
Price, with blower, $139.70.
Price, without blower, $91.30.

STEWART NO. 10 CYANIDE FURNACE

Stewart No. 3 Forge

Specifications

Size of front opening, 3½ in. x 8 in.
Size of rear opening, 3¾ in. diameter.
(Rear opening same as front, if specified.)
Depth of heating space, 10 in.
Gas consumption, about 80 cubic ft. per hour.
Gas and air supply pipe, 1 in.
Net weight, 385 lbs.
Shipping weight, 490 lbs.

Price, with blower, 79.75
Price, without blower, 49.50

FLEXIBLE SHAFT CO.
ROD END FORGE
ROD END FORGE

Rod End Forge

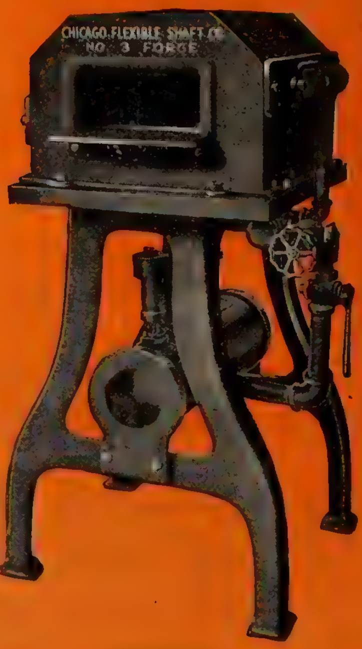
For light forging and tool dressing—file makers—knife or razor blades—rod or pipe end heating, etc.

Specifications

Size of opening, 2 in. high, 10 in. wide, giving a spot heat of 8 in.
Gas consumption, about 70 cubic ft. per hour.
Net weight, 400 lbs. Shipping weight, 450 lbs.
Gas and air connections, 1 in.

Price, with blower, $79.75.
Price, without blower, $49.50.

For gas burners only



NO. 3 FORGE

Chicago Flexible Shaft Co.

Chicago, Ill.

STEWART FURNACES

Stewart Drop Hammer Forges

For natural or manufactured gas or oil. Will heat rods up to 5 inches in diameter. Especially adapted for drop hammer work. Equipped with brackets for adjustable rack, so that long pieces may be handled without the inconvenience of dragging rests or stands to the furnace.

Specifications

No	Size of Opening Height	Width	Depth	With Blower	Without Blower
30	1 in. to 5 in.	15 in.	15 in.	$158.40	$110.00
31	1 in. to 5 in.	15 in.	18 in.	169.40	121.00
32	1 in. to 5 in.	15 in.	21 in.	180.40	132.00
33	1 in. to 5 in.	15 in.	24 in.	223.85	145.20
34	1 in. to 5 in.	18 in.	15 in.	174.90	126.50
35	1 in. to 5 in.	18 in.	18 in.	191.40	143.00
36	1 in. to 5 in.	18 in.	21 in.	232.65	154.00
37	1 in. to 5 in.	18 in.	24 in.	243.65	165.00

CHICAGO FLEXIBLE SHAFT CO.

STEWART DROP HAMMER FORGE

CHICAGO FLEXIBLE SHAFT CO.
SPECIAL FORGE

SPECIAL FORGE

Special Forges

Opening both ends

Specifications

	Height	Width	Depth	Price with blower	Price without blower
Opening,	2 in.	12 in.	20 in.	$158.40	$110.00
Opening,	2 in.	12 in.	46 in.	243.65	165.00
Opening,	2 in.	12 in.	56 in.	260.15	181.50
Opening,	6 in.	20 in.	66 in.	353.65	275.00
Opening,	6 in.	18 in.	72 in.	441.65	363.00
Opening,	6 in.	22 in.	72 in.	474.65	396.00

Burners arranged in two sections so heat is delivered for half lengths, if desired. Heats for bending, forming, etc.

Special Case Hardening and Annealing Furnace—Built-in

Furnaces of such proportions are too heavy to ship assembled. By being erected on the job the walls may be built heavier, cutting down loss of heat by radation.

Specifications

Size of opening and heating space, 12 in. x 24 in.; 60 in. deep.
Height from floor, 30 in.
Floor space, 54 x 82 in.
Thickness of walls, 9 in.
Size of gas connection, 1½ in.
Size of air connection, 1½ in.
Gas consumption, about 600 cubic ft. per hour.

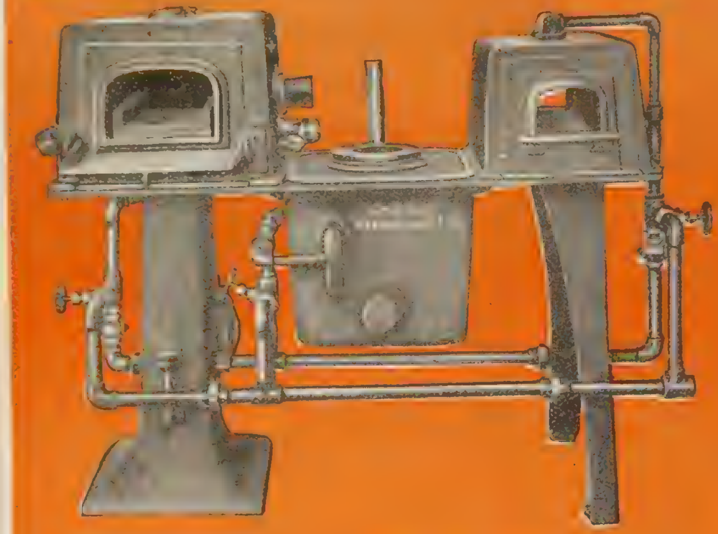
Price on this and other sizes on application.

STEWART SPECIAL CASE HARDENING FURNACE

Chicago Flexible Shaft Company

Chicago, Ill.

STEWART FURNACES



STEWART SPECIAL COMBINATION FURNACE

Stewart Special Combination Furnace

(Not intended for High Speed Steel)

Consists of an oven furnace, crucible and forge, all combined on one base, for economy and convenience. The forge is provided with an opening at the rear, permitting the heating of long bars, and the oven section may be transformed into a muffle furnace by removing the slab and inserting the muffle.

Specifications

Opening of muffle section, 4 in. high in center, 7⅝ in. wide, 13¼ in. deep.
Forge section, 4 in. high x 5¼ in. wide x 10¼ in. deep.
Crucible, pressed steel, diameter at top, 6 in., depth, 12 in.
Size of gas supply pipe, 1¼ in.
Size of air supply pipe, 1¼ in.
Speed of blower, 900 R. P. M.
Net weight, 1,500 lbs.
Shipping weight, 1,875 lbs.
Floor space, 4 x 3½ ft.
Measurement of shipping case, 5 ft. 4 in. x 4 ft. 3 in. x 2 ft. 8 in.
Approximate gas consumption per hour—Muffle section, 90 cu. ft.; Crucible section, 70 cu. ft.; Forge section, 60 cu. ft.

Price, complete, with blower,	$167.75
Price, complete, without blower,	137.50

Stewart Triple Purpose Furnace

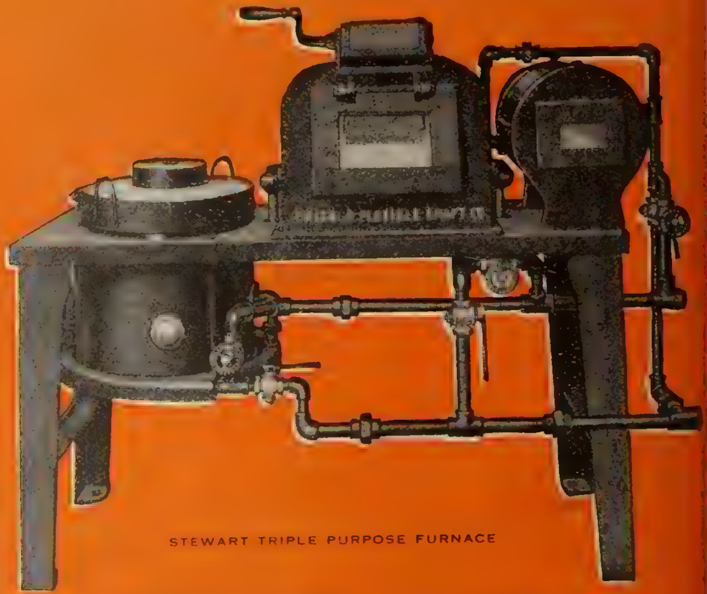
(For Natural or Manufactured Gas)

Any section is capable of High Speed Steel heats. In the right-hand unit a direct heat is delivered, and the heat may be made so intense that a steel rod ⅝-inch diameter may be melted in ten minutes—from a cold start. The opening is 2 inches x 4 inches, and gives a spot heat 8 inches long. May also be used for tool dressing, bending, forging, etc.

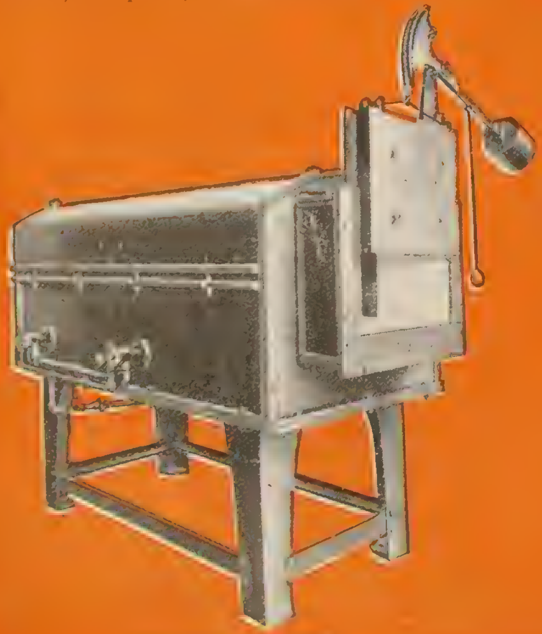
The center section is an oven with an opening 4 inches x 8 inches, and 12 inches deep. The linings are of molded fire-clay and silica, 3 inches thick, a special mixture determined in our laboratories for heat-retaining properties. Fitted with a "U"-shaped bottom slab—giving all the advantages of an open oven, and none of the disadvantages of a muffle. 2,250 degrees Fahrenheit may be reached in 25 minutes and held indefinitely.

The section at the left is our regular No. 12 Barium Chloride Furnace, fitted with a standard graphite crucible, of the same number, for handling high speed steel by the Barium Chloride process.

Price, complete, with No. 3 blower,	$167.75
Price, complete, without blower,	137.50



STEWART TRIPLE PURPOSE FURNACE



STEWART NO. 25 OVEN

Stewart No. 25 Oven

(For Case Hardening, Annealing, etc.)

Specifications

Size of opening, 14 in. x 22 in.
Depth, 60 in.
Gas consumption, about 500 cubic ft. per hour.
Size of gas connection, 1½ in.
Size of air connection, 1½ in.
Net weight, 6,700 lbs.
Shipping weight, 7,000 lbs.

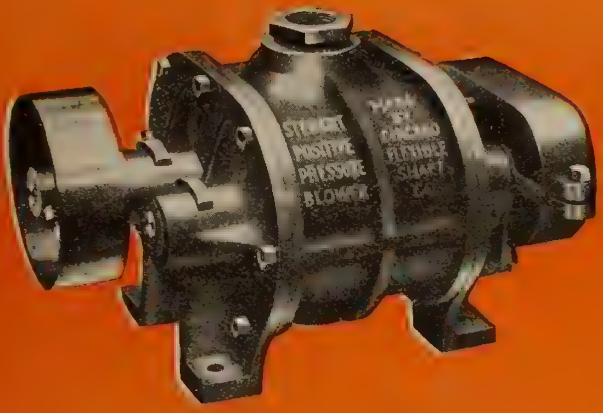
Price with blower, $603.35. Price, without blower, $440.00.

Prices on 27 other stock sizes on application.

Chicago Flexible Shaft Company
Chicago, Ill.

STEWART FURNACES

Stewart Improved Positive Pressure Blowers



Specifications

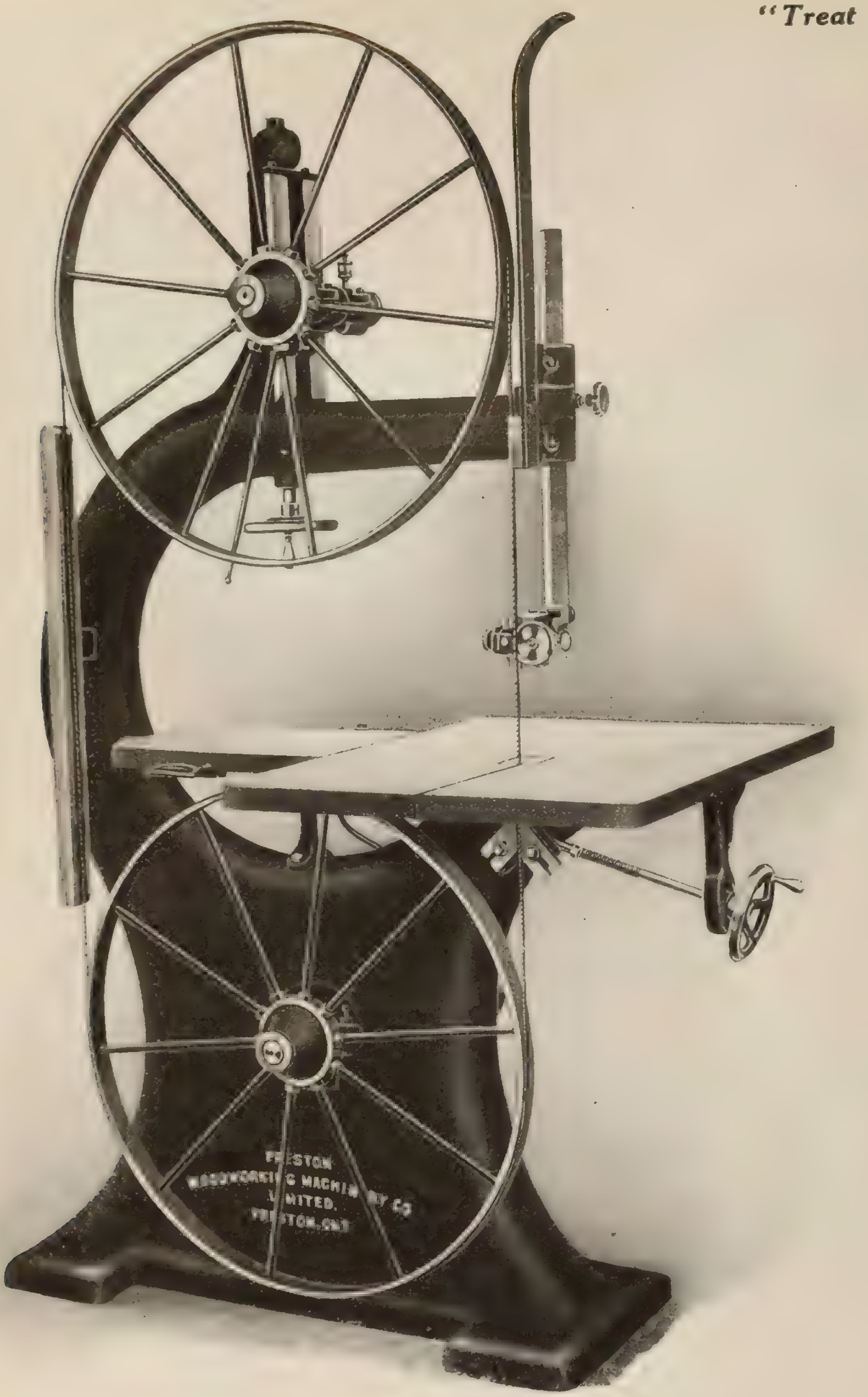
No.	SPEED	Displacement Cubic Inches	Weight Pounds	Price	Extra for Loose Pulley	Horse Power	Size of Pulley
3	500 to 1200	180	95	$30.25	$1.38	¾	6 x 2 in.
4	400 to 800	290	140	48.40	1.93	1¼	7 x 2½ in.
5	300 to 600	575	205	78.65	3.85	2	10 x 2½ in.
6	200 to 400	1152	500	163.35	6.05	2½	16 x 3 in.

30-Day Trial Offer

Tell us what you have to do, and we will recommend a furnace and send it on 30 days' trial. It must prove to you in your own plant, on your own work, that it is all you expect, or it is returnable to us, freight charges collect, for full credit. There are no strings to this offer.

Chicago Flexible Shaft Company

Chicago, Ill.



Preston 36" Band Saw

With All-Steel Wheels

If you need a Band Saw—take a look at this machine. You will be particularly attracted by:

1. The construction of the wheels.
2. Size and style of bearings.
3. Convenient adjustment.
4. Universal alignment of wheels.
5. Steadiness in running.

We also guarantee that *breakage of saws* will be reduced to a minimum by reason of our almost perfect tension device and style of guide. *Solid rubber bands, ¼" thick used on wheels.*

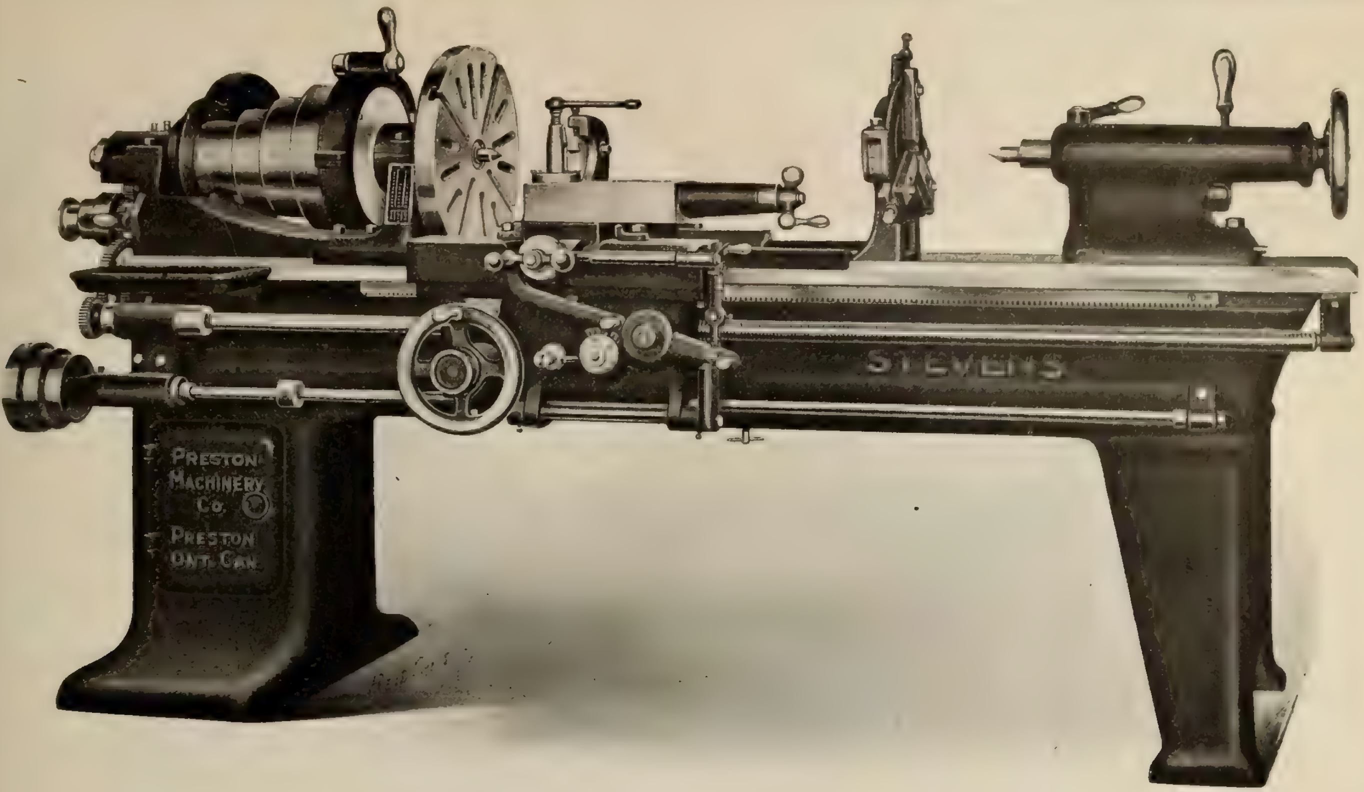
We manufacture a standard line of Woodworking Machinery for use in pattern shops, planing mills, sash and door factories, furniture and piano factories, etc. When the day comes that you will be needing QUICK DELIVERIES on anything in our line, we hope to have the pleasure of serving you.

The Preston Woodworking Machinery Company

Limited

Preston **Ontario** **Canada**

"Treat Your Machine as a Living Friend."



Stevens 18" Engine Lathe

Made in 6 ft., 8 ft., 10 ft. and 12 ft. sizes

Powerful and Accurate **Simple yet Efficient.**

A General Purpose Machine that will meet all your requirements and give 100 per cent. results.

We have built over 100 of these lathes, all under British Government Inspection, for the Ministry of Munitions, London, England.

All of these are now in satisfactory operation in British Arsenals.

We have satisfied them and can satisfy you.

Specifications :

Beds furnished 6, 8, 10 and 12 feet.		Spindle Speeds	16.
Capacity between centres	2, 4, 6 and 8 feet.	Countershaft pulleys	12 x 4¼ inches.
Swing over Vs	18½ inches.	Speed of countershaft	125 and 200 r.p.m.
Swing over Carriage	12¾ inches.	Diameter lead screw	1 5-16 inches.
Front bearing	3 x 4¼ inches.	Nose of Spindle	3 in. diam. x 2 in. face.
Back bearing	2 9-16 x 4¼ inches.	No. threads on nose of spindle	4 per inch.
Diameter hole in spindle	1½ inches.	Threads will cut per inch	1 to 40.
Spindle centres, Morse taper	No. 4.	Range of feed per inch	3 to 100.
Threads on lead screw	4.	Changes of feed	6.
Cone pulley 4 step	3¼ inch face.	Length of head stock at base	26 inches.
Cone pulley diameters	12, 10, 8 and 6 inches.	Length of tail stock	12½ inches.
Tail stock spindle, diameter	2 3-16 inches.	Horse power required	5.
Tail stock spindle travel	9 inches.		

N. B.—All spindle tests made to .001.
All cylindrical surfaces ground and flat surfaces scraped to a bearing.

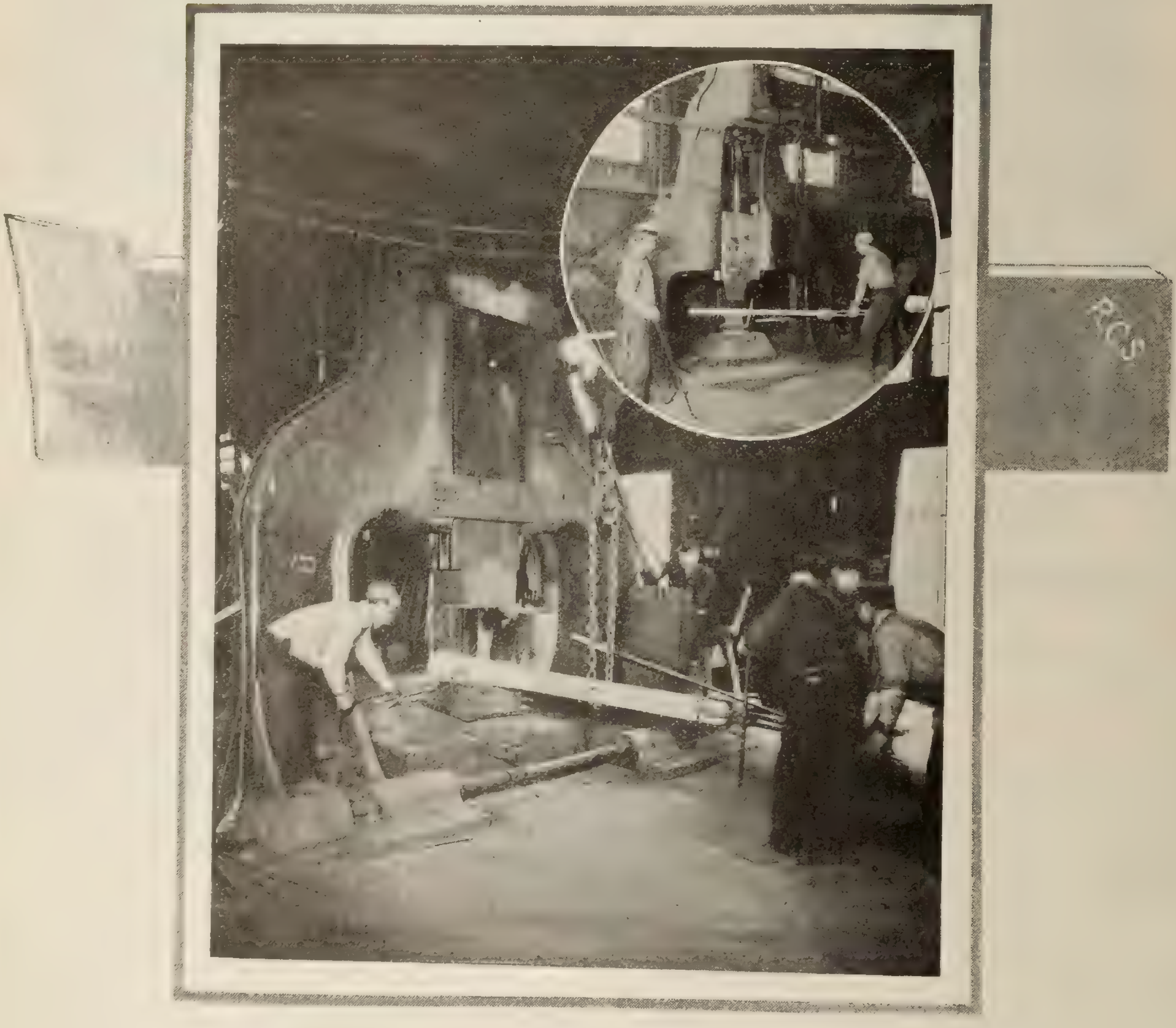
Code—6'—Diagram. 8'—Dial. 10'—Diameter. 12'—Diary.

The Preston Machinery Co., Limited

Preston Ontario Canada

Red Cut Superior

A FIRST QUALITY
HIGH SPEED STEEL



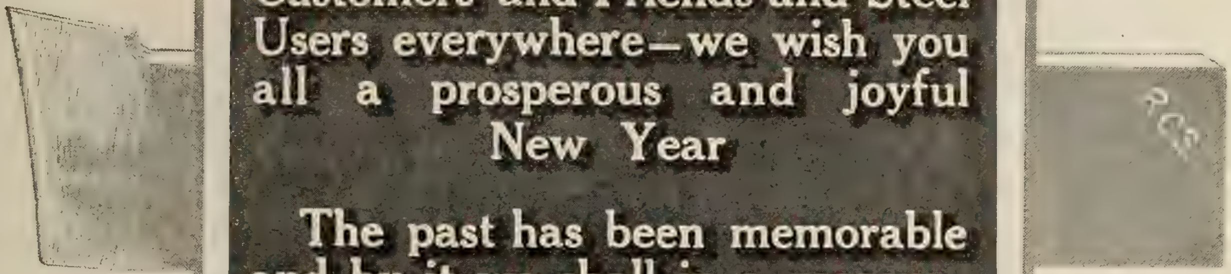
One of the Four-Ton Hammers Cogging
Red Cut Superior High Speed Steel.
Insert: One of the Two-Ton Hammers.

VANADIUM-ALLOYS STEEL CO.
PITTSBURGH PA.
WORKS AT LATROBE PA.

VASCO

Red Cut Superior

THE BEST
FOR ALL MACHINE WORK



ON the threshold of Nineteen Seventeen we greet our Customers and Friends and Steel Users everywhere—we wish you all a prosperous and joyful New Year

The past has been memorable and by it we shall in a measure be judged: the future is a secret unfolding day by day. One thing is certain—your interests and ours are correlated, therefore, we shall strive constantly to merit a continuance of your confidence, forging better and better your ideals to ours as master workmen should

Has it ever occurred to you that the first cost of the very best High Speed Steel is infinitesimal compared with the value of the finished tool in constant daily service.

VANADIUM-ALLOYS STEEL CO.
PITTSBURGH PA.
WORKS AT LATROBE PA.

INTRA STEEL

LOW TUNGSTEN, HIGH CARBON,

combining Hardness and Toughness. As UNSHRINKABLE as steel can be made.

ESPECIALLY ADAPTED FOR

Cartridge Case Plunger and Ring Dies, Thread and General Gauges, Taps, Dies, Punches, Etc.

NOVO SUPERIOR and NOVO HIGH SPEED STEEL

All Manufactured by

SIR JOSEPH JONAS, COLVER & CO., LIMITED, SHEFFIELD, ENGLAND

Sole Agents for Canada:

H. BOKER & CO., Inc.
(Formerly Hermann Boker & Co.)
332 St. James Street, Montreal, P.Q.

Established 1837 Incorporated 1914

Special Vanadium Steel Piercing Die Forgings

For Hot or Cold Work

Made from High-Grade Special Vanadium Tool Steel and hammer-forged in any size.

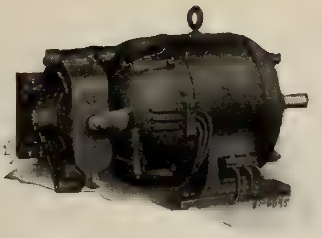
These forgings cut down your machining costs 100% and give you a tougher, more durable Die than you have ever had. Punches made to match the dies. Send us your Blue Prints.

Hammond Steel & Forging Co., Inc.
SYRACUSE, N.Y., U.S.A.

Fine Tool Steels, Specialists in Manufacture of High Grade Hammered Forgings, Hammered Alloy Steels, Weldless Rings—Special Shapes, Die Blocks

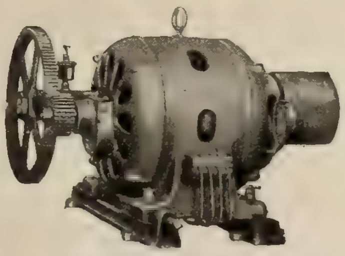
Name the Service and we will Supply the Motor

Wagner, Quality

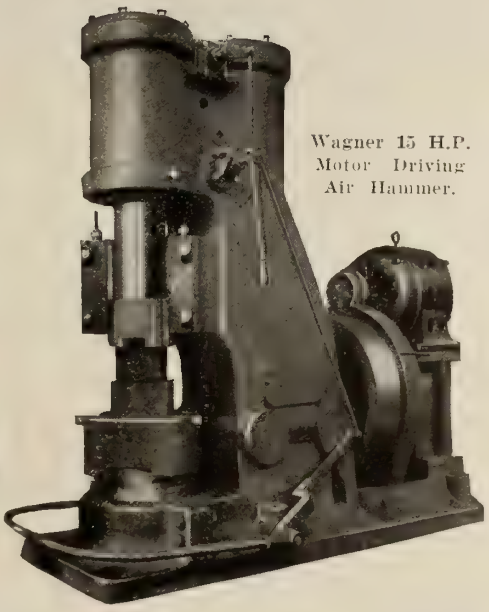


Wagner Crane Motor with Electric Brake.

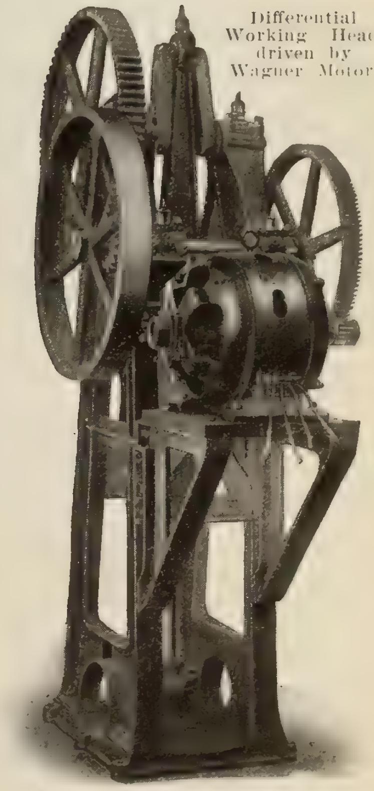
Wagner Polyphase Motor. Popular named "The Public Servant."



Wagner Single-phase Motor with Back Gear.



Wagner 15 H.P. Motor Driving Air Hammer.



Differential Working Head, driven by Wagner Motor.

If you use alternating current, there is a Wagner, Quality Motor not only applicable to, but built for every possible service.

We have power experts. Let us advise the type of motor most efficient for your uses. Efficient not only from the standpoint of current consumption, but efficient in service and in the absence of repairs.

We have issued two new Motor bulletins No. 110 and 111. They contain information of value to every motor user. Ask for them.

Northern Electric Company

LIMITED

MONTREAL	**OTTAWA**	**WINNIPEG**	**CALGARY**
HALIFAX	**TORONTO**	**REGINA**	**VANCOUVER**

Plant at Longueuil, Que.

This Large, New Modern Plant is turning out the HIGHEST GRADES of

HIGH SPEED and CARBON TOOL STEEL

Carbon Steel

suitable for

Taps, Dies, Shop Tools, Shear Blades, Miners' Drills and Tools.

Punches, Rivet Sets, etc.

Special Alloy Steel

made to specification.

Pistons, Forgings, Crankshafts, Shear Blades, etc.

Also Small Tools, Cutters, Drills, Taps, Dies, Gauges, Etc.

ARMSTRONG, WHITWORTH OF CANADA, LIMITED

298-300 St. James St., MONTREAL

Dominion Bank Bldg., TORONTO

ARMSTRONG, WHITWORTH OF CANADA, LIMITED
22 VICTORIA SQ. MONTREAL P.Q.
"T.Y.R."
Highspeed Steel
(Made in Canada)
Works: LONGUEUIL, Que.
DOMINION BANK BLDG. TORONTO

"TYR"

High-Speed Steel

Specially suitable for hard metals, Locomotive and Tramway Tyres, Shell-Turning Tools and Boring Cutters, etc.

"A.W.P."

High-Speed Steel

For cutting hardest metals at high speeds with prolonged lasting power. Guaranteed better than the best.

Armstrong, Whitworth of Canada
LIMITED

298-300 St. James Street
MONTREAL, P.Q

Works: LONGUEUIL, P.Q.

Dominion Bank Building
TORONTO, ONT.

Western Representatives—KELLY POWELL, LIMITED, WINNIPEG.

MADE IN CANADA

WOLFRAM

HIGH-SPEED STEEL

Strong *Tough*
Lasting

18% TUNGSTEN

But the AVERAGE TUNGSTEN Content of all

WOLFRAM HIGH-SPEED STEEL

made during September and October was

18.46%

Wolfram is made from the best grade melting stock, fresh and clean; and pure Tungsten, the melting point of which is 5200° F.

All the ingredients of Wolfram are *new—not* second-hand.

No foreign material is used in making Wolfram. It is truly an American steel.

VULCAN CRUCIBLE STEEL CO.

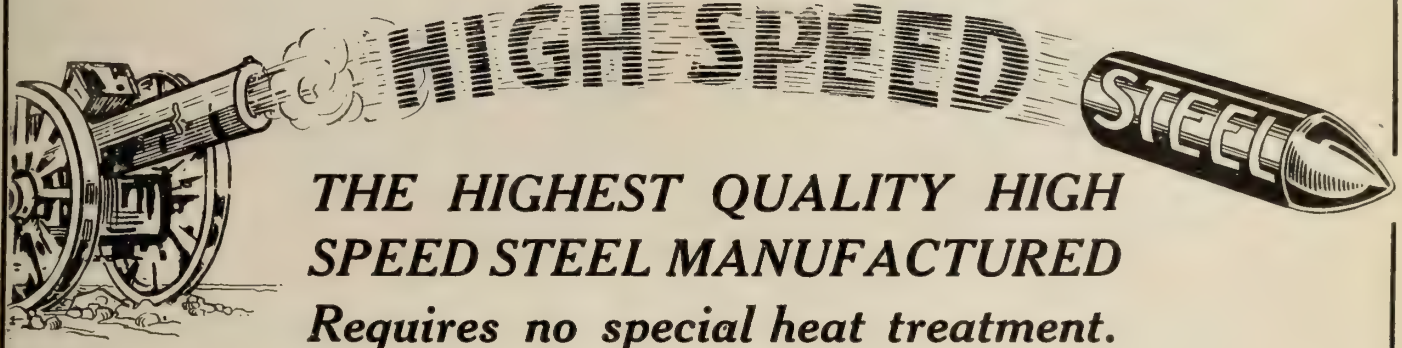
Established 1900 **ALIQUIPPA, PA., U.S.A**

***Represented in Canada by* MESSRS. NORTON, CALLARD & CO., MONTREAL**

TRADE MARK

KELOCK

788



THE HIGHEST QUALITY HIGH SPEED STEEL MANUFACTURED

Requires no special heat treatment.

TOOL STEELS

"K.E." 798 Oil Hardening, Non-Shrinking

Especially valuable for all tools where extreme accuracy as to size is required after hardening.

Best Carbon Tool (all tempers)

Drill Rods Silver Steel Wire Crucible Sheets

Nickel Steel Chrome Nickel Chrome Vanadium

Mining Steels Hollow and Solid)

Welding Steel Auto Steel Forgings

IMMEDIATE SHIPMENT FROM OUR MONTREAL STOCK

KAYSER, ELLISON & CO., Limited

126 CRAIG STREET WEST
MONTREAL, CANADA

Works: SHEFFIELD, ENG.
Established 1825

RALPH B. NORTON
Agent

L-XX High Speed Steel

AS a medium between you and increased production. L-XX High-Speed Steel would prove excellent. In strength and lasting power it is unequalled. As a cutting tool it is the "missing link" you have been looking for so long. If you knew the extra care and watchfulness exercised in making you would not wonder at the sterling quality of the finished product.

Deward Non-Shrinking Tool Steel.

With this metal you don't have to "allow" for shrinkage or waste time "figuring" how your job will be finished. Don't leave anything to chance. **Know** where you are at. Deward Non Shrinking Tool Steel will do it.

E-B. Alloy. Ideal for Hot Work.

You find difficulty when working on hot material with ordinary tool steel? Our E-B Alloy was made especially for this work. Heat in no way affects its power or efficiency. This should prove invaluable to you.

Atlas XX Carbon Steel

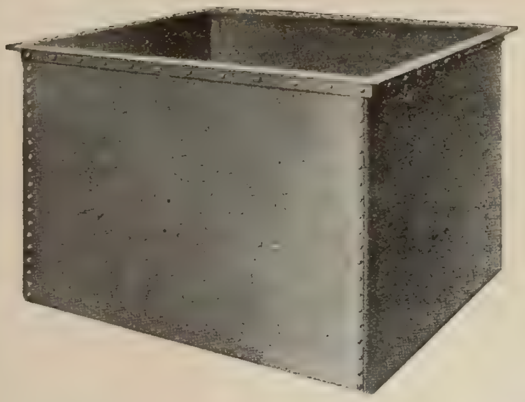
When we say that genuine Swedish Iron is the foundation for the steel you will at once realize its great value—if it is made right. Our experience in producing tool steel is international. Our products are recognized for their high quality. In this ATLAS XX CARBON STEEL we have put the same amount of care and knowledge as in our other products, and we say that for a straight carbon tool steel this is superfine.

Manufactured by

Atlas Crucible Steel Co.

DUNKIRK, N. Y., U. S. A.

TORONTO
IRON WORKS



STEEL PLATE WORK

Oil Storage Tanks, Pressure Tanks, Smoke Stacks, Riveted Steel Pipe, Penstocks, Bins and Hoppers

PREPAREDNESS

PLATE mills are congested with orders, and the insistent demand of our customers is "How Soon Can You Ship?"

To users of tanks, or steel plate work of any description, who are not aware of the service given by this Company, we emphasize these points:

90% of all inquiries received during the past year were shipped from stock, or material in transit.

We will start 1917 with a larger stock of plate than any time during the past twelve months, and shipments at regular intervals are scheduled for months to come.

This service has helped hundreds of firms throughout Canada through a very difficult and trying period and can be depended upon throughout 1917.

We have the material—the organization and the facilities to meet your requirements.

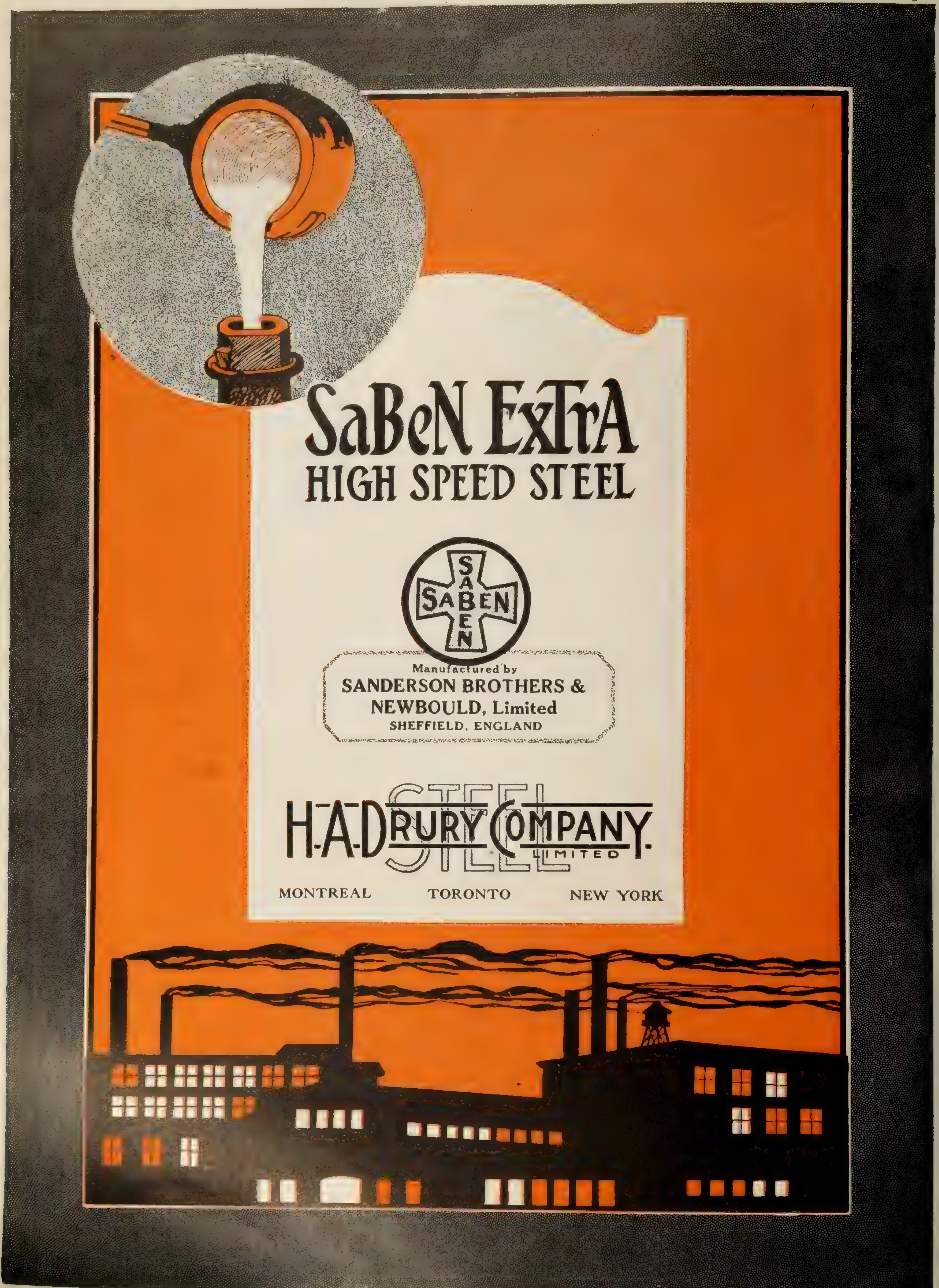
If service and quality are a consideration—send us your inquiries.

THE TORONTO IRON WORKS, LIMITED

TORONTO ONTARIO CANADA

HEAD OFFICE:
ROYAL BANK BUILDING

WORKS:
FOOT CHERRY STREET



SaBeN ExTrA
HIGH SPEED STEEL

SABEN

Manufactured by
SANDERSON BROTHERS &
NEWBOULD, Limited
SHEFFIELD, ENGLAND

H-A-DRURY COMPANY
STEEL
LIMITED

MONTREAL TORONTO NEW YORK

"EXTRA" Die Steel

—produced from the purest hammered Swedish Charcoal Iron by workmen whose families have for several generations been occupied exclusively in the production of this specialty, and is a quality which has been manufactured for nearly a century and a half without change.

You get extra service from "EXTRA" Die Steel A trial is convincing.

Manufactured by
SANDERSON BROTHERS & NEWBOULD, Limited
SHEFFIELD, ENGLAND

H. A. DRURY COMPANY LIMITED
STEEL

MONTREAL
TORONTO
NEW YORK

"HAWK'D" CHROME VANADIUM STEEL

Will Give You Exceptional

SHELL FORGING

PRODUCTION

WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

There are many cases where each punch has turned out over 2,000 shells.

It means more shells per machine per day.

Steel of Every Description

Hawkridge Brothers Company

303 Congress St., Boston, Mass., U.S.A.

Know what you're buying!

WHEN you send in an order for pencils, specify those that you are certain will do what you require. Whether you buy by the gross or by the twelfth of a dozen you will find that for uniformity, economy and satisfaction there is nothing that equals the

VENUS 10¢ PENCIL

THE distinctive water-mark VENUS Pencil is universally used by the best engineers, draftsmen, contractors and all men who have need of the very finest of pencils for sketching and designing.

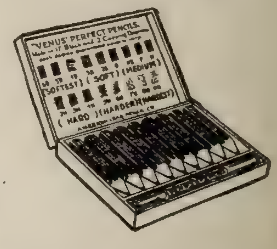
VENUS leads are absolutely standard. The hardness or softness of any degree is invariable. You have 17 degrees to choose from—9H is hardest, 6B is softest. The hard and medium copying for billing and manifolding are peerless.

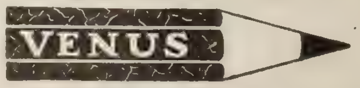
If you are not now using these exceptional pencils, write us a line giving us your name and address so we can send you

FREE

this test box of VENUS drawing pencils, VENUS copying pencil and VENUS Eraser.

AMERICAN LEAD
PENCIL CO.
238 Fifth Ave., New York
and Clapton, London, Eng.





FIRTH'S

"SPEEDICUT" HIGH SPEED STEEL FOR MACHINING SHELLS

DIAMETER AFTER FIRING
← 342·3 M/M →
FIRTH
← 341·7 M/M →
SHEFFIELD

Also STANDARD brands of Firth's CARBON TOOL STEEL. Sold in every country where Steel is used.

We also manufacture

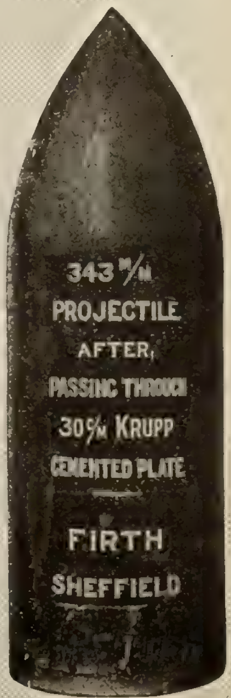
Armour-Piercing and **High Explosive Projectiles; Forgings** of every description for Heavy Ordnance; Propeller Shafts, Turbine and Engine Work, etc.

Nickel, Nickel-Chrome and other **Alloy Steels.**

Tyres, Sword and Bayonet Steel, Bullet-Proof Steel for Armoured Cars, Aeroplanes, etc.

Cutlery Steel, Stainless Steel for Cutlery, etc. (Originally discovered by our Research Dept. in 1913.)

Mining Drill Steel, Shoes and Dies, Files and Rasps, etc.


343 M/M
PROJECTILE
AFTER,
PASSING THROUGH
30% KRUPP
CEMENTED PLATE
FIRTH
SHEFFIELD

Thos. Firth & Sons, Limited

Norfolk Works and Tinsley Works
SHEFFIELD, ENGLAND

Works also at Riga, Russia; McKeesport, Pa., and Washington, D.C.

CANADIAN WAREHOUSES:

449 St. Paul St. W., MONTREAL.
79 Adelaide St. W., TORONTO.

J. A. Sherwood,
Canadian Manager

A Tool Metal Beyond Competition

STELLITE

HIGH SPEED TOOL METAL

MADE IN CANADA
STELLITE

NOT A STEEL

A remarkably hard and tough alloy. Not a particle of iron in it.

Tools made of Stellite stand up to speeds and feeds far in excess of that of the very best high speed tool steels.

Stellite tools have no temper. They cut as well when red hot as when cold.

With "Stellite" Tools you can increase the speed and production of practically every lathe in your plant from 20% to 300%.

There's nothing like trying for convincing.

Why not make the test now?

Made in Canada by
THE DELORO MINING AND REDUCTION CO., LIMITED
DELORO, ONTARIO

The Canadian B. K. Morton Co., Limited
SOLE SELLING AGENTS FOR CANADA AND NEWFOUNDLAND
49 Common St., MONTREAL, QUE. 86 Richmond St. East, TORONTO, ONT.

ATLAS
TRADE MARK.

Giant Quality—

The quality of **ATLAS METALS** has been repeatedly endorsed by the British Government in all departments, also by many foreign governments. All the Allies have purchased Anti-Friction Metal from us during the war. Our products are the choice of "those who know," due to the fact that being smelters and refiners, as well as White Metal Manufacturers, we are able to guarantee that only highly refined materials are employed when alloying our brands.

For 17 years the Atlas Mark has stood for supreme quality.

In Steamship Engine Work

we have the full confidence of a large proportion of the Superintendent Engineers of the leading British steamship lines. For work of this class our Tenaxas A1 Plastic Metal is recognized as the highest possible quality, also our W.E. Watson Marine Bearing Metal.

For Bearings of High Speed Engines

where a specially tough mixture of Anti-friction Metal is necessary, there is no superior metal to our Amacol White Bronze. Enormous quantities have to be supplied for this purpose.

For Motor Car Engines

our Tenaxas and Durastic Copper Hardened Metals are the recognized standard of perfection, both for light cars and heavy commercial vehicles.

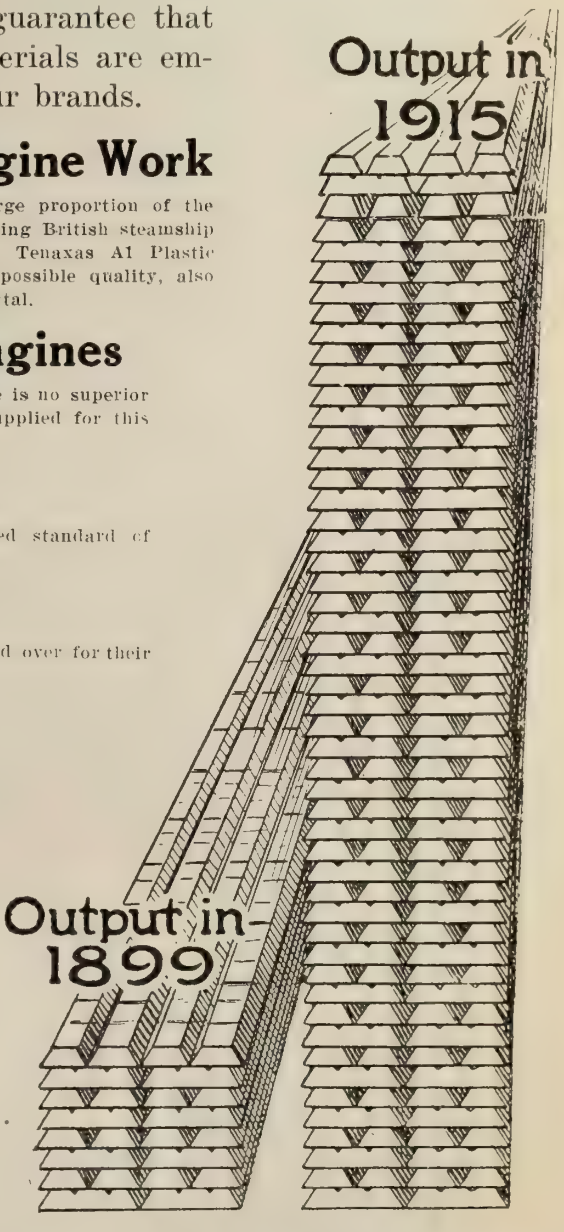
For General Engineering

our Atlas, Mascot and Babbitt Alloy are known and recognized the world over for their consistently good service and reliability.

The following list offers a comprehensive range of accurately alloyed brands from which selection can be made for any given purpose where high-speed metals and alloys of the finest possible quality are required:

Atlas Metal, W. E. Watson's Brand
Atlas Metal, M. B. Tin, Toughened
Amacol White Bronzed
Tenaxas A1 Plastic Metal
Durastic Copper Hardened Metal
W. E. Watson's Marine Bearing Metal
Mascot Metal
Babbitt Metal, W. E. Watson's Brand

WRITE TO US REGARDING YOUR REQUIREMENTS. WE CAN UNDOUBTEDLY SUIT YOU AS TO QUALITY AND PRICE.



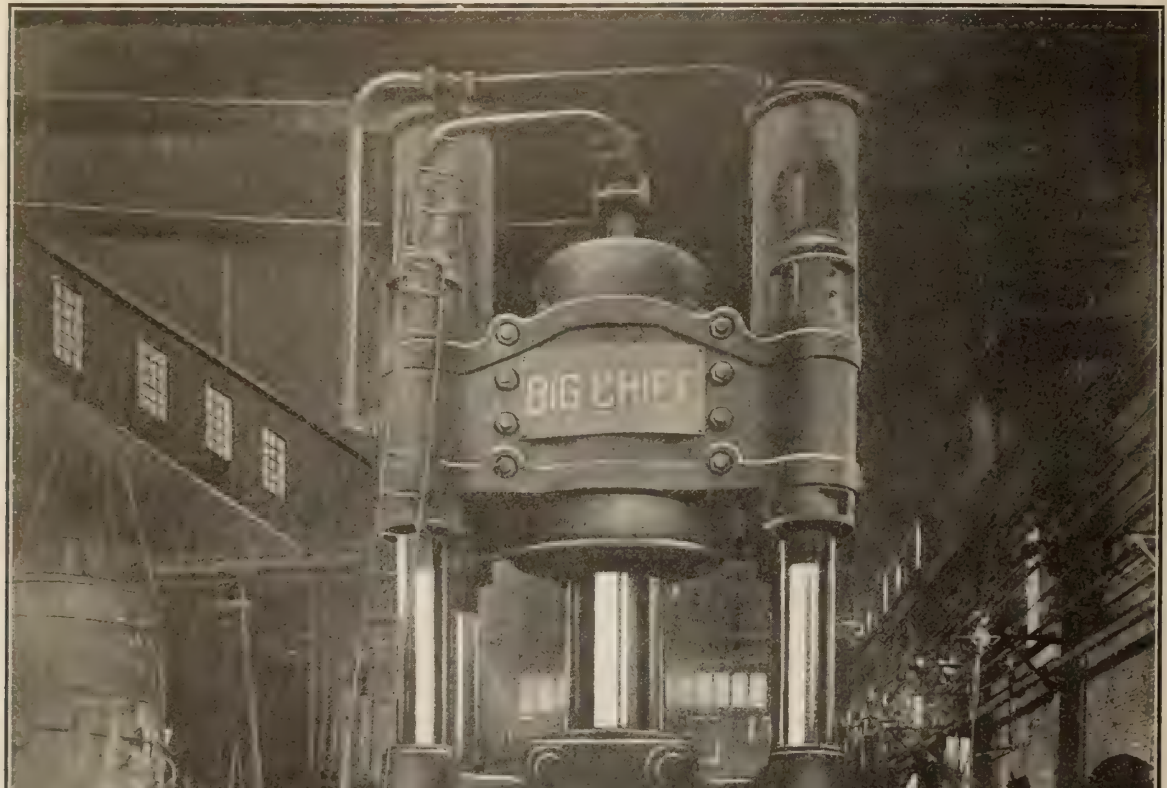
MADE IN CANADA BY
Atlas Metal & Alloys Company of Canada
MONTREAL

The Canadian B. K. Morton, Co., Limited

AGENTS FOR CANADA AND NEWFOUNDLAND

49 Common St., MONTREAL, QUE. 86 Richmond St, East, TORONTO, ONT.

Nova Scotia Steel & Coal Company
Limited
New Glasgow, Nova Scotia, Canada

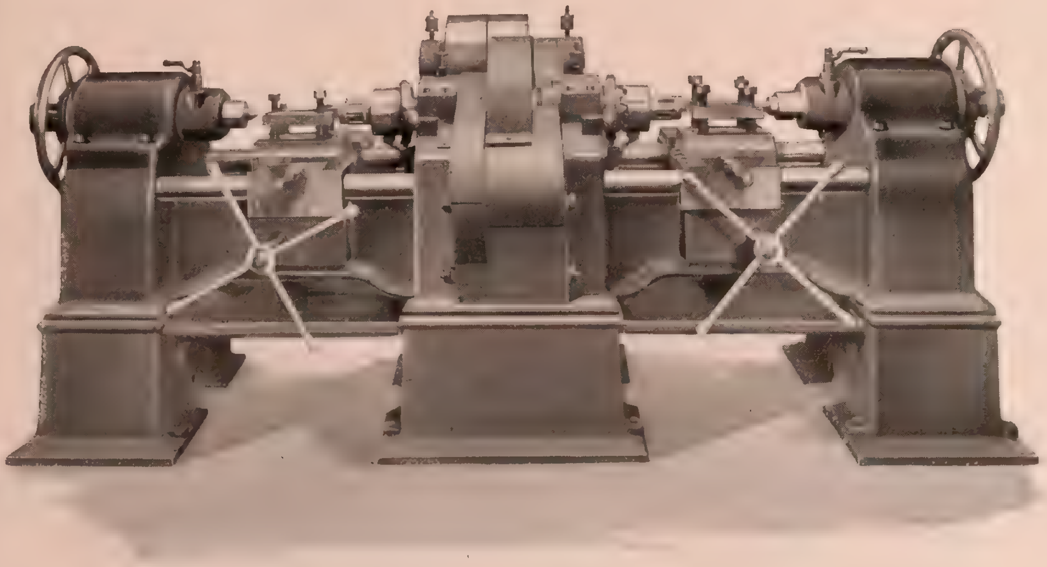


4,000 TON STEAM HYDRAULIC FORGING PRESS FOR MARINE AND OTHER HEAVY FORGINGS.

The product of a modern steam-hydraulic press is denser and more homogeneous than can be obtained with the steam hammer, due to the effect of the blow of the latter not penetrating to the centre, in contradistinction to the uniform kneeding effect of the press; while the amount of work that can be done by the latter at one time with little variation in temperature, strongly tends towards a better product. The greater uniformity and reliability of steam hydraulic forgings make their use imperative wherever high-class products are required.

Cut Your Cost In Two—Save A Man

Two Shells Instead of One, With One Operator



4", 5" and 6" Rough Turning Lathe.

THIS machine is the result of many experiments, covering a period of over a year and is now at the producing stage.

Machine will turn out double the number of rough-turned shells in a given time than any other single lathe of its size.

Features such as the following should interest manufacturers who desire to increase their output without increasing their costs.

This lathe will do it and do it continually, 120—4.5 Shells rough-turned in 10 hours.

Time required for chucking and replacing shells, 35 seconds.

Lathes fitted with two positive drive chucks. Six feet of floor space saved, easy to operate, costs less than two other lathes. Increased output and decreased overhead. Made in sizes for 4.5″ and 6″ shells.

Dominion Universal Grinder

Always Appreciated by the Best Tool Makers

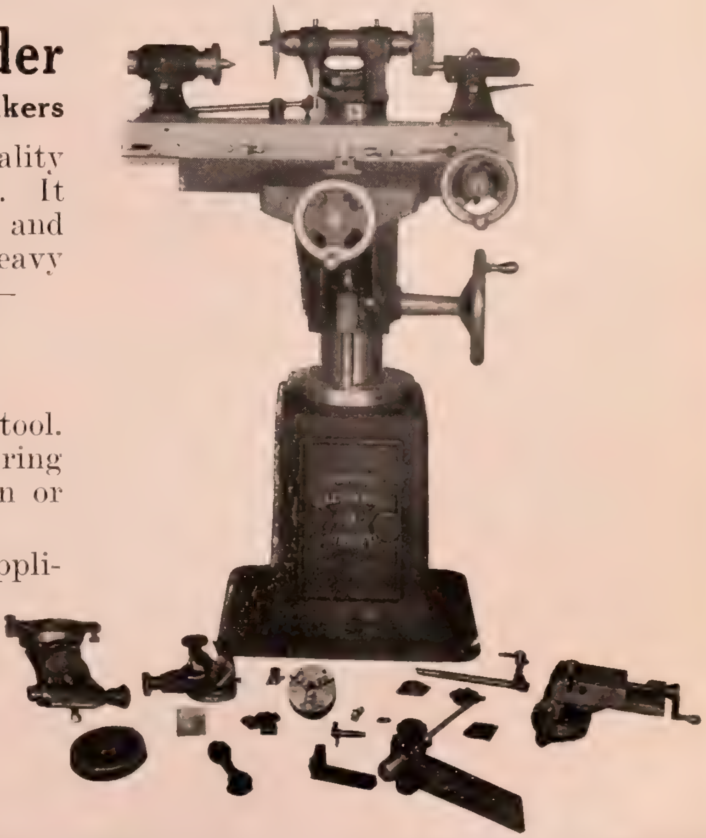
BECAUSE of its sterling worth, universality and solidity commends itself to all alike. It not only adapts itself to the most delicate and precise operations, but it lends itself to heavy surface grinding. If you want to know—

ASK THE MAN WHO HAS ONE.

GET IN LINE.

Equip your shop with this high-grade tool. Every machine equipped with ball-bearing spindle, ball thrust to knee, and is plain or universal.

Full particulars and cut will be sent on application. Early deliveries.



Dominion Machinery Co.

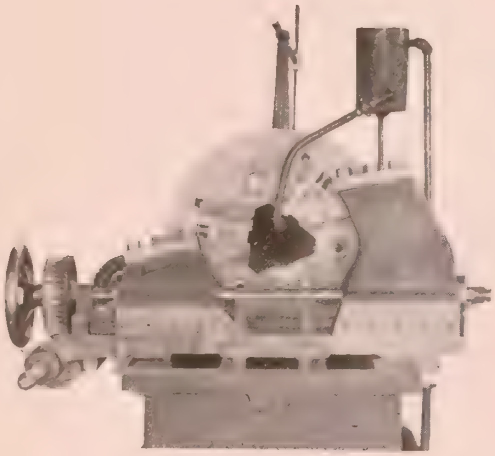
110 Church Street

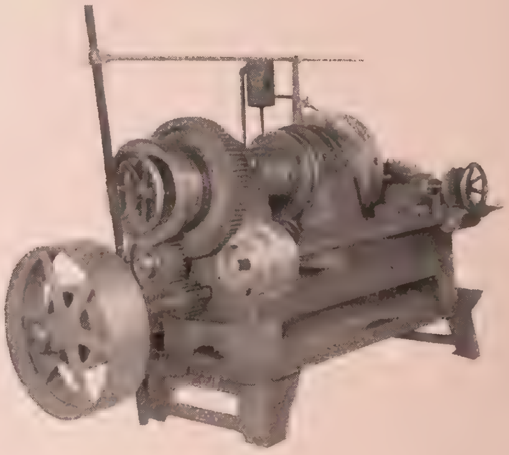
TORONTO ONTARIO CANADA

Double Quick Cutting-off Machine

for

3-in., 6-in., 8-in. or 9.2-in. Shells





The machine illustrated herewith is for 6-inch shells. We make also machines for 3-inch to 9.2 shells.

We can equip them for facing, undercutting, waving and copper-band turning.

Manufactured by

The Globe Electric Machine Co., Limited

Machine Tool Manufacturers

125 Mary Street - - HAMILTON, CANADA

SELLING AGENTS:

The Dominion Machinery Company

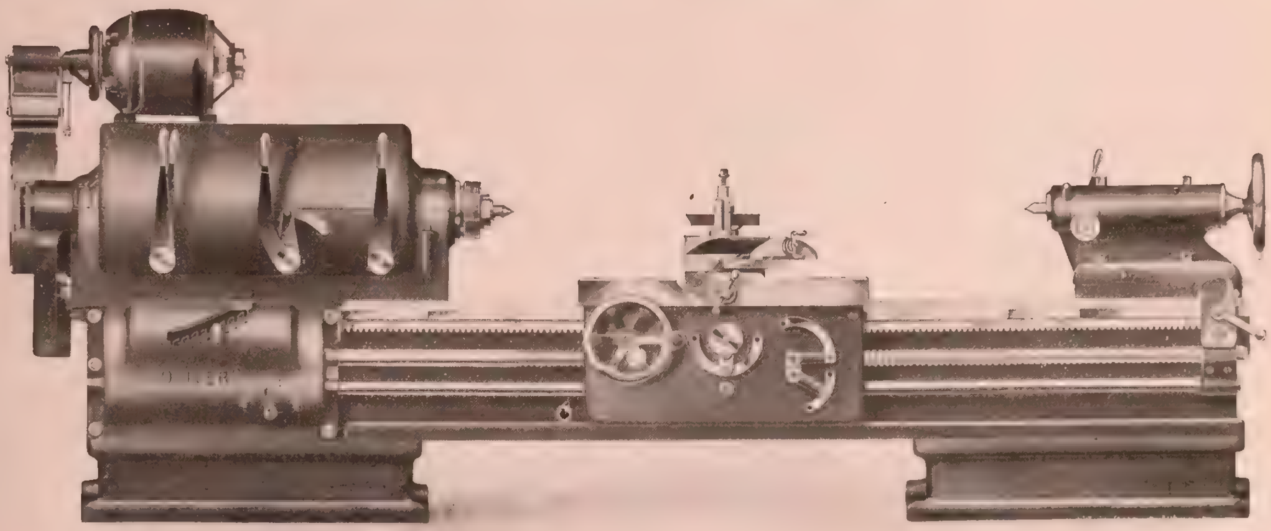
110 Church Street - - - TORONTO, CANADA

"OLIVER"

26-inch Extra Heavy Duty Engine Lathe

Built by the Oliver Machinery Company of Grand Rapids, Michigan, U.S.A., with a world-wide reputation for "Quality."

Strenuous work calls for efficient tools — the "Oliver" kind—symmetrical in design, massive in construction, dependable in operation.



"Oliver" 26-inch Extra Heavy Duty Engine Lathe

All Geared Head—Single Pulley Drive Either Motor or Belt Driven

SEND FOR COMPLETE INFORMATION NOW.

Engine Lathes Turret Lathes Screw Machines

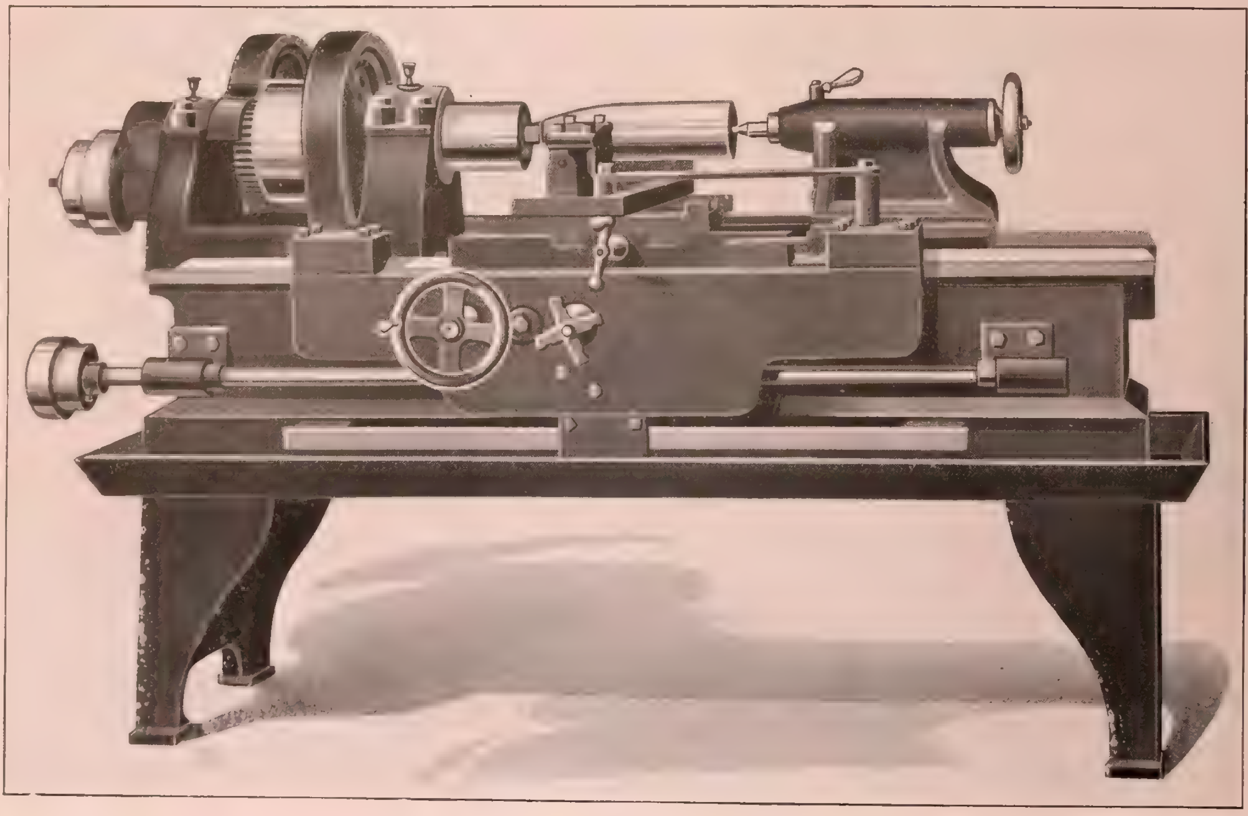
DOMINION MACHINERY CO., Toronto
Agents for Ontario

OLIVER MACHINERY CO.

Grand Rapids - Mich., U. S. A.

PROFILE LATHE

Turns 4.5", 5" and 6" Shells Complete and Perfect in One Operation



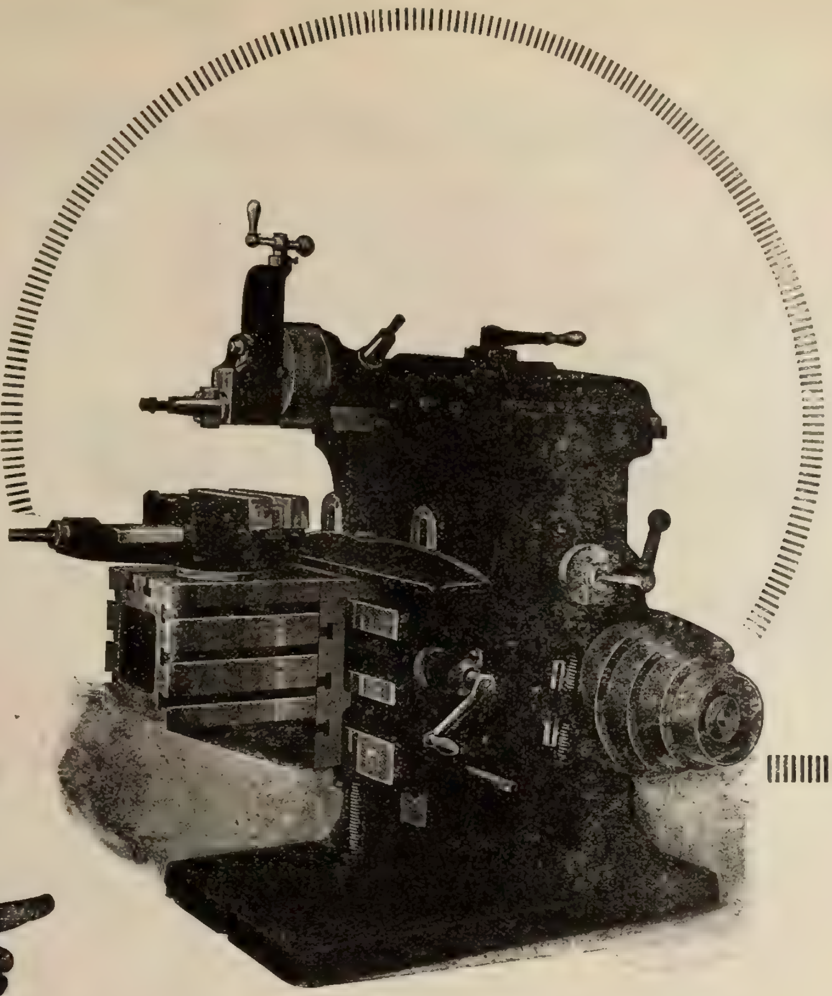
We build other heavy lathes for:

- Inside Boring
- Rough Turning
- Boring Base Recess
- Facing off Base to Length and Weight
- Inside Profile
- Bore and Tap Nose
- Undercut in base
- Face off Base of Recess

PRICES ON APPLICATION.

Martin Pump & Machine Co., Ltd.,

Toronto, Ontario, Canada



This New 15-inch Shaper

Is the result of a long-felt demand for this kind of machine.

OUTSTANDING FEATURES:

The column is heavy and strong, well braced and ribbed.

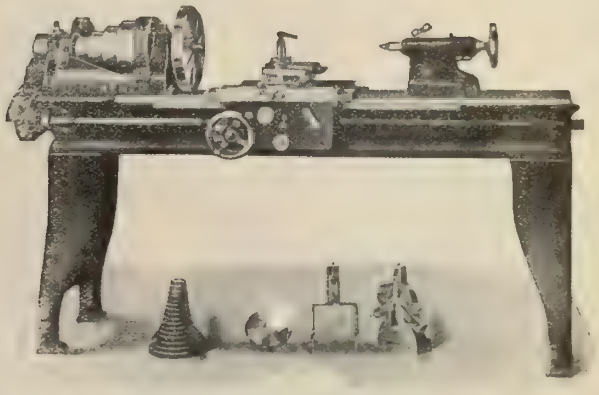
The cross-rail and table are of proper proportions with large bearing surface, shown in cut.

All bearings and sliding surfaces are hand scraped to surface plates and are fitted with adjustments for taking up wear.

All feeds have graduated collars.

Changes of feed and position of ram are made from working side.

We'll be pleased to quote you prices and furnish any information required.



"McKenzie" Engine Lathe

The Standard of Accuracy

You will not find anywhere a lathe of this type and capacity that is better worth its price or that will give you more complete satisfaction in actual work. It is made in an improved design from new patterns, and in every detail of its construction and material it is flawless—a machine you'd be glad to own.

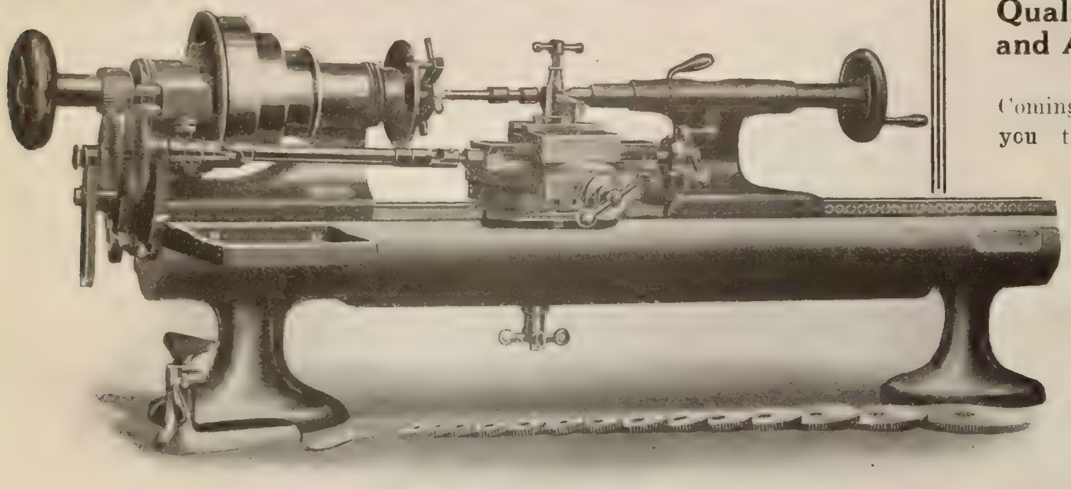
WRITE FOR CIRCULAR giving complete specifications of this lathe and some of our other machines.

The D. McKenzie Machinery Co.

GUELPH, ONTARIO

Cataract Precision Bench Lathes and Attachments

Are doing Remarkable Work in a Number of Canadian Factories Where Their Splendid Qualities are Proved and Appreciated



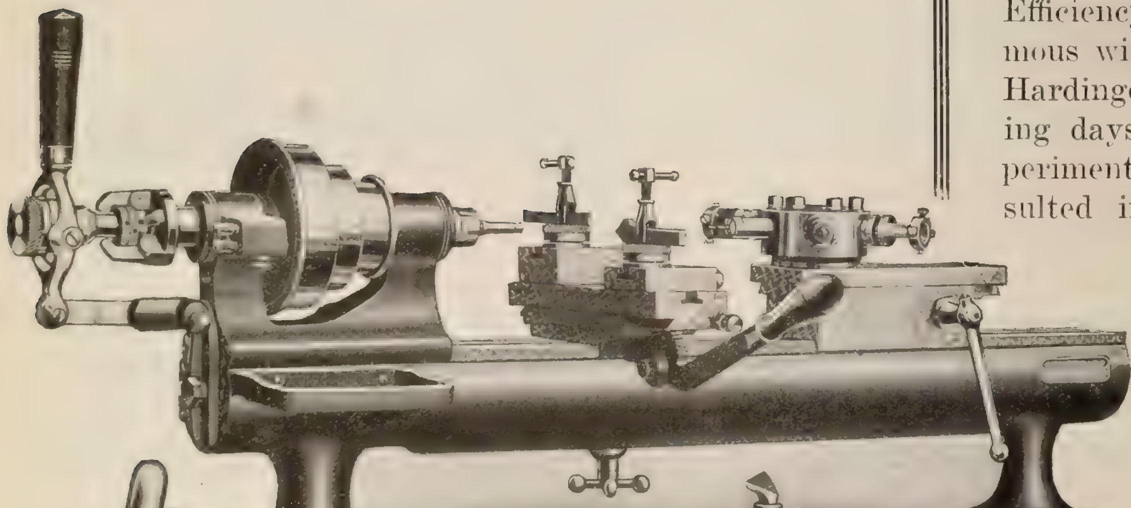
Coming down to facts, what do you think of this machine?

What do you think of the base, the circular bed, the sliding tool post, the strength suggested in that massive headstock, the range of gears, the special tailstock, and the arrangement of those gears? We think you will do as a great many other Canadian firms have done, write for our catalogue which gives the specifications, descriptions, etc.

"Write now."

If You are in the Market for 100% Efficiency Lathes

Write Us



Efficiency is synonymous with the name of Hardinge. The pioneering days, spent in experimenting, have resulted in the finished product and right proud we are of it, too. Its quality is of the best, its price is most reasonable, its efficiency is beyond expectations. Do you know of any equipment with a Hardinge Lathe? What do they think of it? When you find out write for our Catalogue, which will give you a complete line on our products. Get in touch with us.

Catalog No. 15 is ready to mail to-day. You should write "right" now.

Hardinge Bros.

1770 Berteau Ave., Chicago, Ill., U.S.A.

Read the Descriptions—Study the Illustrations

Then Consult Us--We will Co-operate with you.

To us that would be an ideal situation—co-operating with you. We can give you such service that our co-operation would help us both.

The Cataract Quick Change Precision Lathe

Length of Bed	**52″**
Total Length of Lathe	**65″**
Distance Between Centres	**28″**
Swing	**9″ and 15″**
Swing over Carriage	**5½″ and 11½″**
Diameter of Lead Screw	**1″ x 6 pitch**
Diameter of Front Cover	**2 1-32″**
Diameter of Rear Bearing	**1⅛″**
Length of Spindle	**15″**
Hole through spindle	**1¼″**
Draw-in Chuck Cap	**1″ maximum**

From the above specifications you will observe that it is ideally designed for ordinary or specially fine work. Study the illustration and then write us for further information.

Cataract Tool Post Lathe

An ideal machine for fine work. Especially adapted for optical work or any series of work where operations such as turning, boring and recessing, also internal and external threading, must be done in one setting.

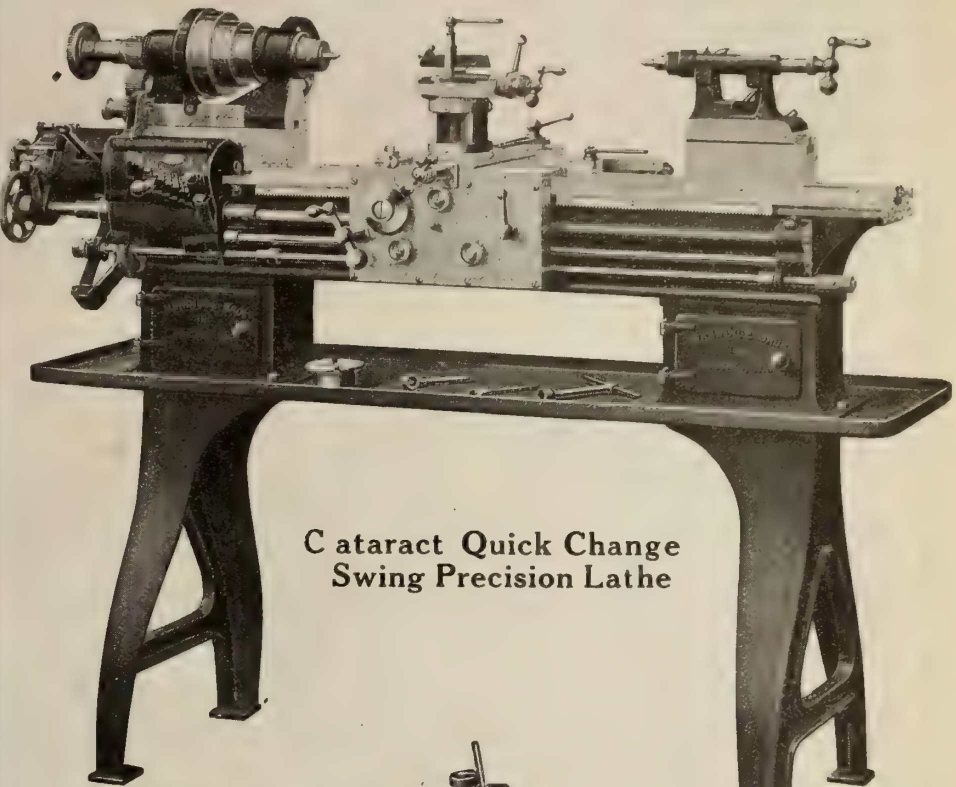
Six tools in turret independently adjustable.

Additional tailstock, turret or other standard attachments allowable.

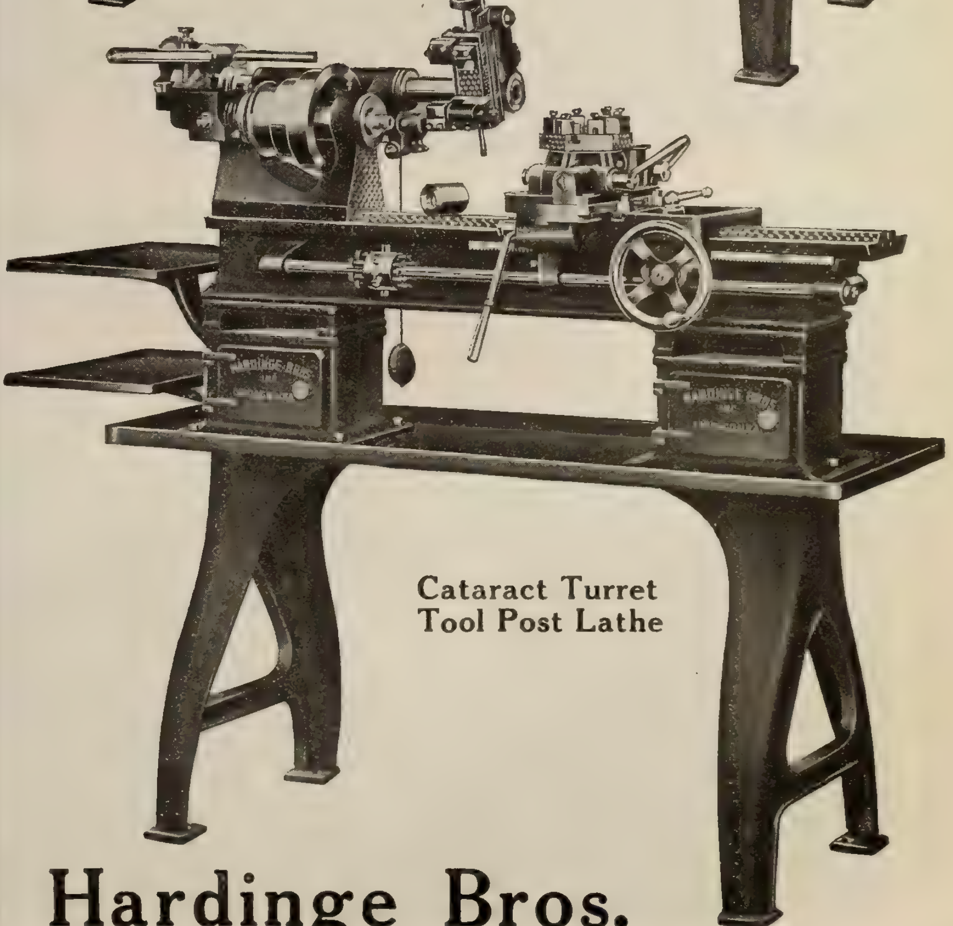
Will take round stock ½″, ¾″, 1″, 1⅜″ and 1 11-16″. In ordering kindly mention chuck capacity desired.

One horse-power required. Supplied with or without motor drive.

Catalogue No. 15 is ready to mail to you to-day. Write for it to day.



Cataract Quick Change Swing Precision Lathe

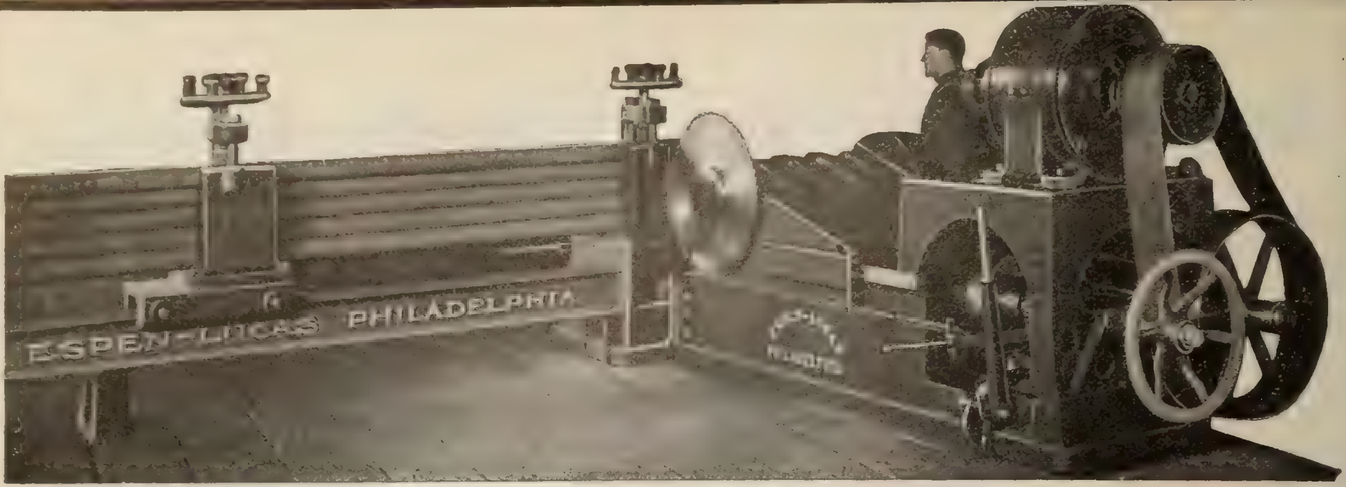


Cataract Turret Tool Post Lathe

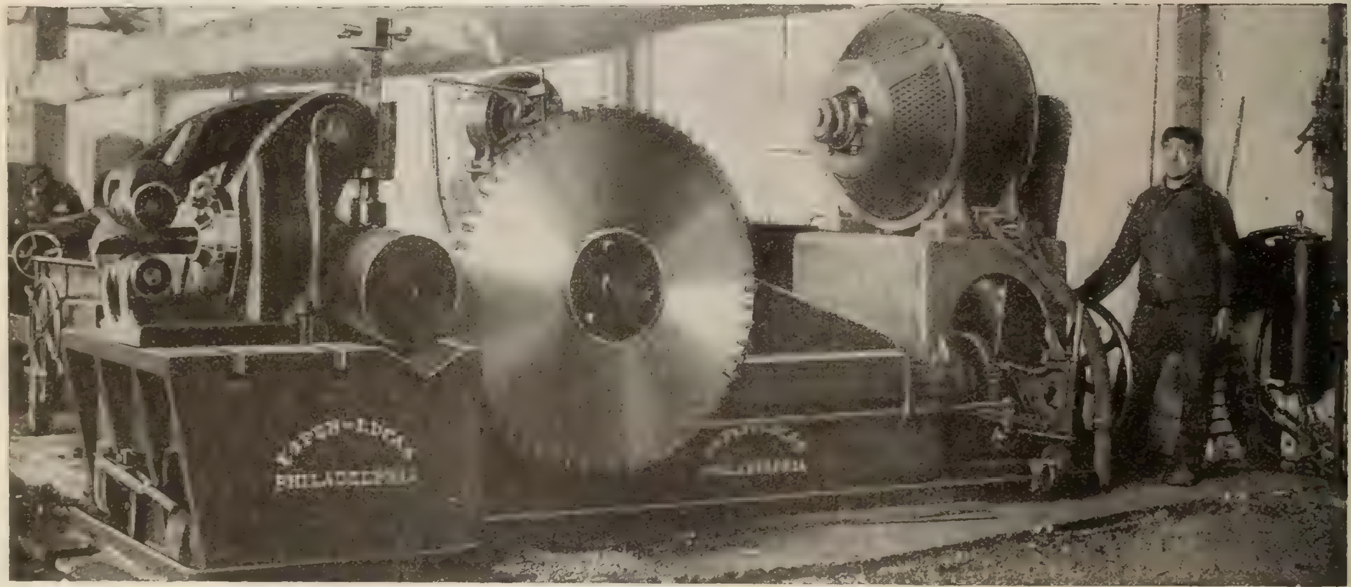
Hardinge Bros.

1770 Berteau Ave., Chicago, Ill., U.S.A.

If any advertisement interests you, tear it out now and place with letters to be answered.


ESPEN-LUCAS PHILADELPHIA

Used by all Large Shrapnel Manufacturers.

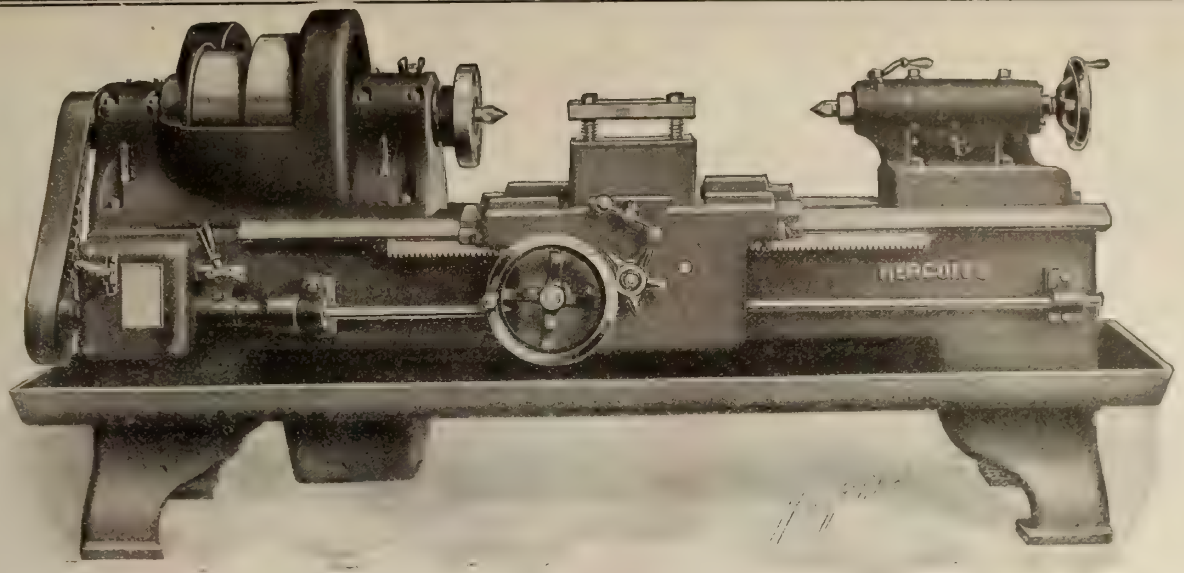

ESPEN-LUCAS PHILADELPHIA

Nova Scotia Steel and Coal Co.

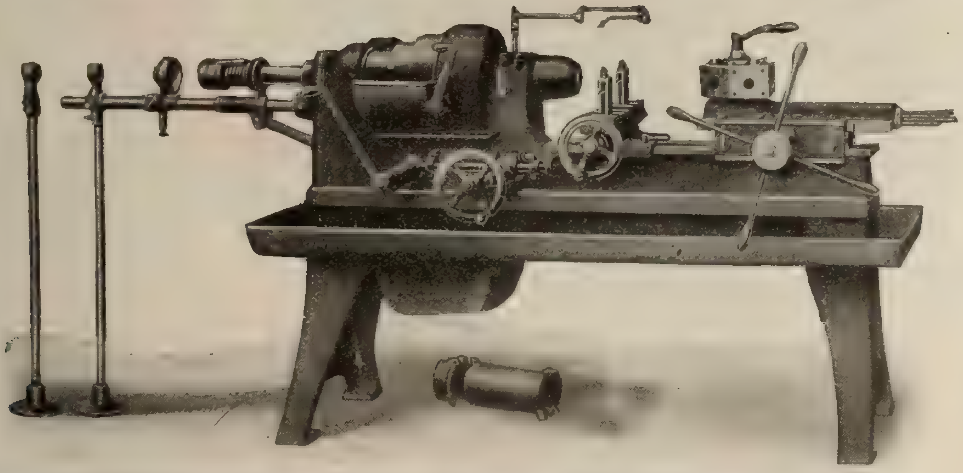
ESPEN-LUCAS PHILADELPHIA

Penna. Steel Co.

THE ESPEN-LUCAS MACHINE WORKS, FRONT & GIRARD AVENUE.
PHILADELPHIA. PENNA.. U. S. A.



The New Hercules 21-in. Lathe



Hercules Turret Lathe and Screw Machine

It Isn't What You Do—It's How You Do It

Any lathe will do your work, but **how** will it do it? That is the basis of the Himoff Machines.

How to do your work. They have "Herculean" strength. They have variety. (90% of your work may be performed on the upper lathe). It is not encumbered by false motion or excessive attachments.

Study the upper illustration. This lathe is built in one size, 21″ swing. It is a manufacturing lathe built to handle every straight or taper-turning operation.

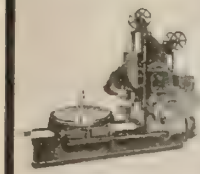
The lower illustration is the Hercules Turret Lathe and Screw Machine. Built in three sizes, ⅝″, 1″ and 1½″ automatic chuck capacity. Detailed specifications on request.

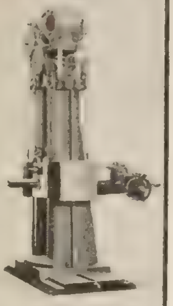
"Write right now."

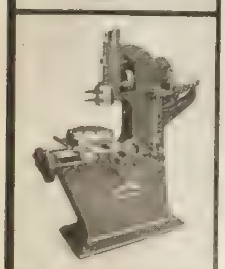
Himoff Machine Company
128 Mott Street New York City
Manufacturers of Lathes, Turret Lathes, Gear Hoppers

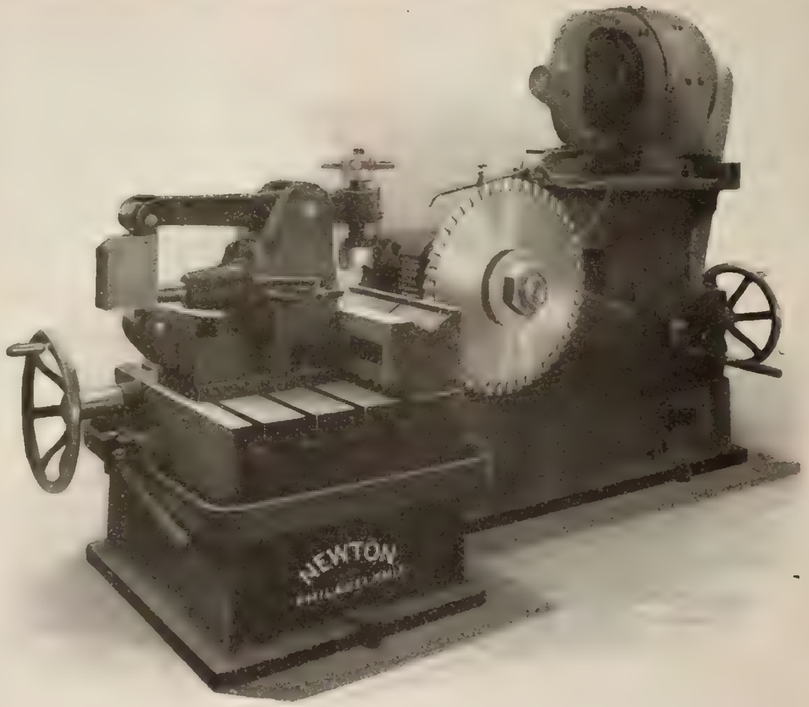
NEWTON

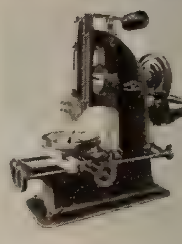
REGISTERED TRADE MARK

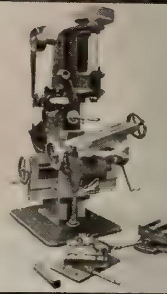


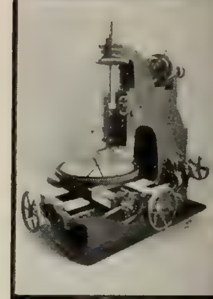


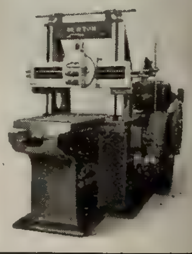












26'' Blade Cold Saw Cutting-Off Machine—Bar Type

Has capacity for round stock up to 7'', square stock up to 6½''. Can be furnished with plain clamps or air controlled clamp as shown. Stock trolley is also furnished when desired.

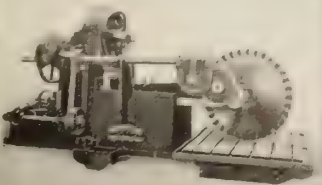
Machines are furnished with shelf for motor driven machines or countershafts for belt-driven machines.

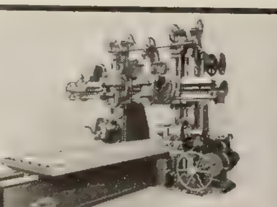
CATALOGUE No. 51

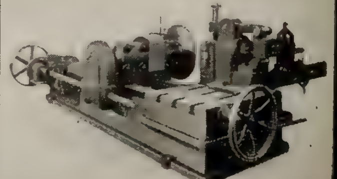
Illustrates and describes our complete line of Cold Saw Cutting-off machines. Just off the press. Mailed on request.

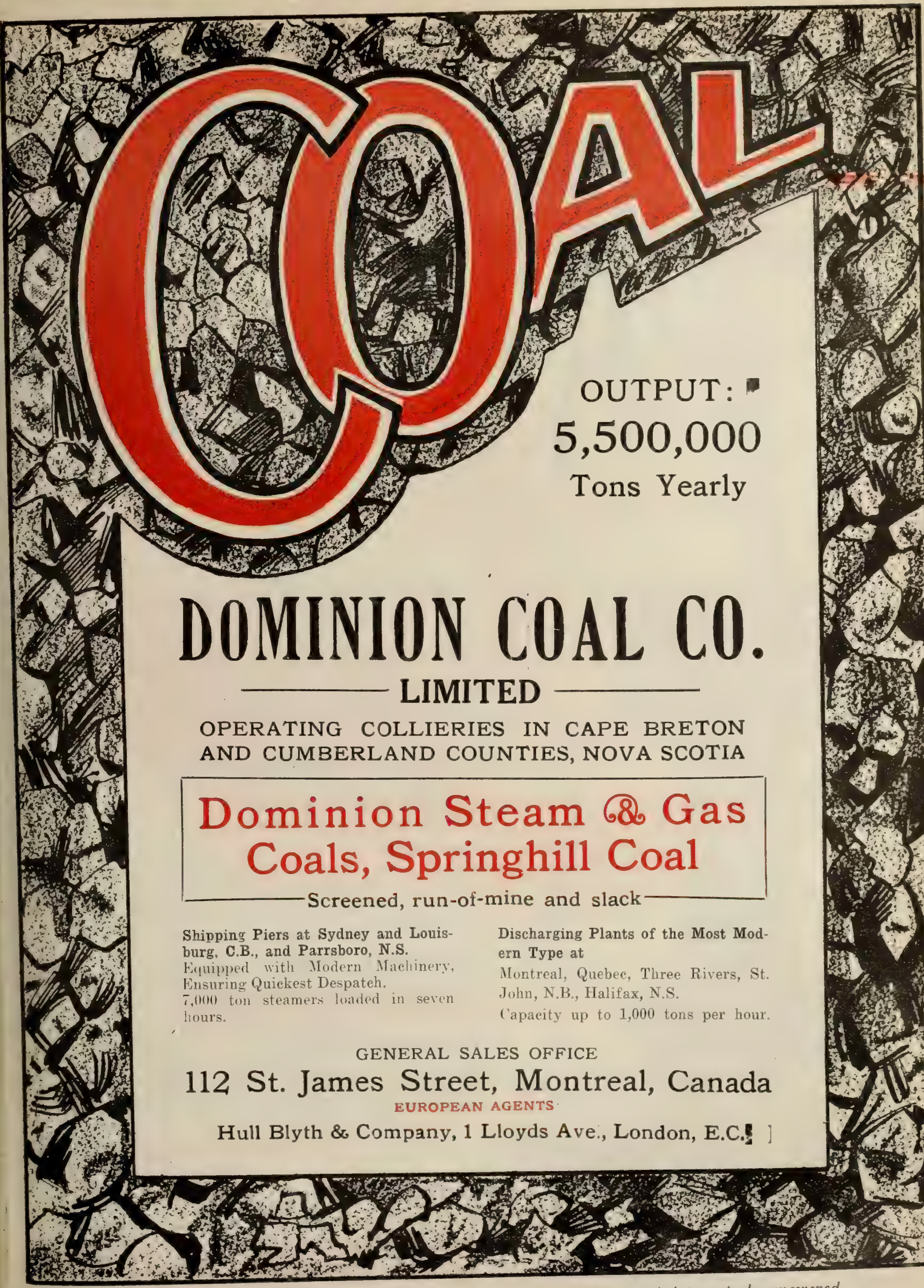
Boring Machines **Milling Machines**

Newton Machine Tool Works, Incorporated
23d and Vine Streets Philadelphia, U. S. A.









OUTPUT:
5,500,000
Tons Yearly

DOMINION COAL CO.
LIMITED

OPERATING COLLIERIES IN CAPE BRETON AND CUMBERLAND COUNTIES, NOVA SCOTIA

Dominion Steam & Gas Coals, Springhill Coal

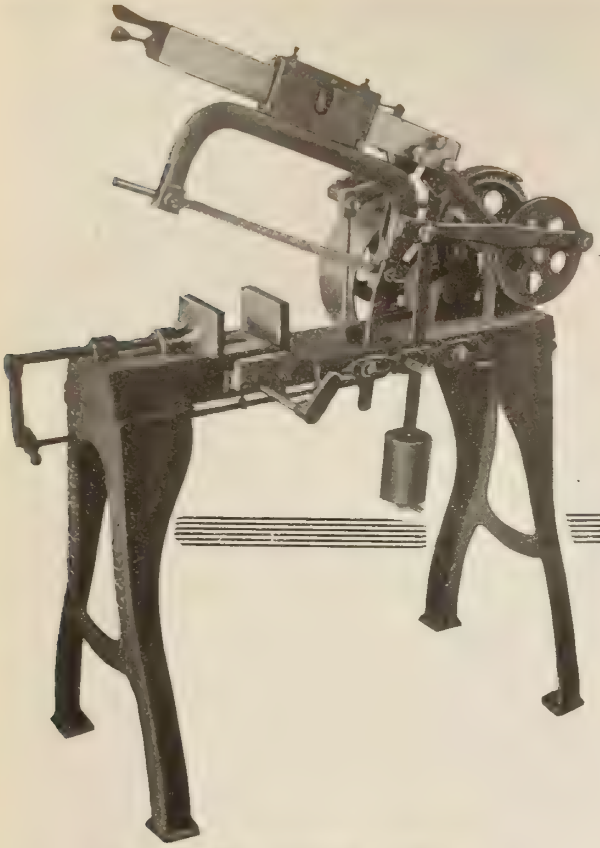
Screened, run-of-mine and slack

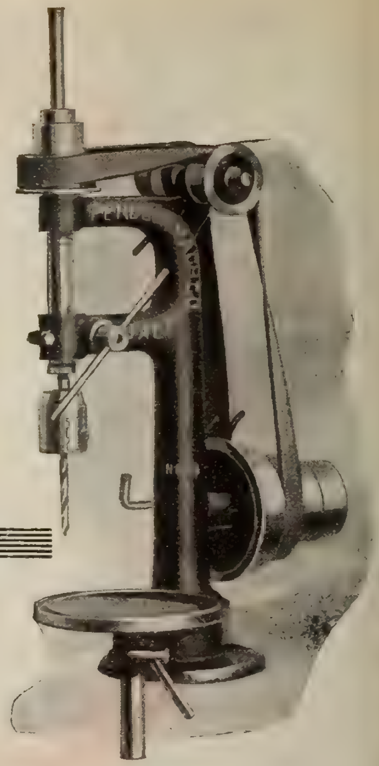
Shipping Piers at Sydney and Louisburg, C.B., and Parrsboro, N.S.
Equipped with Modern Machinery, Ensuring Quickest Despatch.
7,000 ton steamers loaded in seven hours.

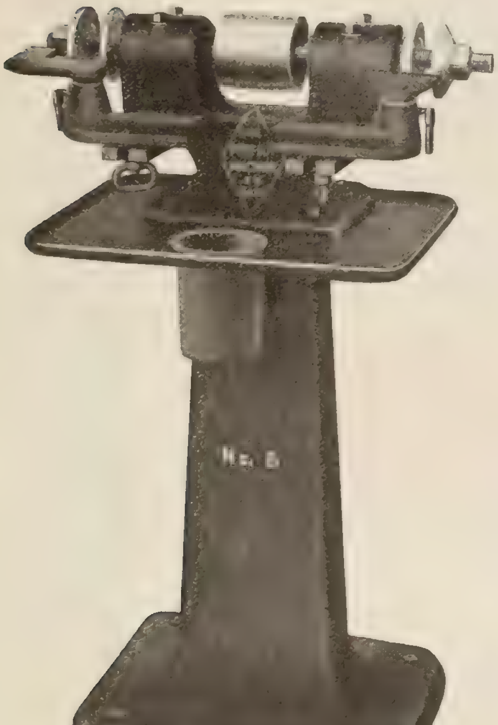
Discharging Plants of the Most Modern Type at
Montreal, Quebec, Three Rivers, St. John, N.B., Halifax, N.S.
Capacity up to 1,000 tons per hour.

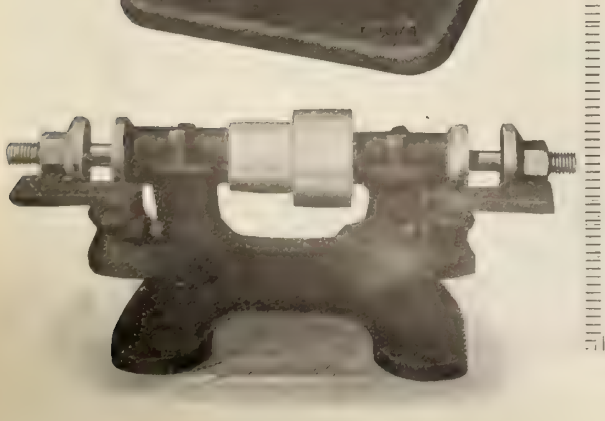
GENERAL SALES OFFICE
112 St. James Street, Montreal, Canada

EUROPEAN AGENTS
Hull Blyth & Company, 1 Lloyds Ave., London, E.C.









Our Name Describes Our Products———

What we make we guarantee—No. 18 Bench Drill. Drills holes up to 5-16". Spindle speed 2000 R.P.M. 1¼" belt which will give ample power. Swing table. Bearings are of high-grade babbitt.

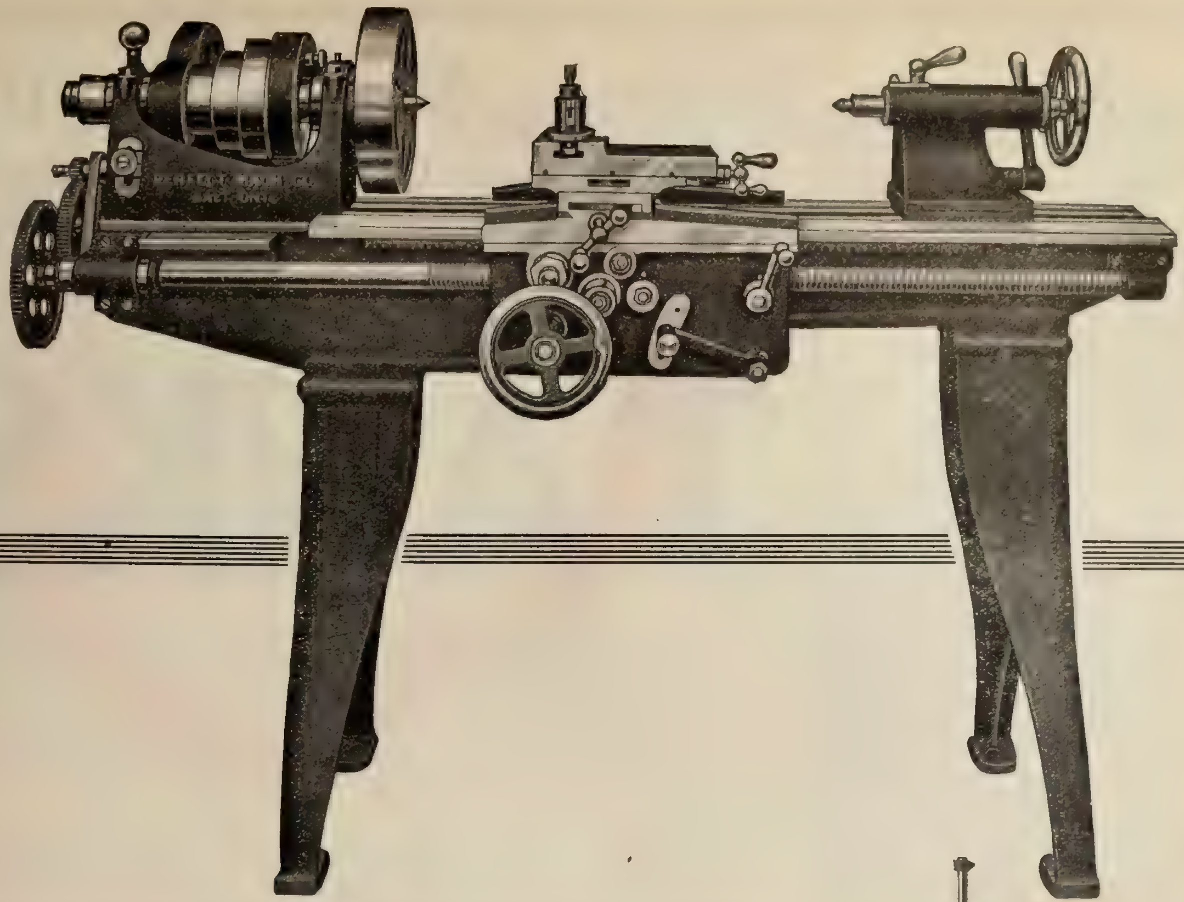
HACK SAW combining features that make the machine even more adaptable than usual. Milled gear driven, automatic shut-off gravity feed, swivel vise, tight and loose pulleys. Study the illustrations, then write us for particulars.

COLUMN GRINDERS—no quiver or shake on this grinder. The base, the bearings, the spindles are all made in exact proportion, giving that smooth, even revolution, so desirable.

PERFECT BENCH GRINDERS are **built,** not just put together. We have a thorough knowledge of the requirements of grinders and although these cost more, the **first** cost is the **only** cost.
Our address is below.

PERFECT MACHINE CO.

Galt Ontario Canada



Our Guaranteed Product—

We claim perfection of product and have confidence enough in the machines to guarantee them.

We make grey iron and semi-steel castings from your patterns and **specialize** on special machinery.

SCREW-CUTTING ENGINE LATHE—12″ swing, 17″ swing in gap. 6′ bed, compound rest is very rigid. Spindle bearings are of split bronze borings. Automatic longitudinal and cross-feeds are reversed by shifting lever on apron. A valuable tool for machine shops, garages, experimental shops, trade schools, etc.

14″ SENSITIVE DRILL—valuable for jig work, die work or special machine work. Positively true in every part, 1¼″ flat belt, 3 speeds, plenty of power. When writing, ask for our catalogue and prices.

PERFECT MACHINE CO.

Galt Ontario Canada

MacKinnon, Holmes & Co., Limited

Sherbrooke, Quebec, Canada

PENSTOCKS

Illustration shows the class of work we are doing in this line for Pulp and Paper Mills.

WE SPECIALIZE ON

TANKS

Steel Plate and Structural Work

for Pulp and Paper Mills, Chemical Works, Oil Refineries, etc. We also build Steel Structures to support them.

Our plant is equipped to give quick delivery. Workmanship and satisfaction guaranteed. Designs and Estimates promptly furnished.

Engineers, Manufacturers and Erectors of Steel Structures, such as Bridges, Buildings, Towers, Tanks, Penstocks, Roof Trusses, Columns, Smoke Flues and Stacks, Coal Bins, Ore Bins, Buckets, Refuse Burners, Stills, Air Receivers and other

MISCELLANEOUS STEEL PLATE AND STRUCTURAL STEEL WORK

We also have a first-class, up-to-date hydraulic press equipment for forging plugs, sockets, shrapnel, high explosive shells and other similar articles.

Write us for price.

ENGINEERS,

MANUFACTURERS

AND ERECTORS

OF STEEL

STRUCTURES

MacKinnon, Holmes & Co.
Limited
Sherbrooke, Quebec, Canada

RECENTLY ENLARGED MAIN PLANT OF MacKINNON, HOLMES & COMPANY, LTD., SHERBROOKE, QUE., CANADA.

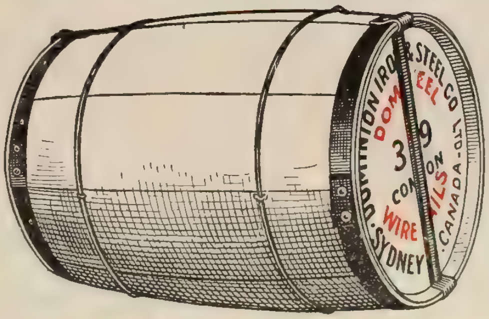
PIG IRON,
BASIC OPEN HEARTH
STEEL, BLOOMS,
BILLETS and RAILS,
MERCHANT BARS

PLAIN, ANNEALED,
GALVANIZED and
BARBED WIRE
SULPHATE of AMMONIA
SULPHURIC ACID

*From Ore to
Finished Product*

Wire Nails Wire Rods

To Standard and Special Gauges. Bright, Blued, Coated, Galvanized, etc.



In Coils
No. 5G to ¾-inch in Diameter. For Drawing into wire for **Wire Nails, Barbed Wire, Annealed Wire, Bright Wire, etc.**

DOMINION IRON & STEEL CO., LTD.

Head Office: SYDNEY, N.S., Canada

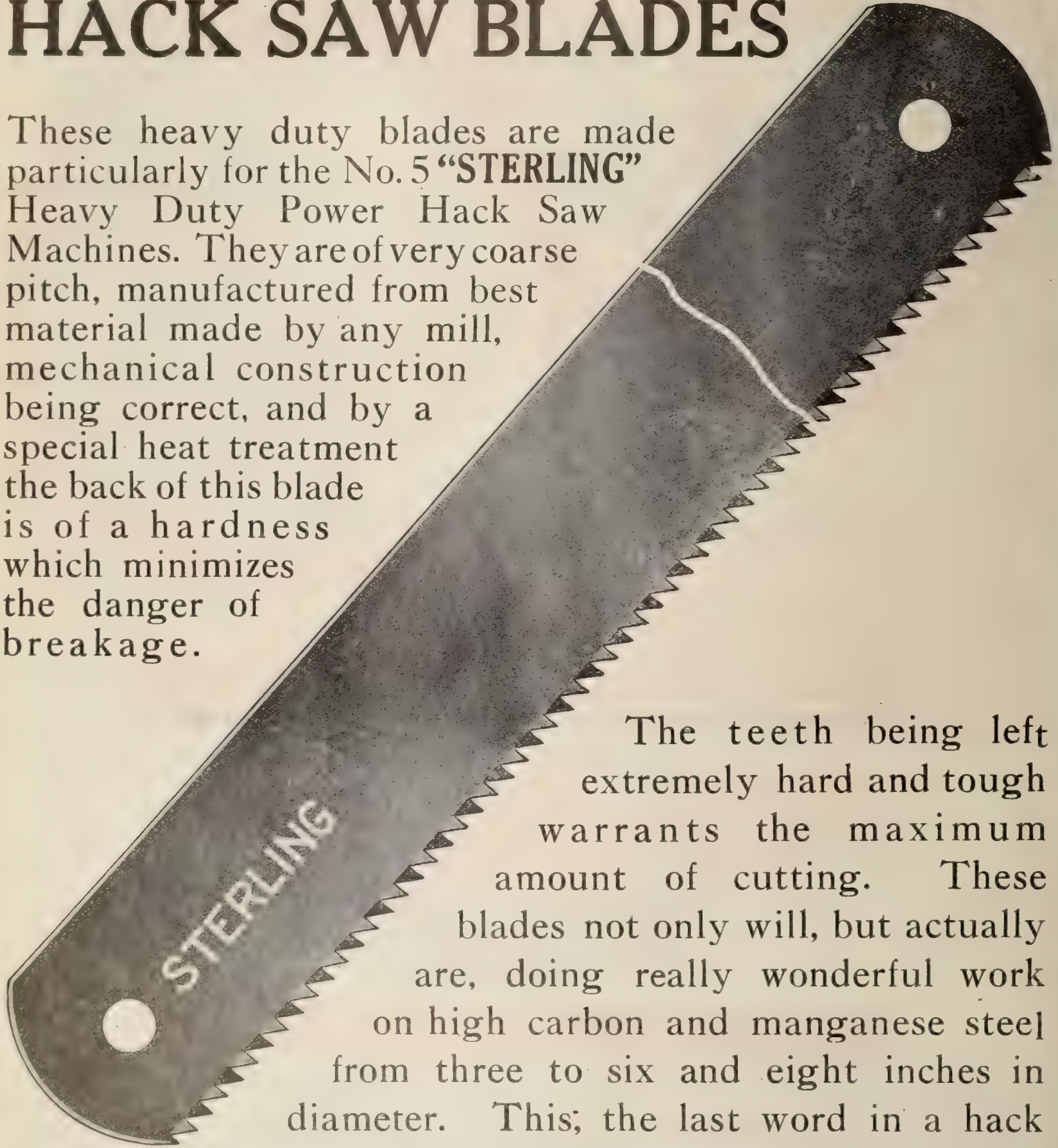
Agencies and Distributing Warehouses:

MONTREAL, QUE. ST. JOHN, N.B. TORONTO, ONT.
FORT WILLIAM, ONT. PORT ARTHUR, ONT.

LONDON OFFICE: 90 Fenchurch Street - PARIS OFFICE: 55 Rue de Chateaudun

"STERLING"

HACK SAW BLADES



These heavy duty blades are made particularly for the No. 5 **"STERLING"** Heavy Duty Power Hack Saw Machines. They are of very coarse pitch, manufactured from best material made by any mill, mechanical construction being correct, and by a special heat treatment the back of this blade is of a hardness which minimizes the danger of breakage.

The teeth being left extremely hard and tough warrants the maximum amount of cutting. These blades not only will, but actually are, doing really wonderful work on high carbon and manganese steel from three to six and eight inches in diameter. This, the last word in a hack saw blade, is manufactured by

DIAMOND SAW & STAMPING WORKS

357-361 Seventh Street, BUFFALO, N.Y., U.S.A.

Brown Engineering Corporation
Limited
415-419 King St. W., Toronto, Canada
Tel. Adelaide 1535

MADE IN
BR-EN-CO
CANADA

Special Machinery,
Gear Cutting
Tools and Gauges
for Munitions,
Tooling Equipment
for Shell Machinery
Tools and Gauges
to Order

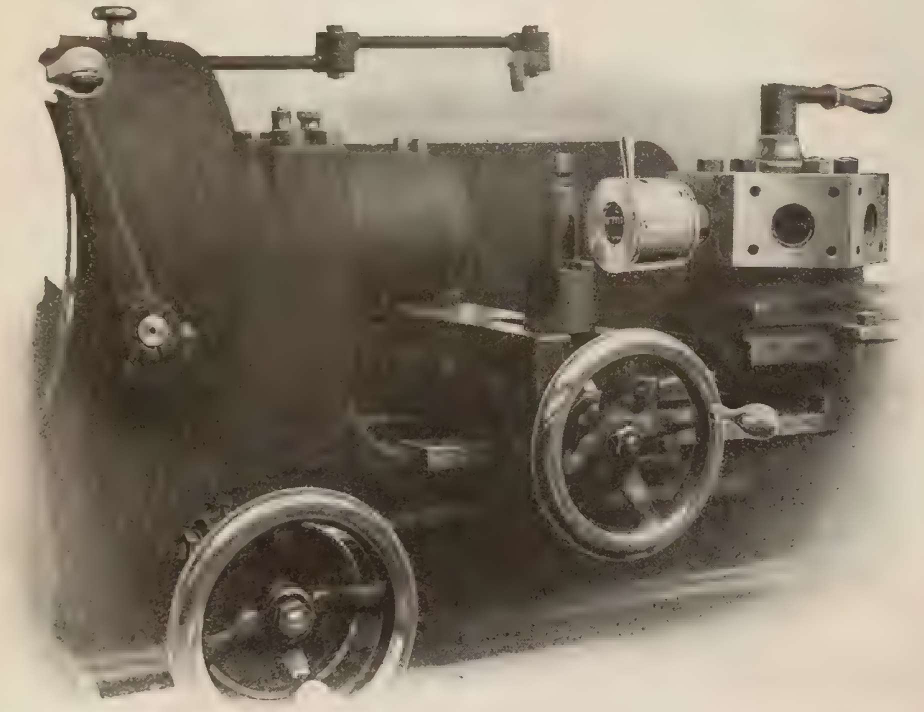
We are equipped with a 36-inch Fellows Gear Shaper for Custom Gear Cutting and are prepared to give prompt service.

Write us for prices on our Special Hammer Attachment for nosing 6-inch Shells. It will save you money.

THE IDEAL DIE

SELF-OPENING ADJUSTABLE

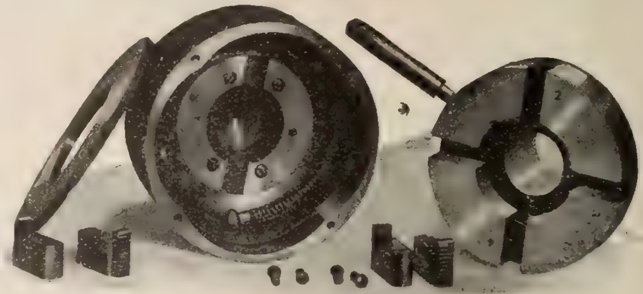
With Simplicity for Continuous Threading



"IDEAL" ACCURACY

Ideal Self-Opening Dies are big time-savers. This is the prompt verdict of all IDEAL users; but aside from that, they have an advantage of extreme importance, positive accuracy, only six loose working parts—with every wearing surface specially hardened—that's the reason why the IDEAL cuts clean, accurate threads at high speed throughout its long life. Moreover, the opening of the die is positive, utilizing the belt power or cutting strain with no dependence on a spring.

For big economy in your turret lathe and screw machine threading jobs, use the "IDEAL," a fitting name for this die head. We named it that because of its mechanically perfect design. Users call it that because of its practically perfect results.



IDEAL ALL-WAYS

Send prints or samples of work and we shall be pleased to give full information regarding your requirements.

The Ideal Tool & Manufacturing Company

BEAVER FALLS, PA., U.S.A.

A. M. ELLICOTT CO., Montreal, Quebec, Distributors for Province of Quebec and Ottawa

High Speed Steel

"ELECTRITE"

Made With Uranium

By introducing URANIUM into the manufacture of our High Speed Steel, we have achieved what users of High Speed Steel ere now had never even dared hope for. We have gained the greatest of metallurgical triumphs.

"ELECTRITE" stands as a symbol of perfection in High Speed Steel.

Besides our different grades of High Speed Steel, we manufacture Permanent Tungsten Magnet Steel; "Select" Die Steel for hot work; "Mangano" non-Shrinkable Die Steel; "Renown" Special Die Steel for drawing dies; "Special" and "Extra" Water Hardening Carbon Steels.

Latrobe Electric Steel Company, Latrobe, Pa.

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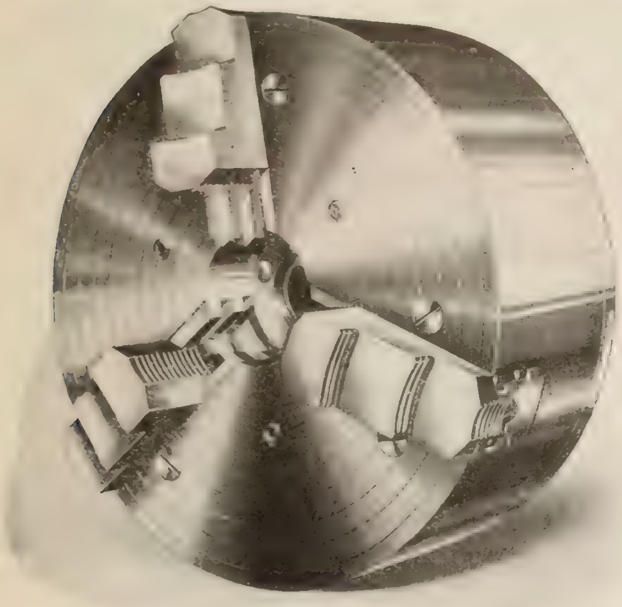
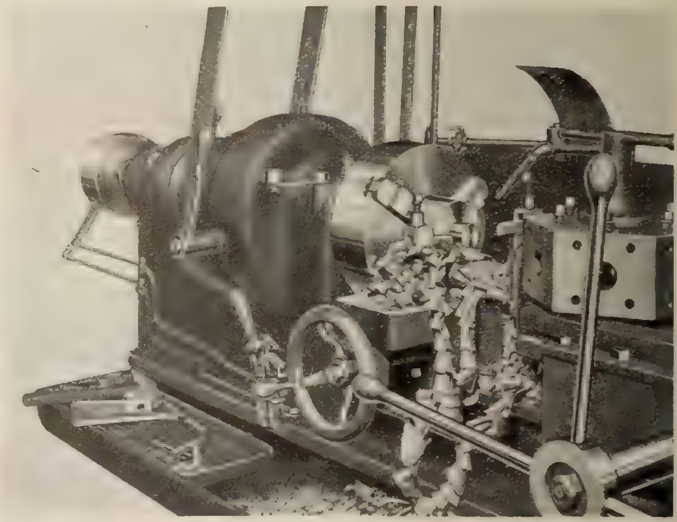
165 Broadway, New York City
Monroe and Jefferson Streets, Chicago

40 Central Street, Boston
1st National Bank Building, Pittsburgh

1608 Jefferson Ave., Toledo
2230-2240 East Ninth Street, Cleveland

MANUFACTURERS EQUIPMENT COMPANY





M. E. C.

Three Jaw Steel Body Air Operated Chucks

Will increase productive power of machines several times on general work. Work up to four or five inches can be chucked with M. E. C. Chucks without stopping machines.

BECAUSE YOUR OUTPUT

has become such a serious problem the advantages of using

M. E. C.

Three Jaw Steel Body Air Operated Chucks

will appeal to you the same as they have appealed to so many other Canadian and foreign concerns. Here are some of the winning advantages of M. E. C. AIR OPERATED CHUCKS:

Whether three-jaw or of the Hinge Collet Type, they hold work in a positive rigid grip. No wrench required. No need for operator to leave front of machine. Operating costs lowered to extent you cannot afford to ignore.

REMEMBER—we are in a position to furnish SPECIAL CHUCKS and AIR OPERATED EXPANDING MANDRELS for a large variety of work. Acquaint us with your problems NOW.

Full details of the M. E. C. AIR OPERATED CHUCKS AND COLLAPSIBLE TAPS cheerfully furnished.

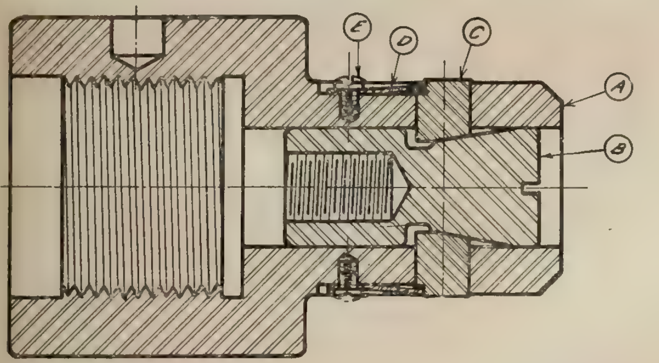
Manufacturers Equipment Company

Foreign Agents:
C. W. Burton Griffiths & Co.
Ludgate Circus, Ludgate Hill,
London, England.

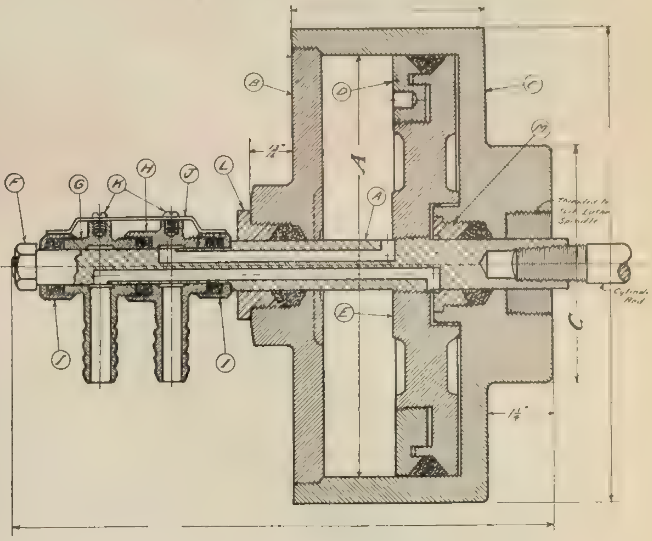
175-179 North Jefferson St.
Chicago, Ill. U.S.A.

Canadian Agents:
A. R. Williams Machinery Co.,
Limited, Winnipeg and Toronto

MANUFACTURERS EQUIPMENT COMPANY



M.E.C. Mandrels



M.E.C. Air Cylinders

M. E. C.

Air Operated Chucks and Expanding Mandrels

THERE IS A REAL REASON why there is such a demand for M. E. C. Air Operated Chucks and Expanding Mandrels—namely—100% efficiency is obtained. M. E. C. 100% efficiency tools have proven their wonderful ability in shell making plants. In Canada, Great Britain, Russia, France, India and other foreign countries they have become FAMOUS.

M.E.C. Mandrels

In shell production M. E. C. Mandrels have proven invaluable, as well as indispensable. M. E. C. Mandrels furnished for rough and finished work. Inquiries invited regarding YOUR particular problems.

M.E.C. Air Cylinders

have proven a boon where there are difficulties to contend with. Strength, quality and latest developments embodied in their construction. *Piston permits adjustment, preventing loss of air.*

Manufacturers Equipment Company

Foreign Agents:
C. W. Burton Griffiths & Co.
Ludgate Circus, Ludgate Hill,
London, England

175-179 North Jefferson St.
Chicago, Ill. U.S.A.

Canadian Agents:
A. R. Williams Machinery Co.
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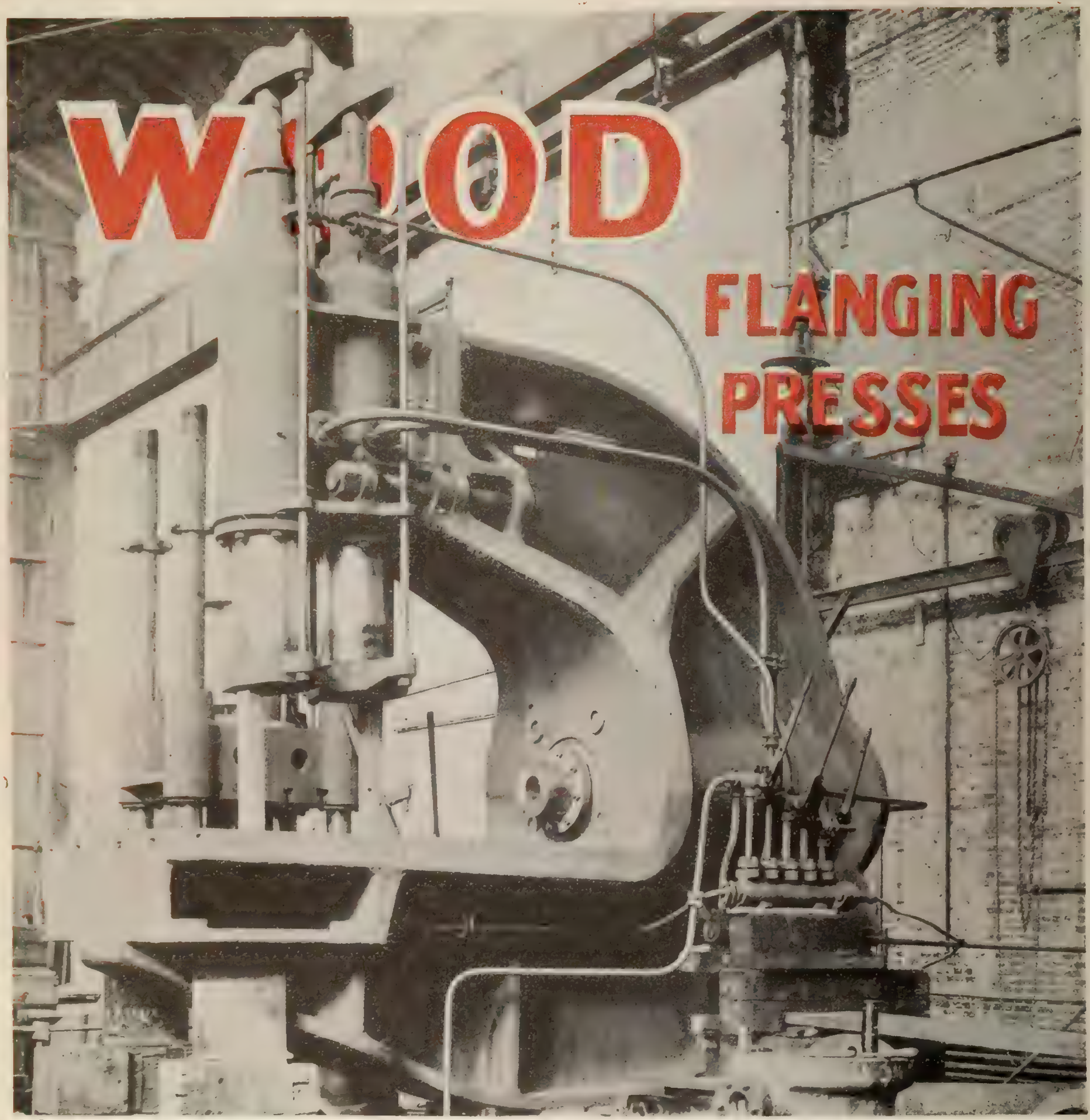
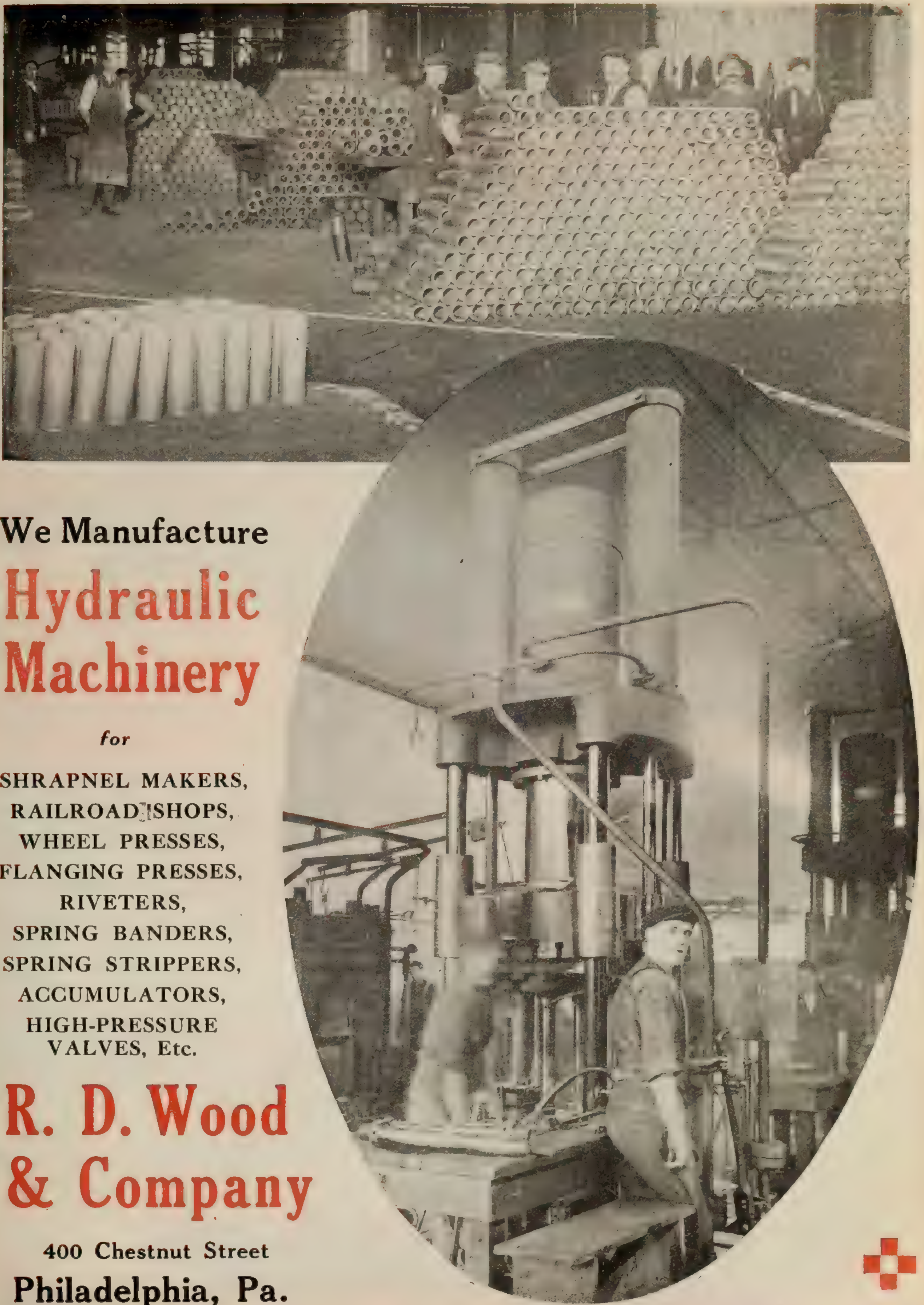


This cut will illustrate the solidity and strength, characteristic of our Hydraulic Machinery. It will be remembered that we are the Pioneers of this class of machinery, and not only in America, but abroad our designs have been followed as closely as permitted.

Write us for details of any Hydraulic Machinery, and if you have a special problem, we will be glad to work it out with you.

R. D. Wood & Co.

400 Chestnut Street, Philadelphia, Pa.



We Manufacture

Hydraulic Machinery

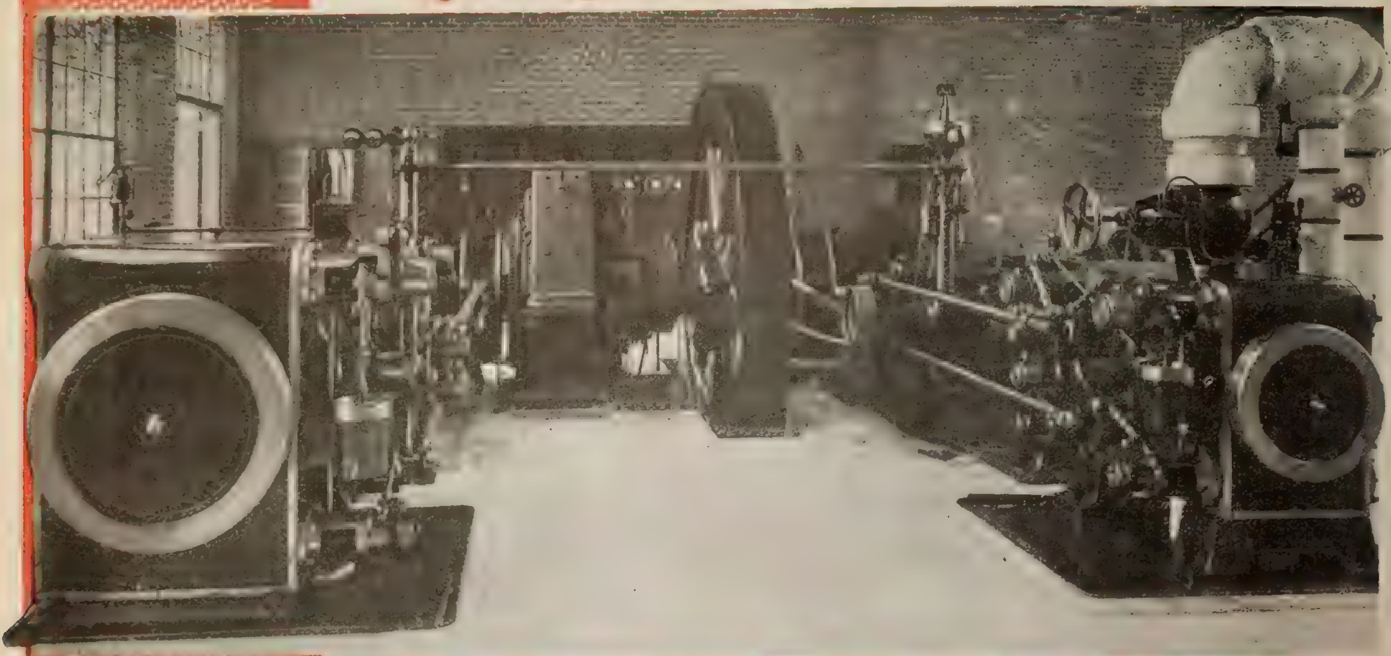
for

SHRAPNEL MAKERS,
RAILROAD SHOPS,
WHEEL PRESSES,
FLANGING PRESSES,
RIVETERS,
SPRING BANDERS,
SPRING STRIPPERS,
ACCUMULATORS,
HIGH-PRESSURE VALVES, Etc.

R. D. Wood & Company

400 Chestnut Street
Philadelphia, Pa.

Inglis Engines carrying a big load continuously



INGLIS

Illustration shows our *Horizontal Cross Compound Heavy Duty Corliss Engine* direct connected to a 300 K.W. direct current Westinghouse Generator.

Double wrist gear for long range cut-off, carrying extremely heavy overloads is another strong feature.

Governor is arranged to control both the high and low pressure gears.

Steam and exhaust valve are double ported.

Tell us your particular requirements and we'll gladly give you the fullest particulars on Inglis Engines especially suited to the purpose.

The John Inglis Company, Limited

ENGINEERS AND BOILERMAKERS

14 Strachan Avenue **TORONTO, Canada**

"Inglis" Boilers

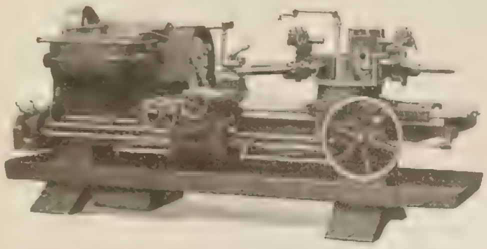
are made to last a lifetime. They are the Canadian "Standard" for materials, workmanship, value and service. We build boilers of all kinds for any service. We are also sole Canadian manufacturers of the Erie City Water Tube Boilers. **Absolute Satisfaction Guaranteed.**

Write us for prices and specifications.

The John Inglis Company, Limited

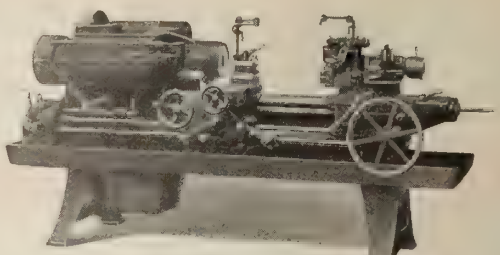
ENGINEERS AND BOILERMAKERS

14 Strachan Avenue **TORONTO, Canada**



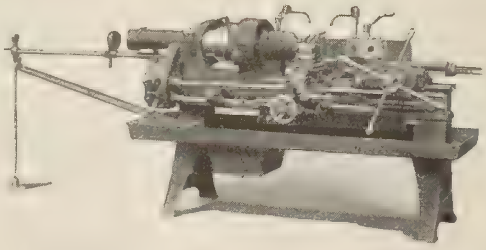
No. 3-A Universal Hollow-Hexagon Turret Lathe with Chucking Equipment.

Bar Stock, 3½" x 40".
Swing-over Bed, 21½".
Swing-over Carriage, 17¼".



No. 2-A Universal Hollow-Hexagon Turret Lathe with Bar Equipment.

Bar Stock, 2½" x 29".
Swing-over Bed, 16½".
Swing-over Carriage, 13¼".



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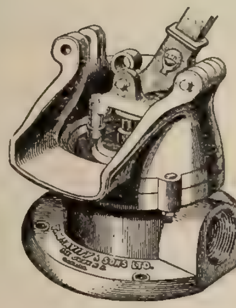

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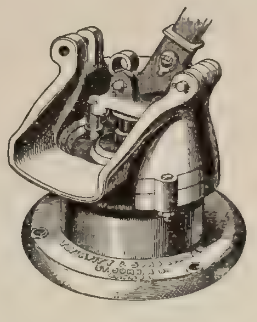

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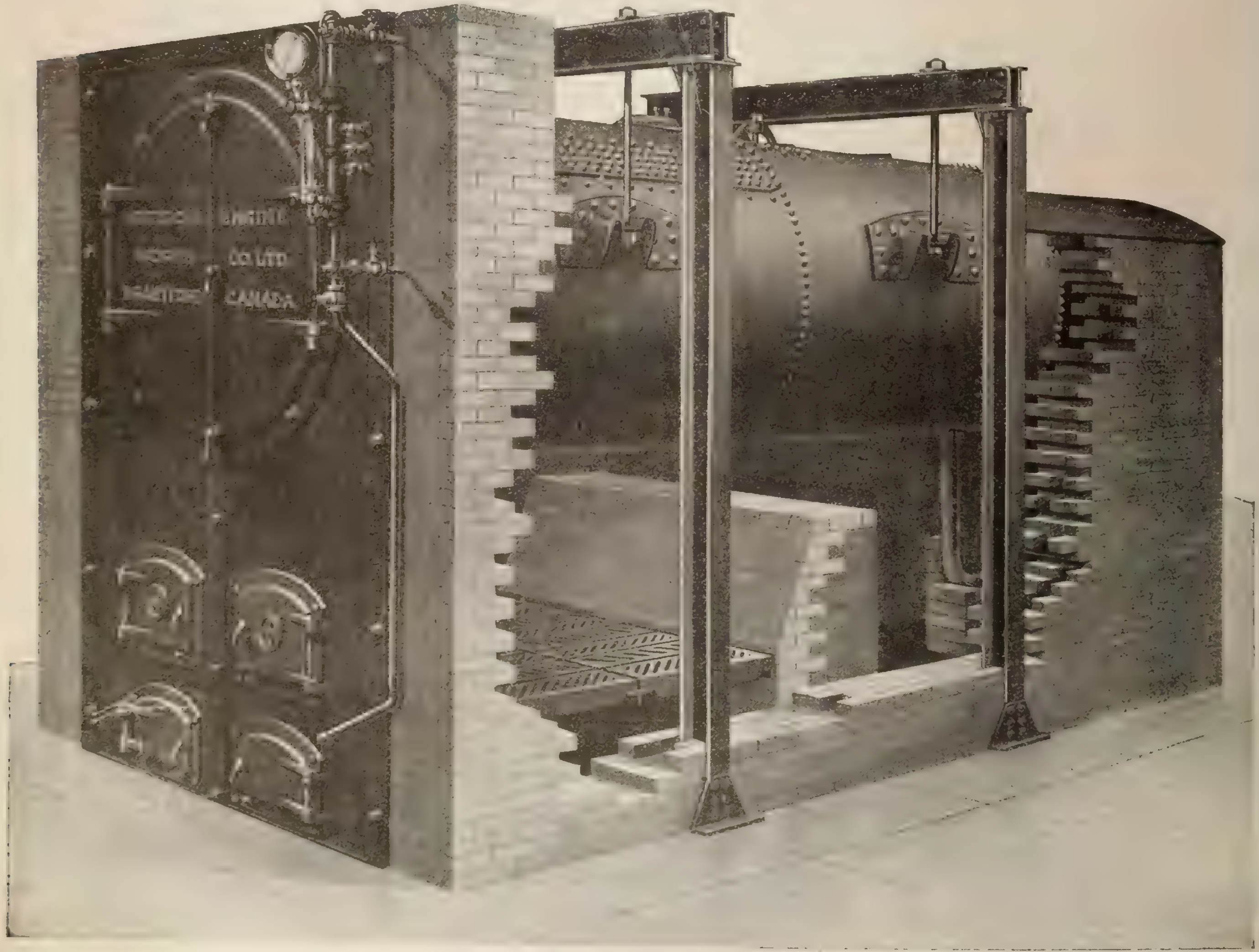

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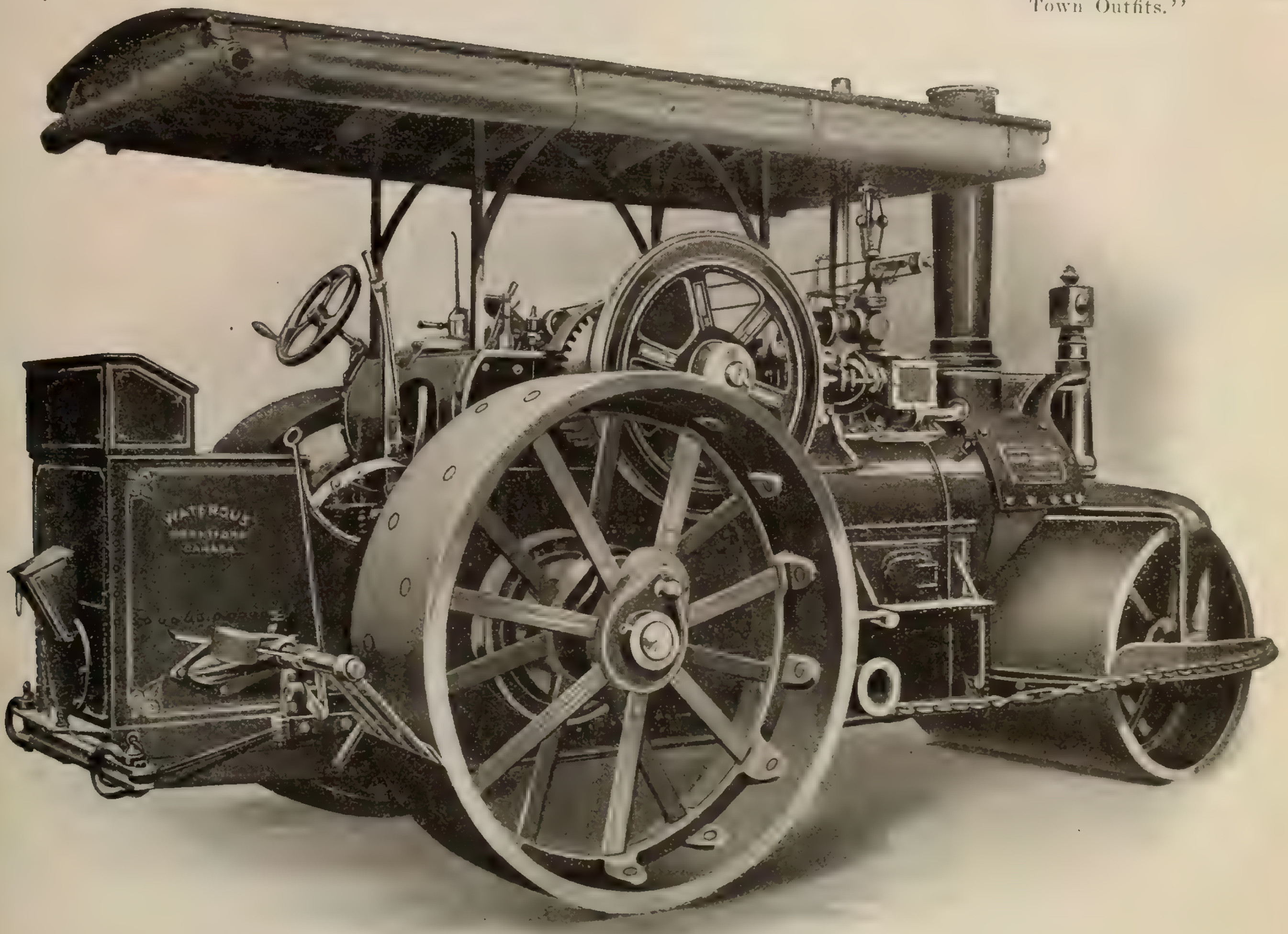

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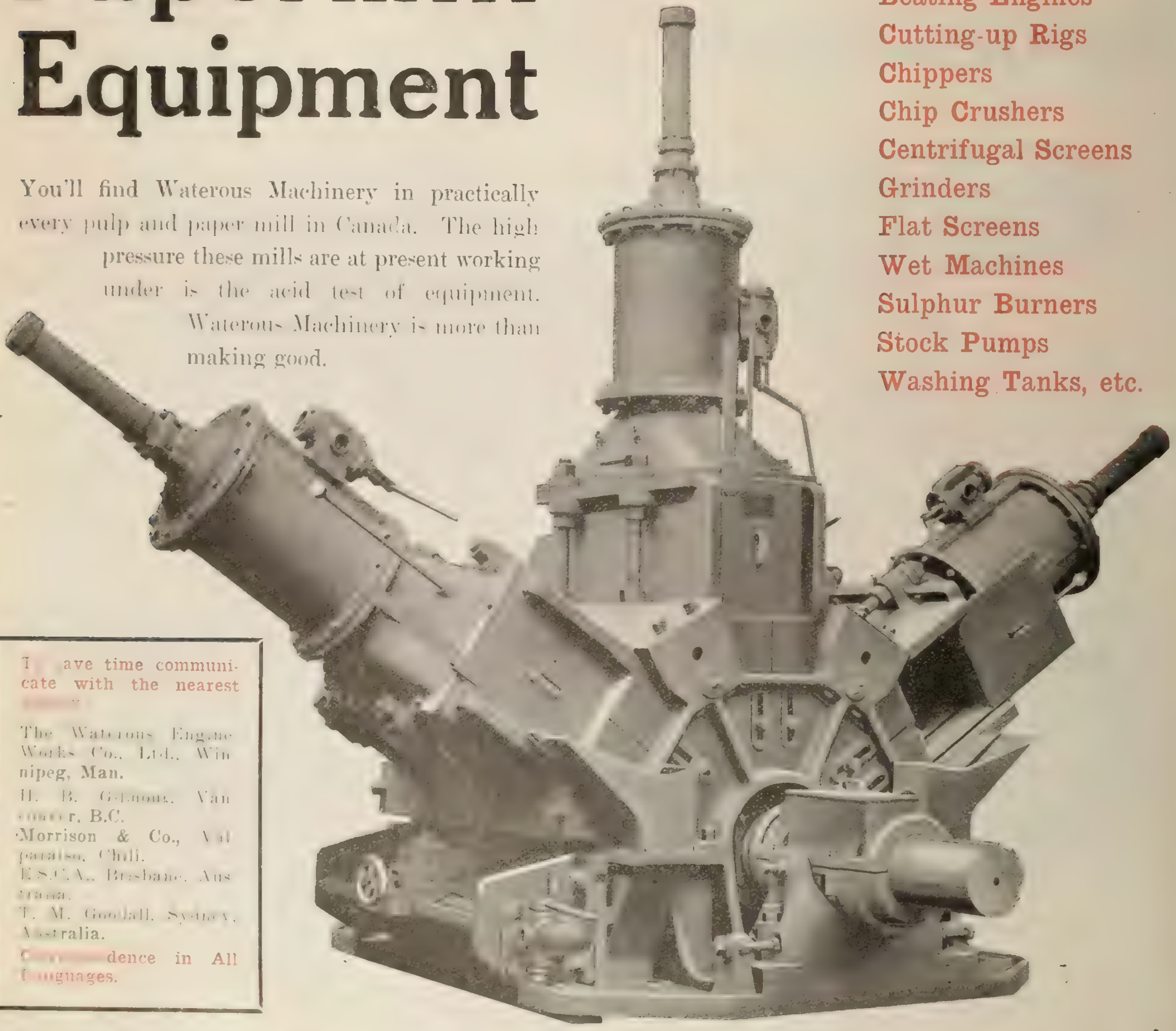

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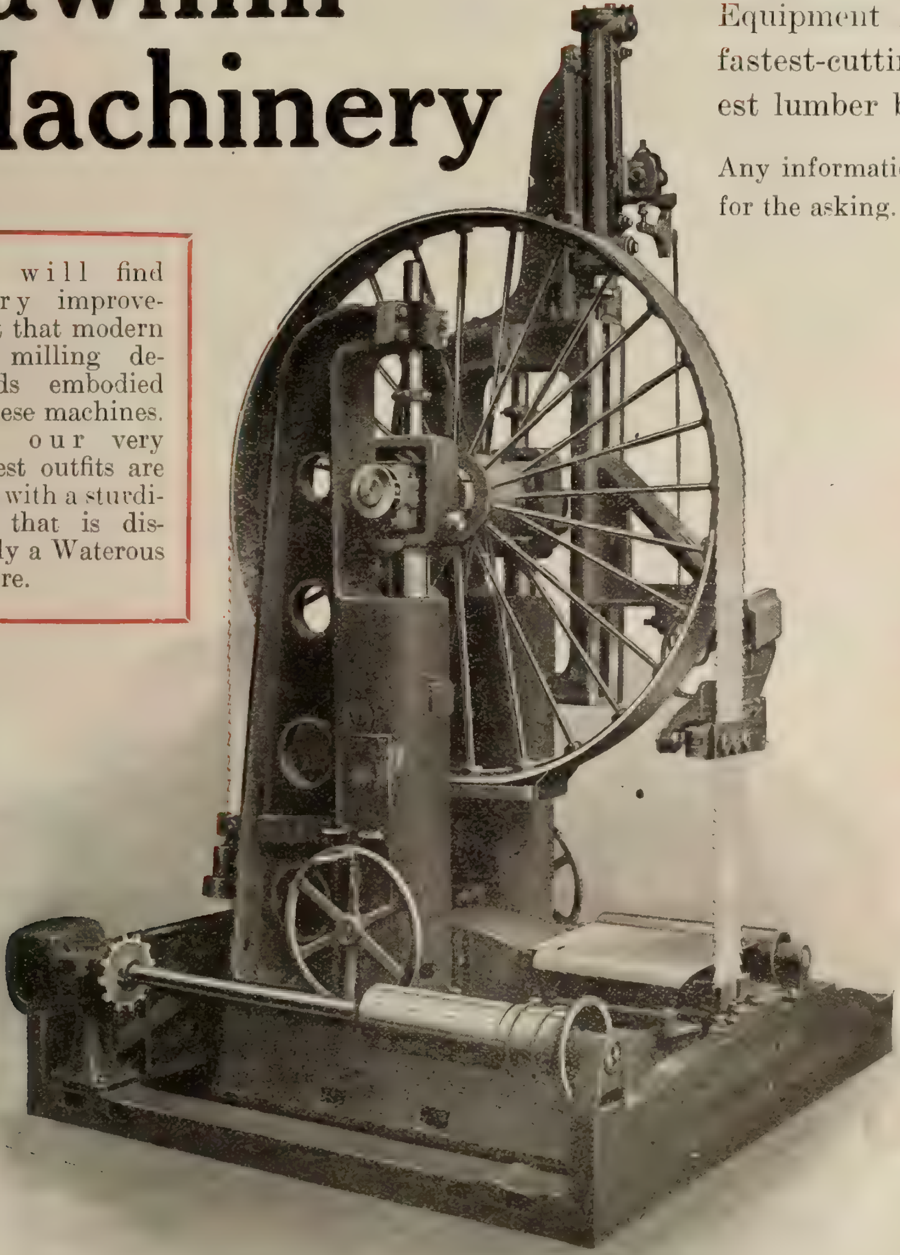

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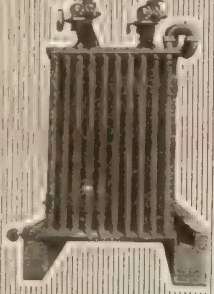

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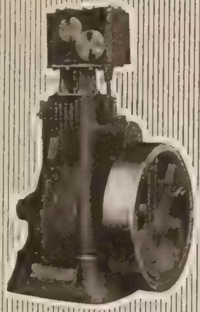

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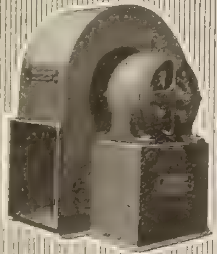

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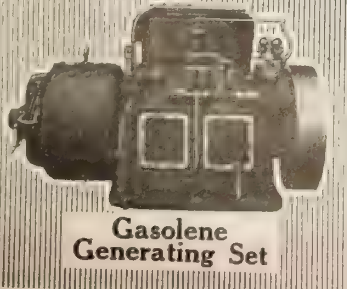

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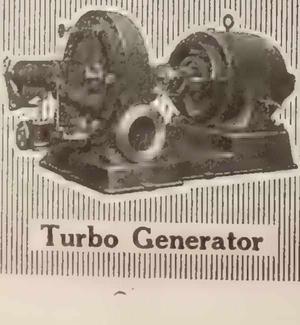

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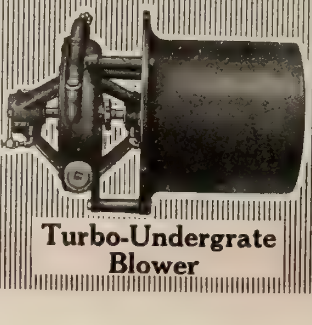

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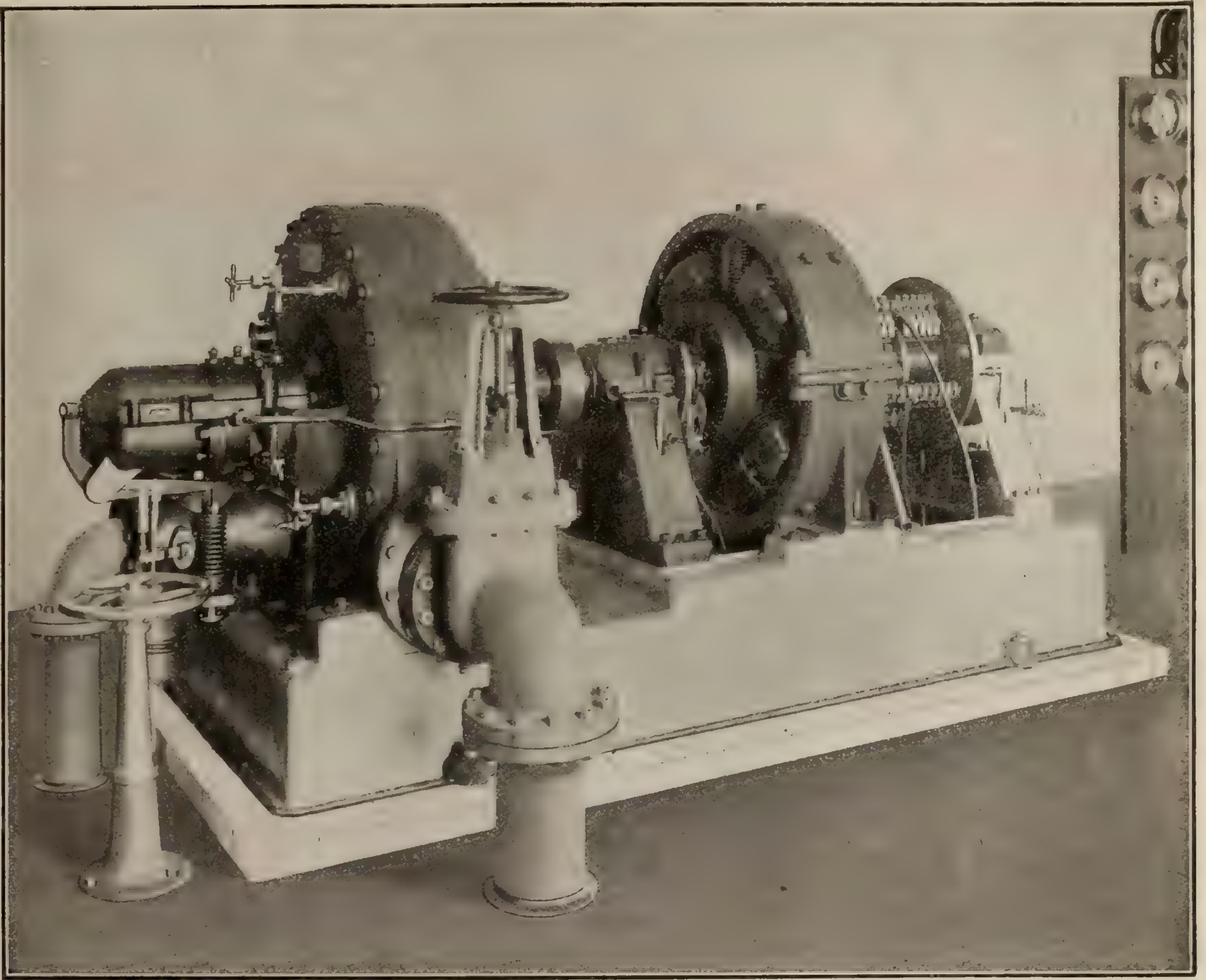

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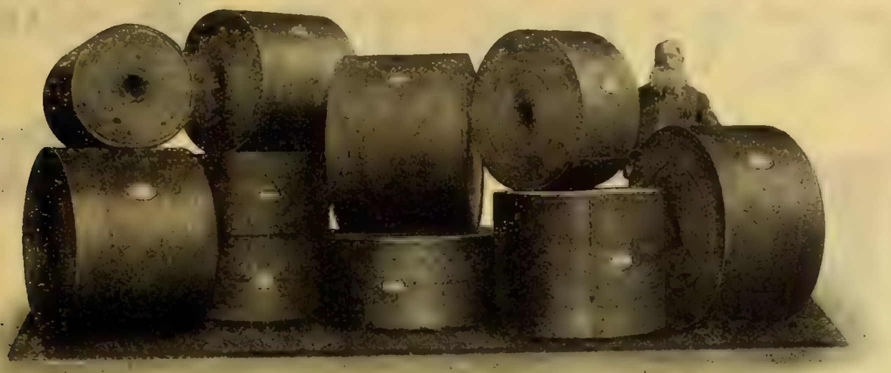

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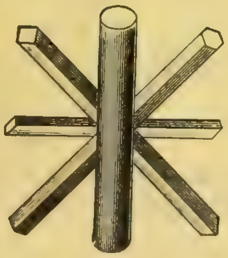

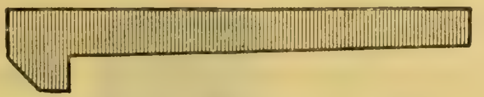

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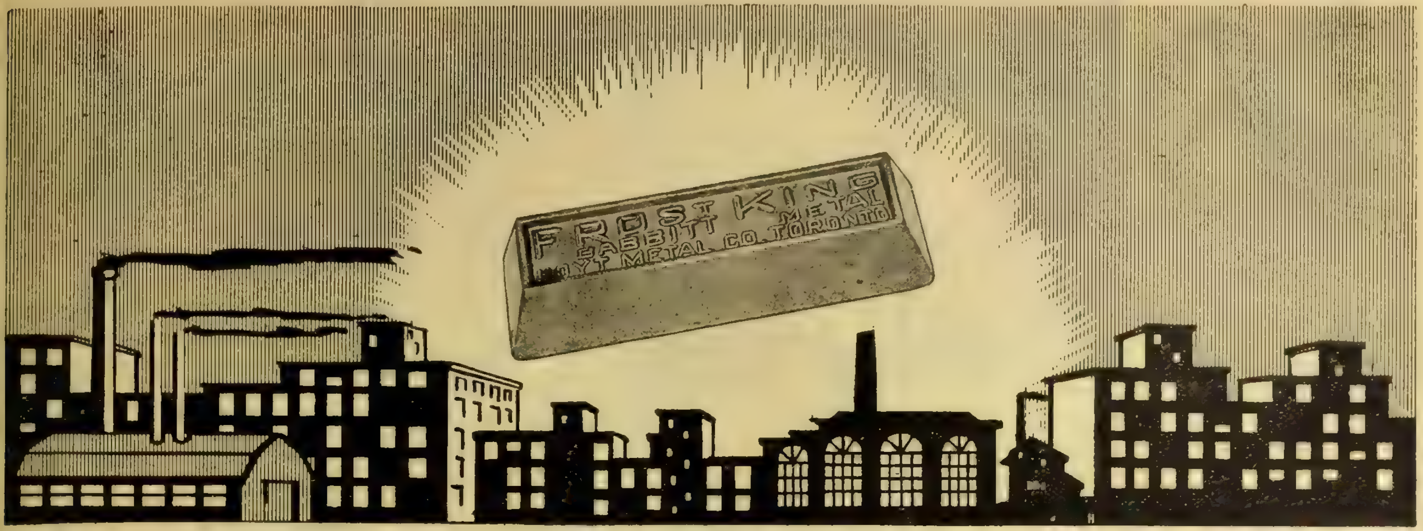

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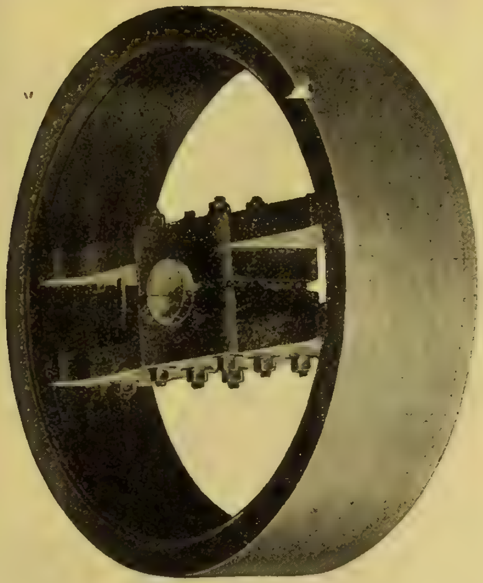

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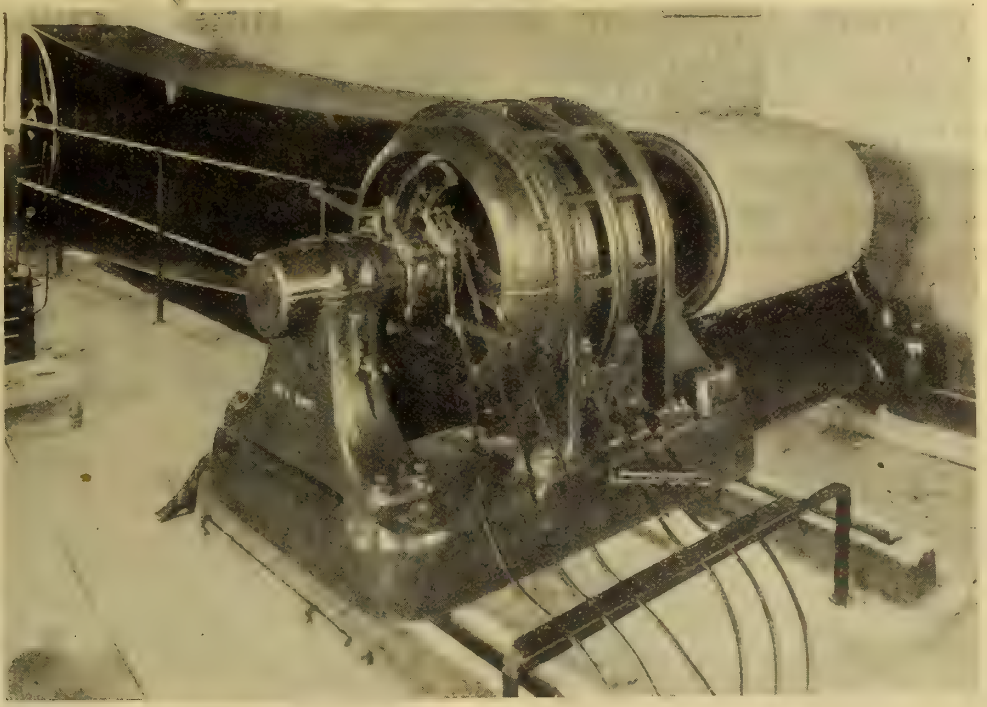
Leviathan Belting



The above photograph shows 75 ft. x 48 in. x 10 ply Leviathan Belt.

THE motor is a 500 h.p., 3 phase, 60 cycle, 2,300 volts, 600 r.p.m. This belt has been carrying a load of about 600 h.p. since 1914.

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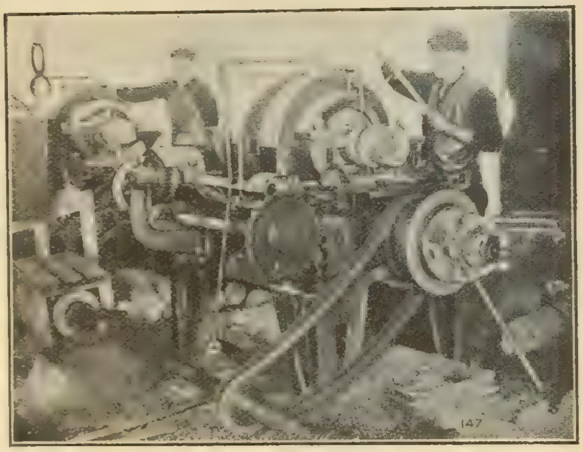
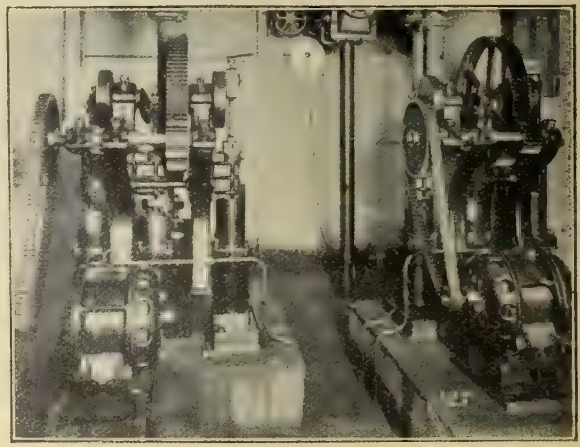


Two Heavy Duty Shell Cutting-off Machines Operated by Renold Chain Drives.



Two Triplex Pumps Operated by Renold Silent Chains in Municipal Lighting Station.

That appreciation of the **RENOLD** record of Reliability and Superiority is not limited to the Industrial World is best evidenced by the fact that for Municipal and Government Work of all kinds **RENOLD** Chains are a Standard Form of Power Transmission.

Write for Particulars.

Chain and Parts Carried in Stock.

Sole Canadian Agents:

Jones & Glassco (Reg'd.)
ENGINEERS

Branch Office:
TORONTO, ONT.

St. Nicholas Bldg.
MONTREAL, P.Q.

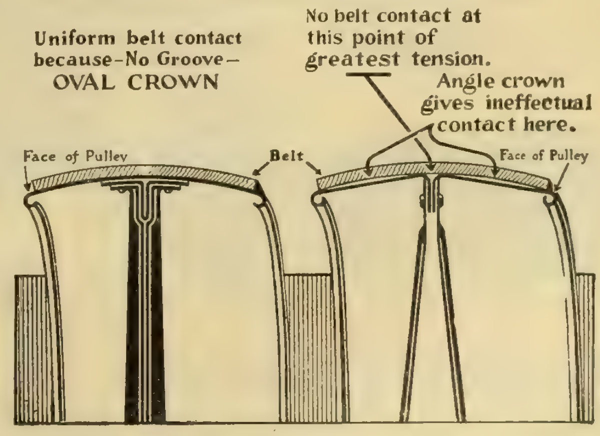
Oneida Steel Split Pulleys

If you are not using this "closest approach to pulley perfection," we have in store for you an additional means of cutting down expense and improving your plant.

For your own best interest—for the sake of your factory overhead—look into this matter of steel pulleys.

And when investigating, you might as well start in at the top, with the steel pulley that has actively demonstrated its positive superiority over all other steel pulleys—the pulley of such construction that not only makes practicable its use for ordinary line shaft work, but is also successfully built, without a change of design, in sizes capable of transmitting 750 H.P.—and more if necessary.

Let us fill your next pulley order with an Oneida. For your convenience we keep on hand a "perpetual stock" of all sizes—your urgent needs can be filled at once.


Uniform belt contact because-No Groove-OVAL CROWN
No belt contact at this point of greatest tension.
Angle crown gives ineffectual contact here.
Face of Pulley
Belt
Face of Pulley

This advantage is tangible.

Unless a pulley has a face insuring efficient belt contact, it is not an economical pulley to use.

The Oneida is a one-piece perfect oval crown, with no groove running through the centre. All the face surface is efficient surface; the belt uniformly hugs the crown, producing the greatest amount of belt adhesion with the least belt tension. Operating conditions being the same, the Oneida will, for this reason, transmit from 5 to 20 per cent. more power than a pulley having an angle crown that requires greater belt tension to force efficient belt contact and that has a centre groove which subtracts belt area from the most vital point of the face—the centre.

ONEIDA STEEL PULLEY COMPANY

ONEIDA, N. Y., U. S. A.

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ENGINE ROOM
WEAVING ROOM
CAMEL HAIR BELTING

27 YEARS SERVICE

10 years exposed to rain, sun, snow, ice.

17 years covered in.

REDUCE YOUR BELTING BILL

BY USING

Now cheaper than leather. Gives less trouble. Lasts longer.

CAMEL HAIR CAMEL BRAND BELTING TRADE MARK REG.

STOCK
1¼" to 12" Single. 2" to 24" Double.
14" and 16" equal to 3-ply Leather.

SOLE MAKERS

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DO-ME-KO
DOMINION SHERBROOKE THE P.Q. CO. METAL
DOMINION GENUINE METAL
DOMEKO
COPPER TOUGHENED
DOMINION SHERBROOKE THE P.Q. CO. METAL
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DO-ME-KO represents a Complete Line of Babbitt and White Metal Products, especially designed to meet exacting needs of modern machinery.

Managers and Engineers will find our goods and Service unexcelled.

Prices right, and every pound guaranteed. Delivery the best.

Catalogue giving valuable information mailed free upon request.
Jobbers looking for a "Winner" should communicate with us.

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N. B. PRICHARD, Prop. and Manager

FOSS & HILL MACHINERY COMPANY
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Selling Agents for Montreal.

SHERBROOKE, QUE., CANADA

CHAPMAN

Double Ball Bearings

Style A
Style B

THE POWER SAVERS

Chapman Double Ball Bearings reduce friction loads 75 per cent., making an average total saving of power 15 per cent. to 30 per cent.

Reduce lubrication 95 per cent.

Chapman Double Ball Bearings fit any adjustable hanger, and the change can be made with but little delay to you.

If you are in need of more power Chapman Double Ball Bearings will give you 15 per cent. to 30 per cent. more without adding to your power plant.

Used in over 2,000 Canadian Factories.

Write for full particulars.

The Chapman Double Ball Bearing Co. of Canada, Limited
339-351 Sorauren Avenue, Toronto, Canada
Transmission Ball Bearing Company, 32 Wells Street, Buffalo, N.Y.

ENGINE ROOM
CAMEL HAIR BELTING

27 YEARS SERVICE

10 years exposed to rain, sun, snow, ice.

17 years covered in.

REDUCE YOUR BELTING BILL

BY USING

Now cheaper than leather. Gives less trouble. Lasts longer.

"CAMEL HAIR" CAMEL BRAND BELTING TRADE MARK

STOCK

1¼" to [illegible] 2" to 24" Double.

14" and [illegible] to 3-ply Leather.

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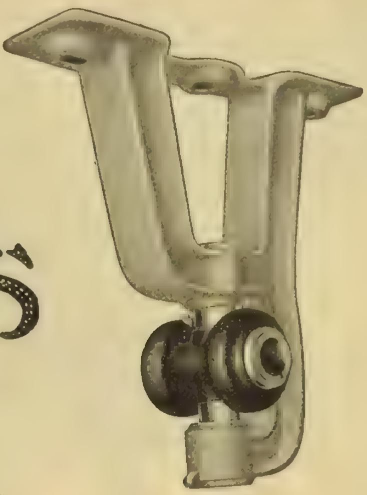
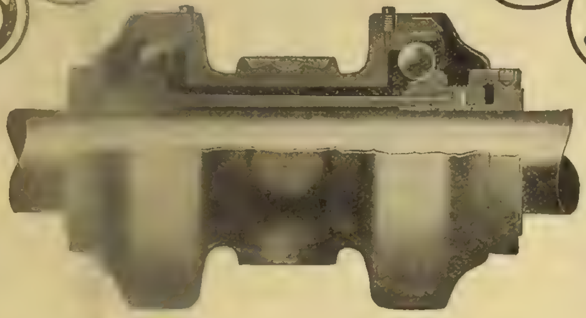
CHAPMAN

Double Ball Bearings

Style A



Style B



THE POWER SAVERS

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Reduce lubrication 95 per cent.

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Used in over 2,000 Canadian Factories.

Write for full particulars.

The Chapman Double Ball Bearing Co. of Canada, Limited
339-35 Sorauren Avenue, Toronto, Canada
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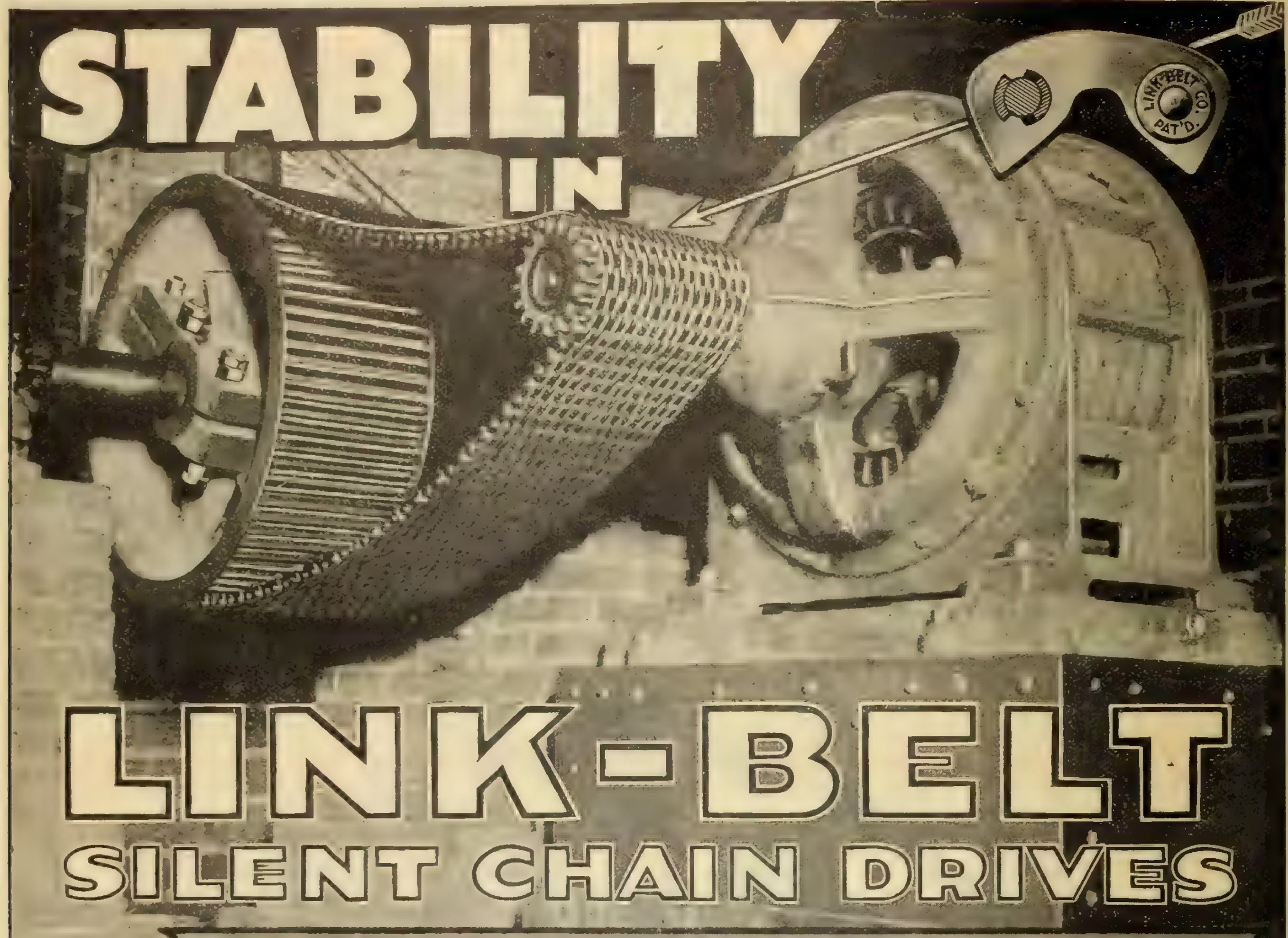
STABILITY IN



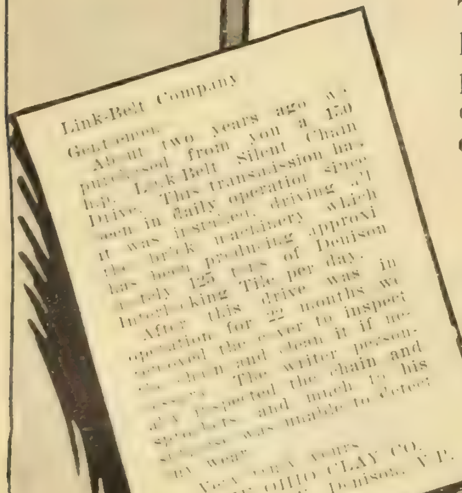
LINK-BELT

SILENT CHAIN DRIVES

STABILITY is a permanent characteristic of Link-Belt Silent Chain. Strength, sufficient to overcome all peak loads for a given horse power, is included in every drive.

Flexible as a Belt Positive as a Gear
More Efficient than Either

Transmit your power through the reliable Link-Belt Silent Chain Drive. For every turn of the prime mover there is a corresponding turn of the driven wheel. There is no slip—no loss of power or speed. For thirteen years Link-Belt Silent Chain proved its superiority over belts and gears, and is winning constantly increasing recognition for driving every conceivable kind of machinery. Learn more about this 98% transmission—write for Data Book No. 125, our 112-page price list.



Link-Belt Company

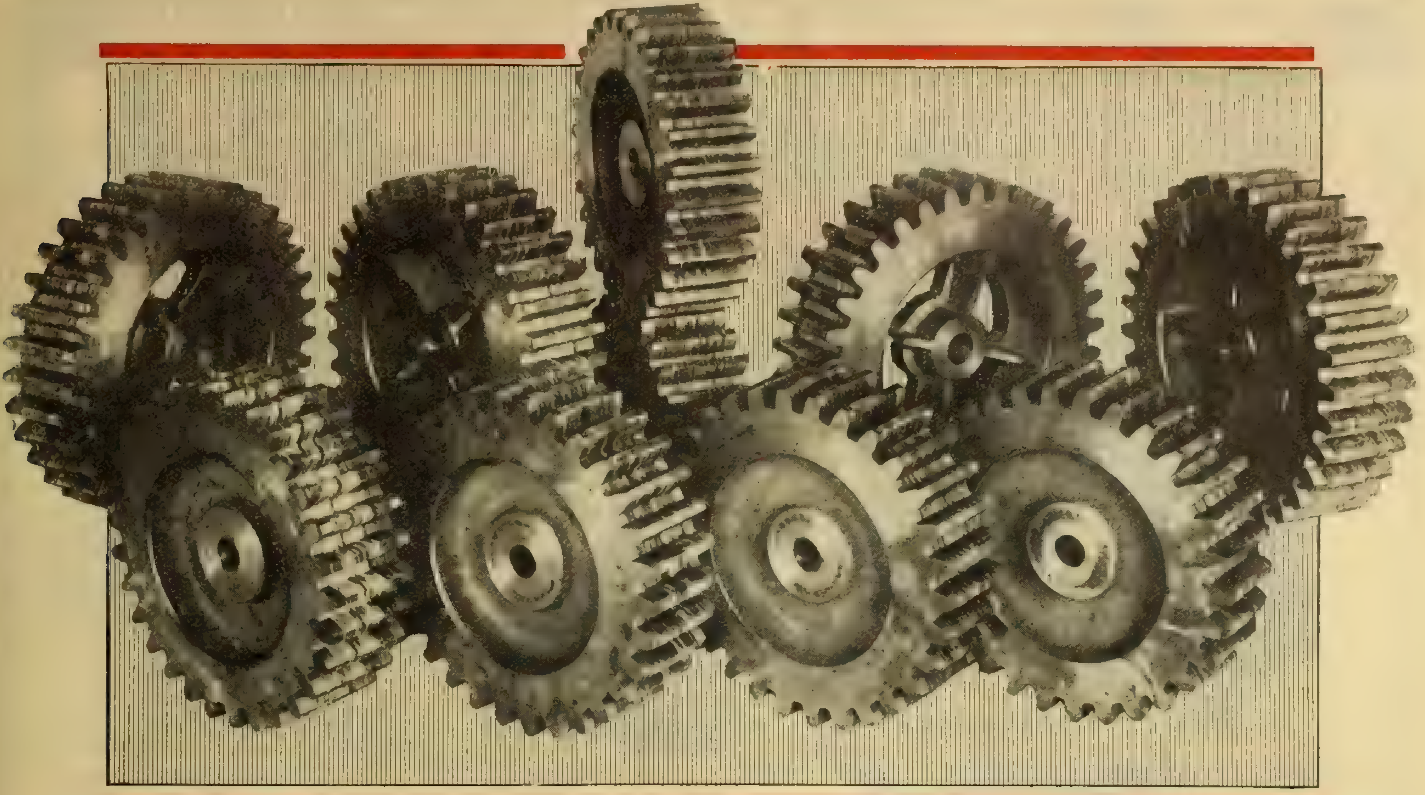
Gentlemen:

About two years ago we purchased from you a 150 h.p. Link-Belt Silent Chain Drive. This transmission has been in daily operation since it was installed, driving all the brick machinery which has been producing approximately 125 tons of Denison Interlocking Tile per day.

After this drive was in operation for 22 months we removed the cover to inspect the chain and clean it if necessary. The writer personally inspected the chain and sprockets and much to his surprise was unable to detect any wear.

Very truly yours,
THE OHIO CLAY CO.
George W. Denison, V.P.

CANADIAN LINK-BELT CO., Limited
265 West Wellington Street TORONTO



All Kinds of

GEARS

The quality of our product makes for remarkably good service.

Write us for catalog.

We specialize on "Rawhide Gears and Pinions" for quick delivery.

Besides giving you an accurately cut product, we are prepared to give you the very best of service.

"Hurry Orders and Break Down Jobs" receive special attention.

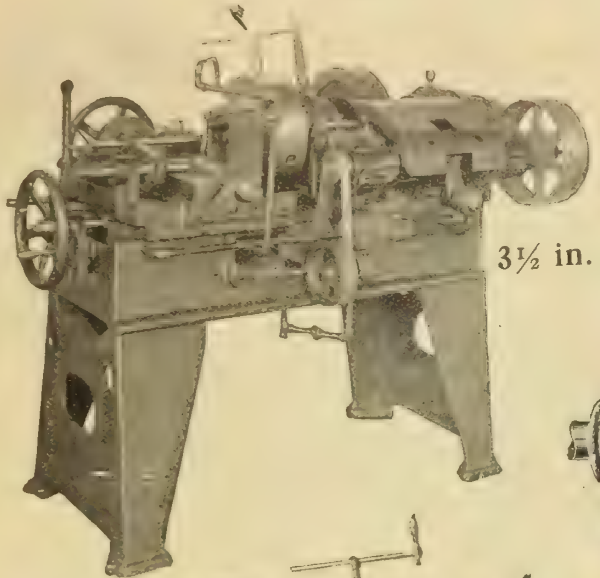
PHILA GEAR WORKS

GEO. B. GRANT, M.E.

PHILADELPHIA, PA., U.S.A.

THE JOHNSON FRICTION CLUTCH

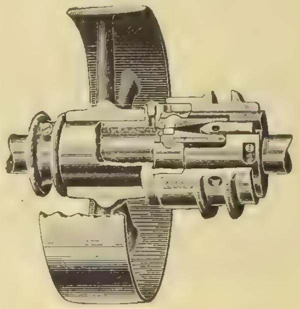
Here



3½ in.

"Spreading!"

The value of the **Johnson Friction Clutch** is finding increased recognition wherever the consideration of **Quality** is allowed to rule.

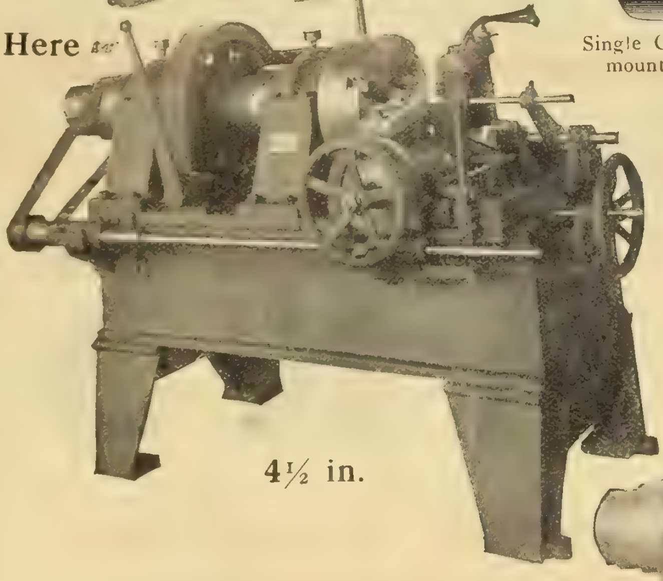


Single Clutch with pulley mounted on the hub.

A large user is the Williams Tool Co., Erie, Pa., who have adopted it for their heavy Cutting Off Machines illustrated here, the capacity of which ranges from 3½ to 5 in. of heavy bar steel.

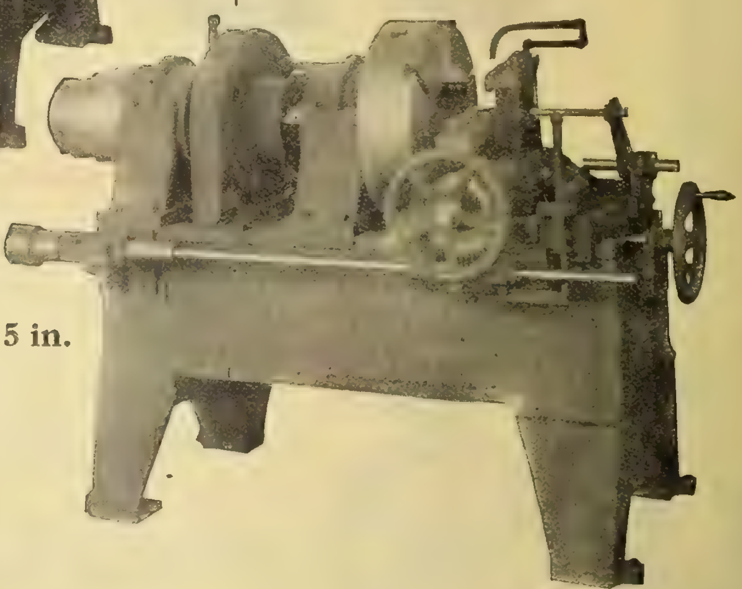
The clutches are located in the headstock, as indicated by the arrows, being operated by the simple lever action characteristic of all Johnson Clutches. The clutch is located between two spur gears and operates both for stopping and starting and change of speed.

Here



4½ in.

Here



5 in.

If you have not considered the manifold advantages of the JOHNSON Friction Clutch—it is nearly time to do so or your machine may suddenly fall into line with the "one-lung" auto and the tall hat—merely objects of curiosity.

"Clutches as applied in Machine Building" is a live book well worth reading by every machinist and machine builder. Why not write for a copy.

Send for our yellow sheets descriptive of these Clutches.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

England—The EFANDEM CO., LTD. 159-165 Great Portland Street, London, W. Sole Agents for British Isles.
Canada—WILLIAMS & WILSON, 320 St. James Street, Montreal. THE CANADIAN FAIRBANKS-MORSE CO., LTD., Toronto

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GENUINE BRITISH-OAK TANNED

Leather Belting

Grip that will give you more revolutions per minute

Our old, genuine British oak method of tanning is proving its superiority everywhere — it makes a **tougher, more flexible and more durable belting.**

Practically no taking up is required which means a saving of time and labor.

Users say—"The best ever." Let us put you in touch with them and **you'll see.**

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GENUINE OAK
REGISTERED TRADE MARK

1851
G&K
TRADE MARK
REG. U.S. PAT. OFF

LEATHER PACKINGS

The value of any packing depends entirely upon its wearing qualities and power of resistance to destructive agencies.

G & K Leather Packings possess these essential qualities to the highest degree, because they are made in a correct, technical manner from leather exactly suited to the conditions under which the packings are to be used.

There are G & K Leather Packings for all ordinary requirements, there are also G & K Leather Packings which will resist to a greater degree than any other packings exposure to heat, hot or cold water, gas or acid fumes, oil, steam or other adverse conditions.

In short, for any service and every service, G & K Leather Packings mean better packing service to-day, to-morrow, and years from to-morrow.

Our Packing samples, prices and literature should interest you.

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Oak Leather Tanners and Belt Makers

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Canadian Agents:
THE CANADIAN FAIRBANKS-MORSE CO., LIMITED
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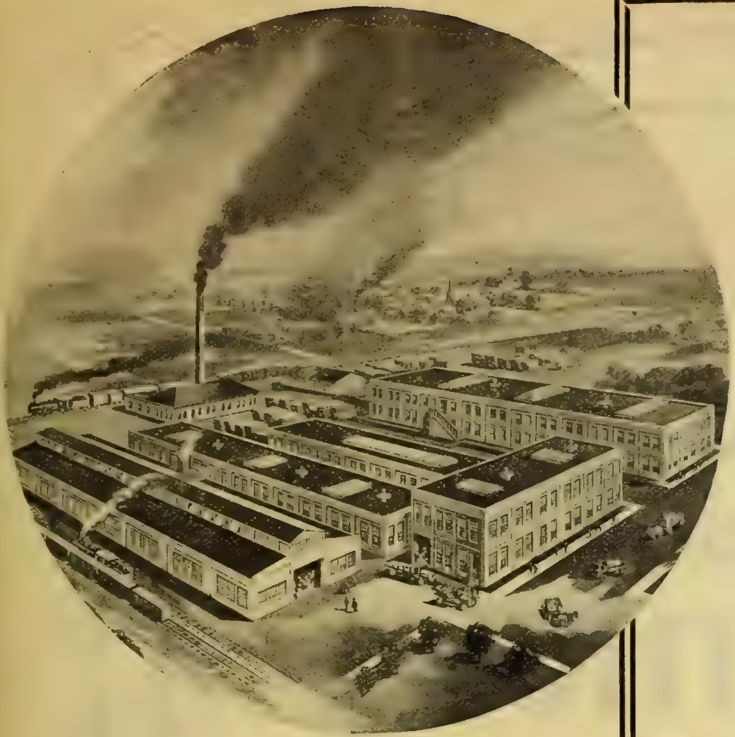
MAKERS OF LEATHER 1851 G&K **BELTING**



The Positive Clutch and Pulley Works,
Limited

MANUFACTURERS OF

IMPROVED POWER TRANSMISSION APPLIANCES

Our Clutches have set the standard of efficiency by which all other types are judged. Their merit lies not in intricate ingenuity, but in simple, positive action, well balanced design, sound material and workmanship.

The growing demand for our Wood Pulleys and Combination Pulleys, both at home and abroad, is the best evidence of the merit of our product.

Our catalogue is yours. Write for it now.

GENERAL OFFICE AND FACTORY:
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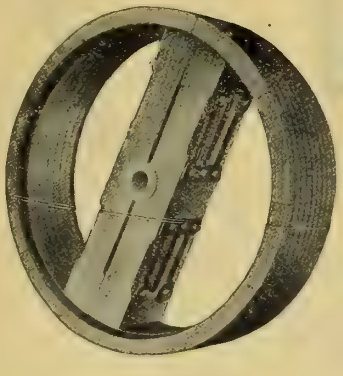

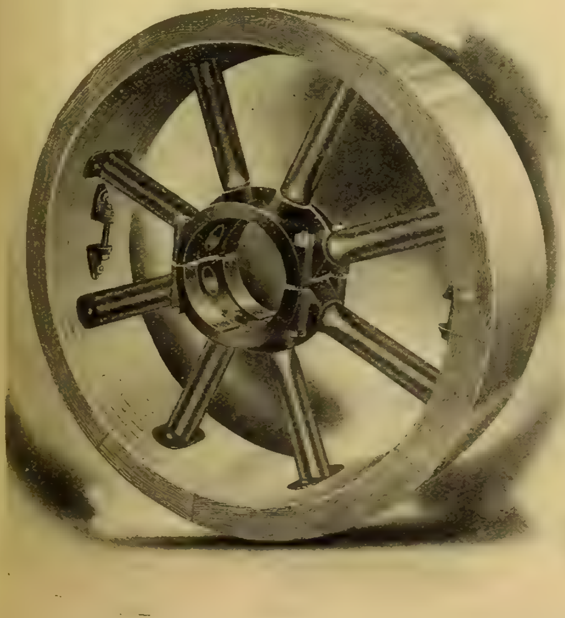

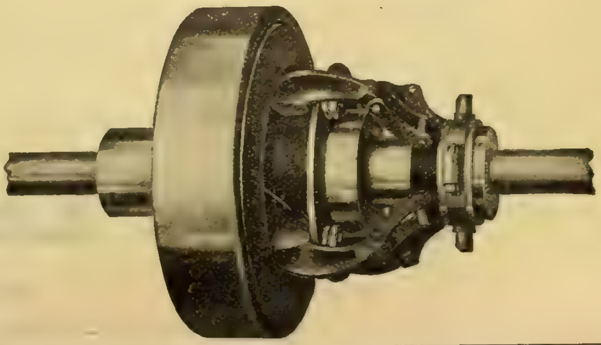

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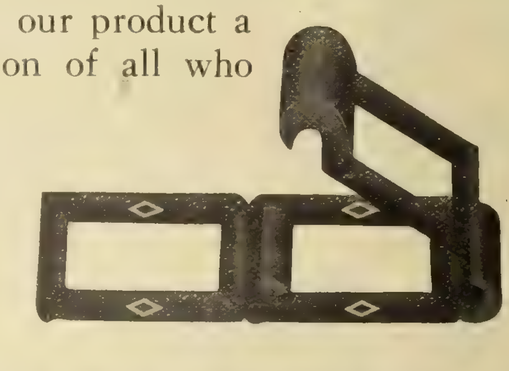
Detachable ◇ Link ◇ Belting

Experience in the making of LINK BELTING ranging well over 30 years, and a continuous effort to keep to the front in quality have given our product a high place in the estimation of all who know.

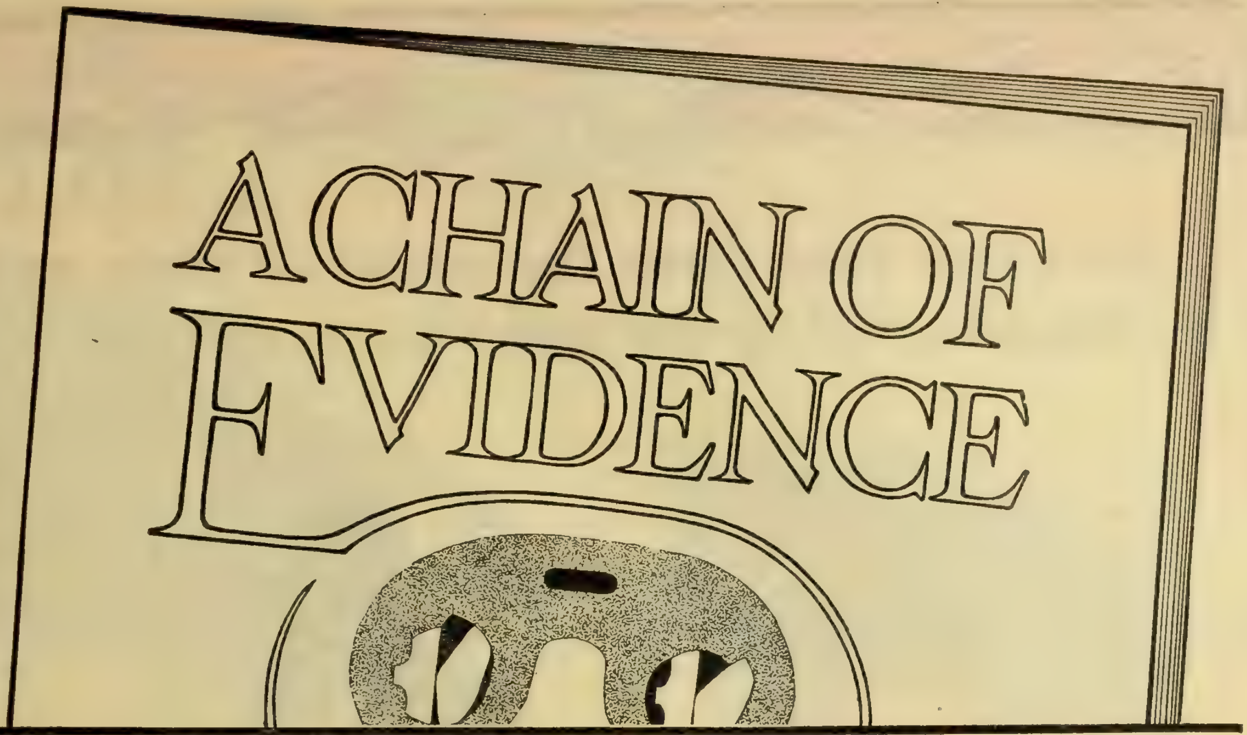


Large stocks always in readiness to meet your needs.

Write for particulars.

Fittings Limited, Oshawa

MONTREAL WINNIPEG VANCOUVER



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If you use power at all, you will be interested in our Publication, No. 15

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OUR business has been built up largely on the foundation of service rendered by "small power drives." With 1,500,000 horsepower of MORSE "Rocker-Joint" Silent Chains now in use, imagine for a moment the thousands of different applications. They have entered practically every power-using industry, from A to Z, and everywhere have given the same uniform economical service, meeting our own expectations and satisfying our customers.

Get a copy of this bulletin and look around your shop or factory and see where a more quiet drive would be welcome, where a more efficient drive would add considerably to your production, or where a little space could be more advantageously utilized. Then think how well a chain drive,—"MORSE, of Course,"—will meet your requirements.

MORSE CHAIN COMPANY, ITHACA, N. Y.

MORSE CHAIN CO., Ithaca, N. Y.
Please send me a free copy of your new publication, Number 15.
A CHAIN OF EVIDENCE, devoted exclusively to "Small Power Drives."

NAME ____________
COMPANY ____________
ADDRESS ____________

Can. Mach. Dec. 28, 1916

Publication No. 15

Small Power Drives

MORSE CHAIN COMPANY ITHACA, NEW YORK

"If you can look into the seeds of time and say which grain will grow and which will not—"

SHAKESPEARE

TO the eye of even the most experienced agriculturist two seeds may be identical, yet upon test one may grow while the other may remain dormant.

It's the test that proves the value of anything. It's the severe test that has been given

HARRIS Heavy Pressure Babbitt Metal

during the past thirty years that has proved its unequaled worth for use on

All General Machinery Bearings.

The rigid tests we make enable us to **guarantee our Babbitt Metals**

TO GIVE EXCELLENT SERVICE.

WE HAVE EVERYTHING IN METALS, AND ARE THE LARGEST EXCLUSIVE METAL DEALERS IN THE DOMINION OF CANADA.

HARRISMETAL
HEAVY
PRESSURE
MADE BY
CO LIMITED
CANADA METAL CO.

The Philosophy of W. G. Harris, Senior

I cannot understand the cast iron conscience of the man who, in time of war, persists in buying foreign-made goods to the detriment of his country.

BUY

HARRIS Heavy Pressure

The Babbitt Metal without a fault.

Made in Canada

The Canada Metal Co., Limited

TORONTO

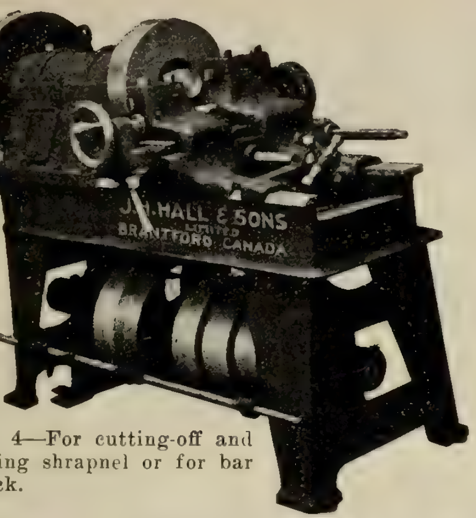
Hamilton - Montreal - Winnipeg - Vancouver

HALL

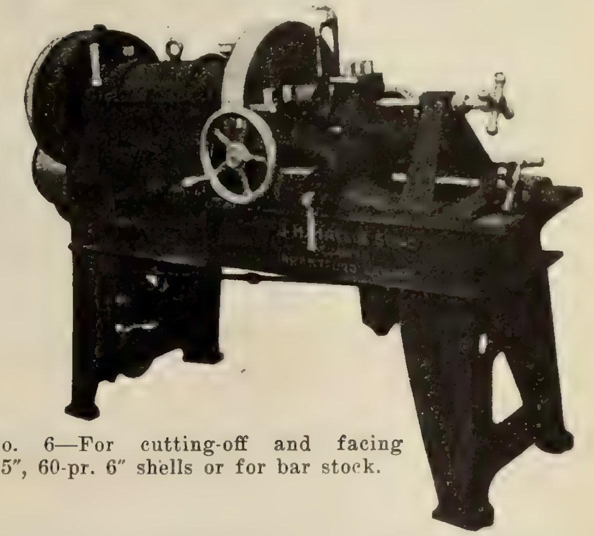
High Speed, Heavy Duty SHELL CUTTING-OFF and FACING MACHINES

Also Pipe Threading Machinery

Any size ⅛ in. to 18 in.



No. 4—For cutting-off and facing shrapnel or for bar stock.



No. 6—For cutting-off and facing 4.5", 60-pr. 6" shells or for bar stock.

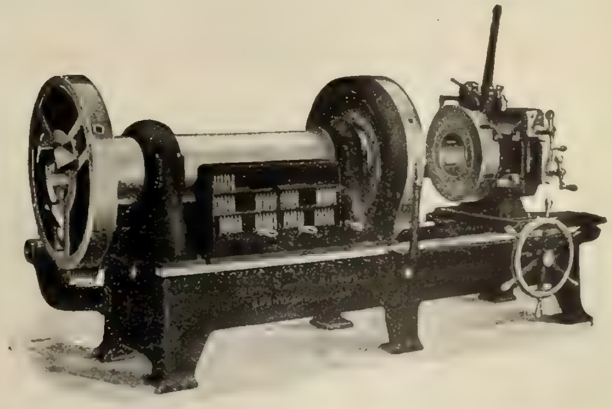
—for Shells, Bar Stock and Ingots

We manufacture a complete line of machines for cutting and facing shrapnel 4.5", 60 pdr. 6", 9.2" shells or larger up to and including 12", or for bar stock and ingots from 3" to 12" diam., single, double or triple cuts at one chucking.

Hall cutting-off and facing machines have been in operation since shells were first made in Canada, and innumerable repeat orders prove that they are more than ordinary machines.

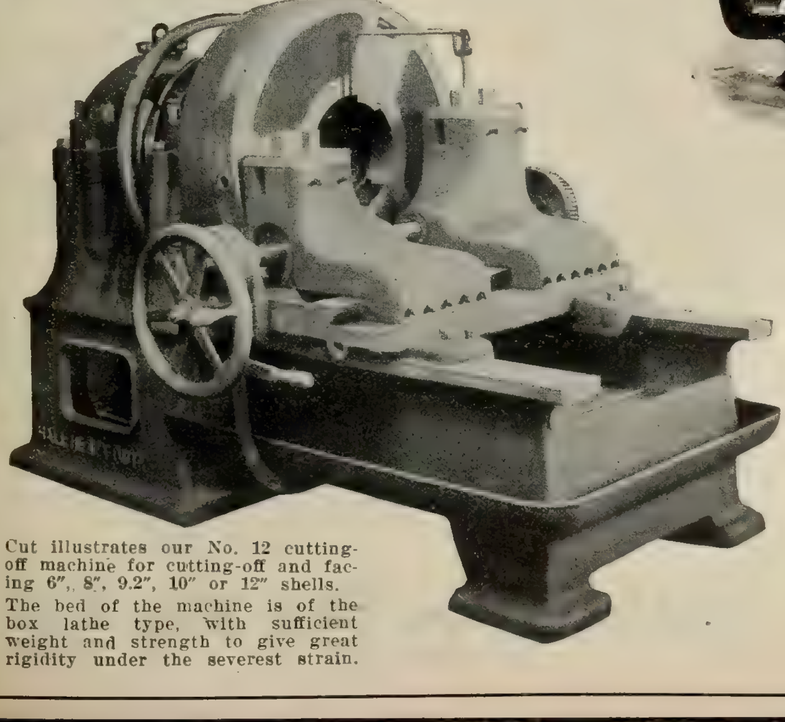
There are more than a score of our machines in one munition plant.

Let us tell you the nearest point at which you can see some of our machines in operation.



The above illustrates our newest design Gear Box drive, Duplex Improved, Pipe Machine, capacity 2½" to 8" inclusive, and is one of our many sizes ranging from ⅛" to 18".

Write us for Catalog and prices.



Cut illustrates our No. 12 cutting-off machine for cutting-off and facing 6", 8", 9.2", 10" or 12" shells.

The bed of the machine is of the box lathe type, with sufficient weight and strength to give great rigidity under the severest strain.

John H. Hall & Sons, Limited

Brantford, Canada

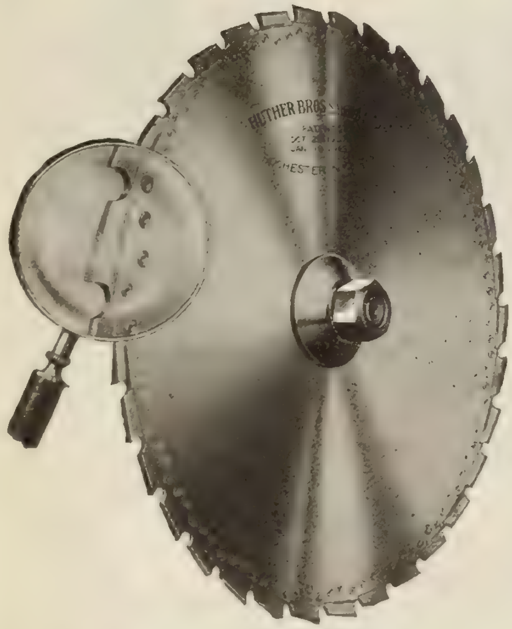
"LENOX"
HACK-SAWS

THE HACK-SAW OF
Guaranteed Uniformity

COST NO MORE—BUT WORTH MORE

Prompt Delivery at All Times.

Ralph B. Norton, 126 Craig St. West, Montreal



Write for full description.

This saw also furnished in fine pitch type. ½ inch to ⅝ inch point to point. Inserts of best High Speed Steel.

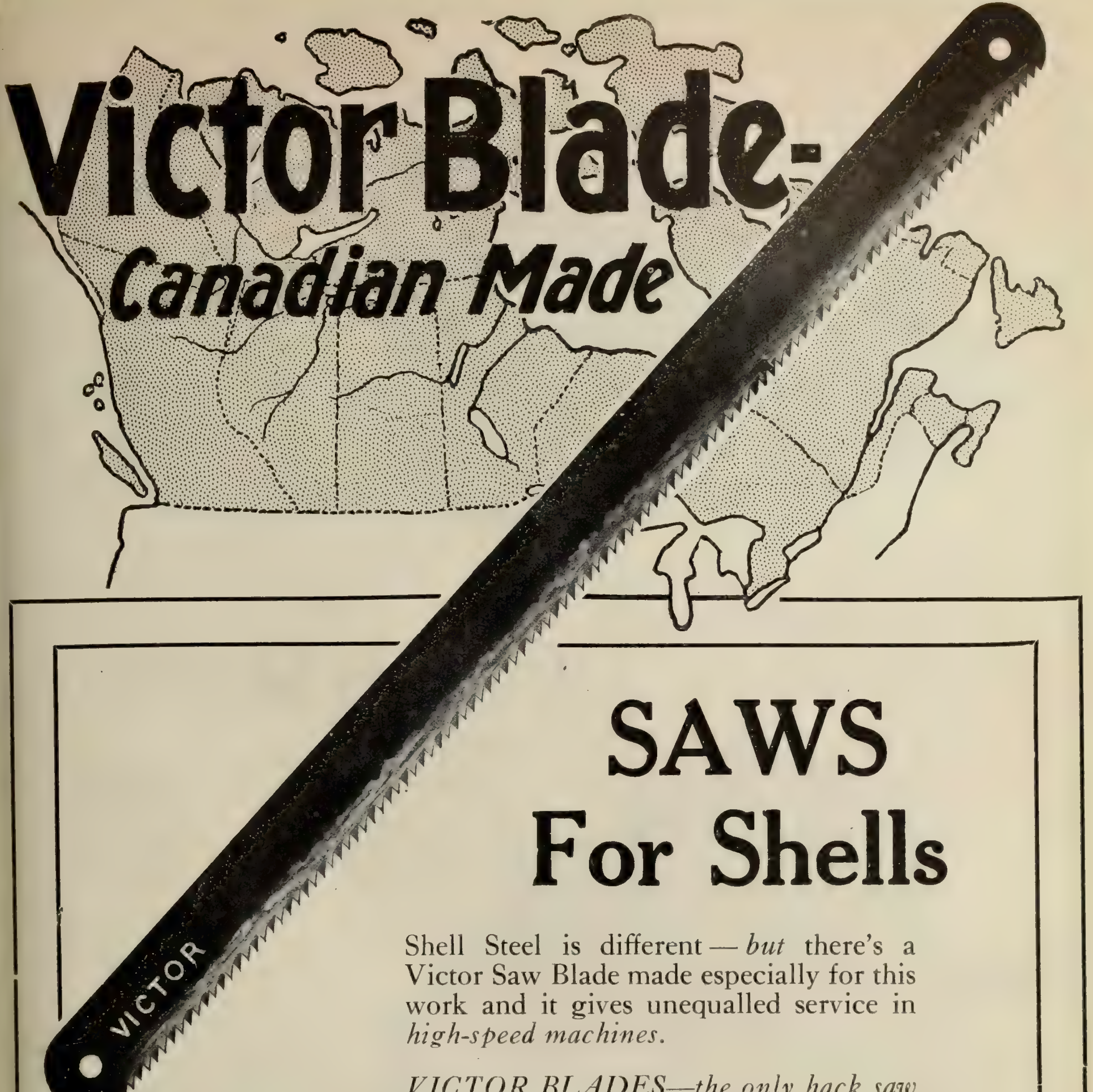
HUTHER BROS.
Metal Cutting Saws

This letter from a satisfied user (name on request.)

"Having just completed a rather large contract for munitions which required sawing of comparatively high carbon steel stock, and on which we have used continuously for over a year your inserted tooth milling saws, we wish to advise you of the very satisfactory service that these saws have given us.

"On account of the small amount of metal removed by your saws, considerable material is saved, and in addition to this much less power is required to drive the saws. They are, therefore, more efficient than any we have previously used, and their use has enabled us to considerably increase our production."

Huther Bros. Saw Mfg. Co.
ROCHESTER, N.Y.



SAWS
For Shells

Shell Steel is different — *but* there's a Victor Saw Blade made especially for this work and it gives unequalled service in *high-speed machines.*

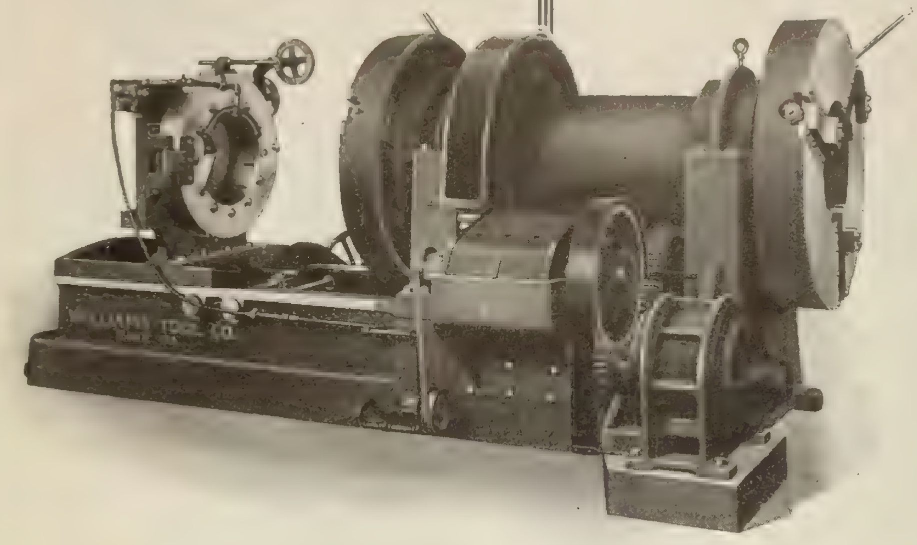
VICTOR BLADES—the only hack saw blades made in Canada.

Used extensively in Canadian Munition Plants.

VICTOR HACK SAWS Get a Box and Try 'em

Victor Saw Works, Limited
HAMILTON, ONTARIO

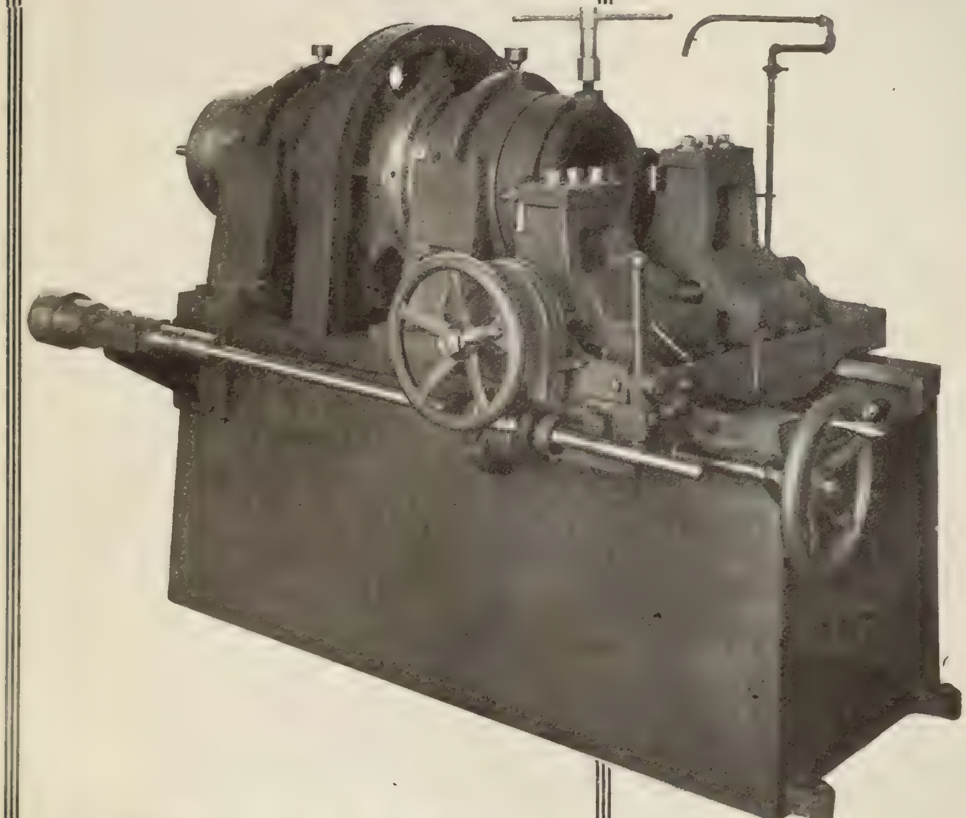
Pipe Machines



The Panama Exposition Highest Award was given to us for one reason — supremacy. Convenience of design and range of work of each machine stamp Williams Pipe Machine in a distinctive class by itself. Each machine will thread from 8 to 11 consecutive sizes, and there are 11 different size machines operating within their range pipes from $1/4''$ to $18''$ diameter. Write us for descriptive matter and specifications.

HIGHEST AWARDS
PANAMA EXPOSITION

Cut-off Machines



For shells from $3''$ to $12''$ diameter is the range of cutting off powers of these machines. Its strength is its life. European and American munition plants have installed great numbers of these machines — why were these chosen over numerous other makes? For one reason—supremacy. It is built for speed, no waste energy, no false motion. They have to be good to lead in their line. Where shall we write you about it?

Agents : The A. R. Williams
Machinery Co., Limited
64-66 Front St. West Toronto

Williams Tool Co.

ERIE, PA., U.S.A.

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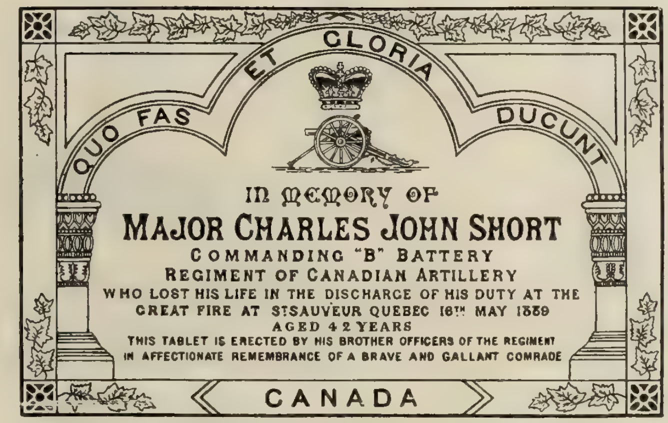


QUO FAS ET GLORIA DUCUNT

IN MEMORY OF
MAJOR CHARLES JOHN SHORT
COMMANDING "B" BATTERY
REGIMENT OF CANADIAN ARTILLERY
WHO LOST HIS LIFE IN THE DISCHARGE OF HIS DUTY AT THE
GREAT FIRE AT ST. SAUVEUR QUEBEC 16TH MAY 1889
AGED 42 YEARS
THIS TABLET IS ERECTED BY HIS BROTHER OFFICERS OF THE REGIMENT
IN AFFECTIONATE REMEMBRANCE OF A BRAVE AND GALLANT COMRADE

CANADA

REDUCED FROM LARGE TABLET

CALL AND SEE SKETCHES OF PLATES MADE

PRITCHARD-ANDREWS COMPANY

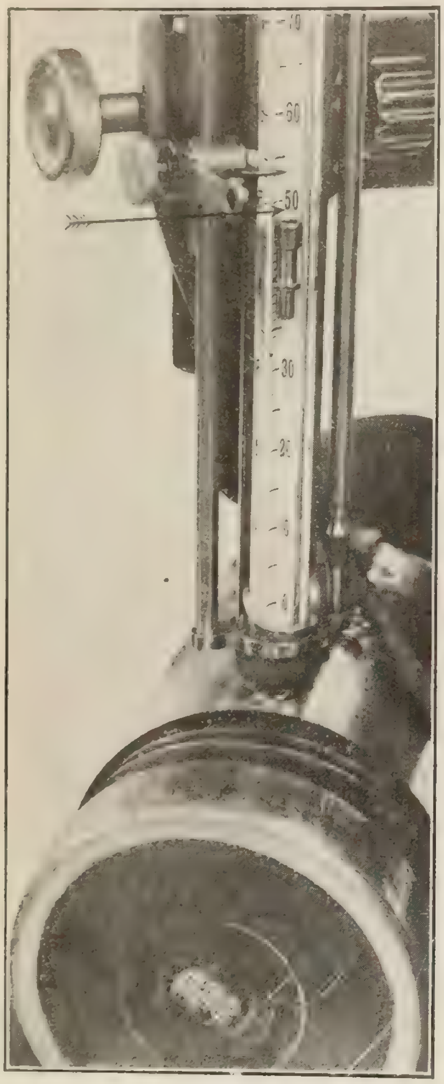
Engravers and Brass Workers

ESTABLISHED 37 YEARS

264 SPARKS STREET ∴ ∴ OTTAWA

For Testing Shrapnel, Other Shells and Parts

THE SCLEROSCOPE IS USED UNIVERSALLY



Scleroscope at Work.

The British Government specifications are that a shrapnel shell shall strike between 43 and 50 after heat treatment. Shells falling below this are rejected.

The scleroscope is depended upon to give accurate results. It does this or it would not be specified by the British Government

The scleroscope has been adopted by the various governments for testing shells and projectiles because it is fast as well as dependable. If you want to *know* the physical qualities of steel, and other metals, use it.

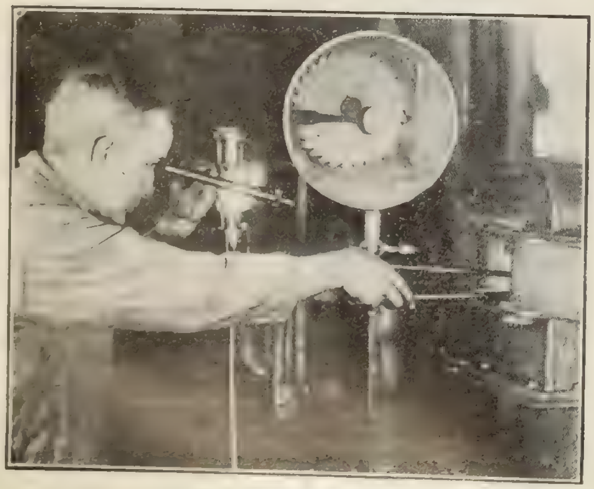
Booklet on request.

The Scleroscope on swing arm.

For Heat Indication Use The PYROSCOPE

Is the common-sense heat measuring instrument that makes straight for results without fuss. Costs least of all: burns simple kerosene; never varies. It is the one available trusty in the grimy hands of furnace men, hardeners, carburizors. It is a pet in the laboratory, and is also being universally adopted by colleges for demonstration purposes owing to the correctness of the principle utilized. Our best customers are those who have tried all other means of heat measuring.

Send for our free circular P. and list of users in the United States.



Pyroscope in use.

SHORE INSTRUMENT & MFG. CO.
555-557 West 22nd Street NEW YORK

Agents in all Foreign Countries

Sales Agents:
The A. R. Williams Machinery Company, Limited
Toronto, Ontari

IF IT'S MACHINERY—WRITE "WILLIAMS"

DOMINION BRIDGE COMPANY, LIMITED

Engineers, Manufacturers and Erectors of

Steel Structures and Travelling Cranes

Capacity, 135,000 tons per annum.

Forgings, Gear Cutting and General Machine Work

Head Office and Works:
Lachine Locks, P.Q. P.O. Address, Montreal

Cable Address
"Dominion"

Branch Works:
Toronto, Ontario
Winnipeg, Manitoba
Ottawa, Ontario

Sales Offices in all the principal cities of Canada and 15 Darmouth Street, London, England.

DOMINION COPPER PRODUCTS COMPANY LIMITED

Copper and Copper Alloys

Refining, Casting, Drawing, Rolling and Extrusion

Office and Works:
Lachine Locks, P.Q. P.O. Address, Montreal, P.Q.

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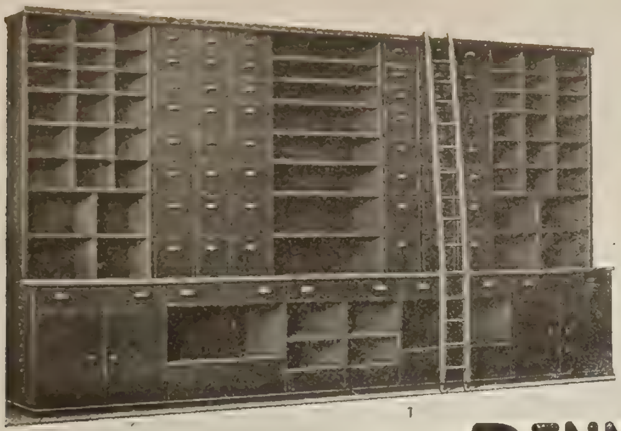

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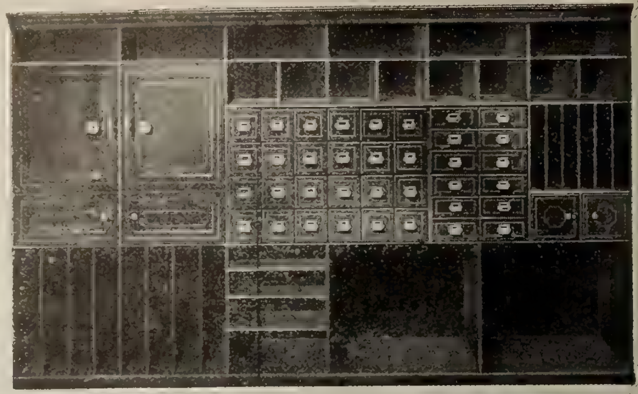
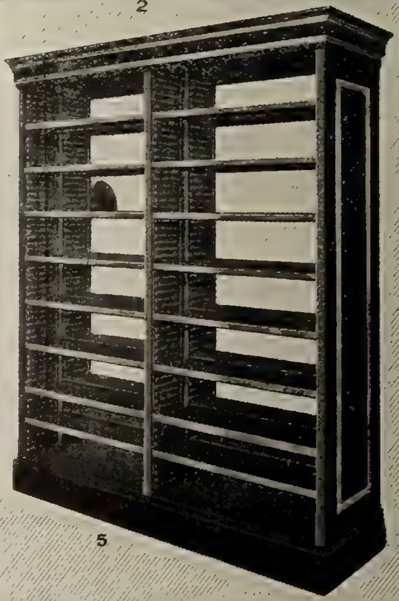


2

DENNISTEEL
LONDON - CANADA
Made By The
Dennis Wire & Iron Works Co. Limited
LONDON, CANADA

3

4



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These are only a few of our many different lines of Steel equipment.

1.—Store Shelving.

2.—Vault Fittings (McLean Pub. Co., Toronto),

3.—Shop Shelving (Michigan Central Shops, St. Thomas, Ont.).

4.—Hospital Kitchen Cabinet (Victoria Hospital, London, Ont.)

9

5.—Library Book Stack.

6.—Office Cabinet.

7.—Lockers and Stools (Central Y. M. C. A., Toronto).

8.—Standard Locker.

9.—Lockers (T. Eaton Co., Toronto).

Complete information on these or any other lines on request.

DENNISTEEL

Made-In-Canada

LOCKERS AND SHELVING

Will Make for Higher Efficiency in Your Business

DOZENS of firms weekly are throwing out old-style combustible wooden lockers and shelving to make room for the modern DENNISTEEL equipment.

SEVENTEEN REASONS

for using the steel article, as made by DENNIS of LONDON:

1. Perfect Sanitation
2. Safety from Fire
3. Thief-Proof
4. Beauty of Appearance
5. Durability
6. Cleanliness
7. Ventilation
8. Space Econmy
9. Convenience
10. Comfort of Employees
11. Vermin-Proof
12. Privacy
13. Permanency
14. Orderliness
15. Neatness of Walls
16. Well-Finished
17. Superior at all Points

GREAT firms, leaders in every line of business, have gone on record as having proved by actual experience that the name DENNISTEEL means the highest type of steel lockers, shelving, factory furniture, material cabinets, bins, etc., made anywhere.

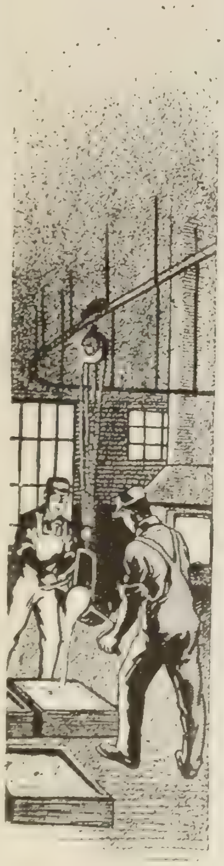
Write us for the illustrated matter that tells the story.

THE DENNIS WIRE AND IRON WORKS CO. LIMITED
LONDON
Canada

THE WINNERS

Used in Every Shop Where Economy and Efficiency Are Practised

FILES OF QUALITY



TRADE MARK
DELTA

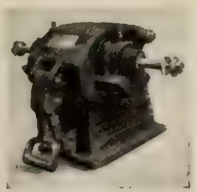
The File You Will Eventually Use—As Perfect As Will and Skill Can Make—Clean, Strong, Sharp Teeth

DELTA FILE WORKS

PHILADELPHIA, U.S.A.

Ued in Every Shop Where Economy and Efficiency Are Practised

"NEW BRITAIN"
SHOP FURNITURE



"NEW BRITAIN"
SHOP FURNITURE

NEW BRITAIN
NB
NONE BETTER

Convenience and Durability

THE embodiment of these two qualities in the fullest degree is a fixed ideal in the design of every item of "New Britain" Shop Furniture.

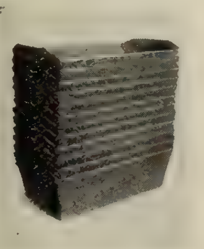
WE have constantly resisted every temptation to sacrifice either of these qualities for the sake of a slight saving in the first cost, knowing full well that the resultant loss of efficiency in use would offset any initial saving many times over.

THE wisdom of this policy is verified daily by the increasing number of factories in which "N.B." has come to stand for "None Better" as well as "New Britain."

WITH a few exceptions these articles were originated in our own plant to supply a real shop need, for which makeshifts of home-made construction had previously been the only thing available.

IF you are not so fortunate as to have already discovered the time and labor-saving possibilities of the "New Britain" Line, our Shop Furniture Catalog should prove a gold mine of suggestions for improving the efficiency and orderliness of your factory.

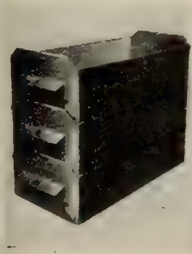
Shall we send it?

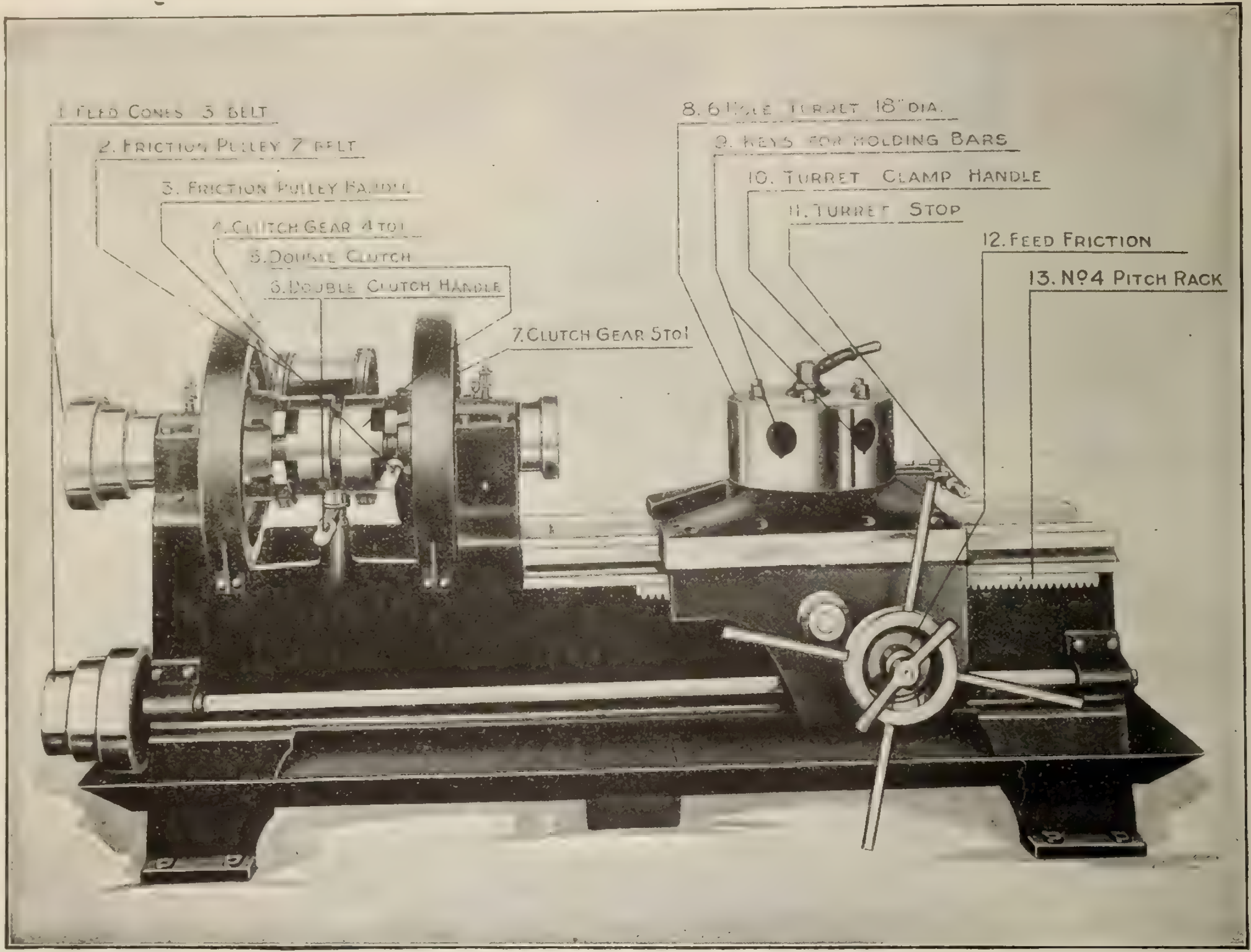


The New Britain Machine Co.

Shop Furniture Originators

NEW BRITAIN : CONN. : U.S.A.




1. Feed Cones 3" belt
2. Friction Pulley 7" belt
3. Friction Pulley Handle
4. Clutch Gear 4 to 1
5. Double Clutch
6. Double Clutch Handle
7. Clutch Gear 5 to 1
8. 6 Hole Turret 18" dia.
9. Keys for holding Bars
10. Turret Clamp Handle
11. Turret Stop
12. Feed Friction
13. No4 Pitch Rack

SPECIAL SHELL LATHE

For boring and turning shells from 9.2 down. Above cut shows bed turret for boring operations. We have them in stock for both boring and turning.

Among other good features, note the following:—

No. 1—3" belt on feed.
" 2—7" belt and 75 H.P. friction.
" 8—18" turret.
" 9—Keys for boring bars.
" 12—External Feed friction.
" 13—Four-pitch rack.
Note ratio of gearing.

Note Sheet Steel Oil Pan.
No countershaft required.
Bronze bearings throughout.
Sight feed oilers.
Hardened and ground thrust collars.
An overplus of strength throughout.
Workmanship guaranteed.

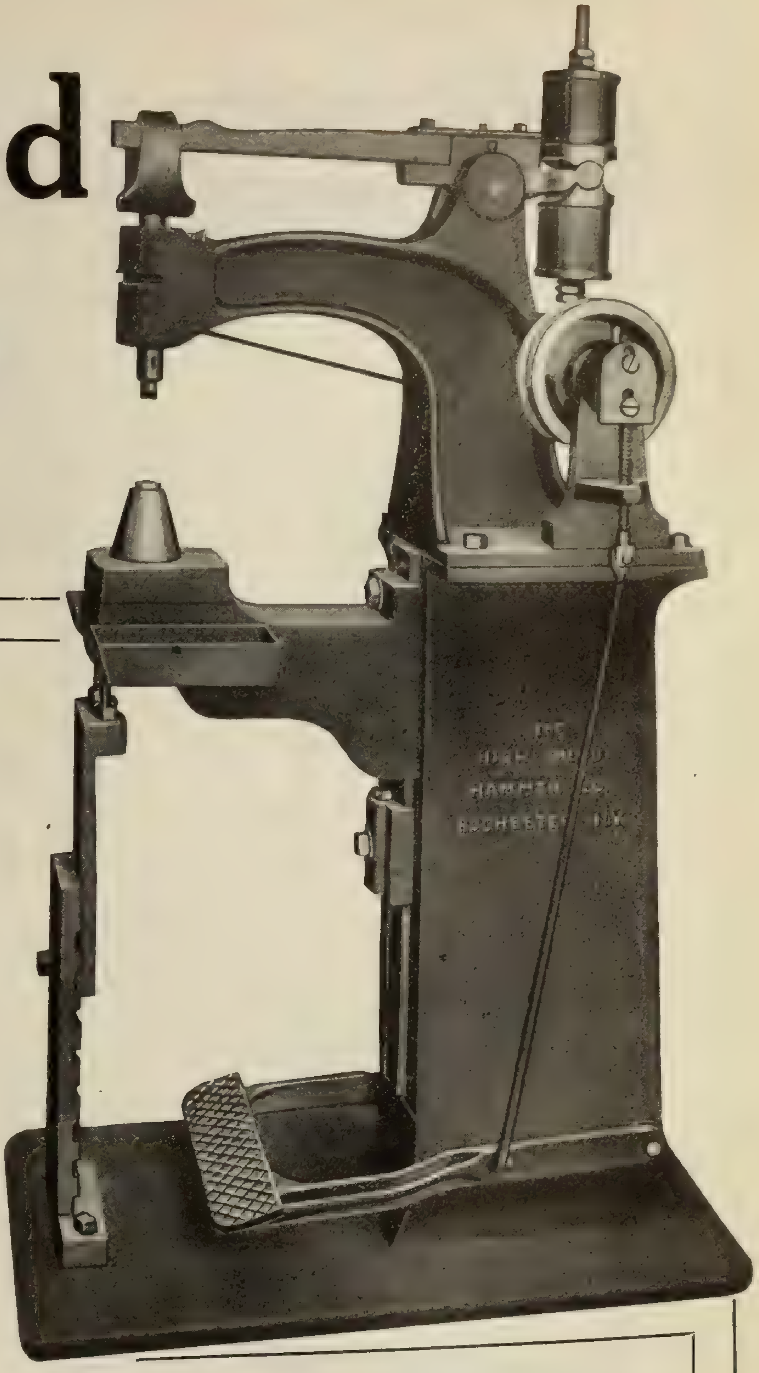
This lathe will give you satisfaction.

Immediate Shipment From Stock

(Subject to Prior Sale)

The Foundry & Machine Co., Limited
1167 Carriere Road
Montreal, Canada

High Speed Hammers



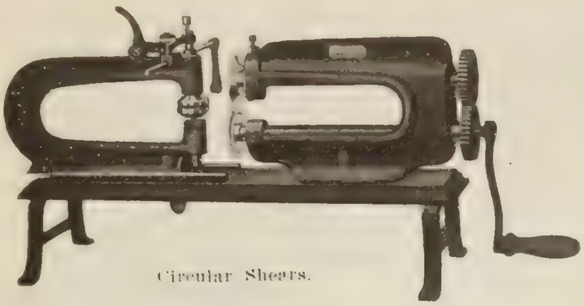
SPEED and quality of production are an ideal combination—if you can get them without damaging your machine. Speed usually puts exceptional strain on the vital parts, thus weakening the machine and repair expenses are high. With a High Speed Hammer, this danger is eliminated. It was built for speed. It is featured by economy in floor space, quality of production, elimination of weight and a *guaranteed* saving of 15% to 20% on any class of work. The life of the machine is practically indefinite, as phosphor bronze bushings are used throughout.

No riveting too intricate. Send for our catalogue on High Speed Hammers.

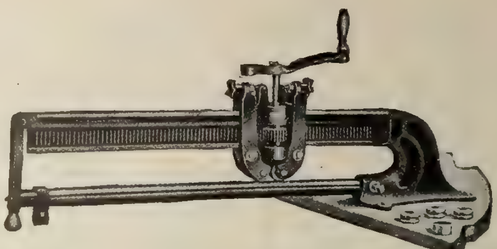
The High Speed Hammer Co.

ROCHESTER N.Y. U.S.A.

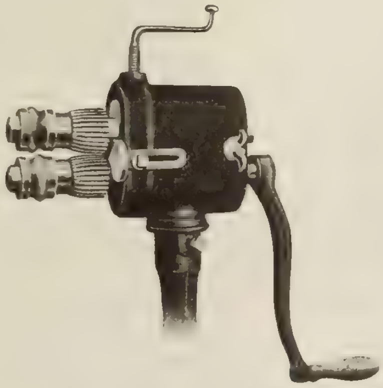
Sales Agents: THE A. R. WILLIAMS MACHINERY CO., LTD., TORONTO, ONT.



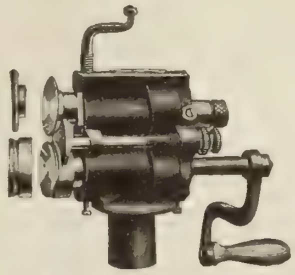
Circular Shears.



Noyes Groover.



No. 9 Crimper and Beader.



Encased Small Turner.

No. 9 Slip Roll Former

Bar Folder.

B B Co LTD.

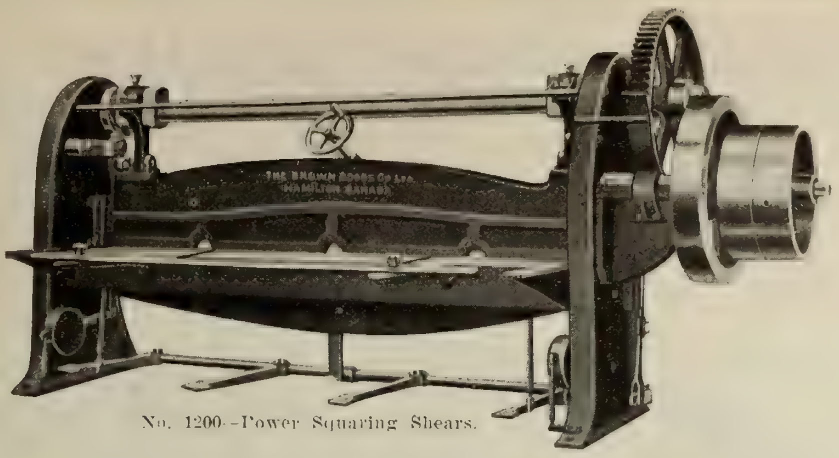
Tinsmiths' and Sheet Metal Workers' Tools of all kinds

We manufacture a complete line of Tinsmiths' Bench and Hand Tools. Forty years' practical experience in this line is concentrated in every B.B. Tool.

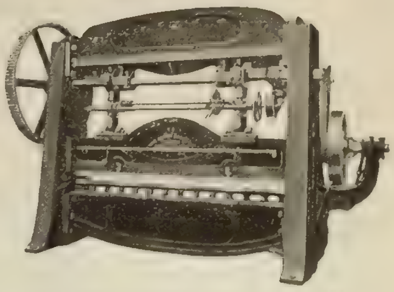
Orders for Export receive our special attention.

The Brown-Boggs Co. Limited
HAMILTON CANADA

Montreal Agent: W. L. Haldimand, Jr.
Western Agents: Bisset & Webb, Winnipeg.
British Columbia Agents: E. A. Earl & Co., Vancouver.



No. 1200—Power Squaring Shears.



No. 500—Power Brake or Press.

B B Co LTD.

Sheet Metal Working Machinery

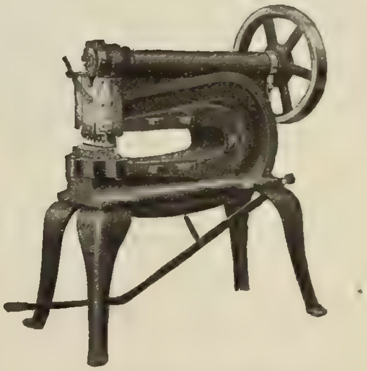
B.B. Presses and Shears will save you money when buying; save many times their cost annually while using. The more B.B. Tools you use, the more you save.

Orders for Export receive our special attention.

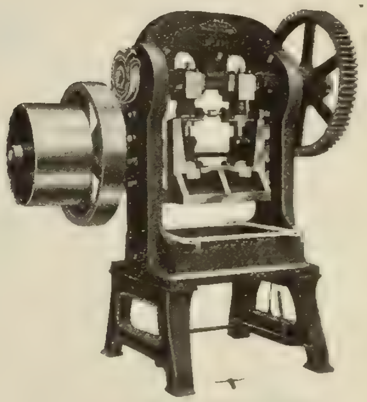
The Brown-Boggs Co. Limited

HAMILTON CANADA

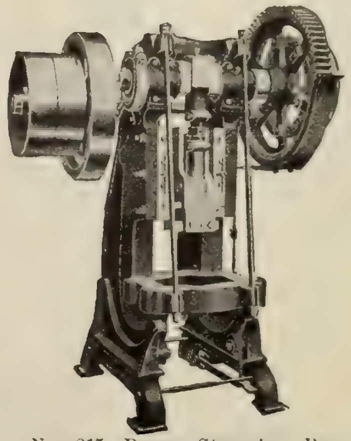
Montreal Agent: W. L. Haldimand, Jr.
Western Agents: Bisset & Webb, Winnipeg.
British Columbia Agents: E. A. Earl & Co., Vancouver.



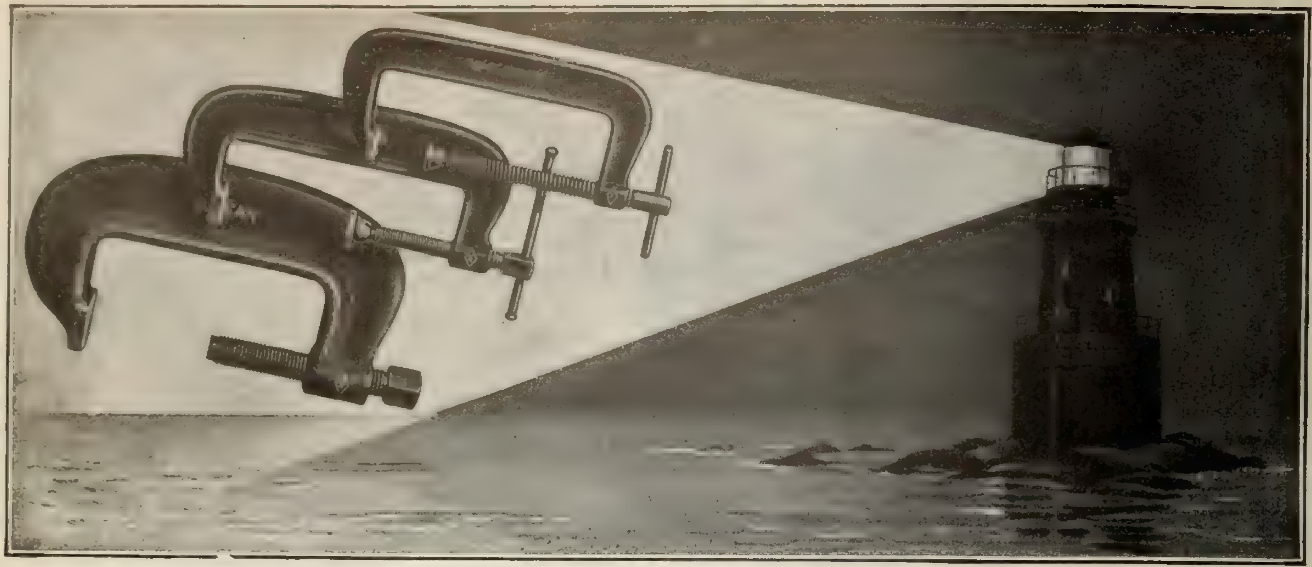
No. 120 Deep Throat Power Punch.



No. 20½ Power Press.



No. 215—Power Stamping Press.



UNFAILING SERVICE!

Identifies our "Grand Prize" "C" Clamps. Aside from the Clamp Satisfaction

assured by superior finish, full capacity, minimum weight, dense homogeneous steel, precise machining, tempering, hardening and inspected assembly.

WHICH PAYS?

The cheap cast clamp, frequently renewed, or
ONE WILLIAMS' "LIGHT SERVICE" DROP FORGED "C" CLAMP
good for a generation on corresponding work?

Add all renewal costs to the losses sustained through delays when replacing the former and you will agree

"The best is the cheapest"

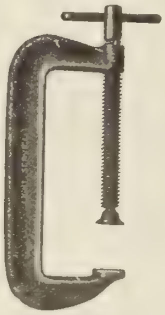
Williams' "Vulcan" Clamps for heavy service.

Capacities ¾ to 12½ in.

Williams' "Agrippa" Clamps for medium service.

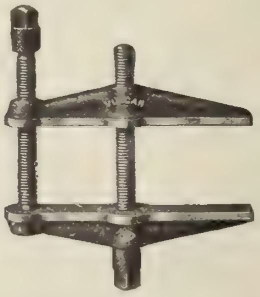
Capacities 4 to 18 in.

Williams' "Light Service" Clamps for light service.



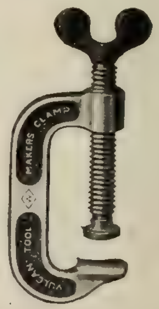
Capacities 2 to 12 in.

Williams' "Vulcan" Machinists' Clamps.



Capacities 1¼ to 4¼ in.

Williams' "Vulcan" Tool Makers' Clamps.



Capacities 1 to 4 in.

TAKE YOUR CHOICE.

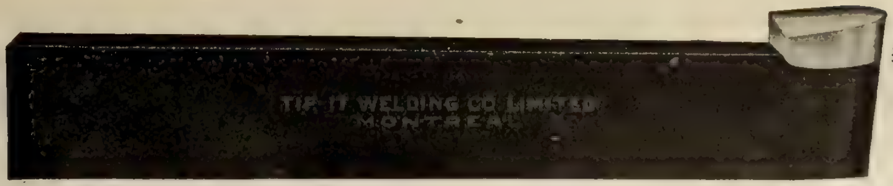
THEY COVER THE FIELD.

Carried by dealers

J. H. WILLIAMS & CO.
45 RICHARDS STREET BROOKLYN, N.Y. CITY
THE WRENCH PEOPLE

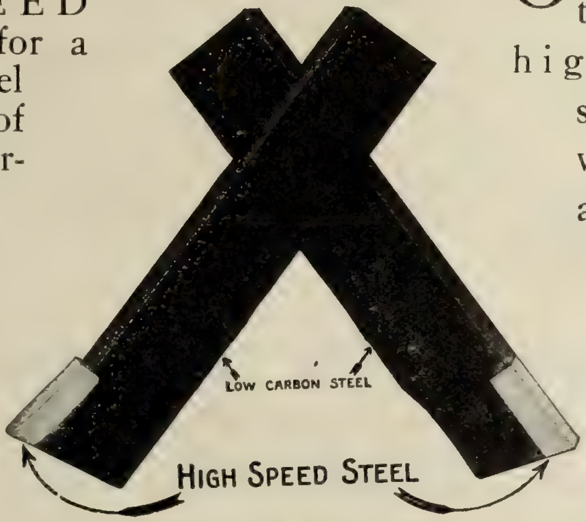
Guaranteed by us

Western Office and Warehouse: 40 So. Clinton Street, Chicago, Ill.



Turn Your High-Speed Scrap Into Tools That Will Outcut Solid Tools

WE WILL use your HIGHSPEED STEEL SCRAP for a TIP on a carbon steel shank — any size of tool—weld them permanently by our patented process, and return you a tool that will produce better results than a solid tool of the same kind of high speed steel—and at a small fraction of the cost.



OR WE will supply a tool using our own high speed steel and shank, permanently welded and ground, and guaranteed to give perfect satisfaction, at a very low price. This applies to lathe or planer tools, roughing or parting, and special tools.

TIP-IT

Patent Welding Process

OUR process is not a temporary braze, but a *positively permanent weld,* and guaranteed in every particular.

TIP-IT treatment actually improves the properties of the high-speed steel tips. They will cut better and last longer than ordinary solid tools. TIP-IT treated tools can be re-tempered or re-heated to any extent without the weld being impaired in any way. When the high-speed steel tips finally do wear out, new tips can be welded to the shank.

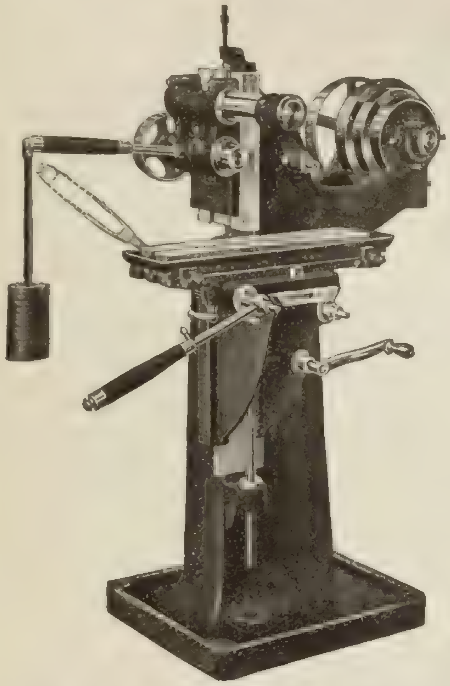
With the present scarcity and high price of high-speed steel, tremendous economies may be effected by using TIP-IT tools, and complete satisfaction is guaranteed. *Several large munition manufacturers are already using TIP-IT tools in their plants.* Let us refer you to them. A trial will convince you,—and remember, you are fully protected by our guarantee.

Write for particulars and prices.

SOLE SELLING AGENTS:

J. R. BAXTER & CO., Limited MONTREAL

This "Whitney" Hand Miller Should Interest You



because it is an all around machine and will greatly increase your production.

Putting work onto a big machine involves careful adjustments, and these take time.

The Whitney "Feels" the job. A touch of the hand lever gives you either a light or heavy cut at will, and your job is done before the big machine could be started.

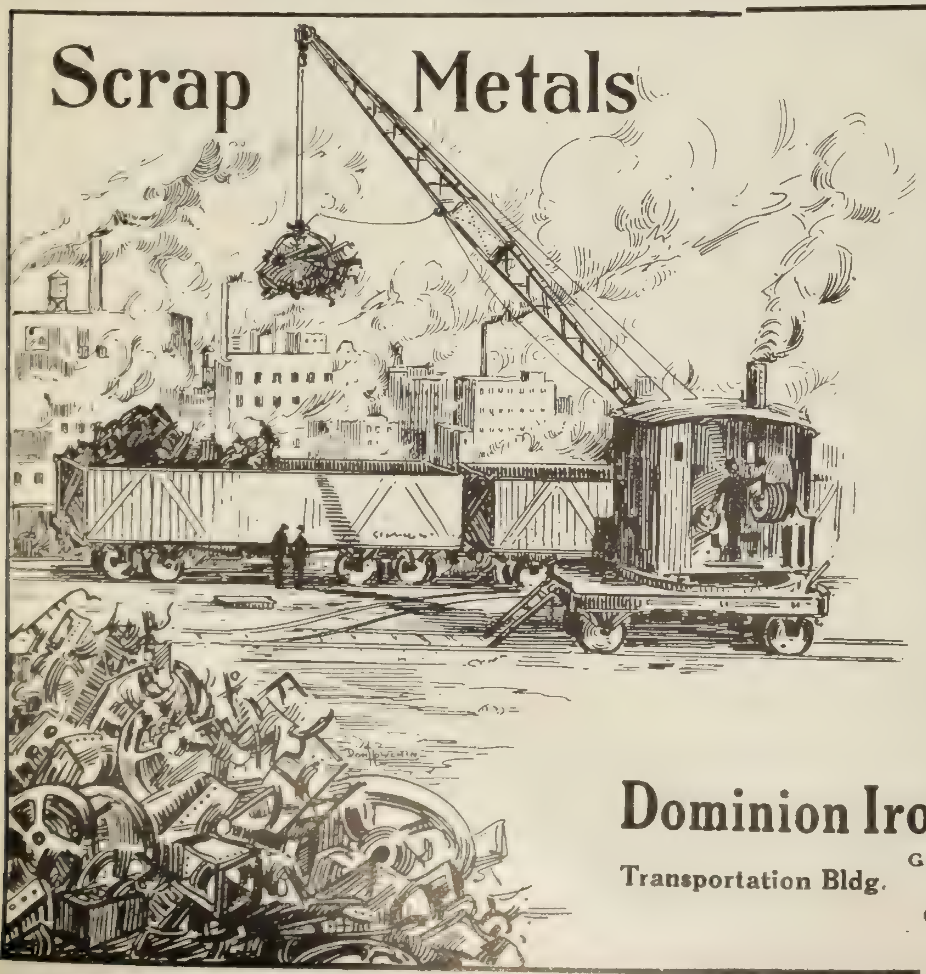
Our Universal High-Speed Milling Attachment makes this machine an all around tool for the large or small shop. Profiling, die sinking, drilling and countless other operations can be easily done by the use of this handy attachment.

Simply send for Catalog A.

THE WHITNEY MFG. CO., Hartford, Conn.

Chains—Keys—Hand Milling Machines

Scrap Metals



Scrap Iron, Steel and Metals

No undertaking is too large for us. We are Scrap Metal Specialists, and can co-operate with you in the dismantling of railway equipment, bridges, plants, steamers, mills and will take your rails and machinery.

Shell Makers. We can take care of all your scrap materials, at highest prices.

Give us particulars and we will relieve you of all worry.

Dominion Iron & Wrecking Co.

LIMITED

Transportation Bldg. - Montreal, Quebec

General Offices:

Quebec, Que.

EXPORTERS

WE have branch offices and selling agencies in AUSTRALIA, NEW ZEALAND, CHINA, JAPAN, INDIA, SOUTH AMERICA, SOUTH AFRICA.

We have every facility for handling the export business of firms in Canada to above countries, in all lines of Hardware Specialties and Machinery and allied trades.

We have had long years of experience and have consequently built up an organization which would be difficult to improve upon.

These advantages we are only too pleased to place at the disposal of our many friends for the transaction of business, execution of indents, etc., etc.

Before making selling or buying arrangements it might be to your advantage to consult us. Enquiries sent to any of the following addresses will receive prompt attention.

A. G. KIDSTON & CO.

ESTABLISHED 1839

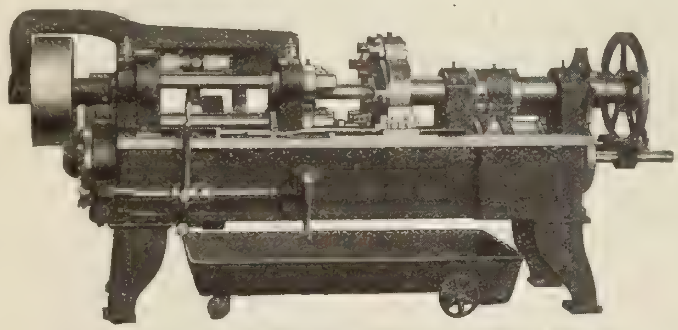
GLASGOW
93 West George St.
Cable Address, Holyrood

LONDON
148½ Fenchurch St., E.C.
Cable Address, Suaviter

MONTREAL
402 Lake of the Woods Bldg.
Cable Address, Kidco

"New Britainize" Your Factory—

THIS is just a short way of saying—***"equip your plant with the most efficient automatic screw and chucking machines."*** It pays from the start.



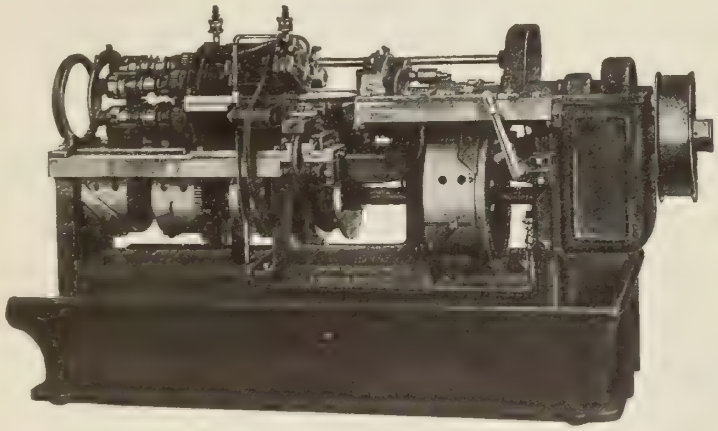
Size 24 Single-Head Multiple Spindle Chucking Machine. Automatically machines 4 pieces at once.

TWO TYPES of Automatic Multiple Spindle Chucking Machines are made—the Single Head, for machining castings or forgings on one end and for the performance of second operations on screw-machine products;—the Double Head, designed for finishing both ends of a piece at the same time.

SINGLE-HEAD MACHINES are built in five sizes, having either four or five tool-carrying spindles and work-holding turrets with capacities for five and six pieces. Turrets will accommodate any style of holding device—chuck, arbor or collet.

DOUBLE-HEAD MACHINES are made in two sizes, having three tool-carrying spindles on each end, the turret being designed to hold four pieces of work and permit of machining **both ends at once.**

* * *



"New Britain" Six-Spindle Automatic Screw Machine "The Machine That Saves Rehandling."

THE NEW BRITAIN "SIX" possesses many points of advantage which add to the convenience and economy of screw machine work.

ONE PARTICULAR FEATURE, however, has given it a unique position in the screw-machine field. This is the use of **six spindles,** which enables it to handle more operations than had previously been possible. On work of a simpler character this extra spindle capacity proves of equal advantage in that it provides for the subdivision of the longer operations. Result—**increased production.**

FOR **close accuracy** and **maximum productivity,** the "New Britain" has no superior.

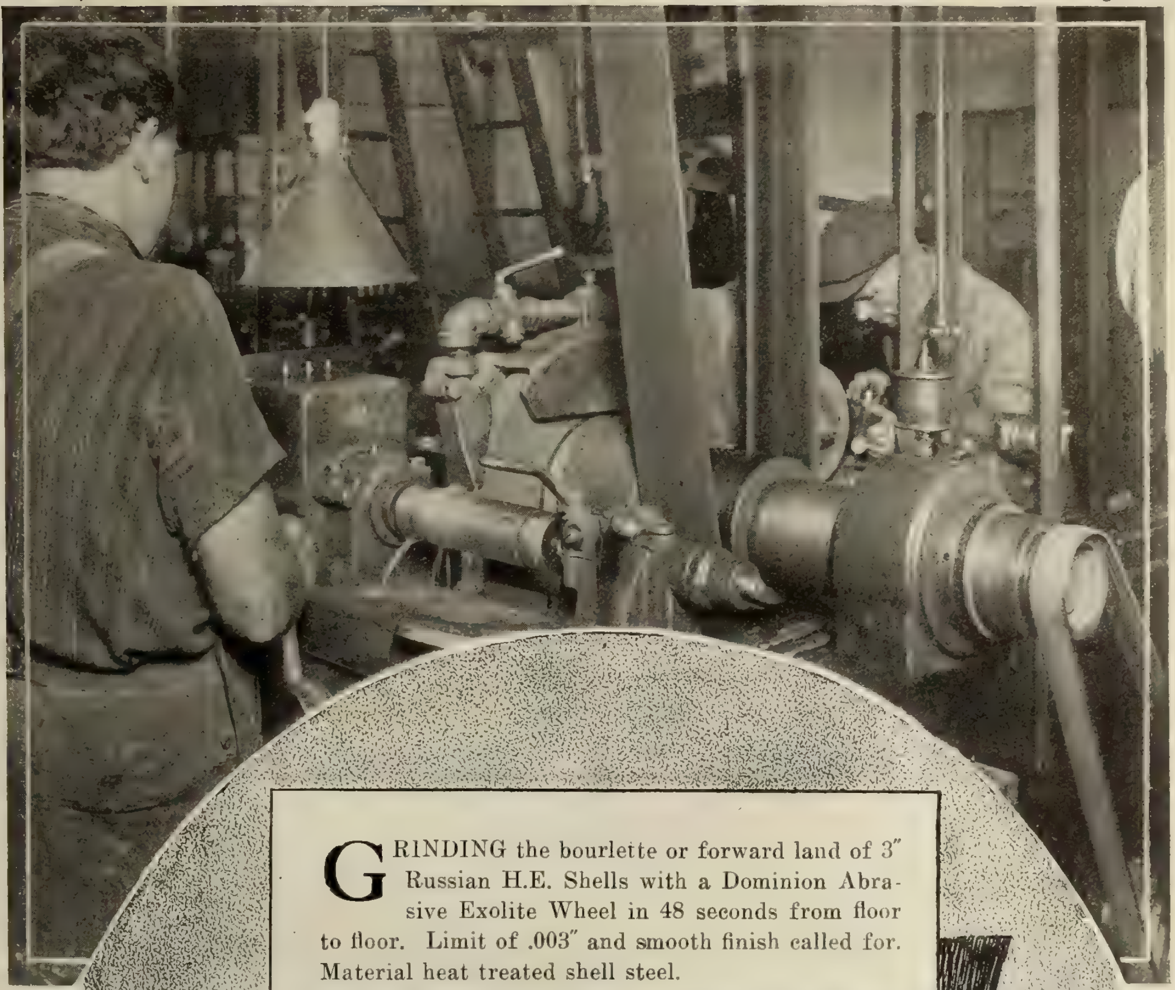
Send us blue-prints of your screw-machine and chuck work and give yourself the satisfaction of knowing how much "New Britain" Automatics would save you.

The New Britain Machine Company

—Automatic Screw and Chucking Machines—

New Britain, Conn., U.S.A.

Dominion



GRINDING the bourlette or forward land of 3" Russian H.E. Shells with a Dominion Abrasive Exolite Wheel in 48 seconds from floor to floor. Limit of .003" and smooth finish called for. Material heat treated shell steel.

MADE FROM NATURAL EMERY, EXOLITE AND CARBOLOX which cover the entire grinding field.

NAXOS EMERY wheels for heavy, rough work, general grinding and tools.

EXOLITE (Artificial Corundum) wheels for Tool Room work, precision and general grinding.

CARBOLOX (Carbide of Silicon) wheels for materials of low tensile strength, such as Cast Iron, Chilled Iron, Brass, Marble and Granite.

Manufactured by

DOMINION ABRASIVE WHEEL COMPANY, LIMITED
NEW TORONTO. ONTARIO. CANADA

Agents for Great Britain:
Dominion Abrasive Wheel & Supply Co., Limited,
198 Corporation St. Birmingham, England

Grinding Wheels

MADE IN CANADA

LYMBURNER, LIMITED
MANUFACTURERS

Special Machinery
Tools and Gauges
Architectural Iron
and Bronze Work
Memorial Tablets
Church Brass Work
Fire Station Fittings
Special Hardware

Let Us Handle Your Manufacturing Problems

With our completely equipped and modern plant, we are prepared to make your metal products better and cheaper than you could afford to equip for their manufacture.

Special attention given to Export Trade and to the manufacture IN CANADA of products now imported from Europe and the United States.

LYMBURNER, LIMITED
360 St. Paul Street East - Montreal, Canada

"Cuts down costs in Riveting"

That's what they *all* say about

ALLEN

Riveting Machines

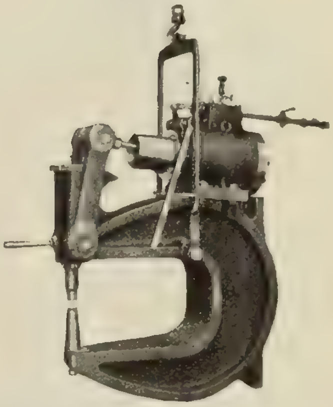
ALLEN
Compression Lever
Riveter.

There is no other type of riveting equipment you can put in your Shop that will do as *fast* and *tight* work as the Allen machines.

This also means—*at the lowest cost.*

ALLEN "Jaw" Riveter

This riveter is most suitable for all descriptions of bridge and building construction work. By a special patented device any desired change in the distance between the dies is easily effected.



ALLEN JAW RIVETER.

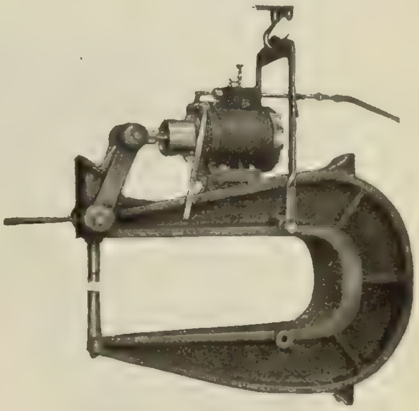
ALLEN "Alligator" Riveter

This riveter is especially adapted for all types of steel car construction riveting work. Suspended on a double axis, machines of this pattern can be arranged in any position, thus making them indispensable for work of this character.

ALLEN "Compression Lever" Riveter

This riveter is built expressly for heavy bridge, beam and girder work and is widely used for this purpose.

We carry a full line of Allen Riveters in stock to insure prompt delivery. *One* of these is adapted to *your* riveting requirements.



ALLEN JAW RIVETER.

Send for illustrated booklet showing different types, and full particulars.

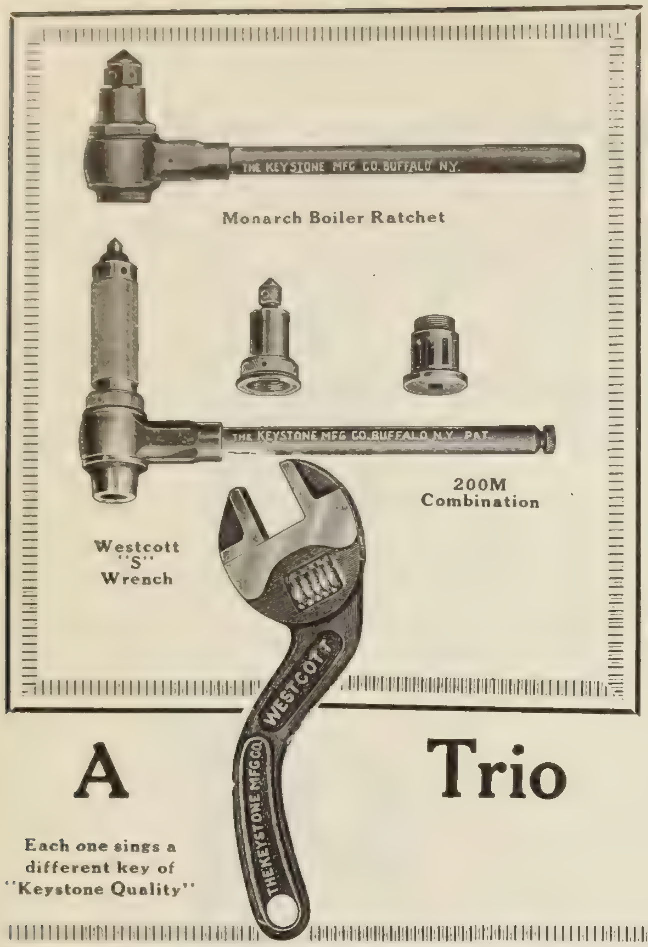
JOHN F. ALLEN COMPANY

Pioneer Builders of Riveting Machines

Established 1872

370-372 Gerard Avenue, New York

Agents—Canadian Ingersoll-Rand Company, Montreal, Toronto, Halifax
Lieber and W. U. Codes: "Riveter"


THE KEYSTONE MFG CO. BUFFALO N.Y.
Monarch Boiler Ratchet
THE KEYSTONE MFG CO. BUFFALO N.Y. PAT.
200M Combination
Westcott "S" Wrench
WESTCOTT
THE KEYSTONE MFG CO

A Trio

Each one sings a different key of "Keystone Quality"

"Keystone Quality"

You can pick up a tool and tell by the "feel" of it, as to its quality and usefulness. When you pick up a Keystone it has the "right feel." Work them and they make you feel right.

From the bottom up they are the ideal trio.

The Westcott Adjustable "S" Wrench has a malleable iron handle with a jaw of forged steel. The Westcott Wrench is the original "hidden nut finder." It gets at them from around the corner, but it gets them—that is the main thing.

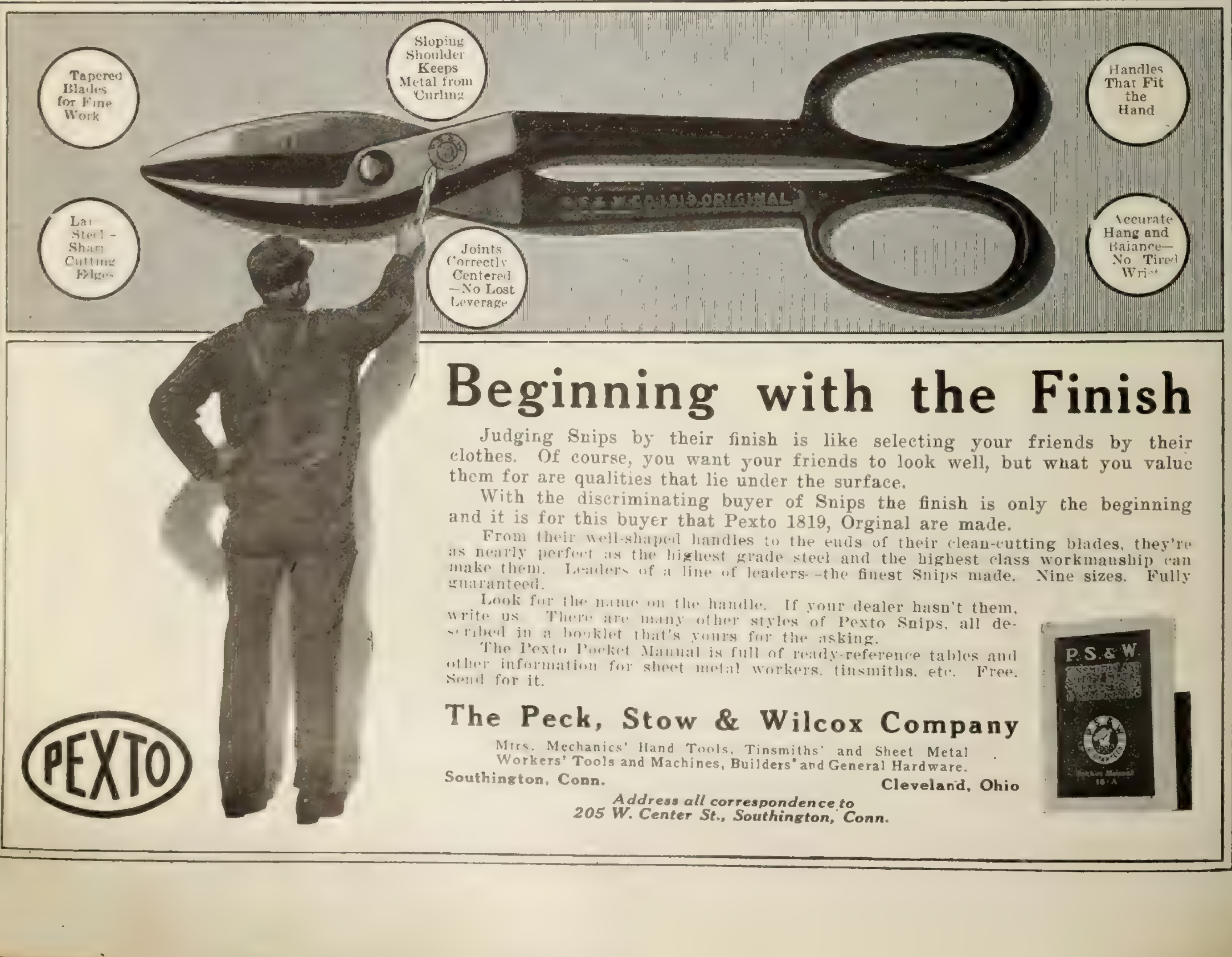
The Keystone 200 M. Combination Ratchet is a quartet in itself. It has 4 complete ratchets in one. All parts are interchangeable and for convenience and usefulness it is unbeatable.

The Monarch Boiler Ratchet is a mighty convenient tool to have around. How are you fixed?

Get in touch with us!

The Keystone Mfg. Co.

Buffalo N.Y.


Tapered Blades for Fine Work
Sloping Shoulder Keeps Metal from Curling
Handles That Fit the Hand
Lar Steel - Sharp Cutting Edges
Joints Correctly Centered —No Lost Leverage
Accurate Hang and Balance—No Tired Wrist
P.S.&W.CO.1819.ORIGINAL
P.S.&W.

Beginning with the Finish

Judging Snips by their finish is like selecting your friends by their clothes. Of course, you want your friends to look well, but what you value them for are qualities that lie under the surface.

With the discriminating buyer of Snips the finish is only the beginning and it is for this buyer that Pexto 1819, Orginal are made.

From their well-shaped handles to the ends of their clean-cutting blades, they're as nearly perfect as the highest grade steel and the highest class workmanship can make them. Leaders of a line of leaders—the finest Snips made. Nine sizes. Fully guaranteed.

Look for the name on the handle. If your dealer hasn't them, write us. There are many other styles of Pexto Snips, all described in a booklet that's yours for the asking.

The Pexto Pocket Manual is full of ready-reference tables and other information for sheet metal workers, tinsmiths, etc. Free. Send for it.

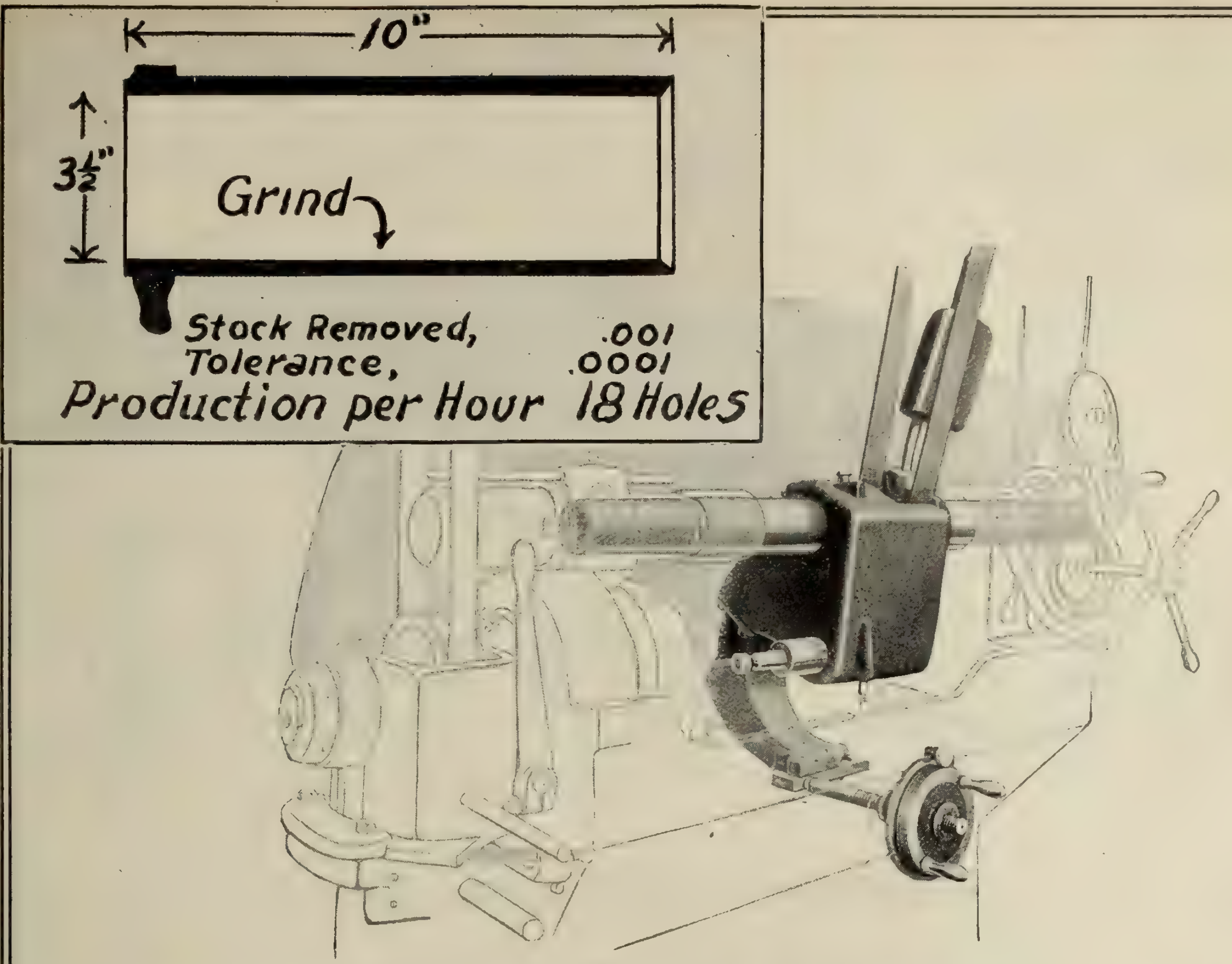
PEXTO

The Peck, Stow & Wilcox Company

Mfrs. Mechanics' Hand Tools, Tinsmiths' and Sheet Metal Workers' Tools and Machines, Builders' and General Hardware.

Southington, Conn. Cleveland, Ohio

Address all correspondence to
205 W. Center St., Southington, Conn.



REMARKABLE PERFORMANCE OF A REMARKABLE MACHINE

The upper drawing shows a section of the cast-iron sliding sleeve of the "Silent Knight" engine.

In rough-grinding these cylinders in the Stearns plant in Cleveland, the Bryant Semi-Automatic Hole Grinder shows production of ***165 cylinders per nine hours.***

We are not surprised at this record. The Bryant has done equally well a number of times. But the reasons for its remarkable performances are always the same—the over-head wheel slide, magnified diameter control, speed of chucking and safety of operation.

Our little blueprint "Production Book" is almost sure to contain grinding examples greatly similiar to your requirements. Study it—and compare. Let us send it to you.

Bryant Chucking Grinder Company, Springfield, Vt.

Complying with the New Shell Specifications

Use

ECONOMIC
SHELL WASHER

It washes shells quickly,
easily and at small cost.

Why not get in line with the big Manufacturer?

Made in Canada.

Canadian Economic Lubricant
Company, Limited
1040-1042 Durocher Street ∴ Montreal, Que.

It's a Pink anyway you take it, and it's the best Peavey made.

PINK'S LUMBERING TOOLS

We manufacture all kinds of lumbering tools. Light and durable.

We have supplied a great number of Lumber Tools for the Overseas Forestry Battalions.

Pink's tools give a service that wins the recommendation of users everywhere. If anyone in England, Scotland or elsewhere requiring tools of this kind, will inquire of the Canadian people who are using our goods there they will be convinced.

MADE IN CANADA

The Standard Tools in every Province of the Dominion, New Zealand, Australia, etc.

We Also Manufacture Car Movers

Long Distance 'Phone No. 87.

Sold throughout the Dominion by all wholesale and retail hardware merchants.

We Solicit Export Business

SEND FOR CATALOG AND PRICE LIST

The Thomas Pink Company, Limited

Pembroke, Ontario, Canada

DWIGHT SLATE MARKING MACHINE

TRADE MARK

Marking Machines

For Numbering and Graduating Time Fuses, Micrometer Collars on Lathes, Milling Machines, 101 Fuses.

One turn of the lever and it is done. An accurate uniform marking or even graduating completed in the flash of an eye. Combined in this machine is the usual "N. & W." quality, together with an intimate knowledge of the requirements of a machine of this character. Simplicity of construction, strength, and accuracy is a description of this machine in a nutshell.

The graduating die is held in holder keyed to shaft; as mark is made shaft revolves with the die, at the same time winding a spring tension which, on contact with work is broken and returns to proper position. Shaft runs in bronze bearings. Depth of pressure is provided by foot through a lever and cam which is adjustable.

Send for Catalogue on General Line of Machines and Steel Lettering Die Engravings.

Noble & Westbrook Mfg., Co.

Hartford, Conn. U.S.A.

TRADE B&C MARK

MAKES DIFFICULT PLACES EASY

The B. & C. wrench of the adjustable "S" type will enable you to reach nuts that are inaccessible to other types. This is a feature you will appreciate only when you have tried to reach those places and found how difficult it is and how much longer it takes.

The B. & C. wrench is adjustable by the thumb of the hand that operates it. The operating nut is steel and the sliding jaw of steel drop forging. All parts are interchangeable.

Our B. & C. Combination Wrench does both pipe and nut work. Write for our wrench catalogue.

Bemis & Call

Hardware & Tool Co.

Springfield, Mass., U.S.A.

H&M Thermometers

Providing the Proper Thermometer

A Problem for You?

Why not put it up to us?

We know **your needs** and meet them squarely with accurate, servicable Thermometers for your **every** requirement.

We are specialists in the manufacture of H. & M. Type Thermometers, Recording & Index Thermometers, Automatic Temperature and Pressure Regulators, Mercury Vacuum and Absolute Pressure Gauges, Engraved Stem Thermometers, Hygrometers, Thermo-Electric and Radiation Pyrometers.

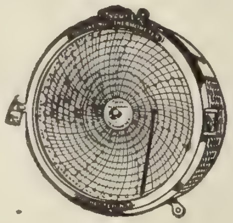


Illustration is of *Tycos* Self Contained Recording Thermometer No. 8000 especially adapted for Cold Storage Rooms, but one of many applications however.

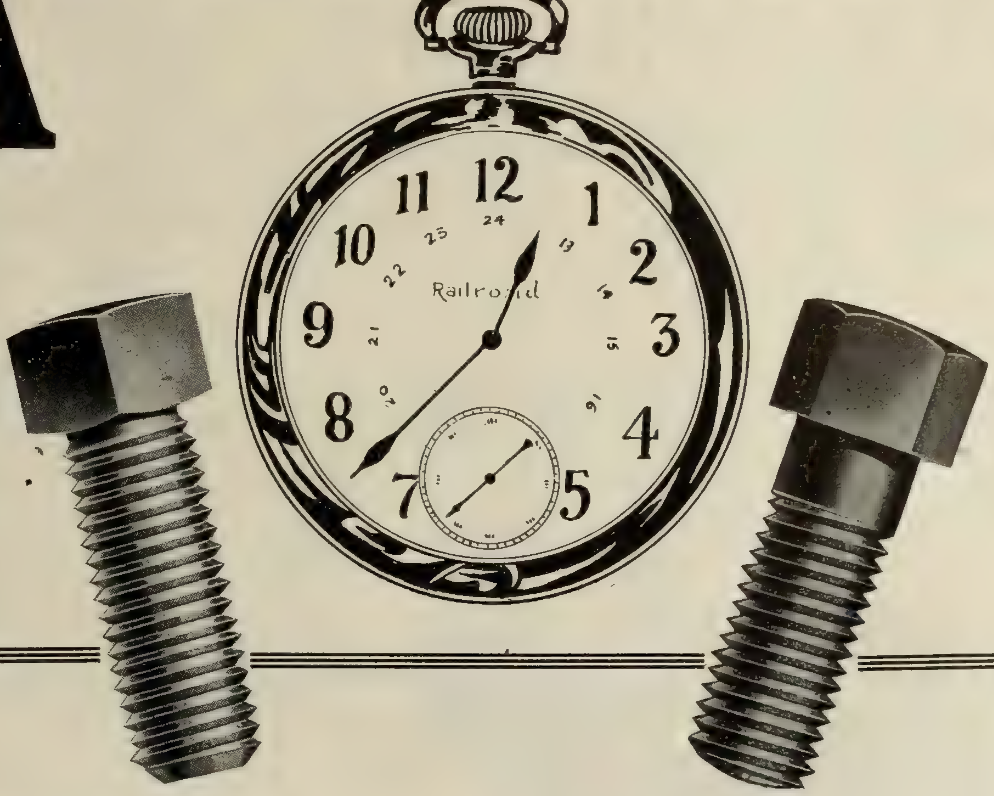
Mark this:- Every Thermometer bearing H. & M. *Tycos* makes honest claim to supremacy because every manufacturing step is carefully worked out in detail, applications carefully studied.

Put your problem up to us. Our experience will prove very valuable to you,—this we are sure.

201 Royal Bank Bldg.
Toronto, Ont.

The H&M Division,
Taylor Instrument Companies
Rochester, N.Y.

ACCURACY



TIME!

Time lost is money lost. If Cap and Set screws are not accurate your employees lose valuable **time** and you suffer loss of **production** and **profit.**

Use "**Galt**" screws and cut out

Loss of TIME
This TIME
Next TIME
Every TIME

Specialists in Cap and Set, Semi-finished and Finished Nuts.

The Galt Machine Screw Company,
GALT, ONTARIO **Limited**

Eastern Representatives :
The Canadian B. K. Morton Co., Ltd., 49 Common St., Montreal, Quebec

THE BANFIELD PLUG MILLER

Patent applied for in Canada and United States

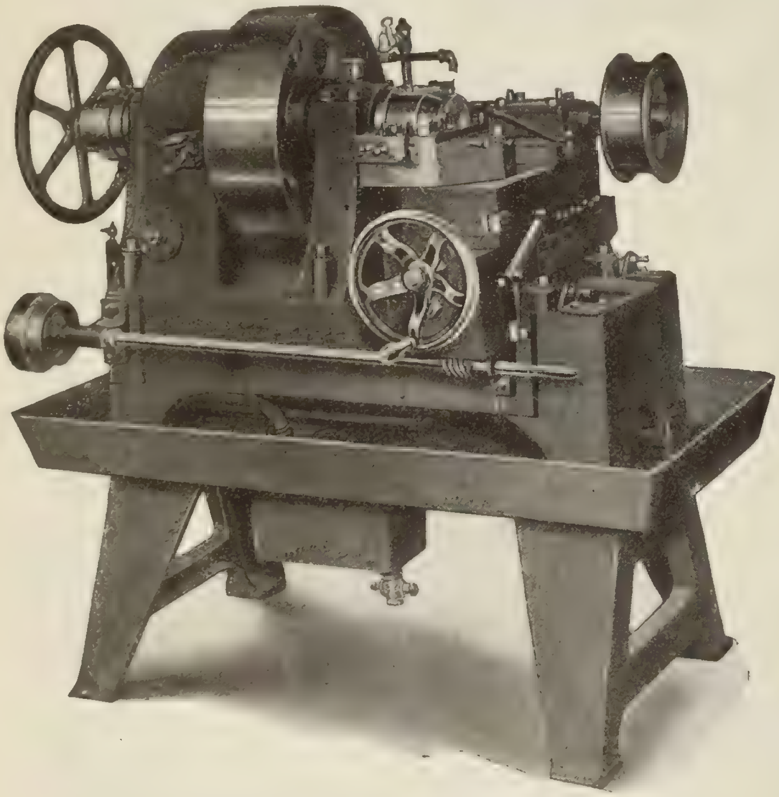
THE COMPLETE PLUG FINISHED IN SIX MINUTES BY UNSKILLED LABOR.

A machine especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired and milling the thread—*all in one chucking.*

One man can operate two machines, considerably reducing your cost per plug.

The Banfield Plug Miller is equipped with quick draw in collet.

Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio with jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds), having automatic stop. Power feed pump with relief valve driven, from worm shaft (all drives direct from main line shaft). Rigidly built; simple and economical to operate.



For Turning and Milling the Thread on Gas Check Plugs for 6-inch High Explosive Shells.

Weight 1800 lbs.

For 18-pdr., 4.5 and 60 pdr. High Explosive Shells. Can furnish machines of same type, weighing 1250 lbs. Particulars on request. These machines are tooled up for finishing plain machined or bevel plugs if desired.

BASE PLUGS

Machined to Government Specification

Have in stock for immediate shipment machined base plugs for 18-pdr., 4.5, 60-pdr, and 6" High Explosive Shells, either threaded or beveled.

Furnished subject to acceptance of Government inspector at your plant.

Capacity 3,000 *per day.* Write for prices.

EDWIN J. BANFIELD

STAIR BUILDING . - TORONTO, ONT.

RIVETS

ROUND HEAD
COUNTERSUNK HEAD
CONE HEAD
WAGON BOX HEAD
FLAT HEAD
WHEEL HEAD

ALL DESCRIPTIONS

½ inch dia. and smaller

COPPER BELT RIVETS AND BURRS.

COPPERED BELT RIVETS AND BURRS.

BIFURCATED OR SLOTTED RIVETS.

TUBULAR RIVETS

Our high quality plus reasonable price make a rivet value that's hard to equal.

A TRIAL ORDER IS CONVINCING.

Parmenter & Bulloch Company, Limited
GANANOQUE, ONT.

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Sheet Metal

STAMPINGS

Automobile Fenders, Hoods, Gasoline Tanks and Sheet Metal Work.

DF&S Co.
Quality & Service

Dominion Forge & Stamping Co., Limited

Walkerville, Ont., Canada

DROP FORGINGS

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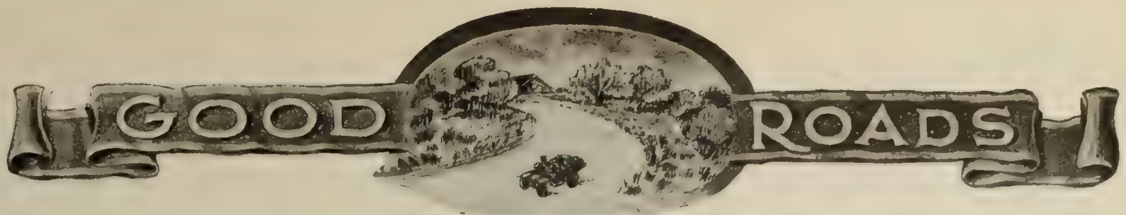
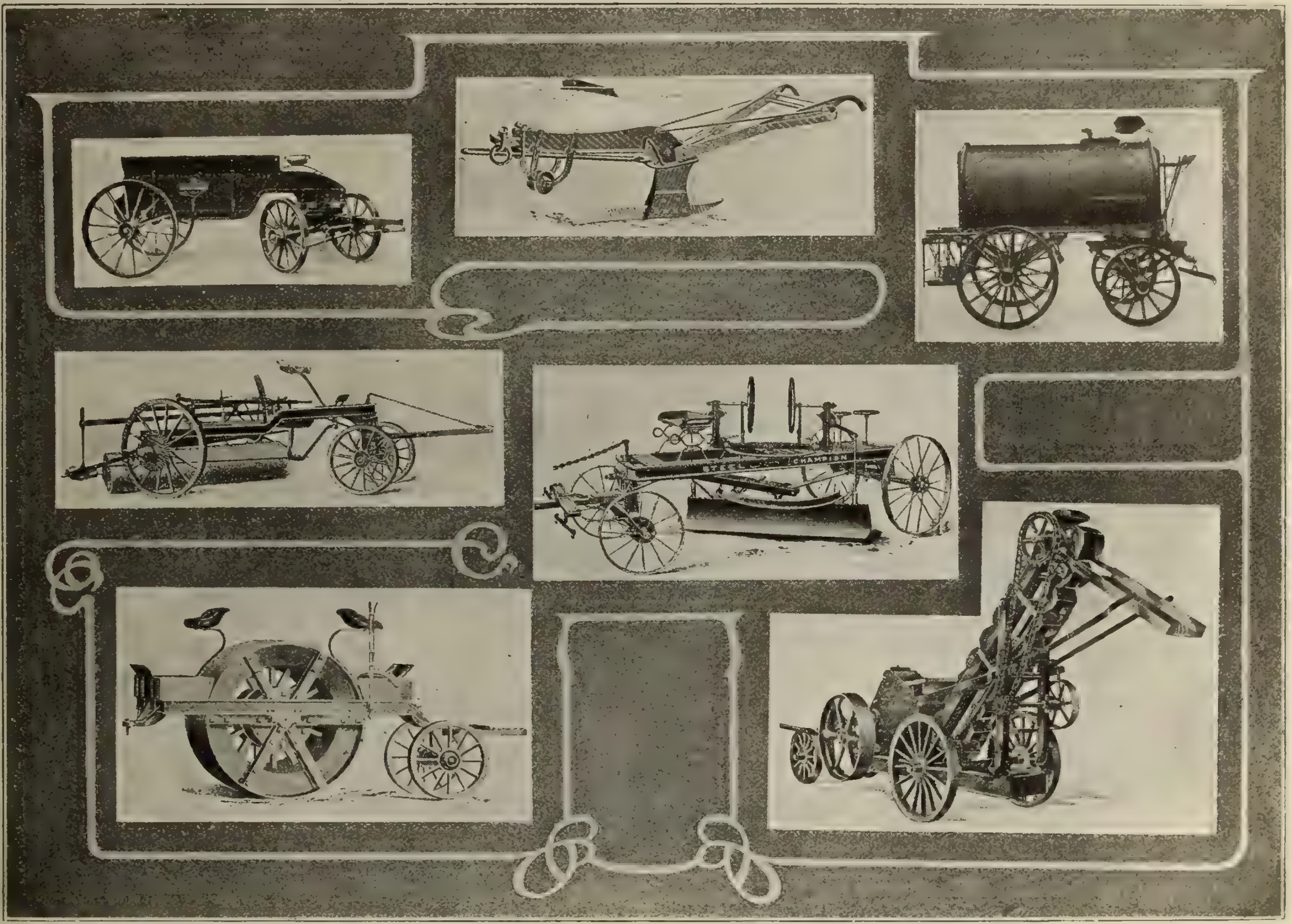


Trade **"CHAMPION"** *Mar*



CHAMPION

Road and Street Building Machinery

Exclusive Manufacturers of Stone Crushing, Earth Moving and Street Cleaning Machinery.

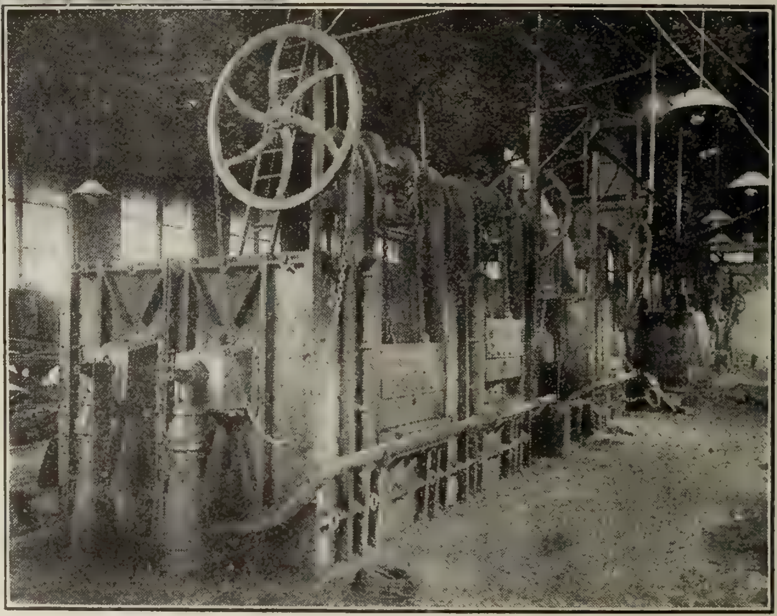
WRITE FOR CATALOGUE OF

Crushers, Elevators, Screens, Bins, Road Graders, Road Rollers, Road Levellers, Road Plows, Road Oiling Machinery, Street Sprinklers, Street Sweepers and Cleaners, Dump Wagons, Spreading Wagons, Rock Drills.

THE DOMINION ROAD MACHINERY COMPANY
LIMITED
Factory and Head Office : : GODERICH, CANADA

"Mecol" Furnaces

designed and built in Canada for all industrial purposes



What the use of OIL instead of coal-fired furnaces means to you:

A Clean Workshop without Smoke or Soot.

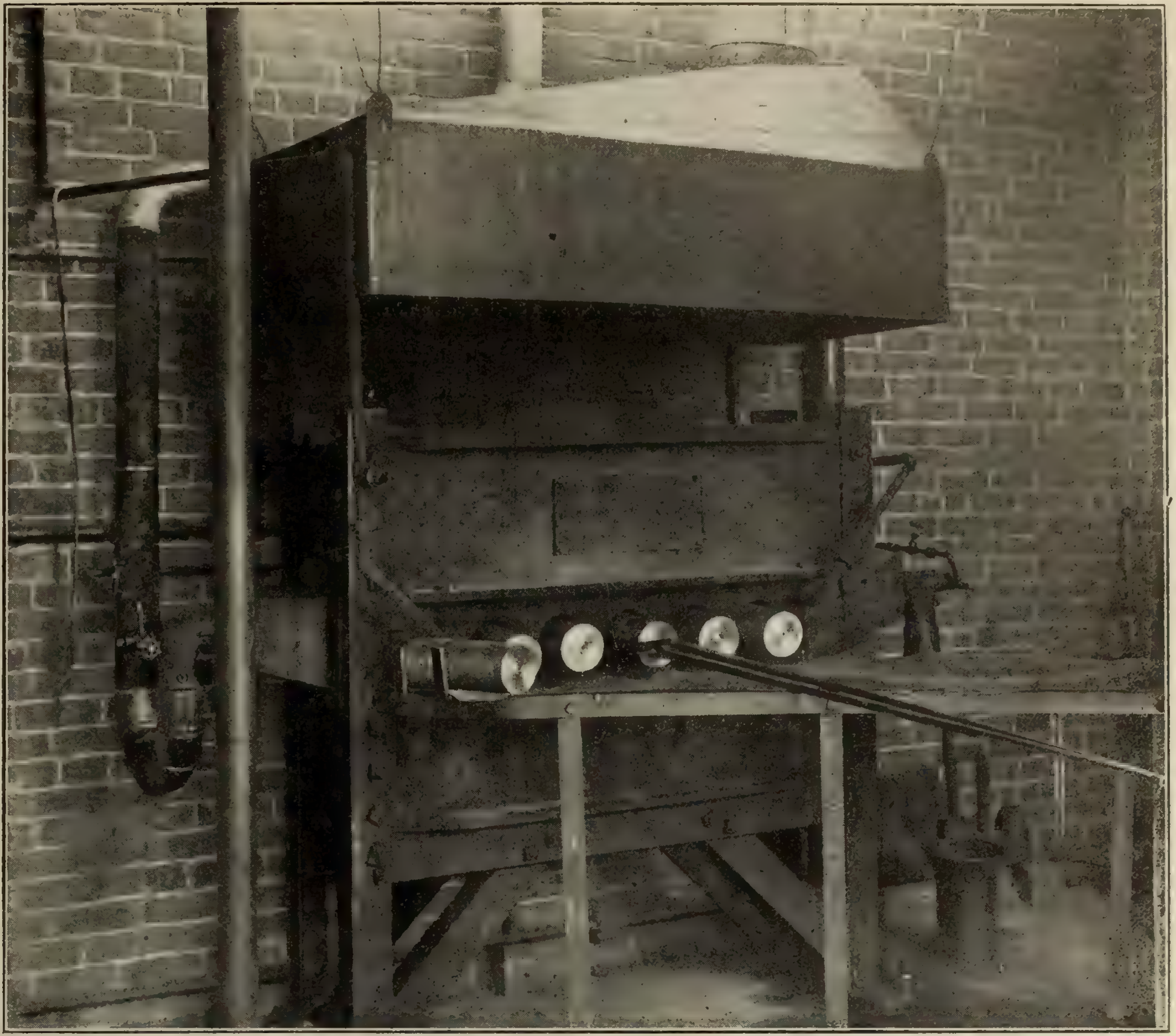
Only half the furnace space necessary.
Less than half first cost of furnaces.
No chimneys or flues required.
Instantaneous and perfect control of temperature.
Higher temperatures obtained.
No heaters, coal or ash handlers required.
No coal or ash piles.
Less waste of fuel and less time required to bring furnaces up to working heat.
No waste of fuel after work is done, as supply is shut off instantly.

Write for full particulars.

Mechanical Engineering Company, Limited

55 COTE STREET, MONTREAL, QUE.

PHONE—MAIN 3585



"MECOL" Furnaces

especially designed for Shell Work

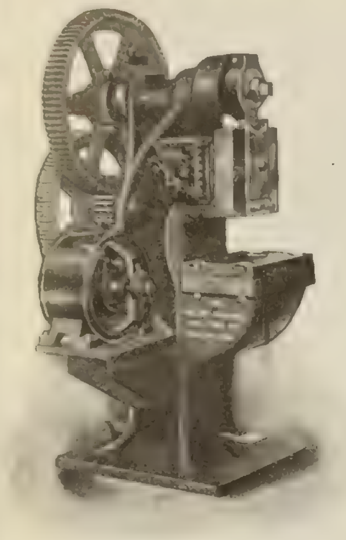
MECOL Furnaces are giving a satisfaction that only well-designed furnaces could give.

The largest manufacturers are users. Is not this proof of merit?

Tell us your requirements, and we'll gladly send full particulars on a suitable Mecol Furnace.

Mechanical Engineering Company, Limited
55 COTE STREET, MONTREAL, QUE., CANADA
PHONE--MAIN 3585

"TOLEDO" PUNCHING PRESSES



Efficient and economical performers in hard, daily service.

Crank shafts are of large diameter and hammer forged from special steel.

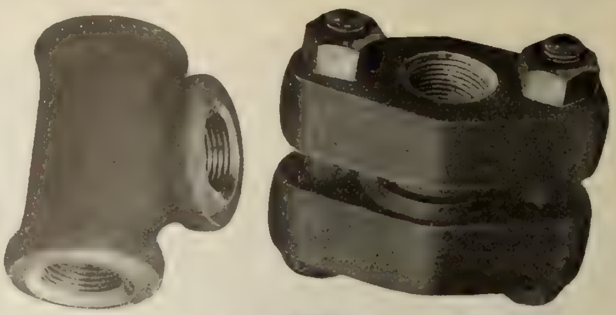
Eccentric adjustment insures rapid, accurate adjustment for all classes of work.

Extra die space allows the use of high dies.

The unusual solidity and strength of the well-proportioned frames specially adapt these presses to heavy work and insure the longest life at minimum upkeep.

For Blank Cutting, Bending, Forming, Trimming, Drop Forgings, etc.

The Toledo Machine & Tool Co.
TOLEDO, OHIO

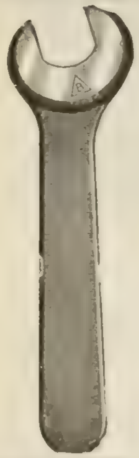


Elmes Fittings

They are made after a thorough study of the requirements of these fittings. Our manufacturing knowledge of the machines these fittings are for has given us an intimate knowledge of the strength required.

Write us for full information, prices, etc.

Chas. F. Elmes Engineering Works
217 N. Mrogan St. - Chicago, U. S. A.



Plyers, Structural Wrenches, Track Wrenches, Machine Wrenches, Eye Bolts, Lathe Dogs, Journal Box Wedges, Etc.

B
TRADE MARK

All Kinds Of Special Drop Forgings

Send Models or Blue Prints for Estimates

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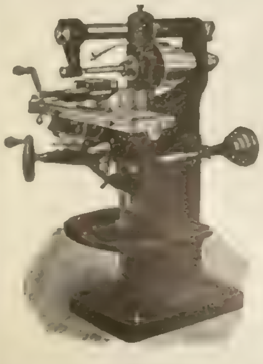
Canadian Billings & Spencer, Limited, Welland, Ontario



Cut Your Shop Costs

Nobody would think of putting 16-inch lathe work on a 30-inch lathe, then why leave small parts on a large Milling Machine?

A Steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

That same principle applied to your small planer work will cut the cost of planer work.

A Steptoe Shaper will do the work faster because it can be handled quicker.

The John Steptoe Company, **CUMMINSVILLE**
CINCINNATI, OHIO, U.S.A.

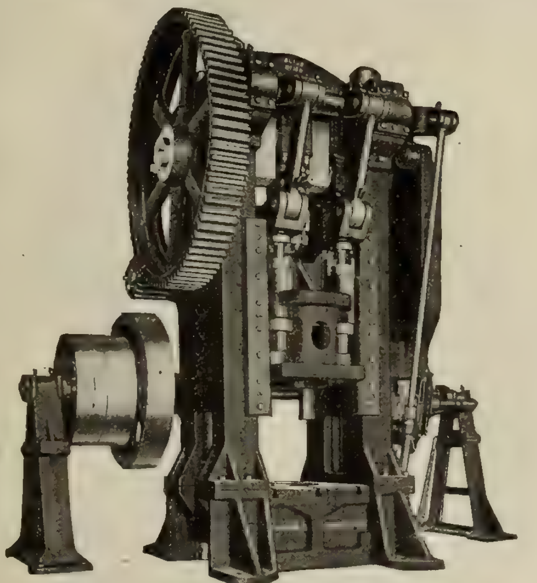
A User's Unsolicited Statement About His "Bliss" Press

"HAS BEEN USED CONSTANTLY FOR FORTY-SIX YEARS AND IS BEING USED AT PRESENT WRITING."

It is proof that our presses are our best advertisement.

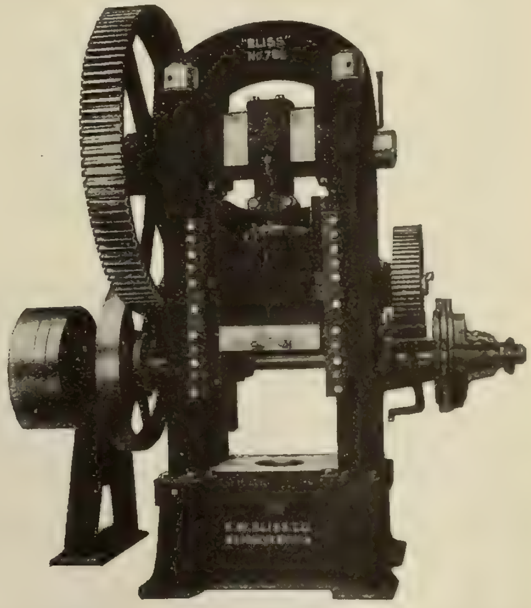
There is a "BLISS" Press for Every Sheet - Metal - Working Requirement

When you put in presses, why not install "Bliss" presses, that are known in every corner of the globe for their real "press" worth—presses that stand by you year after year?



BLISS TOGGLE DRAWING PRESSES—Economical in operation, simple in construction and control. Blank holding pressure is taken by the frame relieving bearings. Our patented toggle motion exerts a uniform pressure during the entire draw. This action facilitates work and requires minimum power. The work produced in every case is smooth and uniform.

Bliss Toggle Drawing Presses, built in sizes to cover all requirements, are successfully meeting modern conditions all over the world.



BLISS STRAIGHT SIDE PRESSES—Built in a number of sizes, weighing from 5,000 to 175,000 pounds, are adapted for heavy punching, piercing, stamping, shaping and drawing operations in the manufacture of automobile parts, agricultural implements, cutlery, electrical instruments, and heavy hardware.

There is a size particularly adapted to your needs.

Write Us Your Requirements.

Turn Your Press Problems Over to Us.

E. W. BLISS CO., 20 Adams St., Brooklyn, N.Y. U.S.A.
CHICAGO OFFICE: 622 West Washington Boulevard. *DETROIT OFFICE;* Dime Bank Building

—for big reductions in handling costs

Handling factory products with the ordinary truck takes numerous trucks and a man to operate each truck. You can effect a saving of both trucks and labor by the use of the

UNIVERSAL
ELEVATING TRUCKS

One man with a Universal can do as much trucking as several men with several ordinary trucks.

All material is stacked on the platforms. To move material the truck is backed under the platform, the handle of the truck is then pushed down, keeping the button depressed, which raises the truck bed, and with it the loaded platform, at the same time automatically locking it in its raised position.

When hauled to the desired position the button is pressed and the handle raised, lowering the platform to the floor. The truck is then drawn from underneath and is ready to move another platform.

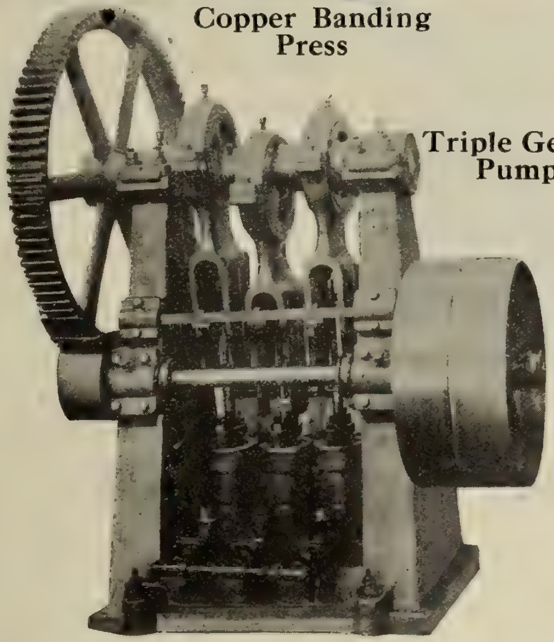
Raising and lowering of the truck can be operated with one hand—can be raised or lowered at any angle. Specially designed ball-bearings throughout.

Drop us a card to-day, for full particulars.

The Chapman Double Ball Bearing Co. of Canada, Limited
339-351 Sorauren Avenue, Toronto, Canada
Transmission Ball Bearing Company, 32 Wells Street, Buffalo, N.Y.

PRESSES

Copper Banding Press



Triple Geared Pump

Made in Canada

Nosing Press

Hydraulic Presses, Pumps and Accumulators

Nosing, Banding and Marking
Presses For All Size Shells.
Presses For General Purposes.

Write for prices and deliveries

William R. Perrin, Limited

TORONTO ONTARIO CANADA

The above Machine was designed for this particular job, and is a success in every way.

A *National* Electric Butt Welder

A Question of the Hour

How is the High Speed Steel for that shell job holding out? It's expensive and scarce. By a National Electric Butt Welder and work up all the stubs and short pieces into good tools. Many automobile and machine shops have done this and saved the price of the welder in the first month.

Example of Saving.—A set of high speed lathe tools in one shop costs..	$285.00
A duplicate set of tools consisting of high speed steel stubs welded to low carbon shanks cost	45.00
Net saving in outlay	$240.00

Does this interest you any? If so, write us and get the details.

The National Electric Welder Company have published a small book showing the proper methods **to follow in reclaiming short** pieces of expensive high speed steel and stellite with the aid of the electric welder. A copy will be sent upon request. We also manufacture a complete line of butt, spot seam and jump welders also electric welders for safe ending locomotive tubes.

The National Electric Welder Company

WARREN OHIO U.S.A.

Montreal Machinery & Supplies, Limited

211 McGill Street Montreal, Que.

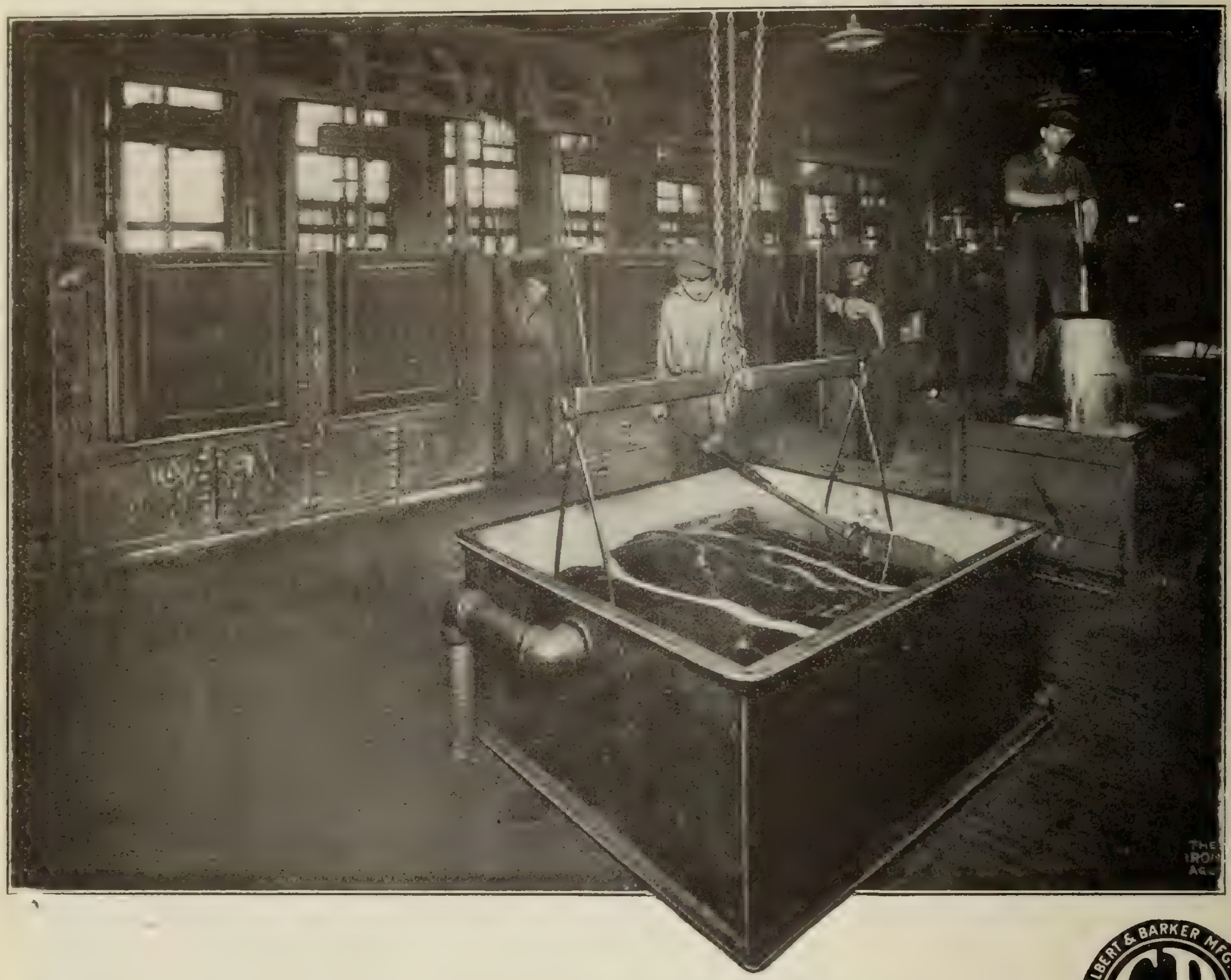
"RICH" HIGH SPEED DRILLS

ALSTON HACK SAW BLADES

Consult Us for Requirements of

Machinery, Machine Tools, Factory and Mill Supplies

We make a specialty of designing and equipping complete Munition Plants. Our facilities in this connection will make our service of value to you.



Case Hardening Efficiency—

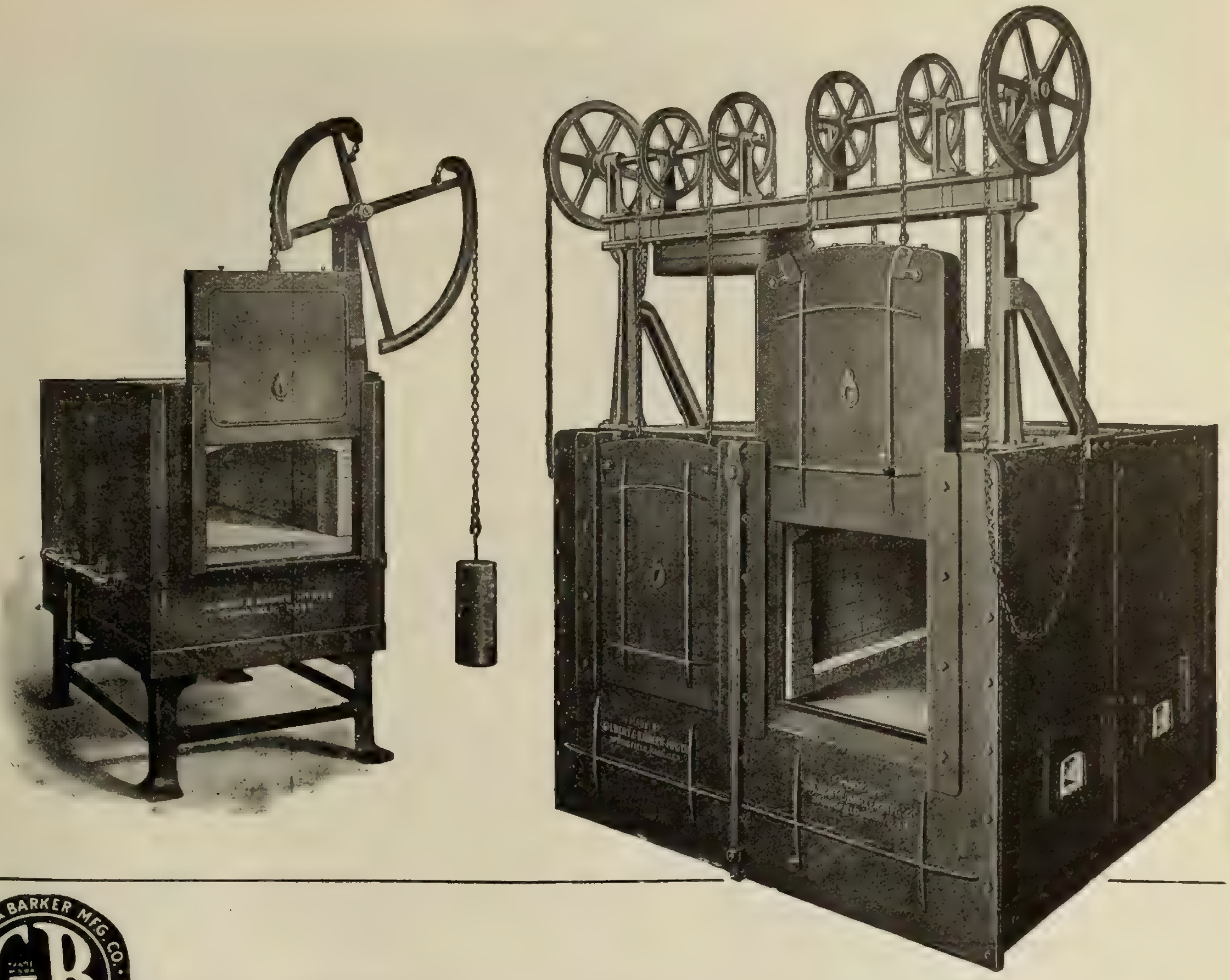
IS not the speed and thoroughness with which the hardening is accomplished, but when to know the exact moment the process is through. This requires more than the usual amount of temperature control on the part of the operator.

He must know that point is the one that made us sit up and ponder. But then our experience came to our rescue, and with the result that "Gilbert and Barker" Case-Hardening process allows you to easily find the **exact moment the** hardening process is **through.** It maintains a standard, uniform and **constant heat. Figure it out** — would it pay you?

Ask for catalogue 24 for full particulars.

Gilbert & Barker Mfg. Co.

SPRINGFIELD MASS. U.S.A.



Are Your Furnaces O.K.?

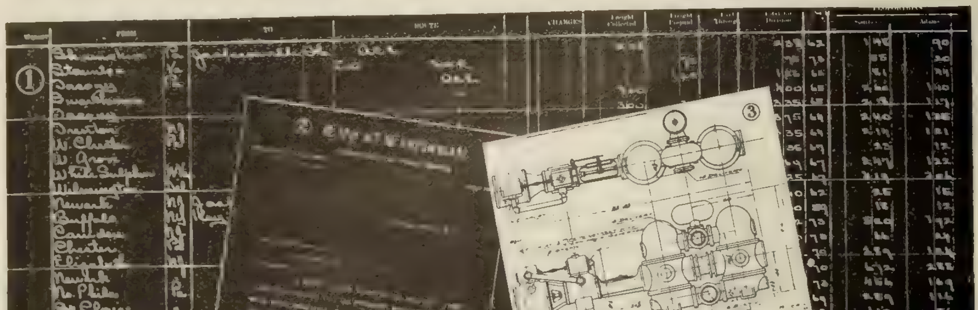
RIGHT now, think of your furnaces—*are they giving 100% efficiency?* If not, will your equipment allow you to do with less. Do you think you have too many furnaces? Probably you could get the same results with fewer number of a better furnace.

The Gilbert & Barker Single and Double Chamber Furnaces embody features which stamp it far in advance of any furnace for similar work.

Built for heat treating, annealing and forging. In our Double Chamber Furnace each chamber is self-acting. One chamber may be loaded up while the other is heating. This saves time and unnecessary loss of heat. To facilitate the work Furnaces can be supplied that open at both ends, allowing a quicker change. If you will write for catalogue 24 you will get full information, specifications, etc.

Gilbert & Barker Mfg. Co.

Springfield Mass. U.S.A.



(1) A Photostat copy of an intricate and detailed specification sheet of which several accurate copies were required. (2) A Photostat copy of an ordinary business letter. (3) A Photostat copy of a blue print required by several departments and different workmen.

This cut shows the PHOTOSTAT in use.

What One Manufacturer Has Done With The PHOTOSTAT

(Reg. U. S. Pat. Off.)

In the drafting, tracing and copying departments of one manufacturer the Photostat has made a saving of about 75%.

And further—the work is more satisfactory. It is photographically accurate, and copying that formerly took days, is now done in minutes.

Aside from its speed and low cost, the Photostat has many distinct advantages over other copying methods. One is the fact that copies may be enlarged, or reduced to scale without the loss of time or detail.

Here are the Ways It is Used and the Savings It Makes in Three Different Lines of Business

$3000 A Year Saved

"The Photostat is saving $250 a month for us, because it is doing work which was previously done by two draftsmen and a stenographer."

Saving $1100 Yearly

"Not only are we saving eleven hundred dollars a year by the use of the Photostat, but we have increased the efficiency of both our office and drafting departments."

Replacing Ten Tracers

"It has enabled us to close down a tracing office formerly employing ten tracers."

Makes Quick Low Cost Copies Directly on Paper

No negatives—dark rooms—nor expert knowledge necessary. All processes are mechanical. The Photostat makes photographic facsimilies of letters, legal papers, maps, blue prints, drawings, financial statements—anything printed, drawn or written—in a few minutes and for a few cents.

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Send for full information, then compare this method, for speed, convenience, cost and efficiency with ordinary methods of copying pencil sketches, plans, statements and other papers by hand.

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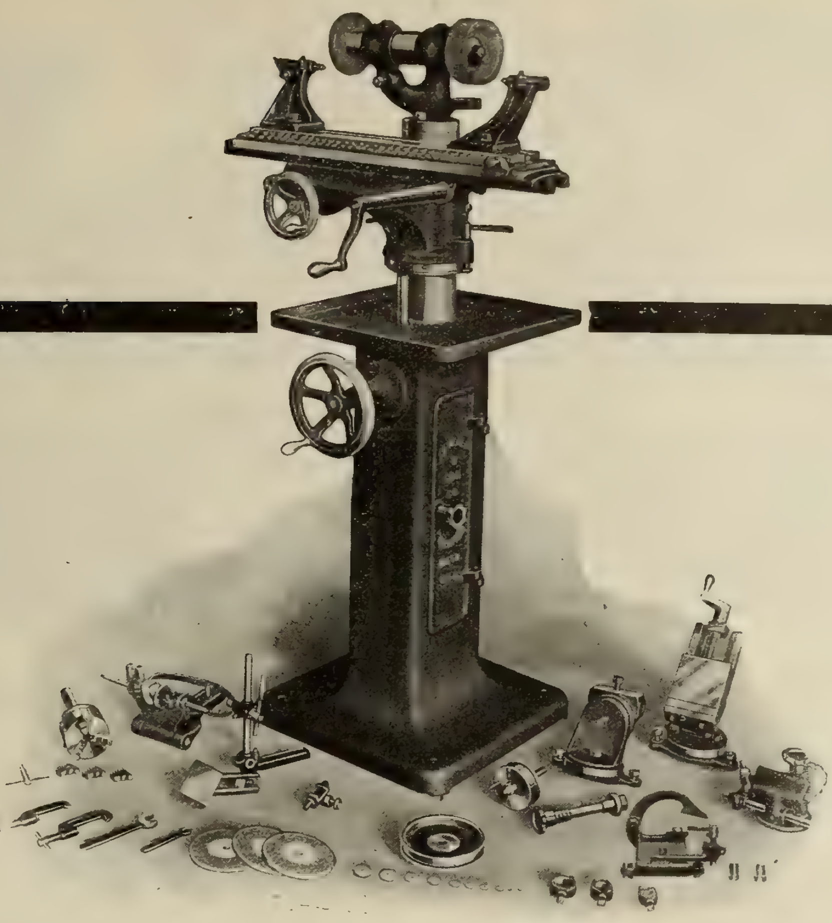


WELLS REAMER AND CUTTER GRINDERS

That's what you *want—a universal* grinder, one with the everything-at-hand convenience—that's exactly what you *get* in a WELLS.

Then too, consider the wide range of choice allowed you by the Wells way—a No. 184 at $115. Plain Grinder up to the No. 190 Full Universal—this means that you buy *only* the size machine that you actually *need*.

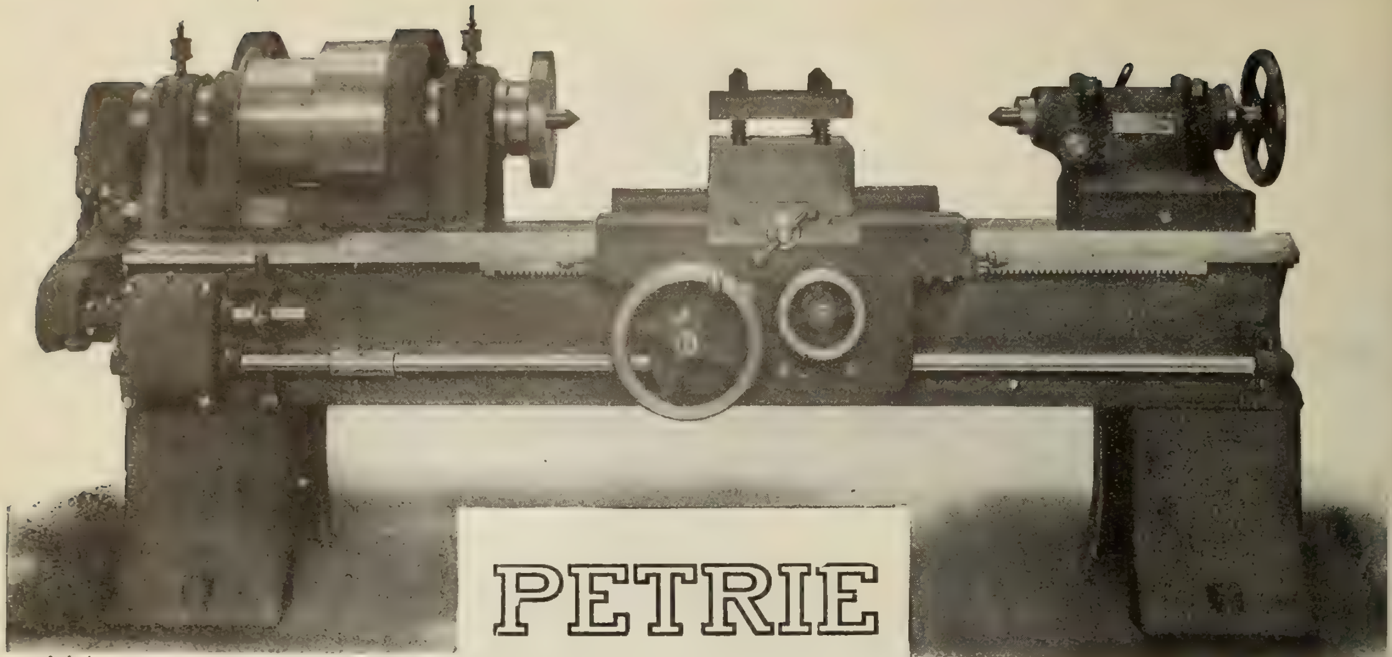
Wells Grinders have proved their worth under a hundred hard conditions—*you* need a Wells in *your* plant.

Study These Wells Grinder Mechanical Features:

Swings 8-in. diameter on centers and takes 16-in. in length between centers.
Rack Feed for longitudinal movement of table gives a steady, even feed.
Swivel Table with vertical adjustment so that Cup Wheels can be used. No other moderate priced grinder has this feature.
Locking Device so that table can be clamped to the column at any angle and raised or lowered without changing its position.
Swivel Boxes which insure perfect alignment of spindle essential to a grinding machine.

CATALOG No. 11 FURNISHED ON REQUEST.

F. E. Wells & Son Co. **Greenfield, Mass., U. S. A.**



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MADE IN CANADA *REASONABLE PRICE* *PROMPT DELIVERY*

DESIGNED AND BUILT ESPECIALLY FOR MACHINING HIGH EXPLOSIVE AND SHRAPNEL SHELLS UP TO AND INCLUDING 8-INCH. USED AND ENDORSED BY SOME OF THE LARGEST AND MOST SUCCESSFUL SHELL MANUFACTURERS.

Complete specification and description on above machine, together with prices and deliveries mailed on request.

We represent the following prominent manufacturers of metal-working machinery in Eastern Canada:

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J. Butler & Co., Ltd.,	Halifax, Yorkshire,	Lathes, Shapers, Planers, etc.
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J. Rhodes & Son, Ltd.,	Wakefield, Yorkshire,	Presses
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Humpage, Thompson & Hardy,	Bristol,	Cutting-Off Machines
	Etc., Etc., Etc.	

UNITED STATES MANUFACTURERS

Cincinnati Milling Machine Co.,	Cincinnati, O.,	Milling Machine and Cutter Grinders
National Machinery Co.,	Tiffin, O.,	Forging Machinery and Bolt Cutters
Rockford Machine Tool Co.,	Rockford, Ill.,	Drills, Planers, Shapers
Cleveland Punch & Shear Works,	Cleveland, O.,	Punches and Shears
Bardens & Oliver Co.,	Cleveland, O.,	Screw Machine and Turret Lathes
International Machine Tool Co.,	Indianapolis, Ind.,	Libby Turret Lathes
Carroll-Jamieson Mach. Tool Co.,	Cincinnati, O.,	Engine Lathes
Dreses Machine Tool Co.,	Cincinnati, O.,	Radial Drills
Peerless Machine Co.,	Racine, Wis.,	Peerless High Speed Hack Saws
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Greaves Klusman Tool Co.,	Cincinnati, O.,	Engine Lathes
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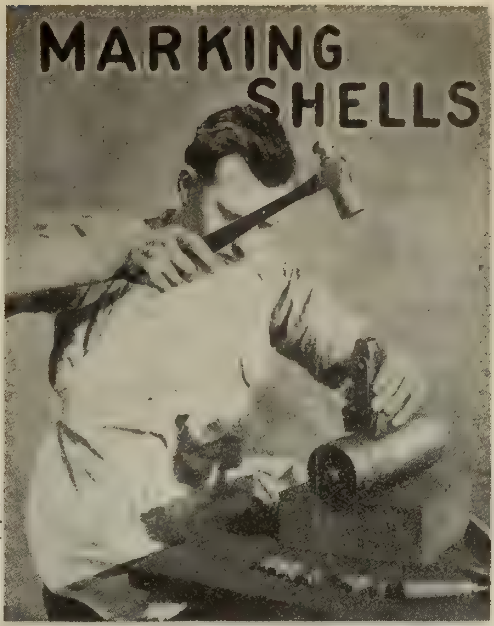
If you require anything in Iron or Wood-working machinery let us have your specifications. Our many years' experience in the machinery business, will be of service to you.

We are always open to purchase machinery, or complete plants.

H. W. Petrie of Montreal, Limited, Montreal, Que.



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Matthews Improved Steel Holder and Interchangeable Grooved Type

PATENTED NOVEMBER 11, 1915

For dating, marking heat numbers or other changeable hand numbering or lettering on shells the Champion Holder is the most rapid, accurate and convenient arrangement. The grooved type is instantly locked or released. No slow thumb screws;

WE have the Men, the Factory, and the equipment to give you proper marking tools for munition work.

66 Years in Business

James H. Matthews & Co.

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Gentlemen—
Send us your book "Marking Shells." We are interested in Die Stamps for:

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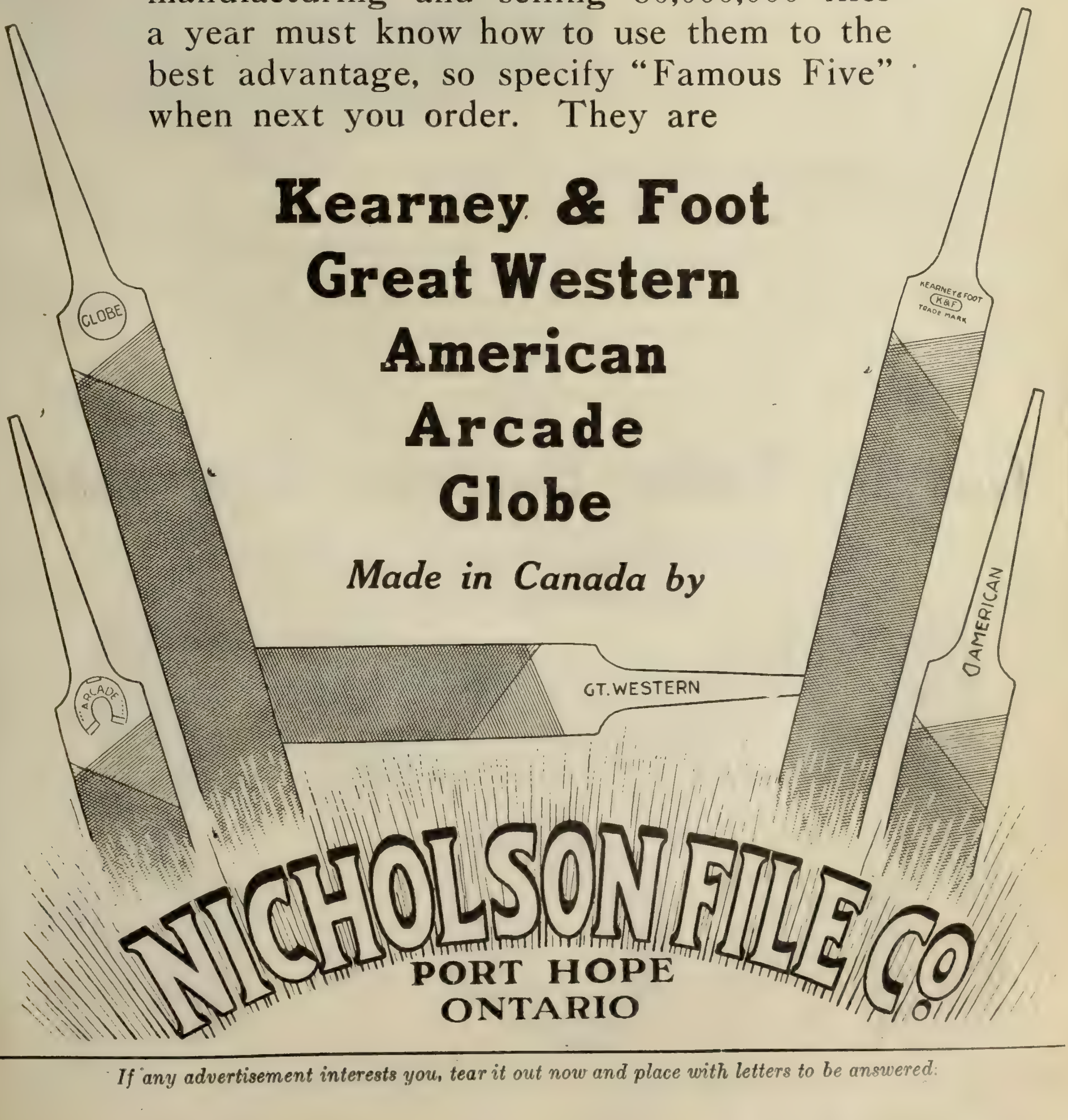
ARMSTRONG BROS. TOOL CO.
"THE TOOL HOLDER PEOPLE"
306 N. FRANCISCO AVE. CHICAGO, U.S.A.

Said the Superintendent to the Purchasing Agent:

The "Famous Five" files, Fred, are sharp and hard and do lots of work, and if we discard them as soon as they cease to be efficient, as the maker suggests, we will get the best results. The firm that is manufacturing and selling 60,000,000 files a year must know how to use them to the best advantage, so specify "Famous Five" when next you order. They are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Globe

Made in Canada by

PORT HOPE
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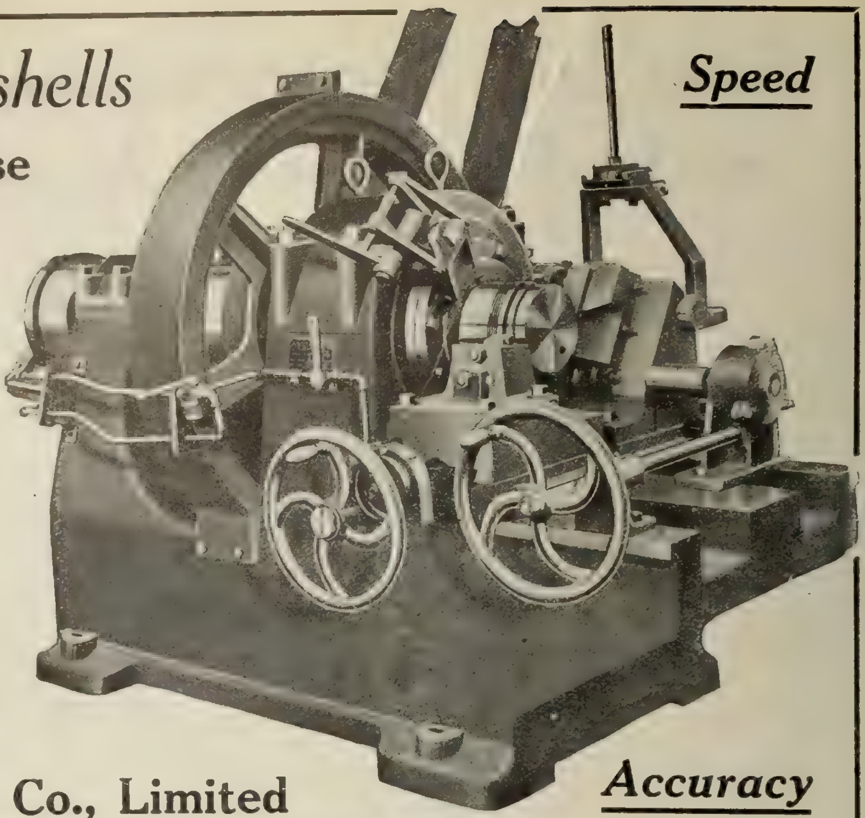
--for banding 8" shells

Jenckes Single Purpose Lathes



Are big duty machines.

Note the liberal proportions, the general appearance of sturdiness—they mean an extra measure of long and efficient service.

These machines are also manufactured for 18-pdr., 4.5", 5", 6", 8", 9.2", 12" and 14" shells; are tooled when required for the mm. sizes corresponding to Russian and French ammunition.

The Jenckes Machine Co., Limited

Works: SHERBROOKE, QUE.; ST. CATHARINES, ONT.

SALES OFFICES: 621-4 Traders Bank Building, Toronto; 908 E. T. Bank Building, Montreal; West Chester Avenue, St. Catharines; Cobalt, Ont.; Exchange Building, Vancouver

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the men
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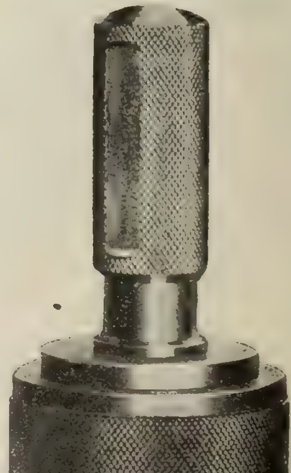
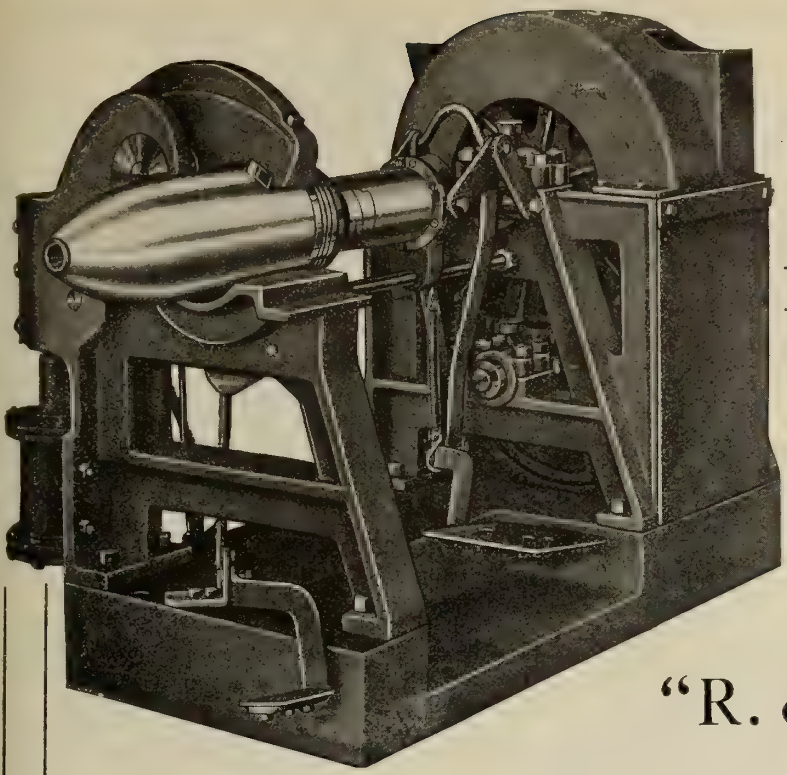
the knack.





Mr. Shell Manufacturer!

Are You Screwing in Base Plugs by Man Power?

"R. & V." Power Base Plug Driver 6-in., 8-in. and 9.2 Shells

If you are looking for a powerful, well built, high-speed plug driver, give us an opportunity to show you the details of this machine.

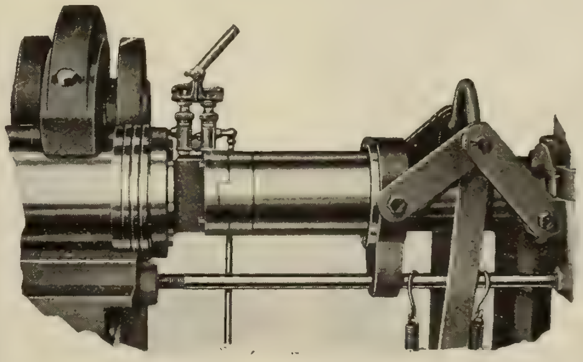
Write or wire us for estimates and deliveries.

We have brought out a line of Special Single Purpose Lathes, for the manufacture of High Explosive Shells.

They are all of exceptionally heavy construction and simple design to meet the severe service and special requirements of the Munition Manufacturers.

These machines are making records rarely met and are receiving favorable recognition already.

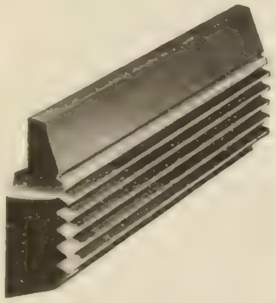
Cutting-off Lathes
Outside Roughing Lathes
Outside Finishing Lathes
Inside Boring Lathes
Inside Roughing Lathes
Facing Lathes



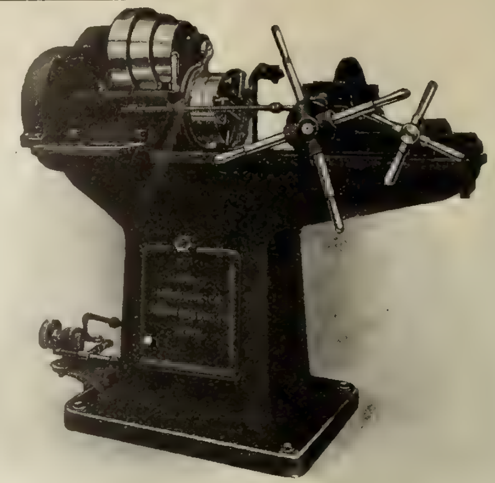
Detail View of Slip Joint.

Inside Finishing Lathes
Band Seat Turning, Waving and Undercutting Lathes
Copper Band Turning Lathes
Turret Lathes
Thread Millers

The Root & Van Dervoort Engineering Company
East Moline Illinois U.S.A.



Two Ways of Figuring Threading Production



PRODUCTION PER DIE:

How long will the die produce before requiring replacement of chasers? This point directly touches economy.

The chasers of the **Landis Die** have 10 to 20 times the life of any other die, under hard usage. Ground on the end only, there are 3 inches to be used before a new chaser is needed.

PRODUCTION PER HOUR:

How fast will the die produce?

Here the **Landis Die** has every advantage. Full natural clearance, and the variable rake angle adjusted to the material to be cut, enable maximum cutting speeds.

Moreover, the cutting contour of the chasers is permanent, consistently producing threads of the highest quality.

Learn the full Landis details in Catalogue No. 22—on request

LANDIS MACHINE CO., INC., Waynesboro, Pa.

WILLIAMS & WILSON, Exclusive Canadian Agents

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of

CHILLED CAST IRON

FOR

4.5", 5" and 6" H.E. Shells

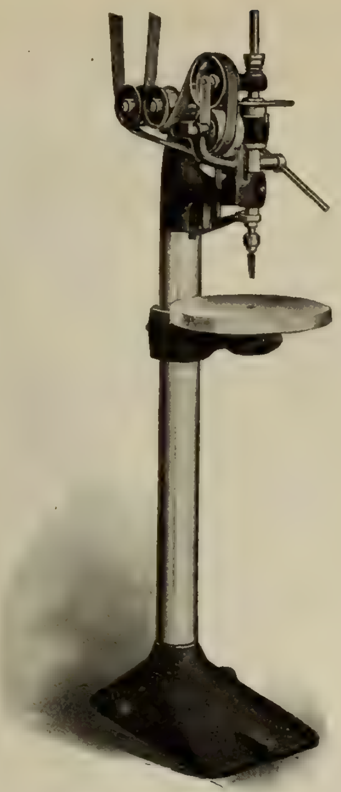
We have one in use now that has nosed over 24,000 shells and is still doing business.

CHEAP AND EFFICIENT

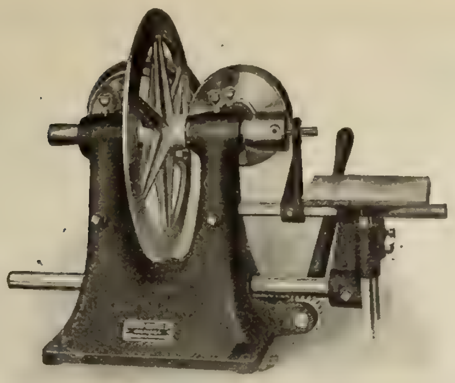
Write or wire for particulars.

Marsh & Henthorn, Ltd.

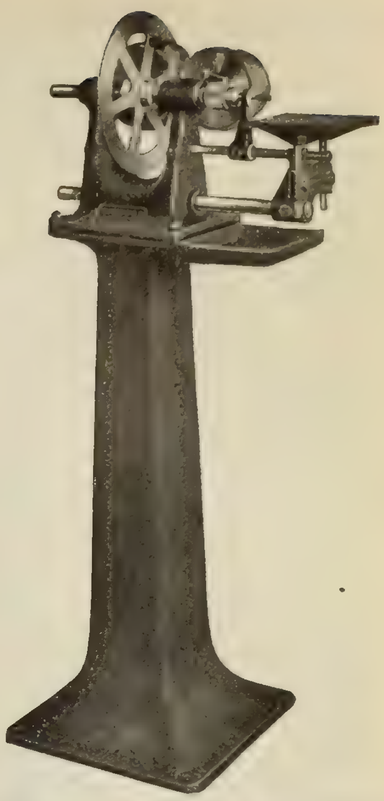
Belleville, Ontario



¼-in. Vertical Tapper

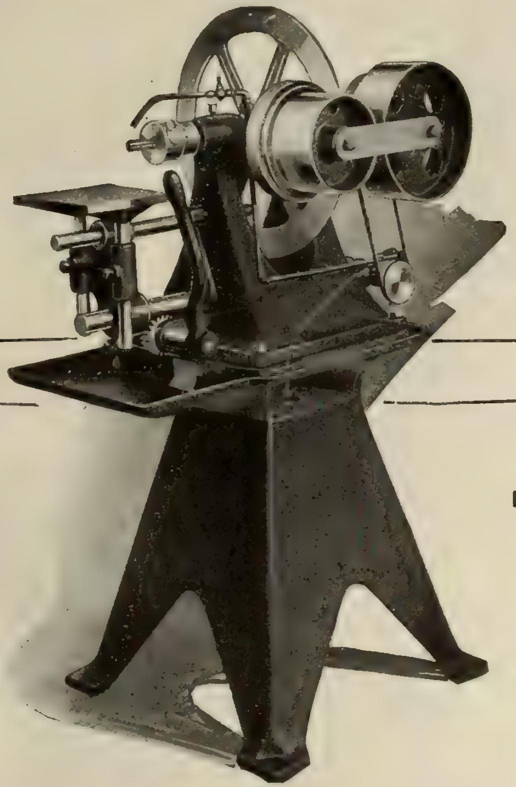


Bench Tapper



Column Type Horizontal Tapper

⅝-in. Oil Feed Tapper



R. & S. Tappers

Tapping of all kinds from 3-16" to ⅝". That is the range of the tappers illustrated above—bench, vertical and horizontal.

Are you suffering from too great a breakage in your taps Are you getting the speed you think you should? Are you getting the *best* work done?

These are three great factors that the "R. & S." eliminate entirely from tapping troubles. They are all built in exact proportion to give the maximum speed and efficiency. They are the result of an expert knowledge of the requirements of machines of this character.

The ⅝" Oil Feed Tapper is featured by the continuous oil feed which allows greater speed, increased efficiency and output and longer life. We will tell you all about this.

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This is Our Address——How Can We Serve You?

Pressed Steel and Brass Grease Cups in any finish required

Complete Line of Oilers; Oil Cups, Both Screw Top and Hinge Lid; Dowel Pins and Closet Screws, Spring Shackle Bolts

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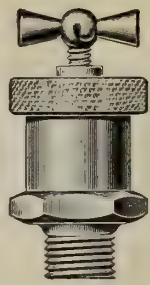
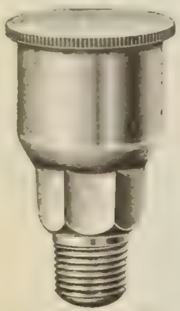
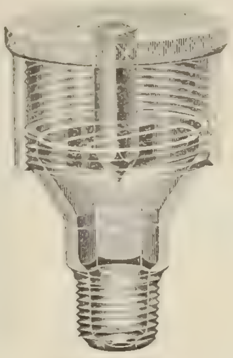
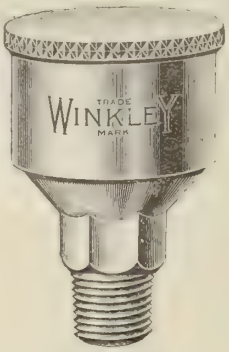
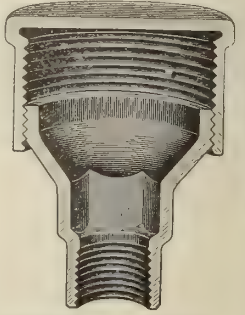
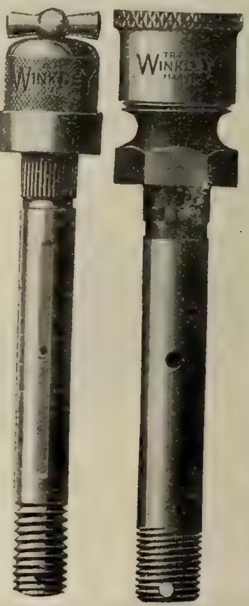

"T" HANDLE

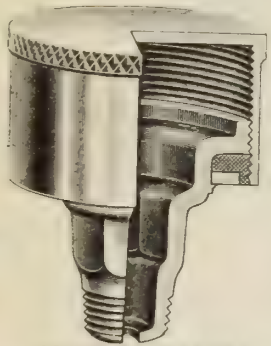

SCREW TOP OIL CUP

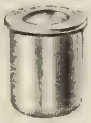

RATCHET


TRADE
WINKLEY
MARK
PLAIN


FEMALE THREADS


WINKLEY
WINKLEY


LEATHER WASHER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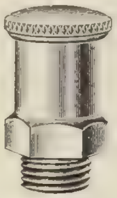
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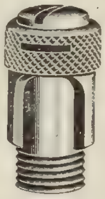
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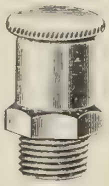
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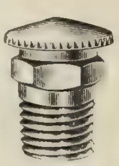
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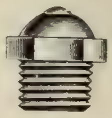
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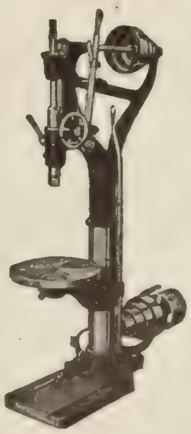
The Canadian Winkley Co., Ltd.

WINDSOR, ONTARIO, CANADA

The BARNES DRILLS

TRADE W.F. & J.B. MARK



Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

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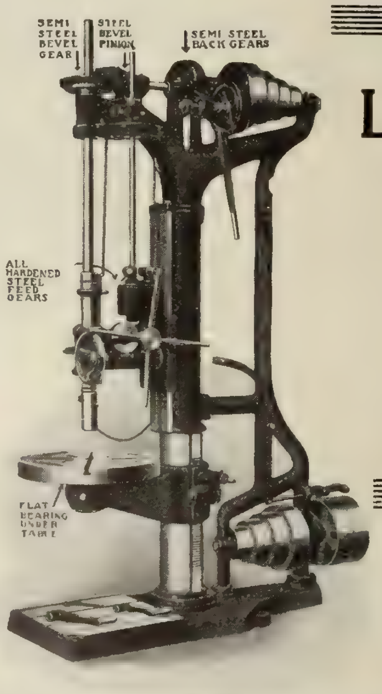
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SEMI STEEL BACK GEARS
ALL HARDENED STEEL FEED GEARS
FLAT BEARING UNDER TABLE

Lower Your Production Cost!

Aurora

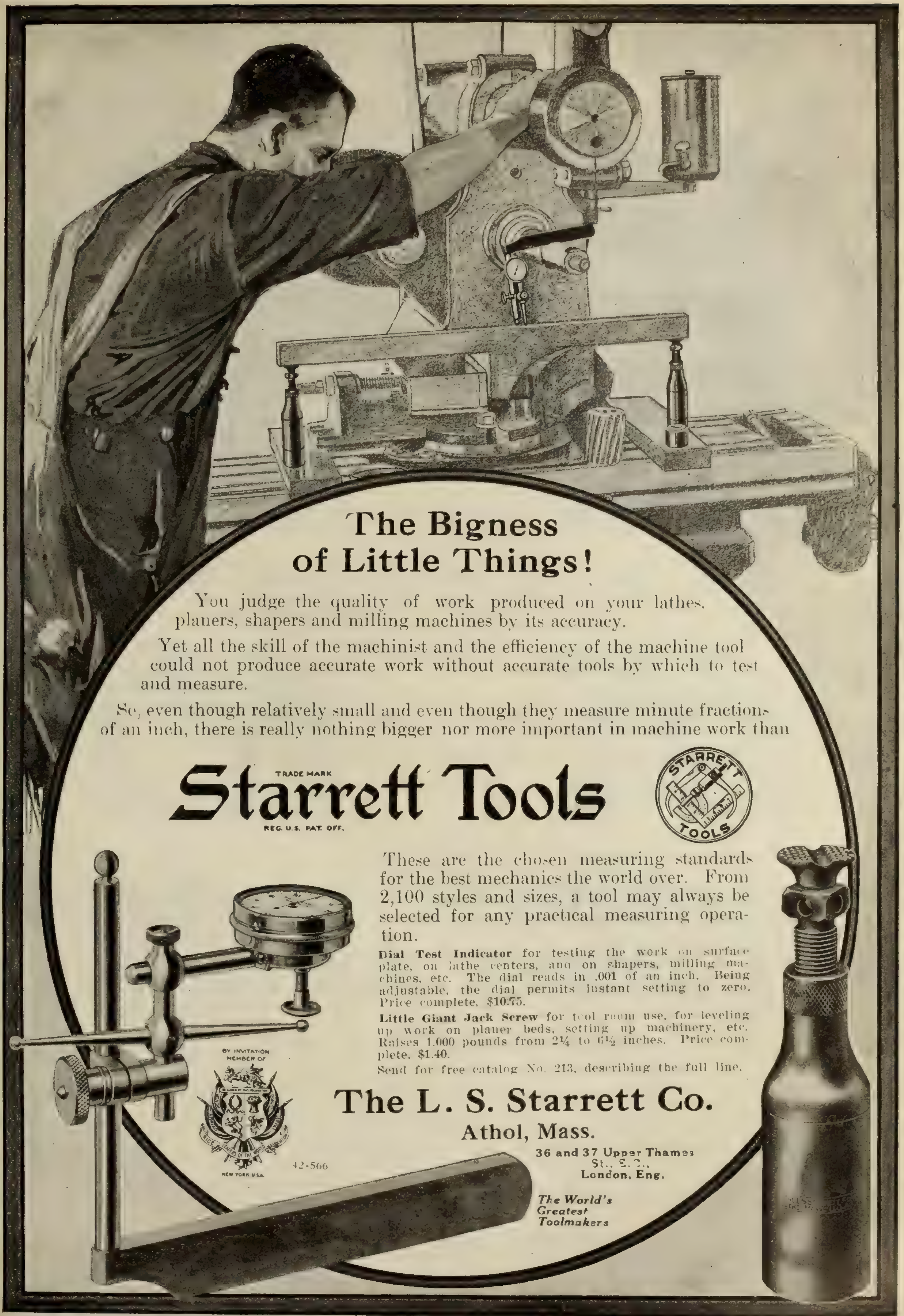
Drilling Machine

Strength is the word that distinguishes this machine. Special care has been used in bringing this Drill up to its present point of efficiency. If you are in the market for drills which must have speed and accuracy consult us. This is an ideal machine for HIGH EXPLOSIVE SHELLS. Inquire—we have the goods.

Stationary head sizes—20", 21".
Sliding head sizes—22", 24".

The Aurora Tool Works

Aurora, Indiana, U.S.A.



The Bigness of Little Things!

You judge the quality of work produced on your lathes, planers, shapers and milling machines by its accuracy.

Yet all the skill of the machinist and the efficiency of the machine tool could not produce accurate work without accurate tools by which to test and measure.

So, even though relatively small and even though they measure minute fractions of an inch, there is really nothing bigger nor more important in machine work than

TRADE MARK

Starrett Tools

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These are the chosen measuring standards for the best mechanics the world over. From 2,100 styles and sizes, a tool may always be selected for any practical measuring operation.

Dial Test Indicator for testing the work on surface plate, on lathe centers, and on shapers, milling machines, etc. The dial reads in .001 of an inch. Being adjustable, the dial permits instant setting to zero. Price complete, $10.75.

Little Giant Jack Screw for tool room use, for leveling up work on planer beds, setting up machinery, etc. Raises 1,000 pounds from 2¼ to 6½ inches. Price complete, $1.40.

Send for free catalog No. 213, describing the full line.

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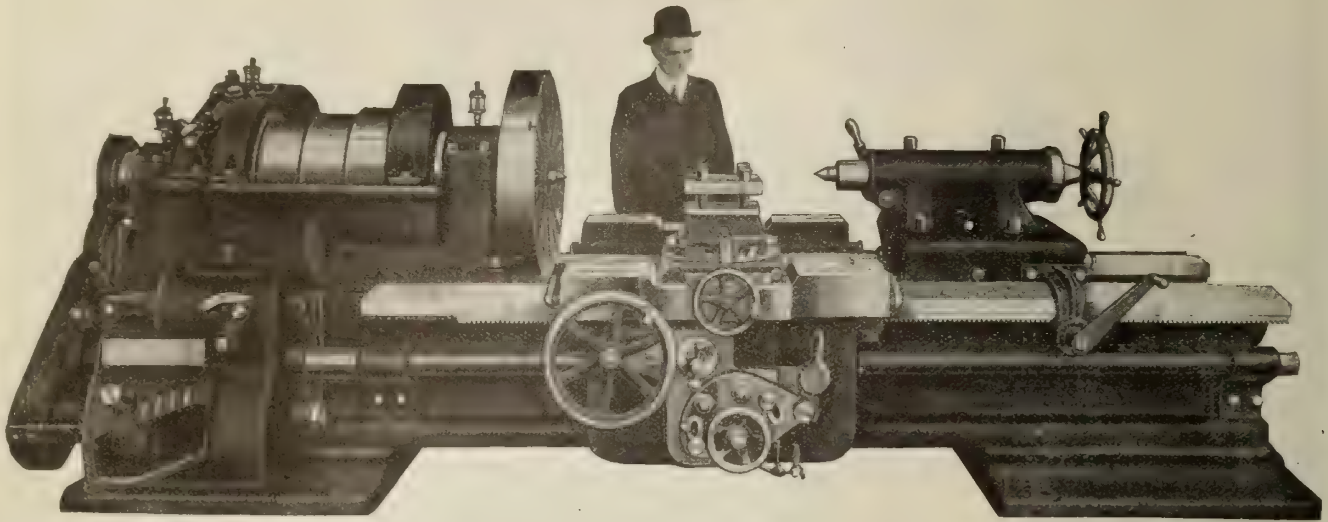

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ILLUSTRATION SHOWS 30" DOUBLE BACK GEARED LATHE WITH 13' BED

THE HOUSTON, STANWOOD & GAMBLE COMPANY
CINCINNATI, U.S.A.

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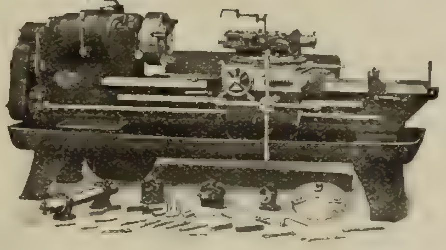
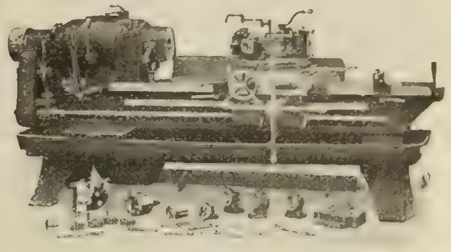
RUDEL-BELNAP MACHINERY CO.
TORONTO and MONTREAL

CINCINNATI ACME

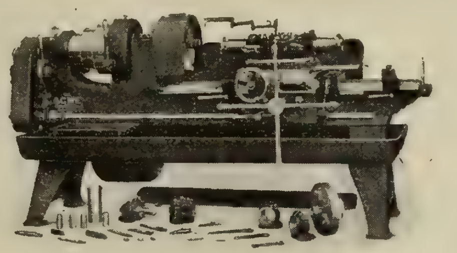
Flat Turret Lathes, Screw Machines, Turret Lathes, Brass Working Machines, Universal Turret Lathes, and all Tool Accessories



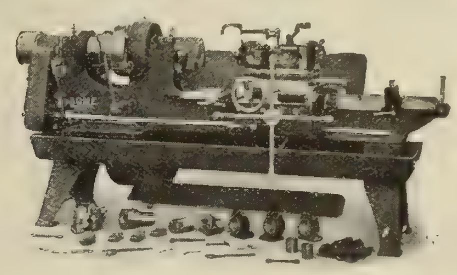
3¼"x36" Flat Turret Lathe with Chucking equipment.



3¼"x36" Flat Turret Lathe with Bar Equipment.

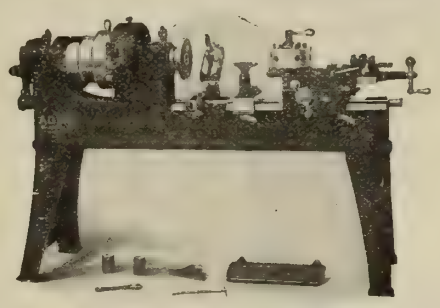


2¼"x26" Flat Turret Lathe with Chucking Equipment.

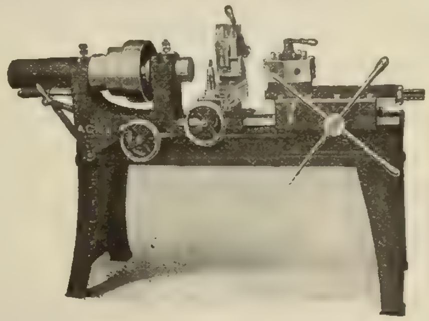


2¼"x26" Flat Turret Lathe with Bar Equipment.

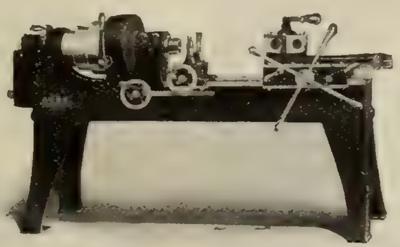
Flat Turret Lathes, the double purpose machines. Adapted to both bar and chucking work. Using simple inexpensive tools. The greatest producers of work from bar stock forgings and castings. Capacity bar stock 2¼" and 3¼" and chucking work 12" and 16" diameter.



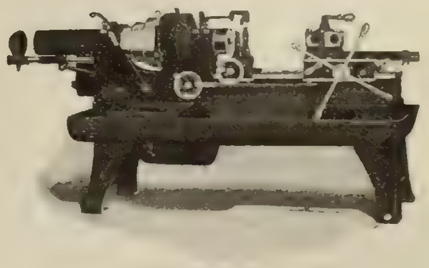
18" Universal Turret Lathe.



16" Forming Turret Lathe.



18" Turret Lathe.



2¼"x11" Screw Machine.

Screw Machines made in five sizes. Automatic Chuck capacity ⅝" to 2¼". 11" to 20" swing. Plain or friction geared head with or without automatic feed to turret.

Turret Lathes and Brass Working Machines made in four sizes. 14" to 20" swing. Plain or friction geared head, with or without automatic chuck, bar feed, automatic feed to turret, or cut off rest. Furnished with plain, set over or universal turret, also chasing attachment, forming attachment, and all tools for rapid and accurate production.

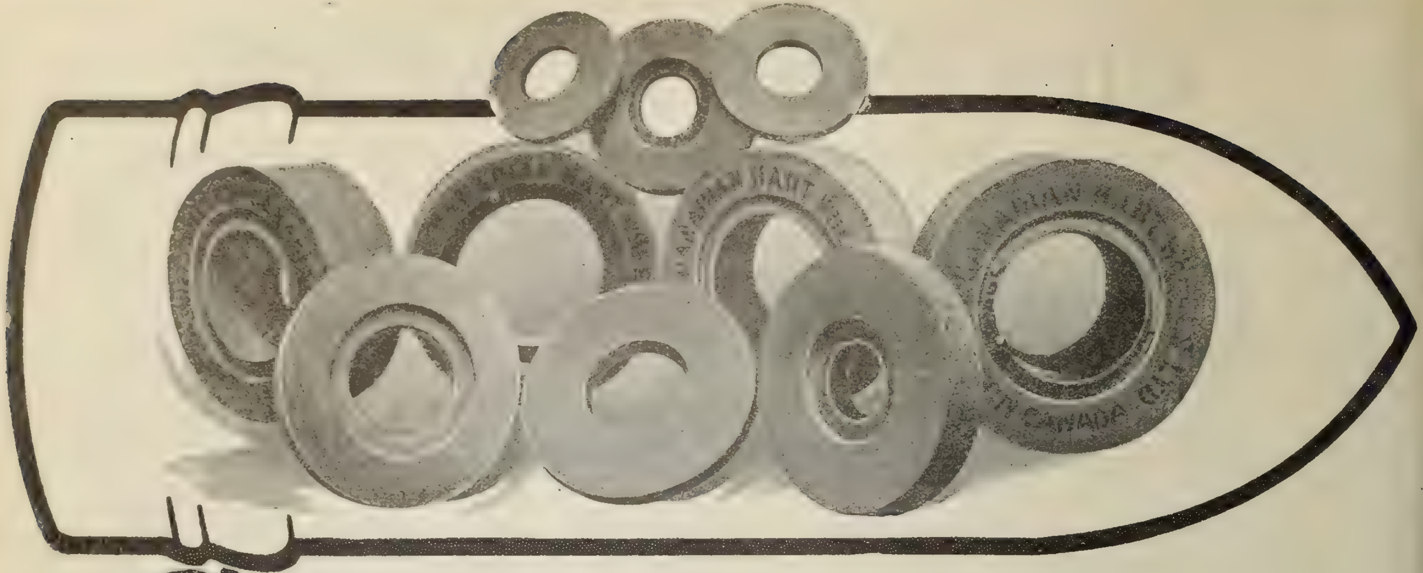
These machines are built to meet the demand for maximum production. Noted for their accuracy, rigidity, convenience to operator, and other points of merit.

Special tool equipment and estimates of production furnished on request. **MACHINES OF QUALITY. SEND FOR DETAILS.**

Canadian Agents: RUDEL-BELNAP MACHINERY CO., MONTREAL AND TORONTO.

THE ACME MACHINE TOOL COMPANY, Cincinnati, Ohio, U.S.A.

CODE WORD: ACME

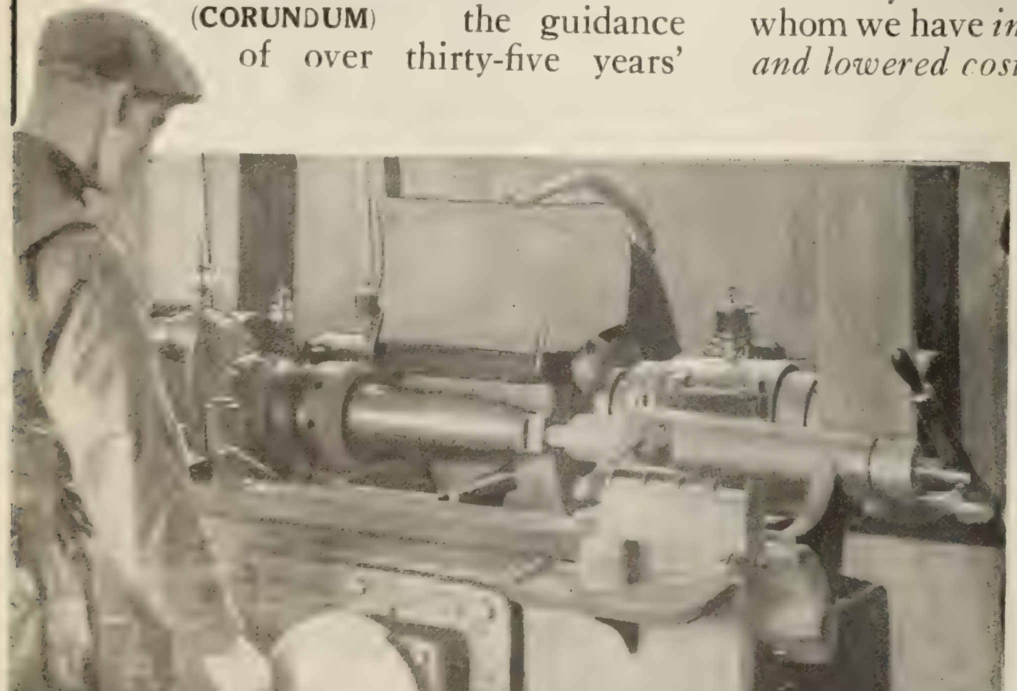


Shrapnel and High Explosive Grinding Wheels

Above illustration shows only a few of the many shapes and sizes we are making for this work.

"REXITE" (CORUNDUM) Wheels are made under the guidance of over thirty-five years' experience. All made from our own artificial abrasive by either silicate or vitrified process.

We'll be pleased to give you names of many satisfied customers for whom we have *increased production and lowered costs.*

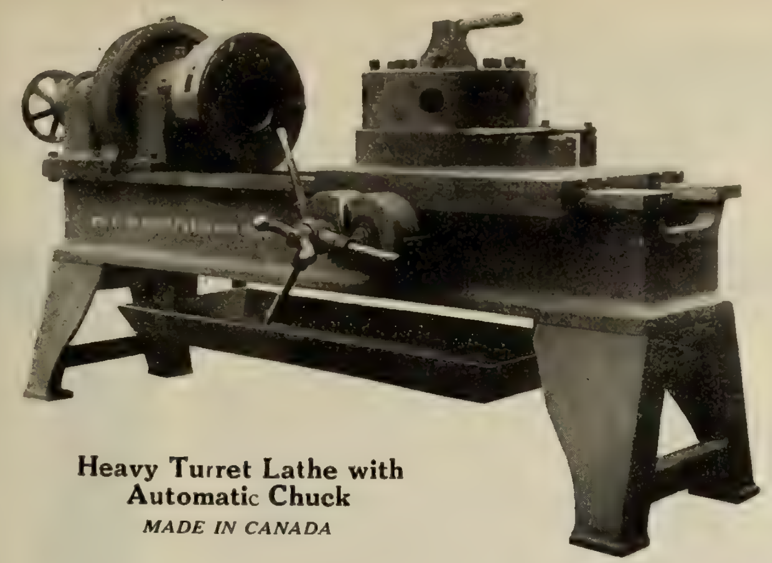


Write our service department for information concerning your grinding needs.

Canadian Hart Wheels Limited

Manufacturers of Grinding Wheels and Machinery

HAMILTON, CANADA



Heavy Turret Lathe with Automatic Chuck
MADE IN CANADA

The Lathe with the Automatic Chuck, and Large Hollow Spindle to Accommodate Shells up to Six inches diameter.

The Corbet Improved Heavy Turret Lathes for Shells

Our Lathes are on active service in over fifty Munition Plants in Canada. When you purchase our lathes and chucks, all you have to do is to instal the lathe, put on the belt and get immediate results, and not have to purchase a chuck, and have to fit it after you have the lathe installed, which means delay. Duplicate orders for our lathes from satisfied customers are quite common. They will increase your output, and render a service, that only those who have them installed can appreciate, and are sold on a positive guarantee to give results. Moderate prices and prompt deliveries. Why not write us to-day?

The Corbet Automatic Steam Towing Machines

For Tugs and Barges

These Machines permit the use of Steel Hawsers in place of Manila Hawsers. Steel Hawsers will last at least ten years, whereas the Manila Hawsers only last one season. The money saved in not having to buy new Hawsers every Spring will soon pay for one of our machines. Besides, our machines will render a service that only those who have them installed can appreciate. These machines are made in four sizes to accommodate steel hawsers from ¾" dia. up to 1½" dia. Now is the time to place your order for delivery April 15th, 1917.

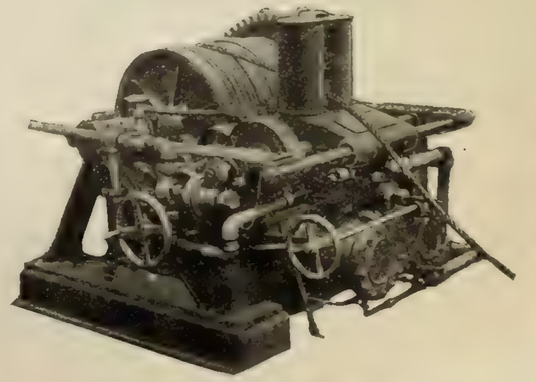
Write for prices and general information.

THE

Corbet Foundry & Machine

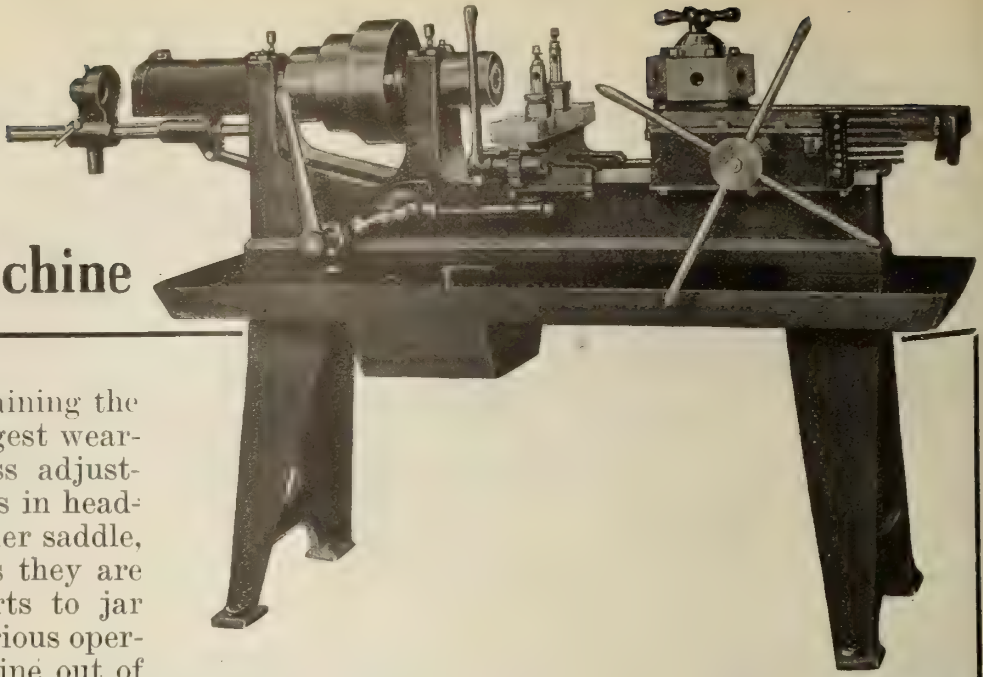
COMPANY, LIMITED

Owen Sound, Ontario, Canada



Steam Towing Machine
MADE IN CANADA

The Stecher No. 4B Hand Screw Machine



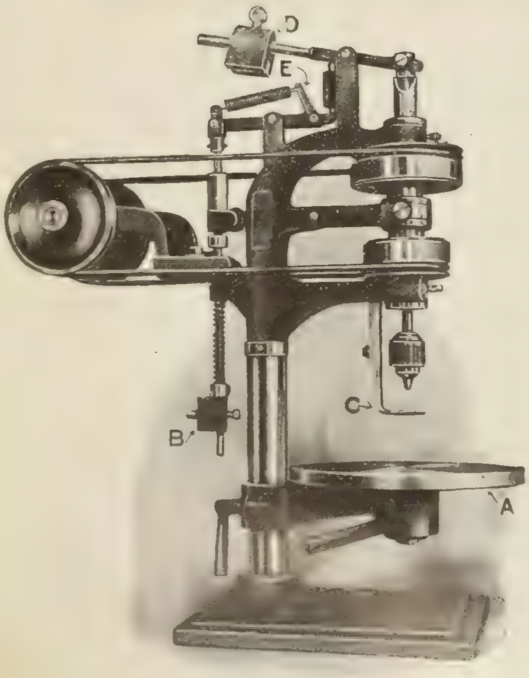
Built with a view to obtaining the greatest rigidity and largest wearing surfaces. All useless adjustments, such as taper gibs in headstock boxes and gibs under saddle, have been eliminated, as they are just so many extra parts to jar loose, and excuses for curious operators to throw the machine out of adjustment.

Other reasons for superiority are pointed out in our descriptive circular. **Better send for a copy.**

Friction Head, Automatic Chuck, Wire Feed and Hand Longitudinal Feed to Cut-off, Independent Stops to Turret.

The Charles Stecher Company, 1574 Crossing St., Chicago, Ill.

The Automatic Release Prevents Breaking of Taps



The Tuttle Tapping Machine is adapted for a great variety of work where accuracy is demanded.

This machine will tap holes up to ¼ inch in diameter and have an automatic stop so that it can be set to tap to any depth desired. They are so designed that they combine lightness, strength, ease and rapidity of manipulation with accuracy and uniformity of the work produced. Simple in construction and convenient in operation.

The Tuttle Tapping Machine

is equally satisfactory on either blind or through holes and tap to the required depth every time, which gives uniform work and prevents the breaking of taps.

How is this for Speed?

"We are using these machines for tapping 3" shrapnel, run them 22 hours a day, and each machine will tap from 180 to 200 holes per hour."

Or this for Economy?

"We feel confident that the saving in time and taps in two months paid for the machine."

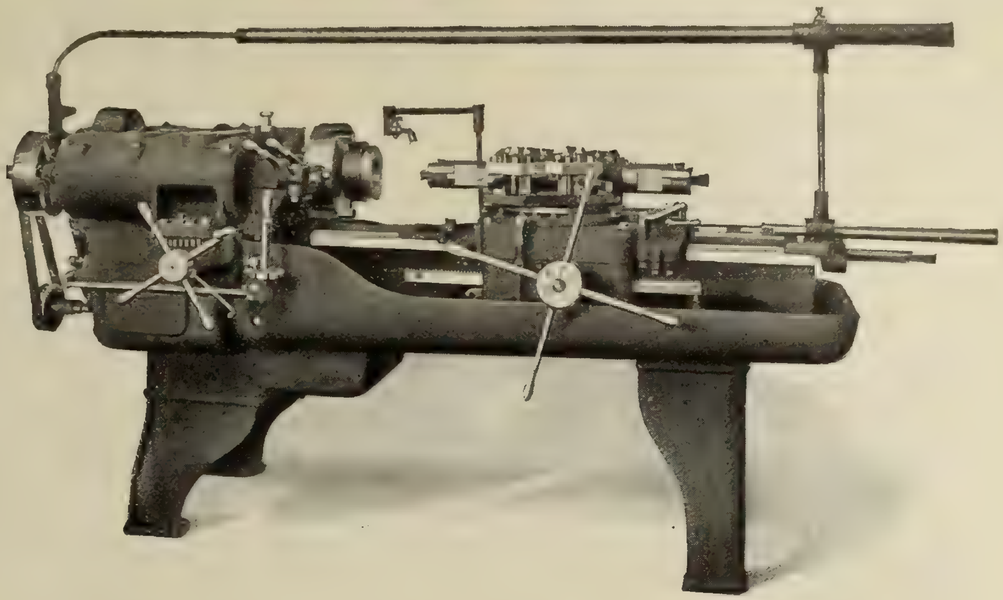
We supply a vertical cast iron column for these machines when desired. Larger sizes on order.

Send for Circular and Prices.

PARAGON GEAR WORKS
EVANS STAMPING AND PLATING CO.
Taunton, Mass., U.S.A.

Cable Address: PARAGON, TAUNTON

Rigid, Yet Flexible



The Flat Turret Lathe is Rigid

in everything that relates to holding the tool and the work firmly in position under the heaviest cuts. The gibbed flat turret; the cross-sliding head; the positive, solid abutment stops; the tool holders, made without overhang and mounted directly over the turret lock bolt; all these constructional features work toward the same end of extreme rigidity.

The Flat Turret Lathe is Flexible

in everything that relates to machine operation and shop management. Wide range of feeds and speeds instantly obtainable; innumerable stops, longitudinal and cross, front and back; and a set of tools that is available for any piece of work, chuck or bar, that will be met with in ordinary shop practice.

Think what this means in lowering the cost of special tools; and above all in making it possible to change the design of your product instantly to meet changes in demand.

JONES & LAMSON MACHINE CO.
SPRINGFIELD, VERMONT, U.S.A.

RIVETT QUALITY

STRONG claims have been made for the high standard of Rivett Quality, and with the full knowledge of the responsibility imposed upon us by such claims, we wish to further impress upon the users and prospective buyers of Rivett products, the fact that we build only the best.

Materials, without regard for competitive costs, are purchased only as they measure up to our requirements. Labor is valued only on the basis of the individual's ability to execute the assigned task with mechanical accuracy, consistent with volume production. Rigid inspection is maintained throughout our processing and assembling.

Each item of our product is finished with the best of paint materials. Unpainted parts are fully polished and there is consistent harmony in the balance of painted and polished parts in the completed units.

Close manufacturing limits are maintained and the newer Rivett products are turned out with full interchangeability of parts. Accuracy is essential in a product of the Rivett class, and we conscientiously believe that we are producing a line in which Accuracy is pre-eminent.

Goods leave our plant in first-class condition, carefully packed and fully protected against rust, dirt and abuse in transportation. However, if through some oversight of our own, goods are not up to the Rivett Standard when received, we are ready to make replacement without cost to the buyer.

The Rivett products are sold at prices based on the general labor and material markets, consistent with quality workmanship and exceptional accuracy.

Rivett products cannot be produced at competitive prices.

RIVETT LATHE AND GRINDER CO.

Precision Tools

Boston (Brighton District) Mass., U.S.A.

RIVETT LATHES

The Rivett Lathe & Grinder Company manufactures a line of small precision lathes of the following types:

No. 504. Plain Precision Bench Lathe of medium weight, suitable for average tool room work. Swing 8", distance between centers 18", beveled edge guideways; equipped with Rivett Type Compound Slide Rest.

No. 505. Plain Precision Bench Lathe of heavier construction than the No. 504, suitable for tool room work and light manufacturing. Swing 8", distance between centers 18", beveled edge guideways; equipped with Compound Slide Rest with Rocker Tool Post.

No. 608. Back-geared Precision Lathe of exceptional accuracy and highest grade finish, suitable for fine tool room, experimental and model work, and a wide range of light manufacturing. Swing 8½", distance between centers 22", central V guideways; equipped with Rivett Type Compound Slide Rest, also feed and lead screws and gears for thread cutting.

No. 705. Plain Precision Turret Lathe with Combination Stand and Oil Pan, suitable for light forming and turret work on stock up to ⅞" round. Swing 8", distance from chuck face to turret face 17¾"; equipped with Automatic Chuck Closer, Cutting-off and Forming Slide.

Lathes 504, 505 and 608 are designed for bench mounting, but may be furnished with Combination Stand and Oil Pan or Oak-Cabinet and installed as an independent unit. Countershafts of either the wall or ceiling types are supplied. Lathe 705 is furnished only, complete, with Stand and Ceiling Countershaft. Individual motor drive may be furnished with Lathes 504, 505 and 608 when mounted on bench or Oak Cabinet.

We manufacture a complete line of Attachments for our Lathes.

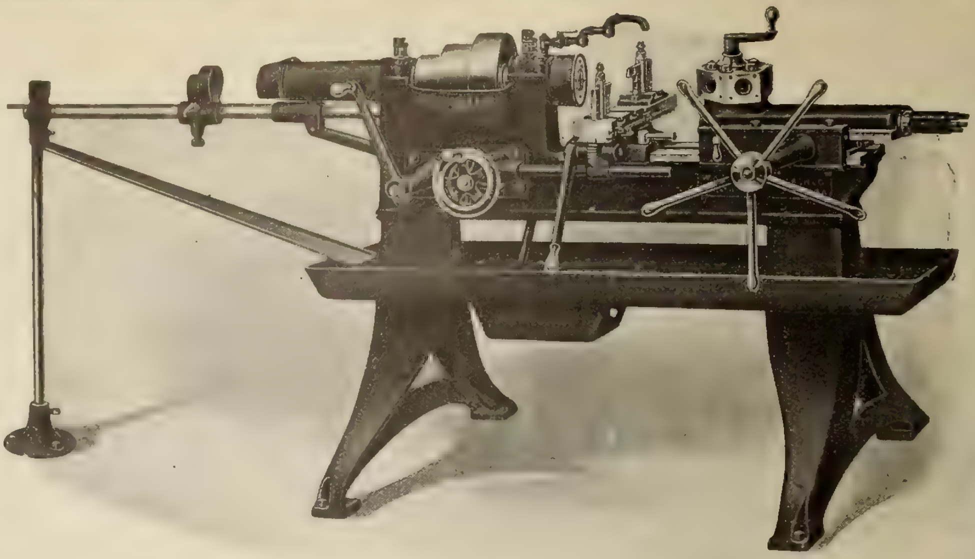
RIVETT LATHE AND GRINDER CO.

Precision Tools

Boston (Brighton District) Mass., U.S.A.

Every Feature to secure strength and stiffness on the heavy cuts is embodied in

Millholland 1"x7" Screw Machine



The Bed is of box construction, well ribbed, and with the headstock cast solid.

The Headstock is made with plain head three-step cone. The steps of the cone pulley are of large diameter and wide face and are so proportioned as to transmit the maximum power with proper spindle speeds.

The Spindle, high-carbon steel with hardened and ground thrust washers.

The Cut-off Slide, with broad, flat, well-gibbed bearings.

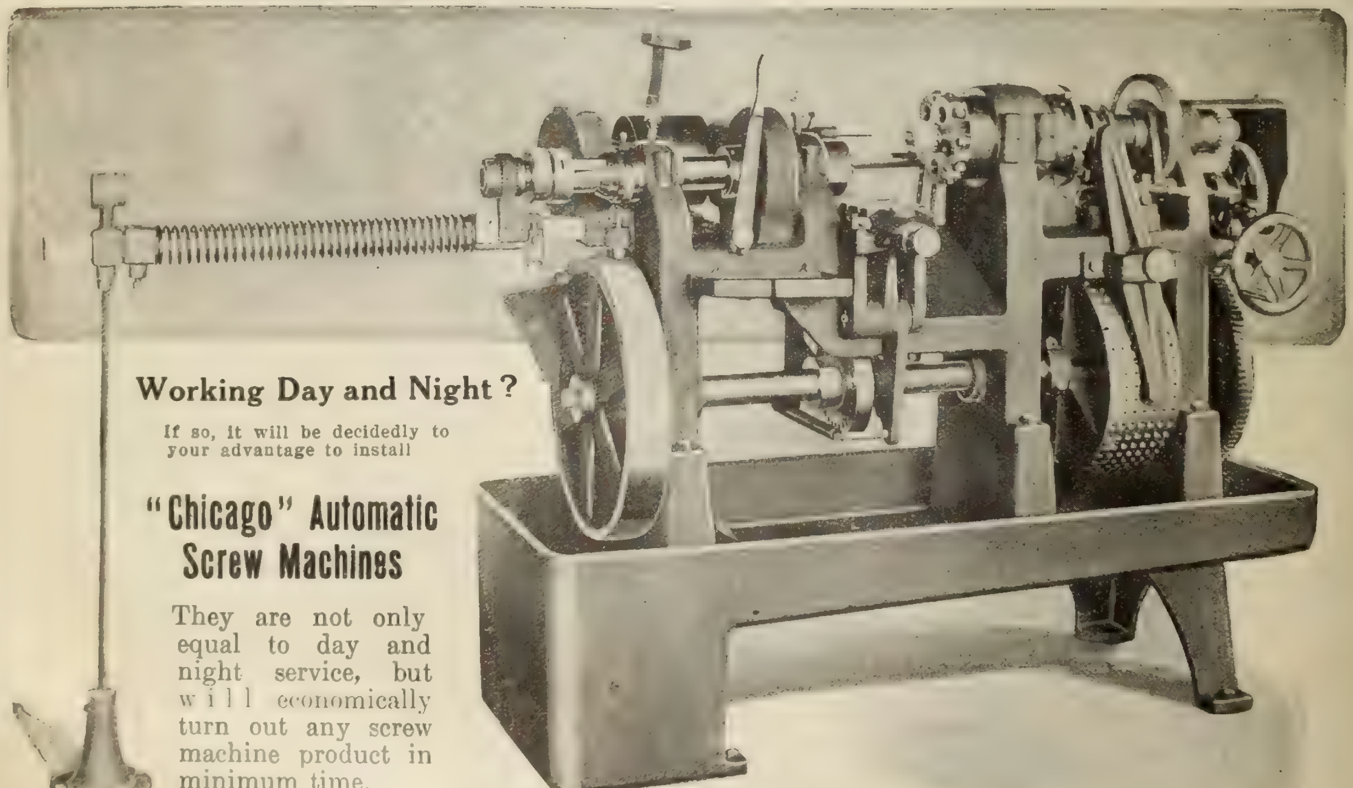
The Turret is of heavy construction and mounted on a large steel stud.

The Automatic Chuck and Bar Feed, operated by the long lever on the front of the bed, grips or releases the work instantly. The operator with one movement opens the chuck and feeds the bar without stopping the machine.

DROP A LINE FOR FULL DETAILS AND SPECIFICATIONS.

Manufactured by

W. K. Millholland Machine Company
INDIANAPOLIS, IND.



Working Day and Night?

If so, it will be decidedly to your advantage to install

"Chicago" Automatic Screw Machines

They are not only equal to day and night service, but will economically turn out any screw machine product in minimum time.

Drop a card now for specifications.

READY FOR OPERATION IN YOUR PLANT IN LESS THAN SIX WEEKS from the time your order reaches us.

The John MacNab Machinery Co., 90 West Street
NEW YORK.

European Representative: John MacNab, Hyde, England.

G&W MACHINERY

TELEPHONE
MAIN 5346

GARLOCK-WALKER MACHINERY CO. LIMITED
WOOD WORKING AND METAL WORKING MACHINERY

32 FRONT STREET, WEST.
TORONTO.
CANADA.

DECEMBER
TWENTY-EIGHTH
NINTEEN HUNDRED AND SIXTEEN

To Our Friends and Patrons:

We take this opportunity of wishing one and all the "Compliments of the Season."

In this our last advertising message of 1916, we desire to extend to our many friends our sincere thanks for their valued patronage and confidence extended to us during the past twelve months.

We have endeavored to represent and sell only the most modern and reliable machinery, and to render to all satisfactory service and courteous treatment. The response has been indeed gratifying, and is keenly appreciated. During the coming year we hope to have the pleasure of co-operating with you still further.

To our friends who are manufacturing munitions, we invite a careful study of the lines illustrated and described on pages No. 160, 161, 162, 163 and 164 following. From those who are working along general lines, we invite enquiries for such equipment as may be required.

Each line we handle we believe to be the best of its kind from the standpoint of efficiency, as well as of construction.

It is our desire and intense wish that our manufacturers and their valiant workers who have labored so long and so earnestly, may see their efforts crowned with success during 1917.

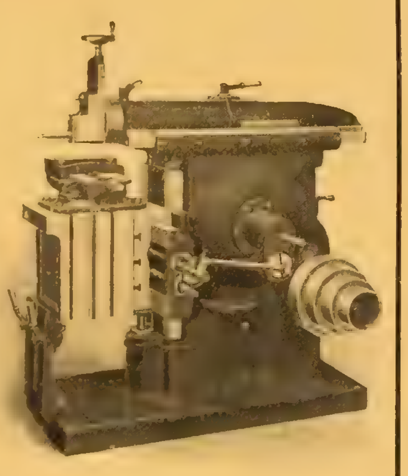
May the new year bring Victory, Peace and Prosperity for the Empire and the Empire's Allies.

William Garlock Jr
A. B. Walker

GARLOCK-WALKER MACHINERY CO. LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Tool Room Equipment

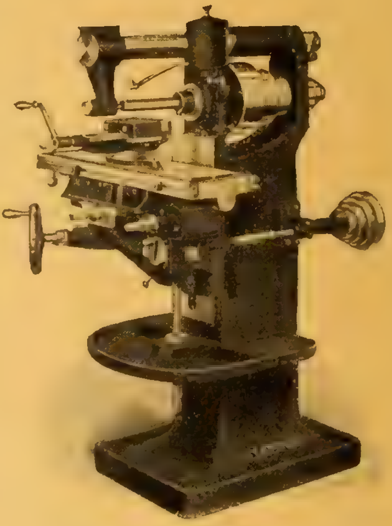


Steptoe Back-Geared Shaper
16" 20" 24".

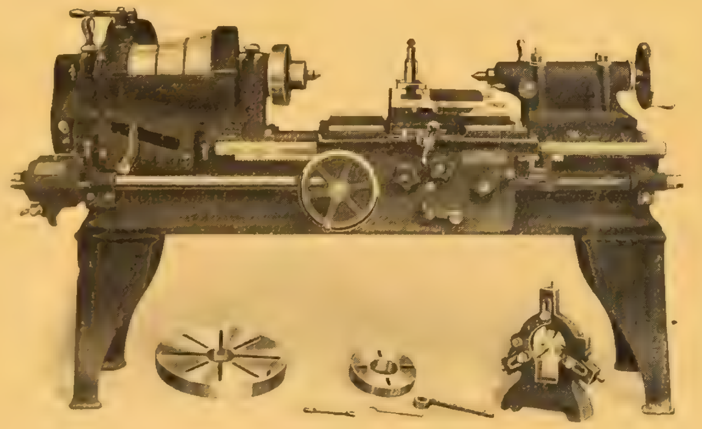
A Steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

That same principle applied to your small planer work will cut the cost of planer work.

A Steptoe Shaper will do the work faster because it can be handled quicker.



Steptoe Power Feed Miller.



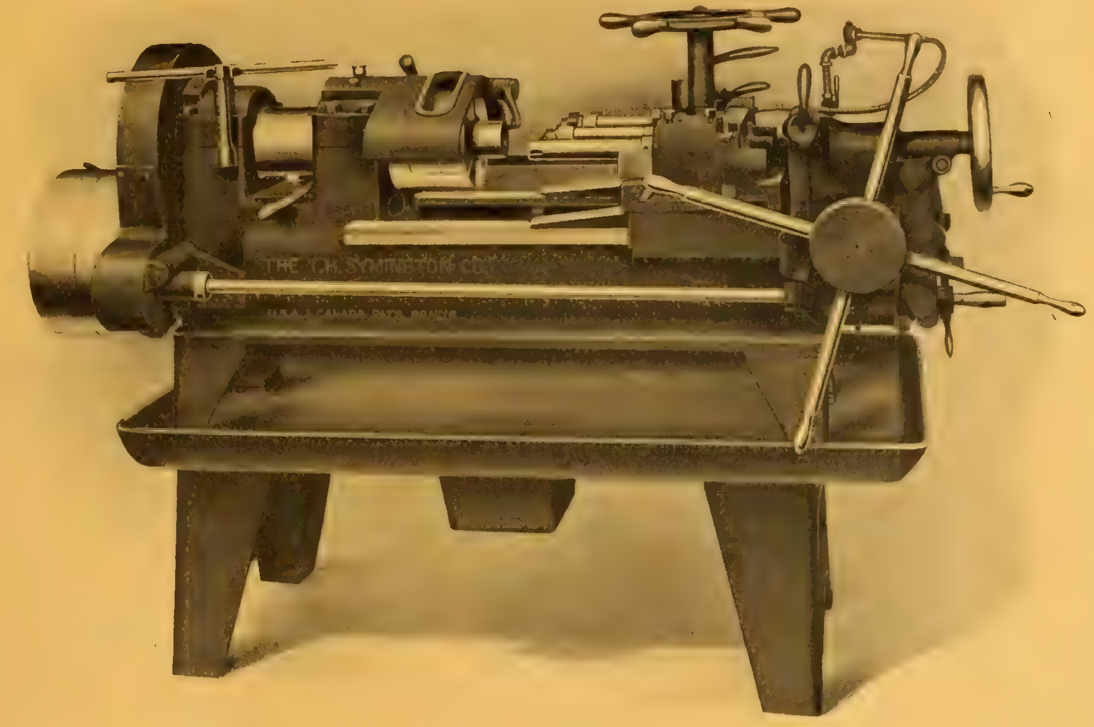
Lodge & Shipley Tool Room Lathe—18"—20"—24".

Grinders
Universal Millers
Lathes
Shapers
Drills, etc.

METAL and WOODWORKING MACHINERY of all Kinds

GARLOCK-WALKER MACHINERY CO.
LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346



Symington B-2 Single Purpose Lathe—for Inside Boring of 18-pdr. Shrapnel.

Machines of this type can be furnished for all operations on 3-inch Shrapnel and High Explosive Shells, either English or Russian, including

Cutting-Off
Centering
Rough Turn
Rough Bore
Finish Turn
Finish Inside
Bore Ream and Tap Nose
Wave and Undercut
Turn Copper Bands

Prompt Shipment ***Low Prices***

METAL and WOODWORKING MACHINERY of all Kinds

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO. LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

Shell Equipment ?

WE OFFER FOR PROMPT SHIPMENT

Full line of Symington Single Purpose Lathes, completely tooled for the various operations on British or Russian 3-inch Shrapnel or High Explosive Shells.

Hepburn Heavy Duty Turning and Turret Lathes, for Rough and Finish Turning, Waving, Boring, Base Recessing, Copper Band Turning on 4.5 and 6" High Explosives.

Hepburn Extra Heavy Turning Lathes with Single or Double Slides, profiling attachments, driving arbor and bell centers for 8" and 9.2" projectiles.

Cutting-off Machines for all sizes. Air Compressors.

Banding Press. Thread Millers.

Nosing Press, Hammer or Hydraulic.

Also a general line of

Pattern Shop Equipment

and

Wood Working Tools for all Purposes

METAL and WOODWORKING MACHINERY of all Kinds

GARLOCK-WALKER MACHINERY CO.
LIMITED

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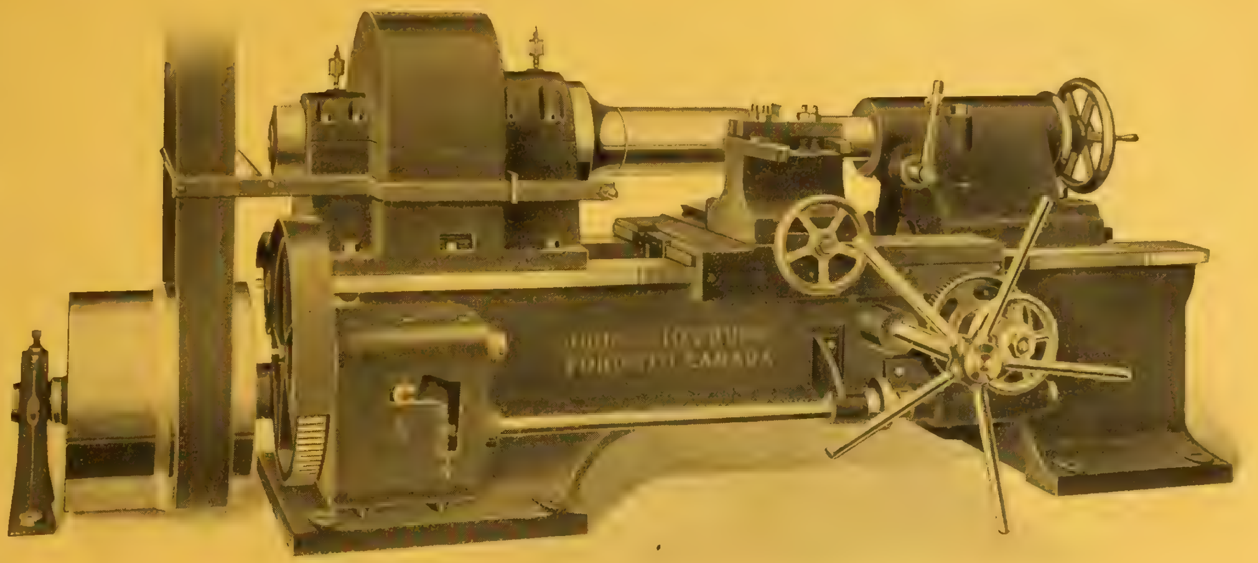
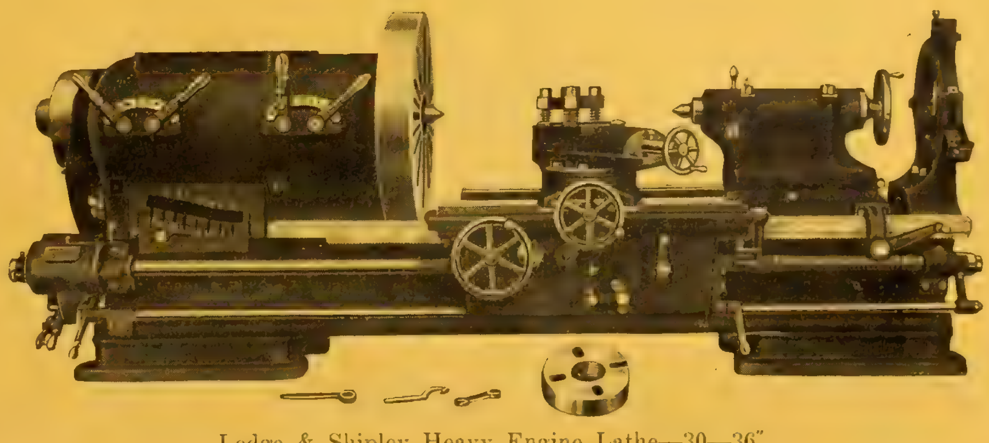


Hepburn Extra Heavy Duty Turning Lathe with Profile for Rough and finish Turn 8" and 9.2" Shells.

Heavy Standard Engine Lathes for General Shop Work or on large Projectiles



Lodge & Shipley Heavy Engine Lathe—30—36".

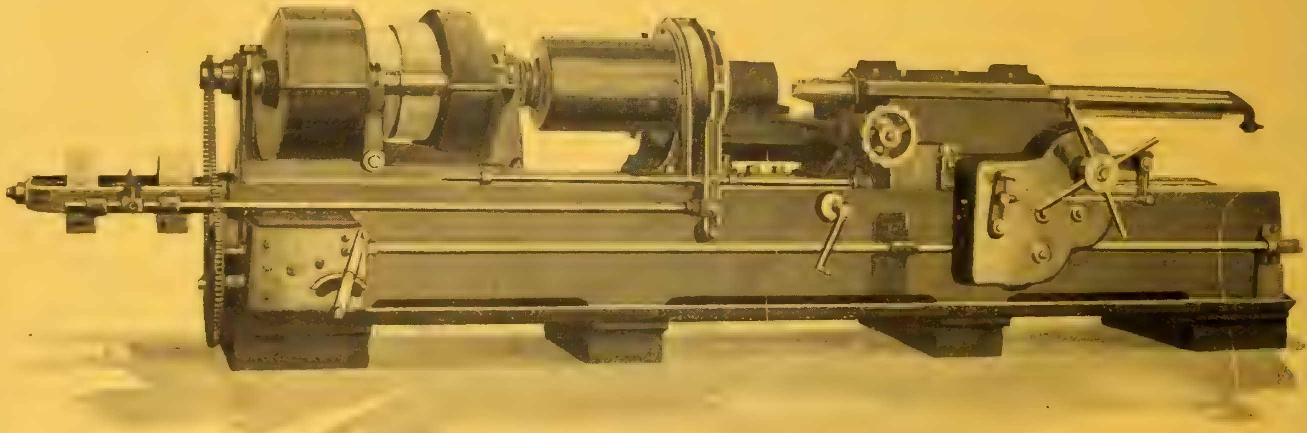
METAL and WOODWORKING MACHINERY of all Kinds

G&W MACHINERY

GARLOCK-WALKER MACHINERY CO. LIMITED

32 FRONT ST. WEST, **TORONTO** TELEPHONE MAIN 5346

For INTERIOR Roughing and Finishing by Profile Attachment or by Removable Form Cutters, on 8-in., 9.2-in., 12-in. Projectiles



G. & L. HEAVY BORING LATHE

Front Spindle Bearing $5\frac{15}{16}$ in. x 10 in.

Steel Spindle.

Double Back Geared.

Quick Return to Boring Bar Carriage.

Machine Complete Ready for use, without Cutters.

Weight, 16,000 lbs.

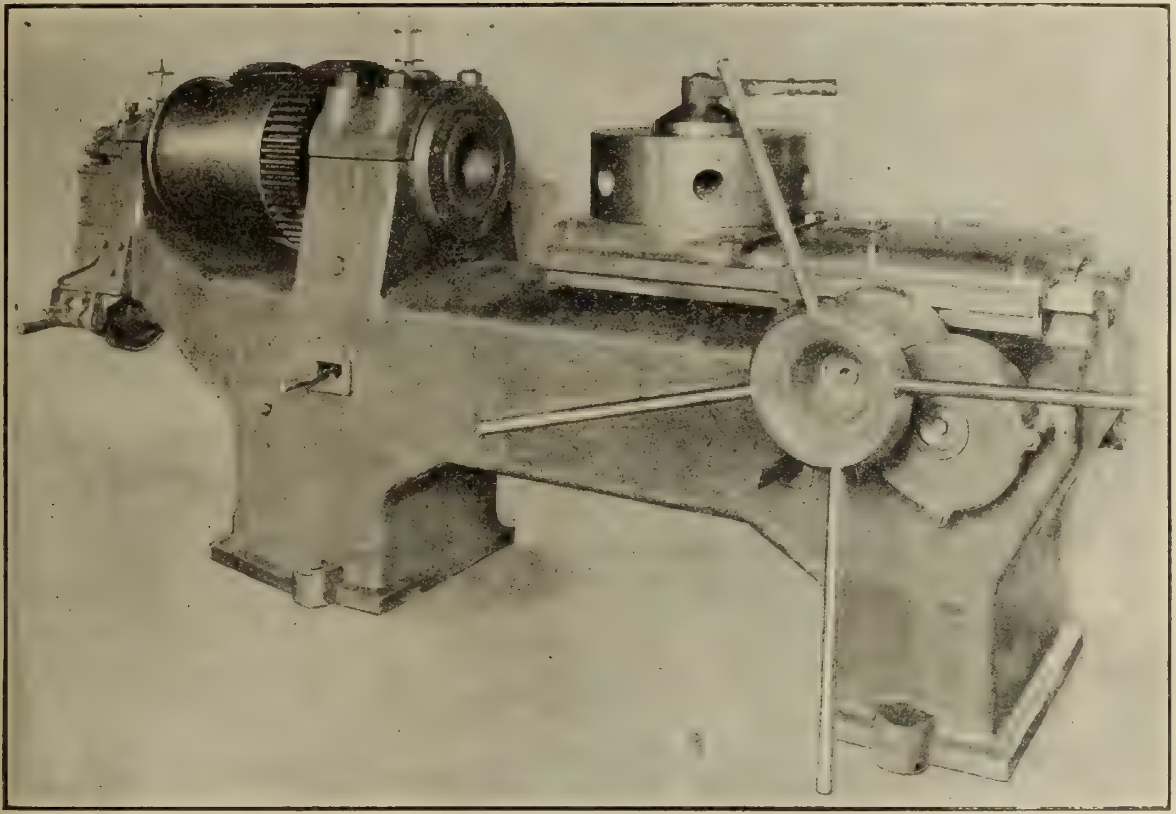
METAL and WOODWORKING MACHINERY of all Kinds

THE RELIANCE

HEAVY DUTY TURRET LATHE

Designed and Built Especially for Internal Boring of 4.5 and 6-Inch Shells

Four for Immediate Delivery.



Is Made For Fast Heavy Work

FRONT VIEW WITH GEAR GUARDS AND OIL PANS REMOVED

Note these features and compare with any other make:

Turret 20 in. diam. Six 2 15/16 in. holes. Heavy set screws and keys.

Turret spigotted on outer edge. Heavy lever and clamp. Boring bar holes in turret faced 4¼".

Index ring and key, cast steel hardened and ground.

Four power feeds 1/64 in., 2/64 in., 4/64 in. and 8/64 in. Instant selection.

Hand feed geared 79:1, 25 lbs. on Capstan gives 2,000 lbs. on tool.

Countershaft fitted with tight and loose pulleys.

Massive one-piece Bed. No bolted joints. Great rigidity.

Cone Pulleys 15 in. and 18 in. diam. for 8 in. double belt.

Back gear 9:1, Main gear 4½ in. face, 3 D.P.

Spindle pocket takes 6 in. shell completely inside.

''Skefko'' Ball Thrust Bearing, on Spindle. Capacity 8,400 lbs.

Carriage 42 in. long, 3 in. steel centre rack 4 D.P. No side strain.

Shipping weight, complete, 8,000 lbs.

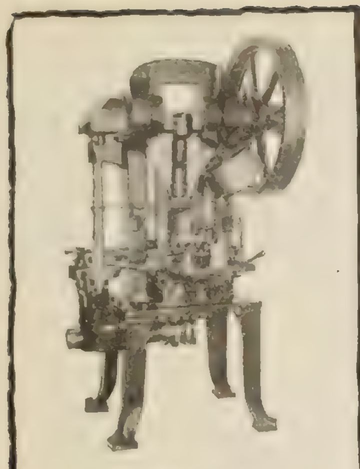
This Lathe has been designed to meet a demand for a heavy duty boring machine of greater rigidity and strength than other machines offered. Check over the details and note the large driving parts and massive strength. This lathe will stand up to its work and do heavier work than the machines you are now using. Investigate this lathe thoroughly before purchasing.

Reliance Machine Company

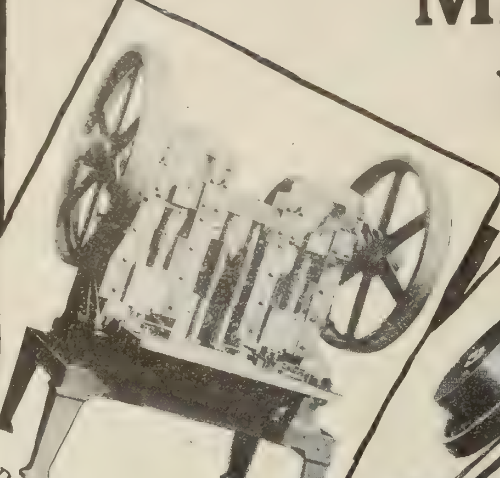
601 CONTINENTAL LIFE BUILDING, TORONTO, CANADA

CARTRIDGE MACHINERY

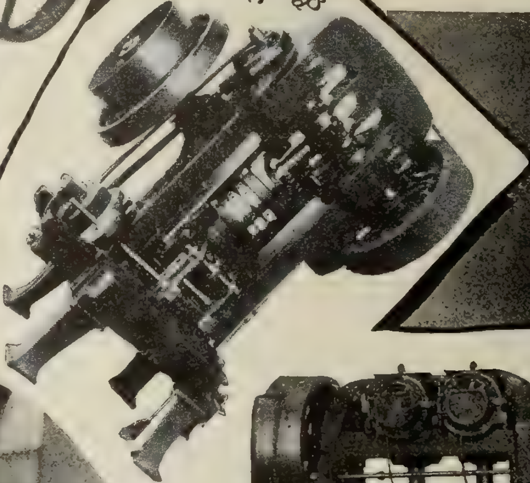
Waterbury Farrel Standard Machines



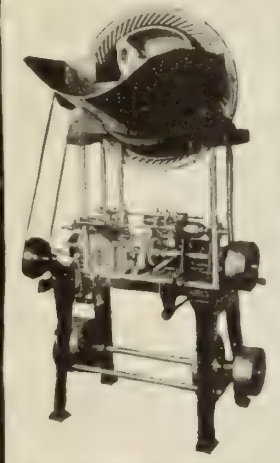
Ratchet Dial Bullet Assembling Machine



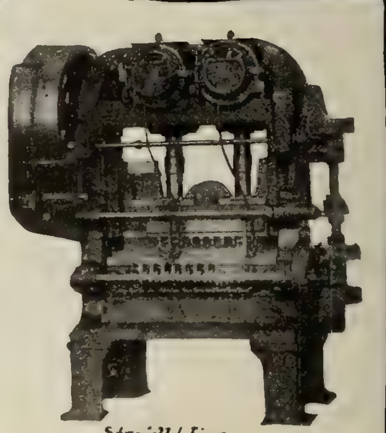
Double Friction Dial Double Punch Press



Double Acting Cutting and Cupping Press

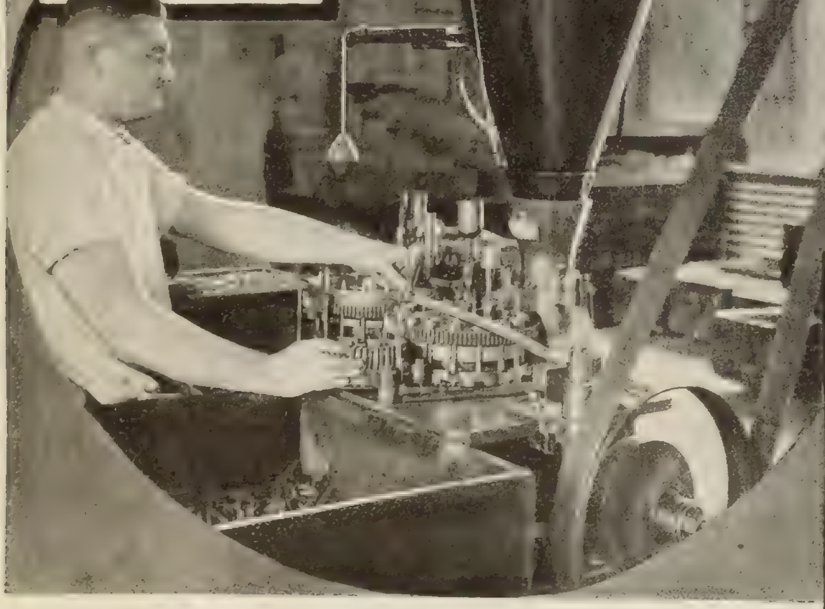


Shell End Trimmer



Straight Line Bullet Assembling Machine

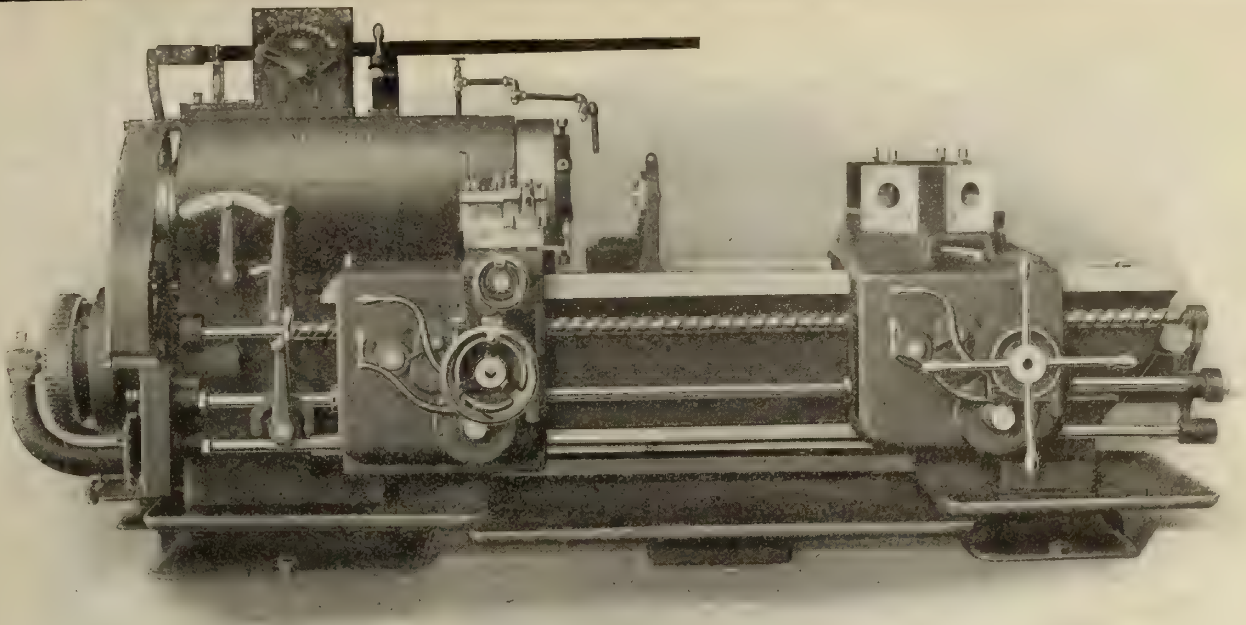
Horizontal Header Hopper Feed



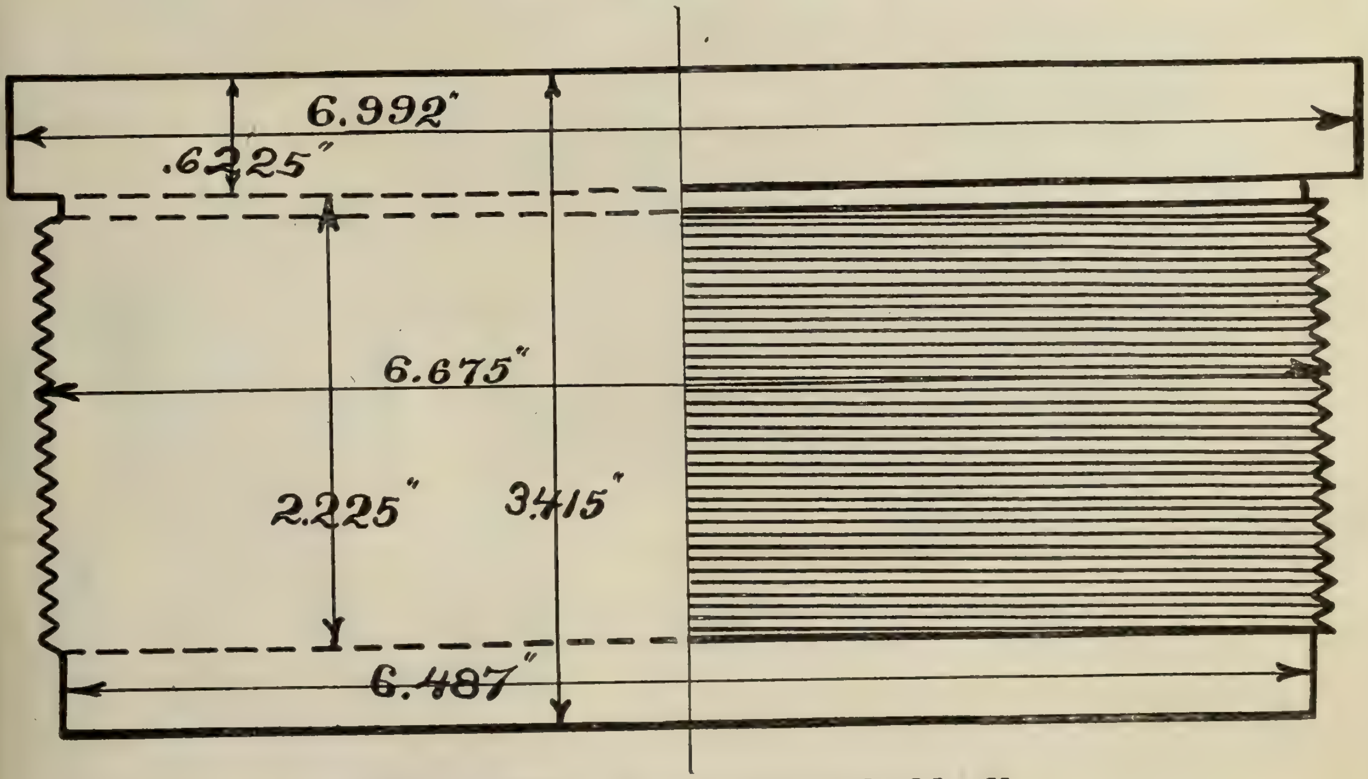
Standard Loading Machine in Government Arsenal

The Waterbury Farrel Foundry & Machine Co., of Waterbury, Conn., U.S.A., has appointed me to be the sole manufacturer for export of their entire line of Cartridge and Shot Shell-Making Machinery. Proposals and Estimates covering complete plants or separate units, required for export will be furnished on request.

FREDERICK S. BLACKALL, Woolworth Tower, New York, U.S.A.



A General Purpose Turret Lathe used on Ammunition Work



Base Plug for 9.2-Inch Shell

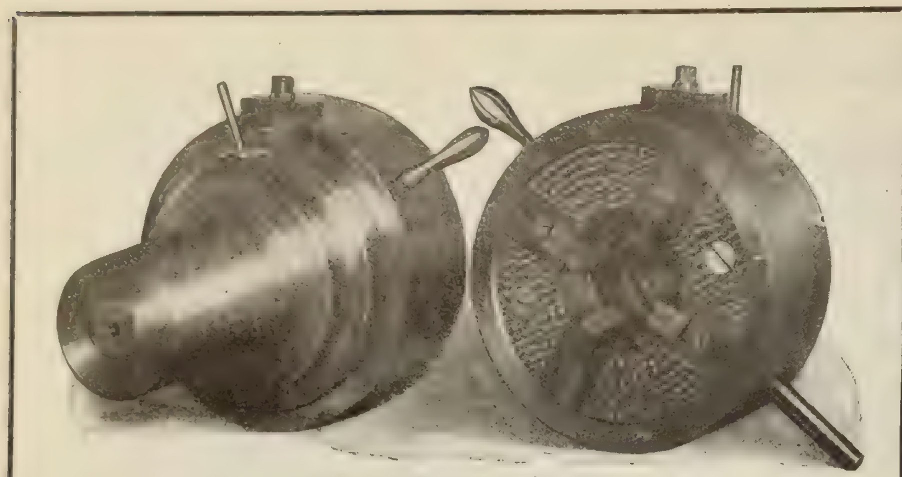
FINISHED COMPLETE ON ABOVE LATHE IN 20 MINUTES

Write for Information.

STEINLE TURRET MACHINE COMPANY

MADISON, WISCONSIN, U.S.A.

LEO C. STEINLE, c/o Equitable Trust Company of New York, 95 Gresham Street, London, E.C.

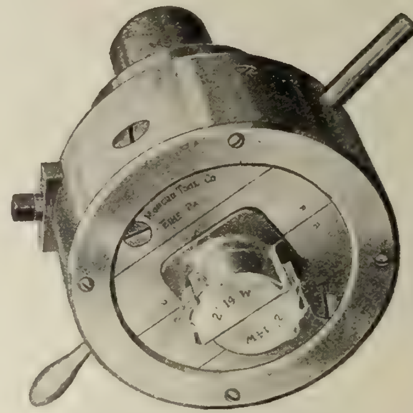


Modern Self-Opening Die Head.

A Single Cut

Gives a Finished Thread

of Absolute Accuracy
in Diameter,
Form, Lead and
Pitch



Modern Collapsible Tap.

"Modern"

Self-Opening—Adjustable

Die Heads and Collapsible Taps

With "Modern" Dies and Taps it is not necessary to take a roughing cut—a single cut finishes the job.

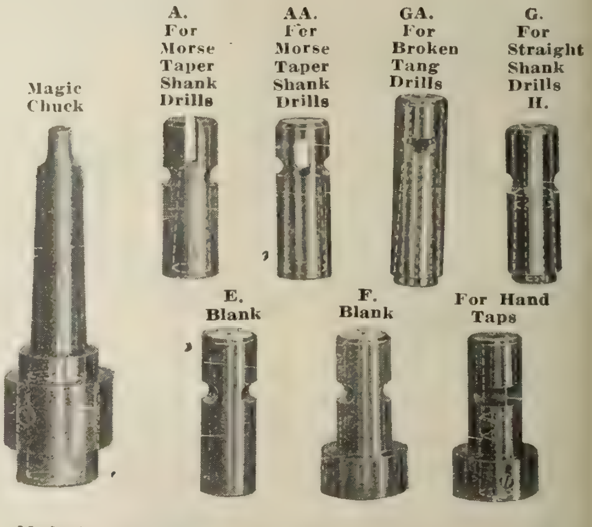
They are properly supported to insure the cutting of a perfectly-straight thread of full size and accurate lead, and will not clog with chips, necessitating frequent cleaning. Cut close to a shoulder.

"Modern" Die Heads and Collapsible Taps are used on all styles of Hand and Automatic Screw Machines, Turret Lathes, Chucking Machines, Drill Presses, in fact on any machine that is used for thread-cutting.

Magic Chuck Equipment

The simplest, safest, easiest to operate and most adaptable chuck on the market. For use on Drill Press, Lathe, Screw Machines and other Revolving Spindle Machines.

Handles such operations as Drilling, Reaming, End Milling, Counter Boring, Tapping, in fact any operation that can be done on a Drill Press, increasing the output from 20% to 100%.


Magic Chuck
A. For Morse Taper Shank Drills
AA. For Morse Taper Shank Drills
GA. For Broken Tang Drills
G. For Straight Shank Drills H.
E. Blank
F. Blank
For Hand Taps

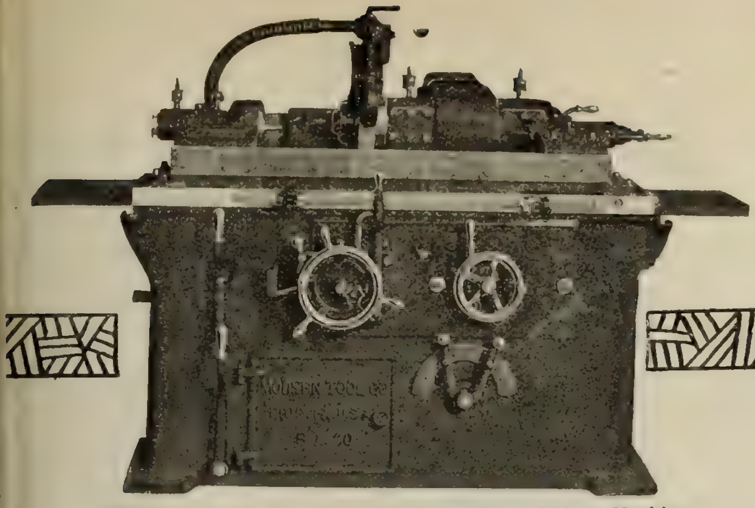
Made in six sizes—the largest with capacity up to 5/8 diam. drills.

MODERN TOOL COMPANY

Main Office and Works: STATE and PEACH STREETS, ERIE, PENNSYLVANIA, U.S.A.
New York Office: 50 Church Street.
Chicago Office: 32 North Clinton Street

F. WESLEY PARKER, Resident Engineer and Export Agent, 2 RECTOR STREET, NEW YORK
Canadian Agent: RUDEL-BELNAP MACHINERY CO., Toronto and Montreal

Modern Self-Contained Plain Grinding Machines

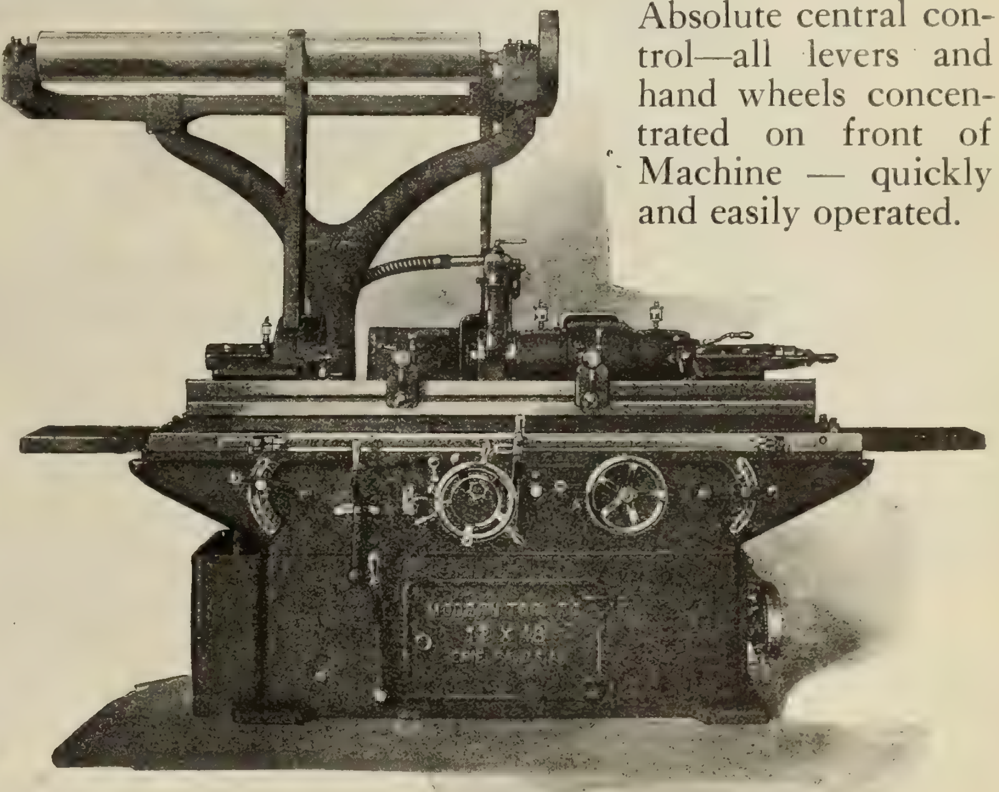


"MODERN" 8" x 30" Self-Contained Plain Grinding Machine.

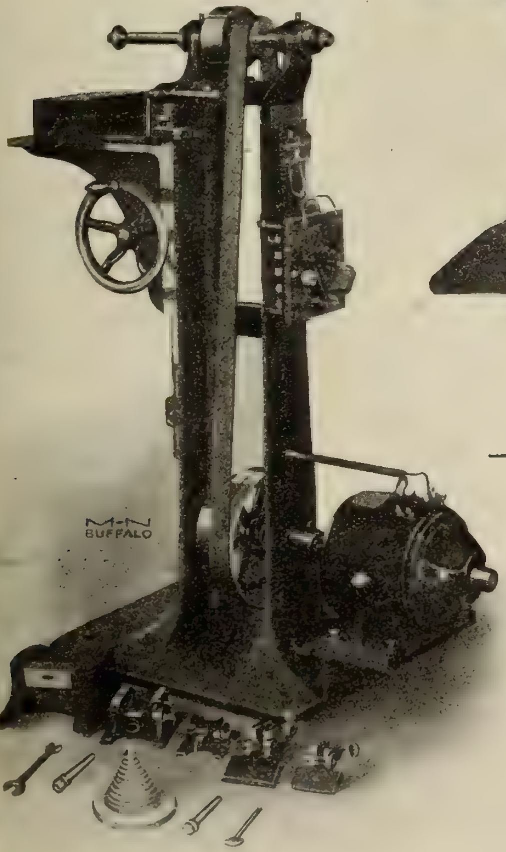
Tools that have proved themselves invaluable for their speed, accuracy and economy of operation.

Absolute central control—all levers and hand wheels concentrated on front of Machine — quickly and easily operated.

Work speeds and table feeds entirely independent and cover every range within the capacity of the machine. Automatic feed at either or both ends of table reverse. Auxiliary feed for bringing the wheel into work without traversing table. Positive stop provided when feeding the wheel by hand. Head stock entirely belt driven. Steady rests that are universal in all their movements and have positive stops for grinding duplicate work. Interchangeable wheel centres.



"MODERN" 12" x 24" Self-Contained Plain Grinding Machine.



—Modern Die Chaser

Those who value accuracy and correctness in gauge of thread will find, by using the MODERN CHASER GRINDER that each Chaser will do its portion of duty, being ground true to the axis of the head, and that the life of the Chasers, as well as that of the Die Head, will be greatly prolonged.

PROMPT DELIVERIES. **Bulletins upon Request.**

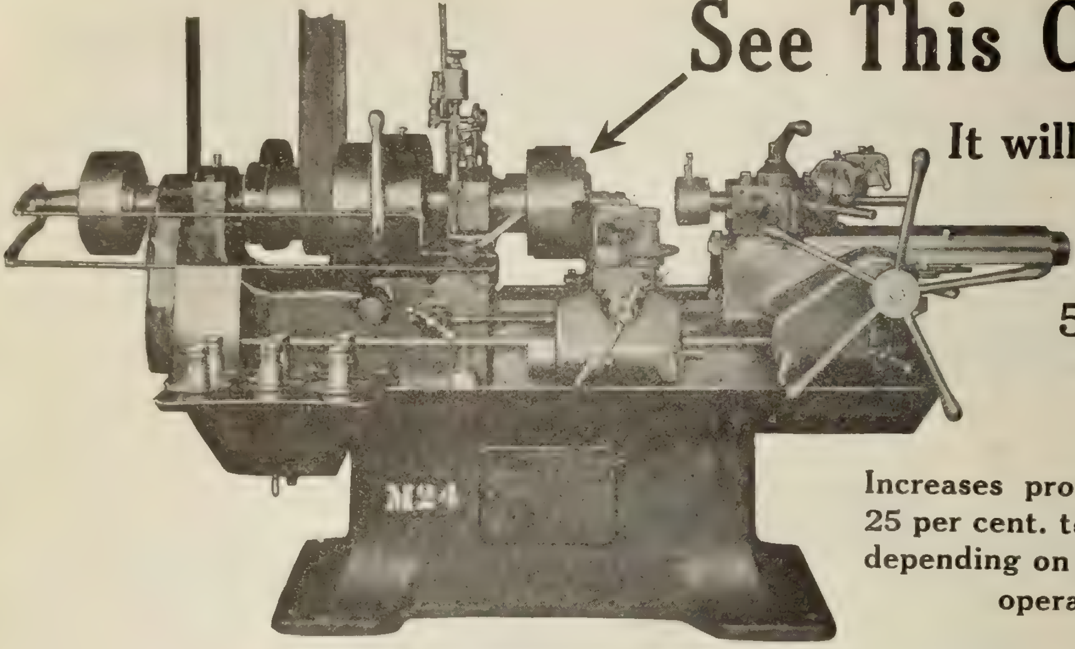
MODERN TOOL COMPANY

Main Office and Works:
State and Peach Streets, Erie, Penna.

Canadian Agents: Rudel-Belnap Machinery Co., Toronto and Montreal
New York Office: 50 Church St. **Chicago Office: 32 N. Clinton St.**

F. WESLEY PARKER
Resident Engineer and Export Agent
2 Rector Street, New York

See This Chuck!



It will Chuck a Piece of Work in 5 Seconds

Increases production from 25 per cent. to 50 per cent. depending on the length of operation.

Are you making Shells, Shrapnel, Fuses or Piston Rings?

If you are, get in touch with us. We want to lay a cost-cutting plan before you. We want to prove to you that

Detroit Pneumatic Chucks

will chuck a piece of work in five seconds. THIS is just about fifty-five seconds quicker than it can be chucked by hand.

The shorter the operation, the more chucking and the greater the saving with DETROIT "AIRGRIP" CHUCKS.

They fit all hollow spindles and are made entirely of steel. Gripping power is adjustable.

Made in two-jaw and three-jaw types. All sizes from 6" to 18" diameter.

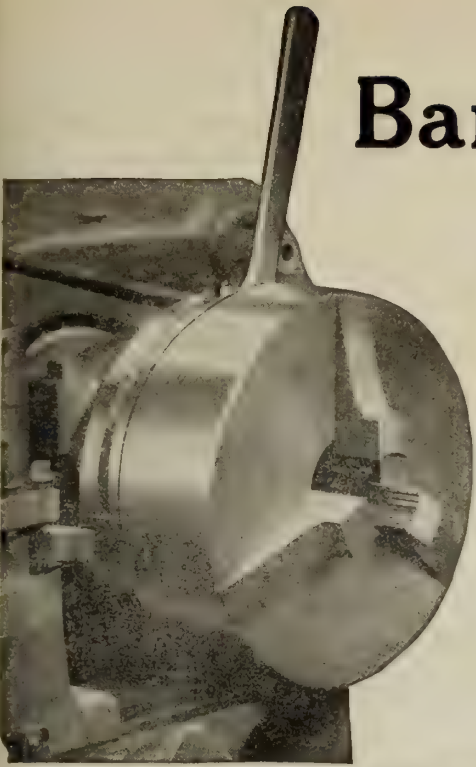
Our Chucks are made entirely of steel; our workmanship is of the very highest grade; our air cylinder is a decided improvement over anything else on the market, as packing on piston is adjusted automatically.

We are just completing a new factory which will be the largest and best equipped plant in the United States for the exclusive manufacture of pneumatic chucks.

We have some open territory and will be glad to hear from good, live agents.

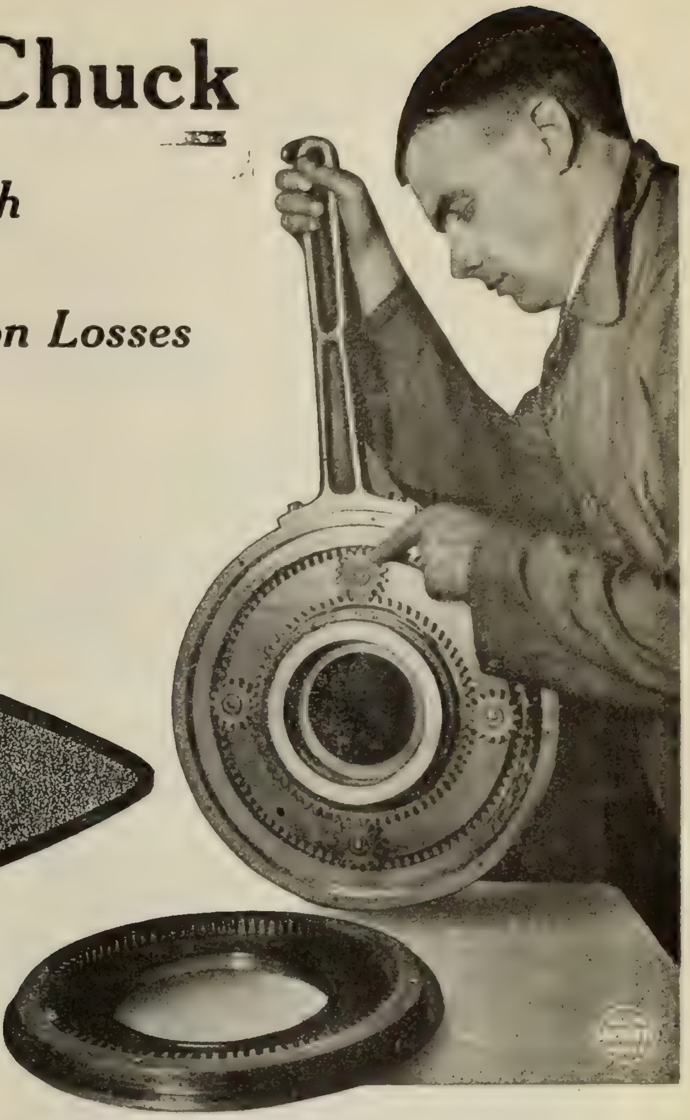
"We can chuck parts of any kind"

Detroit Pneumatic Chuck Company
DETROIT, MICH.



Barker Chuck

No Wrench
No Air
No Friction Losses



Its Ease Solved—

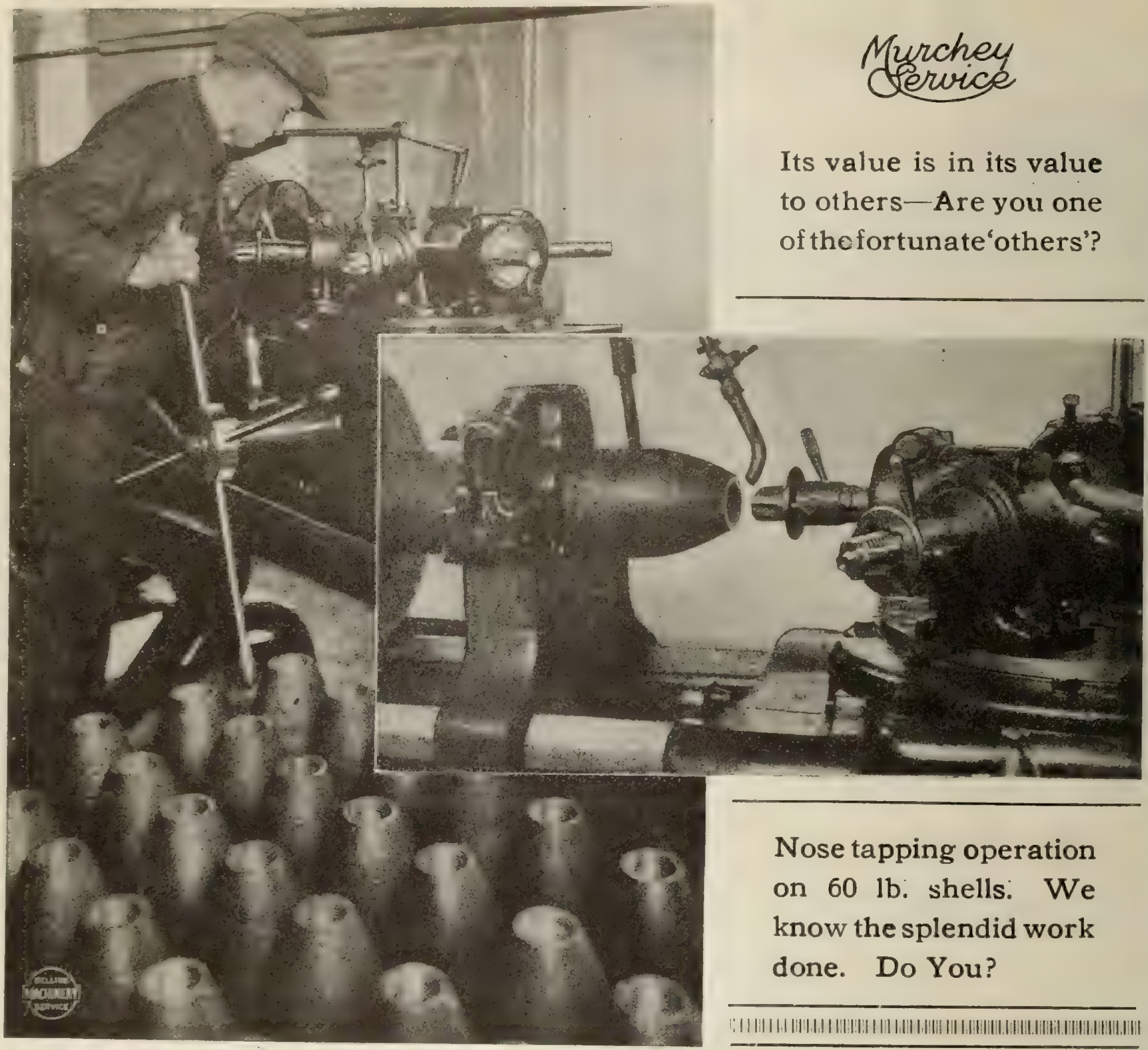
ONE wonders what the internal construction is like when they see the smooth, speedy ease of the Barker Wrenchless Chuck in operation. Yet look at the above illustration. No intricate mechanism; it is not dependent upon any mechanical assistance; it is self-acting, self-contained, and as the illustration shows, it is a model of simplicity.

Having all the advantages of air operated chucks in speed and positive operation it eliminates the air compressors, pipes and valves. Takes no more time to mount than an ordinary chuck, and being self-contained any number may be mounted.

Manufactured by

Thomas Elevator Company

22 South Hoyne Ave., Chicago, Ill., U.S.A.



Murchey Service

Its value is in its value to others—Are you one of the fortunate 'others'?

Nose tapping operation on 60 lb. shells. We know the splendid work done. Do You?

Murchey Taps at the Helm

Murchey Collapsing Taps and Self-Opening Dies are adaptable to work from 1" to 12", and therein lies their value. Being constructed of the highest quality high-speed steel, they bear the earmarks and are distinctive as a high-grade tool. Great many munition manufacturers are finding out their splendid qualities daily. Send your blue-prints and let us co-operate with you in solving your difficulty.

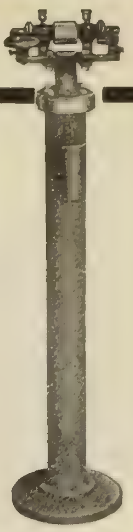
Murchey Machine & Tool Company

The Coates Machine Tool Co.
Claxton House, Westminster
London, S.W., England

75 Porter Street
Detroit, Mich.
U.S.A.

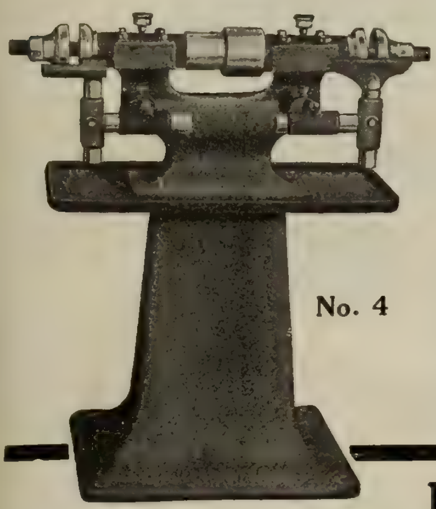
Fenwick Freres & Co., 15 Rue
Fenelon
Paris, France

BARKEY EMERY GRINDERS



No 1

BARKEY Grinders are extensively used throughout the Dominion and judging by repeat orders are giving the best of satisfaction. Uniformity of product is one of the most important factors in manufacturing and we believe it has been the means of establishing Barkey Grinders so favorably in the opinion of Canadian Manufacturers. Into every one of our grinders go the finest materials, the best workmanship and the greatest care, resulting in



No. 4

a combination of Strength, Accuracy and Durability that's hard to beat.

THE Barkey No. 4 is made strong for all kinds of heavy grinding, and is suitable for car, foundry, machine and plow shops, etc. The Barkey No. 1 Round Column Emery Grinder is a light, compact, smooth-running machine suitable for all kinds of fine work, such as grinding self-hardening tool points used in machine shops; knives for molding machines in planing mills; and with the Barkey Skate Attachment makes a very complete machine for sharpening skates.

We also manufacture Brass Valves, Valve Milling Machines, Water Elevators and George Lumber Measuring Machines.

Write for catalog and fuller details.

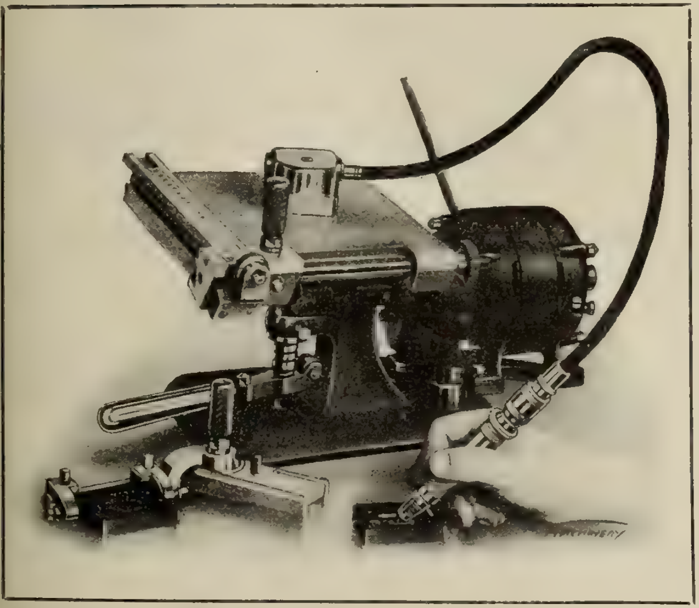
BARKEY BROTHERS, STOUFFVILLE ONT., CANADA

Did You Ever Carve Cast Steel With A Knife?

With our superhelical cutter in the flexible shaft chuck you can carve steel or other metals almost in the same manner as you would carve wood with a knife.

With the attachment for guiding the work, two or more sides of a die or template can be finished with surprising speed and accuracy and in correct angular relation.

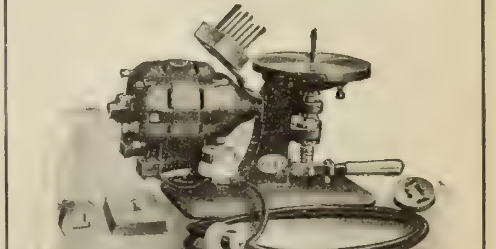
Made for either motor or belt drive.



The Anderson Die Forming Machine No. 1, with Flexible Shaft attachment and appliances for guiding dies and templates for producing straight angular surfaces.

We will send descriptive matter covering these devices upon application.

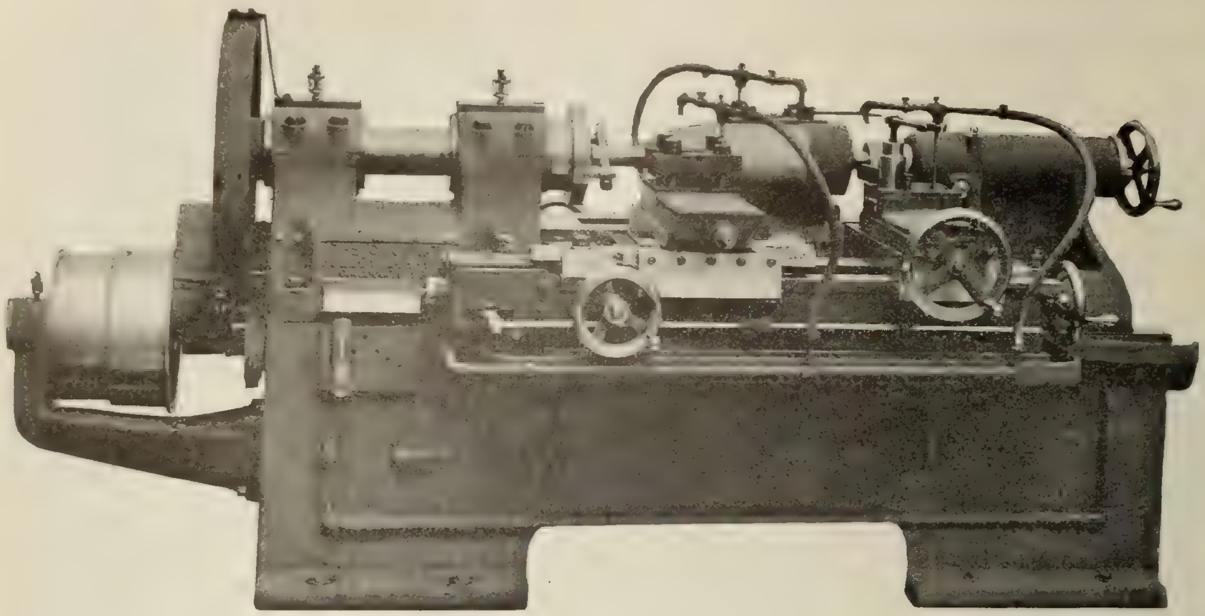
The Coarse Pitch Multiple Thread Hardened Screw Principle Rotary Cutter Does the Work.



Anderson Die Forming Machine No. 1
Bulletin No. 1 describes this

The Anderson Die Machine Company

Die and Pattern Machinery
Bridgeport, Conn., U.S.A.



$4\frac{1}{2}''$ and $6''$ SHELL TURNING LATHE

FOR ROUGHING OR FINISHING

Swings 12 inches over carriage. 30 inches between centres. Four Spindle Speeds. Driven by 5 inch Belt. Six Quick Change Geared Feeds. All Steel Gears throughout.

Standard equipment includes complete lubricating outfit.
Approximate weight, 6700 lbs.

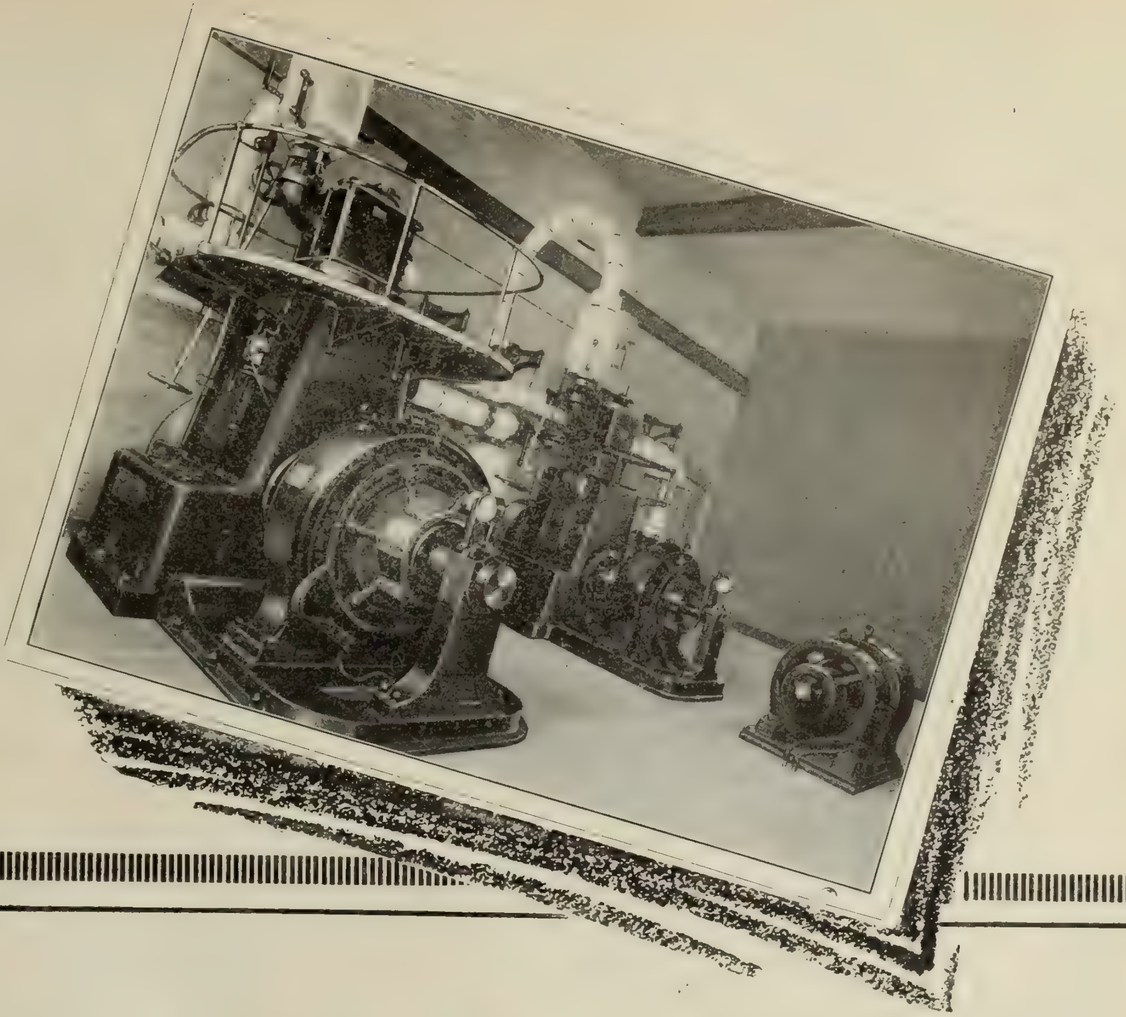
This lathe may be equipped with two plain tool slides, one at the front and one at the rear of the machine, which feed in opposite directions,—

Or, it may have a profiling slide, located at the front of the machine, for the nose forming operation. Also a third slide for facing end of shell.

Special features include adjustable cross stops for tool slides, quick return and automatic stops for longitudinal slides.

Quick deliveries for early order. ***Write us for additional information.***

THE CINCINNATI PULLEY MACHINERY COMPANY
CINCINNATI, OHIO



Robb Vertical Engines

in power plant of Toronto University

We also manufacture Horizontal Engines, Corliss and slide valve, simple, tandem and cross compound; water tube, return tabular and internally fired boilers, sawmill machinery, smoke stacks, tanks, etc.

International Engineering Works, Limited

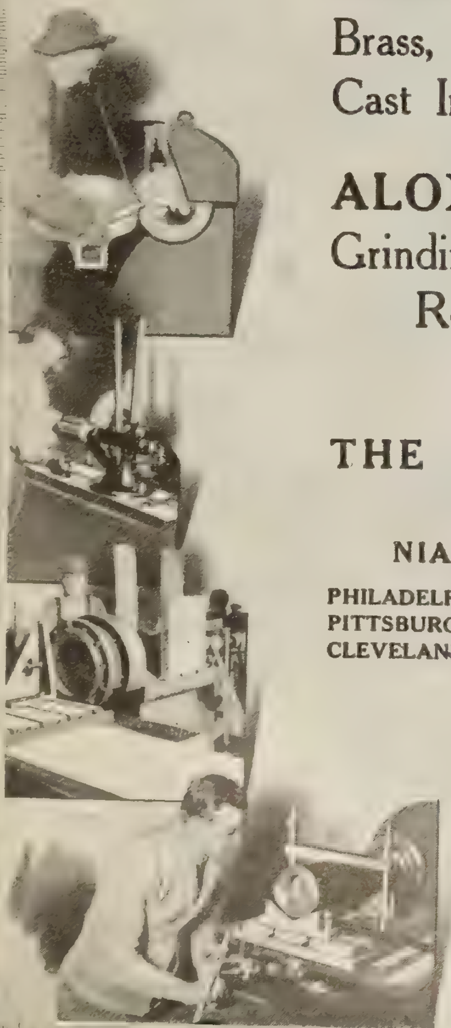
AMHERST, N. S., CANADA **FRAMINGHAM, MASS.**

Sales Offices: Montreal, Toronto, Winnipeg, Calgary, Vancouver

GRIND IT!

LOOK into your production methods. Right now, right in your own plant there may be several jobs that can be done cheaper, quicker and more accurately by grinding.

¶ Speed, greater accuracy, a better finish and an increased production are all at your command when you have good machines, Carborundum service and the right wheel in the right place.

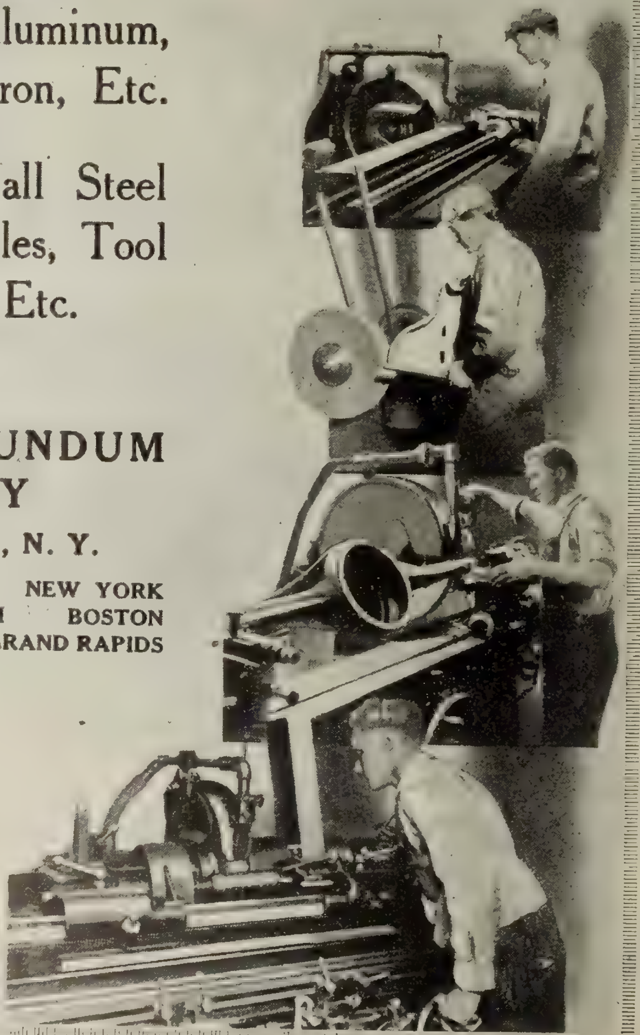


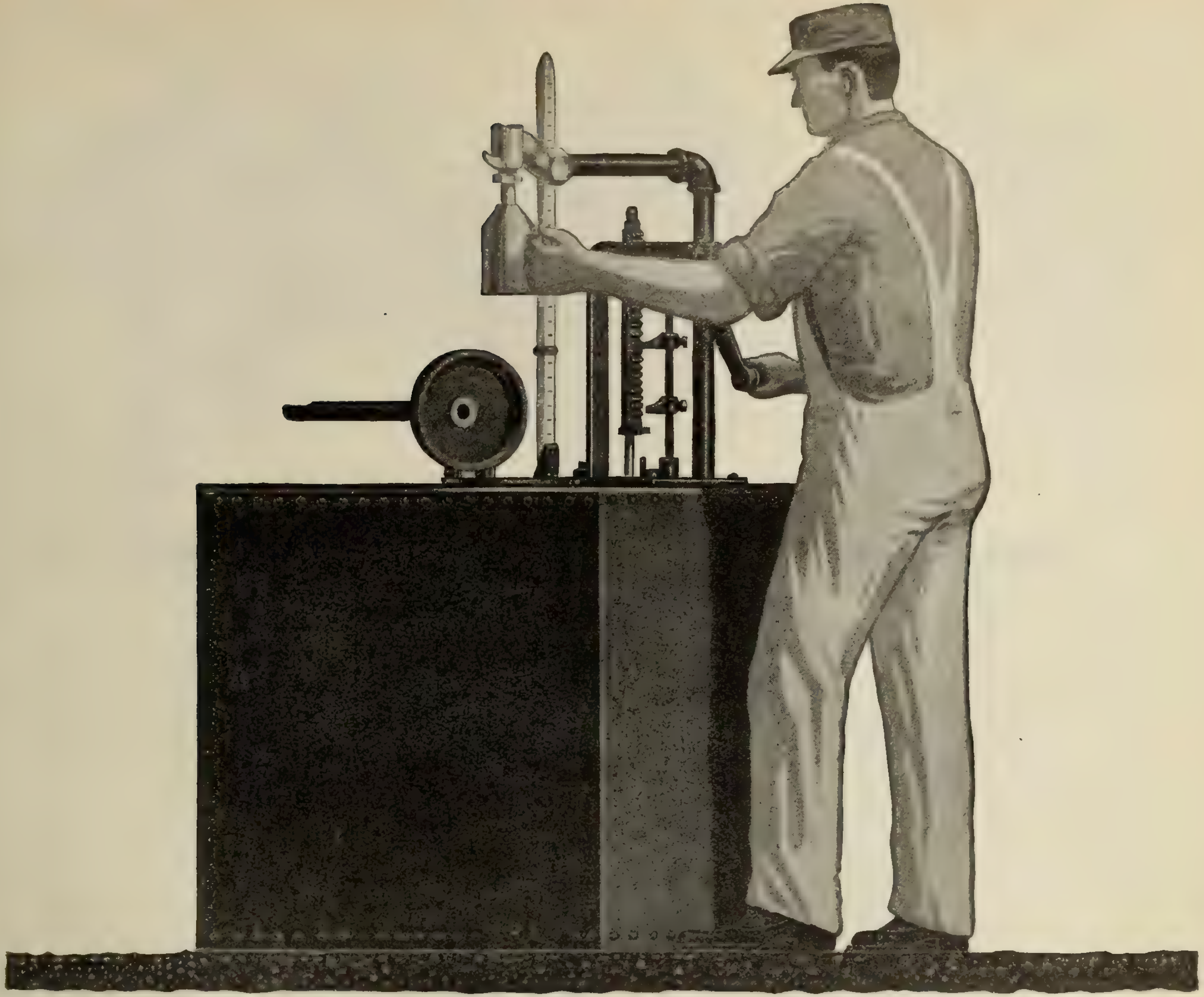
CARBORUNDUM for
Brass, Bronze, Aluminum,
Cast Iron, Grey Iron, Etc.

ALOXITE for all Steel
Grinding, Malleables, Tool
Room Work, Etc.

THE CARBORUNDUM COMPANY
NIAGARA FALLS, N. Y.

PHILADELPHIA CHICAGO NEW YORK
PITTSBURGH CINCINNATI BOSTON
CLEVELAND MILWAUKEE GRAND RAPIDS





The accompanying illustration shows a simple oil handling outfit that will save money for you. It is compactly built and provides much better storage facilities, in a given floor space, than is possible under old-style methods. The entire equipment is constructed of the highest grade material—waste-proof, dirt-proof and fire-proof.

A valuable point brought out by this illustration is that BOWSER ESTABLISHED 1885 **Systems may be purchased in single units.**

One or more of these units may be installed to meet your present requirements and other units added as needed—developing a comprehensive oil storing and distributing system. In other words, the cost of properly systematizing the handling of your oils is in exact proportion with your particular requirements.

Many apparently difficult oil handling problems can be solved by means of this unit idea. May we help solve your problem?

S. F. BOWSER & COMPANY, Inc.

Engineers, Manufacturers and Original Patentees of Oil Handling Devices.

TORONTO, ONTARIO

Sales Offices in All Centers and Representatives Everywhere.

Celfor
Tool
Company

We Have One For You

WE'VE printed a copy for you and we want you to send for it. Certainly, if you use drills you ought not to be without this book. In it you will find illustrated and described a full line of excellent cutting tools—a most complete line, backed by the Celfor reputation.

If you don't know Celfor Drills it will introduce to you a remarkable line of drills that cut holes faster, cleaner and better than you thought possible—it will show you how to cut down operating costs and keep up with the high-water mark of production of these exceptional times. It will prove a wonderful time-saver in ordering. And remember this —every tool shown is in stock or process of manufacture.

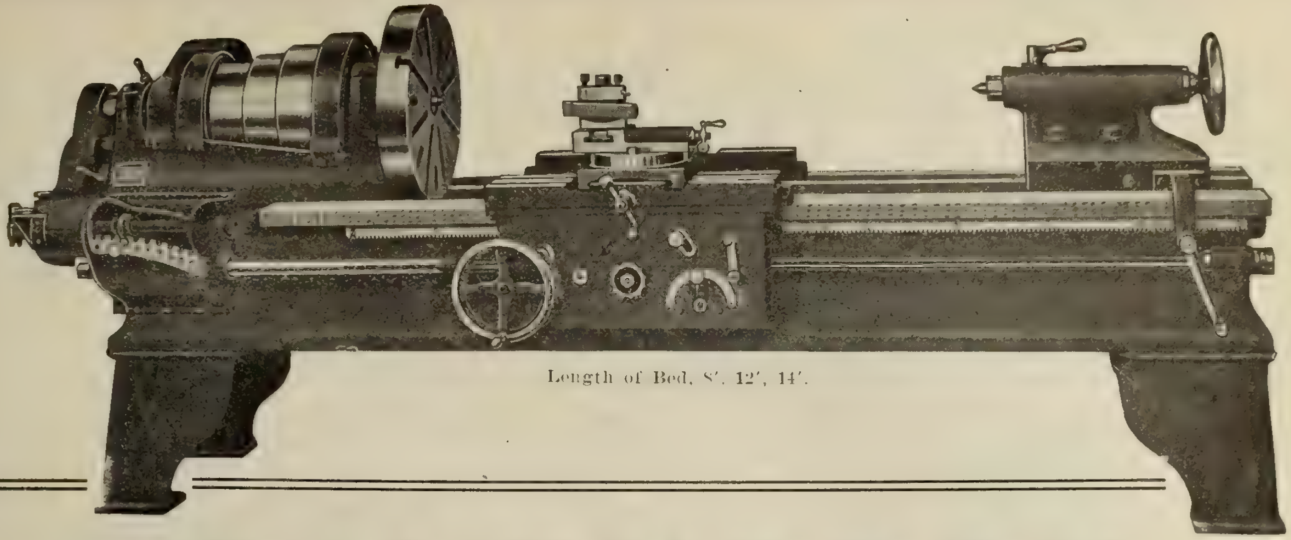
Ask for it by number—15.

May we send you a copy?

CELFOR TOOL COMPANY

Buchanan, Michigan, U.S.A.

AGENTS—*Canada:* **Rudel-Belnap Machinery Co., Montreal and Toronto.**
Great Britain: **Coats Machine Tool Company, Caxton House, London;**
Japan: Andrews & George, Tokyo.



Length of Bed, 8', 12', 14'.

DAVENPORT

22-Inch Lathe

Exceptionally Heavy and Rigid For Extra Heavy Service

No feature has been omitted to secure great strength and power. The bed, the headstock, the tailstock—every detail has been designed and constructed with a view to driving the **heaviest cut** that any tool will stand up against.

Built with ordinary change gears, unless otherwise specified.

Write for bulletin. It gives full details of construction.

We have shipped a large number of lathes to munition plants in Canada, through our representatives, for various operations on shells, and our customers speak highly of them everywhere.

Our Canadian representatives can make immediate delivery from stock.

DAVENPORT LOCOMOTIVE WORKS

DAVENPORT, IOWA, U. S. A.

Canadian Representatives: Williams and Wilson, Ltd., Montreal; A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver and St. John, N.B

Pratt & Whitney
Precision Machine Tools

THE entire Mechanical World has long recognized the superiority of Pratt & Whitney Precision Machine Tools. A broad experience, together with the most modern manufacturing facilities have solved the essentials of modern machinery requirements in a manner that enables us to design and build machinery noted for its stability, power, accuracy, convenience and rapidity of operation, and perfect workmanship.

- **Bench Lathes**
- **Engine Lathes**
- **Turret Lathes**
- **Hand Screw Machines**
- **Hand Milling Machines**
- **Automatic Milling Machines**
- **Thread Milling Machines**
- **Spline Milling Machines**
- **Gun Barrel and Tube Drilling and Reaming Machines**
- **Gun Barrel Rifling and Lapping Machines**
- **Die Sinking Machines**
- **Surface Grinding Machines**
- **Multiple Spindle Drilling Machines**
- **Sensitive Drilling Machines**
- **Profiling Machines**
- **Vertical Shapers**
- **Shaving Machines**

Machinists' Small Tools

In the manufacture of Machinists Small Tools the same policy has been followed as in the manufacture of other P. & W. Products. No effort or expense has been spared to obtain the necessary refinement and accuracy. Through the adoption of the United States Standard thread for bolts and nuts and for all screw threads where possible, we have obtained interchangeability impossible with any other form of thread.

- **Hand Chasers**
- **Dies**
- **Die Stock Sets**
- **Drills**
- **Hobs**
- **Knurling Tools**
- **Milling Cutters**
- **Reamers**
- **Taps**
- **Threading Tools**
- **Punches and Dies**
- **Taper Pins**
- **Lathe and Planer Tools**
- **Counterbores**
- **Hollow Mills**
- **Forming Tools**
- **Lathe Mandrels**
- **Special Tools to order**

Standards and Gauges

Based on the British Imperial Yard and French Standard Meter, of which we have made duplicate standards of exceptional accuracy, Pratt & Whitney Standards and Gauges have been recognized as the predominating influence in the standardization of the machine tool industry.

- **Plug and Templet Gauges**
- **Snap Gauges**
- **Star Gauges**
- **Taper Gauges**
- **Thread Gauges**
- **Pipe Thread Gauges**
- **Measuring Machines**
- **End Measures**
- **Locomotive Wheel Centre and Tire Gauges**
- **Master Car Builders' Standard Gauges**
- **Dial Indicators**

CORRESPONDENCE INVITED

Pratt & Whitney Co. of Canada, Limited

Works: DUNDAS, ONTARIO

TORONTO
1002 C.P.R. Bldg.

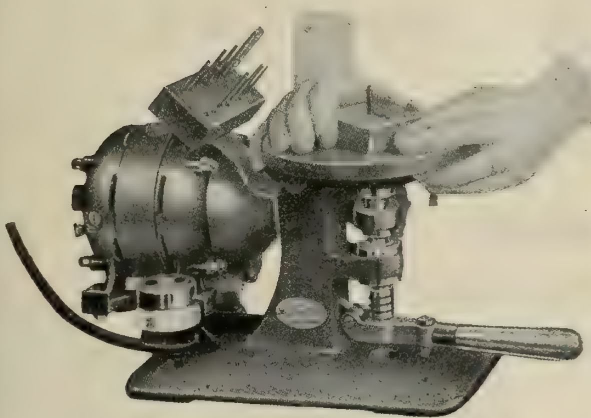
MONTREAL
723 Drummond Bldg.

WINNIPEG
205 McArthur Bldg.

VANCOUVER
B.C. Equipment Co.

The Anderson Die-Forming Machine

means larger and better production



ADVANTAGES

secured by the use of this machine as compared with a reciprocating filing machine for finishing blanking dies:—

1. Work drawn down on table or platen.

2. A wide range of surface contours finished without change of cutters.

3. Surfaces finished with uniform degree of clearance regardless of direction from which work is applied to cutter.

4. Chips carried downward, not deposited on top of the die to obscure the pattern or layout.

5. Will remove very much more material in a given time than is possible with a reciprocating file.

Write for catalog and full information.

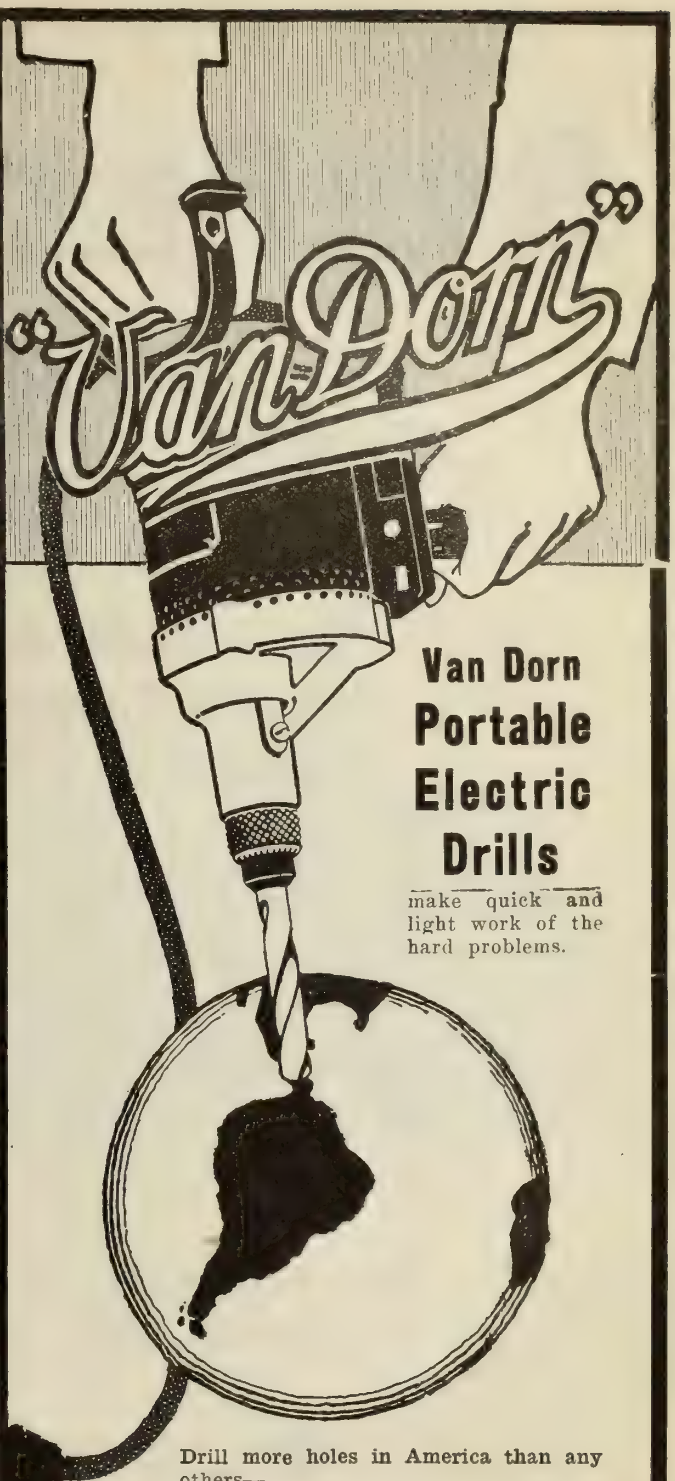
R. E. T. Pringle, Limited

Manufacturers' Agents

OFFICES:

Tyrrell Bldg., 95 King St. E., Toronto

809 Unity Bldg. - Montreal, Que.
3402 Osler Ave. - - Vancouver, B.C.
302 Donalda Block . Winnipeg, Man.



Van Dorn Portable Electric Drills

make quick and light work of the hard problems.

Drill more holes in America than any others—

because they stand up under work that sends other makes to the scrap heap.

They'll effect a big reduction in your drilling cost.

Drop us a card for catalog. It gives full particulars.

R. E. T. PRINGLE, LIMITED

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Tyrrell Bldg., 95 King St. E., Toronto
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REED-PRENTICE COMPANY

Worcester, R-P C Mass., U.S.A.

Man is known by his deeds
Machine Tools by their serviceability
Reed-Prentice by their

Lathes—Drilling Machines—Grinders

The results that Reed-Prentice machines have achieved during the last forty years have established their very high productive value.

Reed-Prentice machine tools are indeed worthy of your personal consideration.

Our catalogue will show the importance of bearing us in mind.

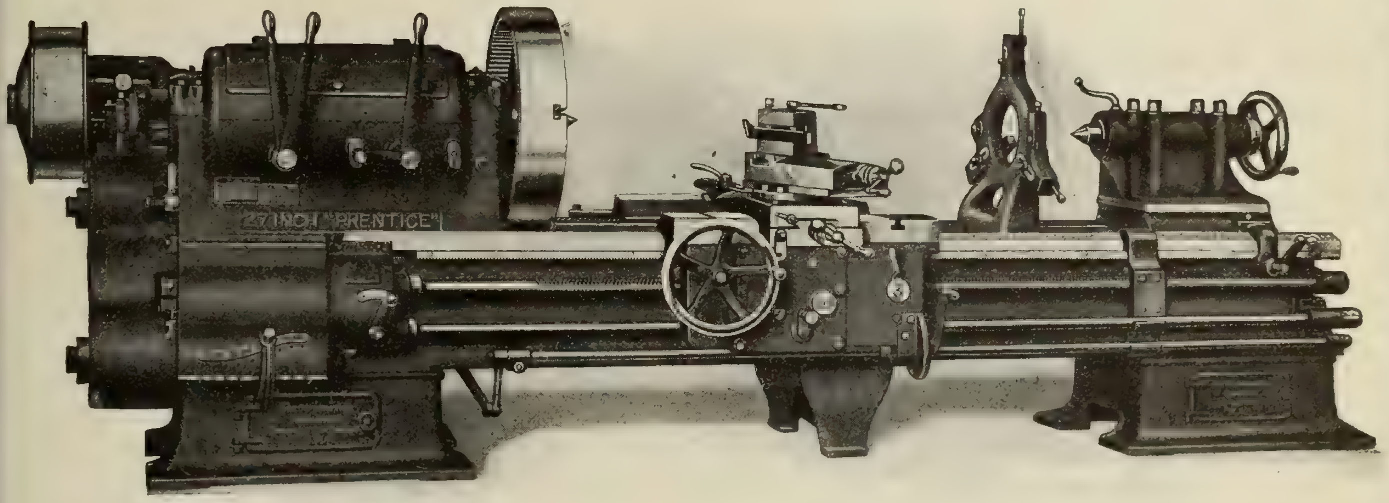
Represented by

Canadian Fairbanks-Morse Company, Limited

CALGARY MONTREAL OTTAWA SASKATOON ST. JOHN
TORONTO VANCOUVER VICTORIA WINNIPEG

REED-PRENTICE COMPANY

Worcester **Mass., U.S.A.**



Geared Head
Type

Face-Plate
Drive

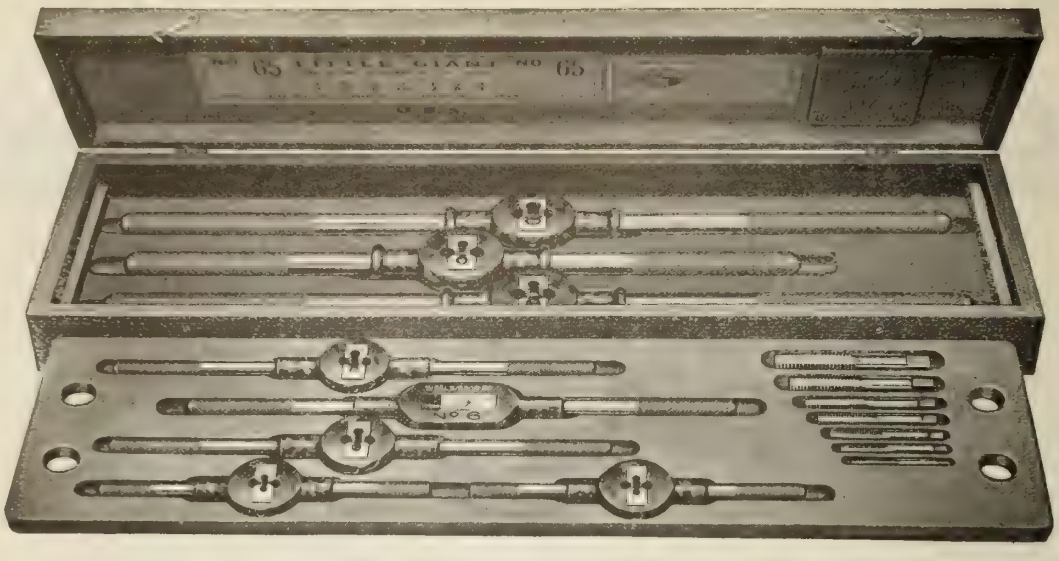
12 Spindle
Speeds

Reed-Prentice Automatic Shell Lathes might interest you.

Represented by

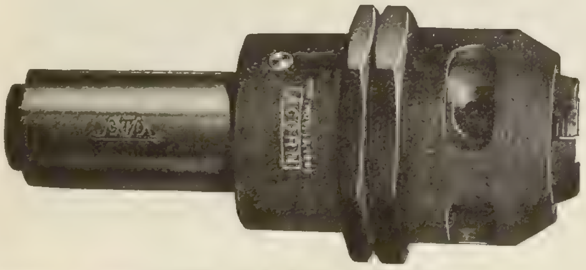
Canadian Fairbanks-Morse Company, Limited

CALGARY MONTREAL OTTAWA SASKATOON ST. JOHN
TORONTO VANCOUVER VICTORIA WINNIPEG

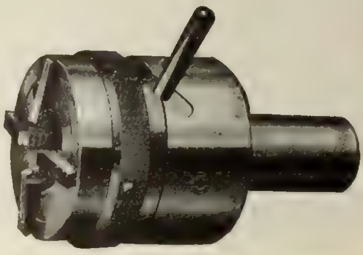


Little Giant FULL MOUNTED SCREW PLATE NO. 65.

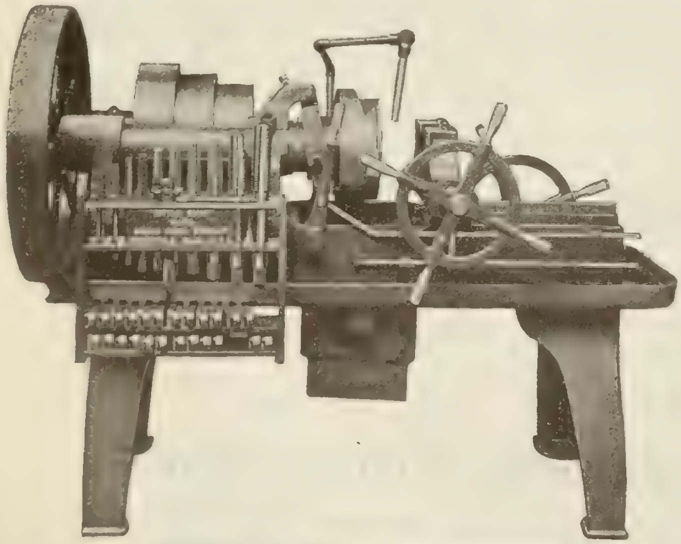
The line of screw plates includes more than 100 different assortments and styles, sufficient variety to insure the meeting of every requirement.



ACORN DIE AND HOLDER.
Perfect adjustment of the die makes for perfect threads.



WELLS SELF-OPENING DIE.
The simplest and most accurate of all the automatics.



Little Giant THREADING MACHINE.
No shop, no matter how large or small, can afford to be without one of these Little Giant Threading Machines.

WELLS BROTHERS CO. OF CANADA, LIMITED

GALT, ONTARIO

Taps, Dies, Screw Plates, Reamers, Gages, Threading Machines

Sales Agents: THE CANADIAN FAIRBANKS-MORSE COMPANY, LIMITED, Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary.

Little Giant

Screw Cutting Tools

enjoy an enviable reputation amongst producers of screw threads—a reputation gained through forty years of experience in producing high-grade tools and machinery.

We are proud of the quality and completeness of the Little Giant Line. Practically every requirement of the user of Taps and Dies and other screw-cutting tools and appliances—as well as Reamers for smoothing and sizing the drilled hole and Gages for measuring the finished work — will be found in the Little Giant Line.

Acorn Dies and Wells Self-Opening Dies have proved themselves wonderfully accurate and economical machine Dies.

Gages—For both thread and cylindrical measurements. Accuracy and careful workmanship characterize the line.

Threading Machines—From the small bench hand machines to the large power machines with automatic opening die heads.

Reamers—A large line—many styles—spiral fluted for easy, smooth-cutting.

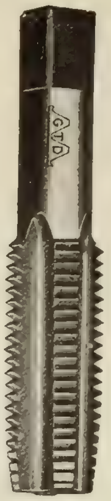
Send for the Newest Catalog.

WELLS BROTHERS CO. OF CANADA, LIMITED

GALT, ONTARIO

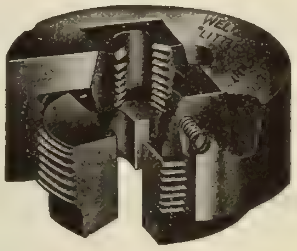
Taps, Dies, Screw Plates, Reamers, Gages, Threading Machines

Sales Agents: THE CANADIAN FAIRBANKS MORSE COMPANY, LIMITED,
Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary.



TAPS.

Every variety for every purpose and satisfaction built into every tooth.



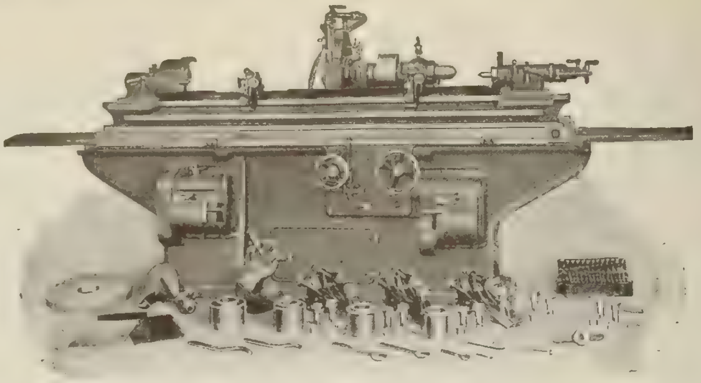
Little Giant DIE.

The adjustable — reversible die—much copied but never equalled.

GAGES.

Accuracy and careful workmanship characterize the line.

B & S Plain Grinding Machines



3 Sizes

No. 12
To 8 in. DIA. 36 in. long

No. 14
To 10 in. DIA. 48 in. long

No. 16
To 10 in. DIA. 72 in. long

Smooth Running, Efficient Machines for your Heavy Grinding Jobs

You can get with these machines steady, rapid production and work that will meet your most exacting standards for accuracy and finish.

Constructed with ample thickness of metal throughout and strong bracing at all points of stress, they have the stability required in machines for heavy manufacturing work. But careful calculations have eliminated all unnecessary weight that would tend to make these machines clumsy and slow to operate. They have large, well-supported and accurately aligned bearings which assure their reliability in long continued service.

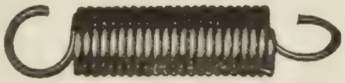
A simple, handy control is provided with speeds and feeds entirely independent, insuring the very fastest production, consistent with the finish required.

You should know more about these and other features, such as the Automatic Cross Feed, Universal Back Rests, etc. Write us for a descriptive circular of machines best suited to your work.

Brown & Sharpe Mfg. Co.
PROVIDENCE, R.I., U.S.A.

Canadian Agts.: Canadian Fairbanks-Morse Co., Ltd.
TORONTO MONTREAL WINNIPEG CALGARY
VANCOUVER ST. JOHN SASKATOON

SPRINGS, WIRE & STEEL
THE WALLACE BARNES CO.
ESTABLISHED
BARNES-MADE PRODUCTS
1857
BRISTOL CONN. U.S.A.
SCREW MACHINE PRODUCTS



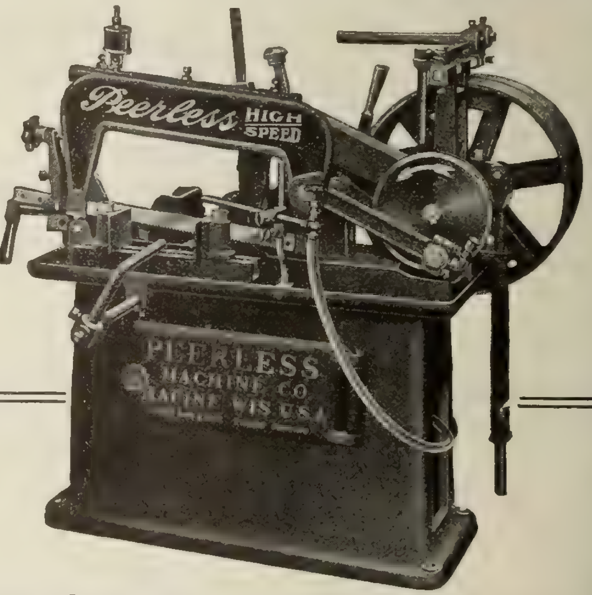
SPRINGS

Special springs, whose quality is the result of 60 years' expert knowledge and unsurpassed equipment. Our Screw Machine Products are made to your plans regardless of the exacting specifications. We are specialists.

Ask for Booklets 6-T and 7-T.

Established 1859

The Wallace Barnes Company
218 South Street Bristol, Conn., U.S.A.



Production and Satisfaction

are the reasons for so many large concerns repeating their order for PEERLESS HIGH SPEED HEAVY DUTY METAL CUTTING SAWS. One order just came in for forty-two machines.

It is also surprising the reports that are coming in stating the universal satisfaction that this tool is performing. Some of these reports are from concerns that have never been able to do their work satisfactorily on this class of machinery before, but the PEERLESS has solved this problem and they are now enabled to do this work better and cheaper than ever before.

Owing to the increased production on the PEERLESS instead of using a number of machines one will do the work, which not only saves in the purchase price of the tools, but in many cases dispenses with enlarging your factory. Or, in other words, you would have floor space to spare.

We have a trial proposition to offer on this tool that is so interesting that no manufacturer can afford to pass it up. Write us and we will submit such news that will completely revolutionize everything in this line.

PEERLESS MACHINE CO. **1607 Racine St. RACINE, WIS., U.S.A.**

Tool Room Grinding

is daily becoming a more important feature in the operation of all machine shops. With its increasing importance comes also a better understanding of the necessity for the **right** grinding wheel.

For instance: 46 grain vitrified Alundum wheels, grades K to L, can now be regularly recommended for twist drill grinding—

While one of the most popular wheels for gear cutter grinding is Alundum 3846-K—

And for grinding lathe and planer tools of high speed steel are the medium grades M, N, O and P Alundum, in grains ranging from as coarse as 20 in the larger wheels to as fine as 80 in the smaller ones.

The subject of Tool Room Grinding has been treated in the recent issues of "Grits and Grinds" — may we send you back copies?

Alundum

For Steel and Steel Alloys

Crystolon

for Cast Iron, Brass, Bronze, etc.

Norton Company - Worcester, Mass.

NEW YORK STORE
151 Chambers Street

CHICAGO STORE
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Electric Furnace Plants:
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THE CANADIAN FAIRBANKS-MORSE COMPANY, LIMITED
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NORTON

840a

Manufacturing Plant Equip

7—Foundry

The Canadian Fairbanks-Mo

Manufacturing Plant Equipm

2.—Power Transmissi

The Canadian Fairbanks-Mo

Manufacturing Plant Equipment

1.—The Power House

The heart of every manufacturing plant is the power house. Here is developed the mechanical or electrical power necessary to carry on the production of goods

Manufacturing Plant Equipment

6—Woodworking Shop

Manufacturing Plant Equipment

Fairbanks-Morse 26" Heavy Duty Lathe

3.—Machine Tools

Planers
Shapers
Lathes
Boring Mills
Horizontal Boring Mills
Drills
Multiple Drills
Tapping Machines
Milling Machines
Slotters
Key Seaters
Screw Machines
Automatics
Turret Lathes
Profilers
Cutting Off Machines
Hack Saws
Grinders

Having developed the power, and then transmitted it to the shop we wish to call your attention to our Machine Tool Department. Here you may select a machine to perform practically every operation necessary to the metal working industry.

The demand for machine tools during the past two years has been extreme. In spite of this fact, we have been able to secure the shortest possible deliveries for our customers.

The list on the left gives a partial idea of the tools which we have been supplying to the Manufacturers of Canada for many years.

Let us know your requirements and look up our large stock in Toronto and Montreal before placing your order.

See our partial stock list on page 89

The Canadian Fairbanks-Morse Co., Limited

Canada's Departmental House for Mechanical Goods

DEPARTMENTALIZED

Your Factory—Our Lines

FOR the most efficient production of your goods, departments are organized—For the greater convenience of our customers, our lines are divided into twelve different departments. Each department under the charge of an expert engineer.

These men are at your service to assist in the most economical equipment of your plant. We can equip the entire plant of the average factory. Concentrate your buying under our roof, and secure the greatest economy.

Our Stocks are the Largest in Canada

The Canadian Fairbanks-Morse Co., Limited

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

Head Office—Montreal

Branch Offices and Warehouses:

St. John Quebec Ottawa Toronto
Hamilton Windsor Winnipeg Saskatoon
Calgary Vancouver Victoria

Factories:

Sherbrooke Toronto Galt

Retrospect and Prospect

"Grant that with zeal and skill this year we do
What us do behoves, what Thou command'st us do
Grant that we do it sharp, at point of moment fit
And when we do it, grant us good success in it.'

INDUSTRIAL prosperity has been an outstanding feature of the year 1916 on this North American continent. As might be expected, war in Europe and on the high seas has been in large measure responsible for its inspiration and attendant development. Canada, through her efforts in munitions production—to refer to but one phase of her Allies-aid activities, has demonstrated not only a readiness to grapple promptly with an emergency, but, as well, an ability to muster her resources in its successful reduction. Her metal-working plant capacities have, on the one hand, been increased, at least, twofold, while, on the other, her pre-war conservatism as to variety product and market scope is no longer existent. In the editorial and advertising columns of this issue, there is demonstrated the evidence of fitness to meet in the first instance the war-created needs of our Allies during and following the life and death struggle now in progress, and secondly, to establish and develop trade relationships in neutral countries where hitherto we have had no part.

In the various spheres of resources, transportation, and manufacturing development, aside from their relation to war-time requirements, little, comparatively speaking, has been undertaken, particularly with respect to the breaking of new ground. As in 1915, railroad extension may be said to have reached the irreducible minimum, and in large measure the same is true as regards improvement and upkeep of rolling stock, roadbed and terminal facilities. Work has proceeded at a moderate pace on the new Union Station at Toronto, the C. P. R. Rogers Pass Tunnel, and at the Halifax new Ocean Terminals, while the new C. P. R. station in Quebec City has been completed and opened this year to traffic.

In the realm of finance, our banks have again made a good showing, and perhaps not the least reason for the very gratifying position in which they find themselves is that arising from their co-operation in the matter of substantial cash advances on Canadian shell contracts to Imperial Government account.

No public works of importance have been initiated or completed during the year, and only those of urgency and involving comparatively small outlays have been given attention. The new Welland Ship Canal, started previous to the outbreak of war, has been substantially advanced in construction, a detailed account of the work done to date being found in another section of this issue. Due to the desire to conserve to the fullest extent our men, material and cash resources, it is understood that work on the Canal will not be resumed until some date following the cessation of hostilities.

Iron, steel, and metals, have as usual, in this issue, a department especially devoted to their activities during the year, on which account but a brief reference need here be made. In spite of the fact that steel plant

LA CAPACITE DES FABRIQUES DU CANADA

SUR le Continent de l'Amérique du Nord, la prospérité industrielle est très en évidence pour l'année, 1916.

Aussi, cette guerre éffroyable en Europe sur terre et sur mer, est grandement responsable, comme on peut le croire de cette inspiration et de ce developpement qui l'accompagne.

Le Canada, en raison de tous ses efforts pour fabriquer des munitions,—ce qui n'est qu' une phase, d'activité pour aider les Alliés—a demontré non seulement sa prompte bonne volonté contre des circonstances inattendues, mais, encore son habileté pour rallier toutes ses ressources et pouvoir surmonter cette position difficile avec succès.

La capacité de ses fabriques de métal est augmentée d'au moins du double, et la "vieille routine" qui existait avant la guerre, et qui paralysait la varieté de la production et l'écoulement des marchandises, n'existe plus aujourd' hui.

Le numéro de ce journal dans les parties de rédacteur et de réclame, démontre:

1. Que l'on peut subvenir aux demandes des Alliés pendant cette lutte de vie et de mort et aussi "Après."

2. Que l'on peut pour l'avenir établir et développer des relations de commerce avec les pays neutres, qui jusqu' à présent n'étaient pas en relations de commerce avec nous.

Afin de pouvoir faire connaître les ressources naturelles et les ressources industrielles du Canada; et pour créer un commerce réciproque entre votre pays et le nôtre, ce numéro du journal est un sur mille que nous envoyons par courrier aux personnes à l'étranger dont les noms se trouvent sur une liste spéciale et que nous prions de nous aider de tous leurs efforts pour arriver à ce but.

establishment, extension and addition, have been carried out on a more or less gigantic scale, both in Canada and the United States, the supply has been all through the year much below the demand, a circumstance wholly attributable to the apparently insatiable munitions requirements. Metals have not, however, maintained the same upward progress as have iron and steel—raw or semi-finished, although for the like reason that the latter have reached fabulous figures, metals may be said to have, on the average, given a good account of themselves.

The season of navigation on our lakes, rivers, and ocean shores has been a particularly profitable one, both as to passengers and freight carried. Great Lakes vessels have again been transferred in quite large numbers to ocean and ocean coast trade, not only immediately preceding the close of navigation about a month ago, but throughout the entire season. The high freight rates prevailing have, of course, made the transfer easily worth while, the added risks notwithstanding. Port, harbor and waterway development and improvement have, like public works enterprise, been for the most part in abeyance, maintenance in the highest state of efficiency of existing equipment and facilities, constituting the direction of effort.

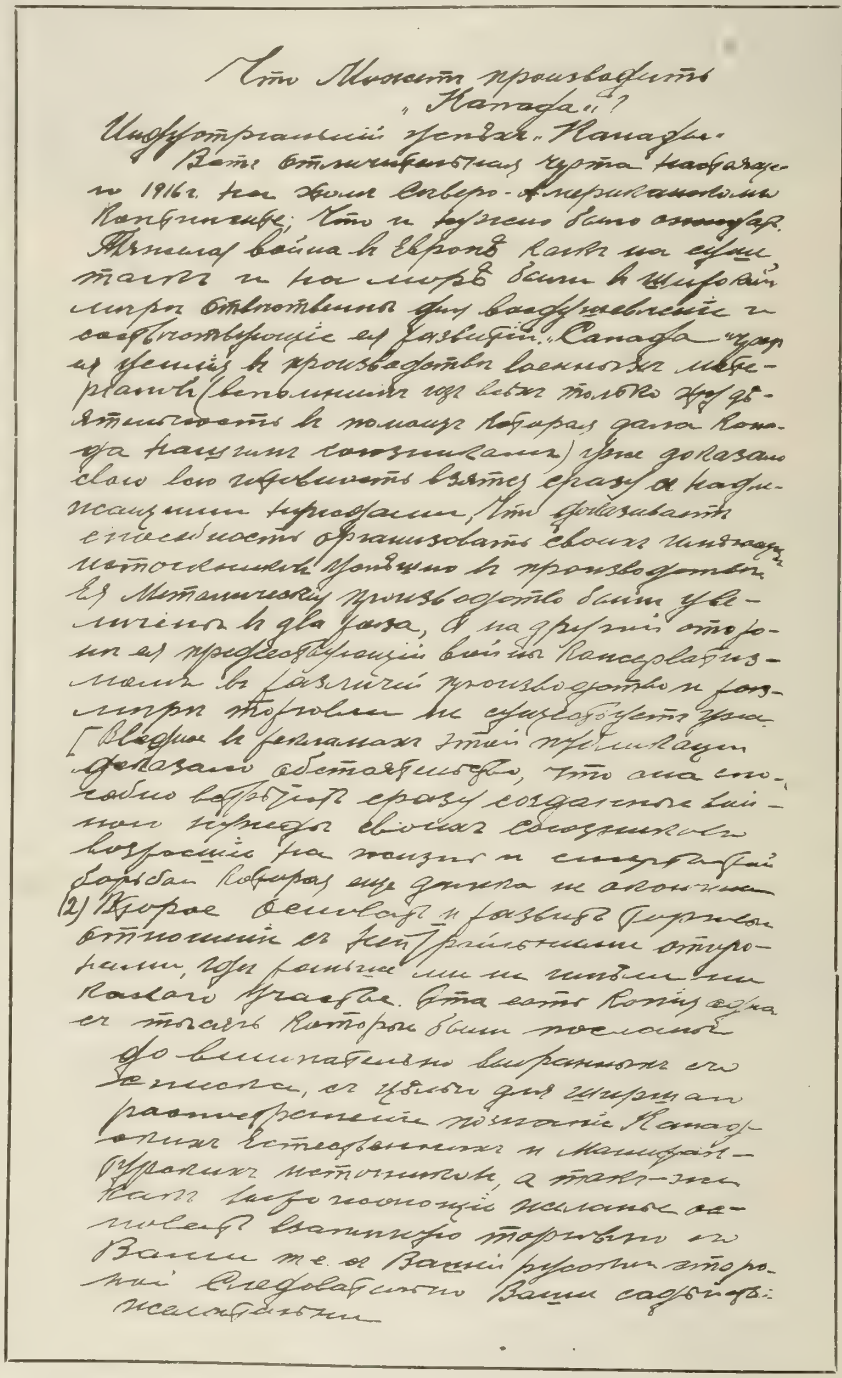
Due to the continued and apparently increasing scarcity of "bottoms" for ocean service, shipbuilding—wood and steel has assumed a more or less boom aspect within our borders. Our shipyards are meantime taxed to the limit of their construction capacity, and in not a few instances extensions on a large scale are either under way or on the eve of being started. Wood shipbuilding is booming quite as much as is that of steel, although its resuscitation at the present time is little likely to make for any great degree of permanence. Details of work completed and on hand will be found in another section of this issue.

Power development, municipal enterprise and building may be said to warrant their activities being classed as well below normal. Munitions production during the year has made large demands on available sources of power supply, and perhaps in Ontario more than in any other province of the Dominion, has the amount procurable become dangerously close to inadequacy. Steps have, however, been taken by the Hydro-Electric Commission to ensure that no possibility of interference with munitions output will occur. Conservation of resources may be taken as a good and sufficient reason for the policy which has restricted both municipal enterprise, public and private building, to more or less modest proportions as compared with pre-war years.

As might be expected, both skilled and unskilled labor scarcity have exerted an influence disadvantageous to the setting up of manufacturing records—munitions or otherwise. Aside from the depletion of our workshops by recruiting for Overseas Service, a shortage would have in any case prevailed, as through the immense development in shell-making, both the normal operative personnel of our plants and the sources from which same could have been supplemented would only have partially met the need. To fill the gap, female labor was requisitioned, and in quite a brief space of time has been successfully installed in increasing numbers of our shell shops. A pleasing feature of the situation has been the co-operative spirit displayed by plant executives and their male employees to make "dilution" the success already registered.

The machine tool industry, as might be expected, has been unusually active during the year, in the first two quarters especially so; and although in recent months an easing off in inquiries has become evident, business continues to be put through on a scale well above the normal of good times preceding the war. The building of machine tools in Canada has grown apace during the year, and even should the number of those engaged meantime in their manufacture show a shrinkage, it goes without saying that their marketing was both opportune and effective in meeting our completed shell output requirement in a reasonably satisfactory manner.

During the past year the paper industry has developed a liveliness that so far as the consumer is concerned has been far from pleasant. Not only have prices pyramided, but deliveries on contract or otherwise for all classes of product have taken on appearances that


Что может производить „Канада“?

may be said to shame like conditions in the steel market. The result has been that publishers have been compelled to cut down space, use in many cases an inferior quality of paper, and to increase subscription rates in addition. The situation has become so acute in these closing weeks of the year, that Government action towards an understanding between producers and consumers may be said to be pending at an early date.

Speculation continues to be indulged in as to the more immediate effect the transfer of hostilities from the battlefields of Europe to the wider fields of world trade and commerce will have—either in the restriction or expansion of our industrial activities. We struck a new stride in manufacturing during 1915, and have materially extended it during the past year, both as regards expertness in solving new problems and in the devising of methods and appliances whereby reduced cost and higher class product have resulted. Steps are undoubtedly being taken by our plant executives to make easy the transition from war-time commodity production to those of peace-time, and to establish the necessary and effective connections to fill the gap promptly. Their experience in grasping the manufacture of shells and making same a huge success will, we think, be sufficient guarantee that, when the last shells are being turned, the raw or semi-finished materials entering into readily marketable commercial commodities will be within the machine operator's reach in quantity considerable.

CANADA'S TRADE

CURRENT trade returns show that the volume of the external trade of Canada is now greater than at any previous period in the history of the Dominion. For the fiscal year ending March 31 last, the grand total of the imports and exports of merchandise—taking no account of the movement of coin and bullion—was just a trifle less than a billion and a quarter dollars. In all its divisions trade is now expanding at a marvellous rate.

Imports for consumption in 1916 were greater by 11 per cent. than in 1915. Under the stimulus of war orders, the export trade shows a more startling development. Exports of Canadian goods in 1916 exceeded in value similar exports in 1915 by $318,000,000, or 69 per cent. Statistics for the months of April to October show that this rate of increase is being well maintained.

For the twelve months ended October the total of imports for consumption, and the exports of Canadian produce was $1,754,143,710. In the last twelve months before the war, the total for the same trade was $995,152,685. The increase during two years of war is thus $560,621,549, or more than the whole trade in the fiscal year 1911.

◆

COMPANY INCORPORATIONS IN NOVA SCOTIA

DURING the fiscal year of the Province of Nova Scotia, ended September 30 last, company incorporations numbered 102, as compared with 97 the year previous, and 168 in 1914. Every Company, whether domestic or ex-provincial, having gain for its purpose or object, is required to be registered and pay an annual registration fee if it does or carries on in Nova Scotia any part of its business. During the last fiscal year, Companies so registered numbered 922, as against 911 the previous year. During the year in which 168 Companies were incorporated, there was great activity in the province of Nova Scotia, in connection with the raising of foxes and fur-bearing animals, and 68 of the 168 companies were formed for that purpose; the following year only eleven such companies were formed, and last year only five.

◆

The Clyde Shipbuilders' Federation responding to the request of the British Board of Trade to consider steps necessary to accelerate the production of merchant vessels declares the first essential is immediate total prohibition.

LA CAPACITA DELLE FABBRICHE IN CANADA

LA PROSPERITA industriale sul continente dell' America del Nord è di tutta evidenza per l'anno 1916.. Questo straordinario sviluppo nel commercio è dovutó helas! alla guerra attuale. Il Canada in più dello sforzo fatto per venire in aiuto con il grande consorso delle sue fabbriche di munizioni à dimostrato non solo l'amore della patria, ma ancora la sua abilità per riunire tutte le sue risorse e vincere tutte le grandi difficoltà.

Le fabbriche metalurgiche hanno aumentato del doppio, é la vecchia ''rountine'' che esisteva avanti la guerra, e che paralizzava la varietà di produzione e la vendita in mercato, non esiste più al di d'oggi.

Il numero di questo giornale nella parte editoriale e reclame dimostra primo: che si può rispondere vittoriosamente a cio che domandano gli alleati per la durata della guerra, secondo che si potrà per l'avvenire stabilire e sviluppare le relazioni commerciali con i paesi neutri che fino a presente ignoravano affato il Canada. Di puz poter far conoscere le risorse naturali e le risorse industrialli del Canada, creare un commercio reciproco fra il vostro paese e il nostro.

Inviando questo numero noi preghiamo i nostri lettori di ogni nazione e di ogni paese, di riunire tutte le loro volontà a fine che un commune sforzo possa dare i risultati che il Canada spera.

TRADE OF CANADA DURING THE TWELVE MONTHS ENDED OCTOBER 31, 1916.

	1912.	1913.	1914.	1915.	1916.
Imports for Consumption—					
Merchandise	$615,619,974	$ 674,313,226	$ 514,585,914	$ 421,584,597	$ 716,930,113
Coin and bullion	16,290,174	5,813,365	92,855,571	56,531,364	49,464,853
Total imports for consumption	$631,910,148	$ 680,126,591	$ 607,441,485	$ 478,115,961	$ 766,394,966
Exports from Canada—					
Canadian merchandise	$327,548,856	$ 405,091,781	$ 412,796,106	$ 509,092,245	$1,037,213,597
Foreign merchandise	20,487,005	24,836,170	46,468,035	41,455,829	18,925,723
Total merchandise	$348,035,861	$ 429,927,951	$ 459,264,141	$ 550,548,074	$1,056,139,320
Coin and bullion	11,840,665	17,228,157	19,862,690	118,782,516	206,126,802
Total exports	$359,876,526	$ 447,156,108	$ 479,126,831	$ 669,330,590	$1,262,266,122
Recapitulation.					
Total Trade of Canada—					
Merchandise	$963,655,835	$1,104,241,177	$ 973,850,055	$ 972,132,671	$1,773,069,433
Coin and bullion	28,130,839	23,041,522	112,718,261	175,313,880	255,591,655
Aggregate	$991,786,674	$1,127,282,699	$1,086,568,316	$1,147,446,551	$2,028,661,088

Our War-Created Opportunities and Responsibilities

Contributed and Selected

Being expressions of opinion from men prominent in the administration and management of iron, steel and associated enterprises regarding developments in trade, commerce, agriculture, manufacturing, etc., during 1916, and their bearing on the immediate and more remote future outlook relative to our Dominion: Optimism will be found predominant.

BANK MANAGER'S VIEWPOINT

By Sir F. Williams-Taylor.*

THE outstanding business feature in Canada is an industrial condition more abnormal in character than ever before in her history. Our much criticized adverse trade balance has disappeared as though by magic, and our exports are now vastly in excess of our imports. Many of our great industries have converted big floating debts, a cause of anxiety, into cash surpluses. Not only is unemployment unknown, but unskilled labour commands wages two and a half times greater than the pay of our volunteer citizen soldiers, who so splendidly risk their lives for their country, while men engaged on "factory piece work" can earn as much as a college professor. It is, therefore, not surprising that the unanalytical minded, or those preoccupied with their own affairs, or those who have not contributed in flesh and blood to the Cause, should complacently say "Times are good." Among those who do not join in this refrain are the men and women of the salaried class and those with small fixed incomes. These have been hard hit by war prices and are indeed finding it difficult to make both ends meet.

The present buoyant industrial conditions are obviously the direct outcome of a steadily increasing demand by the Allies for food, clothing and other munitions of war at rapidly rising prices, yielding large profits to the producers.

In many respects conditions in Canada are comparable with those in the United States. In two notable respects they differ. Our neighbours across the border are adding to their wealth at a pace without precedent in history, but, unlike the Dominion, unpenalized by increasing national debt and loss of human life. The transient nature of our increased exports alone is a simple index to a situation that commands the attention of all thinking people.

There are two obvious means of lightening Canada's coming burden, viz., thrift and immigration. The two are closely allied, for only by practising national and personal economy or thrift can we reduce our high cost of living—that most effective barrier to immigration. Upon immigration we mainly depend for the fuller development of our unsurpassed natural resources. Thrift is overdue but can be started forthwith; immigration must wait, but should follow in natural sequence. I have no words at my command with which to adequately urge the necessity of an organized and an individual effort to promote thrift.

We are going to win the just war we are waging, we are bound to win the war, but let us emerge from it unexhausted, in order that the victory over our enemies may be perpetuated and recurrence of such insensate destruction rendered impracticable. With the advent of peace will come relief to our Empire, but to financial and trade conditions peace will bring a necessity for sudden readjustment that in Canada, as elsewhere, must tax every resource to the utmost.

THE UNIVERSITY VIEWPOINT

By R. A. Falconer.*

THE war has brought forward more prominently than ever the place that the universities fill in the industrial and manufacturing pursuits of a country. The most obvious fact is that we must rely more and more upon expert knowledge, and the training for this is given in the faculty of applied science and in the pure scientific departments. What could we do without our engineers, our chemists, our officers of health? Chemistry is going to play an enormous role in the future. Experts will be needed in special laboratories in almost every large industry. Problems of manufacture, agriculture, and the conservation and development of natural resources will have to be solved by highly trained men in the laboratories. Only the universities can supply the discipline which will turn out men of high grade, and when advisers are wanted on scientific questions the professors of the universities will be increasingly called upon. In the economic struggle that will follow the war, success will come to those who have knowledge, who know how to apply that knowledge, who can eliminate waste, and who with trained minds can get results which are only obvious to the man who has the scientific eye.

The story has not yet been told of the contributions that have been made by the scientists of British and Canadian universities for the conduct of this war. It will be a revelation to many to discover what surpassing service the leading scientists have rendered in the way of making suggestions in munition work, devising instruments in connection with processes of war, and in securing economic results in all the branches of industry. I feel justified in stating that the development of all countries in the future will be in proportion to the development of their universities. Those will be in the van who have the scientific men trained and ready to lead.

SHIPBUILDING VIEWPOINT

By John S. Leitch.*

THE prospects for Canadian shipbuilding are bright, and will be bright just as long as British shipbuilders have enough work on hand to keep them from entering into competition. As soon as they overtake part of the arrears caused through the loss of so many ships submarined, then there will be no hope of the Canadian shipbuilder getting orders in the open market. From the latest reports, the building of a great many merchant ships is now being undertaken in Great Britain, and, while the loss of tonnage has been enormous, the facilities for quick output there are also enormous. The only way the Canadian shipbuilding industry can live after normal or nearly normal conditions prevail will be through some form of Government aid, which has always been necessary, and will be more so in the near future.

Shipbuilders all over are experiencing the greatest difficulty in securing steel, and the necessary labor to construct ships. The outlook for material particularly is not very promising, as the great demand on the steel plants for munitions steel is almost enough to keep them running to capacity, and until this demand slackens it will be difficult to get any thing like reasonable deliveries or prices. At the present time steel in Great Britain costs considerably less than what Canadian shipbuilders pay, and while the cost of labor has gone up considerably in the Old Country, it has not gone up to such an extent as over here. Inquiries are numerous, and those shipbuilders who are fortunate enough to get material and labor in sufficient quantities will, no doubt, secure abundance of work for the next four or five years.

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*General Manager, Bank of Montreal.

*President University of Toronto.

*Manager, Collingwood Shipbuilding Co., Collingwood, Ont.

A great deal has been written and published in the press recently re Canadian Order-in-Council regarding the 99 per cent. drawback of the duty paid on materials entering into ships, and the general impression is that this will be a great help in building up the shipbuilding industry. The people who have already written on this subject are evidently not intimately acquainted with the matter, as the relief afforded by this drawback is not of so much importance as might appear on the surface, and would only amount to a very small proportion of the cost in present-day vessels.

IRON AND STEEL MERCHANDISING VIEWPOINT

By J. T. McCall.*

A SURVEY of the Canadian iron and steel industry and its allied branches during the past year shows a marvellous increase in the capacity of our mills and producing plants. We have been called upon to adapt ourselves to unusual conditions, to supply a demand that was never contemplated when the present iron and steel plants were built. These plants have been greatly enlarged during the past year, and the opportunities of trade offered have been advantageously taken care of. The extraordinary results which have followed the efforts thus put forward to meet the home and also the export requirements in finished iron and steel have inspired a confidence in our manufacturing departments which will carry us on to greater success, larger expansion, and a more thorough development of our natural resources.

We do not refer to the manufacture of munitions, which has been developed on an enormous scale, because this is recognized as being more or less temporary, and will cease when the war is over. Shipbuilding is receiving considerable attention, and promises to become an important and permanent branch of our industrial life. Already much has been accomplished in this direction, in the West as well as in the East, and much more is under contemplation. Car construction and locomotive building have shared in this development, and numerous satisfactory contracts for foreign markets have been handled; others are in course of being negotiated.

There will necessarily be an adjustment to some extent later on, but the connections that have been established for our goods in the markets of Great Britain and our Allies will undoubtedly be of a permanent nature. From every point of view our industrial position is highly satisfactory, and promises great things in the future. We are limited at present by the scarcity of labor and raw materials, both of which are quite inadequate to the demand.

RAILROAD PRESIDENT'S VIEWPOINT

By Baron Shaughnessy, K.C.V.O.*

CANADA has assumed a heavy portion of the burden of the war, far greater than any one anticipated. Canadians have done men's work, fulfilling the terms of the partnership that exists between the various members of the Empire. Canada will, in fact, be a senior partner in the British Empire, bearing an equal share of the burdens, reaping an equal, proportionate share of the profits, and filling a prominent seat at the council table.

This war is developing the individual. Every man, woman and child must do a share. Women in the United Kingdom are taking men's places, and they have demonstrated that they can do the work men heretofore have done and just as efficiently. They work on the railways, manufacture munitions, do the farm work, in fact, there is nothing except the actual fighting in the trenches that they are not doing. Every woman at man's work puts another rifle on the firing line.

> **"We appeal to the nation to assist the Government in distributing our resources, so that no man shall suffer hunger because somebody else has too much. That means sacrifice; but the men on the Somme are enduring far greater sacrifices. We cannot have equality of sacrifices, but we can have equal readiness for sacrifice from all. Let the nation place its comforts, luxuries and indulgences on an altar consecrated to the fighting men. Let us proclaim a national Lent during the war. It will strengthen our fibre, our spirit. Unless the nation as a whole shoulders part of the burden of victory it will not profit by the triumph. It is not what a nation gains, but what it gives, that makes it great."**
>
> **—David Lloyd George.**

As to Canada's future, I have always been certain. The war has only hastened development. With the population nearly equivalent to that of New York State and a territory larger than the United States, her possibilities are vast. The quality of her fighting and her share in the war has carried her name to remote corners. Before the war, immigration was rapid, but not a measure to what it will be when peace is declared. I firmly believe that Canada will have an influx of population not unlike that in the United States about fifty years ago.

A great deal of money and many thousands of settlers have already come to Canada from the United States. The investor finds there a good field for his wealth and the settler a fertile soil for his plough. Rewards have come quickly in both. Canada looks to the United States more than she ever did before for two reasons. Money and men are plentiful there, and the supply from overseas is cut off.

STEEL CORPORATION VIEWPOINT

By Mark Workman.*

THE action of the U.S. Federal Reserve Board will help Canadian business. We are quite willing to accept the credit of the British Empire if the existence of an anti-ally sentiment on the Federal Reserve Board makes such action necessary. The credit of the British Empire is sound without a doubt, and no action of this character can affect its fundamental position. Our enemies have unwittingly assisted us by their action. Other allied business than the munitions business proper will be inclined to seek Canadian sources. The steel industry will be amongst those so benefited. It occupies, of course, a relatively stronger position than ever before. Prices are strengthening up and production is keeping pace with same. Buyers, rightly enough, are holding off in purchases as far as possible until lower prices permit them to make renewals. Nevertheless, actual necessities in war orders and industrial needs absorb all available production.

This condition makes it seem reasonable to suppose that demand will continue good for domestic acount after the war, particularly in the case of replacements which are now being deferred. A similar demand for replacements on export account may be expected when prices reach normal again. It is hard to see any let up in the demand for steel for some time to come, notwithstanding the desirability of maintaining a conservative attitude on this important question.

Canadian steel makers hope after the war is over to be on an equal basis with the United States. Output is being increased by the addition of further equipment which will of course require some time to be put in operation but eventually a large portion of present earnings will have been applied on betterments which will increase the output and reduce the costs of same.

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*Vice-Pres. and Gen. Mgr., Drummond, McCall & Co., Montreal, Toronto, etc.

*President, Canadian Pacific Railway Co.

*President, Dominion Steel Corporation.

Obituary Record of Canadian Business and Public Men

The year 1916 bears away on its bosom, at least, its fair share of our business and public men—young and old, although due to the sacrifice exacted by war service, we are perhaps poorer than otherwise, especially as regards the former. Whatever the circumstances, the record of their passing to the Great Beyond merits specific reference being made to their place and part in the upbuilding of our national fabric, industrial and otherwise.

Hon. F. T. Frost, president of Frost & Wood Co., Smiths Falls, died last August.

H. W. Aird, manager of the Canada Paint Co., Montreal, died suddenly at his residence, Elm Ave.

Wm. J. Chaplin, vice-president of the Welland Vale Mfg. Co., St. Catharines, Ont., died on April 11, aged 57.

Charles Booth, chairman of the Booth Steamship Co., died in London, England, on November 23, aged 76.

Joseph Alfred Gendron, founder of the Gendron Mfg. Co., Toronto, died at Ottawa, on November 25, aged 76 years.

Redmond Quain, a director of the Ottawa Electric Railway Co. and Ottawa Car Co., died at Ottawa on October 5, aged 56.

Robert Archer, a prominent business man in Montreal and a director of the Northern Electric Co., died on January 7, aged 79.

Joseph T. Rolph, founder of the firm of Rolph & Clark, lithographers and engravers, Toronto, died on June 13, aged 84.

S. H. Reynolds, chairman of the Greater Winnipeg Water District Commissioners, died suddenly in Chicago on June 16.

William J. C. White, head of the firm of R. C. White & Co., engine and boiler makers, Montreal, died in that city on March 24.

David Alexander McIlroy, manager of the Hamilton Steel Construction Co., died at Hamilton, Ont., on April 9, aged 35.

F. W. Harrison, president of John Harrison & Sons, Co., sash and door manufacturers, Owen Sound, Ont., died on Feb. 9.

Thos. L. Morrissey, for 44 years mechanical superintendent for Robert Mitchell & Co., Montreal, died there on Oct. 22, aged 72.

Mayor Norman C. Pilcher, formerly general manager of the Sherbrooke Railway & Power Co., was killed in action early in May in Flanders while serving with the Canadian Mounted Rifles, Major Pilcher was born in England 36 years ago, but had lived in Canada for 24 years.

Thomas Tomlinson, head of the firm of Thomas Tomlinson & Son, iron founders, Frederick Street, Toronto, died on Feb. 22, aged 45.

Graham Fraser, a pioneer of the steel industry in Canada, died at New Glasgow, N.S., on Dec. 25. The deceased was 68 years of age.

Arthur H. Chadwick, director and manager of the Canadian Chadwick Metal Co., of Hamilton, Ont., died on November 8, aged 50.

J. W. McCallum, for many years superintendent of the Amherst branch of the Canadian Car & Foundry Co., died at Amherst, N.S., on Feb. 16.

Robert Hastwell, superintendent of the International Malleable Iron Works at Guelph, Ont., passed away last October following a short illness.

Alexander Ramsay, head of the firm of A. R. Ramsay & Sons, paint and varnish manufacturers, of Montreal, died there on Jan. 14, aged 76 years.

Virgil G. Bogue, a well-known engineer, died last October. Mr. Bogue was born at Norfolk, N.Y., in 1846. He took a prominent part in engineering projects on this contienent.

Hugh Wilkinson, former mechanical superintendent of the Brockville branch of the Canadian Northern Railway, died at Brockville, Ont., on August 27.

Edwin F. Goodison, president of the John Goodison Thresher Co., of Sarnia, Ont., and one of the province's well known manufacturers, died on Oct. 29, aged 44.

Frederick Wells Avery, of Ottawa, millionaire lumberman, died on May 11 at the General Hospital, Montreal. He was born in New York in 1852, and came to Canada in 1878.

J. Kerr Osborne, formerly vice-president of the Massey-Harris Co., Toronto, Ont., died on Jan. 14, at Bournemouth, England. Mr. Osborne was born in Beamsville, Ont., on July 27, 1843.

J. Howard Jackson, head of Jackson & Co., civil engineers, died on October 7. He was born in England in 1847, and came to Brantford, Ont., in 1912 to join his son in the engineering business.

Charles Hodgson Osler, civil engineer of the Montreal Light, Heat & Power Co., Montreal, died on July 8, aged 56. The deceased was born in Sheffield, England, and came to Canada in 1872.

William Angus for many years manager of the Royal Pulp & Paper Co., died at Montreal on May 12 aged 81. The deceased was born in Glasgow, Scotland and came to Canada 63 years ago.

Captain John Simpson, veteran Canadian navigator and shipbuilder, died on June 3 at his home, Owen Sound, Ont., in his ninety-first year. He was born in the Bay of Quinte district near Belleville.

Robert Paton Dawson, for some time foundry superintendent with H. R. Ives & Co., and for 18 years machine shop foreman with J. & R. Weir & Son, Montreal, died in that city on January 25, at the age of 67.

John B. McDonald, who conducted a foundry at Tiverton, Ont., for many years, died there on January 31. The deceased was born at Ross Mull, Argyleshire, Scotland, 78 years ago, and settled in Tiverton at the age of 18.

Ernest G. Barrow, C.E., late city engineer of Hamilton, Ont., died in Toronto on July 21. The deceased was born in Bristol, England, in 1846, and came to Canada in 1871. He was appointed city engineer of Hamilton in 1896.

Arthur Drummond, son of the late Sir George Drummond, of Montreal, died on May 29 at the Royal Victoria Hospital. The deceased, who was in his 48th year, was the general manager of the Canada Sugar Refining Co. of Montreal.

George Arthur Grier, president of G. A. Grier & Sons, Montreal, died on Oct. 25, aged 67. Mr. Grier was also president of the Dominion Glass Co., St. Lawrence Flour Mills Co., and general director of the Dominion Textile Co.

William Yellowley, superintendent of the Canadian Locomotive Works, Kingston, Ont., died at his home on August 6 of heart failure, aged 57. He was a native of Newcastle, England, and had been with the locomotive works for over 15 years.

Thomas J. Drummond, a prominent business man of Montreal, and a member of the Drummond, McCall Co., died at his summer residence at Castine, Me., on August 6. Mr. Drummond was born at Tawley, County Leitrim, Ireland, on September 26, 1860.

John Power, who for 33 years was superintendent of the Montreal Gas Works, passed away in that city on October 4, at the age of 81. Mr. Power was an Irishman by birth, and came to Canada in 1860. He retired as superintendent of the gas works in 1895.

Erastus Long, president of the E. Long Mfg. Co., Ltd., Orillia, Ont., died on Oct. 4, aged 48. Mr. Long was one of the most prominent and public spirited citizens of Orillia. He had been chairman of the Orillia Water, Light and Power Commission since its inception four years ago.

John D. McEachren, a former well known manufacturer of Galt, Ont., died at Indianapolis, Ind. The late John D. McEachren was in his 81st year and was born in St. Croix, Quebec. He founded the McEachren Heating and Ventilating Co., now Sheldons, Ltd., Galt.

Robert Maitland Roy, C.E., manager and director of the Hamilton Bridge Works, Hamilton, Ont., died on June 27. Deceased was born at Stirling, Ont., on November 28, 1869, and had been manager of the Hamilton Bridge Works since 1908, and a director since 1913.

William Henry Jaques, who did much to develop the American armor plate and ordnance industry, died at High Barnet, near London, England, on Nov. 24. Mr. Jaques was born in Philadelphia on December 24, 1848, and lived for the most of his life in the United States.

Angus B. McColl, founder of McColl Bros. & Co., Toronto, died early in February. The deceased was born in Kilmelfort, Argyleshire, Scotland, in 1834, and when about ten years of age came to Canada. In 1878 he founded a large lubricating oil business in Toronto, Ont.

Arthur P. Scott, well-known in engineering circles in Montreal, died in that city on Feb. 17, aged 39. Mr. Scott was a graduate of McGill University and for the past year had been connected with the Snider Electric Furnace Co., of Chicago, Ill.

Sir Charles Rivers-Wilson, K.C.M.G., former president of the Grand Trunk Railway, died in London, England on Feb. 9. Sir Charles was born in England in 1831, and entered the British Treasury in 1856, having a distinguished career as a financier. He was president of the G.T.R., from 1895 to 1909, retiring in favor of Charles M. Hays.

Capt. Frank Ross Newman died in London, England, on Oct. 23, as a result of wounds received in action in France. Capt. Newman was born in Montreal in 1879. Prior to going overseas with the 19th Battalion he was manager of the Toronto sales office of the Canadian Fairbanks-Morse Co.

Dr. William Frederick King, chief Astronomer of Canada and Commissioner for the Survey and Marking of International Boundaries, died on April 23, at the Obeservatory Residence, Ottawa, Ont. The late Dr. King was born at Stowmarket, Suffolk, England, 62 years ago, coming to Canada with his parents eight years later.

Sir Hay Frederick Donaldson, who early in June was lost on H.M.S. Hampshire, was technical adviser to David Lloyd George, when Minister of Munitions. He visited Canada in the fall of 1915 on the invitation of D.A. Thomas (Lord Rhondda) to study the possibility of manufacturing heavy ordnance in this country. He was born in 1865.

Richard Grigg, Canadian Commissioner of Commerce, died suddenly at Ottawa on January 6. The deceased was born at Plymouth, England, in 1847, and came over to Canada when quite young. He was appointed Trade Commissioner for Canada in 1909, with headquarters at Montreal, and in 1912 was appointed Commissioner of Commerce.

James Chase Wallace, former president of the American Ship Building Co., died on Oct. 31, at his home in Lakewood, O., after an illness extending over several months. Mr. Wallace was born May 23, 1865, a son of the late Robert Wallace, who was one of Cleveland's pioneer ship builders. He was elected president of the company in 1904 and retired in 1914.

Sir Hiram Maxim, inventor of the automatic system of firearms, died in London, England, on November 24. Sir Hiram Maxim was born in Sangerville, Me., on February 5, 1840. The Maxim automatic gun was invented in 1884 in London, and was immediately adopted by the British Government. Some years later Sir Hiram was knighted by Queen Victoria after having become naturalized as an Englishman. He invented the first smokeless powder. In 1915 he was appointed a member of the Inventions Board created by the British Government to meet the needs of war.

David McNicoll, formerly vice-president and general manager of the C.P.R., died on Sunday, Nov. 26, at Guelph, Ont., after a protracted period of ill-health. Mr. McNicoll retired from the C.P.R. two years ago. Mr. McNicoll was born in Arbroath, Scotland, 66 years ago, and started his railway career as a clerk in the freight traffic manager's office of the North British Railway. In 1874 he came to Canada, and entered the service of the Northern Railway of Canada at Collingwood, and served later on the Toronto, Grey and Bruce before joining the C.P.R. in 1883 as general passenger agent. He became second vice-president and general manager of the road in 1900.

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CANADA'S MINERAL PRODUCTS

AN authority on such matters is quoted as saying that of the traffic provided for all railroads in Canada in the year 1913, the mines were responsible for 38 per cent., as compared with 16 per cent. credited to products of agriculture. Similar ratios govern in other years, and from such figures it is deduced that mining is the basic industry of the Dominion. He goes further by accentuating the part mining plays in providing the first essentials in national defence. From this viewpoint the position of Canada looms to proportions of international significance. The following word picture is drawn:—

"Our coal resources are among the greatest in the world.

"Our asbestos deposits in Quebec supply most of the asbestos of commerce.

"The greatest nickel deposits in the world are located at Sudbury.

"Ontario has the largest body of high-grade talc on the continent at Madoc; the largest body of high-grade feldspar on the continent in the Richardson mine, near Verona; the greatest mica mine on the continent at Sydenham, and the greatest graphite mine at Calabogie, and a recent molybdenite find within thirty miles of Ottawa may soon outstrip all rivals.

"We also have one of the richest silver camps in the world at Cobalt, and the most promising of the younger gold camps on the continent at Porcupine. Our smelters produce more refined cobalt than all other refineries in the world put together.

"With such a magnificent heritage we would be very delinquent in our duty if we did not give the mineral industry the careful attention it deserves."

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OUR FRONT PAGE MOTTO

IN the album presented to the Kitchener Memorial Fund (British), the lines constituting our front page motto appeared as a contribution from Sir David Beatty over his boldly written signature. It has been said—with full knowledge of the many brave deeds already to his credit, that Sir David, now in chief command of our navy afloat, has perhaps excelled himself in personally adopting the quotation. The four lines are a translation of part of a hymn, the writer of which has been in his grave in Poland for nearly 300 years. The third person has been substituted for the first in our quotation—in a word, the scope is nationalized.

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THE SEASONS' GREETINGS

OPPORTUNITY is taken in this, the closing issue of the 1916 volume of CANADIAN MACHINERY and Manufacturing News to extend to our subscribers the dual Greeting of a Christmastide of Good Cheer, and of a New Year throughout whose course there will predominate good health, work in plenty, and reward commensurate with hearty performance of same. As compared with twelve months ago, the outlook is indicative of greater and more widespread industrial activity, particularly with reference to our metal-working plants. We will be called upon, however, to shoulder still heavier war burdens in the coming year—men, money and munitions, and, only through our measuring up to their most exacting requirement, will the fullest realization of the greater business prospect materialize. Peace talk, and panicky stock markets—already in evidence, are incidents that will figure more or less prominently in our New Year experiences as factors militating against fulfillment of the munitions production programme to which we are committed, their effects will, however, be nil. Thank God, we realize for what we are fighting; further, that the Shake-Hands-and-be-Friends feature of the schoolboy scrap—the substance of the meantime peace proposals, is inapplicable to a settlement. We have neither been "Too Proud to Fight," nor are we so morally stupid as to let the issue go by default on any pretext or source of suggestion, however inspired.

The year now closing has been marked by a sustained and increased recognition of the purpose and worth of our journal in the spheres of the machine tool and allied industries in Canada. All of this we appreciate, stimulating as it does to greater effort along lines already undertaken as regards their further development, and in the introduction of new features as mechanical engineering progress makes available and necessary.

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MUNITIONS PRODUCTION URGENCY AND COSTS

THE necessity for further limitations to shell profits was strongly emphasized by Mr. Flavelle, Chairman of the Imperial Munitions Board, in his speech to assembled Canadian munitions makers immediately on his return from England recently. Viewing his pronouncements in the light of a speech made a few weeks ago by the British Minister of Munitions, it is made abundantly clear that not only are more, and still more shells required and at a much accelerated rate of production, but it has been determined that within the Empire sole accomplishment is to be brought about. Canada's embrace of the opportunity, by assuming the responsibility of her share, will, we believe, be both immediate and complete. Evidence of the increased shell output requirement is to be found in the formation of a Man-Power Committee in Britain to devise ways and means whereby the productive ability of her citizens may be more effectively placed and applied, and this, notwithstanding the fact that two and a quarter million workers are already under operative control by her Ministry of Munitions. Still more workers are, however, urgently required. Why?

Quite early in the war, the departmental executive charged with the production and supply of shells for the battle front were far-seeing enough and gifted enough to not only diagnose the then serious nature of the struggle with its added certainty of being long drawn out, but to immediately prescribe for its efficient treatment. Large numbers of existing metal-working plants were at once put under Government control, and the erection of munition factories, numerous and enormous beyond the most advanced human comprehension were undertaken, completed, equipped and made productive in record time. That such action was necessary for a variety of reasons is perhaps more fully appreciated at this stage than two years or more ago, especially in view of developments—military and financial, European and American statesmanship activities, etc.

Quoting from the speech last month of Mr. Montagu, Britain's Minister of Munitions . . . "Sometimes a factory had been put up against time, regardless of cost, yet, in spite of the apparent extravagance from a peace-time standpoint, the profit realized after a few month's operation more than paid the total construction cost, allowing for the difference between making a thing oneself and buying it abroad." The foregoing quotation puts the matter of munitions production cost in a nutshell, so to speak, and defines for us here both the attitude to be adopted and the specialized effort required. The opening days of the New Year will be marked by the taking of a census of Canada's man-power, the latter being none the less vital to our part in the struggle than are the activities of the Man-Power Committee in Great Britain.

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Omission—A line at the bottom right hand corner of page 730—"CONTINUED ON PAGE 293" (Advertising Section), has been inadvertently omitted.

VIEW OF MACHINE SHOP, SHOWING TOOL ROOM ON UPPER GALLERY AT LEFT, DOMINION BRIDGE CO. PLANT.

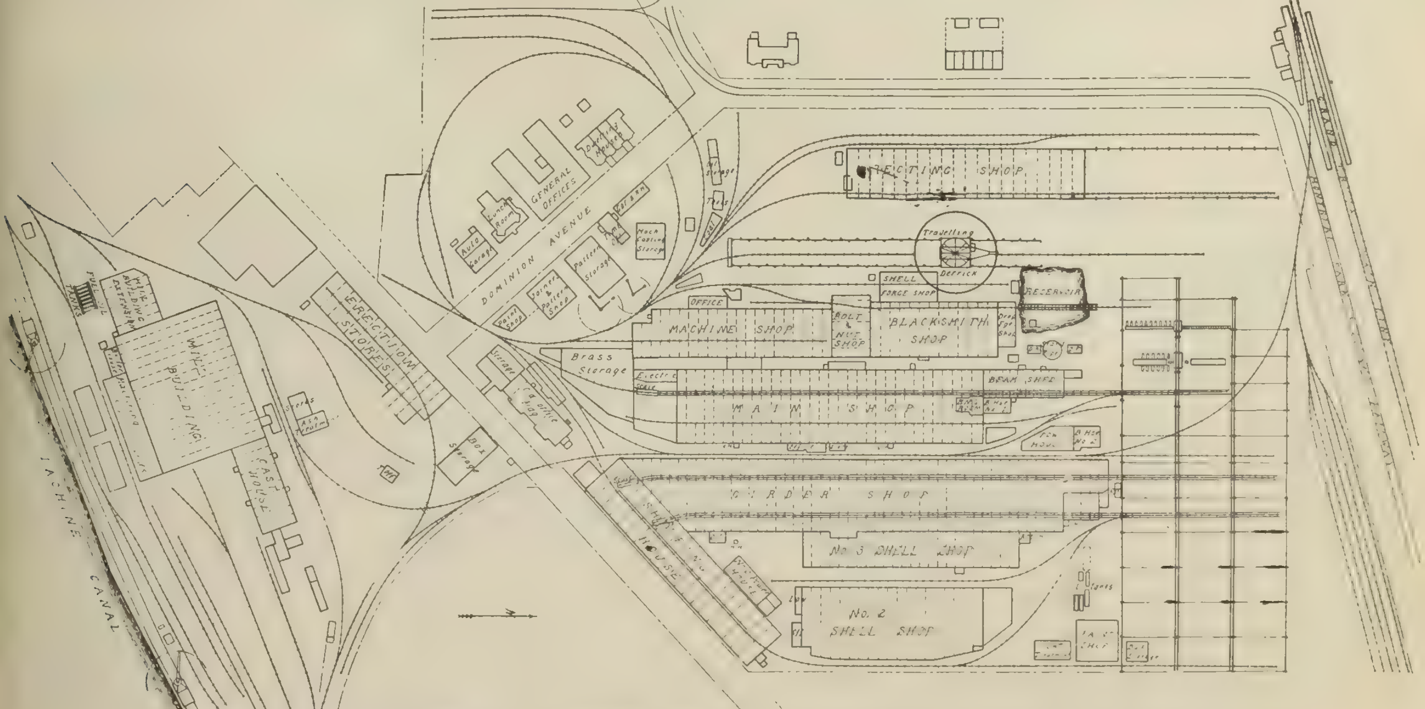
Dominion Bridge Co. Ltd., and Subsidiaries, Lachine, P.Q.

Staff Article

A front-ranker on its own record among Canada's metal-working industries, the Dominion Bridge Co. can lay claim also to have been a generous contributor to our national upbuilding and development. While its creation of two subsidiary concerns—the Montreal Ammunition Co., and the Dominion Copper Products Co., may be said to be primarily a war-opportunity inspiration, it will be evident from what follows that the groundwork of an enlarged sphere of peace-time product manufacture has thereby also been established.

DOMINION BRIDGE CO.

THE Dominion Bridge Company, Limited, of Lachine, Province of Quebec, Canada, had its origin in a small concern located in Toronto and known as the Toronto Bridge Co., which concern was founded in 1879 to cope with a demand for iron and steel work at that time springing up in the Dominion. During its earliest years the company fabricated and erected numerous railway and highway bridges of various types, plate and lattice girders, pin and riveted trusses, trestles and viaducts, as well as several buildings for industrial purposes. In the year 1882 the owners decided to organize and equip for the manufacture of the various larger bridges which at that time were receiving the attention of promoters and engineers. With a capital of $348,100, which was successfully procured, a new property was acquired in the town of Lachine, Que., about seven miles west of Montreal, and in 1883 the Dominion Bridge Company, Limited, was incorporated, the Toronto organization bein


GENERAL OFFICES
Lunch Room
Auto Garage
DOMINION AVENUE
Pattern Storage
Joiners & Pattern Shop
Paint Shop
Mach. Casting Storage
ERECTION STORES
FUEL TANKS
MILL BUILDING
CAST HOUSE
Brass Storage
ERECTING SHOP
Travelling Derrick
SHELL FORGE SHOP
RESERVOIR
OFFICE
MACHINE SHOP
BOLT & NUT SHOP
BLACKSMITH SHOP
BEAM SHED
MAIN SHOP
GIRDER SHOP
SHIPPING HOUSE
No. 3 SHELL SHOP
No. 2 SHELL SHOP
Box Storage
LACHINE CANAL

GROUND PLAN, SHOWING DEPARTMENT LAY OUT OF THE VARIOUS PLANTS AT LACHINE, QUE.

carried as a branch. The Board of Directors of the new company consisted of Job Abbott, Ira Abbott, Angus M. Thom, Lake Lyman, Phelps Johnson, James King, and J. Reid Stewart.

The first shop constructed at Lachine was 512 feet long by 120 feet wide. It was well equipped with the best class of machinery then available, and was accepted as one of the largest and most efficient bridge plants then existing on the continent. Shortly after incorporation, a contract was received for the St. John cantilever bridge, and when this was nearing completion, a further contract was received for the steel work in connection with the Canadian Pacific Railway Bridge over the St. Lawrence River above the Lachine Rapids. Previous to 1890 many important bridges and structural undertakings were successfully erected, a few of which are here referred to:—

GRAND TRUNK RAILWAY BRIDGE ACROSS ST. LAWRENCE AT COTEAU LANDING, 1910.

Early Bridge Output Detail

The C.P.R. Bridge at Sault Ste. Marie, consisting of ten fixed spans of 240 feet long each, and one swing span of 405 feet.

GRAND TRUNK RAILWAY BRIDGE ACROSS RICHELIEU RIVER AT BELOEIL STATION, 1907.

The Fredericton Bridge on the Fredericton and St. Mary's Railway, over the St. John River, consisting of six 239-feet fixed spans, two 161-feet fixed spans, and a 242-feet swing span.

The Coteau Bridge, on the Canada Atlantic Railway, over the St. Lawrence River, aggregating 3,906 feet in length.

The Cape Breton Railway Bridge over the Grand Narrows, C.B., embracing six 239-feet spans, and one 242-feet swing span.

In 1888 the Toronto branch was dismantled, as it was found that the Lachine plant could successfully handle the fabrication of all the work secured. However, in 1897, the capacity of the headquarters plant was not sufficient to take care of the rapidly increasing volume of business created by the remarkable acceleration of the country's development, and further additions to the Lachine plant were therefore built, the year 1897 marking the commencement of a long period of growth and progress. From time to time other extensions have been added, until at the present time the entire plant represents one of the most modern and efficient bridge shops to be found anywhere on this continent, or elsewhere. Before the inception of war activities, the Lachine Works had a total floor space, under cover, of 458,600 square feet, or about 10½ acres, which is 7½ times greater than the original shop of 1883.

Recent Business Development

In more recent years the growth of the company's business, which, in common with the general trend of Canadian development, has been most marked in the Western Provinces, has led to the establishment of branch shops and offices; those at Toronto and Winnipeg being capable of supplying most kinds of structural work and certain classes of bridge work; in fact, the Winnipeg plant as enlarged in 1912-3, is now fitted to handle the heaviest material, with the exception of the most extreme varieties. A smaller branch is also maintained at Ottawa, having a covered area of 20,000 square feet, and capable of producing about 3,000 tons of building steel annually. Including the Lachine plant and the above-mentioned auxiliary plants, the total yearly capacity of the Dominion Bridge Company is approximately 120,000 tons. In addition to the preceding, the company owns over a half interest in the shops of the St. Lawrence Bridge Company, at Rockfield, Quebec, where the steel for the new Quebec Bridge was fabricated, and also that of the lost centre span. The new span is now in course of construction at the Rockfield plant.

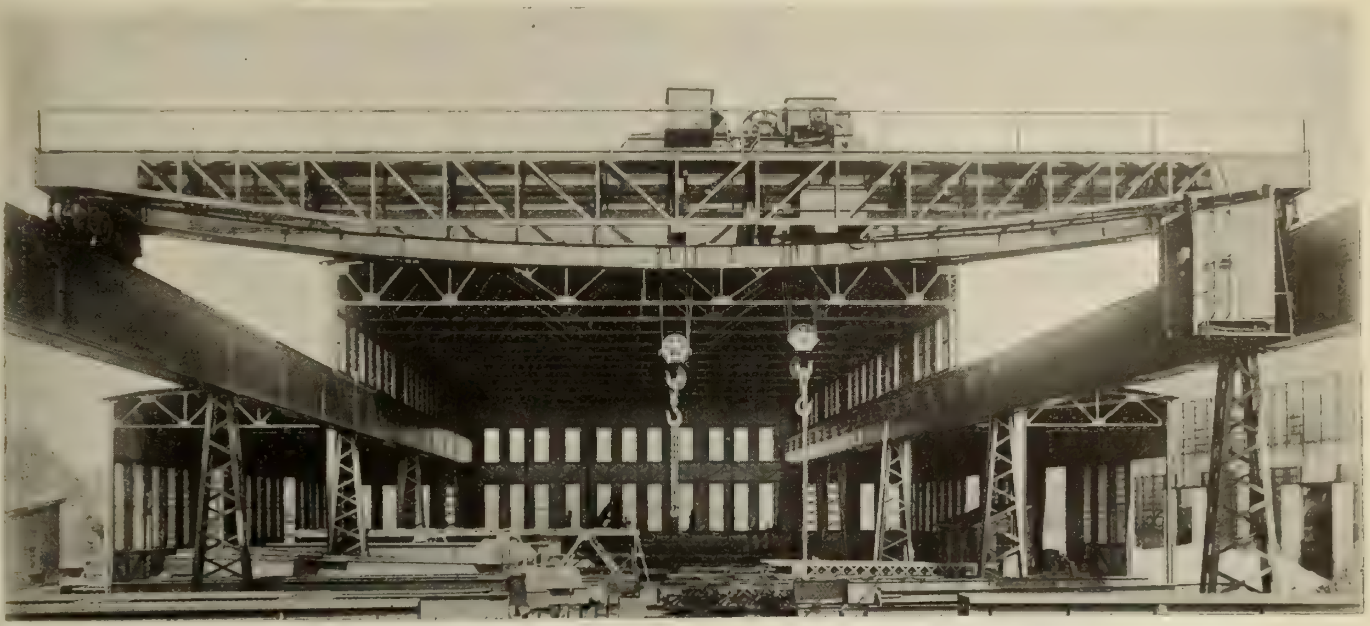
Engineering Staff Personnel

A trained and efficient staff of engineers has always been maintained, there being attached to the technical staff engineers from other countries, both European and American, the general policy always having been to keep abreast of the best practice throughout the world.

The contracts received for many of the most important structures were obtained largely through the designs submitted by the firm's own engineers in open competition with those of other countries.

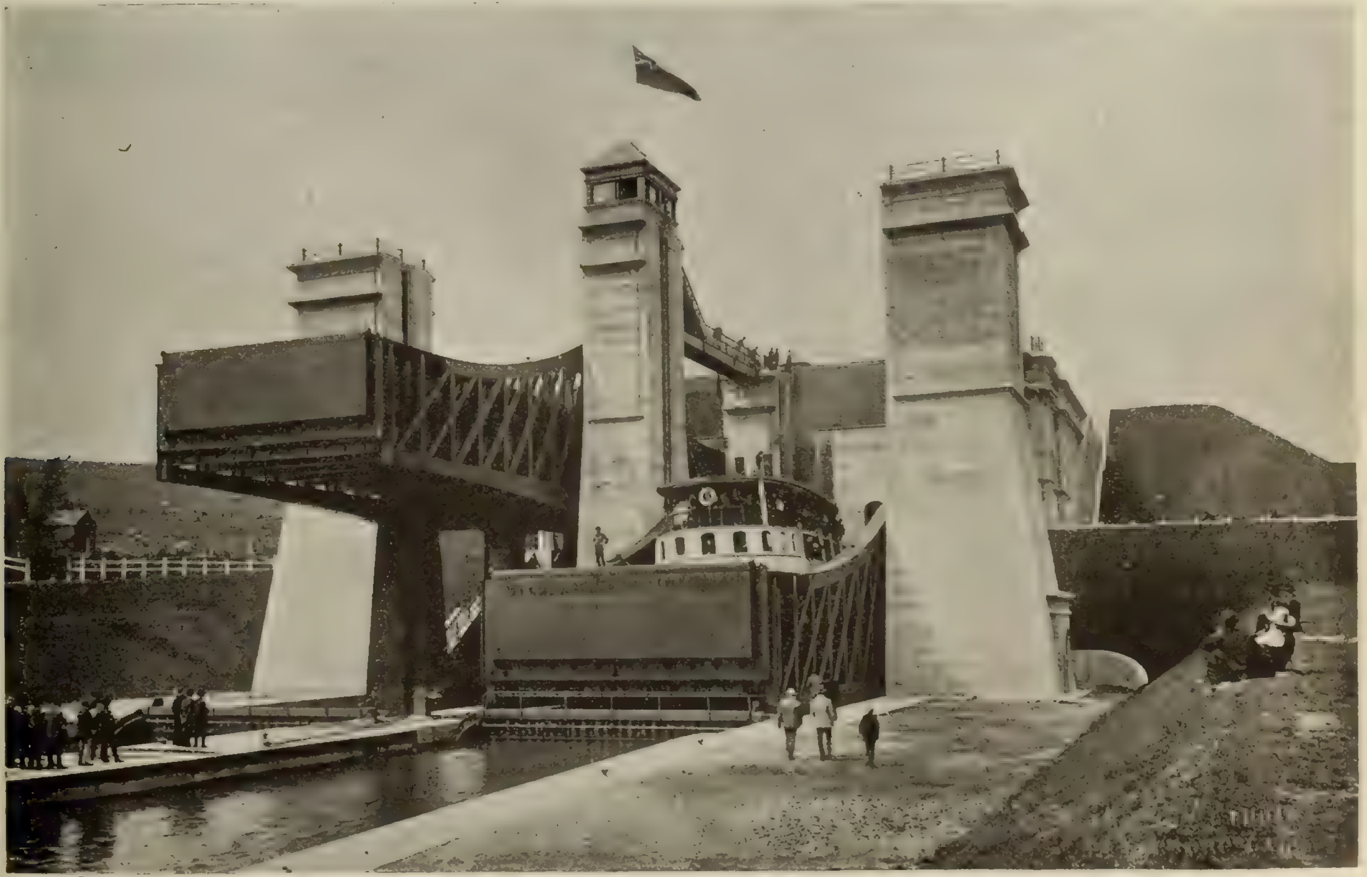
Special mention should be made of the engineering department of the plant at Lachine, which undertakes the design and manufacture of every description of mechanical apparatus. Possessing, as it does, a large and exceptionally well equipped machine shop, work of almost any magnitude can be undertaken. The hydraulic lift locks at Peterborough and Kirkfield, the movable dams at Sault Ste. Marie, the regulating gates at Shawinigan Falls, are among the better known structures of a mechanical engineering nature built and installed.

The flight of time has brought about many changes in the directorate since the company commenced business, included in the removal list being such well-known names as those of R. B. Angus, T. G. Holt, the late James Ross, the late Duncan McIntyre, and the late James P. Dawes.


FIVE-MOTOR ALTERNATING CURRENT ELECTRIC TRAVELLING CRANE, 81 FT. 3½ INS., SPAN WITH TWO 35-TON TROLLEYS.

Munitions Manufacture Feature

In common with the greater number of Canadian metal-working plants, the


END ELEVATION OF HYDRAULIC LIFT LOCK, TRENT CANAL, PETERBOROUGH, ONT.

Dominion Bridge Co. for the past two years has devoted much of its energy and enterprise to the manufacture of munitions, for which purpose many extensions and several new shops have been erected and equipped. One of the most recent developments that evidence the progress made is that of the organization of the Dominion Copper Products Co., a description of which as a going concern being found in another section of this article. The banner year of the Bridge Company was that just completed, the total business aggregating $6,525,000, this being just $25,000 greater than the capitalization of the company. A brief description of a few of the more important departments follows:—

CANADA ATLANTIC RAILWAY BRIDGE ACROSS ST. LAWRENCE AT COTEAU LANDING, 1889.

General Offices and Laboratory

Directly facing the main entrance to the works is the general office building, U shaped of three storey brick construction, with a frontage of 108 feet, and a depth of 125 feet. On the first floor are located the main offices and those of the general executive; on the second floor are the engineering staff, draughting and accounting departments; the upper storey being reserved for the drawing room of the structural and

SIDE ELEVATION OF HYDRAULIC LIFT LOCK, TRENT CANAL, KIRKFIELD, ONT.

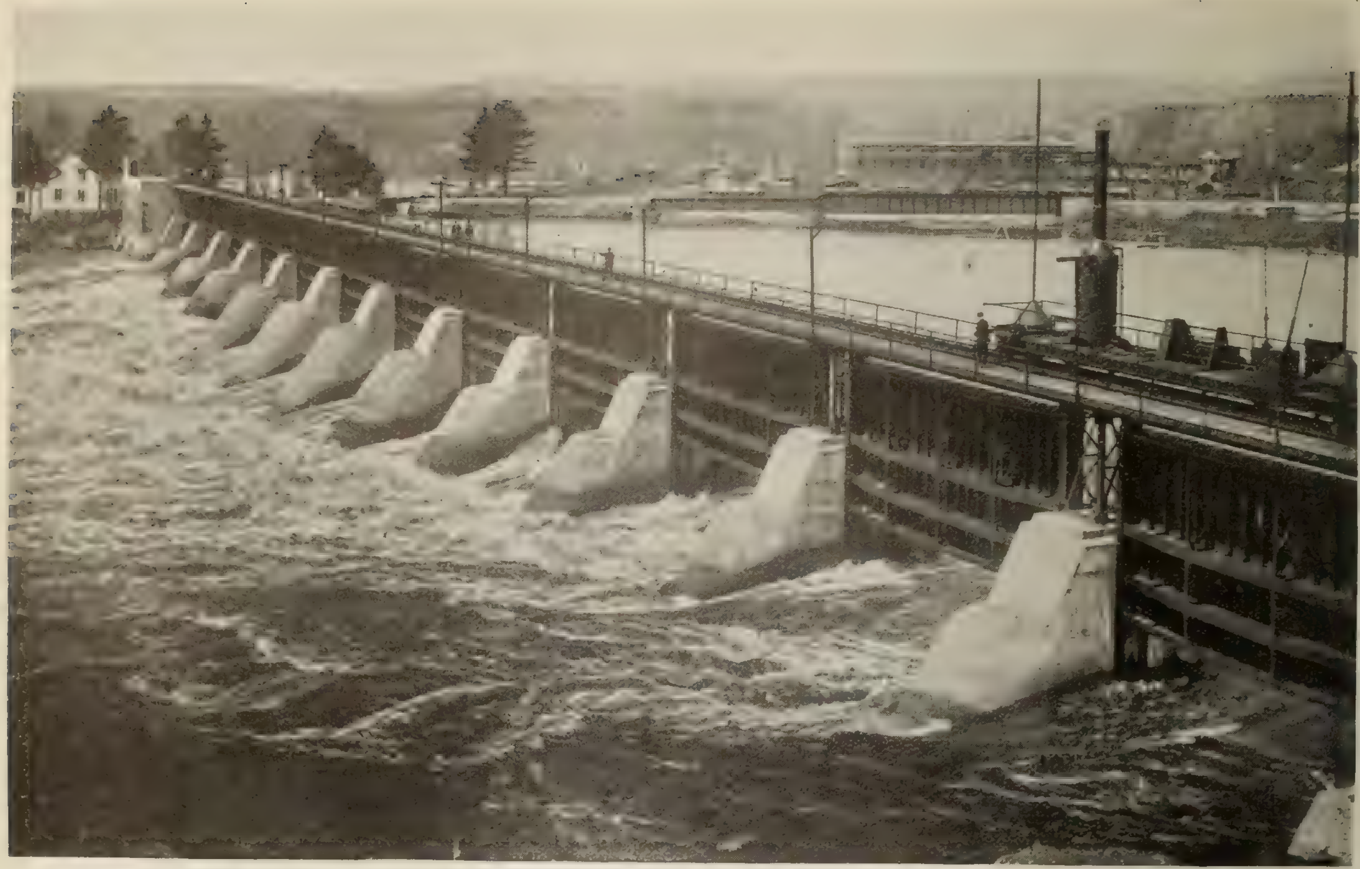
building departments. Since the inception of the manufacture of munitions, it has been found necessary to establish a local metallurgical department for the testing of the various materials entering therein. The laboratory, located in the basement of the main office building, is under the direction of a chief chemist, his deputy and four assistants. The laboratory is equipped with the latest and most efficient apparatus for both the physical and chemical testing of metals. Control analyses are run daily on brass to see that it is kept well within the specified limitations. For this purpose a Braun electrolytic testing apparatus is used, having revolving anodes, and turning out four copper determinations every twenty minutes; a set of four being determined at one time. Efforts are made to maintain a composition of 68.5 per cent. of copper and 31.5 per cent. of zinc, with an unavoidable small proportion of such impurities as iron, arsenic, etc. The copper that comes from the refining furnace is also carefully tested and the analyses run close to 99.95 per cent. copper.

In addition to laboratory work for the Dominion Copper Products Co., this department has charge of the heat treatment of the Russian high explosive and British 18 pdr. shrapnel shells for the Dominion Bridge Co., the annealing of the brass cartridge cases for the Montreal Ammunition Co., also the tool hardening for all departments of the plant. For physical tests, a 100,000 pound Olsen machine (one of the largest in Canada), has been installed. There is also a complete microphotograph equipment for the taking and developing of photos, showing the composition of various metals.

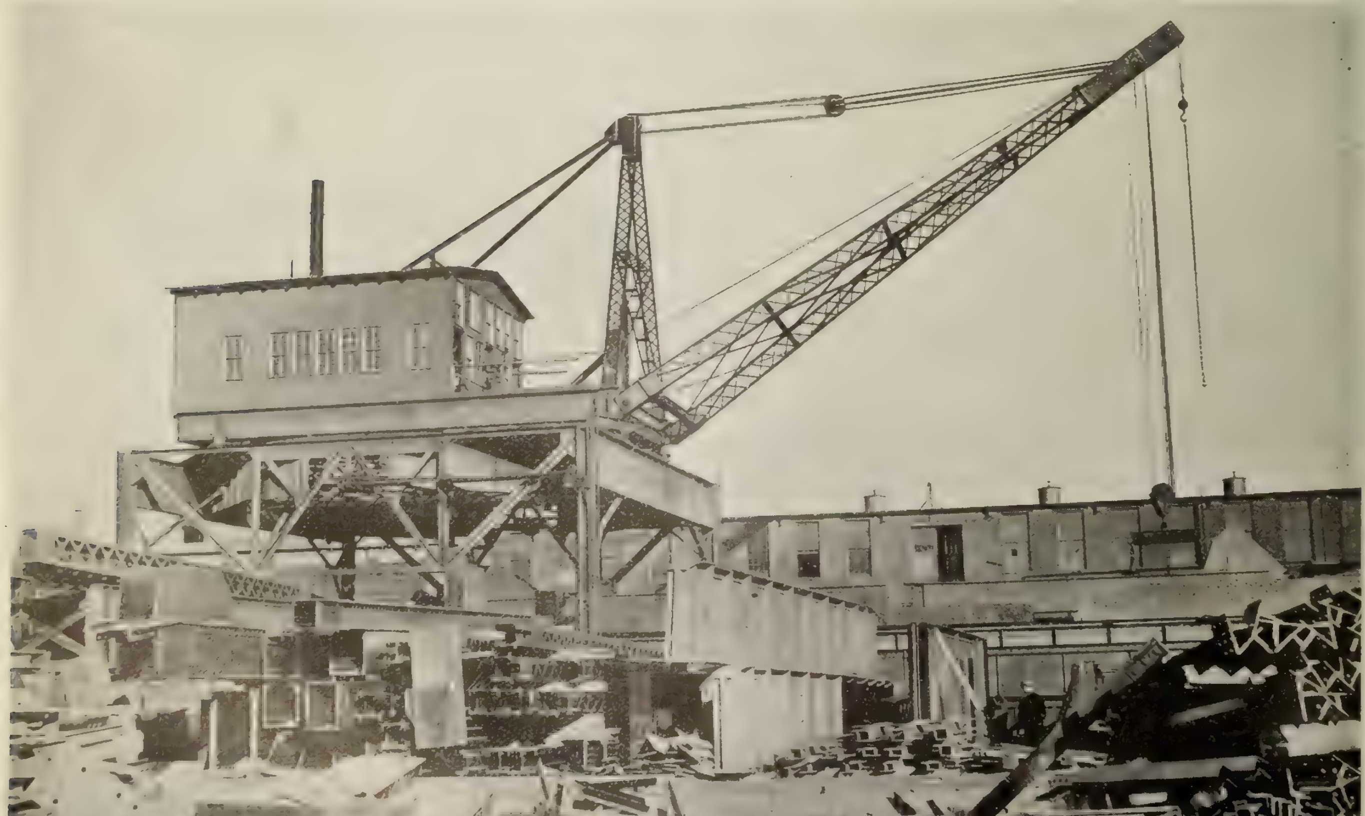
PORT OF MONTREAL FREIGHT SHEDS NOS. 24 AND 25, BUILT IN 1914.

Machine Shop and Tool Room

Owing to the large variety of mechanical equipment being constantly manufactured by this company, it requires quite an extensive machine shop for successful accomplishment. This shop, the first large building from the entrance to the works, is 330 feet long and 80 feet wide, and of fabricated steel and brick construction. The nature of the work covers a wide range of engineering, more especially along the lines of heavy structural equipment for mechanical purposes. In addition to the mechanical devices that form part of all bridge construction, the more important work handled by this department in recent years has been cranes and crane equipment, various types of steel dams, lift locks, etc. Operating throughout the full length of the main shop and above the heavier machine tools is a 50-ton Dominion Bridge Co. crane; numerous jib cranes are also located along the walls. These latter have an approximate range of 180 degrees, and are supported at the outer ends by means of two spreading legs, the wheels on the lower end of which run on a semi-circular rail, having a radius of about 20 feet. In addition to the standard gauge track that passes down the center of the shop, a narrow gauge track is provided for light trucking. It might be here stated



SECTION OF MOVABLE STEEL DAM, SHAWINIGAN WATER AND POWER CO., SHAWINIGAN FALLS, QUE.



SPECIAL TRAVELLING AND REVOLVING DERRICK, 25 TONS CAPACITY AT 60 FT. RADIUS, AND 15 TONS CAPACITY AT 80 FT. RADIUS.

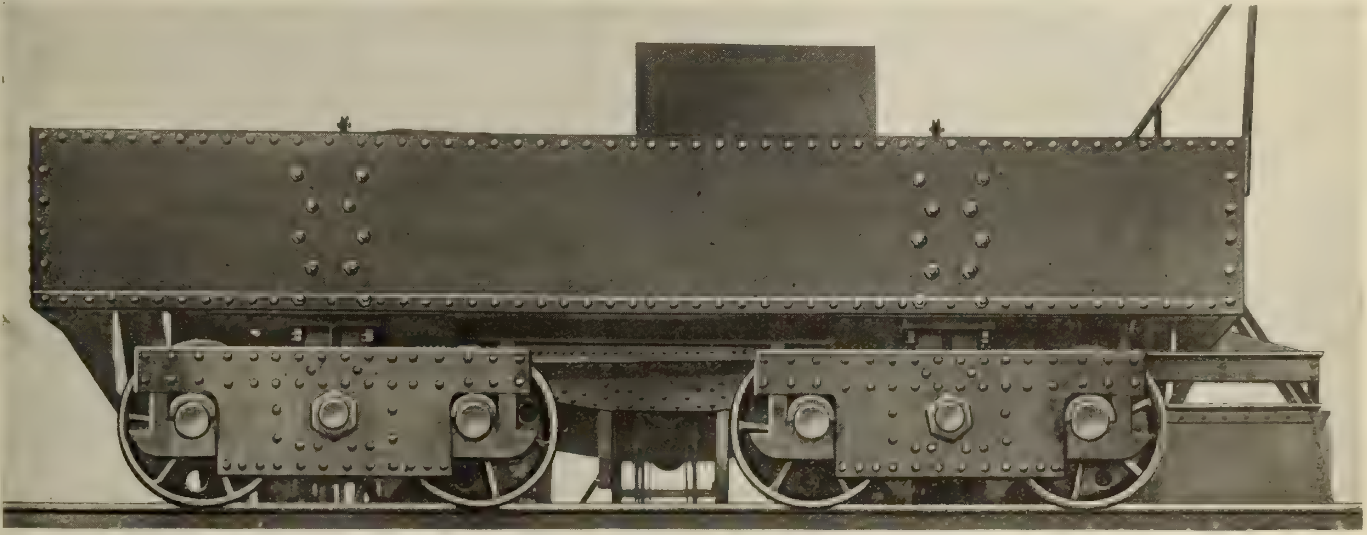
that much of the past year's activity has been due to the building of machinery for shell production and other war contingencies. During the past eighteen months, considerable equipment for the several Associated Companies has been constructed, in addition to that for the requirements of the ordinary lines of domestic business.

Machine Tool Equipment

Among the more important machines on the lower floor are:—

Drills—One Bertram 5 foot radial, belt driven; two Bickford 5 foot radials, motor driven; one 20 inch Foote-Burt, belt driven;

Boring Mills—One 12 foot Bertram; one 6 foot Bullard; one 3 foot Bullard; one 4 foot Baush & Harris; one 4 foot Bertram; all of them vertical and motor driven; one horizontal boring machine, Bertram make, motor driven.



ROLLED STEEL PLATE BRIDGE TRUCKS FOR 70-TON BRIDGE, 81 FT. 3½ INS. SPAN.

Planers—One 5 x 5 x 18 foot Bertram, motor driven; one 3 x 3 x 7 foot Cincinnati, belt driven; one 4 x 4 x 18 foot Bertram, belt driven; one 16 foot open side Cleveland, belt driven; one Bertram open side gang cutting planer, motor driven.

Shapers—One 24 inch Rockford, belt driven; one Gleason bevel gear shaper, motor driven.

Slotters—Three motor driven Bertram slotters, with strokes ranging from 10 to 20 inches.

Lathes—5 C.M.C. engine lathes 14 to 20 inch swing; 3 Bertram, 24 to 28 inch swing; one 18 inch Gardner; one 36 inch Fifield; one 36 inch Bertram; one 5 foot Bertram gap lathe, all of them belt driven; and one 36 inch Bertram engine lathe, motor driven.

One 12 inch Baker key seater, and one Bertram horizontal hydraulic press.

In the upper gallery extending along one side of the entire shop is the small tool section. This has been largely utilized for nearly two years as a special tool room for the maintenance of tools, dies, jigs and fixtures necessary for the economic and rapid machining of the various types of shells. At first glance this section impresses one as being greatly over-crowded owing to the large number of machines in sight, but as very little floor space is required for the "product," the apparently crowded appearance is nothing more than the profitable use of every available inch of space. The principal tools in this department are:—

Milling machines—One Brown & Sharpe; one Cincinnati; one American; two Garvin; three Ford-Smith; and one Rockford.

Lathes.—One 14 inch Hendey; one 14 inch P. E. Reed; one Boye and Emmes; one 14 inch Rockford; one 16 inch C.M.C.; four 14 to 18 inch Mueller; one 14 inch Le Blond; and two 10 inch Mulliner.

Shapers—Three Bertram, one Walcott, and one Buttler, with strokes from 16 to 24 inches.

Planers—One 2 x 2 x 7 foot Bertram, and one 2 x 2 x 7 foot Gardner.

Grinders—One R. E. Wills & Sons; one Wilmarth & Norman; one Brown & Sharpe; and one Iroquois.

There are also three Sipp sensitive drill presses and six Racine power hack saws. In addition to the machine equipment, bench facilities are provided for a large number of die and tool makers.

Nut and Bolt Department

Located between the machine shop and the blacksmith shop is the nut and bolt department in which all the rough bolts made in the adjoining departments are threaded and the nuts tapped. Four Landis Machine Co. double headed bolt threaders and one six spindle nut tapping machine, made by the National Machinery Co. are in continuous operation. Owing however, to the abnormal conditions that prevail throughout the entire plant, the greater activities of this department are at present confined to machining the lighter forgings belonging to shrapnel and high explosive shells. These pieces, which consist of 18 pdr. shrapnel diaphrams and the base plates of the high explosive shells up to 6 inch, are brought to this department from the drop forge presses, and have the fins trimmed off in an E. W. Bliss press. The shrapnel diaphrams are drilled and tapped in fourteen R. McDougall drill presses, being afterwards machined in a number of Automatic Machine Co., special lathes. The machining operations on the different base plates are also performed on the last mentioned lathes. Included in this department are a Bertram combination punch and shear, and a Besly face grinder for removing the ragged edges from the rough forgings.

Blacksmith Shop

North of and adjoining the nut and bolt department is situated the blacksmith shop of steel and brick construction, with a length of 210 feet and a width of 90 feet. The end nearest the bolt shop is devoted to the manufacture of nuts, bolts, and rivets, for which purpose eight to ten bolt machines are installed; each being provided with an oil burning furnace suitable to the size and nature of the work. Two horizontal type hydraulic presses are located about the center of the shop, with furnaces adjoining, for upsetting the ends of long heavy tension rods. The hammer equipment consists of one Pilkington 5 ton pneumatic hammer; one 10 ton Bertram steam hammer; one 10 ton Bertram steam hammer; and one large 25 ton plate frame

CAP ROUGE VIADUCT ON NATIONAL TRANSCONTINENTAL RAILWAY NEAR QUEBEC, 1906.

steam hammer. This last mentioned unit was designed by the staff engineer, F. C. McDonald, and constructed in the plant. In addition to four large jib cranes arranged along the center of the shop and having a range of 360 degrees, there are a number of smaller ones located at desirable positions along both of the side walls; these have a range of about 180 degrees. All cranes are provided with air hoists or chain blocks to facilitate the handling of material. Numerous small forges, anvils, etc., are distributed about this department. Since the initiation of shell manufacture, and establishment of the plant of the Dominion Copper Products Co., the blacksmith shop has been called upon to take a very active part in filling the demands made by the different departments for their various requirements.

Drop Forge Department

To meet the demand for the smaller forgings required in the make-up of different shells, a small steel and corrugated sheet iron addition, 75 feet by 30 feet, has been made to the north end of the old blacksmith shop. The hammer equipment consists of one 2,000 pound E. W. Bliss unit; two 1000 pound Billings & Spencer; one 1200 pound E. W. Bliss; two 600 pound Billings & Spencer; one 500 pound Billings & Spencer; and three 600 pound Chambersburg; all being of the board lift type, and located in two rows down the center of the shop. An oil fired furnace is provided for each. For the removal of ragged edges, a heavy Ford-Smith grinder has been installed. The present daily output of this department is approximately, 10,000 shrapnel discs, and 8,000 each of 18 pdr., 4.5 in., 60 pdr. and 6 inch H. E. shell base-plates per day.

Shell Forging Department

During the summer of the past year a shell forging shop has been added to the other activities of the plant, and for the past few months has been in operation on the production of 6 inch high explosive shells; further developments are under consideration. The present equipment consists of one continuous coal fired billet heating furnace about 30 feet long; two oil fired Ferguson continuous billet heating furnaces, and two smaller oil burning Mechanical Engineering Co. furnaces. The presses installed consist of two-700 ton Southwark vertical hydraulic shell forging presses, and two-200 ton horizontal presses of same make. The billets are received from cars at the charging end of the furnace and elevated to a platform by means of a low lift hoist. The billets are then taken and placed on an inclined runway and allowed to roll down into the fire chamber, where they are heated to the desired temperature of about 2150 degrees F. They are removed from the furnace through a door on the side, across which a number of hanging chains are placed to protect the workmen from the heat. The hot billet is supported in long tongs which are carried on overhead rails to the front of the press. The large 700 ton presses were designed to operate on four shells at a time, but for various reasons are at present only working on half this quantity. A quadruple revolving punch holder is secured to the movable ram of the press, and two dies set diametrically opposite are located in position on the base of the press. Two centering and two piercing punches are used. When two heated billets have been placed in the dies, the turret is locked in position with the centering punches in line with the dies; the first movement of the ram making an impression about 3 inches deep and of the shape of the nose of the punch. The turret is then revolved through an angle of 90 degrees, locked in position, and the piercing completed on the two shells at the second downward stroke of the press. The capacity of each press under good working conditions is approximately one shell per minute. The shells as they come from this extrusion operation have a slight taper in the bore, and about one-half inch on the outer diameter in the length of the shell. To bring the forging to the desired diameter with parallel walls, the shells are forced through a pair of reducing dies in a 200-ton Southwark horizontal press, which is provided with a swing stripper to remove the shell from the punch as the ram returns to its former position. Under ordinary conditions, these two operations (piercing and redrawing) can be performed at one heat, but to guard against unforeseen difficulties with consequent delay, it is deemed advisable to re-heat the billet so as to avoid unnecessary stress upon the punches and dies. However, owing to the loss through oxidation, better results are obtained when the drawing process is completed at one heat. From this method of production it is obvious that the output will be the same on both presses. The coal fired furnace takes care of one large press, while the other 700 ton press is supplied from the two smaller oil burning furnaces. The average production of 6 inch forgings at the present time is over 1,000 per day. As the accumulator is located in another building, a graduated wooden board is placed on the wall back of the press to indicate the accumulator position and the volume of water available.

Wood Working Shop and Pattern Storage

On the right of the main entrance to the works, is a three storey building, 65 feet by 85 feet, used for pattern storage, and constructed of steel and corrugated sheet iron. All patterns are easily accessible being arranged in serial order. A large Otis Fensom freight elevator is installed for the convenient handling of the heavier patterns. Fire precautions are amply provided for by a complete sprinkler system installation, innumerable fire buckets and several Garth fire extinguishers. Connecting the second storey with the upper floor of the adjacent pattern shop and joinery department is a closed-in bridge gallery, which offers a convenient means of communication between the two buildings. The pattern shop is a two storey brick building 60 x 60 feet, well lighted and steam heated and embodying a complete line of equipment necessary for highly efficient production. Some of the more important machines include:—

One C.M.C. planing machine.

One MacGregor, Gourlay, planing machine.

One MacGregor, Gourlay rip saw.

One J. A. Fay rip saw.

Two MacGregor, Gourlay band saws.

One C.M.C. band saw.

One MacGregor, Gourlay moulding machine.

One Oliver trimmer.

One Oliver wood turning lathe.

One C.H. Besly sand papering machine.

Machine Casting Storage

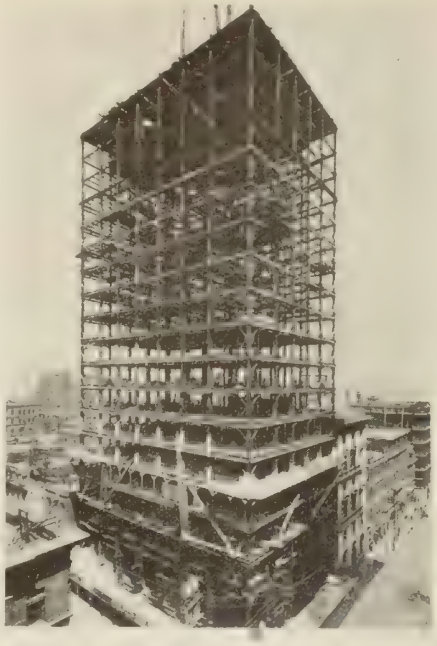
To the rear of the main time office.

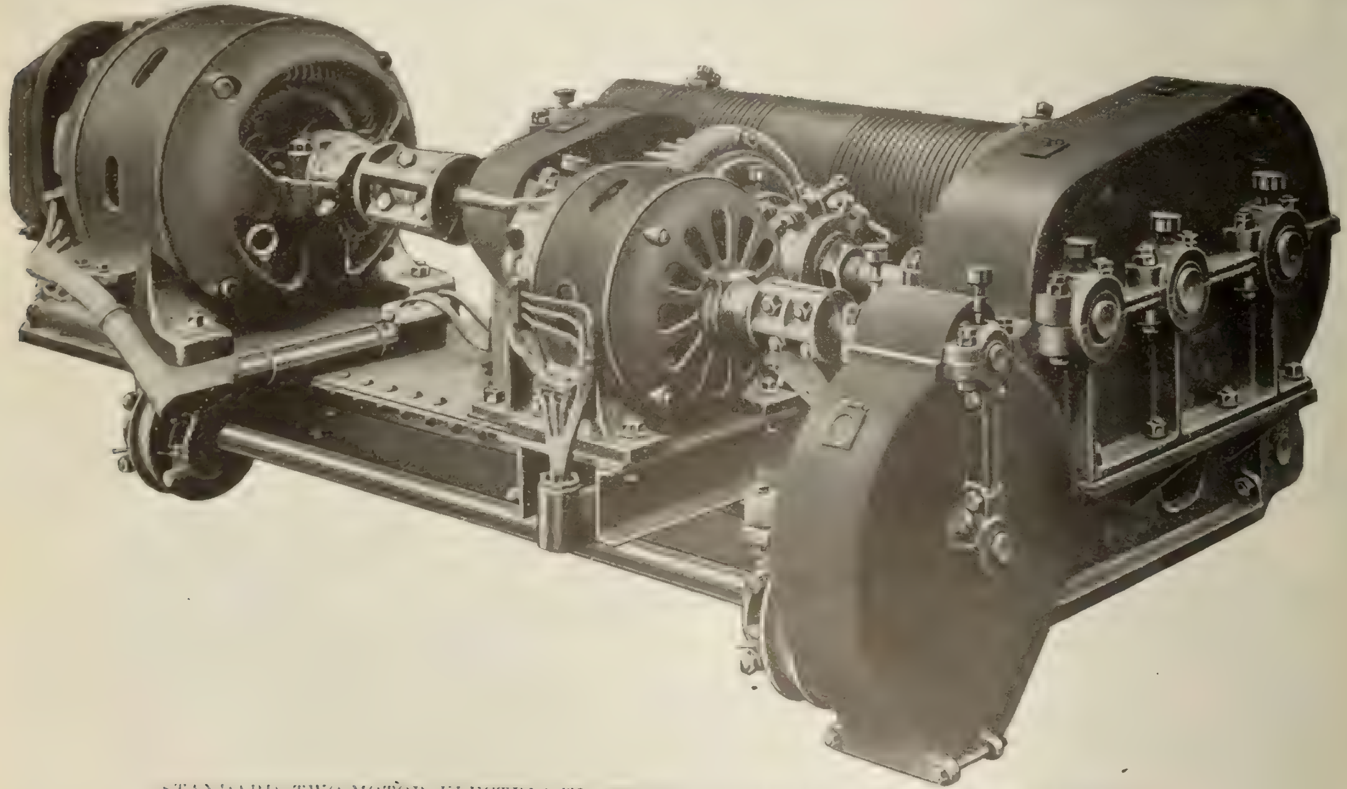
HIGHWAY ARCH BRIDGE OVER GORGE OF ST. JOHN RIVER, NEW BRUNSWICK.

and just left of the works entrance, is the machine casting storage, a corrugated sheet iron building 60 x 48 feet. Here a complete stock of finished castings for the various machines and power equipment is always maintained, to avoid unnecessary delay in the operation of any one, or group of units in a department. The smaller parts are systematically arranged in labeled bins along the walls and down the center of the room, while the more bulky pieces are kept in order upon the floor. A 2 ton chain block and monorail are provided for facilitating the handling of the heavier castings.

Girder Shop

About the only department that has retained its identity—not having been materially effected by war conditions is the girder shop, where the various bridge and structural steel members are prepared and assembled. Next to the work of the designing and structural engineers who plot and prepare the plans and specifications, the successful completion of a particular engineering undertaking depends largely upon the accuracy and care exercised and displayed in this department. It has therefore been the aim of the management to provide every facility for the rapid fulfilment of structural contracts, coincident with a high standard of strength and workmanship. This shop which runs parallel to the other main buildings, is of steel, brick and sheet iron construction, 720 feet long, with a width of 120 feet. The roof trusses are so designed that the lower or horizontal member of each one acts as a runway for small travelling air hoists; two of which are often used on the one truss. Along each side of the shop, six radial jib crane drilling machines are provided for drilling holes in the varous members preparatory to the riveting process. These machines can be moved along the entire length of the shop, thus increasing their effectiveness, as it is often easier to bring the machine to the work than the work to the machine. Along the center of the shop, for a distance of nearly 200 feet, is a runway that carries three travelling jib cranes, supporting heavy pneumatic riveters for operating on large fabricated material. For the lighter work, numerous smaller air operated riveters are provided; small oil burning rivet heating furnaces are located in each bay of this section. In addition to two standard railway tracks running through the shop, two narrow gauge tracks of different widths are used for the local trucking of material. Owing to the nature of the work, and the necessity of often requiring to move large members to definite positions for machining purposes, and at the same time retain their horizontal position, special roller stands are provided. Among the machines in this department are the following:—


TWENTY STOREY ROYAL BANK BUILDING, TORONTO, 1914.


STANDARD TWO-MOTOR ELECTRIC TRAVELING CRANE TROLLEY OF 10 TONS CAPACITY.

Girder Shop Equipment

Two large Bertram rotary planers for facing off the ends of I beams and girders; these are driven by 30 h.p. Crocker-Wheeler, and Westinghouse motors.

A heavy I beam shear is mounted on a rotary table to aid in locating for exact position.

A row of nine heavy 6 feet radial drills, made by Wm. Asquith of Halifax, Eng., are installed for the heavier and more accurate drilling of important holes.

For plate work, three Bertram combination punches and shears operated by 15 h.p. motors are provided.

One Cleveland and one Bertram motor driven angle iron and I beam punch.

One Newton cold saw, driven by an 8 h.p. General Electric motor, is used for general variety work.

LITTLE SALMON RIVER VIADUCT ON NATIONAL TRANSCONTINENTAL RAILWAY. 185 MILES NORTH OF MONCTON, N.B.

For facing the edges of long plates or beams, a 30 foot motor driven Bertram plate planer is installed.

One Hilles & Jones double angle shear, driven by a 15 h.p. Westinghouse motor.

One 6 foot Bertram gap shear, driven by 15 h.p. Westinghouse motor.

One Cleveland gang punch 8 feet wide, driven by 20 h.p. Crocker-Wheeler motor; this unit is provided with a roller table on the feeding and discharging sides, the feeding side being supplied with motor driven control for advancing the work to the desired position.

One Cleveland deep-throat heavy plate punch, driven by 10 h.p. Crocker-Wheeler motor.

A Bertram gang punch operated by a 20 h.p. Westinghouse motor is provided with a special semi-automatic feeding attachment made by the Standard Bridge Tool Co. of Pittsburg.

Together with the above standard tools, an interesting machine is that constructed by the Dominion Bridge Co. for the shearing of large I beams. This unit is made largely of heavy steel plates and has an intermittent motion when cutting through a beam. It might be added that considerable auxiliary equipment of an essential nature is also provided, the non-mention of same here making them none the less important. A complete system of forced hot air heating is installed throughout this and the main building.

Erection Shed

Along the western side of the property is the erection shed of iron and sheet iron construction, 400 feet long by 82 feet wide, with a crane runway throughout its entire length and extending into the stock yard for a distance of 300 feet. At one end of this building is a large Bertram 6-foot rotary planer, driven by a 24 horse-power Crocker-Wheeler motor. This unit is used for facing off the ends of large girders and fabricated members. Two 35-ton Dominion Bridge Co. cranes are in service in this department, while several traveling jib crane drilling machines are located along the walls. A section of this shop is at present used for cutting $6\frac{1}{2}$-inch diameter steel bars into billet lengths for 6-inch shells. Several Hall cutting-off machines are used to cut a groove about $\frac{1}{2}$ inch deep around the stock, the bar being afterwards broken into lengths by means of a heavy short-stroke bulldozer. A large Newton cold saw is also employed on this operation.

Power Plant Equipment

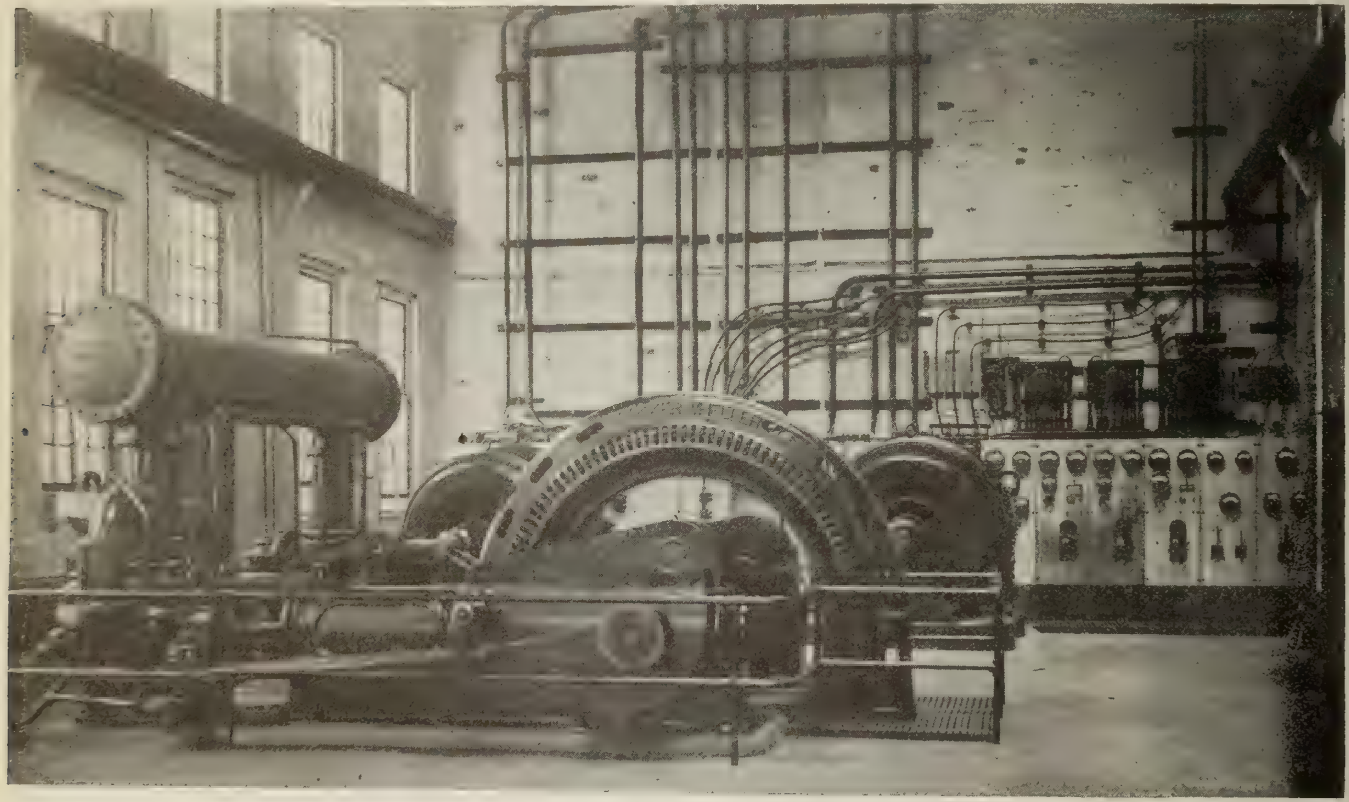
Owing to the greater volume of power being obtained from outside sources, the power equipment is confined to the transforming of power from a main line of 10,000 volts to a plant voltage of 2,200 volts for the operation of the motor-generator sets and also the air compressor. Current is also transformed to 220 volts for the operation of departmental motors. Two Crocker-Wheeler motor-generator sets are installed to generate A. C. current for use in several departments. Direct current is used to operate the 375 horse-power Crocker-Wheeler motor that drives the large Canadian Ingersoll-Rand air compressor. This unit has a capacity of 2,000 cubic feet of free air per minute, compressed to a pressure of 100 lbs. per square inch and which is maintained in several receivers located in different parts of the plant. A small low pressure air compressor is provided as an auxiliary to maintain the required volume of air when the plant is working at full capacity. A fully equipped 14-panel switchboard is located at the end of the engine room. In addition to the main power house, a large boiler room containing five 100 horse-power boilers is used for heating purposes; the main shops being heated by forced hot air from a Sturtevant fan, while the other smaller shops are heated with live steam.

Ordnance Departments

In common with nearly all large metal working establishments, the outstanding feature of present activities is the manufacture of munitions of war for the Allied Governments. When it was definitely decided that shells were to be made in Canada, the Dominion Bridge Co. was one of the first to fall into line, and from a small beginning

DROP FORGING DEPARTMENT DOMINION BRIDGE CO.

in November 1914, when the initial order for ten thousand 18 pdr. British shrapnel was received, the capacity of the plant has not only steadily developed, but has been among the foremost to set the pace for further achievement. The machine tool equipment has gradually been increased and new departments added, so that in many respects, the entire plant has, with few exceptions, practically lost its pre-war identity. A noteworthy feature in connection with the plant was the erection of No. 2 shell shop, 305 feet long by 120 feet wide, constructed of timber and sheet iron, with steel I beams.



POWER HOUSE WITH AIR COMPRESSOR IN LEFT FOREGROUND, DOMINION BRIDGE CO. PLANT.

This building was completed in about six weeks, the first machines being installed and running in less than three weeks after the turning of the first sod. The shop was used first for the manufacture of 18 pdr. high explosive shells, and reached a maximum production of 4,500 shells per day. It may be noted here, that the company have constructed a large number of the lathes that are working on the various size shells. Some conception of the plant activities may be had from the knowledge that upwards of 275 engine lathes; 60 turret lathes; 30 cutting off machines and 70 drills are in constant operation during 10 to 23 hours every day, with the exception of Sundays. As the manufacture of the smaller shells has been well covered in previous issues of this journal, a detail description will not be given, the methods now employed varying but little from those already published. A brief summary covering various shell products being manufactured, with their sequence of operations will therefore be all that is here necessary:—

Russian 75 mm. H.E. Shell Production

The shells are received at the plant in the form of rough forgings, the latter having been made in an outside forging plant. The first machining operation is to face off the base, so that the thickness of metal is 11-16 inch; the open end is then cut off to an overall length of 10 11-16 inches. When facing off the base, a portion is left in the middle, in which the hole for the lathe center is made. The shell is then placed in the lathe and rough turned to a diameter 3.035 inches, the allowance above and below this size being .005 inch. The base is again faced off, removing about 1-16 inch of metal. Following this operation, the shell is placed in a collet chuck, the bore being roughed out to a diameter of 2.16 inches; the recess cut in .526 inch from the open end; the open end faced off to an outside length of 10.531 inches; and the nose chamfered and counterbored to a diameter of 2.35 inches. After the old center has been cut off, the shells are heat-treated. Five oil-fired furnaces are provided to heat the shells to a temperature of about 1,400 degress F., after which they are quenched in oil, which is kept cool by the circulation of cold water on the outside of the tank.

After hardening, the shells are drawn back by placing them in a furnace heated to a temperature of about 800 degrees F. They are again placed in a chuck to have the bore finished to a diameter of 2.19 inches, and the counterbore to 2.375 inches. They are again centered in the base, after which the thread R.H. Whitworth, 12 threads per inch is milled in the nose. After hand sizing the nose, the shells are washed and cleaned and the nose bushing (previously machined), screwed in. The outside is now finished, the diameter at the base—for a distance of 1.625 inches being 2.95 inches; the main portion is .010 inch larger, while the section back of the profile is 2.985 inch. The base is again faced. The next operation is grooving, undercutting and knurling for the copper band, following which the base is faced off to thickness of ½ inch, and the corner rounded. Such operations as marking, sand blasting, polishing, etc. precede the pressing-on of the copper bands and the turning of same. After the final inspection, the shells are lacquered inside and out, nose plug finished, then crated and shipped.

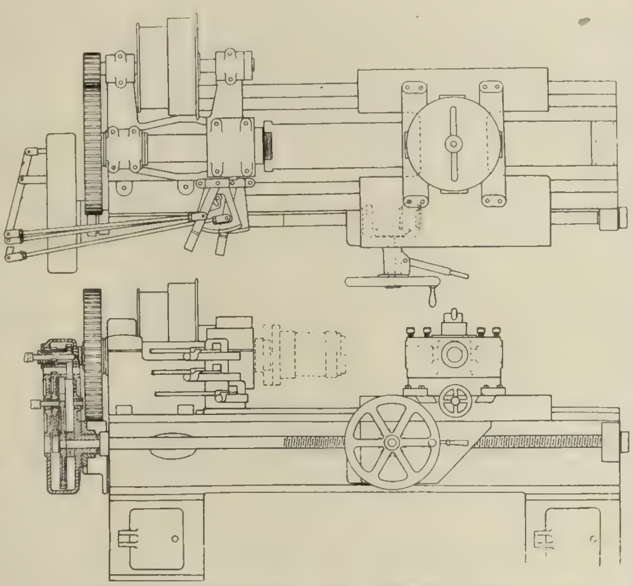
Operations on 60 pdr. Shell

The sequence of operations on the British 60 pdr., Mark V shell are as follows: Facing off base, and leaving tit for center. Cutting off the open end to an inside length of 15½ inches.

Face off and recenter base. Rough turn to a diameter of 5.045 inches, and rough off nose. Finish inside bore to a diameter of 3.365 inches, with a high and low limit of .005 inch. The shells are then placed in an oil-fired furnace, and the nose heated for a distance of about four inches and the open end closed in, the overall length at this stage being 17⅛ inches. The next operation is to bore and face the nose to 1 13-16 inches diameter and an outside length of 17 inches, turn chamfer in nose, and finish inside profile. The thread in the nose is next milled to 2 inches in diameter, 14 threads per inch, R.H. Following this the outside diameter is finished to 4.960 inches, with an allowable variation of .004 inch either way; profile is also finished to a radius of 11.16 inches, back 5.19 inches from open end. The shell weight at this stage should be 51 lbs. 11 oz., with 2 oz. variation. Waving and grooving is the next operation. The base is then recessed to a diameter of 3.375 inches, leaving .575 inch thickness of metal. The hole for the fixing screw is now drilled and tapped. After such operations as hand sizing of nose, sand blasting, preliminary inspection, etc., the next machining operation is to insert and rivet in the base plate, and saw off the driving square, following which the base is faced off and the corner rounded. After inspection and sundry operations, the copper rifling bands are pressed on and turned. The shells are then marked, varnished, etc., and finally crated in readiness for shipping. Practically the same process is followed on the 4.5 inch and also on the 6 inch high explosive shells.

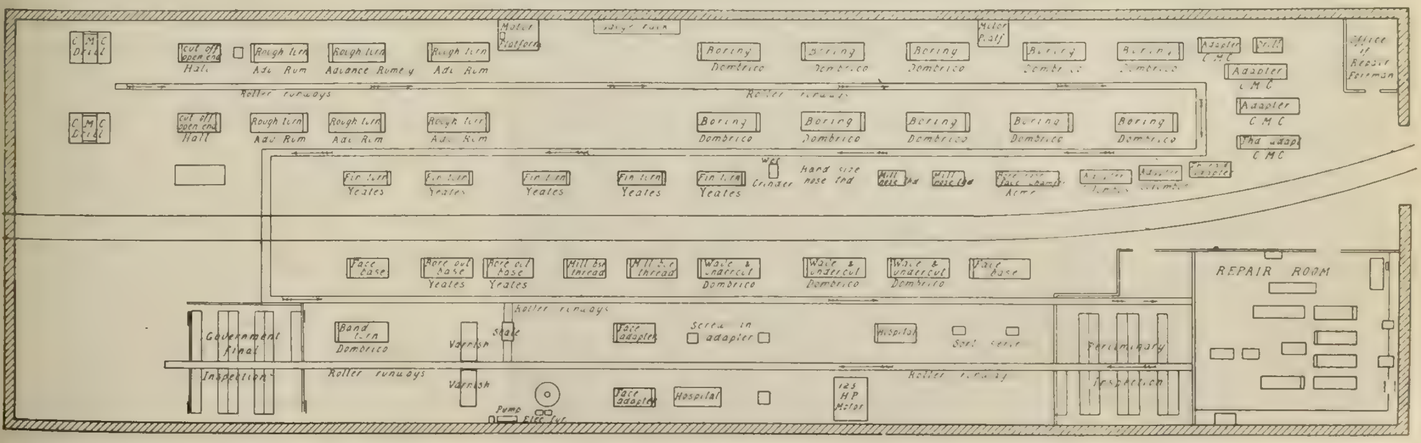
Operations on 8 Inch H. E. Shells

The machining of the larger shells, 8 inch, varies somewhat from that on the smaller sizes. The interior of the shell nose is first rough drilled to insure accurate work on the subsequent operations. The hole in the nose is next rough-drilled to a diameter of 1 1-16 inches, and the end faced, leaving a depth of metal of about 2.125 inches. This operation is accomplished on two C.M.C. 5 foot radial drills. Several Hall cutting off machines are used to cut off the open end, the overall length being 23.35 inches. The outside diameter is then roughed off to 8.07 inches and the profile roughed; this operation being done on a number of Advance-Rumley heavy duty lathes. The succeeding operation, that of boring, is performed on several Dombrico lathes; the finished diameter being 5.258 inches, with a high and low tolerance of .0075 inch. The nose is now bored, faced and tapped, the process and dimensions being similar to that on the smaller shells. Five Yeates lathes operate on the finish turn and profile, the outside diameter being 7.958 inches, with high and low limit not exceeding .0075 inch. The next operation is boring out the base and cutting to length, the diameter for the thread being 5.278 inches, counter bore 6 inches with a tolerance of .003 inch either way; the overall length being 23.02 inches. Two Lees-Bradner machines are used to mill the threads in the base, these being eight per inch and left hand. For grooving, waving and undercutting, three Dombrico lathes, fitted with special attachment, are used. After preliminary inspection, cleaning, etc., the adapters are applied and faced off on the base, and the corner rounded. Following hand sizing of nose and weighing, the copper bands are heated to a dull red in an electric furnace and pressed on in a West banding machine; the shells being afterwards placed in a Dombrico lathe for finishing of the bands. After varnishing the inside, and sorting series, the shells are given a final inspection, following which they are greased and crated. The approximate production on the 8 inch shells is about 240 per day. Following is a tabulated statement of the production of the various size and type shells, cases, discs, and rough copper up to and including November 20, 1916:—



PLAN AND ELEVATION OF "DOMBRICO" LATHE, DOMINION BRIDGE CO. PLANT.

Shells.	
15 pdr. Shrapnel, British	26.227
18 pdr. Shrapnel, British	721,900
18 pdr. High Explosive, British	527,207
4.5 in. High Explosive, British	418,912
60 pdr. High Explosive, British	60.514
6 in. High Explosive, British	35,198
8 in. High Explosive, British	720
75 mm. High Explosive, Russian	87,550
Brass Cartridge Cases.	
18 pdr. British	3,887,053
4.5 in. British	3,609,266
75 mm. Russian	300,200
Copper Driving Bands.	
18 pdr. Shrapnel and High Explosive, British	461,961
4.5 in. High Explosive, British	525,095
6 in. High Explosive (two types), British	236,787
8 in. High Explosive (two types), British	24,810
9.2 in. High Explosive (two types), British	33,559
Brass Discs for Cartridge Cases.	
Discs for 18 pdr. and 4.5 in. British cases	1,808,669



EQUIPMENT LAYOUT OF 8 IN. SHELL SHOP, DOMINION BRIDGE CO. PLANT.

Base Plates and Disc Drop Forgings.

18 pdr. High Explosive Base Plates, British	657,000
4.5 in. and 60 pdr High Explosive Base Plates, British	653,839
6 in. High Explosive Base Plates, British	105,000
18 pdr. Shrapnel Discs	50,000
6 in. Forgings	8,286
Cut-off and ship 4.5 in. blanks	110,300
Cut off and ship 6 in. blanks	22,900

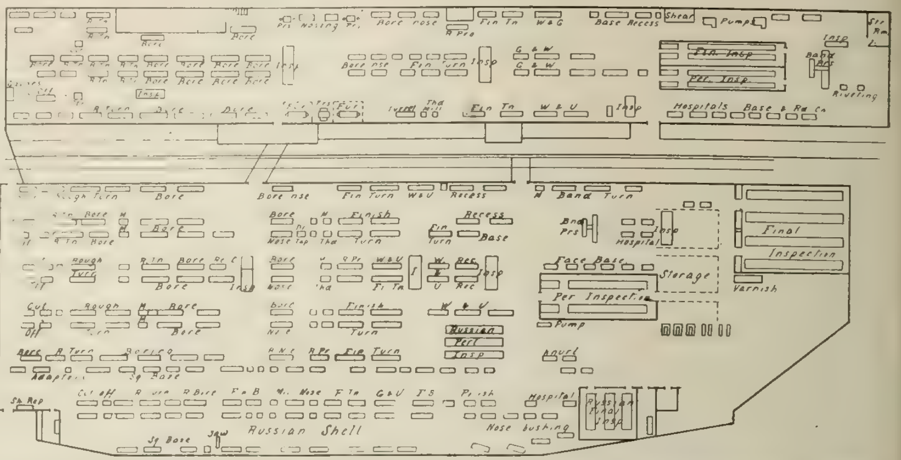
In addition to the large volume of business handled by rail and water, considerable local trucking is done between the plant and the City of Montreal, which is about 7½ miles away. There being no foundry in connection with the plant at Lachine, castings are obtained from outside firms, and for this purpose four 5-ton trucks are maintained in constant service. A one-storey fireproof brick garage, 50 feet by 48 feet, with accommodation for eight or ten cars (including trucks), is located close to the main office and works entrance.

MONTREAL AMMUNITION

During the year 1915 the Montreal Ammunition Co., which is a subsidiary of the Dominion Bridge Co., was organized for the purpose of manufacturing brass cartridge cases for 18 pdr. and 4.5-inch high explosive shells. The greater portion of what was formerly the main shop of the Dominion Bridge Co. is now utilized for this purpose. Since the inauguration of this undertaking, the facilities for production have gradually been increased; improved methods have been adopted; new equipment has been installed; workmen have become more expert in the operation of machines, until the efficiency of the plant may be said to have almost reached its maximum. The present output of the plant is approximately twenty thousand 18 pdr. and 4.5-inch cases a day. A brief description of the process followed in the production of the 18 pdr. cases follows:—

Cartridge Case Production

The brass discs for the cases are supplied by the Dominion Copper Products Co., their manufacture being described in another section of this article. The first operation after the discs are received is that of cupping, which is performed on several Ferracute presses. Under ordinary conditions, the press operates continuously, a cup being formed at each stroke of the press, the product passing completely through the die. A copious supply of lubricant is automatically distributed to the punch and die by the vertical action of the ram. The drawn cup has an inside diameter of 3.99 inches and an outside diameter of 4.544 inches, with a depth of 2¼ inches. In order that satisfactory results may be obtained on all subsequent operations, it is essential that the semi-finished cases should be thoroughly annealed between each drawing operation to restore the ductility of the metal. Four Quigley, and one Rockwell continuous, oil fired furnaces are used for this purpose. The capacity of each furnace is six loaded trays, the trays, about 5 ft. square, being pushed into the furnace by means of a long ram operated by compressed air. At intervals of six minutes, the doors at either end, which are controlled simultaneously, are opened, and, as the ram moves forward, the trays are all advanced; the one at the discharging end having attained a temperature of 1,220 degrees F., passing onto a specially constructed roller platform, which is immediately lowered into the cooling bath. Following the cooling of the cases, they are placed in wooden crates and pickled in a weak solution of sulphuric acid. They are afterwards dipped in a caustic soda bath and then washed in warm water to remove all trace of acid.


EQUIPMENT LAYOUT NOS. 2 AND 3 SHELL SHOPS. DOMINION BRIDGE CO. PLANT.

First to Fourth Operations

The first and second re-drawing operations are practically the same, but with different reductions. In all instances, the cases are forced through the dies, falling out below. The dimensions after the first draw are 3.962 inches inside and 4.275 inches outside diameter, with a length of 3⅛ inches; second draw dimensions are 3.912 inside and 4.121 inches outside diameter, with a length of 4¼ inches. Crank operated Ferracute presses are used on preliminary drawing. Before going to the third annealing (which is identical in all cases), the partly finished product is given its first indent in the head. The cases are placed on a tilting post, the impression being made when the fixture is in a vertical position. The press operates continuously, an indent being made at every stroke. The cases are again annealed and given the third draw, following which the diameters are 3.984 inches outside, and 3.843 inches inside, the length being roughly 5¼ inches. The fourth draw is similar to the preceding

BALING SCRAP IN A LONGEMANN "CABBAGE" MACHINE, MONTREAL AMMUNITION CO. PLANT.

ones, being accomplished in a vertical press, but owing to the increasing length, the operations require a little longer time, and consequently more presses are necessary. This reduction increases the length to 7½ inches, with an outside diameter of 3.855 inches and a tapering bore, the wall thickness being 0.042 inch at the mouth and 0.077 inch near the head end. Before being again annealed, the cases are given the final indent, and a small hole drilled through the centre to permit of the free passage of air as the case is drawn on and off the punch.

Fifth and Final Operations

Owing to the increasing length of the cases, the drawing for the fifth and sixth reductions are performed on variable stroke presses; several Bliss vertical presses operated by rack and pinion, and a number of horizontal double ended Ferracute screw presses being employed. The dimensions after the fifth draw show an approximate length of 9¼ in., an outside diameter of 3.776 in., and a tapering bore, the diameter at the mouth being 3.725 inches. After the cases are trimmed to a length of 9 inches, they receive their last annealing and are then taken to the final draw, which is performed in the horizontal presses, the dimensions after drawing being 12½ inches long, an outside diameter of 3.7315 inches and an inside diameter of 3.680 inches at the mouth, tapering to 3.635 inches near the head end. The cases are again trimmed to a length of 11¾ inches, following which they are headed in two operations, that of flattening and final heading. A revolving turret is secured to the lower or movable ram, with an enclosed spring and roller bearing to facilitate operation.

Up to this point, the case has been practically parallel, but in order that it will fit the breach of the gun for which it is intended, it must have a taper of 0.04066 inch per inch throughout its entire length, with the exception of an inch at the mouth, which is left parallel. To successfully accomplish this operation, it is necessary to anneal the mouth of the case half way down. For this purpose a special furnace has been built, in which a number of cases are placed, each one resting on a revolving post, thus assuring uniform heating and annealing to avoid buckling of the case when being tapered in the die. The complete tapering is done in two operations, the first closing the upper end for about six or seven inches, the next bringing it to the desired shape and dimensions, the parallel portion at the mouth being 3.34 inches diameter. The machining of the head and mouth is performed on a number of Bullard, and C.M.C. special lathes, after which the cases are inspected and rectified in another department. The operations on the 4.5 in. shell cases are almost identical to those on the 18 pdr. shell cases, one less draw being required. For a detailed description of these, readers are referred to our August 24 issue.

For the maintenance of the numerous gauges, the accuracy of which is one of the most essential factors in the manufacture of shells and cases, this plant has provided a special gauge-making department, where the final operations are performed on the various gauging tools, and also the readjustment of the numerous gauges that are used throughout the entire works. To obtain the greatest efficiency of the limit system and assure the highest standard of checking of all limit gauges, a master set of Johansen gauges is provided.

MAIN SHOP, DOMINION COPPER PRODUCTS CO. PLANT.

DOMINION COPPER PRODUCTS

To overcome the difficulties that confronted munition manufacturers at a time when great annoyance was being experienced in securing delivery on component parts of shells, more especially copper bands and brass discs for cartridge cases, steps were taken by H. H. Vaughan, president of the Montreal Ammunition Co., to undertake the production, on a large scale, of these most essential accessories. The Dominion Copper Products Co. was, therefore, incorporated on November 5, 1916, supplementary Letters Patent, dated July 31, 1916, being issued, and additional supplementary Letters Patent now being applied for. The company is capitalized at $3,500,000, and its operation is distinct from that of the parent concern, its defined purpose being to refine, cast, roll and otherwise work and manufacture

FILLING BILLET MOLDS FROM COPPER REFINING FURNACE, DOMINION COPPER PRODUCTS CO. PLANT.

copper and brass products and the alloys thereof.

Seamless Copper Turning Production

After ceaseless labor and untiring energy on the part of Mr. Vaughan and his engineer, Ferdinand Deming, a seamless tube expert, the plant of the Dominion Copper Products Co., was established on an operating basis, and with the extensive additions now projected, it promises to become an important and permanent factor in our coming peace-time industrial development. The ultimate intention of the company is to manufacture all kinds of copper and brass metal products, the extensions and equipment now under consideration having for their object the rolling and drawing of all kinds of sheets, strips, rods, tubes, etc.

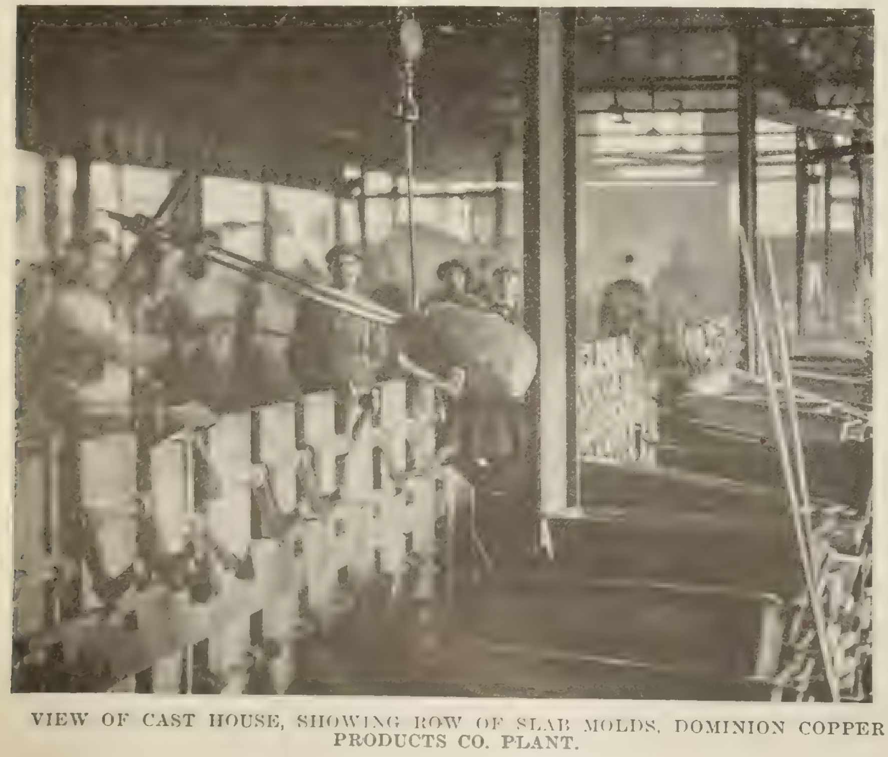
Activities are meantime confined to the production of seamless copper tubing for the rifling bands of shells from 3 ins. to 12 ins. in diameter; also the brass discs for the British 3.3 ins. and 4.5 ins. cartridge cases, and the Russian 3 in. cases. Owing to the fact that this undertaking was launched at a time when definite delivery on equipment was practically impossible, it fell to the lot of the management to, not only design but construct the bulk of the machinery necessary for the successful operation of the plant. The three large tube drawing presses as well as many of the lesser tools and much of the general equipment are expressive of what has been thus accomplished. The plant is located on the north shore of the Lachine Canal, and on property previously occupied as a stock yard by the Dominion Bridge Co. The main mill building has a width of 180 feet and a length of 240 feet. The extensive additions now under construction will when completed, greatly enhance the meantime production capacity. The various departments are so arranged that the handling of the product is reduced to the minimum, the material progressing through the different operations, from the raw ingot to the finished article.

SPECIAL OIL-FIRED TILTING FURNACE FOR SMELTING INGOT COPPER, DOMINION COPPER PRODUCTS CO. PLANT.

Casting the Brass Slabs

Before the cast ingots are delivered to the casting room, they are carefully weighed and the proper proportion of each placed in oblong sheet steel trays, one of which holds the charge for each crucible. For the weighing of these metals, two Fairbanks floor scales have been installed. Arranged along each side of the shop are forty crucible pit furnaces, and back of these are the bins that hold the coke and charcoal used in firing the furnaces. Midway on each side and extending the full length on one side and over half the length on the other, are the slab moulds into which the molten metal is poured. These moulds, of which there are 120 in the shop, are made of special cast iron and always remain in a vertical position; the front portion being hinged at the lower end and secured in place by means of clamps and lugs which form part of the complete mould.

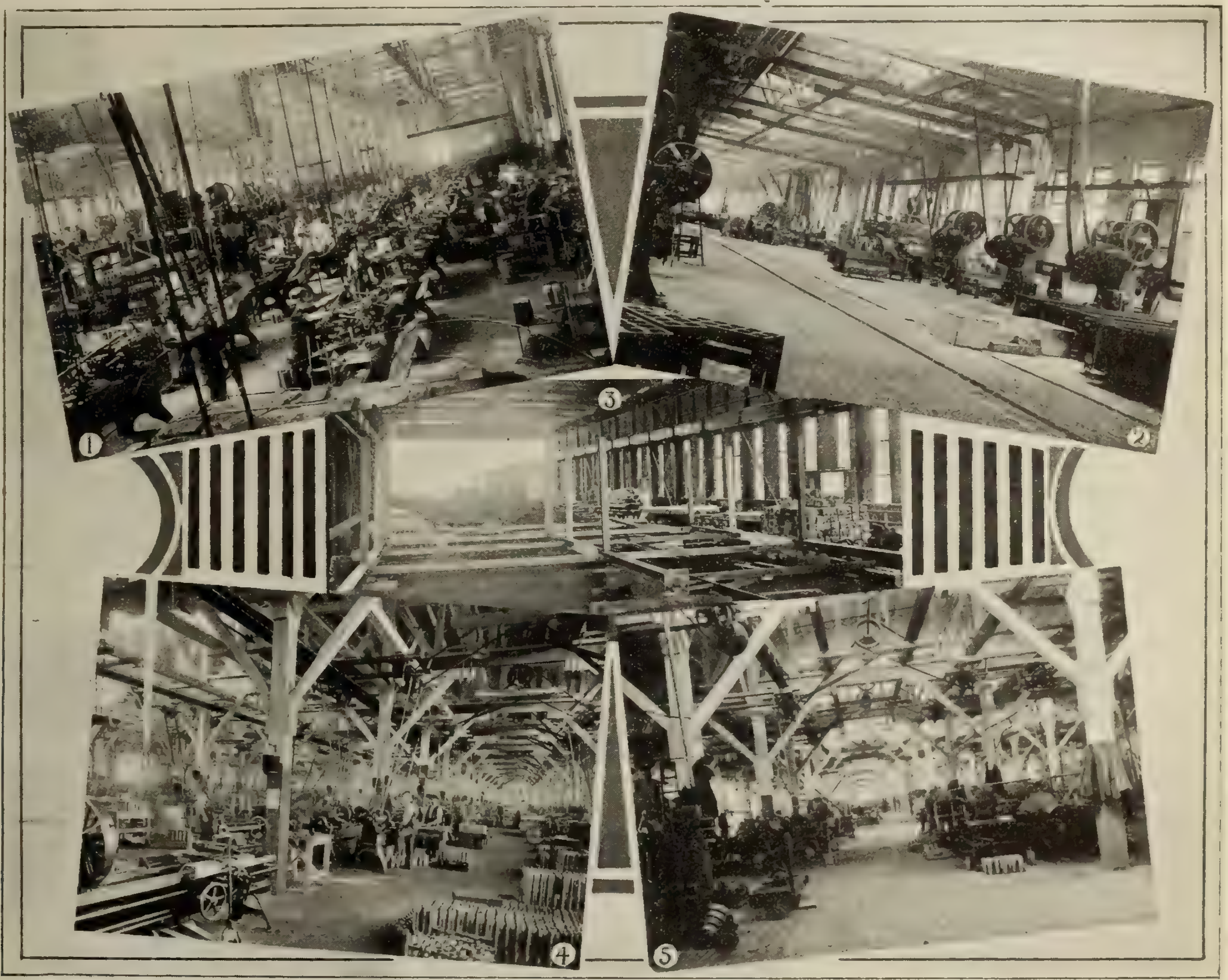
The molten metal is strained through $\frac{3}{8}$ in. holes in the bottom of the runner boxes which are also hinged to the upper section of the mould. After the metal has solidified, the slabs are removed and the mould cleaned with a wire brush, and otherwise prepared for the following cast. To facilitate the pouring of the hot metal, eight jib cranes having a range of 360 degrees are installed. The slabs as they come from the moulds are $6\frac{3}{4}$ inches wide and $1\frac{1}{2}$ inches thick, with a length of about 40 inches. Owing however, to the pipe that forms at the top of the slab, it is necessary to cut away some of the metal at this point. This is accomplished in a large 20 inch alligator shear, made by the Canton Foundry & Machine Co. Pieces about an inch wide are cut off until the end of the


VIEW OF CAST HOUSE, SHOWING ROW OF SLAB MOLDS, DOMINION COPPER PRODUCTS CO. PLANT.

slab shows no sign of pipes or other defects. The scrap from the punch presses is received in this department and cut into small pieces by the alligator shear.

Rolling Out the Brass Strips

After the pipe has been cut off, the slabs are taken to the breaking down rolls which are 22 inches in diameter and operate at 16 turns per minute. Both this mill and the finishing mill were built by the Waterbury Foundry & Machine Co., the former being driven by a 200 h.p. and the latter by a 150 h.p. Crocker-Wheeler motor. It might be mentioned here that other units of a like nature are at present under construction in the plant of the Dominion Bridge works. The first breaking down operation consists of four passes through the rolls, starting off with about a 20 per cent. reduction in cross sectional area; this amount becoming less at each pass. The various thicknesses after each pass are approximately 1.250 in., 1.075 ins., .925 in., and .875 inch. The strips are next annealed by heating them in a large Quigley furnace for about an hour and a half, the final temperature being about 1,320 degrees F. The brass strips are placed upon large open steel trays that are carried about on steel trucks. These trucks are backed up to the furnace door, and the loaded trays drawn into the fire chamber by means of long rods and cables, the latter being wound around a drum which is operated by a small motor located conveniently.



1—JONES & LAMSON TURRET LATHES OPERATING ON 18-PDR. SHRAPNEL D.B. CO. 2—PRESS DEPARTMENT FOR 18-PDR. AND 4.5 IN. SHELL CARTRIDGE CASES—M.A. CO. 3—INTERIOR VIEW OF ERECTION SHED SHOWING STEEL IN COURSE OF CONSTRUCTION FOR OFFICE BUILDING FOR THE MADRAS & SOUTHERN MAHRATTA RAILWAY, INDIA—D.B. CO. 4 AND 5—NO. 2 SHELL SHOP ERECTED COMPLETE IN LESS THAN SIX WEEKS, AND WHICH WAS PRODUCING 18-PDR. H. E. SHELLS IN THREE WEEKS AFTER FIRST SOD WAS TURNED.

Scalping Operations

From the furnace the strips are plunged into a cooling bath, following which they pass to the scalping machines where the surface is scraped off. Four Torrington, and two Waterbury-Farrell units are used on this operation; these machines having a stroke of about 12 in., and a lateral feed of about ½ inch. Before scalping, it is sometimes necessary to strengthen the strips owing to the curl left from the rolling operation. A short stroke bulldozer driven by a 5 h.p. motor is used for this purpose.

From the scalping machines, the strips are again taken to the roughing rolls, where they receive four further reductions, the dimensions after each pass being approximately .710 in., .640 in., .530 in., and .500 in. They are again annealed, also pickled and cleaned, then taken to the finishing rolls and given two passes, the thickness reductions being respectively .420 in. and .380 in., the last being the thickness of the finished disc.

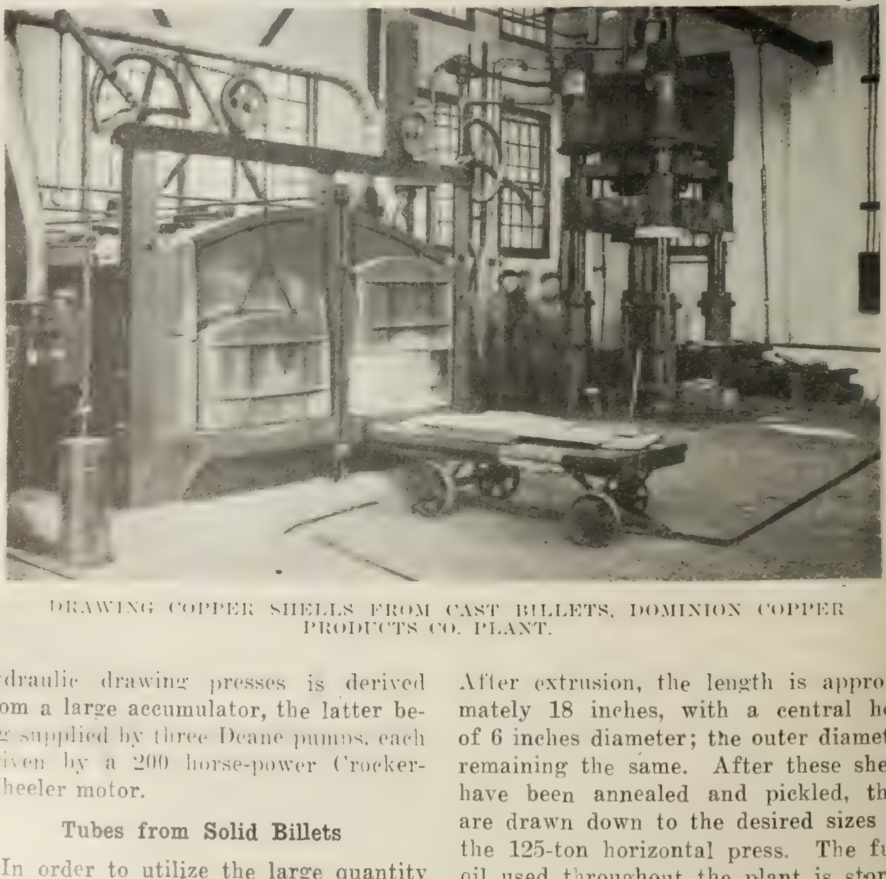
Before blanking out, the strips are annealed and pickled, being afterwards taken to the presses to have the discs punched out; the diameter being 6.22 inches. Two heavy presses are used on this operation, one Hilles & Jones, and one Bertram. These two machines turn out about 23,000 discs per day when operating at full capacity. The discs are weighed in quantities on a Toledo dial scale and must average 3½ pounds apiece. Crating for delivery to the case-making departments of the different plants follows:

FINISHING ROLLS, DOMINION COPPER PRODUCTS CO. PLANT.

Copper Bands for Large Shells

Three methods are at present employed for the production of the various sizes of copper bands; casting into tubes and drawing for the smaller sizes; casting into ingots and drawing for the intermediate sizes; and cupping from the flat sheet and drawing for the larger sizes. The plates for the latter process are received at the plant in octagonal shape of one inch thickness, and after a $1\frac{1}{2}$ inch hole has been punched in the center, they are cut to a round disc 48 inches in diameter on a Lennox heavy circular slitting shear driven by a 5 h.p. Westinghouse motor. This machine is fitted with a jib crane secured to the frame and with a $\frac{1}{2}$ ton triplex chain block. After the disc has been annealed and pickled, it is cupped in the large 300 ton horizontal tube drawing press; the flat plate being rigidly held by the hydraulic blank holder which is operated by the two smaller cylinders shown above and below the central die. The center hole is located on the pilot pin while the metal is being shaped in the die.

The diameter of the cup is about 29 inches, and the succeeding draws reduce the cup to tubes having diameters that are approximately 24, 20, 16, 12, 9.2 and 8 ins., or roughly speaking a reduction of cross sectional area of from 25 to 20%. As there are two weights for the 9.2 ins. shell bands, the tubes for the lighter ones are used to draw those for the 8 inch bands, as the reduction can be obtained at one operation. If the heavier tube is used it necessitates two reductions to obtain the desired size. These various reductions are performed in series, as the tubes for the 8 inch bands and larger are drawn on the 300 ton press, and the punches and dies are required to be changed for each size. All tubes are annealed and pickled between each drawing operation. The semi-finished tubes are placed upon steel trays and drawn into the furnaces, being allowed to heat to a temperature of about 1,350 degrees F., after which they are removed and immersed in a cooling bath and then pickled. A fair average output on this press is about one draw per minute. The power for the three large hydraulic drawing presses is derived from a large accumulator, the latter being supplied by three Deane pumps, each driven by a 200 horse-power Crocker-Wheeler motor.



DRAWING COPPER SHELLS FROM CAST BILLETS, DOMINION COPPER PRODUCTS CO. PLANT.

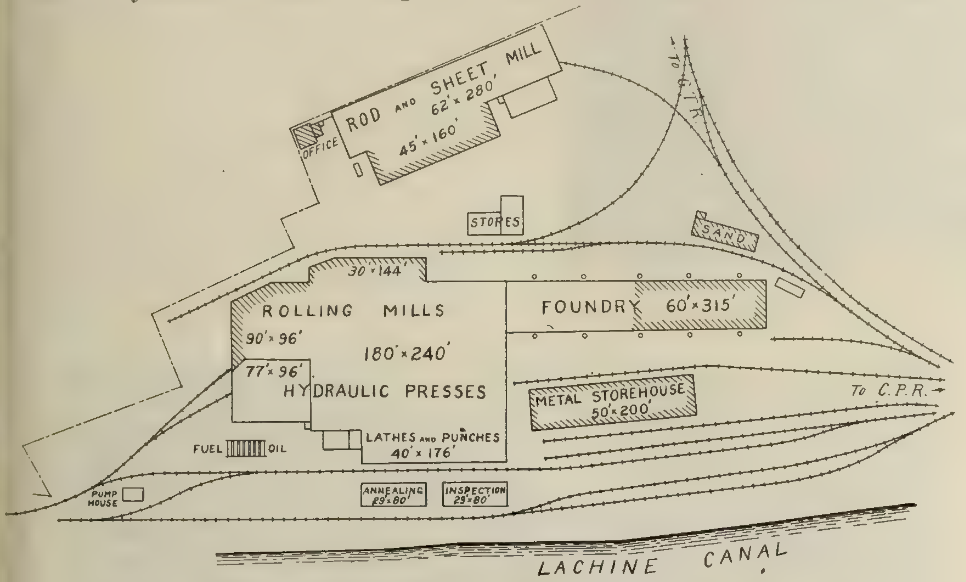
Tubes from Solid Billets

In order to utilize the large quantity of scrap that naturally accumulates about a plant of this description, a reverberatory refining furnace has been installed, in which all the scrap copper from the plant and elsewhere is melted and refined by the regular poling process. Immediately in front of the furnace tap hole, a structural steel revolving device is located that will hold 12 ingot moulds. These moulds are provided with trunnions upon which they can be revolved when dumping out the ingot. Semi-circular perforated water pipes are located above and below the moulds for cooling puposes. When pouring, a continuous stream is allowed to flow from the furnace into an auxiliary ladle directly beneath the tap hole. This ladle is then tilted as each mould is brought into position, a small quantity of sulphate being mixed with the metal as it flows from the ladle.

Another method of obtaining these ingots is by means of a special high pressure oil burning Rockwell tilting furnace, in which the pure copper ingots are melted and poured into billets. The blast for this furnace is supplied by a Connelsville Blower, driven by a 10 h.p. Westinghouse motor. The cast billets are afterwards placed in the double chamber furnace shown and heated to a temperature of about 1750 degrees F., and drawn into a shell in the 1200 ton Southwark extrusion press. The billets have a diameter of 9 inches and a length of 10 inches, with a round base. After extrusion, the length is approximately 18 inches, with a central hole of 6 inches diameter; the outer diameter remaining the same. After these shells have been annealed and pickled, they are drawn down to the desired sizes on the 125-ton horizontal press. The fuel oil used throughout the plant is stored in seven large tanks located between the main building and the canal. From these tanks the oil is forced to the various furnaces by means of two small electrically-driven geared pumps.

Small Tubes from Cast Cylinders

The tubes, from which are produced the 4.5 ins. and 3 ins. bands, are first cast in cylindrical moulds having a destructible core, the center being made of a perforated iron pipe upon which is wound a layer of damp straw, this again being covered with about an inch of loam, placed while the pipe is being revolved. It is then trimmed off parallel by means of a long straight blade, being afterwards baked in a steam heated oven and finally sand papered smooth. When the tubes have been cast they are taken to the main shop where the end is swaged cone-shape in a Bradley trip hammer to allow the punches to force the tube through the reducing dies. These sizes are finished on the 75 ton press. Before the tubes pass to the copper band department the round end of the larger and the ragged end of the smaller tubes are cut off in a circular saw. The tubes are next cut off into copper bands of desired width in eight cutting-off machines, fitted with special roller steady rests and chucks. Other equipment consists of three Automatic Machine Co. cutting-off machines and seven Bullard semi-automatic lathes for finishing copper bands. The dimensions of the rough copper bands are given in accompanying table:



PLANT LAYOUT, DOMINION COPPER PRODUCTS CO.
Shaded Portions Show New Additions Recently Built or Under Construction.

Shell Size and Mark—	Thickness High	Thickness Low	Bore High	Bore Low	Width High	Width Low
18 pdr.	.184	.166	3.31	3.29	.880	.860
4.5, Mk. V.	.255	.220	4.505	4.485	1.195	1.185
60 pdr., Mk. V.	.295	.260	4.970	4.950	1.34	1.32
6 in., Mk. III.	.310	.265	5.940	5.920	.980	.960
6 in., Mk. XVI.	.416	.371	5.94	5.92	1.734	1.710
8 in., Mk. III.	.397	.352	7.885	7.865	1.960	1.935
9.2 in., Mk. II. and V.	.595	.550	9.10	9.055	2.525	2.500
9.2 in., Mk. IX. and X.	.455	.410	9.10	9.055	2.525	2.500

Lunch Room

Owing to the semi-isolated location of the plant and the large number of employees both in the offices and works, ample provision has been made in the immediate vicinity for the comforts of the inner man. Adjacent to the main office is a one storey frame building used as a lunch room for the office staff and workmen. In addition to this, the company control the Dombrico Hotel on a nearby street, the seating capacity of the two places being about 500.

Fire Protection

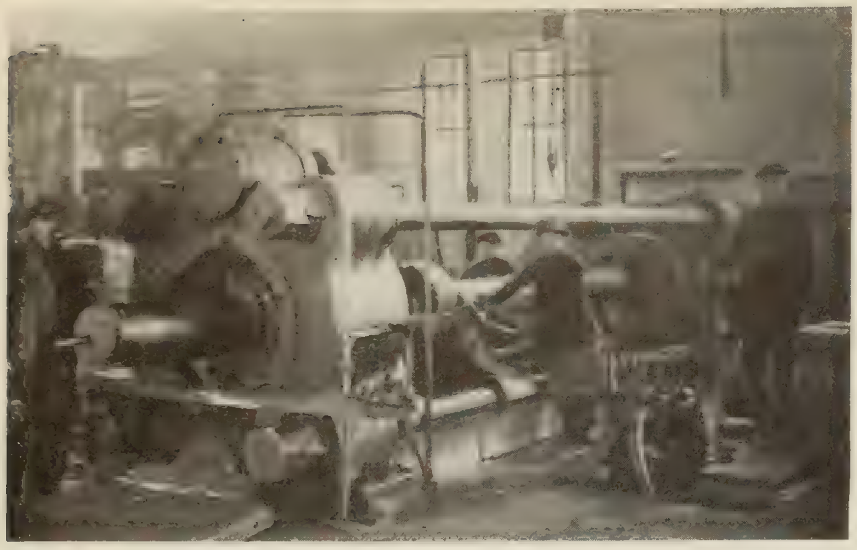
To guard against the possibility of fire, the plant is amply protected by two electrically-driven direct-connected Lea-Courtney, 750-gallon, two-stage Underwriter fire pumps. These are located in a pump house on the canal bank, and draw water from the latter, the maximum lift being about 14 feet in the spring, when the canal is emptied for cleaning, inspection and repair, and about 3 feet at all other periods of the year. The main discharge pipe from the pumps branches off into two smaller lines, one 8-inch pipe leading to the plant of the Dominion Copper Products Co., the other 8-inch line carrying the water to the Dominion Bridge Co. plant. A connection is provided for filling a 300,000-gallon capacity reservoir located just north of the blacksmith shop. Alongside this reservoir is a large standpipe, 28 feet in diameter and 89 feet high, of 408,000 gallons capacity. Close to the foot of the standpipe are two pump houses, one on either side, each containing one 1,000-gallon Worthington Underwriter fire pump. One of these pumps can draw its supply either direct from the standpipe or the reservoir. The other pump draws water from a well fed by gravity from the large reservoir, and also by the mill supply pump at the canal bank pump house. With the exception of the shell forge shop, which is of fireproof construction, the erecting shop and a few isolated sheds, all buildings of the plant are equipped with automatic sprinklers. Throughout the yard, numerous hydrants and hose houses are located, together with two hose reel houses, the latter being close to the works offices and directly facing the main office building. An efficient fire brigade, composed of workmen in the plant, is maintained, fire practices being regularly held. A system of signals has been adopted to indicate the location of departmental fires.

Miscellaneous Data and Equipment

To more easily handle the constantly accumulating copper and brass scrap, a Longemann cabbage machine is installed, the scrap being pressed into blocks 6 inches square and 12 inches long, under a hydraulic pressure of 2,000 lbs. per square inch. Several large Fairbanks track scales are installed in different parts of the various shops for the weighing of large fabricated material and car contents.

Running along the northern portion of the property is the stock and storage yard, having a total area of over 1½ acres. This section is traversed by three 90-foot span Dominion Bridge Co. cranes, the run of each being 660 feet. Between the erection shed and the blacksmith shop is a special travelling and revolving derrick operating along 500 feet of 44-foot track; this crane has a capacity of 25 tons at 60-foot radius and 15 tons at 80-foot radius. In order to reclaim the brass that unavoidably drops about the floor of the cast house when pouring the molten metal, the ashes and cinders about the moulds are subjected to a screening process, which separates the heavy particles of brass from the bulk of the other material.

Owing to the scarcity of labor that prevailed at the time the plant was put into operation, the securing of help was a vital problem, its solution therefore by the management is of more or less interest, inasmuch as something over 10 per cent. of the present employees are Iroquois Indians obtained from the Caughnawaga Reservation, just across the St. Lawrence River from Lachine. That the "experiment" has been successful is shown by the fact that many of these original North Americans are employed in responsible positions, such as casters, rollers, yard foremen, etc. In addition to the Indians, many nationalities are represented throughout the various departments. The number



CLOSE VIEW OF 300-TON HYDRAULIC DRAWING PRESS FOR FORMING SEAMLESS COPPER TUBES, DOMINION COPPER PRODUCTS CO. PLANT.

ROW OF TORRINGTON SCALPING MACHINES, DOMINION COPPER PRODUCTS CO. PLANT.

of men at present employed is about 700. While the war demands are at present sufficient to keep the plants operating to capacity, the possibilities are that the post-war activities of the Domnion Copper Products Co. will mark a new and important departure in our metal-working industrial progress. The personnel of the executive is as follows:—G. H. Duggan, president; H. H. Vaughan, vice-president and general manager; F. W. Evans, secy-treas.; Ferdinand Deming, consulting eng.; G. L. Willard, general superintendent.

Welfare Work

Welfare work at the different plants described may be said to embrace well heated, lighted, and ventilated workshops; reading, recreation, dining and wash rooms; evening commercial and technical instruction during the winter months; first aid to the injured, accident investigation and possibility prevention, etc. An ambulance corps, under the direction of executive officers of the company and a committee of employees, not only render first aid when an accident occurs, but in serious cases requiring prompt hospital accommodation and treatment, continue their services, by personal attendance aboard the ambulance, until the former have been secured.

Each department is equipped with a stretcher, blanket and cover, while Red Cross ambulance boxes are located convenient to water, the boxes being furnished with absorbent cotton, sterilized pads, gauze bandages, scissors, splints of various kinds, etc., all ready for service. The ambulance room is furnished with leather couch, operating table, medicine cabinet (fully equipped, including instruments), small glass top table, electric heater and stand, electric sterilizer, disinfecting pans, etc. A daily record slip, giving full particulars of all accidents which may have occurred, is filed for reference should occasion arise.

CUTTING OUT BRASS DISCS FOR CARTRIDGE CASES, DOMINION COPPER PRODUCTS CO. PLANT.

In addition to the Ambulance Corps Executive Committee, there is also an Accident Investigation and Prevention Committee, composed of the superintendent as chairman, general foreman, twenty representative foremen, and the head timekeeper as secretary. The operations of this body are constantly in evidence, the twofold duty of preventing the recurrence of a particular accident, and the elimination of both real and apparently possible risks, furnishing unlimited scope for its activities.

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Thus far, the pulp and paper industry in Canada has been limited to the provinces of Ontario, Quebec, New Brunswick, Nova Scotia and British Columbia. Now, however, the beginning of a large development in the prairie province is foreshadowed by the announcement that a pulp and paper mill is to be erected in Manitoba, at a point 250 miles northwest of Winnipeg.

Development of Ocean Service Shipbuilding in Canada--I.

By " Artificer "

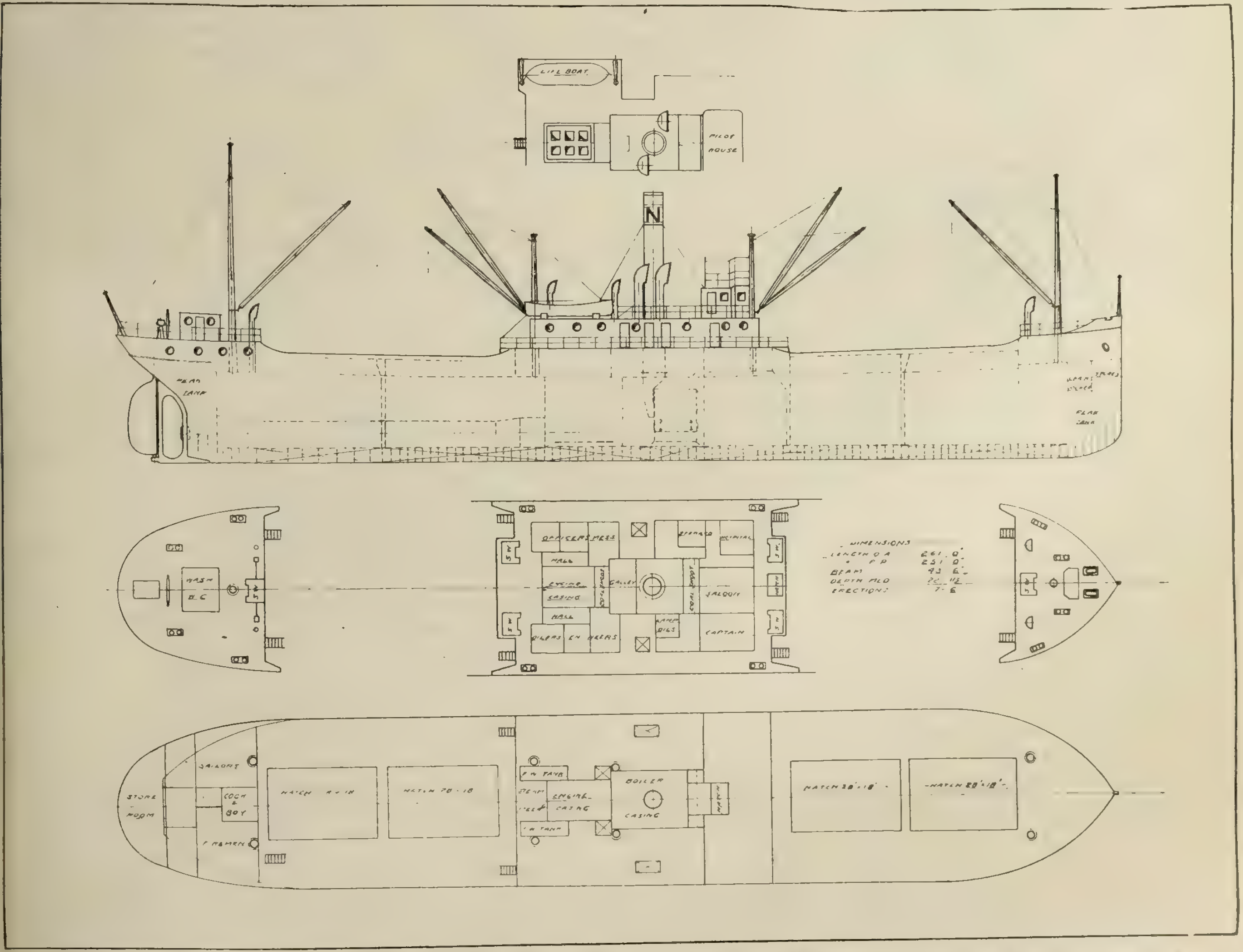
In addition to the widespread requisitioning of vessels for transportation purposes by the Allies, the war attendant and normal merchant ship losses and the many months' almost complete cessation of new construction on the part of the latter, the merchant marine of neutral countries has had the misfortune to become to a large extent the target for enemy submarine activity. Norway, perhaps more than any other nation, has suffered in this respect, hence the almost feverish anxiety being displayed by her shipping fraternity to have the losses made good at the earliest possible moment. In recent weeks many contracts have been placed on Norwegian account, with Canadian shipbuilders. The vessel features of one such follow.

NORWEGIAN FREIGHTERS BUILDING AT TORONTO

THE construction of two steel cargo steamers by the Polson Iron Works, Toronto for Christoffer Hannevig of Christiania, Norway marks a new development of the shipbuilding industry in the Queen City. Steel freighters are also being built on the Pacific Coast for Norwegian owners, from all of which it is evident that still more important developments may be expected in shipbuilding in Canada on not only her ocean shores but on those of her Great Lakes as well. The two freighters which have recently been laid down at Polson's shipyard, give indication of being but the first of a series of orders for vessels for foreign owners, as the shortage of tonnage has rendered imperative the building of new ships to replace those sunk during the past two years. There is every evidence that all our Canadian shipyards will participate to a generous extent both in quantity and variety of the new construction.

New Freighter Features

The new vessels will be of standard construction for ocean service, and will be able to navigate the St. Lawrence Canals to the sea only when in ballast, as the mean draught will be 19 ft. 6 in. when carrying a total deadweight of 35c tons. The principal dimensions are as follows:—Length over all, 261 feet; length between perpendiculars 251 feet; beam moulded, 43 ft. 6 ins.; and depth moulded 22 ft. 11½ ins. The vessels are to be built of steel to class highest class Bureau Veritas for ocean service. They will have a flat plate keel and the framing is to be especially stiffened forward of the collision bulkhead. The



SINGLE SCREW STANDARD FREIGHTERS OF 3,500 TONS DEADWEIGHT UNDER CONSTRUCTION BY THE POLSON IRON WORKS, TORONTO, FOR NORWEGIAN OWNERS.

tank top plating is to be of steel ½ in. thick under the engines and boilers.

They will be of the single deck type, built on the deep frame principle, with cellular double bottom right fore and aft. They will have peak tanks and four watertight bulkheads. The poop bridge, and T. G. forecastle will be 7 ft. 6 ins. in height from top to top of beams. Each ship will have two wooden pole masts and four large cargo derricks with a winch to each. There will be two forward cargo hatches 18 ft. by 28 ft., and two aft. cargo hatches 18 ft. by 26 ft.

The stern post will be of cast steel 8¼ in. by 5¾in. with rudder frame of the single plate type, the coupled stocks being 7½ in. diameter. The deep frame system with auxiliary side frames will constitute the basic constructional features of the hull fabrication. Intermediate angle frame stiffeners will be installed in fore peak from about one foot below light draught line to about one foot above full load draught line. Water ballast will be carried in the double bottom and fore and aft peaks, all necessary connections leading to and from the engine room and being under control there. The shell plating is to be overlapped at the edges and to have overlapped scarfed butts. Bow plates between light and load draught lines are to be thickened about 25 per cent. as provision against ice, tapering to normal thickness at from 20 ft. to 30 ft. sternwards. The keel, double bottom floors, and frames are to be machine riveted. The main poop and bridge decks will be steel, and the forecastle deck of pine.

Deck Machinery

For handling cargo, there will be six 7 in. by 10 in. horizontal double cylinder steam winches of Clarke-Chapman type, one at each mast and derrick. The winches will have central barrels and drums and will be placed on girders above the deck. Each mast will carry one pitch pine, 3 ton derrick, the latter to be long enough to land cargo 10 ft. away from ship's side. The windlass will be of direct acting type for operation by hand, as well as by steam, and will be complete with reversing gear. A hand screw steering gear will be installed aft. and a steam steering gear amidships. The total bunker capacity will be about 350 tons.

Suitable accommodation for the officers and crew is provided, the sailors and firemen's quarters being aft, and those of the officers on the bridge deck. Two lifeboats and one dinghy, will be carried by each ship, other equipment and fittings being in accordance with the classification requirements.

Main Engines

The propelling machinery will be constructed to Bureau Veritas requirements for a working pressure of 180 pounds. The main engines will be of inverted direct acting, surface condensing, triple expansion type, the cylinders being 20½ ins. x 33 ins. x 54 ins. diameter by 36 ins. stroke. The condenser and pumps will be independent of the main engine structure. The H.P. and I.P. cylinders will be served by piston valves and the L.P. cylinder by a double ported slide valve. All these valves will be on the fore and aft centre line of the engine. The H.P. cylinder, steam chest and steam pipes are to be tested to 270 pounds cold water pressure. The bed plate will be cast iron of box section, as will also be the columns. All shafting will be of best open hearth forged steel. The crank shaft of forged steel will be of built-up type, with cast steel crank arms. The connecting rods, crossheads and piston rods will be of open-hearth, forged steel. The valve gear will be of "Stephenson" link motion type, with direct acting steam reversing gear. The propellers will be four bladed of cast iron.

Machinery Auxiliary Equipment

The pumping equipment will include deck pumps for each hold; vertical duplex, brass-fitted, main boiler feed pump; duplicate of the main boiler feed pump for use as a general service donkey pump; duplex horizontal piston type bilge pump; a 7 ins., duplex, brass-fitted, ballast pump; and a fresh water pump, 4½ ins. x 4 ins. x 5 ins. of duplex type; air pump and a centrifugal circulating pump for main condenser. The feed water heater will be of multi-coil type installed in the feed pump discharge line. One 7½ k.w. Enberg electric generating set will be installed in the engine room for the ship's lighting system. An evaporator of 15 tons capacity will also be installed in the engine room.

Boilers

The boiler installation will consist of two 14 ft. diameter by 12 ft. long, single-ended, Scotch marine type units, arranged for natural draft only, and built to pass Bureau Veritas requirements for 180 pounds working steam pressure. Each boiler will have three corrugated steel furnaces of 42 ins. inside diameter. The tubes will be 3½ ins. diameter, lap welded and standard gauge. There will be a separate combustion chamber for each furnace, and one double funnel to each ship.

The keels for both steamers have already been laid and launching in each case is expected in April 1917. The steam trials of six hours duration will take place on Lake Ontario.

LACHINE CANAL TRAFFIC

UP to the end of November, 24,581,371 bushels of grain passed through the Lachine Canal, just 16,082,728 bushels less than passed through in the same period last year. For November alone the amount of grain which passed through was 2,176,257 bushels, less than half of the amount for November, 1915, which was 4,978,811 bushels. Produce also showed a decrease, and the net tonnage operated was less than in the previous November. The surprising thing, however is that the cargo tonnage was greater last month by 29,368 tons than a year ago. The explanation of this lies mainly in the fact that the amount of coal carried last month was 120,548 tons, and only 98,826 tons in November, 1915.

Comparing November, 1915 and 1916, every grain showed a marked decrease, even oats and barley, which had shown increases in previous months, taking the down grade at last. The amounts, in bushels, are as follows:—Wheat, 1,439,364, decrease, 1,234,008; corn, nothing, decrease, 80,000; oats, 688,393, decrease, 1,431,836; barley, 48,500, decrease, 39,402; and flaxseed, nothing, decrease, 17,308.

In produce there are decreases in every item, as witness the following totals for last month:—Flour, nothing, decrease, 47,000 bags; eggs, 22, decrease, 29 cases; butter, 50, decrease, 95 packages; cheese, 15,458, decrease, 1,719 boxes; and apples, 3,852, decrease, 4,135 barrels.

The number of trips made through the canal last month was 750, a decrease of 84 from the same month in 1915. The tonnage operated was 386,174, a decrease of 39,027 net tons. There were 402 passengers in boats, which passed through the canal, or down the rapids, 77 more than a year before. The cargo tonnage was 350,908, against 321,540 tons in November, 1915. The number of trips light was 272, and the fact that this was 1,022 less than for the same month in 1915 is one reason why a smaller net tonnage carried more cargo even though fewer total trips were made.

* * *

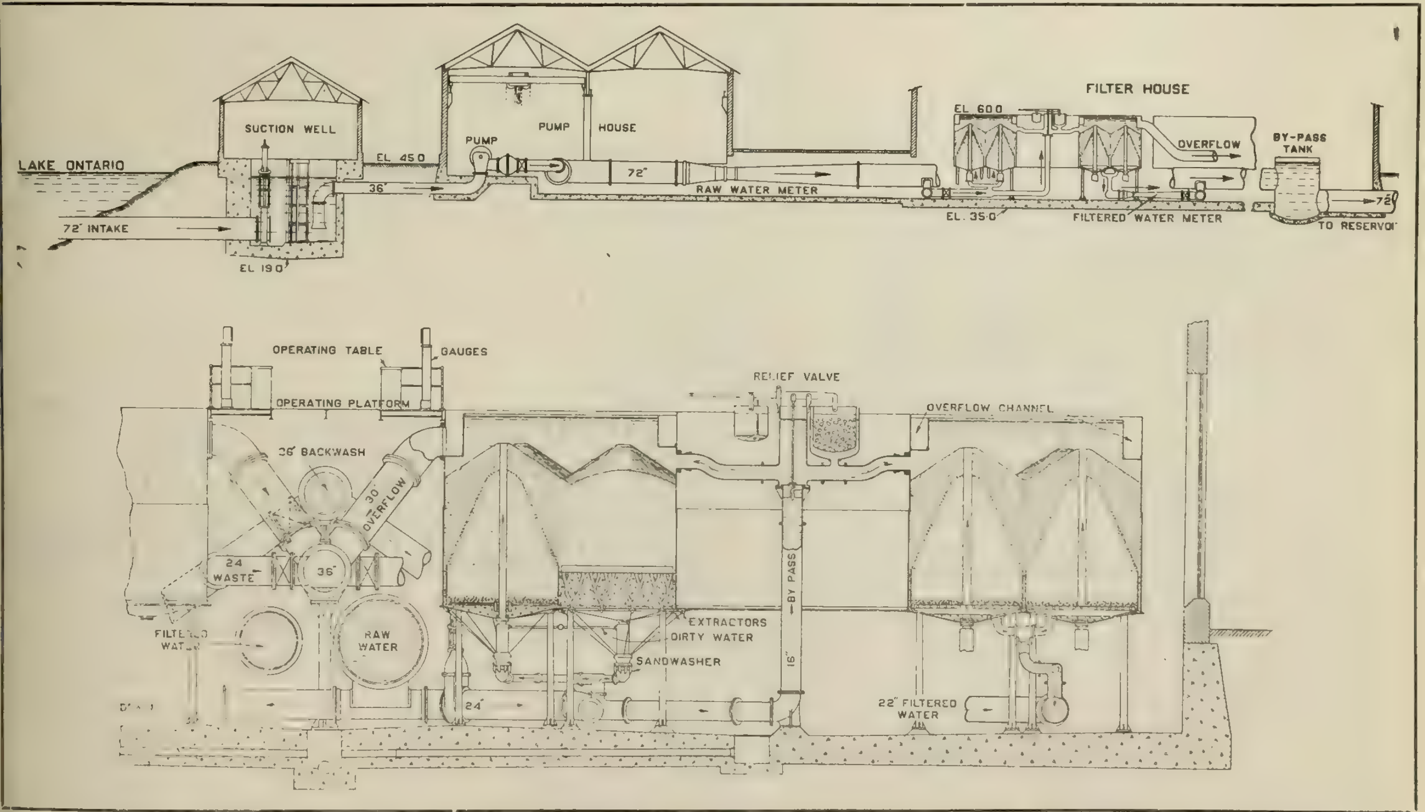
Port of Montreal.—The St. Lawrence, owing to its situation, is the natural route from the Atlantic to the northern and north-western half of the North American continent. The possibility of converting Montreal into a deep-water seaport was first suggested in the year 1825, when the Lachine Canal was completed, connecting Montreal with the Great Lakes, and establishing the route commercially.

60 Million Gallon Drifting Sand Filtration Plant City of Toronto Ont.

Staff Article

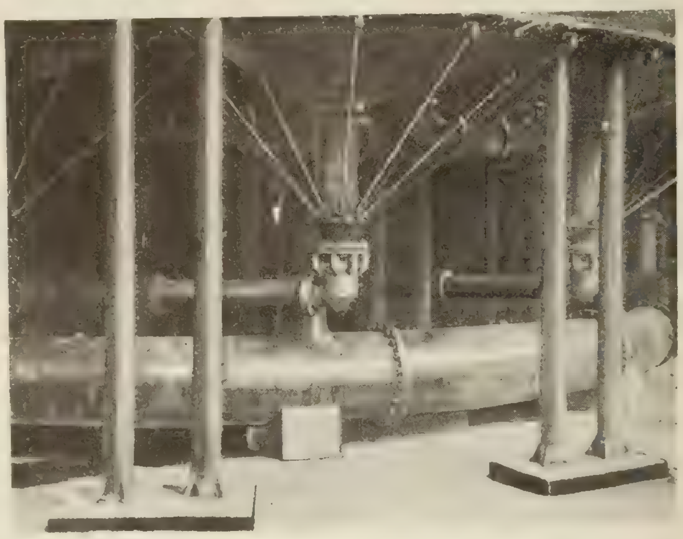
A plant of the nature here described and illustrated embodies in its make-up and result accomplishment features of interest alike for the mechanic and private citizen, no matter their community or national location; the necessity for pure water, either for consumption alone or as a food constituent being generally recognized as a public health essential.

THE new mechanical filtration plant at Toronto Island, which has been under construction since the fall of 1914, is now practically completed, and some filtered water is already being delivered to the city. An additional supply of pure water for the city of Toronto became imperative owing to the rapid increase in population, the slow sand plant installed being altogether too small for the requirements. Owing to the condition of the water in Lake Ontario, some form of filtration is necessary. After considerable investigation the city authorities decided that for the new plant mechanical filtration was more suited to local conditions than the slow sand system. Specifications and plans were accordingly prepared under the supervision of Works Commissioner Harris, and tenders on same were received in January, 1914. In June of the same year the tender submitted by the John ver Mehr Engineering Co., of London, England and Toronto, as engineers, and William Cowlin & Son (Canada), Ltd., of Bristol, England, and Toronto, as contractors, was accepted for a Ransome mechanical type drifting sand filter, with a capacity of 60,000,000 Imperial gallons per 24 hours, and at a contract price of $1,066,282.

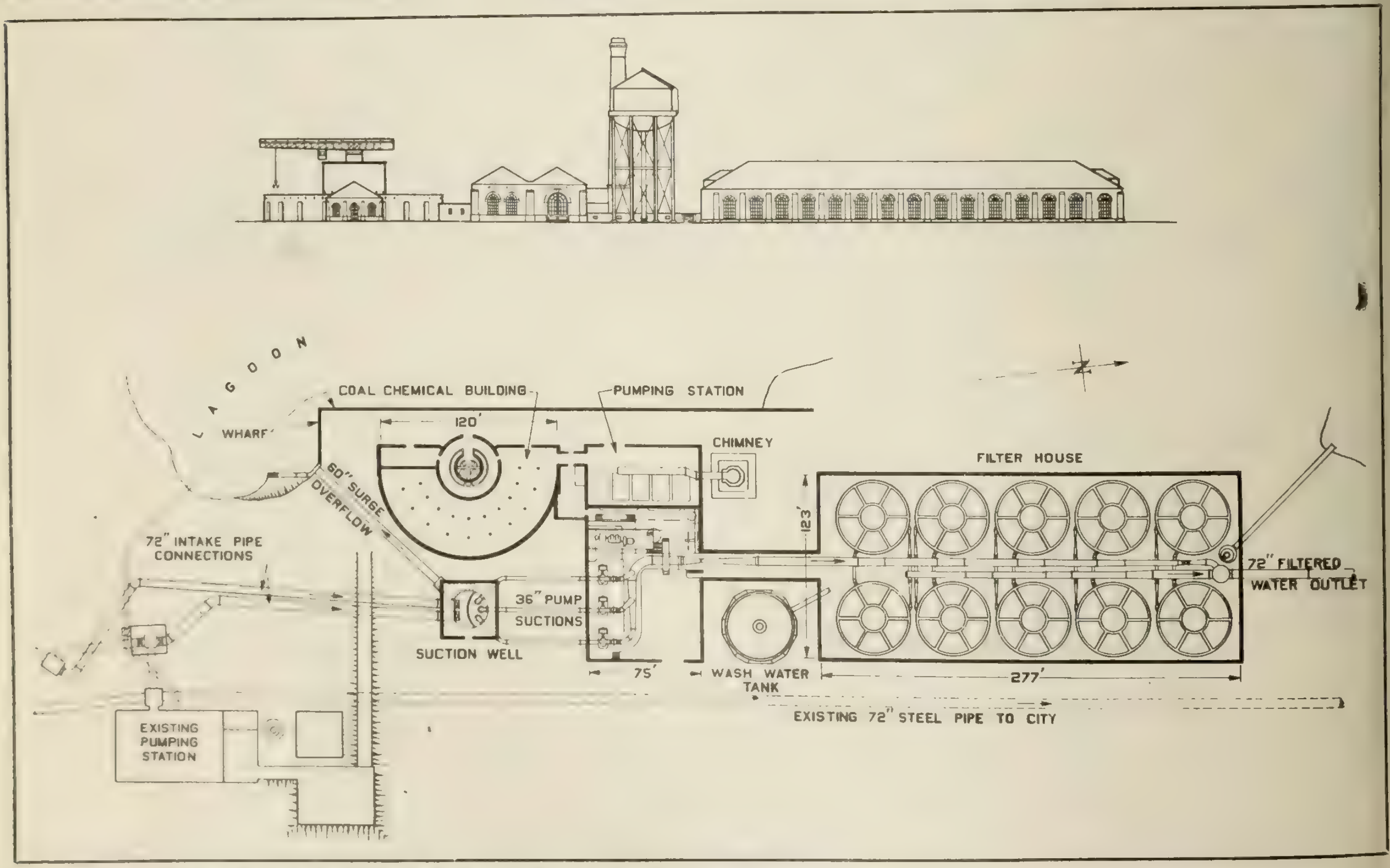

LAKE ONTARIO
SUCTION WELL
EL 45.0
PUMP
PUMP
HOUSE
36"
72"
RAW WATER METER
72" INTAKE
EL 19.0
FILTER HOUSE
EL 60.0
OVERFLOW
BY-PASS TANK
EL. 35.0
FILTERED WATER METER
72"
TO RESERVOI
OPERATING TABLE
GAUGES
OPERATING PLATFORM
36" BACKWASH
30" OVERFLOW
24" WASTE
36"
FILTERED WATER
RAW WATER
RELIEF VALVE
OVERFLOW CHANNEL
BY PASS
16"
EXTRACTORS
DIRTY WATER
SANDWASHER
24"
22" FILTERED WATER

UPPER VIEW SHOWS LONGITUDINAL SECTION THROUGH PLANT, AND LOWER VIEW A SECTION THROUGH SINGLE FILTER.

When the city of Toronto contemplated installing an additional filtration plant, the John ver Mehr Engineering Co. solicited consideration of their system. The request being granted, the company proceeded to erect a demonstration plant on Ellis avenue, West Toronto, for the purpose of proving the efficiency of their system and its suitability to local conditions. The plant was constructed during the spring of 1913 and turned over to the city for the official test on May 21. This continued until June 27, 1913, operation being closely watched for a period of one year. The results of the test were highly satisfactory, and were the subject of a report issued by Drs. Geo. G. Nasmith and Fred. Adams, of the Department of Public Health, Toronto. The plant at the Island was designed by the John ver Mehr Engineering Co., of which William Gore, M.Inst. C.E., is the consulting engineer, and William Storrie, A.M.Inst.C.E., the chief engineer. It is the largest drifting sand filtration plant yet installed and the largest filter plant of any type in the British Empire. The construction and operation features have aroused considerable interest among engineers in both Canada and the United States. The company has constructed smaller plants of the type in Great Britain, Brazil, Jamaica, etc.; in addition, they have supplied portable units for use at the various Allied battle fronts.



SAND WASHER UNDERNEATH EACH FILTER. THERE BEING 30 SAND WASHERS TO EACH UNIT.



UPPER VIEW SHOWS EASTERN ELEVATION OF PLANT, AND LOWER VIEW THE GENERAL ARRANGEMENT PLAN.

Drifting Sand System of Filtration

The plant as already stated has a contract capacity of 60,000,000 Imperial gallons in 24 hours, but must be able to operate at a rate of 72,000,000 Imperial gallons for 10 hours. An important feature of the drifting sand system is its ability to filter unusually turbid water without excessive clogging of the filters, thus obviating the necessity of frequent shutdowns to wash the whole bed of filtering material, which is done without using large settling tanks and coagulating basins. The coagulant, sulphate of alumina, is introduced in the raw water in the suction well. This water is then pumped to the filters. The sand bed in the filters is composed of fine sand 9 feet deep, laid on a bed of gravel, 9 ins. deep. The action of the influent causes the upper part of the sand bed to drift across the water being filtered, the bulk of the impurities being swept out, together with a part of the drifting sand, the latter being washed and returned to the bed by the circulation of the water. The lower portion of the sand bed which remains stationary removes the remaining impurities in the water. The stationary sand bed is washed by reversing the flow of filtered water at long intervals.

The raw water enters the filter through a standpipe (see cross section of filter), in the centre of the unit, after passing through a sand washer at the bottom, and delivers above the sand at the top and also through a vertical by-pass. The sandwasher is an important feature of the system. The drifting sand passes over the top of the stationary sand bed down to a system of outlets or extractors, and thence by pipes to the sand washer. Here the sand falls to the bottom through a current of raw water and is picked up by an inductor. The dirty water passes upward and out at the top of the washer. The sand extractors are of such form that the sand is kept out of the piping system except when the inductor is in full operation. Within the sand washer the raw water pipe is in the form of a venturi tube, and the drifting sand collected and washed in the washer is inducted into the raw water at the throat of the venturi tube. This sand passes up the standpipe with the water and is delivered, with it, above the top of the sand bed, forming a cone which continuously drifts away and is continuously being replaced. Under the gravel bed is the filtered water collecting system.

VIEW OF FILTER UNIT IN OPERATION, SHOWING RAW WATER COMING UP THROUGH VARIOUS INLETS. THE OPERATING TABLE, VENTURIMETER, AND LOSS-OF-HEAD GAUGE ARE TO BE SEEN IN THE FOREGROUND.

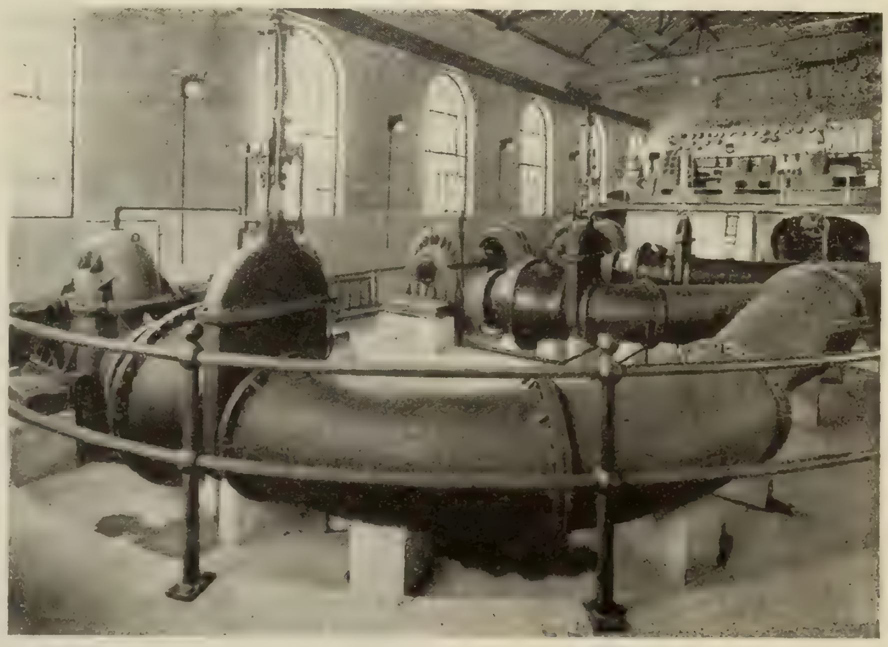
Plant Layout

The area occupied by the entire plant is nearly 2½ acres. At the lake end of the plant is the suction well, connected to chambers near the lake by two 72-in. diameter steel pipes, through which the water flows by gravity to the well. To the west is the coal and chemical store, a concrete structure located near the wharf so that the materials coming over on scows can be handled with facility. Next, to the north, is the boiler house, with the pumping station adjoining. A chimney is built to the north of the boiler house, and the wash water tank is situated between the pumping station and filter house. The chimney was built by the Custodis Canadian Chimney Co., Toronto, and is 122 feet high above boiler grate bars, and 7 ft. inside diameter at the top. It is constructed of buff pressed brick outside, and "Custodis" perforated radial brick inside, with a firebrick lining 40 feet up. The wash water tank was built by the Canadian-Chicago Bridge & Iron Works, Bridgeburg, Ont. The tank is of steel and has a capacity of 2,000,000 Imperial gallons. Its bottom is 60 feet above the ground and 45 feet above the top of the filters. The filter house is on the north side of the plant and is connected to the pumping station by a tunnel in which is also a 72-in. venturi meter.

The sand for the filters was obtained from pits on the mainland. The sand was taken in cars to the sidings at the foot of Spadina avenue and towed across on scows to the Island, being afterwards prepared at the site. All coal required is taken over the same way. During the construction of the plant the contractors had their own carpenters, blacksmiths, and machine shops. Philip J. Duff has been resident engineer in charge of the plant since the work started. Considerable care had to be exercised and special precautions adopted when excavating and building the foundations owing to the water-logged condition of the land. The buildings, with the exception of the coal and chemical storage, have reinforced concrete foundations, with concrete substructures carried up to a height of one foot below the finished ground level. The superstructures of the buildings are of buff pressed brick, and on the steel frame work forming the roof is placed boarding with red Spanish tile on top. The window frames are of pressed steel sash, fitted with wire glass. The floor and substructure of the filter house are built in sections with joints to allow for expansion or contraction.

Suction Well

The suction well building is 40 ft. square and the suction well is 24 ft. diameter and 25 ft. deep. The water comes from the lake into two chambers near the lake front and flows by gravity through two 72-in. diameter steel pipes, one from each chamber to the suction well. At the end of each pipe in the well is a 72-in. hydraulically operated gate valve supplied by Glenfield & Kennedy, Kilmarnock, Scotland. The valves are operated at a pressure of 700 lbs. per sq. inch from hydraulic pumps and accumulator located in the pumping station. The valves open the full 6 ft. in 2½ minutes. The suction well is used as a screen chamber from which the water is taken by three 36-in. pipes to the pumps. There are six sets, being 3 screens to each set, of fine mesh copper in duplicate, so that one set can be taken out for cleaning while the other set is in



INTERIOR VIEW OF PUMPING STATION, SHOWING THREE 36-MILLION GALLON "DE LAVAL" PUMPS.

operation. The suction well has a surge overflow in the event of any sudden failure of the Hydro power. There is a Builders' Iron Foundry indicating instrument for indicating the water elevation at all periods. The building is steam heated and there is also a 1-ton crane provided for lifting the screens. The coagulant is introduced to the water in the well, coming through duplicate pipes from the chemical building.

WILLIAM STORRIE, A.M. INST. C.E.,
Chief Engineer and Director, John ver Mehr Engineering Co.

Chemical and Coal Storage

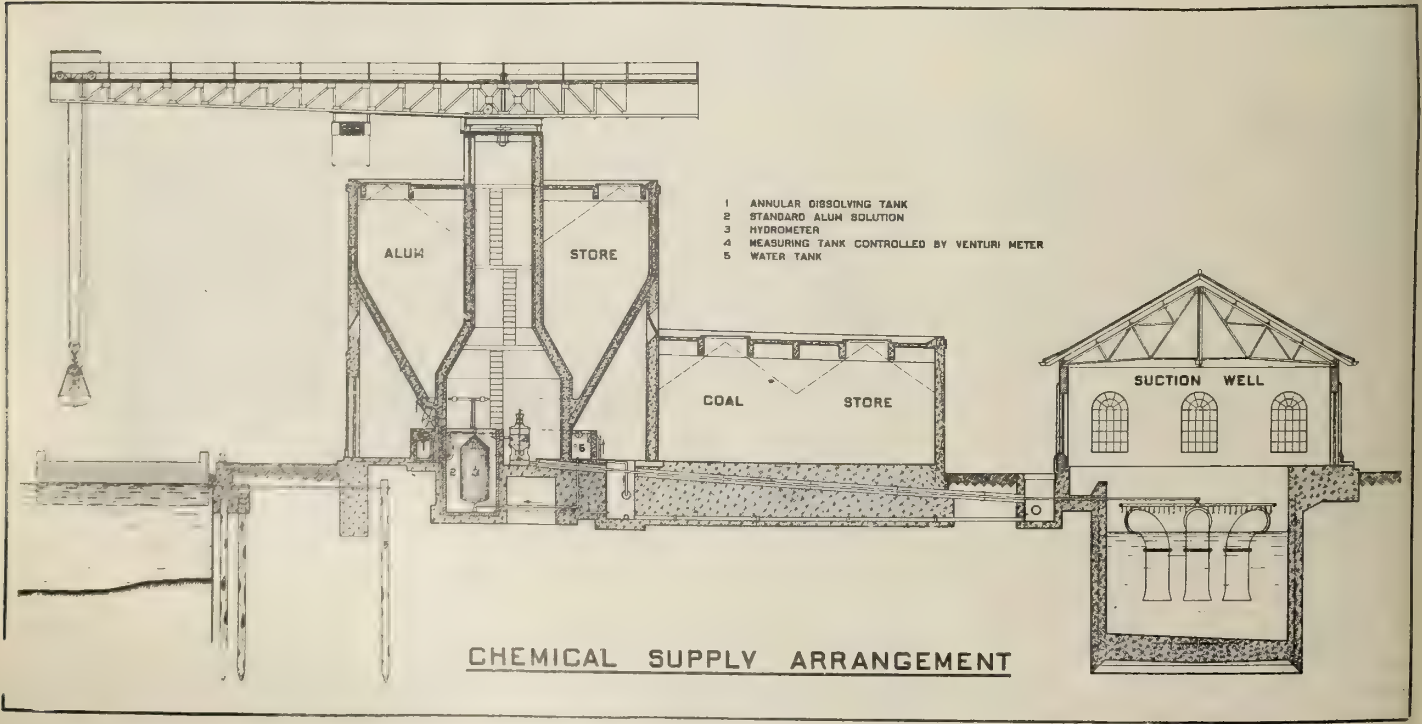
The building comprising the chemical and coal storage is constructed of reinforced concrete. The chemical building is circular, being 40 feet diameter, the upper part carrying a horizontal 4-ton crane with 60 ft. reach for unloading scows at the wharf. The coal storage is built around the chemical buildings except at the front, which is straight. The coal storage has a capacity of 1,500 tons. The chemical building will hold about 800 tons of sulphate of alumina or alum, as it is more generally called. Around the storage bin are a number of doors through which the alum is fed down to a tray at mid-level in the dissolving channel maintained full of water. The solution is fed from this channel into a dilution tank in which it is automatically diluted down to the standard 5 per cent. by an arrangement similar to a hydrometer. From the tank the solution is fed into a measuring tank controlled by the 72-in. venturi raw water meter in the pumping station through a combined electric and hydraulic relay. From the bottom of the measuring tank the solution gravitates through lead pipes to the suction well and is there distributed throughout the raw water.

In this apparatus, which is in duplicate, the annular dissolving channel tank is kept full of filtered water by a float valve. From the water tank the water flows freely to the dissolving tank and, after dissolving, the alum passes through a valve at the top of the hydrometer. At the same time the water also comes from the water tank to a valve at the bottom of the hydrometer. The hydrometer is poised in the solution between the two valves. Any vertical movement of the hydrometer opens one valve and closes the other. Thus it will let in strong solutions at the top and water at the bottom until the balance is obtained, at which the hydrometer just floats in a solution containing 5 per cent. of aluminum sulphate.

Filter House and Filters

The filter house is 277 ft. long by 123 ft. wide. It contains ten steel filter tanks, arranged in two rows, each tank being 50 feet diameter and 14 ft. deep. Between the two rows are the mains for the raw water, filtered water, and waste water. These mains are connected with each filter by cast iron pipes equipped with hydraulically operated gate valves.

WILLIAM GORE, M. INST. C.E.,
Consulting and Civil Engineer to John ver Mehr Engineering Co.



CHEMICAL SUPPLY ARRANGEMENT

The operating gallery extends the full length of the building in the centre and at the same level as the top of the filters. The gallery has stairways at each end. On the gallery are ten operating tables, five on each side, or one for each filter. The tables are made of Cecilian marble and have on the top handwheels for operating the small valves under the table, which work the hydraulically operated gate valves that control the filters. In connection with each handwheel there is a gauge for indicating the amount of opening of each valve. Behind the table are situated a loss-of-head gauge, and a venturi water meter, registering the amount of filtered water. On the west side of the space between the two rows of filters is the 72-inch raw water pipe while on the other side is a corresponding pipe for filtered water, delivering into the inspection tank at the end of the building. Above these pipes are situated two 36-in. cast iron pipes, one above the other. The lower pipe takes water after backwashing from the overflow gutters of the filters, while the upper pipe is for back wash water and is connected to the wash water tank. There are, in this building, 50 Glenfield & Kennedy hydraulically operated valves ranging from 6 ins. to 24 in. diameter.

Filter Tanks

The filter tanks are constructed of steel plate supported by cast iron columns. In the centre of each tank is a space 16 feet 8 in. in diameter, in which is located a 16 in. diameter by-pass with a relief valve. At the top of the filter are arranged gutters for carrying off the wash water during the cleaning operation. Each tank contains about 600 cubic yards of sand and has 30 sand cones or units with a 6 in. standpipe up the centre of each cone. For about 3 feet above the bottom of the tank these units are separated by spaces formed with steel plates and containing the extractors. On the bottom of the tank is the filtered water underdrain system consisting of $1\frac{1}{2}$ in. perforated sherardized pipes laid on concrete and connected to a collector. Gravel 9 in. deep is placed on the pipes in three layers, each a different grade. The filter sand is placed on top of the gravel to a depth of 9 feet. When the filters are operating, the stationary sand cones have a slope of 60 degrees and the drifting sand cones 30 degrees to the horizontal. The cones are formed by the action of the water and drifting sand passing down through the extractors to the sand washer and up to the standpipe, the sand being deposited around the pipe at the angle of repose The surface of the stationary sand collects the deposit in the water as it passes through to the underdrain system.

INTERIOR VIEW OF PUMPING STATION, SHOWING AUXILIARY PUMPING UNITS AND SWITCHBOARD PLATFORM.

When in operation, the coagulated raw water passes from the raw water main and enters the filter partly through the sand washer and up the standpipe or through the by-pass controlled by a relief valve. From the top of the filter it passes in turn through the drifting sand, stationary sand and gravel, to the collecting system, where it flows away through the filtered water main to the inspection tank. During this time the drifting sand is passing down the extractors and through the small pipes to the sand washer where it is cleaned and is again forced up the standpipe to the filter. This process is continuous.

About every ten days, according to the condition of the raw water, the filters have to be cleaned or back washed. The backwashing is done with filtered water from the wash water tank, which also gives the required head. The backwash water passes from a 36 in. main through the underdrain system and up through the gravel and filter bed, overflowing into the gutters where it is carried away through a 36-inch drain pipe to the lagoon. The valves during this operation are operated very slowly so that the gravel and sand bed are not disturbed. The dirty water from the sand washer is carried away in a small pipe connected to the waste pipe.

INSIDE VIEW OF FILTER UNIT BEFORE GRAVEL OR SAND HAVE BEEN PLACED IN POSITION.

Pumping Station—Boiler House

A reserve steam plant is installed, and in connection with it are four boilers for supplying steam to the turbo-generator set in the pumping station and also for the steam heating system.

The boiler house and pumping house are in one building but are separated by a brick division wall. The entire building is 142 ft. by 75 ft., the boiler house part being 75 ft. long by 40 ft. wide. The latter contains four 300 horse power, Scotch, marine type, dry back boilers built by the International Engineering Works, Amherst, N.S. They are each 11 ft. 8 ins. mean diameter, and contain 2,200 square feet of heating surface. Each boiler has two Morrison corrugated furnaces of 50 ins. inside diameter. To the rear end of each corrugated furnace are riveted three plain courses aggregating 7 ft., making a total length of furnace and flue of about 15 ft. In each course is placed a Galloway tube making six of these tubes to a boiler. These Galloway tubes are an interesting feature, tending as they do to improve materially the circulation. Each boiler has 142 tubes of 3½ inches diameter and spaced 4¾ inches between centres; also a manhole on the top of shell and one on the front head below the furnace. MacDonald shaking grates are fitted, and furnace doors are of balanced type.

In the main flue leading to the chimney is located a balanced damper controlled by a Ford damper regulator. Each boiler is equipped with the following accessories:—One 8 in. main stop valve with by-pass; two ball and lever safety valves set for 150 lbs. working pressure; also two spring type safety valves; one 12 in. steam pressure gauge; two sets of large size water gauges; one feed check valve; one blow off valve and one blow off cock. In connection with the steam heating system there are two reducing valves, the final reduced pressure being two pounds. All the piping and fittings are extra heavy. The boilers, piping, valves, breeching, etc., will be covered with 85 per cent. magnesia, the latter being covered with 12 ozs. canvas, all supplied by the Philip Carey Co., Toronto. The breeching to smoke stack was built and installed by the International Engineering Works. A 12 in. steam header extends over all four boilers and is 50 feet long. The steam line from header to the pumping station is 6 ins. diameter.

VIEW LOOKING ALONG FILTER GALLERY.

The boiler feed pump was supplied by the Smart-Turner Co., Hamilton, Ont. It is a 10-6-12 ins., duplex, outside packed unit fitted with pot valves.

There is also installed in the boiler house a 1000 horse power Cochrane feed water heater which takes the returns from the heating system, steam pumps and steam lines. A Bawden vacuum pump in connection with the heating system is also installed in the boiler house.

Pump House

The pumping station is 75 feet by 102 feet, and contains the three main

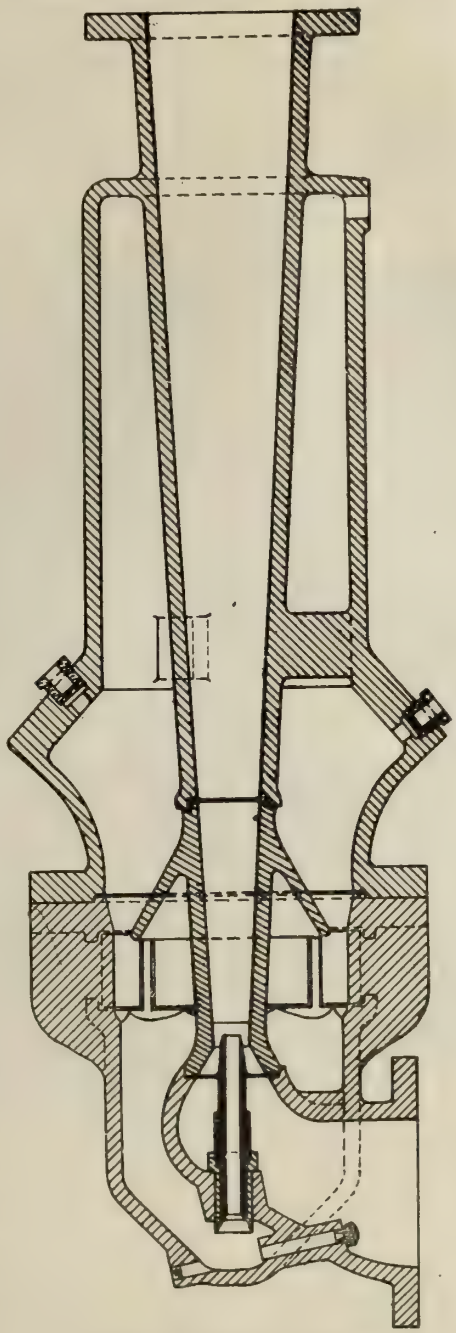
INTERIOR VIEW OF PUMPING STATION, SHOWING MAIN PUMPING UNITS, GENERATOR SET, AND SWITCHBOARD.

pumps, a steam turbo-generator set, switchboard, wash-water tank pumps, and pumps for hydraulic valve operating system. Ample space has been provided for installing equipment for other purposes in connection with water supply of the Island and City. The interior of the building is of buff brick with white glazed brick around the walls to a height of 4 ft. 6 ins. above floor line.

All the large pumps are situated along the South side of the building at a lower level than the main floor, while at the West end is a platform 5 ft. 6 ins. above the main floor, around the turbo-generator set. At the rear is the switchboard gallery, 3 ft. 6 ins. above the platform. The switchboard gallery is L shaped and contains at one end the main switchboard for the mechanical filter plant and a table from which hydraulic gate valves on the main pumps are operated. At the other end of the gallery is a venturi meter recorder for recording the flow in the 72 in., pipe and also a wash water tank level indicator. In the gallery, space has been allowed for additional switch boards, one for controlling the machinery for existing slow sand plant, and another also in connection with the old plant. These switchboards have not been installed at present but will be at a later date. Below the gallery are the transformers, wash water pumps, accumulator pumps, and drainage pumps. The pumping station has two bays, over each of which is a 12 ton Hepburn hand operated traveling crane. A covered passage connects the pumping station with the filter house. The 72 inch raw water main from pumps to the filters runs through this passage and has a 72 inch venturi meter in the line.

Filtration Pumps and Motors

Three 36 inch pumps are installed for pumping the raw water from the suction well to the filters, each pump having a capacity of 36 million gallons per 24 hours against a total head of 32 feet. They are of the De Laval type, direct connected by means of a flexible coupling to a Canadian Westinghouse 325 horse power, induction motor running at 360 r.p.m. The motors use hydro current of 2200 volts, 3 phase, 25 cycles. The pumps were supplied through and installed by the Turbine Equipment Co., Toronto. They are single stage, double suction centrifugal units with a guaranteed efficiency of not less than 77 per cent. The impellers are of bronze and renewable, the case and impeller rings being also of bronze. The hammered steel shaft is protected from the action of the water by bronze sleeves, and the pump casings are split on the horizontal centre line. Priming is secured by a 3 inch Penberthy ejector. Each pump is equipped with a check valve and gate valve on the discharge side. The 36 in. gate valves were supplied by Glenfield & Kennedy, Kilmarnock, Scotland, and are hydraulically operated from a control on the switchboard gallery. The discharge pipes from the pumps are connected to a main which increases in diameter from 36 in. to 72 in., the large end being connected to the main leading to the filter house.



DETAIL OF SAND WASHER.

Turbo-Generator Set

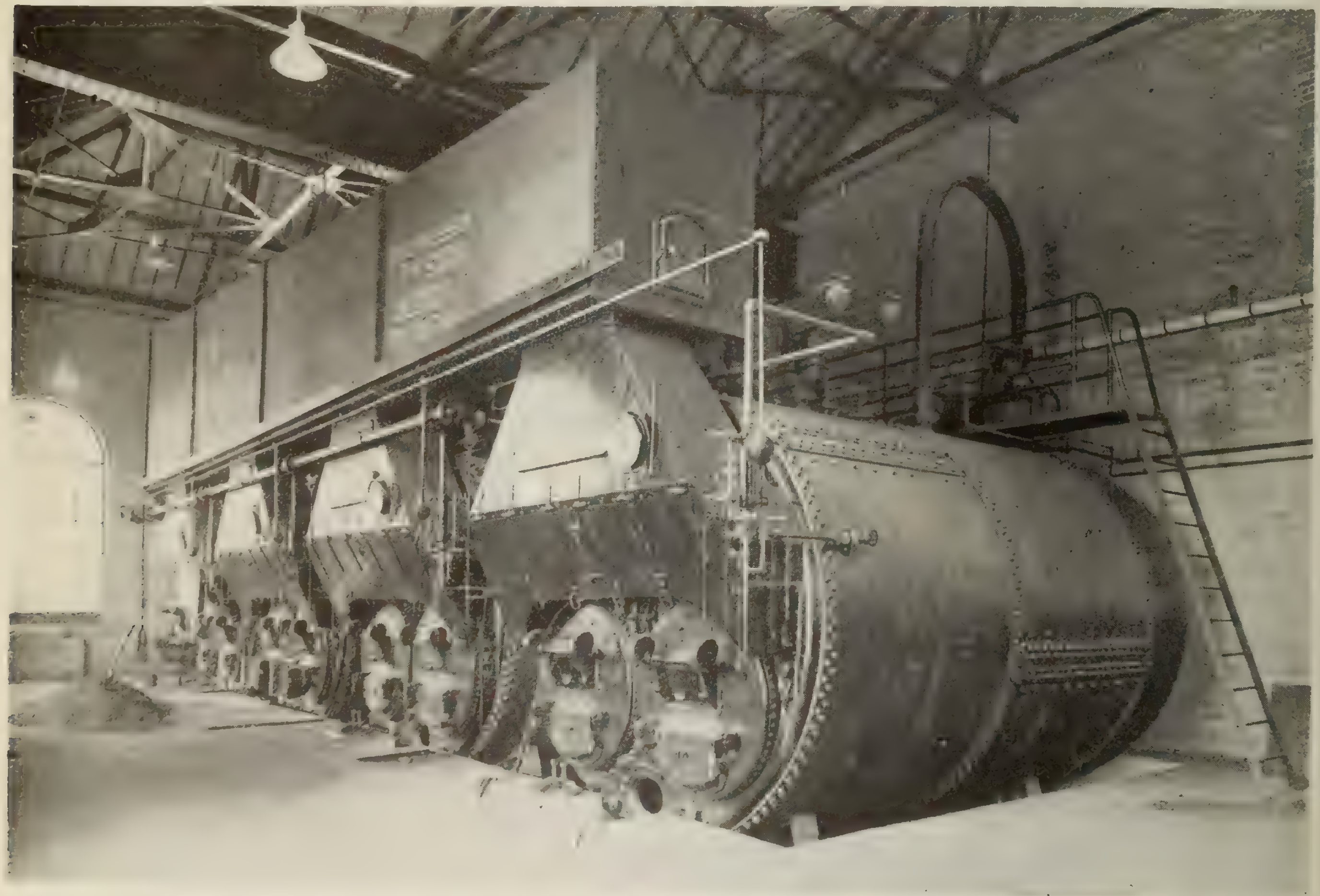
The pump motors are operated by hydro power, and during peak load, or in the event of the power failing, the steam turbo-generator set has been installed as a reserve. This unit is of the De Laval type and was supplied through and installed by the Turbine Equipment Co. The steam turbine is an 1800 horse power impulse type machine, having one velocity and twelve pressure stages. It is direct connected, through double helical reduction gears to a 1335 k.v.a. Lancashire dynamo of 2200 volts, 3 phase, 25 cycles, slow speed, revolving field type, with a d.c. exciter on the main shaft. The turbine operates at a speed of 3600 r.p.m., the generator at 500 r.p.m., the gear ratio being 7.2 to 1; the gear bearings are of the three pinion type. The initial steam pressure on the turbine throttle is 135 lbs. per sq. inch, and the exhaust is into a vacuum of 1½ ins. Hg. absolute. The guaranteed steam consumption is under 18 pounds per k.w.h. Under the turbine is installed a Wheeler low level type jet condenser with centrifugal condensing water and an entrainment centrifugal air pump. Both pumps are direct connected to a 45 horse power Lancashire a.c. motor.

The turbine is fitted with a Jahns governor acting from a pilot valve that admits steam to a piston controlling the governor valve, the latter being a balanced double-seated unit. The steam admission is controlled by throttling. There is also an emergency governor consisting of a Schutte & Koerting trip and throttle valve which trips at about 10 per cent. above normal speed and stops the machine. The main steam pipe to the turbine is 6 ins. diameter and the exhaust to condenser, is 36 in. diameter. This unit is equipped with an oiling system. A rotary pump connected to the governor spindle pumps oil from a small collecting reservoir to an overhead Burt cooling tank. The oil returns through a filter under a pressure of 5 lbs. per sq. inch to the turbine and pinion bearings, and also to the manifold containing nine nozzles which supply oil to the gear and pinions. The oil is next carried by brass piping to a small reservoir, and after being strained is pumped back to the overhead tank. The turbine and pinion bearing are water cooled, and the gear and alternator bearings are of ring oiling type. A 6 in. Cochrane steam separator is installed in the line from boiler header to turbine, and is drained into a Squires trap.

Auxiliary Pumping Units

In the pumping station under the switchboard gallery are located various auxiliary pumping units, while there is also a De Laval booster pump situated near the main pumps. This booster pump has a capacity of two million Imperial gallons per 24 hours and is intended to be used when only a comparatively small volume of water is required for the filters or other purposes. It delivers into the raw water main and against the same head, viz. 32 feet, as the 36 in. pumps. It is also of the same general design as the large pumps and is direct connected to a 20 horse power Canadian Westinghouse alternating currents.

The equipment under the switchboard gallery consists of two wash-water pumping units, two hydraulic pumping units and two drainage pumps, the extra set in each case being a reserve unit. Each wash-water unit pumps water up to the wash-water tank for back washing the filters, and consists of a 5 in. De Laval contrifugal pump having a capacity of 350 Imperial gallons per minute against a head of 180 feet. It is direct connected to a 20 horse power Canadian Westinghouse, a.c. motor running at 1415 r.p.m. There are two of these units, each pump being equipped with a by pass so that water can be obtained from various sources of supply.



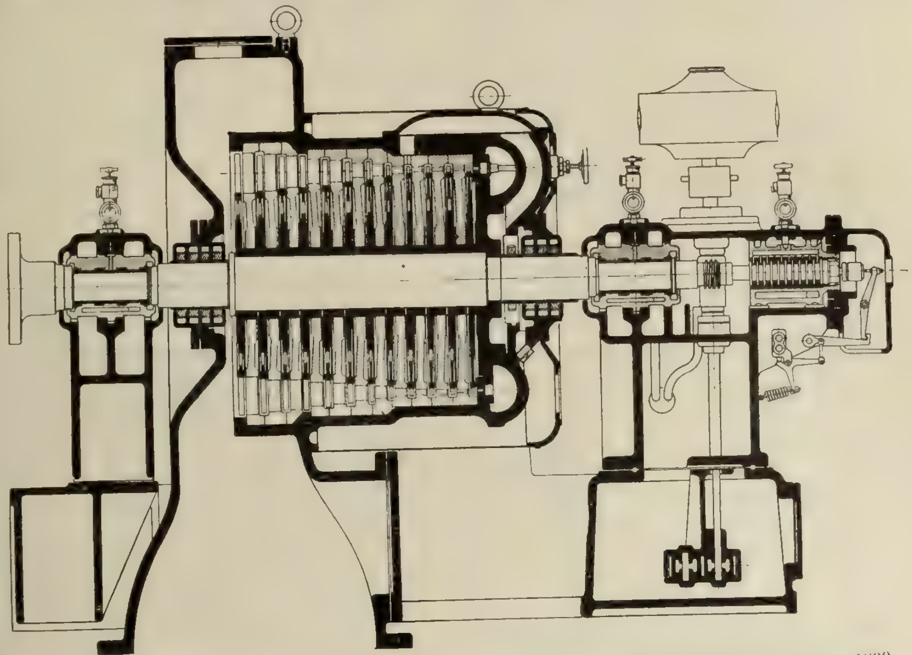
BOILER ROOM SHOWING BATTERY OF FOUR MARINE TYPE, TWO-FURNACE DRY BACK BOILERS.

The hydraulic pumps operate in connection with an accummulator and supply a pressure of 700 lbs. per square inch for operating the hydraulic gear on the various gate valves in the plant. These pumps are of Glenfield & Kennedy, vertical triplex type, driven through worm gearing by a Lancashire motor, each of the latter being a 7½ horse power, 550 volts, 3 phase, 25 cycle machine, automatically controlled by Cutler-Hammer switches and relays. The drainage well or sump is located under the switchboard gallery. The bottom of the well is the lowest point in the plant and so collects the drainage from any part. The well is 9 ft. diameter and 15 ft. deep, and is cared for by two vertical De Laval 6 in. centrifugal single stage pumps. Each pump has a capacity of 700 Imperial gallons per minute against a total head of 20 feet, and is direct connected to a 7 horse power Canadian Westinghouse vertical a.c. motor. The motors are automatically controlled by Cutler-Hammer self starters.

Switchboard and Transformers

The main switchboard was supplied and installed by the Canadian Westinghouse Co. It is made of blue Vermont marble, of standard construction, and has 15 panels. It is 25 ft. 4 ins. long, and 7 ft. 6 ins. high. The first panel belongs to the exciter; the second controls the turbo-generator; the third is for the incoming line from the Hydro system, while the fourth, fifth and sixth panels control the three 325 horse power main pump motors. The seventh panel is connected to the three 50 k.w. transformers, the range being 2200—550 volts for the small motors. The eighth panel controls the two 25 k.w. lighting transformers, 2200—220—110 volts; the ninth controls the 20 h.p. booster pump motor; the tenth, the 45 h.p. condenser pump motor, and the eleventh, the two 7½ h.p. sump pump motors both fed from the one switch and controlled by the Cutler-Hammer auto starters. The two 20 h.p. wash-water pump motors are controlled from panels twelve and thirteen, while the fourteenth panel controls the two 7½ h.p. motors with one Cutler-Hammer auto starter and double throw knife switch for operating the hydraulic pumps. The last panel is blank being reserved for future equipment.

At the left hand side of the switchboard is a swinging bracket with a volt meter, 150 scale for the d.c. exciter, a volt meter with a 3000 volt scale for the a.c. generator and a syncroscope. On the incoming line panel there is a graphic recording wattmeter and an intergrating meter on the generator panel. On the generator panel there are also two ammeters, a.c. and d.c.; a frequency meter and an indicating wattmeter. On the incoming line panel there is an ammeter and a power factor meter. On each panel there are the usual operating handles for the oil switches and a pair of relays, the general layout being arranged to use hydro current or the power generated at the plant. On the wall behind the switchboard are mounted the remote controlled oil switches, also the starting and running buses on the 2200 and 550 volt motors. The transformers are of Canadian Westinghouse make, and consist of three 50 k.w. units transforming the line current at 2200 volts down to 550 volts for the small motors, and two 25 k.w. transformers for the lighting system which is 3 wire, 220-110 volts. All motor connections are made in lead-covered triple conductor cable.

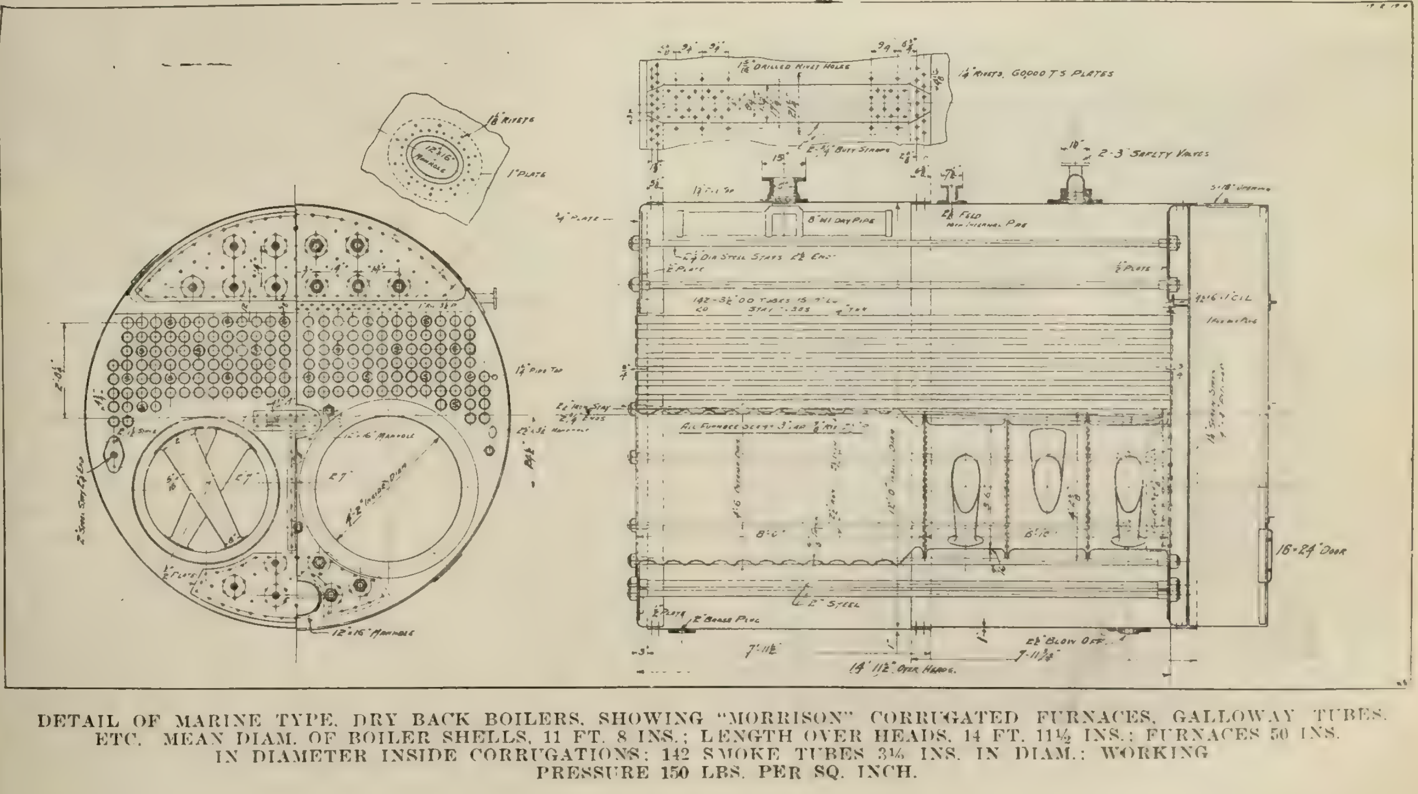


AXIAL SECTION, SHOWING GENERAL ARRANGEMENT OF "DE LAVAL" 1800 HORSEPOWER, IMPULSE TYPE, MULTI-STAGE STEAM TURBINES.

Steam Heating System

The steam heating system was designed and installed by Bennett & Wright, Toronto. It is of the low pressure vacuum type, steam being obtained from a valve on the boiler header and passed through two extra heavy Kiely & Mueller reducing valves. The first valve reduces the pressure to 80 lbs. and the second to 10 lbs. There is a connection between these two valves to the heating system in the wash water tank. The layout of the system generally does not present any unusual features except in the filter house where the steel tanks and large surface area of contained water had to be taken into consideration. Attention had however to be given to the matter of the wind pressure on the filter house tending to drive the heat to the opposite side of the building causing inequality of temperature. The total amount of radiation is 17,940 sq. ft. made up principally as follows. Filter house 15,144 sq. ft.; pumping station 1764 sq. ft.; suction well building 612 sq. ft.; chemical house 324 sq. ft.

In the filter house the temperature has to be maintained at 50 degrees Fahr. At the ground floor level, radiators are suspended under the windows on the walls by special steel hangers. The radiators are arranged in two 12 ft. sections one above the other. Radiators are also suspended on the operating gallery and on the skylight. The heating of the entire building can be controlled from a point midway on the operating gallery. At this point is a header with eight connections to various sections of the building, each connection being controlled at the header. The main steam line to header and the header itself are both 9 ins. in diameter. The header controls are as follows:—One for the window low level radiators West side; one for those on the East side; one for the gallery radiators South section; one for the North; two for the coils on the West

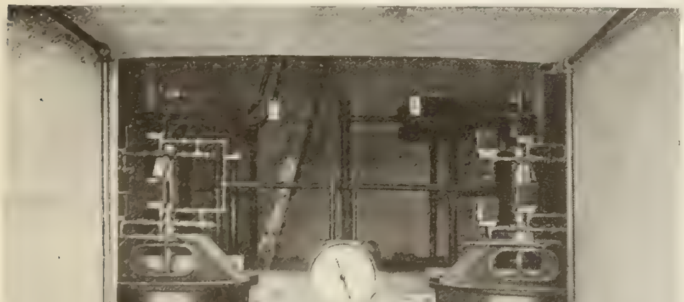


DETAIL OF MARINE TYPE, DRY BACK BOILERS, SHOWING "MORRISON" CORRUGATED FURNACES, GALLOWAY TUBES, ETC. MEAN DIAM. OF BOILER SHELLS, 11 FT. 8 INS.; LENGTH OVER HEADS, 14 FT. 11½ INS.; FURNACES 50 INS. IN DIAMETER INSIDE CORRUGATIONS; 142 SMOKE TUBES 3¼ INS. IN DIAM.; WORKING PRESSURE 150 LBS. PER SQ. INCH.

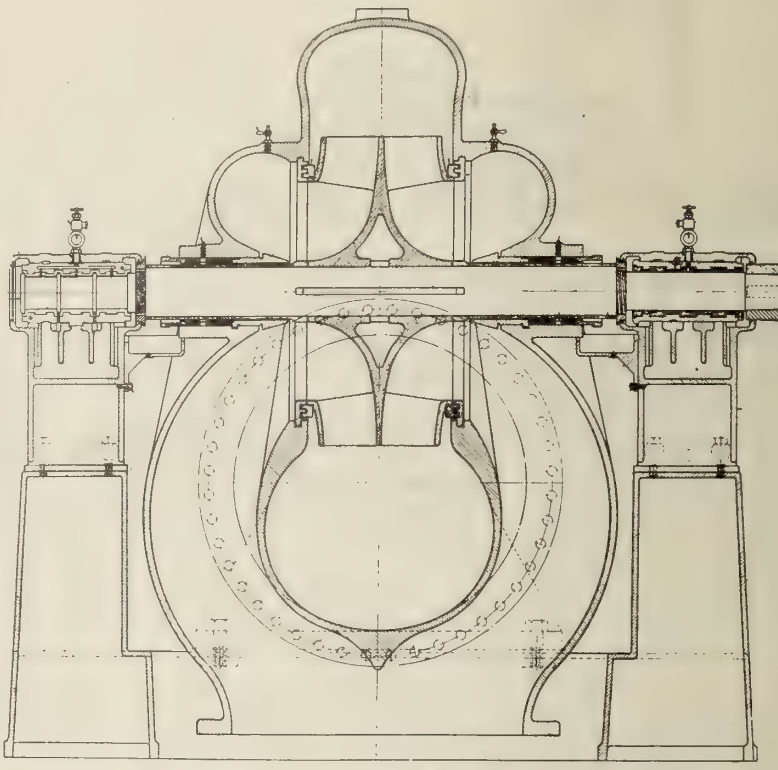
and East sides respectively; two for the skylight or monitor radiators East and West; the centre connection being the steam supply. The control system was adopted in order to equalize the temperature when the wind pressure, already referred to, drives the heat from one side of the building, making the other side too warm, in which case radiators on the warm side would be cut off. The filter house has 15,144 sq. ft. of radiation.

The pumping station has 1764 sq. ft. of radiation and all the radiators in the building have hand valves, and also a "vento" vacuum trap on the return line. These traps allow air and water to pass through but hold steam in the radiator. The chemical house has 324 sq. ft. of radiation and the suction well building 612 sq. ft. The installation in these two buildings is precisely the same as in the pumping station. These three buildings have to be maintained at 70 degrees F. in zero weather.

The wash water tank is heated by steam at 80 lbs. pressure taken from a point between the reducing valves on the boiler. This line is connected to a 2 in. pipe around the tank inside, the steam mixing wth the water. A Bawden 40,000 sq. ft. 8-10-10 ins. vacuum pump is installed in the boiler house for drawing the returns from the system under from 10 ins. to 15 ins. of vacuum to the "Cochrane" heater also in the boiler house. The pump is controlled by a Foster vacuum govenor. All main steam lines are covered with air cell covering and the radiators are painted with two coats of old bronze. The radiators were supplied by the Dominion Radiator Co.



CHEMICAL FEED APPARATUS INSTALLATION.



SECTION THROUGH "DE LAVAL" 36 INS. CENTRIFUGAL PUMP.

Lighting System

The lighting is on the 3 wire, 110-220 volts, single phase, distribution system and was installed by E. F. W. Salisbury Ltd., Toronto. The distributing mains are run underground from the switchboard to the various buildings, the circuits being run to Crouse-Hinds panel boards enclosed in steel cabinets. The wires are carried in galvanized conduits supplied by Conduits, Ltd., Toronto. The lighting in the chemical house consists of two 40-watt lamps on each landing, also four 100 and one 25 watt lamps with reflectors in the chemical storage. In the coal storage are ten 60-watt lamps. In the suction well building is a cluster light containing five 100-watt lamps. In the pumping station there are ten wall brackets, each with a 200-watt nitrogen filled lamp and angle reflector. There are also six suspended semi-indirect lights, each having a nitrogen filled lamp, and sixteen 60 watt lamps in various parts of the building. In the boiler room there are twelve 60 watt lamps and one 100 watt lamp with reflector. There are six 60-watt lamps installed in front of the boilers, near the water gauges. In the filter house there is one cluster light containing five 100 watt lamps over the centre of each tank, equipped with special reflectors. There is also a lamp at each operating table, making a total of 15 lights, ten of 500 watt capacity and five of 300 watt capacity. There are also a number of lights around the bottom of the tanks and on the stairways. The wharf is illuminated by means of nine 300 watt lamps mounted on brackets.

Efficiency of Plant

In conclusion it should be mentioned that both buildings and equipment represent workmanship of high order. The plant is unusually interesting from an engineering standpoint as it is the first one of its kind to be installed in this country. The contract requires that the filtration plant shall remove 98 per cent. of the B. coli as determined by the standard methods of the American Public Health Association. All turbidity must be removed leaving a bright colorless water free from taste. Such results must be obtained by the use of not more than one grain of alum per gallon of water under average conditions. Among the sub-contractors not already mentioned are included the following:— Cast iron pipe was supplied by the Canada Iron Corporation and the Standard Foundry; all venturi water meters by the Builders' Iron Foundry, Providence, R.I.; filter tanks and steel pipe were made by the Thor Iron Works, Toronto; handrailing, steel stairway and window sash by the A. B. Ormsby Co., Toronto; bricks came from the Don Valley Brick Works, Toronto, and the structural steel was supplied and erected by the Dominion Bridge Co., Montreal and Toronto.

CANADIAN PEAT RESOURCES

ATTENTION is being drawn to the possibility of expansion of Canadian commerce and industry as a result of the war. This may take the form of domestic production of articles for a supply of which Canada has been dependent upon foreign sources, or of increased exports to other countries of products hitherto supplied by Germany and Austria. Among other things, this emphasizes the importance which development of the latest resources of Canadian peat bogs might readily assume if full advantage of the new conditions arising from the war were taken. Sulphate of ammonia, the chief by-product of European peat plants, is a valuable fertilizer worth about $60 per ton. The world's production last year is estimated at 1,365,000 tons, worth about $80,000,000, says the Journal of the Canadian Peat Society.

Many Canadian peat bogs are rich in nitrogen, and, therefore, suitable for this industry, and inquiries have already been made by British capitalists with a view to establishing chemical works in Canada, provided that a sufficient supply of peat can be guaranteed. Apart from the potential value of our peat bogs as a subsidiary source of fuel supply and for production of sulphate of ammonia, there are numerous other products, such as moss litter, peat dust, alcohol, acetic acid, acetone, tar, tar oils, creosote, etc., which might form the basis of paying industries, giving employment to many people, where now we have only waste lands.

Provincial Locations

Systematic investigation of the peat bogs of Canada with a view to ascertaining their location, extent, depth, character and suitability for production of fuel and litter has been carried on since 1908. During the period from 1908 to the close of the season of 1914 there have been located, delimited, mapped and investigated as to depth, character and quantity of peat available for commercial exploitation as fuel or litter, twenty-five bogs in Ontario, twelve in Quebec, eight in Nova Scotia, six in Prince Edward Island, and seven in Manitoba, fifty in all, covering about 140,000 acres altogether and estimated to be capable of yielding about 115,000,000 tons of fuel. Twelve bogs were found to be in part or as a whole adaptable for production of peat litter, having an estimated capacity of production of about 10,500,000 tons. Seven Ontario bogs investigated within convenient shipping distance of Toronto are estimated to be capable of producing approximately 26,500,000 tons of fuel.

Seven bogs in the Montreal district could furnish that city with 23,500,000 tons of fuel. Five bogs along the Lower St. Lawrence in Kamouraska and Temiscouta Counties, convenient to the City of Quebec by water, are estimated to be capable of supplying 16,250,000 tons of fuel and 5,750,000 tons of peat litter. Nova Scotia bogs investigated in Yarmouth, Shelburne and Lunenburg Counties will produce 6,250,000 tons of fuel and 500,000 tons of peat litter. Six bogs investigated in Prince Edward Island can furnish 1,250,000 tons of fuel and over 1,000,000 tons of litter. In 1913 Canada imported artificial fertilizers to the value of $737,656, showing that there is quite a market in this country for peat by-products.

PHENOMENAL INDUSTRIAL ACTIVITY IN SHERBROOKE, QUE.

THE city of Sherbrooke, Que., is experiencing the greatest outburst of industrial activity yet experienced in its history, metal-working and other plants operating at full capacity, some of them night and day. A number of the more important industries have recently expanded and, having expanded, are still planning for further expansion. Others have extensions in process and the word "extension" here does not simply mean a new wing or a boiler room. It means increasing the floor space and capacity by 25 per cent., 50 per cent., 100 per cent., and in at least one case by over 200 per cent. Of course a great deal of this activity is due to war business; practically all the metal working industries in Sherbrooke doing some branch of work in connection with the supply of munitions. The same is true of the woollen mills, and of at least one of the clothing factories.

A notable example of expansion on account of war business is that of the Canadian-Ingersoll Rand Co., who in the summer of 1914 were employing about 350 hands and who now have about 2,100 hands. Extensions for munitions purposes have also been made by the Mackinnon, Holmes Co., Jenckes Machine Co., etc. The E. & T. Fairbanks Co., besides the work they are doing on munitions, are also turning out a large quantity of scales.

Other industries, without war orders, are all very active in the manufacture of their regular lines. The Canadian Connecticut Cotton Mills, Ltd., who manufacture all the tire duck made in Canada, are completing large extensions which will triple their present capacity. Before making these extensions, the company had under consideration the question of moving from Sherbrooke, but after looking over various cities and weighing up all considerations, they finally decided to remain where they were.

DEVELOPED WATER POWERS IN BRITISH COLUMBIA

THE accompanying detail statement shows at a glance the developed water powers of the Province of British Columbia, and indicates at same time those owned and operated by public utility corporations, as well as those privately owned. The horse-power developed is given in each case:—

Public Utilities

Owners and Location.	Horse-power.
Vancouver Power Co. (B.C.E.R. Co.), Lake Coquitlam and Lake Buntzen	84,500
Western Canada Power Co., Stave Falls	26,000
Vancouver Island Power Co. (B.C.E.R. Co.), Jordan River	25,000
Goldstream	3,000
Nanaimo Electric Light, Power & Heating Co.	870
Duncan, Vancouver Island	160
City of Prince Rupert, Woodworth Lake	1,650
Ashcroft	100
Kamloops City, Barriere River	2,800
Revelstoke City, Illecillewaet River	600
Golden, city	1,200
Armstrong (Okanagan)	335
Enderby (Okanagan)	100
Peachland, Trepannier Creek	70
Summerland, Trepannier Creek	40
Naramata, Trepannier Creek	40
Penticton, Trepannier Creek	135
City of Nelson, Kootenay River	4,000
West Kootenay Power & Light Co. (Bonnington Falls, Kootenay River, Kettle River, Cascade, near Grand Forks)	23,000
City of Greenwood Waterworks Co.	170
Kaslo	160
Sandon	100
Denver Power & Light Co., New Denver	100
Cranbrook	440
Fernie	400
Coal Creek	630
Michel	670
Athalmer	30
Privately Owned	
Canadian Collieries (Nanaimo), Puntledge River	9,400
Britannia Mining & Smelting Co.	2,735
Power River Co., Powell River	24,000
Ocean Falls Co., Link River, Ocean Falls	11,200
Swanson Bay Forests Wood, Pulp & Lumber Mills, Ltd.	1,250
Granby Consolidated Mining & Smelting Co.	7,325
Hedley Gold Mining Co., Similkameen River, near Hedley	2,650

INCREASING OUTPUT OF ONTARIO MINERALS

THE mineral production of Ontario for the nine months ending September 30, 1916, shows a gain of approximately 37 per cent. over the corresponding period of last year according to a recent statement issued by the Provincial Bureau of Mines. The figures for the period follow, and for purposes of comparison, those of last year are also given. It will be noted that there has been a considerable increase in the aggregate value, as also in the value of nearly all of the individual products.

SUMMARY OF MINERAL PRODUCTION FIRST NINE MONTHS OF 1916.

Product.	Quantity.		Value.	
	1915.	1916.	1915.	1916.
Cobalt ore, tons	92	98	$12,472	$10,591
Cobalt oxide, lbs.	135,337	378,732	107,363	231,947
Cobalt metallic, lbs.	76,979	172,055	66,552	146,467
Cobalt and nickel oxides (unseparated), lbs.	2,501	57,026	500	22,890
Copper ore, tons	......	1,715	......	21,685
Copper in matte, tons	14,057	16,989	2,024,658	6,285,930
Gold, ounces	281,712	363,955	5,826,941	7,513,734
Iron ore, tons	302,586	271,034	601,044	673,170
Molybdenite (concentrates), lbs	......	15,845	16,085	6,381
Nickel, in matte, tons	24,054	31,046	5,369,536	15,523,000
Nickel, oxide, lbs.	142,483	54,152	16,085	6,381
Nickel, metallic, lbs.	11,905	17,435	4,762	7,618
Pig iron, tons	354,153	501,410	4,510,906	6,686,965
Silver, ounces	17,178,629	16,203,091	8,030,469	9,750,040

Cobalt.

The mines of the Cobalt district appear to have definitely established their supremacy as the source of the world's supply of this mineral. Notwithstanding the war, which has closed the European markets, the shipments of cobalt oxides were much greater, both in quantity and value than in the first nine months of 1915. It will be observed that metallic cobalt is assuming an important place in the list. This is mainly due to its use in the manufacture of special alloys, principally stellite, for high speed tools. Stellite is made of cobalt, chromium and tungsten, and is finding a good demand from munition makers and others.

Copper

The extraordinary rise in the price of copper, which averaged 27 cents per pound in New York during the nine months, has brought about the opening of several deposits of copper ore chiefly west of Lake Superior, from which shipments have been made to British Columbia smelters. The principal of these mines is the Tip Top, while another at Mine Centre has lately been sending forward to British Columbia a carload of ore daily. The price received by the shippers has averaged 18.5 cents per pound for the copper content. This figure has also applied to the copper contained in the heavy shipments of matte from the Sudbury nickel copper mines, and a considerable part of the increase in value of the copper reported is due to the higher valuation, although the quantity shipped was also greater by 220 per cent.

Gold

The output from the mines of Northern Ontario is steadily increasing, being 28 per cent. in excess of that for the nine months of 1915. Hollinger Consolidated continues to be the chief producer, accounting for 47 per cent. of the total. Dome followed with 21 per cent., and McIntyre-Porcupine with 10 per cent. The other considerable contributors in this camp are Porcupine Crown, Schumacher, Vipond and Jupiter, which together furnished 5.5 per cent. Outside of Porcupine proper, Tough-Oakes yielded $519,149; Canadian Exploration, Croesus and a small output from Dome Lake amounted to over one-quarter of a million dollars. At Teck-Hughes (Kirkland Lake) the mine has been developed and a mill built which will be put in operation as soon as the power transmission line now being erected from Cobalt has been completed. Other prospects here, the Lake Shore, Wright-Hargrave, Kirkland Lake Gold Mines, La Belle-Kirkland and Sylvanite, are also being developed. This is a promising camp. In Gauthier township, the Huronian mine is being worked under a lease. Several discoveries of gold were made during the summer in Benoit township, but there has not been time to prove their value. At Tashota, the Tash-Orn Co. has bought the Wells claim and has put in machinery to give it a thorough test. This company is also working the King-Dodds claims. A diamond drill has been operated on the Devanney, Reamsbottom and Clive claims.

Molybdenite

There is a demand in Britain for tool-steel purposes, and several deposits of the ore in Eastern Ontario have been opened and are being worked. There are dressing plants at Renfrew and Ottawa, the latter operated by the Dominion Mines Department. Ferro-molybdenum is also being made at Orillia and Belleville. The supply of molybdenite throughout the British Empire has been reserved as a war measure and a price of 105 shillings per unit fixed for concentrates delivered at Liverpool. This approximates $1 per pound here.

Nickel

The Canadian Copper Co. and the Mond Nickel Co. have been working their mines and smelters at maximum capacity, and the output of nickel contained in the matte product of the furnaces, for the nine months falls little short of that for the full year 1915. The production for 1916 will probably exceed the production of 1915 by 20 per cent. The valuation of the nickel in the matte has been increased from about 11 cents per pound (the figure adopted by the mining companies), in 1915 to 25 cents per pound in 1916. Nickel refineries are being erected in Ontario by the International Nickel Co. and the British America Nickel Corporation, the latter of which is developing the Murray mine. Small quantities of metallic nickel are being produced from Cobalt ores by the Deloro Smelting & Refining Co.

Iron

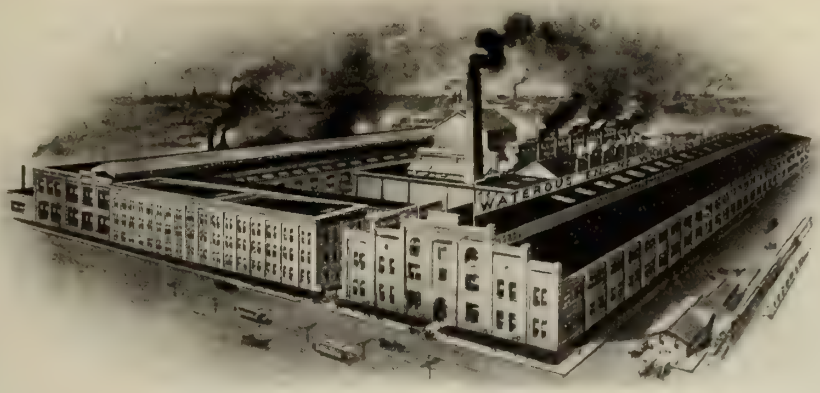
The whole production of iron ore was from the Helen and Magpie mines of the Algoma Steel Corporation. At the latter, the ore (siderite), is roasted previous to shipment. Four blast furnace companies at Port Colborne, Sault Ste. Marie, Deseronto and Hamilton respectively, produced pig iron in quantity 41 per cent., and in value 48 per cent. greater than in the corresponding period of 1915.

Silver

The mines at Cobalt continue to produce, though on a slowly diminishing scale. The number of fine ounces contained in the shipments of the nine months was 975,538 below the record for the same period of last year, but, owing to the much higher prices that have prevailed for silver, the return of the mining companies was $1,719,571 greater. Silver started the year at 56.76 cents per ounce and rose to a maximum in May of 74.27 cents, when it receded to 63.06 in July, reaching 68.51 cents again in September. In 1915, the monthly average was 49.75 cents per ounce. Nipissing still leads in production, Mining Corporation coming next, followed by Kerr Lake, Coniagas, McKinley-Darragh-Savage, Seneca-Superior, Temiskaming, etc. The flotation process is likely to assist materially in increasing the production of silver at Cobalt. It has been introduced at the Buffalo mine, where it is treating successfully low-grade rock containing 5 or 6 ounces per ton. From the gold ores treated during the period, 66,347 ounces of silver were obtained, and from the copper ores 607 ounces.

◆

St. Lawrence Ship Channel.—The ship channel of the St. Lawrence River for 220 miles below Montreal has been continuously undergoing improvement: lighthouses, lighted buoys, semaphores, wireless telegraph, signal stations, pilotage arrangements having not only been established but their service efficiency developed to the fullest extent.



Waterous Engine Works Company
LIMITED
BRANTFORD, ONT.

Plant and Product

Staff Article

Important as may be the future development of Canadian export trade, the soundness of such development is a first consideration. The business whose growth forms the subject of this article possesses the desirable feature of having foreign fields available whose market conditions, based on raw material and consuming power, are closely analogous to our own, and will be more so when conditions again facilitate normal development of world resources.

NO MORE interesting records of the growth and development of the Dominion of Canada offer themselves to the student of industrial economy than those based upon the career of such firms as that which forms the subject of this article. Seventy-two years is more than the span of modern life, yet while the founders of the firm have left the sphere of their earthly activities, the business which they established remains, a monument to their thoroughness and integrity, and, in its present extended and active form, live evidence that their successors have inherited that ability, foresight and progressiveness, which have made the name of Waterous familiar to machinery users in the four corners of the globe.

Pioneer Period

In the year 1844, P. C. Van Brocklin laid the foundation of what is now the Waterous Engine Works Co., Ltd. The scene of operations was a small building on Dalhousie Street, present-day inhabitants being guided to its location by reference to a livery establishment. Conditions under which the plant was operated seem primitive in the light of modern conditions yet the very source of power by which the work was then done would seem to have been an inspiration throughout the years of development—almost three-quarters of a century—which lay before the youthful concern. In 1848, when the late Charles H. Waterous became interested in the business, the motive power for driving the machinery in the little engine shop amounted to one horse-power nominal, brake, and indicated, developed by a single specimen of man's best friend, which, with traditional faithfulness, journeyed round the cellar floor from morning till night.

Evolution of Product

The product of the firm gradually broadened with continued prosperity and the nature of its work through all these years has been closely indicative of conditions and demands existing throughout the country at different stages of its development. Threshing machines, plows, stoves, and sawmills, four very staple lines, were the principal directions of early efforts, to be followed at a later date by fire engines, these latter in turn being supplemented by steam engines, boilers and roadmaking machinery, in all of which the firm's name stands for the best of quality in materials and workmanship.

Each succeeding decade saw additional buildings erected until all available space surrounding the original site was occupied. Ultimately, in 1895, the site of the present factory was obtained and buildings, of a design and nature commensurate with the firm's reputation and equipped with modern plant and machinery, were raised, which, however, have been subject to additions also in recent years.

The product of the plant consists today of equipment for five distinct lines of industry in addition to such special and general work as may be suited to the shop equipment. These lines are:—

(1) Power plant equipment — This includes high-speed automatic engines heavy duty mill engines, portable and stationary engines —boilers of all types, including return tubular, vertical, locomotive and

WATEROUS ENGINE

ENTRANCE TO WATEROUS ENGINE WORKS CO. MAIN OFFICE BUILDING.

marine accessories, such as pumps, injectors, air compressors, condensers and coal handling plant.

(2) Sawmill equipment—The production of sawmill machinery has advanced in step with the development of Canadian forest wealth. From the time the timber logs are drawn from the river down which they have been floated from the lumber camp until they leave the sawmill in the form of rough dressed lumber destined for the multifarious uses of civilized life, the material is seldom out of contact with some item of Waterous equipment. Log handling apparatus, such as log haul-ups, chains, drives, deck equipment, etc.—feed carriages, large and small sawmills, band mills, etc., are a few of the principal items, in the design and development of which the firm has taken a leading part.

GENERAL VIEW OF INTERIOR OF MAIN OFFICE.

(3) The great growth of the paper industry in recent years afforded an allied field in which the company's experience stood it in good stead. Complete pulping machinery outfits form a frequent portion of the firm's output, a notable instance of their capabilities being shown some time ago when they shipped 63 carloads of machinery, being practically the entire pulp mill equipment for a paper plant in British Columbia. Cutting-up rigs, barkers, grinders, beating engines, screens, degenerators and accessory equipment, such as conveyors, etc., indicate the wide manner of the company's efforts in this line.

(4) Good roads are neither obtainable nor maintainable if proper equipment be not procurable and Waterous products for this purpose have more than kept pace with the requirements of modern road construction. Starting with the rough rock and passing over crushers, screens, conveying apparatus and graders, the culmination of roadmaking plant is reached in the steam road roller.

(5) The adoption of motor fire apparatus by city fire departments created a considerable demand for equipment of this type. Steam fire engines, self propelled apparatus, and horse drawn sets with gasoline driven pump are the principal output of this department. Hose waggons, reels, and hook and ladder trucks are also included in this line.

To be satisfactory to producer and purchaser alike, such a variety of material must be produced systematically, in as large quantities as commercial considerations prove desirable, while quality is an essential where long life and satisfactory service are demanded.

Modern Plant Development

As previously mentioned the present plant was laid down in 1895, and besides the main building, 300 ft. x 120 ft., there were also erected of suitable proportions, boiler, blacksmith, moulding and other shops. At the end of the main building facing Market street, is the office building, a handsomely appointed structure of appropriate architecture, having a floor space of 40 ft. x 120 ft.

MAIN BAY OF FOUNDRY, SHOWING DOORS IN END OF BUILDING FOR CRANE TO PASS THROUGH. NOTE ALSO SAND PIPES FROM GALLERY AND RADIATORS ON COLUMNS.

On the first floor are the drafting room and superintendent's office, having convenient access to the main shop and other departments. The second floor contains the general office conveniently arranged and fully equipped with modern devices for the handling of commercial business routine. On the third floor is situated the blue print room and photographic department, the constant improvements and additions to the product rendering the services of such a department very essential in record and publicity work.

VIEW IN SIDE BAY OF FOUNDRY FOR LIGHT FLOOR MOULDING, SHOWING EXCELLENT LIGHTING AND HANDLING FACILITIES.

The completion of the Market street plant saw the company enter on a further period of activity and in 1912 a new foundry was completed so that the production of castings could be maintained on a scale and of a quality which the increasing requirements of the machine shop rendered imperative. In the illustration of the factory, the foundry can be seen on the opposite side of the lot from the main shop and running parallel to it, the old foundry extending along the thoroughfare between the two buildings.

Foundry Department

The foundry is 240 ft. x 110 ft. and is of monitor construction with a centre bay 50 ft. wide, and two side bays 30 ft. wide. The north, or outer bay, is provided with a gallery along its full length, forming the charging floor, and also providing ample space for sand and coke storage, sand tempering machine, etc. The gallery construction is particularly suitable, the floor being of reinforced concrete having a thickness of 6 in., supported on I-beams resting on girders supported by the shop columns. Sand and coke are received on a track paralleling the foundry on the outer or north side and are dumped into a pit below the track, from whence they are elevated to the gallery, whence a distributing chute delivers the coke to a storage space next the charging floor, while another chute directs the sand onto a travelling belt which conveys it to any one of several storage bins.

Conveniently situated between the various sand bins is the mixing machine which delivers the tempered sand into a hopper-shaped truck with a bottom discharge, so that by placing the truck over a number of openings in the floor, the sand can be delivered to various chutes leading to the desired part of the moulding floor.

A CORNER OF THE CLEANING DEPARTMENT. AN EXHAUST FAN REMOVES ALL DUST FROM TUMBLING MILL, AND PNEUMATIC HOISTS ASSIST IN HANDLING THE CASTINGS.

Pig iron and limestone are stored in bulk in the foundry yard and brought up to the charging floor by platform elevator, arriving close to the platform scale for weighing purposes before entering the cupola. Two cupolas are installed—a 72-in. Colliau and a 60-in. Waterous, blast being provided by an A. B. C. Sirocco motor-driven fan.

Building Features

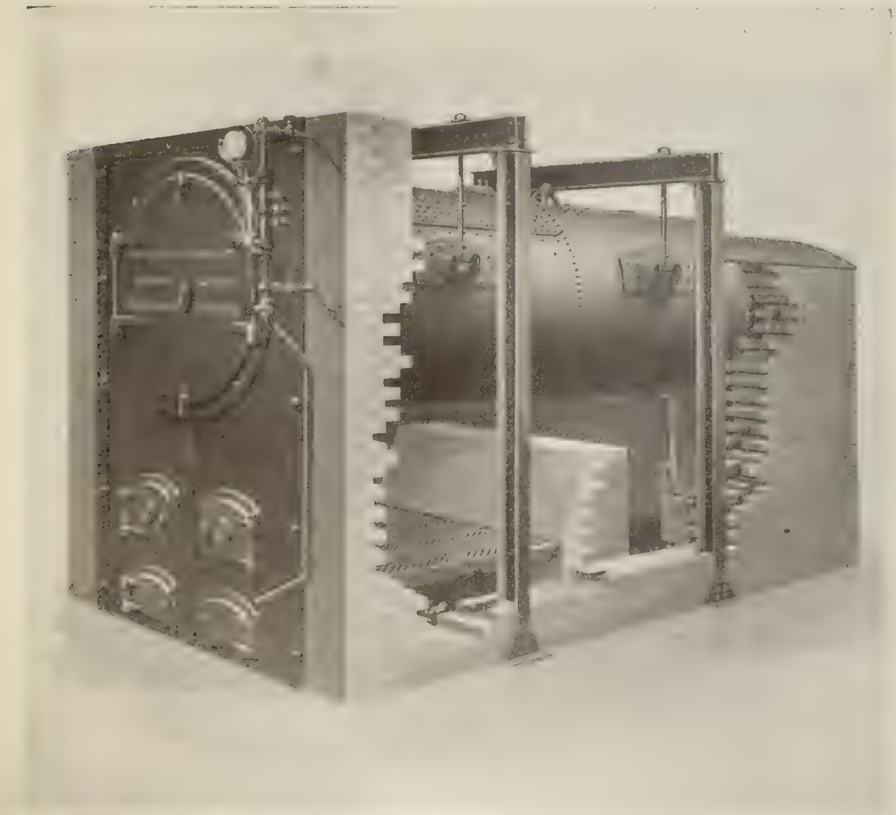
The main bay forms the subject of an

illustration, which conveys some idea of the spaciousness and airiness of the building. As will be seen, this bay is used for floor moulding and the production of heavier castings. The head room to the bottom chord of the roof truss is 30 ft. 9 in., while 7 ft. 6 in. lower are the crane rails which carry a 15-ton, 3-motor Northern electric travelling crane. This crane serves the full length of the main bay, and is provided with exit doors in the end of the building, by means of which it has access to a further 120 ft. of track, where heavy flasks and other foundry equipment are stored. The exit doors are electrically operated, and when open in summer have a beneficial effect on the ventilation.

A BAY IN THE BOILER SHOP, WHERE BOILERS OF ALL TYPES AND TO MEET ALL SPECIFICATIONS ARE BUILT.

The floor of the main bay for a space of 80 ft. x 50 ft. is covered with a system of pits and grids for bolting down large flasks; the bars being spaced 4 ft. apart at a depth of 6 ft. below floor level.

As the product of the factory is of quite a varied nature, the absence of any great amount of repetition work precludes the adoption on a large scale of moulding machines. There is installed, however, one Mumford 10-in. jolt rammer adapted for both moulds and cores, and two Pridmore roll-over draw pattern machines, as well as a pulley moulding machine, which handles work from 12 in. to 18 in. diameter.



RETURN TUBULAR BOILER WITH FULL SUSPENSION SETTING, FIRE GRATE AND FRONT TO MEET REQUIREMENTS OF PROVINCIAL GOVERNMENT.

Side Bays

On the floor of the north bay are arranged the core makers, bench moulders, cupola room, etc., the core ovens being situated in a suitable extension on the outside of the bay.

The south side of the main bay is occupied by a 30 ft. bay devoted to lighter floor work, and served with a 5-ton traveller. In addition to the ample side lights, roof lights are also provided. Exhaust steam from the power plant heats the building by means of radiators ensconced between the flanges of the main shop columns, while a sprinkler fire protection system is also installed. The space formerly occupied by the old foundry is now turned to advantage in the shape of very completely equipped cleaning room, with tumbling mills and cranes, an extensive exhaust system having been installed, which maintains a remarkable freedom from dust in what is usually a dirty corner in most shops.

Boiler Manufacture

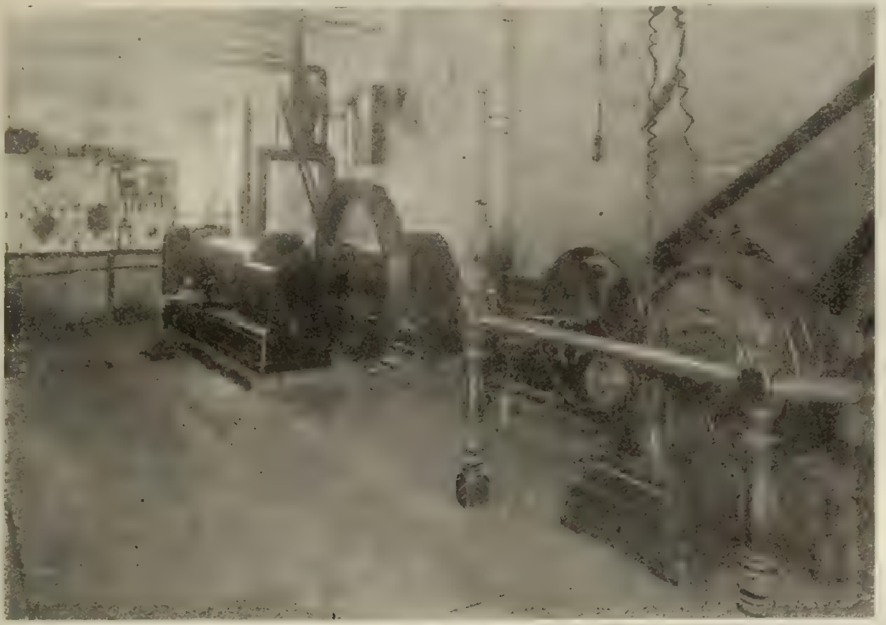
The supplying of complete plants to the various provinces of Canada and to different foreign countries has involved the building of boilers to suit many varied requirements, resulting in an unique experience in boilers and boiler making. Situated in the quadrangle formed by the main buildings, already referred to, is the boiler shop, equipped with machinery and tools to turn out the previously mentioned types of boilers. Planing machines, bending rolls, tube hole cutters, hydraulic and pneumatic tools and appliances enable the work to be produced in a thoroughly substantial manner.

The return tubular type of boiler enjoys a high degree of popularity because of its simplicity of design, the absence of complication in its design not only permitting a high degree of thoroughness in its manufacture, but facilitating inspection and maintenance when in use. The boiler illustration on this page shows the complete setting of a return tubular boiler to conform to the laws of Ontario. Full suspension is provided boilers 16 ft. and over in length, smaller boilers having variations according to size.

A very complete range of locomotive type boilers is produced, from 25 to 150 horse-power, the largest size having an overall length exceeding 23 ft., with a shell diameter of 66 in., and suited for steam pressure of from 125 to 172 lbs. per sq. in., according to size and specification. Plain grates and shaking and dumping grates are supplied to suit any variety of fuel, the design of these along with various types of boiler settings being the result of accumulated experience under different conditions.

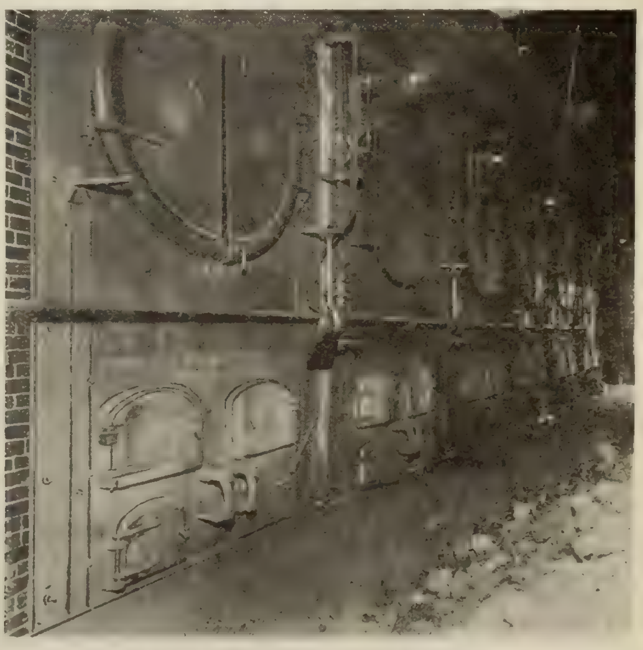
Power House

Flanking the boiler shop is the smiths' shop, where a wide variety of general forging and welding is performed, while situated transversely at the near end of these is the power house building consisting of boiler house and engine room. A view of the boiler house interior is reproduced, showing a battery of six Waterous return tubular boilers, the accessory equipment including a duplex steam feed pump by the Snow Steam Pump Works and a Webster feed water heater.


AIR COMPRESSOR AND HIGH VOLTAGE GENERATING EQUIPMENT FOR MAINTAINING SERVICE IN FACTORY DEPARTMENTS.

As engine builders, the company would naturally be expected to develop its own supply of energy, whether mechanical or electrical. The main shop drive is by belt from a steam engine, this unit being shown in the illustration of engine room interior, the large driving belt being observable over the top of the generator unit in the foreground. The belted engine is of the Ridgway Corliss type, with cylinder 19 in. dia. x 18 in. stroke, developing 235 horse-power at 235 revs. per min. The generator set referred to consists of a Ridgway dynamo direct connected to a 14 x 16 in. McEwen engine, developing 145 horse-power at 250 revs. per min., this being a standard set in the series of McEwen engines built by the company.

PORTABLE LOCOMOTIVE TYPE BOILER MOUNTED ON SKIDS TO FACILITATE TRANSPORT AND ERECTION.


BATTERY OF SIX RETURN TUBULAR BOILERS SUPPLYING STEAM TO FACTORY ENGINES AND PLANT.

Hydraulic power is obtained from a duplex steam-driven plunger pump and pneumatic power from a steam-driven Blaisdell air compressor of the two-stage type, having cylinders 18 x 12 x 12 in. running at 150 revs. per min. High voltage current for special purposes at 1,150 volts is obtained from a G.E. alternator; and direct current at 500 volts from an Electrical Construction Co. dynamo, both being belt-driven by a 10 x 10 in. McEwen engine developing 65 horsepower at 325 revs. per min.

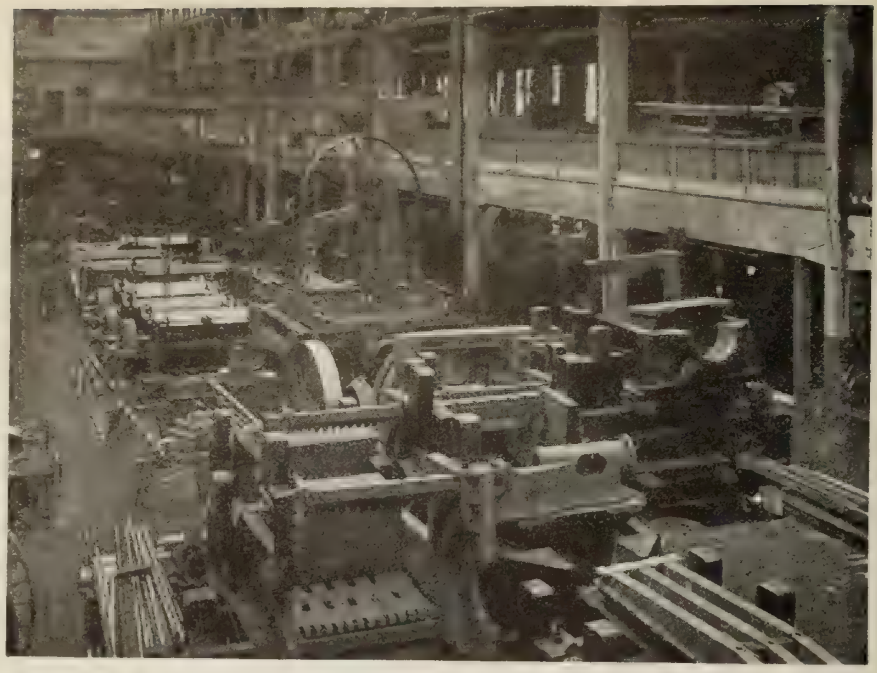
Main Building

The machine shop, tool room, erecting department, test floor, and shipping dock are located on the floor of the main building, while the surrounding galleries accommodate the pattern shop and the finishing and painting department for light work. With a width of 120 ft. and length of 300 ft. this, the principal building, is of substantial construction and dignified design. It is the original building erected in 1895, and, while factory construction and operation ideas have altered with the times, this shop, with its specially-adapted equipment, continues to fulfil its mission in satisfactory manner. Several views are reproduced showing the diversity of work handled.

General Features

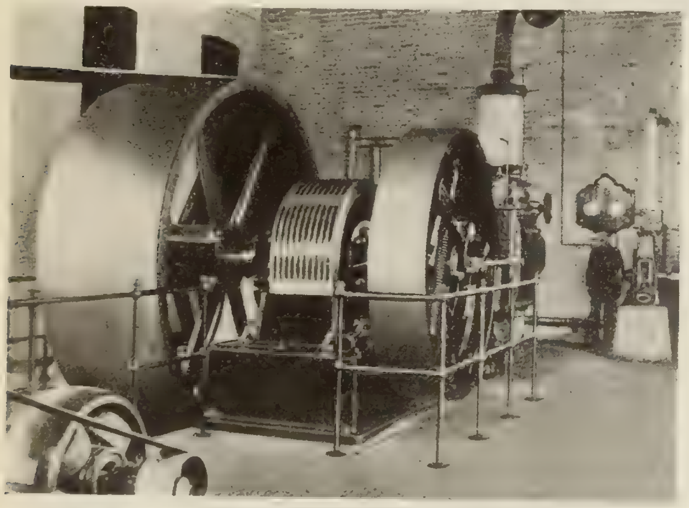
A feature of the equipment is the large proportion of Canadian-made tools installed, the types most in evidence being planers, boring mills, horizontal borers, milling machines and medium and large engine lathes. The production of small parts in quantity is carried out on a number of screw machines, turret lathes, and similar specialized tools. A tool of peculiar interest is a shaft-straightening machine. The device proper consists of a species of punch press frame with an anvil block for supporting the shaft, while the swage block on top receives the impact of the blows delivered by an eccentric-operated ram. On either side of the machine extends the bed about 40 ft. over all, which has gear-driven supporting rollers arranged in pairs at suitable intervals, by means of which the shaft is revolved, so that the deviations from perfect straightness can be ascertained over any portion of the shaft. Any portion can thus be chalk-marked individually and straightened until by the elimination of local kinks it is possible to consider the shaft as a whole, after which little difficulty is experienced in removing the imperfection.

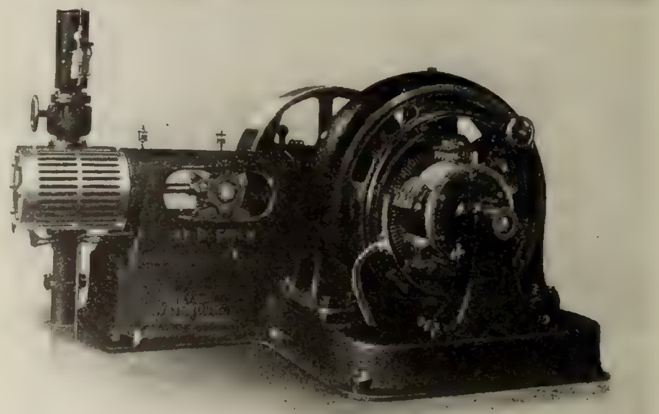
In this, as in many other jobs around a general engineering works, the elements of personal skill and familiarity with operations have considerable influence on the smoothness and satisfactory nature of the product, and conditions show that the firm is exceptionally fortunate in the fidelity of its employees. In few lines of work is this so necessary as engine building, and the long record of success enjoyed by Waterous engines of various types is satisfactory evidence of this fact.

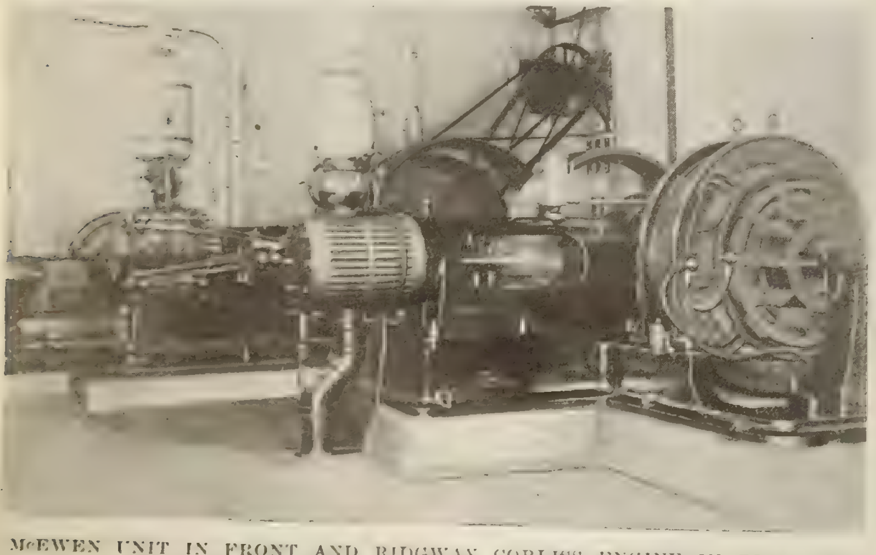

VIEW OF MAIN SHOP INTERIOR SHOWING VARIOUS MACHINES IN COURSE OF ERECTION.

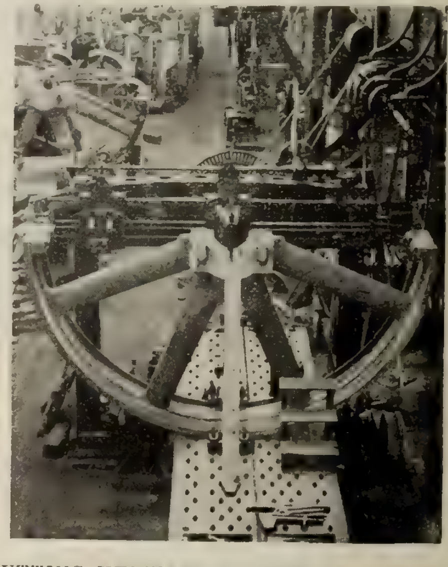
Steam Engine Products

The varied requirements and frequently strenuous conditions under which prime

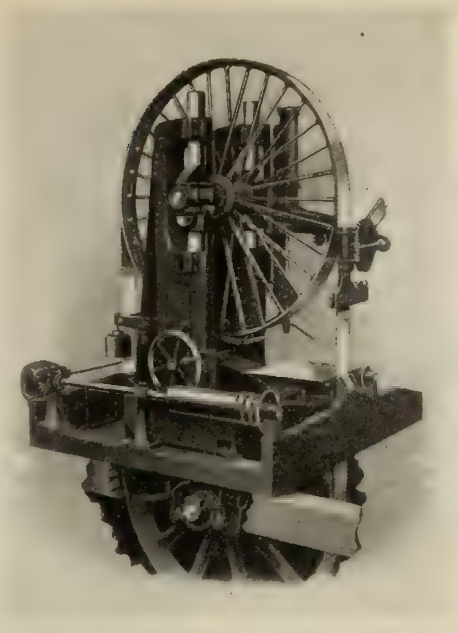

LARGE McEWEN STEAM ENGINE DRIVING MILL BY BELT FROM FLYWHEEL.


TYPICAL GENERATING UNIT DRIVEN BY DIRECT-CONNECTED McEWEN STEAM ENGINE.


McEWEN UNIT IN FRONT AND RIDGWAY CORLISS ENGINE IN REAR, THE LATTER BELTED DIRECT TO MAIN LINE SHAFT.


CUTTING KEYWAYS IN BORE OF LARGE FLYWHEEL CASTING.

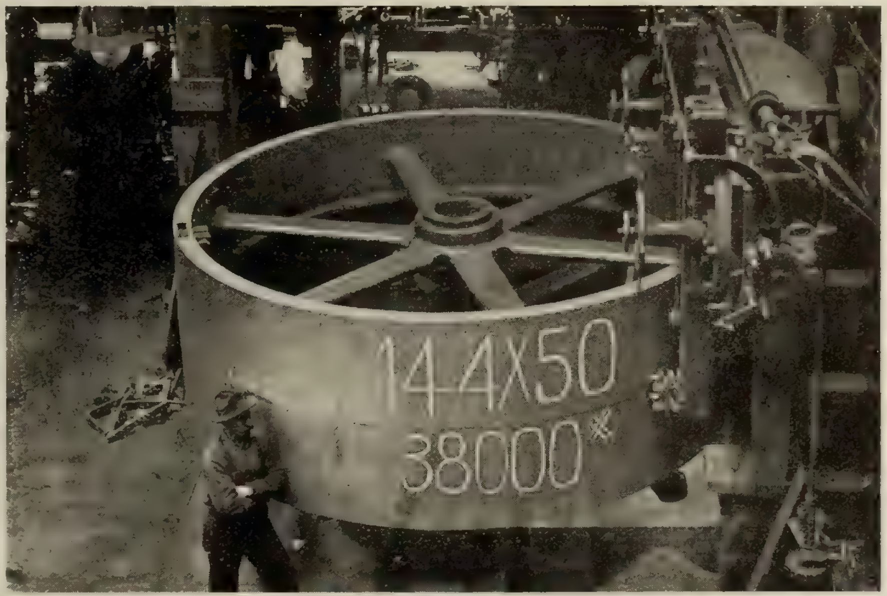
movers are operated in pioneer districts of a young country are in a great measure responsible for the different types of engines built by the company, resulting in the production of steam engines suited for the rough usage of the lumber camp and, on the other hand, the highest class of engine for electric generating work, factory and mill driving, where economy of running and regularity of operation are the chief desiderata. The former type is exemplified in their centre crank engines of general and heavy duty types, in which power, durability and simplicity are outstanding features. The design is characterized by the use of a Corliss type of steam valve located under the cylinder and operated by a single eccentric from the crank shaft. A perfectly balanced valve is obtained, which, along with short travel and large bearing surfaces, insures a high degree of longevity in this vital part. A sensitive type of throttling governor exercises a direct control over the speed.



MODERN TYPE OF DOUBLE CUTTING BAND MILL. NOTE TENSION WEIGHT, BAND GUIDES, AND WORM ON SUPPORTING ROLLER FOR CLEARING WORK.

McEwen Engines

More than twenty years ago the McEwen engine was placed on the market by the Waterous Co., and an enviable record has been built up around this type of prime mover. It is a high-speed automatic engine specially designed for close governing under excessive load fluctuations, such as electric service of all descriptions, mine haulage, crane work, etc. A direct connected generating set is illustrated on page 704, from which the general design of the engine is apparent, the bed being of heavy construction, with the sides open for the purpose of adjusting cross-head shoes and wrist pin boxes. Guides, main bearings and end of bed are machined at one setting to insure perfect accuracy. A feature of the main bearing design is the arrangement of the babbitt liners, which may be removed by simply relieving them of the weight of the shaft, thus obviating the necessity of removing armatures of direct connected units before removing bearing liners.



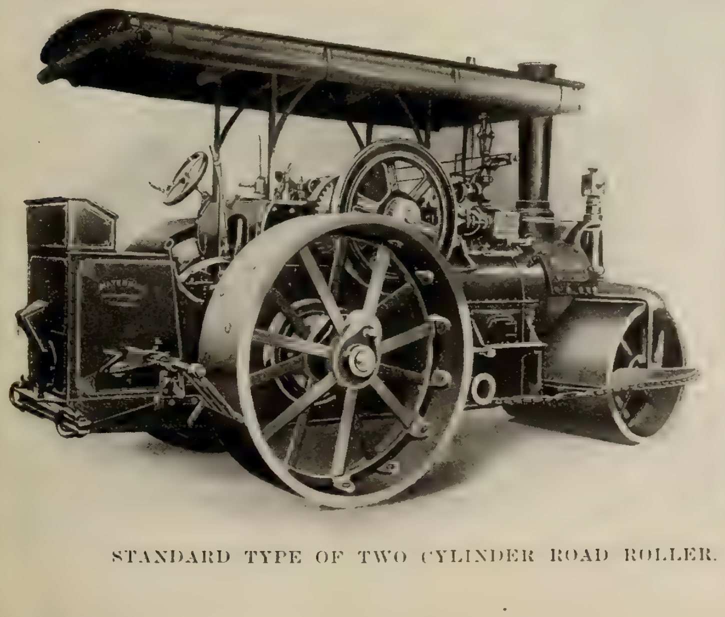
TURNING A LARGE FLYWHEEL. A CAPACITY JOB FOR ONE OF THE BORING MILLS.

A swivelling eccentric adjustment is provided for the cross-head shoes, which assures a full bearing on the guides and allows adjustment to be made by simply loosening a single nut and turning a bolt to draw in or force out the shoe as required. Accurately balanced discs are fitted to the crank shaft, which is a single-piece forging.

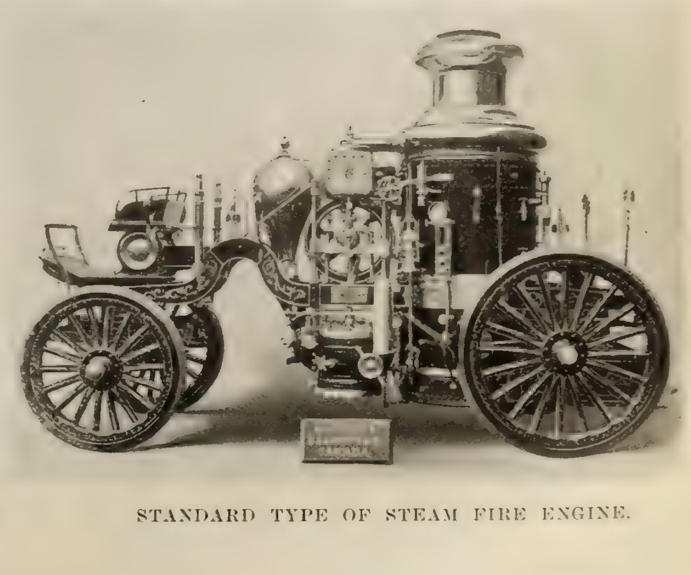
The remarkable regulation for which these engines are noted is obtained through a simple form of quick-acting governor of the flywheel inertia bar type. Governing limits of one revolution are obtained, the instantaneous variation in speed when full load is thrown on or off being seldom more than 1 per cent.

Road Rollers and Fire Engines

A natural development of the firm products was the building of road-making machinery and fire-fighting equipment. Long experience in engine and boiler building rendered the production of steam road rollers



STANDARD TYPE OF TWO CYLINDER ROAD ROLLER.



STANDARD TYPE OF STEAM FIRE ENGINE.

VIEW OF HEAVY MACHINE SHOP. LARGE PLANERS IN FOREGROUND.

a matter of comparative simplicity, the success of which is evidenced by the presence of these machines in all parts of the Dominion where road-making is in progress. As will be observed from the illustration on page 705, the English design has been followed, having a locomotive type of boiler, with double cylinder side by side engine, geared down to road wheels, having bar steel spokes cast into a felloe ring, which in turn is riveted into the tire. Extension shaft with driving pulley is provided for the opposite end of the crank shaft from the flywheel, which enables the engine to be used for driving all kinds of plant when not engaged on rolling.

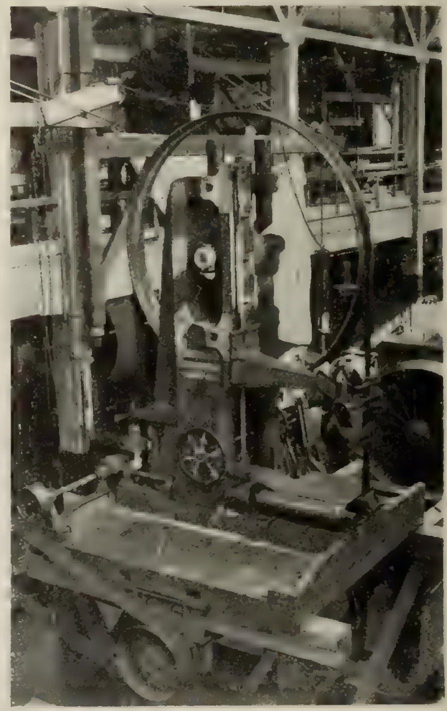
The ultimate adoption of motor-driven fire apparatus was early recognized by the company, and their product as illustrated is representative of standard practice in modern fire-fighting equipment. While greatest interest centres in the monster units employed by city departments, the requirements of small towns and villages have not been overlooked, and a view is reproduced on page 707, showing a horse-drawn gasoline-driven fire pump which has been adopted by numerous small municipalities. A number of these are shown in course of construction, from which it will be seen that a four-cylinder engine is mounted directly over the rear axle, and is coupled through a friction clutch to a simple rotary pump, having a capacity of 400 gals. per min. at 1,000 revs. per min. The capacity of this outfit is such that with 1,000 feet of $2\frac{1}{2}$ in. hose in use, it will throw a stream of water 125 feet high, using a $1\frac{1}{8}$ in. nozzle, while with three $\frac{3}{4}$ in. nozzles a height of 100 feet can be obtained.

GRINDING EQUIPMENT IN PULP MILL TYPICAL OF MANY WATEROUS INSTALLATIONS.

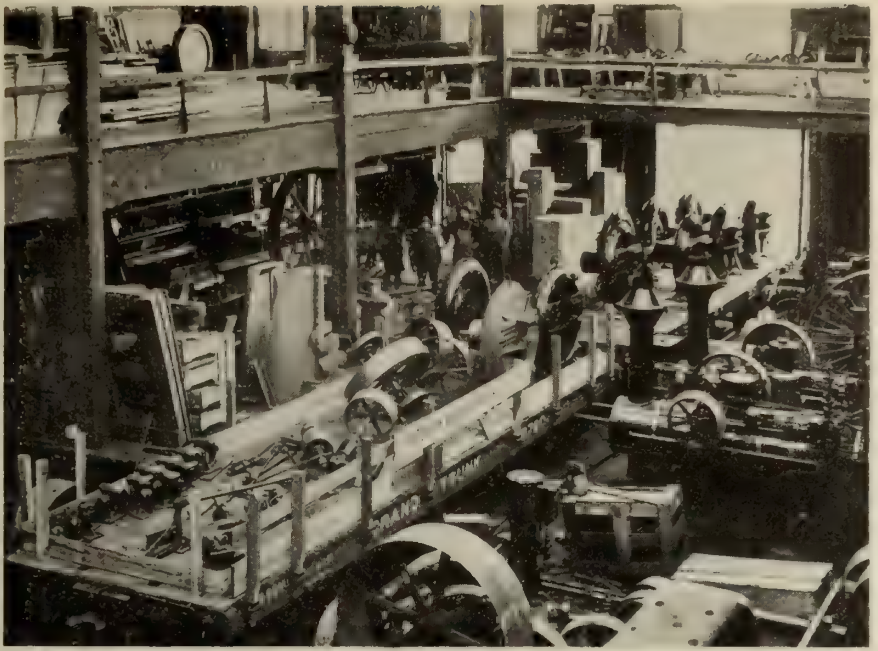
Sawmill and Pulp Machinery

Present and future developments of the lumber and pulp industry not only in Canada but in all forest-bearing countries, impart peculiar interest to these lines of machinery which form the major portion of the output of this plant. The lumber industry being the old established of the two, it is only natural that sawmill machinery is more closely associated with the firm name, especially as sawmill equipment is purchased by a much greater number of individual users than is pulp machinery.

Prominent amongst woodworking equipment are band mills and carriages, two illustrations being shown of representative items in these lines. The type of band mill illustrated is the result of an entire revision of designs whose evolution had been contemporaneous with that of the industry. This mill, known as the "New Model," retains all of the essential features which first made the band mill a success. As shown in cut this mill is equipped for double cutting, and possesses interesting features in the tension device for the band and the method of constructing the lower wheel. The tension weight employed is hollow, and supported on an internal spring, which, combined with knife edge fulcrums on the tension arm gives an extremely sensitive system so that when a sudden vibration or jar is thrown on the mill, the extra tension is absorbed instantly by the spring before being transferred to the saw. The lower wheel, visible through the floor, is made entirely of iron, with the arms attached to the rim in such a way that they connect each side of the rim to the opposite end of the hub. The hub itself

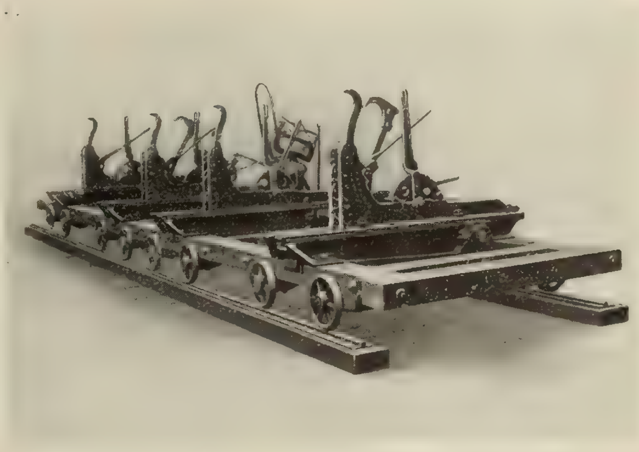


BAND MILL UNDER TEST IN SHOPS DURING CONSTRUCTION.



SHIPPING DOCK IN FACTORY WHERE PLANT EQUIPMENT FOR ALL PARTS OF THE WORLD IS PACKED AND LOADED ON CARS.

is cast in two parts, each attached to one set of arms, thus allowing perfect contraction of the arms without any strain. A wrought iron centre is bolted into the hubs and is finally secured on the mill mandrel with a ground taper fit. The inner side of the rim is steeply beveled so that sawdust falling on it is immediately thrown off and does not accumulate so as to throw the wheel out of balance.



FEED CARRIAGE FOR BAND MILL, SHOWING DOGS FOR HOLDING LOGS ON THE SEATS AND SETWORKS FOR FEEDING FORWARD.

Typical Sawmill Equipment

The numerous appliances involved in the handling of lumber in sawmill plants are all developed to a high degree of perfection, the band mill carriage illustrated on this page being a typical example of lumber handling machinery. This carriage travels on a track of suitable length and feeds the log against the band saw. The log rests on the transverse castings or log seats, being held down tightly in position by clamping spikes or dogs carried in knee castings, the knees being set forward by means of setworks which determine the thickness of board cut by the saw. Considerable ingenuity is evident in all mechanism of this class as owing to the conditions under which it is used—rough treatment, distance from repair wook, etc., together with required accuracy of operation — it must embody ideas of proven merit and material of reliable quality. These features are much in evidence throughout the entire range of modern sawmill equipment. Log chains and elevators, conveyors, kickers, flippers, niggers and other mechanical devices enable unwieldy logs to be handled and sawn by the minimum of help and with the maximum of accuracy and output.

Wood Pulp Production.

Of almost more interest is the equipment involved in the production of wood pulp for papermaking. A large amount of work is involved in handling the pulp logs, and the log haul-ups, conveyors and stackers are familiar features of pulp mills. When the logs leave the storage pile they pass through cutting-up rigs which cut the logs into billets of certain size, barkers which remove the bark, grinders for reducing the billets to pulp, to be followed by the necessary machines for screening, washing and drying the pulp, finally delivering it in condition to be taken to the paper mills. A view of a Waterous installation of grinders is shown on page 706, the characteristic appearance of the grinders being due to the radial cylinders which feed the billet of wood against the periphery of the centrally located grindstone.

Conclusion.

In all of the work referred to, it will be recognized that experience counts. When C. H. Waterous died a few years ago, the responsibility of continuing the work so ably developed by him rested upon his son C. H. Waterous, Jr., who, along with other members of the firm, today directs the activities of the company, the officers being: President and manager, C. H. Waterous; secretary, F. T. Wilks; treasurer, D. J. Waterous; directors, J. E. Waterous, C. H. Waterous, D. J. Waterous, F. T. Wilks and F. J. Waterous. The continuity of policy thus assured is

HORSE-DRAWN GASOLINE FIRE ENGINES IN COURSE OF ERECTION.

an asset of considerable value and the increased opportunities which the future may offer will, therefore, be recognized and taken advantage of with the same success as has been the case since the early days of pioneer effort.

* * *

CANADIAN TRADE CENTRES

THAT Montreal is the leading trade centre of Canada is shown in various ways in the report for the year 1915-16 of the Department of Customs. It is fairly certain to remain so, although, with the development of other centres, its proportion of the whole trade done in the country may not greatly advance. In the statement of exports and imports it is given a lead which may be taken to justify what has been done in recent years in the way of making the St. Lawrence waterway safely navigable by the larger class of ocean vessels. In spite of the war the trade of Canada with other countries was in 1915-16 greater than ordinary. The loss in passenger traffic was more than made up by the increase in freight business, which is sometimes the most profitable.

Exports and Import Values

The total exports for the twelve months were valued at $882,872,000. The imports are given at $564,505,000, of which $542,077,000 was "entered for consumption." The ports which figure most largely in the total, and the amount of the exports and imports credited to them are as follows:—

	Exports.	Imports.
Montreal	$191,170,000	$147,663,000
St. John, N.B.	121,042,000	11,057,000
Fort William	81,284,000	3,283,000
Niagara Falls	41,141,000	2,622,000
Port Arthur	33,928,000	1,860,000
Bridgeburg	32,308,000	1,908,000
Coaticook	30,080,000	269,000
Halifax	26,843,000	9,873,000
St. Johns, Que.	22,359,000	3,486,000
Vancouver	15,843,000	20,167,000
Sydney	7,266,000	1,963,000
Quebec	3,991,000	12,145,000
Winnipeg	181,000	24,087,000
Ottawa	173,000	20,520,000
Toronto	134,000	114,604,000

Montreal stands well in front in the matter of exports and imports. It has both water and rail communication with outside countries, and has, among its merchants, men who deal in practically every class of goods in international trade. Next to Montreal in the matter of exports is St. John N.B., while Toronto has second place in the import column. The tables show the existence of lines of commerce not often considered. Port Arthur and Fort William, the twin communities at the head of Lake Superior, show exports combined of $115,000,000, this being chiefly a development of the grain trade, which in the late fall especially finds its way to the ocean by way of Buffalo and New York. The large figures of Niagara Falls, Bridgeburg, Coaticook, etc., are the result of the growing trade in produce of various kinds with the United States.

Customs Collections

The statment of the customs duties collected is also interesting. In some cases the exports credited to a port have little connection with the actual trade of the place, which may be little more than a port of entry for goods coming from far away points. The amount of customs duties collected usually indicates commercial status, however. In 1915-16 the following were the records of collection of duty at the places named:

Montreal	$24,011,964
Toronto	20,378,379
Winnipeg	6,517,892
Vancouver	4,717,180
Hamilton	4,480,682
St. John, N.B.	2,688,348
Halifax	2,412,474
Quebec	1,854,243
Ottawa	1,378,558
Victoria, B.C.	985,326
Calgary	922,801
Edmonton	696,711
Regina	802,950

The Customs collections during the twelve months were $103,940,000, and the contributions at Montreal were quite 23 per cent. of the total.

* * *

WESTERN CANADA POWER CO.

ONE of the most important requirements of British Columbia in general, and of Vancouver in particular, is the supply of power in the form of electrical energy to the industrial, commercial and agricultural communities. One of the factors in such service is the Western Canada Power Co., which has its hydroelectric plant at Stave Falls, on Stave River, thirty-five miles east of Vancouver, and reached by the C. P. R. main line at Ruskin, where transfer is made to the company's own railway, which runs a daily service between Ruskin and the plant at Stave Falls, six miles north of Ruskin.

From the plant the high tension transmission lines carrying 60,000 volts radiate southward to the international boundary line at Sumas, eastward as far as the Nicomen rock quarries of the C. P. R., and westward to Vancouver city, taking in the cities of Port Coquitlam, Port Moody and New Westminster and the territory included in the municipalities of Mission, Maple Ridge, Pitt Meadows, Coquitlam and Burnaby.

Traversing this same area are two Canadian transcontinental railway lines, two trunk line American railways and a third Canadian line which will eventually connect up with a transcontinental line. Serving this Lower Mainland section of British Columbia, as it is sometimes called, are the salt and fresh waterways which provide unexcelled transportation facilities for those districts and cities.

In connection with this development are three dams—the storage dam, the sluice dam, which will ultimately be made into a solid dam, and the Blind Slough dam. The foundations of the power house are of solid concrete construction, and the superstructure is of steel and reinforced concrete. The building, which is at present 100 feet wide and 90 feet long, is being extended to cover the turbine and generator of the third unit, which is now being set in place, and will be ready for generating power at an early date.

Power Plant

In the power house are installed at present two 10,000 k.v.a. 3-phase, 60-cycle, 4,400-volt generators, built by the Canadian General Electric Co., driven by two 13,000 horse-power Francis type turbines, built by the Escher Wyss Co. of Zurich, Switzerland. Excitation is provided by two 250 k.w. 125-volt generators, each driven by its own turbine, and each capable of exciting four machines. Governors and oil pumps were also provided by the Escher Wyss Co., the pumps being driven by individual wheels of the impulse type.

Six single-phase transformers of 3,000 k.w. capacity each are located on the main floor, each in its own concrete vault with a steel hatch as a top. A travelling crane of 70 tons capacity spans the entire main floor, placing the transformers as well as the generators and wheels directly under the crane. The control switchboard is in a gallery at the east end of the building, giving the operator full view of every piece of moving machinery. All switches are solenoid operated, and, with the fuses, are located in reinforced concrete cells in a concrete lean-to parallel to the main building. The third unit consists of the same type and size turbine and generator as the two at present installed.

British Columbians are hopeful that the industrial activity already begun will continue to increase. Much hope is entertained that the mining industry will be firmly established on a permanent basis. Western Canada Power Co. of Vancouver is in receipt of many inquiries regarding copper refining furnaces, and regarding the treatment of zinc ores by electricity. The establishment of reduction works anywhere in the vicinity of Burrard Inlet or the Fraser River would certainly lead to great activity, and be the means of permanent employment to thousands of men.

* * *

Canadian Vessel Registry.—On March 31, 1916, the total number of vessels on the Canadian register was 8.631 of 1,215,021 gross tons measurement, while the total tonnage transferred during the twelve months ending on above date was 25,834, represented by 24 vessels.

FIG. 1. MAIN BUILDING OF THE UNIVERSITY OF TORONTO, NORTH OF AND FACING THE CAMPUS.

Central Heating and Power Plant, University of Toronto

By L. M. Arkley, M. Can. Soc. C.E. *

The operation of central heating plants for the supply and distribution of heat over comparatively large areas has been successfully accomplished in certain instances by progressive municipalities. The private installation of such systems, however, is somewhat infrequent, due probably to absence of opportunity. Such an enterprise as that featured in the present article possesses exceptional interest not only because of magnitude and distances involved, but because of the consistent results which are justifying the wisdom of the undertaking.

THE buildings which comprise the University of Toronto are situated in extensive grounds, on west side of Queen's Park, in the city of Toronto. Bounded on the north by Bloor street, the west by St. George street, and the south by College street, the 21 buildings, as shown in plan, Fig. 5, present a problem of considerable magnitude and interest as regards the provision of a suitable heating system.

Previous to the year 1911-12, the widely scattered buildings were heated by several separate plants, the most of which were old and inefficient. Electric current for light and power was partly generated in these plants and partly purchased from supply companies. Conditions, therefore, were such that the possible economies which could be effected through the installation of a central heating and power plant warranted such a procedure, and the gradual reduction of costs since the plant was put in operation is submitted as amply justifying the centralization arrangement as well as that of the equipment installed.

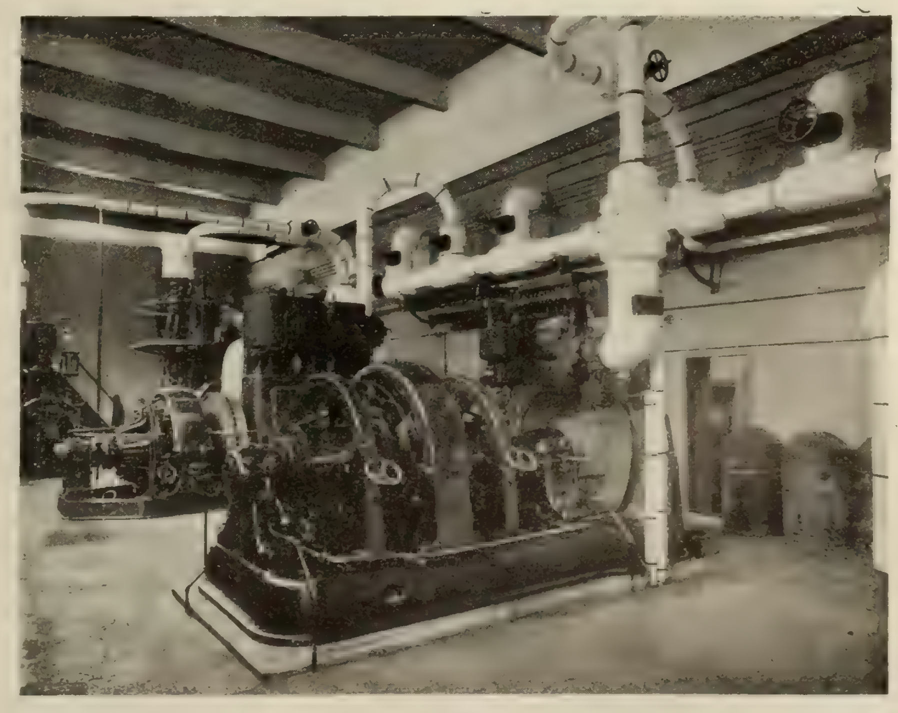


FIG. 2—INTERIOR OF POWER HOUSE ENGINE ROOM SHOWING CURTIS TURBO-GENERATOR IN FOREGROUND WITH ALLEN HIGH SPEED UNIT IN REAR

Power House

The location selected for the central plant was to the east of the Medical Building (4), and adjacent to the western end of the Ontario Legislative Building in Queen's Park. The power house building is for the most part underground, its flat roof being practically level with the pavement in the adjacent driveway in the park, from which the ground slopes down so that the west wall of the building is about eight or ten feet above ground level.

The main object in providing such a location was to facilitate the installation of a gravity return heating system. An additional, though minor advantage, was that it has been possible, by placing ornamental balustrades on roof of the coal bunkers, and the judicious planting of shrubbery, to almost entirely disguise the location of the plant so that the scenic surroundings of the Legislative Building suffer no detraction whatever.

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*Assistant Professor of Mechanical Engineering, University of Toronto.

FIG. 3—KNOX COLLEGE. THIS EDIFICE ALSO FACES THE CAMPUS, AND IS ONE OF SEVERAL RECENTLY COMPLETED BUILDINGS

The ground space occupied by the building including the coal bunkers, is 82 feet in length by 107 feet in width. The sectional view, Fig. 7, shows the relative position of the engine room, boiler room and coal bunkers. The boiler room is 58 feet wide, with a total height of 26 feet and contains four Babcock and Wilcox water tube boilers of 403 nominal horse-power, and one boiler of the same make with a rating of 516 horse-power, giving a total of 2,128 boiler horse-power.

All of the boilers operate at a pressure of 150 lbs. per sq. in., without superheat, and each unit is equipped with a Murphy automatic smokeless furnace to which coal is fed by gravity from the overhead bunkers. These have a capacity of 600 tons, are built of concrete, and, as shown in Fig. 7, overlap the furnaces so that a suitable angle is obtained for the delivery pipes which are fitted with sluice valves at their upper end for regulating the supply of coal. The bunker is 25 ft. wide and 12 ft. high, and the roof forms part of the roadway by which the coal is brought to the plant, the sidewalk, along with the balustrades referred to, being indicated thereon.

An induced draft system is operated in conjunction with the boilers—two 78-in. American Blower Co. fans coupled to Robb fan engines drawing the waste gases from a smoke breeching extending along the back of the boilers (see Figs. 6, 8, and 10), and discharging them into an underground concrete tunnel leading to a brick stack which is built into a corner of the Medical Building (4).

Boiler feed requirements are taken

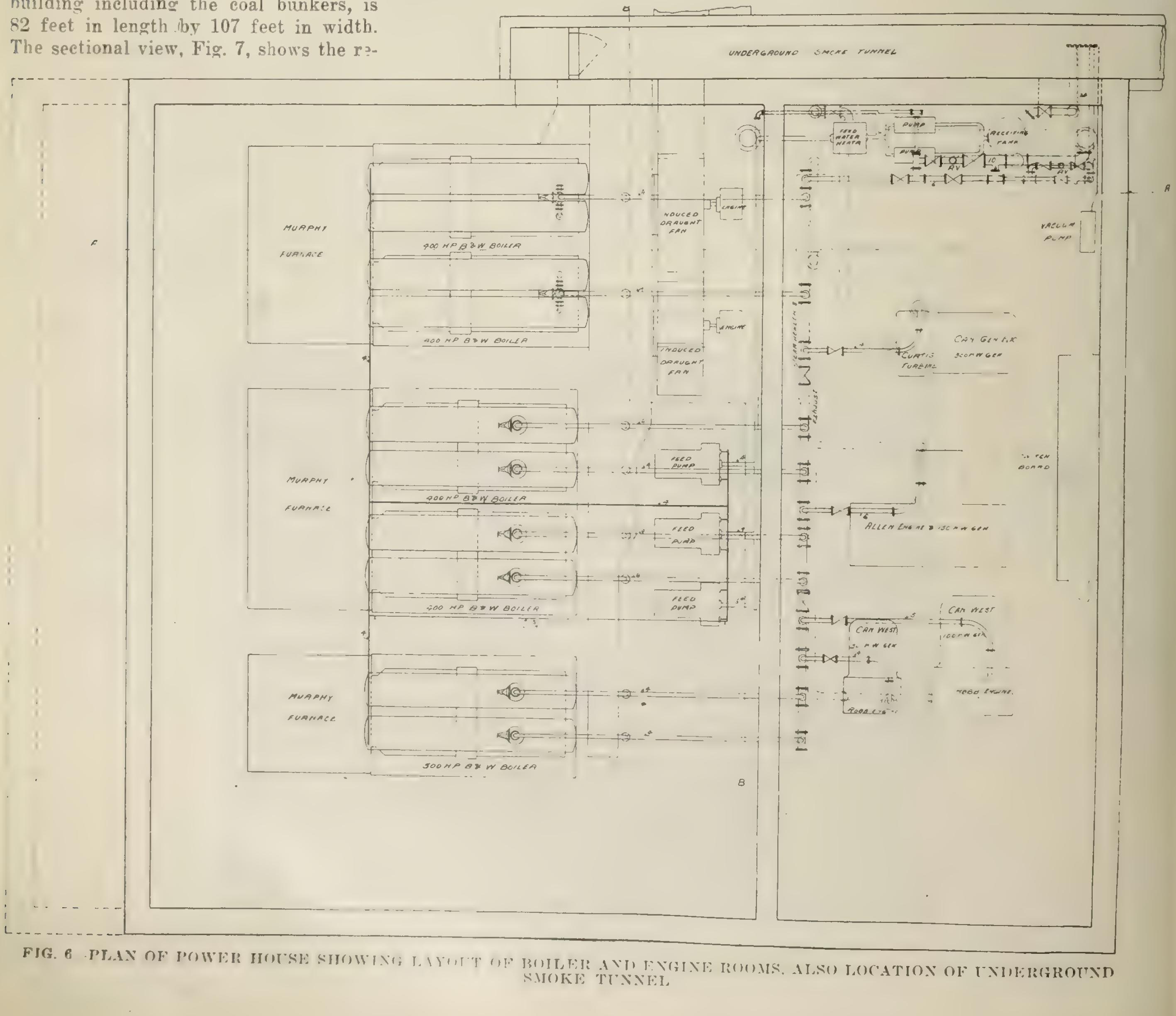

UNDERGROUND SMOKE TUNNEL
MURPHY FURNACE
400 HP B&W BOILER
400 HP B&W BOILER
MURPHY FURNACE
400 HP B&W BOILER
400 HP B&W BOILER
MURPHY FURNACE
500 HP B&W BOILER
INDUCED DRAUGHT FAN
ENGINE
INDUCED DRAUGHT FAN
ENGINE
FEED PUMP
FEED PUMP
FEED PUMP
FEED WATER HEATER
PUMP
PUMP
RECEIVING TANK
RV
10
RV
VACUUM PUMP
STEAM HEADER
EXHAUST
CAN GEN ELK
CURTIS TURBINE
300 KW GEN
SWITCH BOARD
ALLEN ENGINE & 150 KW GEN
CAN WEST
CAN WEST
100 KW GEN
ROBB ENGINE
ROBB ENG
A
B
F

FIG. 6 PLAN OF POWER HOUSE SHOWING LAYOUT OF BOILER AND ENGINE ROOMS, ALSO LOCATION OF UNDERGROUND SMOKE TUNNEL

FIG. 4—DEPARTMENT OF HOUSEHOLD SCIENCE BUILDING, SITUATED ABOUT FIVE EIGHTHS OF A MILE FROM THE CENTRAL HEATING PLANT

care of by an installation of three Smart-Turner duplex steam-driven feed pumps. These are illustrated in Figs. 10 and 11, and are of the outside end-packed plunger type, 10 in. x 6 in. x 10 in., with pot valves. They are situated immediately behind the boilers, and are so piped that two independent methods are available for supplying water to the boilers. At the near end of the pump room, Fig. 10, is the sump, equipped with two small steam pumps for draining purposes, and one Bundy steam trap for taking care of the high pressure drips.

The coal used is a bituminous slack containing about 21 per cent. of volatile matter and this is burned with very little smoke. While the coal is not bought on the B. T. U. basis, samples are taken regularly from the delivery waggons and tested for ash , volatile matter, carbon, moisture and sulphur. This procedure has resulted in the quality of coal received being uniformly high.

Engine Room

The engine room extends the full length of the building, i.e., 82 ft., and is 30 ft. wide by 23 ft. high, the floor level being 3 ft. above that of the boiler room. It is separated from the boiler room by a 27-in. brick wall, and although not shown, a hand-operated overhead traveling crane is provided, fitted with a 3-ton Yale triplex block, which enables all maintenance adjustments and repairs to be conveniently made.

The equipment contained in the engine room consists of four steam-driven generating units, switchboard, waterweigher and feed water heater, with feed water and vacuum pumps, the purpose of the latter being explained under heating section.

The generators are all direct connected to their engines, and are as follows:

One horizontal Curtis steam turbine, driving a 300 kw. General Electric D. C. generator, running at 1,500 rev. per min. (see Fig. 2).

One high speed vertical compound reciprocating engine, with generator built by W. H. Allen, Son & Co., Bedford, Eng., cylinders 16 in. and 24 in. x 11 in. stroke, developing 300 kw. at 400 revs. per min. This unit can be seen behind the Curtis outfit in Fig. 2.

Two Robb, Armstrong-Westinghouse units of 100 kw. and 50 kw. capacity respectively—these engines are of the single cylinder vertical type, the former having a 15 in. x 14 in. cylinder, and speed of 275 revs. per min., and the latter a 12 in. x 10 in. cylinder, with a speed of 265 revs. per min., shown in Fig. 12.

All of the engines operate under a steam pressure of 140 lbs. per sq. in. at the throttle, while the generators supply direct current at a pressure of 110 volts, each unit having an individual panel on the switchboard, which has seven panels in all, two being for distribution purposes and the seventh coupled up to one of the local supply companies.

The auxiliary apparatus in the engine

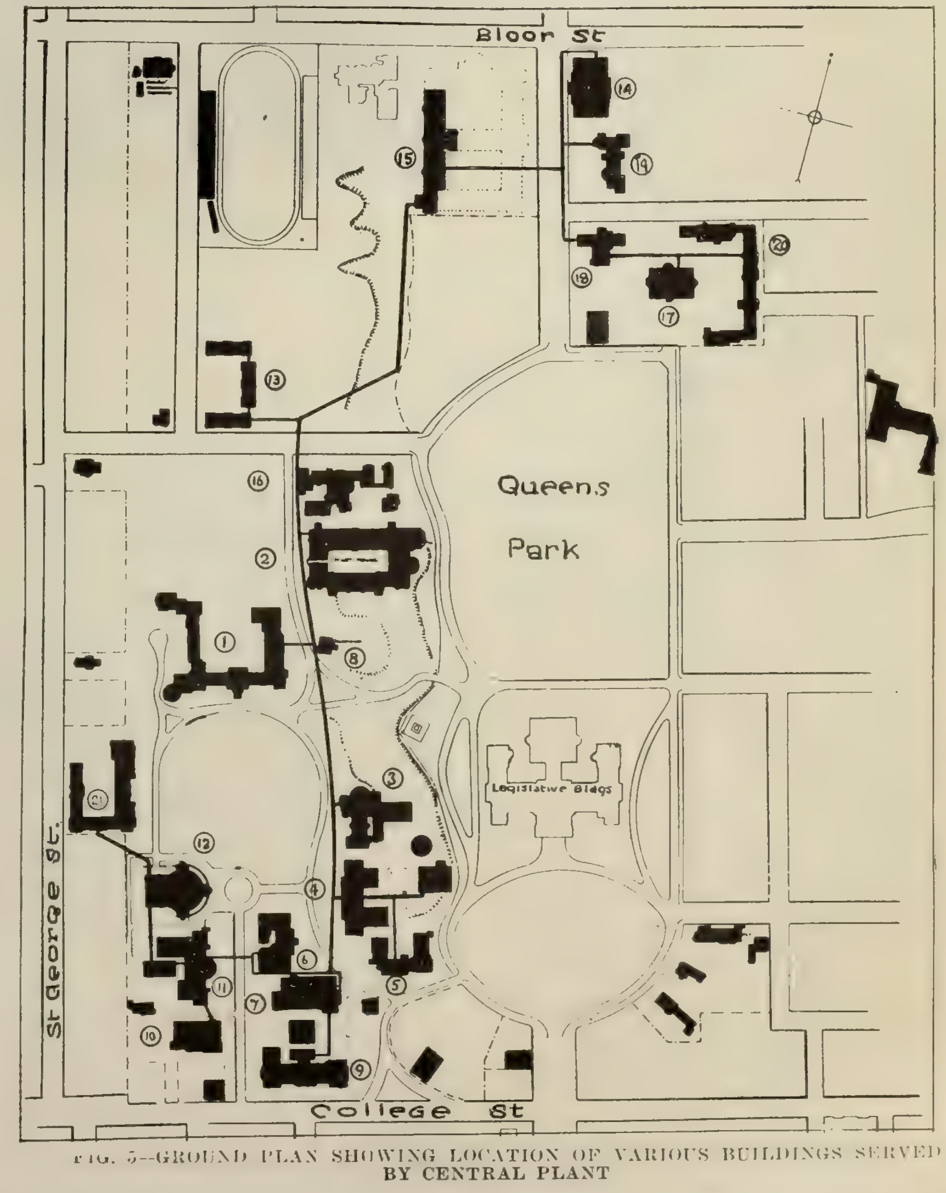


FIG. 5—GROUND PLAN SHOWING LOCATION OF VARIOUS BUILDINGS SERVED BY CENTRAL PLANT

room is illustrated in Fig. 13. At the left of the photograph is a Webster open type feed water heater, which receives part of the exhaust steam from the generating units, and is supplied with feed water by two Smart-Turner 6 in. x 5¾ in. x 6 in. duplex pumps, located next to it. Further to the right is a Kennicott water weigher with a maximum capacity of 65,000 lbs. per hr.

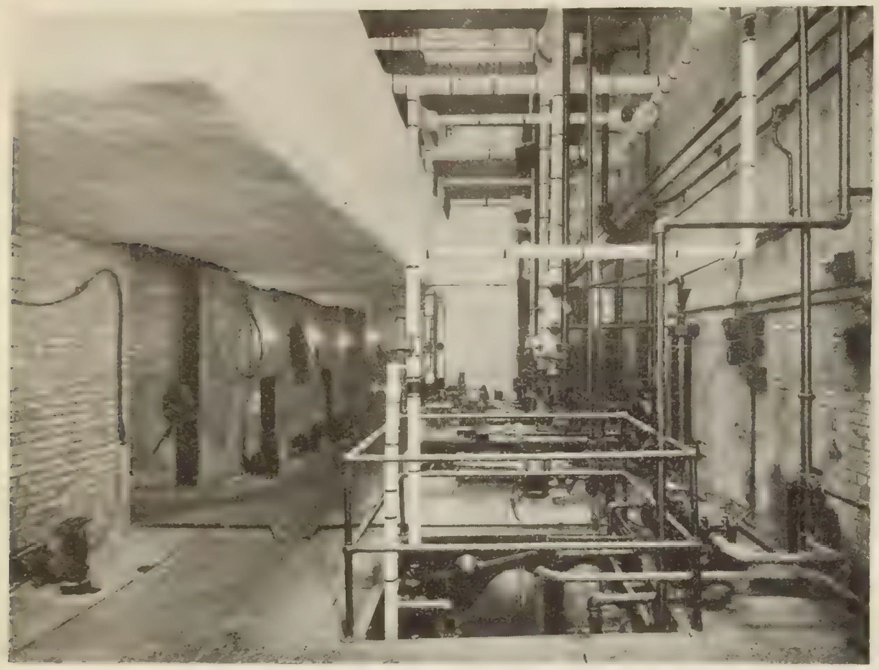


FIG. 10—PUMP ROOM SHOWING ALSO SMOKE BREECHING IN UPPER LEFT HAND CORNER AND FAN CASINGS IN BACKGROUND. HOT WELL IS IN IMMEDIATE FOREGROUND

Immediately above the water weigher is the entrance to the tunnel which carries the distributing pipes and cables referred to later, the 20 in. main being clearly discernible as it enters. At the extreme right is an 8-in. x 12-in. x 12-in. Warren vacuum pump, referred to above.

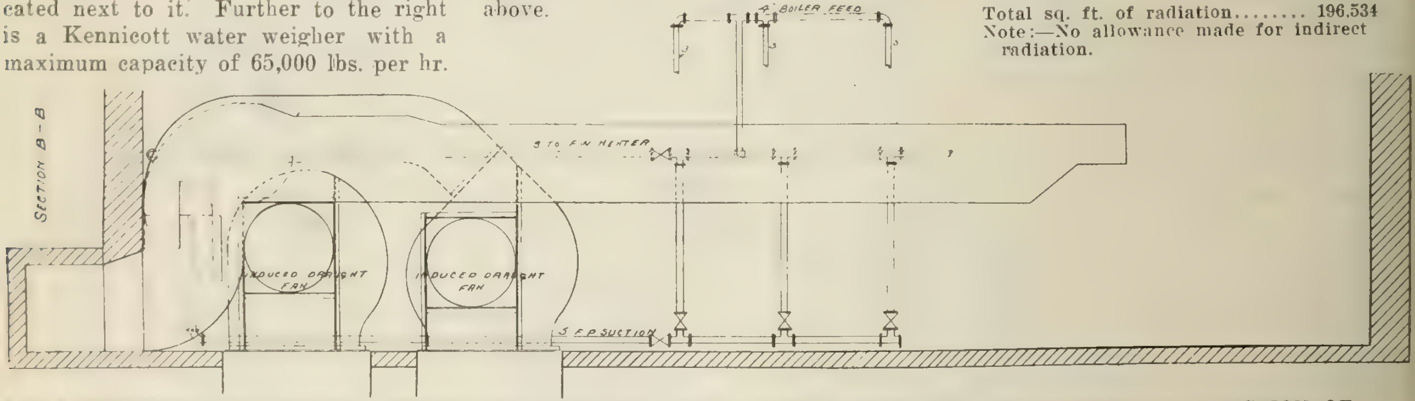


FIG. 8—ELEVATION OF INDUCED DRAUGHT EQUIPMENT SHOWING SMOKE BREECHING, FAN CASINGS AND SECTION OF SMOKE TUNNEL

Heating System

The heating system was originally designed as a gravity return system, the hot well in the power house being the low point to which all condensed steam returned by gravity. Of the original buildings heated in this way, the Main and Mining Buildings have been changed to a vacuum system and the same method has been adopted for the recently completed Knox College and for Hart House. In this case the vacuum pumps located in these buildings discharge the returns from the radiation to overhead tanks, from which it flows by gravity into the main return line back to the power house.

The following table gives a list of the buildings heated, together with the number of square feet of radiation in each for the heating season 1914-15:—

Name and No. of Building.	No. of sq. ft. of Radiation.
No. 1—Main	12,936
No. 2 Hart House (in course of construction)	5.000
No. 3—Library	10.829
No. 4—Medical	7,160
No. 5—Biological	8,271
No. 6—Engineering	9,084
No. 7—Thermodynamics	6,114
No. 8—Observatory	783
No. 9—Mining	13,721
No. 10—Chemical	6,595
No. 11—Physics	19,648
No. 12—Convocation Hall	6,689
No. 13—Men's Residences	9,336
No. 14—Household Science	10.137
No. 15—Museum	17,303
No. 16—Wycliffe College	12.371
No. 17—Victoria College	9.028
No. 18—Victoria College (Library).	4.021
No. 19—Annesley Hall	4,274
No. 20—Burwash Hall	4,300
No. 21—Knox College (not completed	15,000
Total sq. ft. of radiation	196.534

Note:—No allowance made for indirect radiation.

Piping Distribution System

The main heating pipe as it leaves the power house is 20 in. dia., and con-

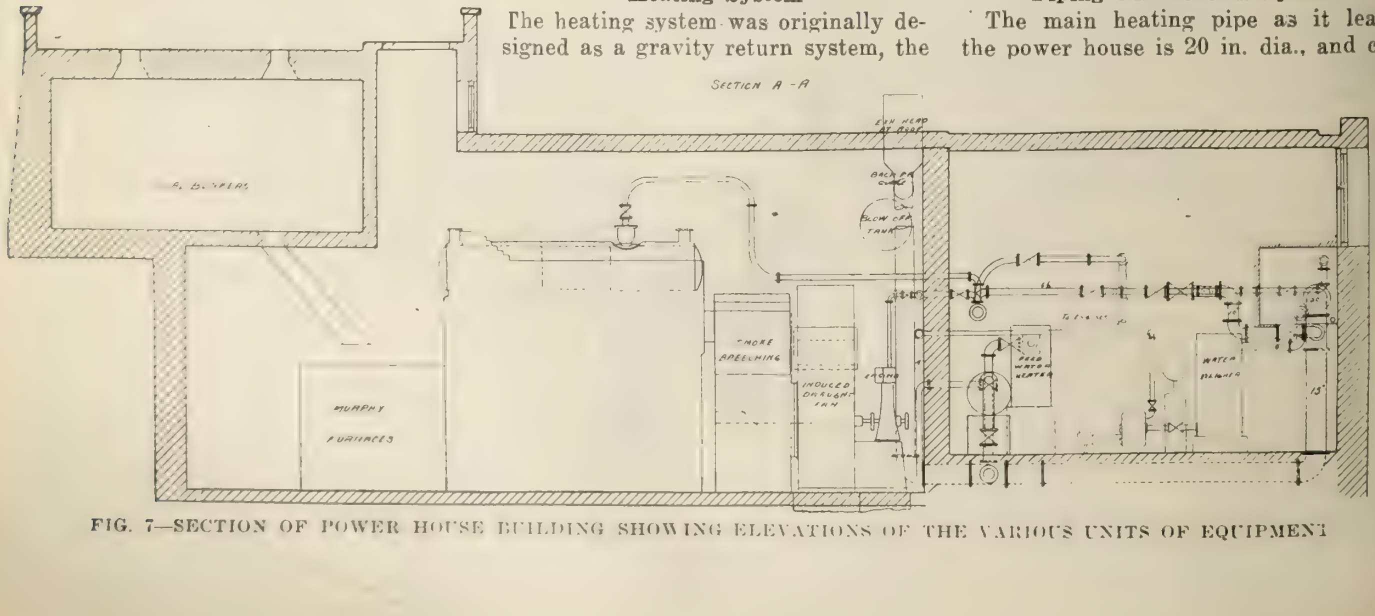


FIG. 7—SECTION OF POWER HOUSE BUILDING SHOWING ELEVATIONS OF THE VARIOUS UNITS OF EQUIPMENT

tinues of this size to a point west of the Medical Building (4), where it branches north and south in 16 in. mains, and gradually reduces in size towards the end of the line.

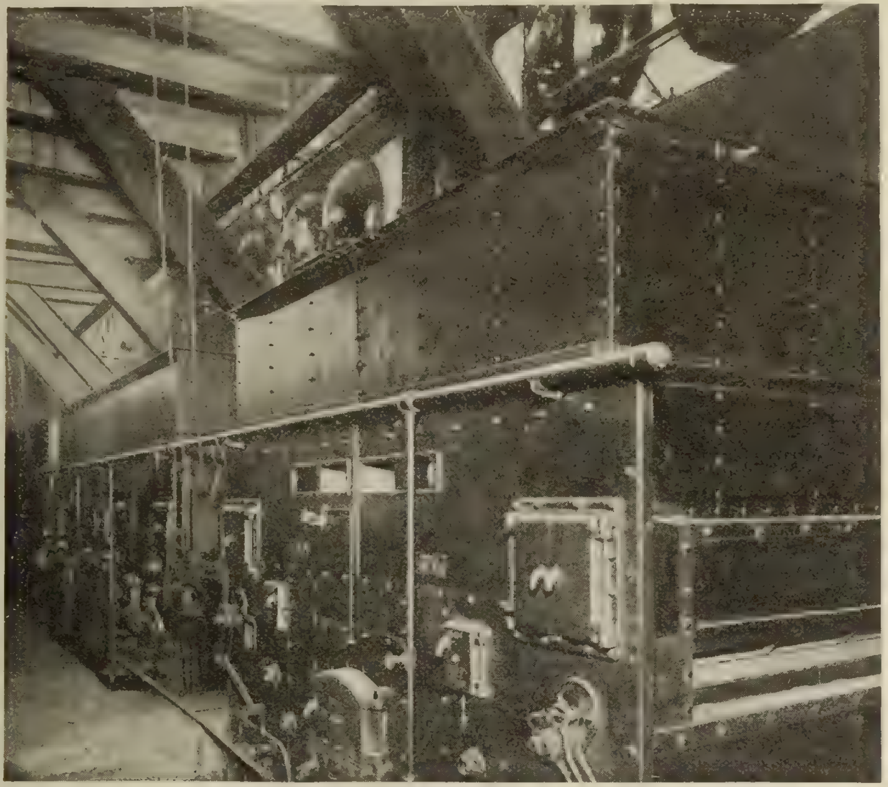


FIG. 9.—BOILER ROOM SHOWING MURPHY FURNACE INSTALLATION.

All engines, turbines and steam pumps in the power house exhaust into this pipe, but as the lighting and power load is normally small compared with the heating load required, live steam is introduced by passing it through a pressure reducing valve in the usual way. A pressure of from one to 4 lbs. per sq. in. is carried on the main heating pipe at the power house.

The question of expansion and contraction due to change in temperature is an important one in a steam line of this length, and it is taken care of by slip expansion joints, the pipe being securely anchored at the proper points. This form of expansion gives satisfactory service if the pipe is looked after and kept well in line, otherwise it leaks.

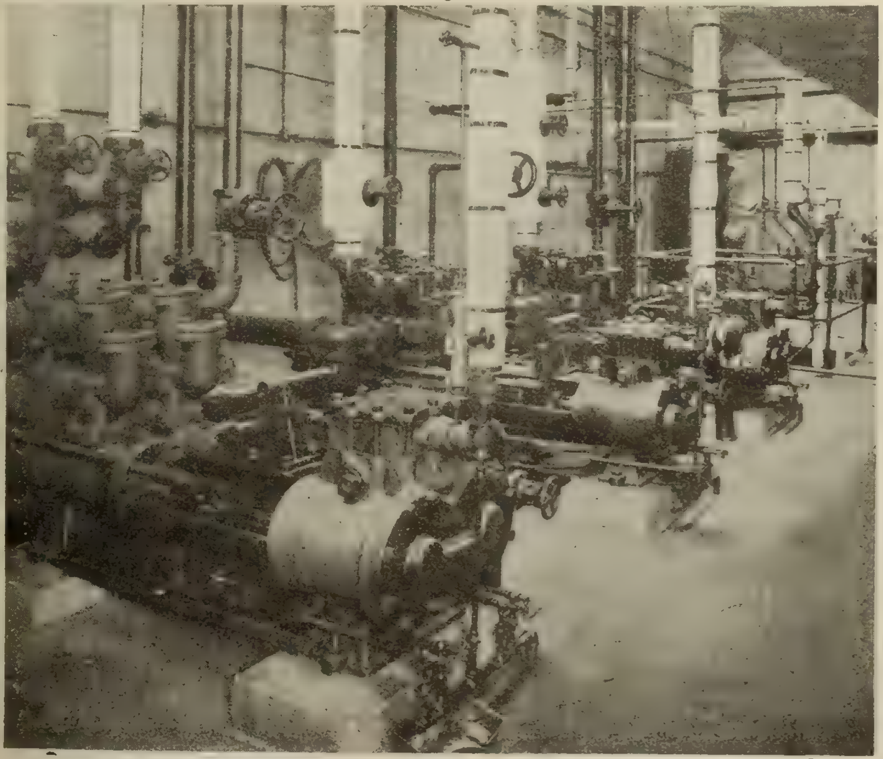


FIG. 11—THREE SMART-TURNER DUPLEX BOILER FEED PUMPS WITH OUTSIDE END-PACKED PLUNGERS AND POT VALVES.

A question of still greater importance than that of expansion is that of condensation of steam, as excessive condensation means not only a loss of heat, but also introduces the problem of taking care of the water of condensation. The best method of reducing the loss from this source is, of course, to lag the pipes well with some heat insulating material; this feature in the original layout was somewhat neglected resulting in a hot tunnel and large quantities of condensed steam in the main pipe, this condensation being drained from the pipe through traps to the power house. It was found necessary later to instal a vacuum pump in the power house to pump this condensation back and deliver it to the hot well, and with this addition the system works quite satisfactorily.

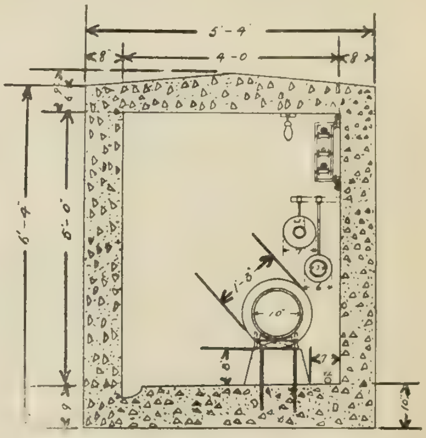


FIG. 14—SECTION OF TUNNEL CONNECTING KNOX COLLEGE WITH CONVOCATION HALL

Besides the main heating pipe, the tunnel contains a live steam main of 5 in. diameter, where it leaves the power house, also the main gravity return line of 8 in. diameter, and a 3 in. return line to the vacuum pump from the 20-in. main. The live steam is carried at 50 lbs. pressure and is used principally in the Main Building (1), Burwash Hall (20), Knox College (21), and the Household Science Building (14).

Besides these pipes all electric wires are carried on the walls of the tunnel.

Tunnel Construction

The main tunnel through which all steam pipes and electric wires are distributed to the various buildings, is of concrete and of 5 ft. x 6 ft., inside dimensions, where it leaves the power house. Its walls are vertical and 8 in. thick, while the roof slab slopes from 9 in. at the centre to 6 in. at the walls, and is reinforced where necessary.

The power house is indicated on Fig. 5 by a solid black circle.

Figure 14 shows a section of a piece of tunnel built recently by the Superintendent's Department to connect Knox College (21) with Convocation Hall (12). This shows a considerable improvement over the first tunnel built, in the arrangement of the piping and wiring. The main pipe rests on rollers which in turn are supported by substantial concrete piers securely bolted at the bottom of the tunnel; this point requires attention or the gradual movement of the pipe due to expansion, will work the piers loose in a short time, this trouble having actually developed in the original layout. The plant has been remodeled in many respects since first installed and this work has been done under the supervision of A. D. LePan, Joint Superintendent of Buildings and Grounds, under whose direct supervision the plant is operated.

Efficiency Test of Boiler Plant

The object of the test was to find the efficiency of the boiler plant under actual working conditions. While the boilers were cleaned shortly before the test, there was no special preparation made to insure anything but a normal efficiency.

The test was conducted by the writer assisted by J. D. Thompson, Demonstrator in Mechanical Engineering, and the members of the 1916 graduating class. A. D. LePan, Joint Superintendent, and W. H. Bonus, of the Superintendent's office, gave every assistance in preparing for the test. The operation of the plant was under the direction of C. Moseley. The accompanying table embodies in its detail the various factors entering into the test, together with the obtained results.

1—Name of Plant	University of Toronto Heating and Lighting Plant
2—Number and kinds of boilers	Five Babcock and Wilcox water tube
3—Kind of furnace	Murphy Automatic
4—Grate Surface—Inclined grates—	
Projected area	328 sq. ft.
Actual area	454 sq. ft.
5—Heating surface— Total	21,264 sq. ft.
8—Date	Jan. 17th, 1916
9—Duration	11 hours
Average Pressures, Temperature, Etc.	
10—Kind and size of coal	Vinton, Slack
11—Steam pressure by gauge	153 lbs. per sq. inch
12—Steam pressure absolute	167.6 lbs. per sq. inch
13—Temperature of feed water entering boiler	173° F.
14—Temperature of escaping gas leaving boiler	487° F.
15—Force of draft between damper and boiler	0.4" water
(a)—Draft in furnace	0.16
16—State of weather	Fair and cold (10° above zero)
17—Percentage of moisture in steam	1.5%
18—Factor of correction for quality of steam	98.5%
19—Total coal as fired	67,900 lbs.
19a—Total siftings weighed back and credited to furnace	6,130 lbs.
19b—Total net coal as fired	61,770 lbs.
20—Percentage of moisture in coal as fired	3.51%
21—Total weight of dry coal fired	59,600 lbs.
22—Total ash, clinkers and refuse (dry)	5,372 lbs.
23—Total combustible burned	54,228 lbs.
24—Percentage of ash and refuse in dry coal	9%
25—Total weight of water fed to boiler	563,720 lbs.
26—Total weight of water evaporated corrected for quality of steam	555,250 lbs.
27—Factor of evaporation	1,088
28—Total equivalent evaporation from and at 212° F. corrected for quality of steam	604,112 lbs.
Average Hourly Quantities and Rates.	
29—Dry coal per hour	5,418 lbs.
30—Dry coal per sq. ft. of grate surface per hr.	11.93 lbs.
31—Water evaporated per hr. corrected for quality of steam	50,477 lbs.
32—Equivalent evaporation per hr. from and at 212° F. corrected for quality	54,919 lbs.
33—Equivalent evaporation per hr. from and at 212° F. per sq .ft. of heating surface	2.58 lbs.
Capacity.	
34—Boiler horse-power developed (average)	1,592
35—Rated capacity per hr. (10 sq. ft. H.S. per boiler H.P.)	2,126
36—Percentage of rated horse-power developed	74.9%
Economy.	
37—Water fed per pound of coal as fired	9.12
38—Water evaporated per lb. of dry coal	9.31
39—Equivalent evaporation from and at 212° per lb. of coal as fired	9.78
40—Equivalent evaporation from and at 212° per lb. of dry coal	10.14
41—Equivalent evaporation from and at 212° per lb. of combustible	11.14
Efficiency.	
42—Calorific value of 1 lb. of dry coal by calorimeter	14,800 B.T.U.
43—Calorific value of 1 lb. of combustible by calorimeter	15,800 B.T.U.
44—Efficiency of boiler furnace and grate	66.5%
45—Efficiency based on combustible	68.3%
46—Cost of coal per ton of 2,000 lbs. delivered in boiler room	$3.525
47—Cost of coal required for the evaporation of 1,000 lbs. of water under observed conditions	19.3c
48—Cost of coal required for evaporating 1,000 lbs. of water from and at 212° F.	18.02c
49—Note on smoke: Very little smoke noticeable during test.	
51—Analysis of chimney gases—	Average.
Co2	9.7
O	10.1
C O	0.1
N by difference	80.1
52—Proximate analysis of coal—	Per cent.
(a) Moisture	0.465
(b) Volatile matter	21.467
(c) Fixed carbon	71,358
(d) Ash	6,710
(e) Sulphur separately determined	2.00

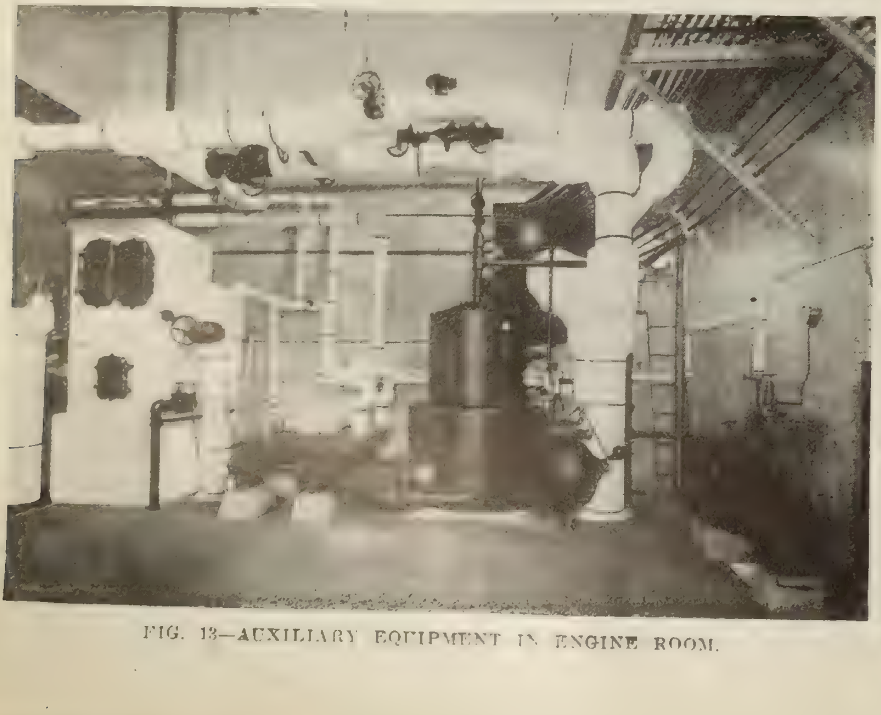


FIG. 13—AUXILIARY EQUIPMENT IN ENGINE ROOM.

As will be observed from these results, the plant possesses ample capacity for all heating requirements and, being connected to local supply sources, occasional demands for lighting current in excess of the plant capacity in operation can be instantly met without having to force the boilers or start up additional generators. These conditions enable the plant to be run at a fairly steady load with no sudden or unexpected variations so that conditions of at least as great or perhaps greater efficiency than those indicated by the test results are doubtless constantly maintained under regular operation.

Operating Data

The cost of production for three successive seasons from 1912-13 are tabulated below, as well as tables showing the amount of coal used and the temperatures obtaining during the different months of these seasons:—

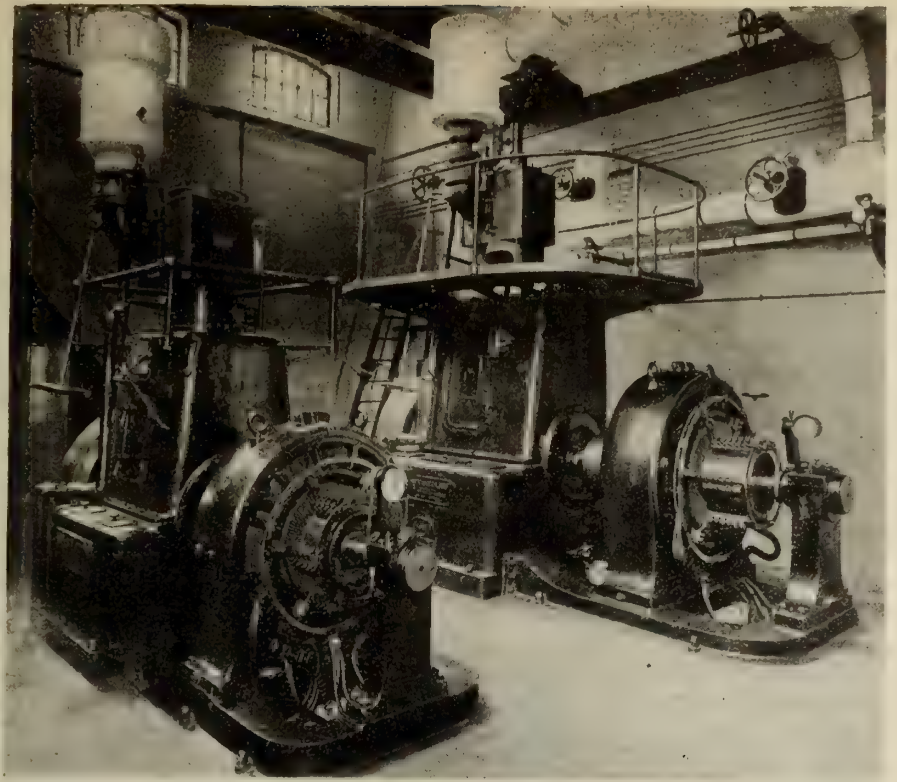


FIG. 12.—ROBB-ARMSTRONG ENGINES AND WESTINGHOUSE GENERATORS.

COST OF PRODUCTION.

	1912-13		1913-14		1914-15	
	Total cost	Cost per sq. ft. radiation in cents	Total cost	Cost per sq. ft. radiation in cents	Total cost	Cost per sq. ft. radiation in cents
Cost of coal	$29,429.52	17.22	$26,649.23	15.12	$25,135.64	12.80
Cost of city water	510.62	.30	265.90	.15	209.00	.11
Repairs and renewals	2,393.39	1.41	3,674.89	2.08	5,354.06	2.73
Salaries (Engineers, Firemen, Helpers)	8,713.81	5.12	7,992.47	4.54	7,972.25	4.05
Elec. cur. purchased	1,100.66	.65	1,424.24	.81	1,329.22	.66
Total cost of operat'n	$42,148.00	24.71	$40,006.73	22.70	$40,000.37	20.35
Additional Data—						
Total sq. ft. radiation	170.221		176,203		196.534	
Total current generated (Kw. hrs.)	395.395		351,231		390.655	
Total water evaporated	112,329,664 lbs.		121,657,911 lbs.		117,424,163 lbs.	
Total cost of coal required for evaporating 1,000 lbs. of water under observed conditions	26.2 cents		21.9 cents		21.4 cents	
Cost of evaporation per 1,000 lbs. steam	38 cents		33 cents		34 cents	

Note:—1—The increased charge on repairs and renewals is accounted for by extensive alterations which have ultimately reduced the cost of operation.

2—In this distribution of cost no charge is made for light and power or high pressure service.

TEMPERATURES.

On a Basis of Average Taken from 1840 to 1898.

	1912-13. Degrees	1913-14. Degrees	1914-15. Degrees
October	50.6–4.05 above aver.	51.6–5.1 above aver.	52.75–6.20 above aver.
November	40.5–4.54 "	42.2–6.3 "	38.13–2.17 "
December	32.6–6.41 "	32.4–7.2 "	25.72–0.47 "
January	31.3–0.45 "	25.5–3.7 "	23.62–1.77 "
February	20.4–1.77 below aver.	15.5–6.7 below aver.	26.04–3.87 "
March	33.3–4.61 above aver.	30.8–2.1 above aver.	29.93–1.24 "
April	46.3–5.13 "	41.5–0.3 "	49.82–8.65 "
May	54.3–1.90 "	58.5–6.1 "	52.15–0.30 below aver.
Yearly average	4.29 "	3.85 "	2.89 above aver.

COAL USED.

Average daily consumption.	1912-13. tons	1913-14. tons	1914-15. tons
Sept. 25-Oct. 31	17.0	14.2	13.2
November	36.5	31.4	29.1
December	49.0	35.7	41.5
January	43.8	46.0	44.5
February	58.2	57.4	44.9
March	42.8	37.6	38.6
April	23.6	24.2	18.6
May	10.1	10.1	7.0
Total consumption	8.584	7.760	7.146

POWER DEVELOPMENT AT DOG LAKE

THE city council of Port Arthur, Ont., decided on Nov. 28 to submit a by-law at the January elections to find if the electors want the Hydro-electric Commission to develop, construct and acquire some 30,000 horse-power for the city, probably at Dog Lake. The city at present consumes about 30,000 horsepower, which is secured from Current River, and about 2,300 horse-power, which is secured through the Hydro-eletric Commission from the Kaministiquia Power Co. of Fort William. The influx of new industries and elevators into the city will increase the consumption by several thousand horse-power in the immediate future, and in the event of the Kaministiquia Power Co. not being able to supply this from its present plant, another source of power is necessary.

For years this city has been striving to have Dog Lake developed by the Hydro-electric Commission, and it is expected that the vote will be unanimous in favor of it, especially as it will prevent the developement of this power by private interests. There is a probability that the city of Fort William may vote on the same by-law and eventually become a partner in the plant if installed, in proportion to the amount of power consumed. The sister city at present has a contract with the Kaministiquia Power Co. which does not expire for several years. The proposed plant is estimated to cost several million dollars.

* * *

PORT OF MONTREAL, 1916 SEASON

THERE came to the port of Montreal for cargoes, during the season which is now closed, 685 sea-going vessels with a total tonnage of 2,119,051, as against 815 vessels last year with a total tonnage of 2,261,374. Although the two totals compared seem to show that last year's business transacted by the port was more than this year, it is believed that further analysis of the figures will show that, if the coasting tonnage included in the returns for all the years were eliminated, the total of ocean-going ships this year would exceed that of any year in the history of the port.

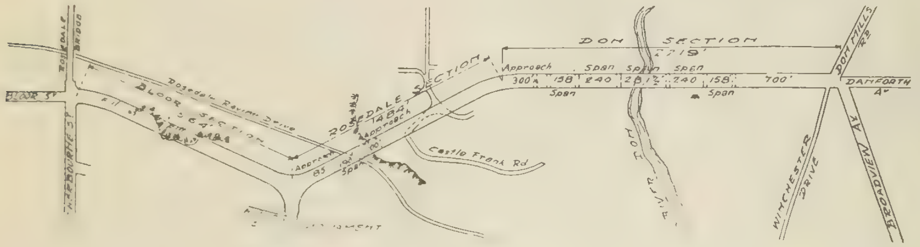
Coal, for example, which has formed in other years a great part of the cargoes brought up to Montreal from the Maritime Provinces, has come in comparatively small quantities this year because of the difficulty of getting tonnage. Last year there were probably two or three times as many coasting vessels as this year. The average capacity for cargo of the ships, which came this year, is also ahead of last year, another result of the large number of coasting vessels in last year's list.

Grain has again formed the major portion of the port's exports. Up to the end of November the exports from the elevators of the Harbor Commissioners and the Grand Trunk Railway reached the goodly figure of 71,646,455 bushels.

* * *

BLOOR STREET VIADUCT, TORONTO, ONT.

ON its completion in December, 1917, the Bloor Street Viaduct, Toronto, will assume its place in the realms of engineering achievement. The ultimate necessity for such a structure had been foreseen for many years, and the rapid development of North-Eastern Toronto during the last decade and a half accentuated the lack of highway communication in this part of the city to such an extent that in 1913 the sum of $2,500,000 was voted by the ratepayers of the city to defray the cost of the undertaking, including expropriated land and all other items.



PLAN SHOWING THE DIFFERENT SECTIONS OF BLOOR STREET VIADUCT AND VARIOUS CONNECTING STREETS.

The topography of the locality is roughly indicated in the accompanying map of the viaduct, the River Don flowing through a very pronounced depression known as the Don Valley, which is paralleled on the west by the Rosedale Ravine, those two physical features constituting a natural barrier between the east and west of Toronto. In addition to acting as an obstacle in the way of direct communication, these depressions diverted all traffic southward toward Queen and Gerrard Street bridges, and caused considerable congestion in these thoroughfares, all of which points will be relieved and great economy and convenience obtained through the use of the new means of communication.

VIEWS OF THE TWO EASTERN ARCHES OF THE DON SECTION, SHOWING FALSEWORK IN POSITION, AND FEATURES OF SURROUNDING DISTRICT.

The entire viaduct has a total length of 5,267 ft., divided over the three sections indicated on the map as follows:—Don section, 2,219 ft.; Rosedale section, 1,484 ft.; Bloor section, 1,564 ft. The estimated cost of the completed structure is approximately $2,500,000, and the allotted time for the completion of the work from the date of commencement is exactly three years for the Don section, the general contract for which was let to Quinlan & Robertson on December 17, 1914, and work commenced one week later. The sub-contract for the steel work was let to the Hamilton Bridge Works Co. A feature of the work is the provision of a bonus-penalty system, the time allowed being divided up over the various sections, such as piers, steel work, etc., the bonus being paid or the penalty collected at each interval; at the time of writing all sections have been ahead of schedule.

The Rosedale section contract was let to the Dominion Bridge Co., the sub-contract for the excavation and concrete work being secured by the Raymond Construction Co. Work on this section was commenced March 24, 1915, with two years allowed for completion under a bonus-penalty system. The Bloor section is entirely filling and possesses no actual bridge building features.

The Don section naturally possesses the major features of interest. It has two 158 ft. arches, two 240 ft. arches and one 281½ ft. arch, the actual distance between pier centres of the largest arch being approximately 300 ft., and height above normal level of Don River being 130 ft. While the preliminary estimates of quantities have been slightly altered as a result of actual construction, the principal approximate quantities on the Don section are: Excavation, 49,696 cu. yds.; concrete, 43,344 cu. yds.; concrete reinforcements, 985,200 lbs.; structural metals, steel, 10,875,370 lbs.; cast steel, cast iron and lead, 485,580 lbs.; total, 11,360,950 lbs.

All of the arches, including the single arch of the Rosedale section, are of the three-hinged, four-ribbed type. The total width of the viaduct is 86 ft., allowing 21 ft. for the car tracks, with 21 ft. 9 in. roadway on each side, while the cantilevered sidewalks are each 10 ft. 9 in. wide. A feature of the viaduct is the provision of a lower deck to carry a future system of underground railways.

* * *

LIQUOR AND TOBACCO CONSUMPTION

A PRONOUNCED decrease in the consumption of liquor and tobacco in Canada is indicated by the 1916 annual report of the Inland Revenue Department issued on Dec. 14.

The amount of spirits consumed per capital decreased to .745 gallons, the lowest figure since the year 1900, the consumption the previous year having been .812 gallons, and in 1914, 1.061 gallons. Of beer, 4.950 gallons per head were drunk last year, as compared with the previous one. Wine drinking also decreased, .062 gallons per head being consumed last year, as compared with .095 the year before. There was a large increase in exports of Canadian spirits, 808,135 proof gallons, as compared with 275,911 gallons in 1915. The decrease in tobacco consumption was less pronounced 3.329 pounds per capita being smoked as compared with 3.427 pounds the year previous.

"Dilution" of Labor in Canadian Munition Plants

By Mark H. Irish, M.P.P.*

No record of Canadian industry during 1916 would be complete without special attention being drawn to the introduction of female labor into our metal-working plants, or, to be more specific, those of them engaged in the manufacture of shell and shell accessories. The following racy, yet comprehensive sketch of the initiation and progressive development of "diluted" labor in our midst will constitute more or less of a revelation to many of our readers—at home and abroad, while at the same time impressing them with the certainty of still more remarkable achievement to be looked for quite early in the New Year.

WHEN the Ministry of Munitions in Great Britain indicated that a larger output of projectiles was needed and that a very important percentage of this increased requirement should come from Canada, the Imperial Munitions Board in this country was immediately aware that a factor in satisfying these demands would be labour.

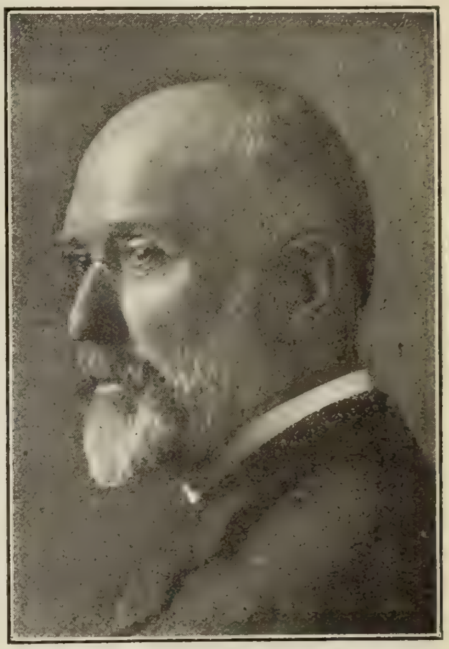
MILLING ESCAPE HOLE, TOP AND BOTTOM RINGS, NO. 80 FUSE.

MILLING THE UNDERCUT IN STEM NO. 80 FUSE.

We in Canada had reached a stage at which we were experiencing the same shortage in the male labor market, owing to enlistment in the Overseas Forces, as the Old Country had faced a year and a half before. The Imperial Munitions Board, in this emergency, formed a Department of Labor and set to it the task of meeting the requirements of the various manufacturers with the view that the reduced manpower might not be a cause for delayed deliveries. The department frankly imitated the example set it in England, and has devoted its attention to the Dilution of Labour almost exclusively.

Labor "Dilution" Defined

Dilution of Labour does not mean the substitution of a woman for a man, rather is it the spreading over either a greater time or a greater number of machines, the available men and, under charge of these men, placing women in their midst. For example:—If one hundred men can produce quantity A, then mathematically two hundred men can produce quantity 2A. We had not the second hundred men, therefore the first hundred men are "diluted" with one hundred women, the result being that one hundred men plus one hundred women produce quantity 2A. These figures, of course, are not perfectly accurate because trial has proved that one hundred men plus one hundred women sometimes only produce quantity 1¾ A. On the other hand, I am pleased to record that one hundred men plus one hundred women have frequently produced quantity 2½A.



JOSEPH WESLEY FLAVELLE, LL.D.,
Chairman Imperial Munitions Board.

A New Experience

When we remember that the metal working shop was a realm wherein woman had never stepped prior to the present war necessity, one must not be surprised that a change in conditions so revolutionary was not grasped with enthusiasm by either the manufacturer or his male employee. In passing, let me say, however, that the manufacturer faced with splendid courage the expense incidental to the adaptation of his factory for the reception of female help, and the trials and tribulations incidental to women first entering a machine shop. Also, let me pay a tribute to the loyal co-operation of the workmen concerned, actuated as they have been from the beginning, by a steadfast patriotic purpose. It speaks volumes for the mechanic as a class that, up to the date of this writing, we have not experienced ing a single moment's delay of his making, in the effort at the Dilution of Labour.

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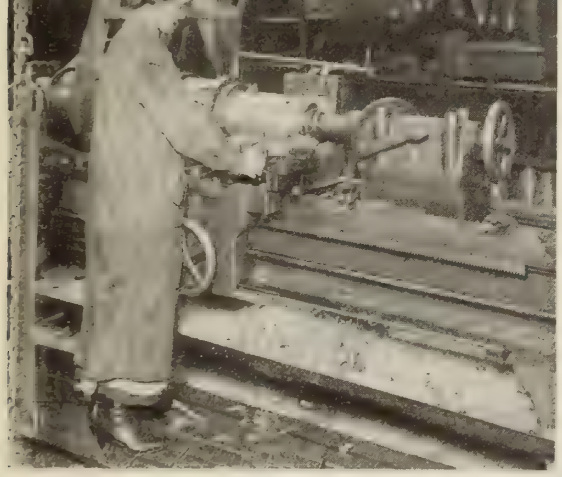
*Director of Munitions Labor, National Service Board, Canada.

The manufacturer first said:: “Women cannot make shells.” The pictures from England of the women at work in munitions factories only brought forth the statement that we did not have the same class of women in Canada. Finally, one contractor, operating upon the largest shell we make in Canada, which weighs several hundred pounds net, consented to a trial. Four weeks from the day he agreed to the change, he had several hundred women turning out the 9.2 inch high explosive projectile. All honour to this pioneer. All honour to the men who trained the women that first assisted munitions-making in Canada.

When this example was complete, we again commenced our missionary tours, having now the advantage of a factory in actual operation with women, and open, as all factories are, to other munitions manufacturers to view and be convinced. We took many of them to this experimental plant and then their statement was:—“We cannot get the women. How little we know of the Womanhood of Canada!” So as soon as it became, even in a very small degree, public that women were wanted to make munitions, we were deluged with applications, so much so, that we had to appeal to the Government of Ontario, in which province the greatest number of factories are located, to open an employment bureau for the registration of the applicants and eventually, as the plants became remodelled, for their allocation. To-day, and the effort is not four months old, we have more than twenty per cent. of the factories engaged in operations suitable for women, employing them, and we have more thousands of women at work in this last week of December than we had hundreds at work the first week in October. It looks now as if the supply of female labour for munitions plants would only cease when the necessity has been satisfied, or if the satisfaction given by their employment would induce almost every manufacturer, where their services are suitable, to adapt his buildings for their reception and employment.

BORING FUSE HOLE IN 8 IN. SHELLS.



UNDERCUTTING AND WAVING COPPER BAND GROOVE IN 8 IN. SHELLS.

Welfare Features

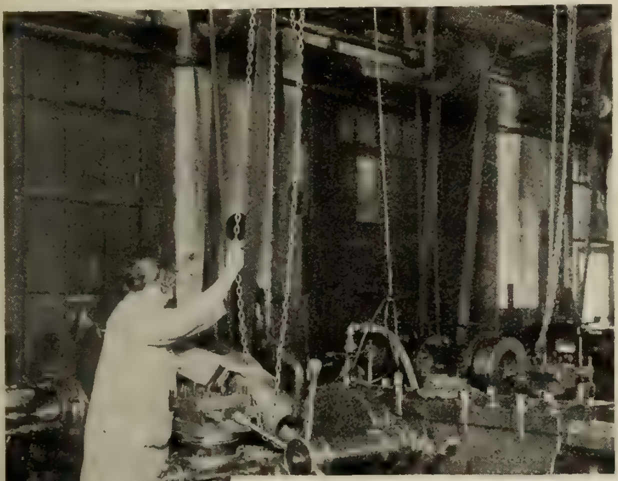
In the smaller towns where the women had to be imported from the urban districts, there was at once experienced a shortage of accommodation. In this difficulty we appealed to the Young Women's Christian Association and they responded in a manner creditable in the extreme. Hostels were opened under

NO. 100 FUSE RING TURNING DEPT.

DETAIL VIEW IN NO. 100 FUSE RING TURNING DEPT.

their supervision and management, where girls and women are housed and cared for amidst environments which · enables us to say to every mother: "Let your daughter go, she will be well looked after."

In the large cities where the factories are located in the outskirts, where there were no restaurants or other suitable places in which women could obtain, even at exorbitant prices, light refreshments, we again turned to the Young Women's Christian Association and they have established, under voluntary effort, canteens in the factories, where all the female employees can secure tea, coffee, milk, sandwiches, pastry, and sometimes sweetmeats. These canteens perform a work aside from and above the mere supplying of food at cost and of the most wholesome quality; they provide a refuge for the woman in the factory where she receives the sympathetic and helpful encouragement of the voluntary Y. W. C. A. worker, and many a kindly act could be recorded connected with this welfare effort.



HANDLING 8 IN. SHELLS FOR MACHINING.

RECESSING AND THREADING 8 IN. SHELLS FOR ADAPTERS.

We insist that there shall be employed by the manufacturer a matron and that he shall supply rest rooms, suitable cloak and lavatory accomodation, and that everything connected with his establishment shall be wholesome, clean and generally conducive to the health and happiness of his women employees. While this has its moral side, it also has its material advantage. Such conditions are conductive to steady and contented work, with the consequent increase in output by the plant at large. We cannot commend too highly to those interested in the subject this welfare feature, the housing, the canteen, the rest room, hospital and all other adjuncts that go with perfection in the employment of women in industrial

Service Badge Feature

We have also issued badges to the women workers after steady employment in one plant for thirty days. These badges are supplemented with a service bar after the employee has retained the same position for six months. The badges are highly prized as indicating that the wearer is doing her "bit" in the prosecution of the war.

All the women wear a uniform style of "overall," which are purchased by the manufacturer in large quantities and sold to the worker at cost. Part of this equipment consists of a head cover, like a bathing cap, designed with a view to keeping the hair from catching in shafting, belting or other machinery. The long shops with row upon row of lathes, each "manned" by a keen, alert, uniformed woman, is as inspiring as it is strange to Canadian life.

On the smaller parts where dexterity and nimbleness of finger is essential, the woman has excelled the man in efficiency. In work where a man's strength enables him to perform an operation without mechanical assistance but which is too heavy for a women to handle in like manner, the man still prevails in point of rapidity of production. When, however, the woman and the man are both obliged to use mechanical assistance for moving the shell body, they become equal, and their output varies but slightly and, I am told, in favour of the woman.

The woman labour is being drawn not from other industries, as might have been expected, owing to the attractive rate of wage, but from the class, at least so far, which has worked before but presently found no necessity to continue. These women and their daughters have entered the factory again as a duty to the State. Their enthusiasm is unbounded. The majority of them have husbands, fathers, brothers or sweethearts at the front and they rightly feel that their position in the munitions factory has joined them to the force behind the man behind the gun.

* * *

IRON AND STEEL PRODUCTION DURING 1915

THE production of iron and steel in Canada during the calendar year 1915 is the subject matter of a bulletin just issued by the Department of Mines, Ottawa. Our iron and steel industry had made steady progress up till the end of 1913, when the record figures of 1,128,000 tons of pig iron and 1,168,000 tons of steel ingots and castings were reached. The year 1914 however, showed a considerable decline in output of the furnaces. The railroads which are large consumers of steel, ceased generally to enter upon new construction work, confining their purchases of rolling stock to what was just necessary to maintain the efficiency of their services during a period of slackened trade. When railways reduce purchases, other industries generally follow suit.

In 1914 the production of pig iron fell to 783,000 tons and that of steel ingots and castings to 828,000 tons. Last year (1915) was a year of recovery. The call for munitions of war created a demand for steel, which was helped by the impetus to general trade given by the great harvest. The production of pig iron rose to 913,000 tons, and of steel ingots and castings to 1,012,000 tons. When the figures of the present year are available, it will be found that the record of 1913 has been surpassed. During 1916, there has been a still greater demand for munitions material, while both for home and foreign railways there have been orders for cars on a large scale, and experiments and developments in the way of modern ship construction give promise of creating a new market for the output of home furnaces.

Provincial Production of Pig Iron

The production of pig iron in Canada is confined to two provinces, Ontario and Nova Scotia. Quebec from the time of the early French days had furnaces which, through the processes followed, turned out a quality of iron second only to that of Sweden. The yearly figures, however, were never large. The greatest, 11,000 tons, are credited to 1904. Since 1911, the furnaces have been dead. Nova Scotia, whose furnaces are at Sydney, in 1915 produced 420,000 tons, and Ontario, which has its larger furnaces at Hamilton, Sault Ste. Marie, and Port Colborne is credited with 493,000 tons. The value of the whole was $11,374,000.

The ore used was largely imported. Iron ore is widely distributed in the Eastern Provinces. From peculiarities of composition, the situation of the deposits, or the relatively small percentage of iron carried, it has not been found practicable to use much of the home product in home furnaces. Nova Scotia and Quebec, like British Columbia, have in the past figured in the list of producing provinces. They have nothing credited to them in 1915. New Brunswick produced 3,600 tons and Ontario 394,000 tons of the total of 1,463,000 tons charged to Canadian furnaces in 1915.

The chief mines in Canada are the Helen and Magpie, in the Lake Superior region, operated by the Algoma Steel Corporation. Extensive electrical development at Steep Hill Falls supplies the power for working the mines. From the Helen mine in 1915 there was shipped to Sault Ste. Marie 205,000 tons of hematite, averaging 50 per cent. of iron. This mine has since 1900 produced 2,535,000 tons of ore, and over 42,000 tons of iron pyrites. Shipments from the Magpie were 132,000 tons of roasted siderite, carying 50 per cent. of iron.

The great dependence of the iron producing industry in Canada for ore is on Newfoundland, from which last year 789,000 tons were imported, and the United States, where 715,000 tons were obtained. On the other hand there was exported in 1915, 79,000 tons of ore, including 48,000 tons sent to the United States.

The Industries Still in Infancy

The iron and steel industry in Canada is yet at its beginning. Pig iron and steel billets are the raw materials of a great variety of manufacturers. From the furnaces the product goes in great part to the rolling mills, which in 1915 turned out 232,000 tons of steel rails, 124,000 tons of wire rods, 264,000 tons of plates, sheets and bars, and 34,000 tons of other products. These, and the articles into which they entered as materials for other industries, constituted $14,391,000 of the exports of Canada in 1914, and $48,268,000 of those of 1915, some $30,000,000 of the latter amount being due to demands of temporary character. The imports of iron and steel and their products in 1914 were valued at $80,063,000, and in 1915 at $74,308,000 from which it will be noted that there is considerable opportunity for expansion to meet home market demands.

BURLINGTON STEEL CO. YEAR

DURING the past year the rolling mills of Burlington Steel Co. plant at Hamilton, Ont., have been operating 24 hours a day, the capacity at present being 40,000 tons of steel bars per annum. The output consists of all types of bars for reinforcing concrete, angles and flats for the manufacture of agricultural implements, and various sections for almost every commercial and industrial requirement. The mills are electrically operated, calling for between 2,000 and 3,000 horse-power. The mill installation consists of a 7-stand, 12-inch unit, and a combination 8-inch unit for small material.

In addition to the production of steel bars, the manufacture of 4.5-in. high explosive shells has been in progress during the year, an order for 25,000 having been already completed. Business during 1916 has expanded very considerably, a nice export connection having been formed with France and Australia, and further substantial orders from these countries are meantime being negotiated.

STEEL PLANT FOR PACIFIC COAST

FOR some weeks, W. H. McLaws and G. A. Mackenzie, of Calgary, were in Vancouver looking over probable sites for the establishment of a plant for the manufacture of steel. These gentlemen are president and managing director respectively of the Canadian Western Steel Co., of Redcliffe, Alta., and the Alberta Rolling Mills, at Medicine Hat. A site consisting of ten acres has been secured at Eburne, at a cost of $14,000, and, upon this, the construction of a steel plant, the initial cost of which will be about $250,000, will be begun early in January. Ultimately, employment will be given to three hundred men.

The buildings will cover four acres, and, when production starts, the necessary pig iron will be procured from China, owing to the war demands on same in Canada and the United States. Ultimately, it is proposed to erect a smelter and treat ore, which is to be found in considerable quantity in the Province of British Columbia. Bolts, screws, angle iron, nuts, bar iron, and, later on, steel plates, will be manufactured. Mr. McLaws was formerly a member of the Calgary legal firm of Lougheed, Bennett, Allison & McLaws.

CANADA'S NICKEL OUTPUT

THE value of the nickel production of Canada in 1916 is estimated at $23,000,000, against $20,423,348 in 1915, and $13,655,381 in 1914. Ten years ago the valuation was $8,948,834 and in 1896 it was $1,188,990, but only $498,286 in 1889. In the first half of 1916 the output was 42 per cent. greater than for the corresponding period in 1915.

The first and largest producer of nickel in the world is the International Nickel Co., which does its refining in New Jersey, but produces matte at Sudbury, Ont., through the Canadian Copper Co., which it controls. Another corporation is the Mond Nickel Co. of Great Britain, of which the head is Sir Alfred Mond. This company smelts its ore at Coniston, Ont., and the matte is refined at Clydach, Wales, the plant having been greatly enlarged in 1914. The International Nickel Co. shipped 59,000,000 lbs. to the United States in 1915, and the Mond Co. sent 12,000,000 lbs. to Great Britain. Each company uses its own process, developed after extensive experimenting and great expense.

A third corporation was organized in July, 1913—the Canadian Nickel Corporation—but the name was afterwards changed to the British-American Nickel Corporation. The British Government will take part of its output and will guarantee its bonds. Undoubtedly this is part of a plan to increase the supply of nickel for the Government without dependence on foreign countries. Not long ago it was announced that very soon actual operations on the building of another refinery for the British-America Co. would begin, and that the new refinery of the International Nickel Co. at Port Colborne, Ont., would be turning out refined metal within 12 months. The work of the British-American Co. will be directed by E. P. Mathewson, who has recently left the Anaconda Copper Mining Co. to associate himself with the new undertaking.

Relation of Canada's Universities to Her Industries

By W. L. Goodwin, D.Sc. *

Not the least notable feature of the war to date, and relative especially to its further successful prosecution, has been the response of the personnel of our Empire scientific institutions, colleges, and universities, to the call for co-operative effort with the factory and the field. Attention has, therefore, naturally been again, and perhaps more forcibly, directed to the kinship that should exist between the University and the workshop in peace-time as well as war-time. Inspiration to greater effort towards that end is available in this article.

THE prosperity of a state depends, not so much upon its natural resources, as upon the efficiency of its citizens. That this is the case has been proved in the history of many states—some, like the Dutch, wresting prosperity from the most unpromising circumstances; others, like the Mexicans, remaining poor in the midst of Nature's bounties. Efficiency depends upon knowledge, and intelligence to use it to the best advantage. For the highest efficiency the knowledge must be complete for the purpose, and up to date. Intelligence implies such development of the brain power as is necessary in making use of knowledge; but it also includes character—a quality of spirit which leads to conscientious work. It must not be forgotten, too, that there is an intelligence of the body, as well as an intelligence of the mind; and both must be cultivated by the processes of education, if the citizens of a state are to be completely efficient. The universities offer opportunities for the most complete acquisition of knowledge and the development of the best intelligence. If they truly discharge their functions they will provide leaders for all the activities of the country.

The Meantime Situation

In discussing the relation of Canadian universities to manufacturing and other industries of our country, it will be well to inquire in the first place how far they have gone towards fulfilling the ideal thus set forth. During the past twenty-five years our universities have very largely increased the facilities for giving young Canadians good courses of study to qualify them for the various branches of engineering and other pursuits resting upon science as a foundation. It can be justly asserted that the universities have kept abreast of the demand for highly trained men of this class, and in the case of some branches of engineering they have turned out graduates rather faster than Canadian industries have absorbed them. A considerable proportion of the best of our science graduates have found positions in the United States and other foreign countries. In the meantime, at any rate, their services are lost to Canada. Of the graduates who have found their place in this country, an increasing proportion are managers of manufacturing and other industrial concerns; while others hold responsible positions implying the quality of leadership. While, however, the universities have fully met the demand for such specially educated men, it does not follow that industrial concerns have employed, or are now employing as many of these men as a wise and progressive policy calls for

The Instruction Provision

Passing in review the principal Canadian universities as to what they are doing in training men for the industrial pursuits, we find that in Nova Scotia the Technical College in Halifax offers courses in the different branches of engineering; in New Brunswick, the University of Fredericton graduates men in Civil Engineering; in Quebec Province, McGill University, in Montreal, has a strong Faculty of Applied Science; in Ontario there are two universities with complete science faculties—viz., the Provincial University in Toronto, and Queen's, in Kingston; in the Western Provinces, the universities, although quite young, have already organized faculties of science, and are paying special attention to agriculture.

There are several smaller universities and colleges which are doing good work in scientific education, and in taking stock of our resources in men for carrying out any scheme of research and cooperation with industries, these institutions should not be overlooked. There will be found in them men of ability and scholarship who only need the opportunity to do good service for Canada. In addition to these educational facilities, a number of the provinces have well-developed agricultural colleges —e.g., McDonald College, in Quebec; Guelph Agricultural College, in Ontario, and the Manitoba Agricultural College, near Winnipeg. There is also an agricultural college in Nova Scotia, and the Universities of Alberta and Saskatchewan have opened departments for higher education in agriculture. There are also several technical schools, which, while not of university standing, yet should be mentioned as providing a scientific education much in advance of that which can be had in the ordinary type of secondary schools. Good examples of this class are the finely appointed Technical School in Toronto, and L'Ecole Polytechnique, in Montreal.

Altogether, it may be maintained that Canada has made a good beginning in providing for her sons' education of the university grade, to fit them for the higher positions in manufacturing and other industries. All these institutions of learning, whether supported by the provinces or by private endowments, are more or less hampered by lack of funds. It seems that we are not yet fully awake to the fact that money spent liberally for this purpose is a first-class investment for the country. Science is organized, up-to-date knowledge, and applied science is that knowledge used in the industries. A country in which industrial concerns are in the hands of men who are not in possession of such knowledge is evidently handicapped and must surely fall behind in competing with countries using all the resources of science.

Tackling of New Problems

For industrial purposes it is not enough to call to our aid the knowledge which has already been brought to light. New problems are constantly arising, requiring for their solution the application of scientific principles. Improvement in processes, the discovery of new processes, the reduction of costs by increasing the yield, the utilization of waste materials, the discovery of new materials—all these are subjects of investigation by men trained for the purpose. The universities should provide such men, and their education should be of a kind to commend them to managers of industrial concerns, who, in their turn, must have their eyes open to the fact that, unless they in this way make use of the best obtainable knowledge and skill, they must inevitably fall behind.

There is no more clearly demonstrated fact in the modern business world than this. It is quite possible that the universities are in part to blame for the slowness with which this idea has been accepted and acted upon by managers of industries. Courses of study and the general college atmosphere and discipline are not always calculated to cultivate the habits or the point of view which fit a man for the real business of life. but it may be safely stated that on the whole the science graduates of Canadian universities are a fairly businesslike lot of men. What is particularly needed just now is a closer co-operation between the universities and the industries—a co-operation which may take a number of useful forms.

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Forms of Industrial Co-operation

(1)—Some arrangements by which the students should spend part of the year at college and part in the factory, mine, or other scene of practical activity, and thus carry on at the same time the gaining of practical experience with advance in the college course. This is done in a scattered informal way by many students. What is needed is a system which would take in every science student of every university. In this way managers would always have passing under their eye young men from among whom they could choose those especially adapted to their business; and, on the other side, the young graduates would have already the introductions and chances for a start which they sometimes find it hard to get.

(2)—Co-operation in research would lead to results good for both parties. It would provide stimulus for the professors and advanced students; and, on the other side, it would give the industries the assistance not of one man, but of a whole staff of scientific advisers. There are great possibilities here. But it implies two things:—First, an increase in the staff of the universities so as to lighten the burden of teaching. In this way the professors will have more time to give to investigations. Second, a system which will connect the universities and the industries in such a way that problems will be handed over to the universities for solution as a matter of course. In countries where industries make full use of modern science, the great manufacturing corporations have in their employment large numbers of men who devote their whole time to research. This is the ideal which we should choose for Canada. There will always remain many smaller concerns not strong enough, however, to afford research laboratories of their own. Even in the most advanced countries it will always be found difficult to maintain bewteen university and factory the close connection described.

(3) There is a third way in which the universities could usefully co-operate with the manufacturers viz., by an interchange of lecturers the university professor going to the factory to talk to the staff about the newest development of science in their line, and representatives of the manufactories lecturing to the students and professors on the applications of science. The writer has before him a letter just received from one of the great manufacturing corporations in the United States, signed by the Secretary to the Committee on Relations with Educational Institutions. This letter shows that arrangements are being made for such an interchange of lectures. Our motto in Canada for university and factory should be: "Let us get together."

To sum up—Both our universities and our industries will benefit by a closer co-operation, the manufacturers strengthening the universities: (1)—by employing more of their graduates; (2)—by giving students vacation employment; and (3)—by sending to the universities manufacturing and other problems for solution, and by providing the necessary assistance through scholarships and fellowships; The universities increasing their usefulness to the industries: (1)—by studying more thoroughly the needs of the country and shaping their educational work accordingly; and (2)—by cultivating a closer acquaintance with existing industries.

Government Enterprise Necessary

Outside of all this there is a ground which can be covered only by Government enterprise. An example of this is the manufacturing of nitrate from air—a great undertaking of national importance to agriculture, to chemical industries, and for the manufacture of explosives for war. There are many developments of natural resources which, like this, can best be undertaken in their initial stages, at any rate, by the Dominion Government. The scientific basis could, however, be most advantageously worked out in many cases at the universities, where the co-operation of a whole staff of scientific men could be secured. The first step towards this has already been taken by the appointment of the Commission on Industrial Research, the terms of appointment of which include co-operation with the universities. The wisdom of this course is almost axiomatic, as it is obviously best to use to the utmost the men and organizations already existing for the purpose.

COAL AND STEEL IN NOVA SCOTIA DURING 1916

By F. W. Gray, M.I.M.E.*

THE progress of the Nova Scotia coal industry may be gauged from the following figures of production (gross tons), covering the ten-year period ending 1916. The figures for the latter year are closely approximate:

1907	5,775,503
1908	6,076,330
1909	5,106,135
1910	5,817,109
1911	6,362,099
1912	6,995,289
1913	7,263,485
1914	6,650,038
1915	6,630,000
1916	6,170,000

Production Variation

The natural progress of coal production was interrupted and hindered in 1909 by the numerous strikes occasioned by the abortive efforts of the United Mine Workers of America to gain a footing in Nova Scotia, and to oust the existing local miners' organization. The maximum production of Nova Scotia was reached in 1913, but the record figure of a little over 7¼ million tons attained in that year did not represent the maximum capacity of the Nova Scotia coal mines for output at that time, as a decided trade depression manifested itself about the middle of the same year, and the collieries did not work full time during its last quarter. It may be considered that the maximum output capacity of the collieries was about 7½ million tons. A production of 6,170,000 tons in 1916 is, therefore, 1¼ million tons below the maximum productive capacity of the Nova Scotia collieries.

In a time when the necessity for increased production of raw materials is being preached by the responsible statesmen of every belligerent nation, this very considerable diminution in the output of our most important raw material is sufficiently serious, particularly when the low figures of 1916 follow large recessions in output during the preceding years 1914 and 1915. A more serious aspect, however, is the probability that the tonnages of 1917 will show a still further decline to a figure between 5½ and 5¾ million tons.

Production Decline Factors

A combination of circumstances is responsible for the decline in production. Foremost and chief among these is the loss of 5,000 colliery workers by enlistment for service at the front, and the fact that a preponderating proportion of these enlistments has been from among the skilled underground workers. It is everywhere admitted that the miner makes an excellent infantry soldier, and his willingness to do his bit, and more, has been in evidence throughout the Empire. The colliery districts of Nova Scotia were for a long time the happy hunting ground of the recruiting sergeants, who flocked into the mining villages to recruit men for units, having their headquarters as far away as New Brunswick and Quebec.

During the past year recruiting activities have been restricted throughout the colliery districts, but unfortunately the paramount necessity for coal was not recognized by the authorities until the output capacity of the collieries has been irremediably crippled for the further duration of the war, and even yet the men who are helping in the manufacture of munitions by digging coal have been granted no official recognition of their usefulness. If the miner is not a munitions worker and entitled to an official badge, who is? He produces the basic, indispensable, essential munition of war, without which not a wheel could turn, and failing which neither men nor shells could reach the fighting fronts.

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*Dominion Steel Corporation, Sydney, N.S.

Other factors tending to restrict production are the practical cessation of expenditure on new developments since the spring of 1913, and the increasing physical difficulties attendant on the mining of coal in Nova Scotia, such as increased depths of extraction, increased proportion of coal won from submarine territory, lengthened haulages, and an unfortunate succession of underground fires at the mainland collieries that have considerably restricted production. All these causes, however, are to-day subordinated to the shortage of skilled miners, and no amount of new development or capital expenditures will permit of an increase in the output of coal until "the boys come home."

Wages and Materials Cost Increases

The year 1916 has seen a succession of wage increases granted in quicker rotation and more substantial in amount than in any previous comparable period in the history of coal mining in the province. Increases aggregating 25 per cent. have been given within dates less than six months apart. The cost of materials has increased in similar proportion, and transportation charges are so high as to approach absurdity. Yet while these increases in wages and cost of materials have within the past twelve months become so extraordinary as to attract general attention, the steady increase during the past ten years probably represents a more permanent and serious problem than the temporary unsettling of markets and prices by war conditions. During the past ten years wages have increased about fifty per cent., and the cost of materials entering into colliery operations, such as timber, oils, steel and iron goods, horses and horse feed, explosives, building materials, etc., has increased from 50 to 150 per cent.

Legislative Enactment Features

In addition to the enhancement of the cost of mining that arises out of that unhappy and universal subject of debate to-day, usually referred to as the high cost of living, there have been legislative enactments in recent years that have caused increments in mining costs. The rate of royalty was raised by the Government in 1913 from 10 cents to 12½ cents per ton, and workmen's compensation laws will be responsible in 1917 for an addition of not less than 4 cents per ton on the cost of mining.

In spite of these serious additions in practically every department of coal mining, the selling price of coal at the pit mouth has not materially changed. It is quite true that coal is now costing the ultimate consumer more money, and that there have recently been considerable advances in price in the large cities, but a large portion of these advances is represented by increased charges for transportation, and an additional increment of cost between the coal dealer and the consumer. The net increase to the operator is small and disproportionate to the increase in the cost of producing coal. By the introduction of modern power plants, electric motive power, mechanical methods of coal-cutting, improved haulage systems underground, the utilization of all refuse and inferior coals and slacks, the recovery of by-products and generally more efficient methods, the coal operators of Nova Scotia have endeavored to combat the tendency of the cost of mining to increase by reason of the operation of the physical and economic causes above related, but the meagre increase in the selling price of coal at the pit mouth has not permitted the coal operator to reap the legitimate reward of his enterprise and foresight.

It is, therefore, quite evident that the future will of necessity see a considerable and permanent increase in the selling price of coal in Nova Scotia. The margin of profit available to the coal owner there has never been sufficiently large to enable proper provision to be made for amortization of capital expenditures, or to allow of the accumulation of sufficient financial reserves to carry the smaller companies through periods of financial stress.

Increased Coal Consumption

The great demand for steel has caused a largely increased consumption of coal in the various processes of iron and steel manufacture, and when this has been coincident with a diminished output and a sharp demand for bunker coals f.o.b. at home ports, it has resulted in a marked decline in the amount of coal available for the St. Lawrence markets. The exports of Nova Scotian coal to St. Lawrence ports in 1916 was only one-quarter of the normal annual shipments, and indications are that next summer not even this quantity will be available. The result is a pronounced increase in the importations of United States coal, at prevailing high prices of transportation and initial cost, and the loss to the Nova Scotia operators of a market that it has cost much effort to cultivate.

From the national point of view the increased revenue of the Customs Department is scarcely sufficient to offset the foolishness of spending millions on the purchase of United States coal at the same time that the Canadian coal production is steadily dropping. The effect on our national finances is tantamount to raising a loan in the United States at high rates of interest, and it adversely affects both our money exchanges with New York and our national earning power.

The Steel Situation

The steel industry of Nova Scotia seems at last to have come into its own. The present prosperity may be evanescent, and a passing result of the demand for munitions, but there are certain factors of permanence that have always existed in Nova Scotia, and which will, as years go by, steadily assume greater importance. These factors are the presence of large and practically limitless coal areas, the proximity of ample limestone supplies, and the facilities which the roomy harbors of Cape Breton Island, particularly the harbor of Sydney, afford for the cheap assemblage of raw materials and the receiving of the iron ore from the unique deposits at Wabana. The valuable character of the practically unlimited supplies of coal, limestone and iron ore that are controlled by the two large steel companies of Cape Breton Island have long been recognized by those acquainted with them, but it is only recently that the significance of them appears to have dawned upon the general public.

For a time, however, the Prince seems to have come into his own, and steel is being manufactured to-day in Cape Breton at a hitherto unprecedented rate. Some indication of this is the fact that the Dominion Iron & Steel Co. is daily producing 10,000 shell blanks of various diameters, in addition to the usual production of wire, wide rods, nails, etc. Large extensions are under way or in contemplation at the works of both the "Dominion" and the "Scotia" Companies. A new blast furnace is approaching completion at Sydney Mines, and, at Sydney, extensions contemplated include new furnaces, additional coke ovens, additional soaking pits, and additional equipment sufficient to double the present production capacity of the "Dominion" plant.

The future no man can tell, but an intelligent anticipation of coming events is permissible even in these days of the disrepute of prophecy. Whether, therefore, the present activity of the steel trade in Nova Scotia, admittedly due to war demands, will decline when peace shall come, is a problem that every man must decide according to his ability, but some day or other, sooner or later, the permanent economic advantages possessed by Sydney will place its steel industry in a pre-eminent and unassailable position. With the memory of past hard times before them, it is fair to assume that those who are directing the coal and steel industries of Nova Scotia will take advantage of the opportunity offered by the present brisk demand to improve and put the plants into first-class condition and to provide the financial reserves required for the coming "rainy day."

Review of the Past Year's Iron, Steel and Metal Markets

Staff Article

A year ago we stated that prosperity was rampant so far as the production of iron and steel was concerned, and only in slightly lesser degree was the like condition true with regard to the more prominent metals. The year now closing has added materially to the prosperity of its predecessor, a circumstance due almost entirely to the insistent and ever-developing demand for munitions by Great Britain and her Allies. The charts, together with the accompanying data amply evidence the altogether abnormal situation above indicated.

IRON AND STEEL

THE unusual activity which prevailed in the iron and steel trade in Canada at the close of 1915 has been continued during the year just closing only to a far greater degree. There never has been in the history of the trade such a year of unexampled prosperity as during 1916. All records have been broken both as regards prices and tonnage output, and the coming year bids fair to eclipse the 1916 record in every way, as far as can be judged at the present time. The situation is due almost entirely to the enormous demand for shells, although there has been considerable export business done in wire rods and wire products. The output of the steel companies has to a large extent been at the disposal of the Imperial Munitions Board, and for this reason a comparatively small tonnage has been available for purposes other than munitions. The development of export business in steel products which was widely discussed during 1915 has been held up indefinitely for reasons above stated, and it is doubtful if the question will be reopened until the present urgent demand for shells has been satisfied.

Increased Output Provision

One particularly satisfactory feature has been the ability of the steel companies to largely increase their output in view of the famine in steel which threatened towards the end of last year. Although there is now a decided shortage of steel, it cannot be said to approach a famine in the general acceptance of the word. If, however, a famine had developed, the results might easily have been serious in view of the enormous tonnage required for munitions. Considerable credit is therefore due to the steel companies and the Munitions Board for the way in which they have handled the situation. The shortage of steel is of course general, but fortunately is not affecting the production of munitions as this industry has the first call on the output of the mills. In other respects however, the shortage is serious and the increase in values of practically all iron and steel products, semi-finished and finished, has been the natural result. One effect of this shortage has been the partial and in some cases complete suspension of building operations while many industrial plants using iron or steel in the manufacture of their products have been badly handicapped and their output restricted in volume. Very little relief has been obtainable from the United States, as the mills there are as badly congested as our own plants. Canadian dealers having contracts with American mills were for a time in a better position, although the advantage which they enjoyed in the early days of the boom has now practically disappeared. The shortage from U.S. sources has been felt to a greater degree perhaps than that from Canadian mills, particularly as regards structural shapes and ship material.

Plates

The marked decline in building, and consequently less demand for structural shapes relieved the situation to some extent. During the year however, there was an important revival in the shipbuilding industry affecting every ship-building yard in Canada; a rush for ship plates accordingly resulted. Prices of plates had already reached a high level and deliveries were so backward that shipbuilders have only been able to obtain material by paying premium prices. It was only by reason of the urgent demand for tonnage that shipowners were able to pay the increase in cost of construction. The present cost of plates and the great difficulty in obtaining them is tending to restrict for a time, further development in the shipbuilding industry. Plates have made a gain of 2¼c per pound during the year.

Rails

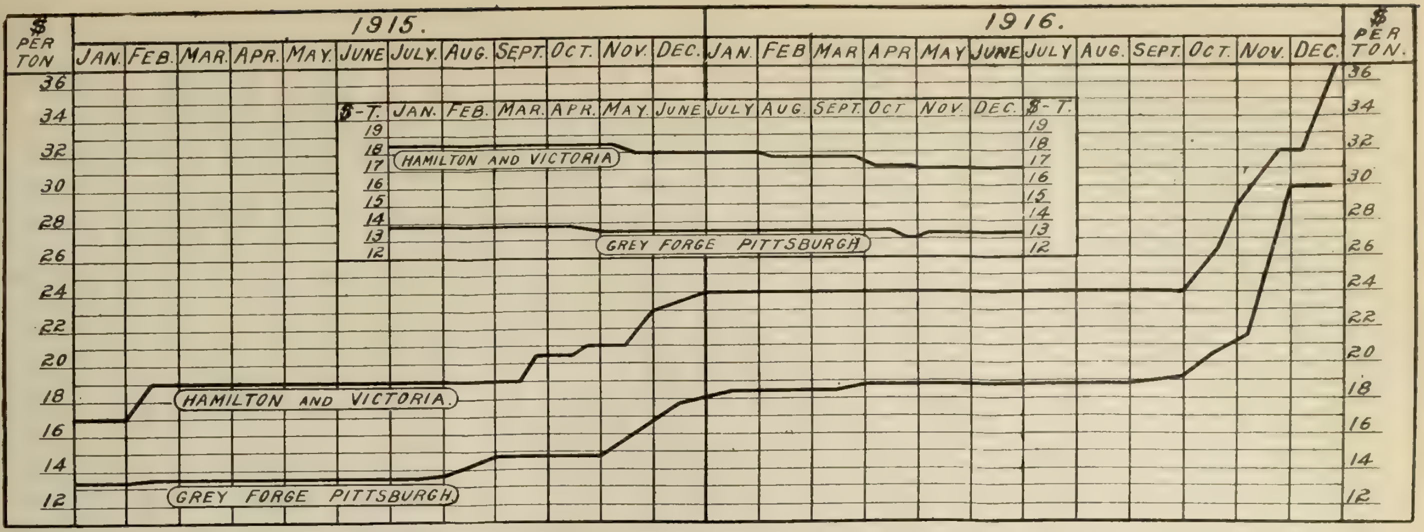
During the year a scarcity of steel rails developed. The railways, during the year and also in 1915, had purchased comparatively small tonnages of rails owing to the policy adopted of keeping down expenses to a minimum. Only one concern, the Algoma Steel Co., kept their rail mill in operation. The Dominion Steel Corporation who also roll rails used their entire output of steel for other purposes. The C.P.R. has already shipped a quantity of old rails from sidings, etc. to France for military railways, while arrangements are now being made for further large tonnages of similar material to be sent overseas. Little relief was obtainable from the States owing to the oversold condition of the mills there and very backward deliveries. The situation continues to become more acute with no sign of relief in sight. During the summer the price of rails advanced $5 per ton from $28 to $33, the first price change in 12 years. Later they were advanced to $38 per ton f.o.b. mill, which is now the ruling price. The advance created some sensation in the market but was inevitable under the circumstances.

Pipe and Tubes

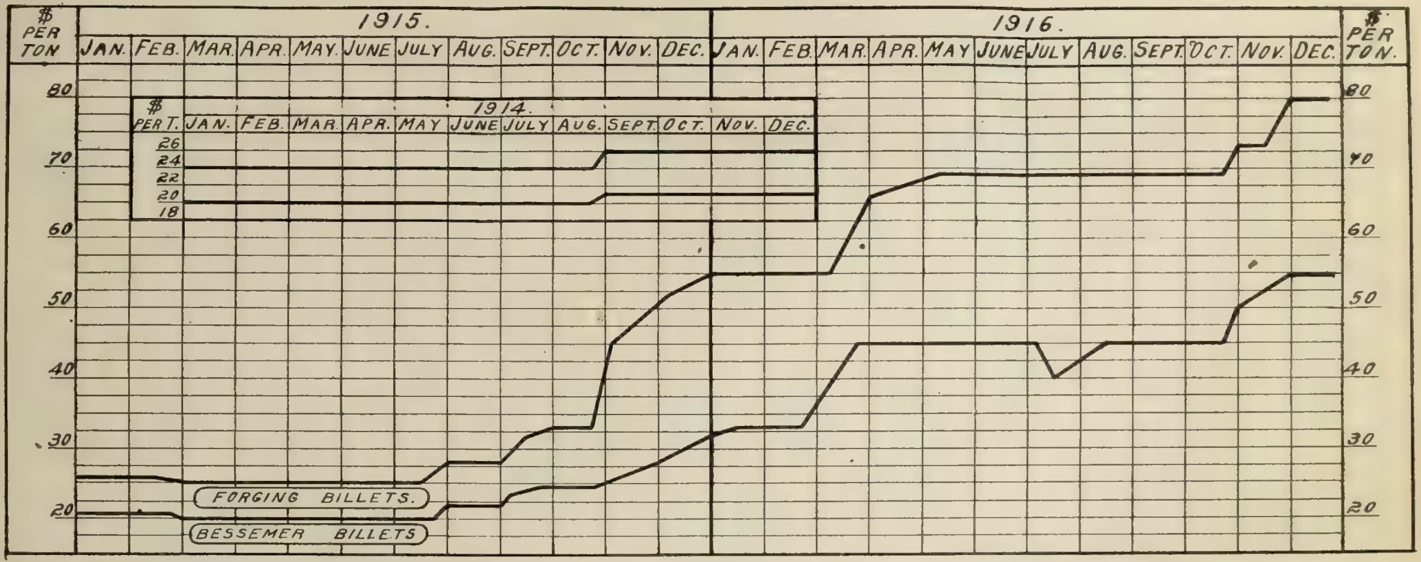
Prices of tubular goods have advanced rapidly during the year and like all other steel products have attained record levels. With regard to boiler tubes, conditions in the U.S. market have affected the situation here rather than any influence in the Canadian Market. The demand for merchant and boiler tubes in the States has been so heavy that the mills are sold up for practically twelve months and prices consequently are high. The situation in wrought pipe differs little from that in tubes although the increase in cost of raw material is the principal reason for the prevailing high prices. Boiler tubes are now 100 per cent. higher on an average than at the beginning of this year.

Sheets

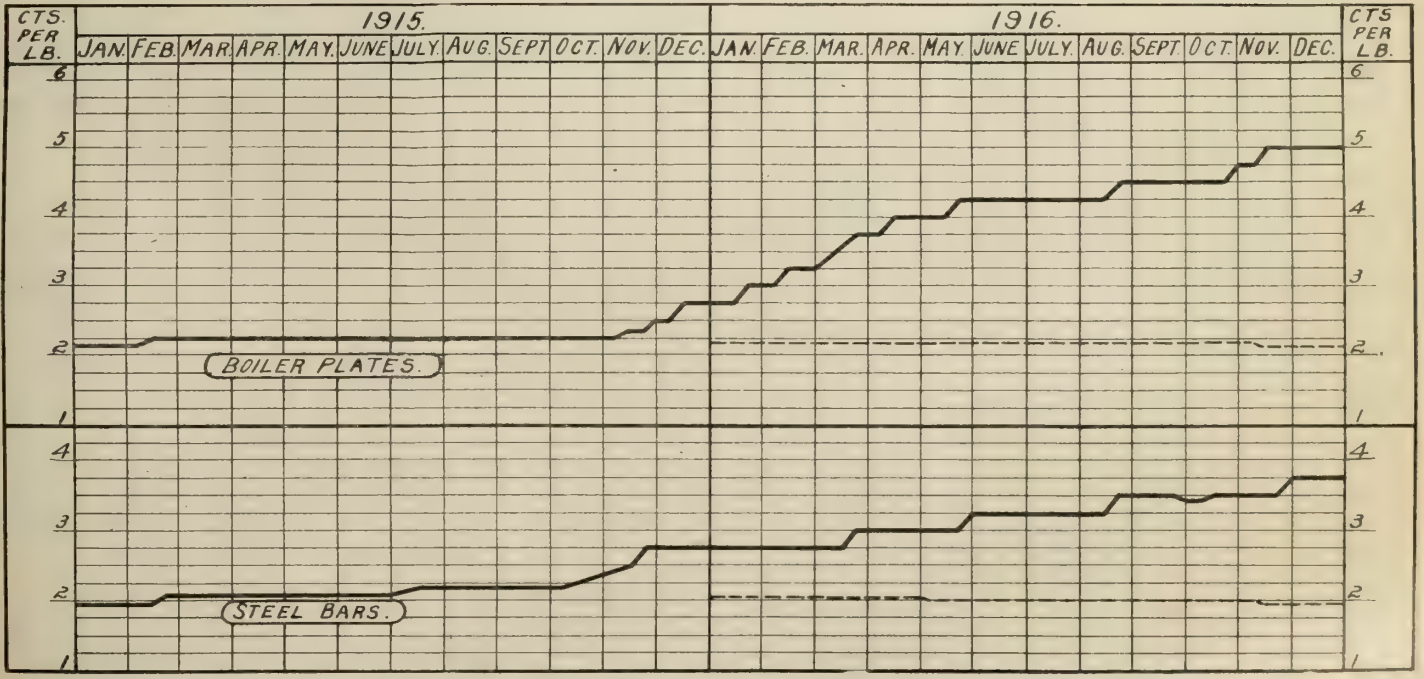
The market for black and galvanized sheets has been very firm throughout the year and prices have been steadily advancing. In black sheets Canada is now entirely dependent upon the United States for supplies, and conditions there consequently affect the situation in this market. The demand in the primary market, during the year has been good, and sheet mills have for the most part been behind on deliveries. A shortage of sheet bars has on more than one occasion tended to restrict production which has usually been accompanied by an advance in prices. Towards the end of the year the situation became more acute, sheet bars became scarce and higher, while shortage of fuel and labour also hampered operations at the mills. Prices of galvanized sheets have, of course, been materially affected by



PRICE FLUCTUATIONS OF PIG IRON DURING 1914 (INSET), 1915 AND 1916.



PRICE FLUCTUATIONS OF FORGING, AND BESSEMER BILLETS, DURING 1914, 1915 AND 1916.

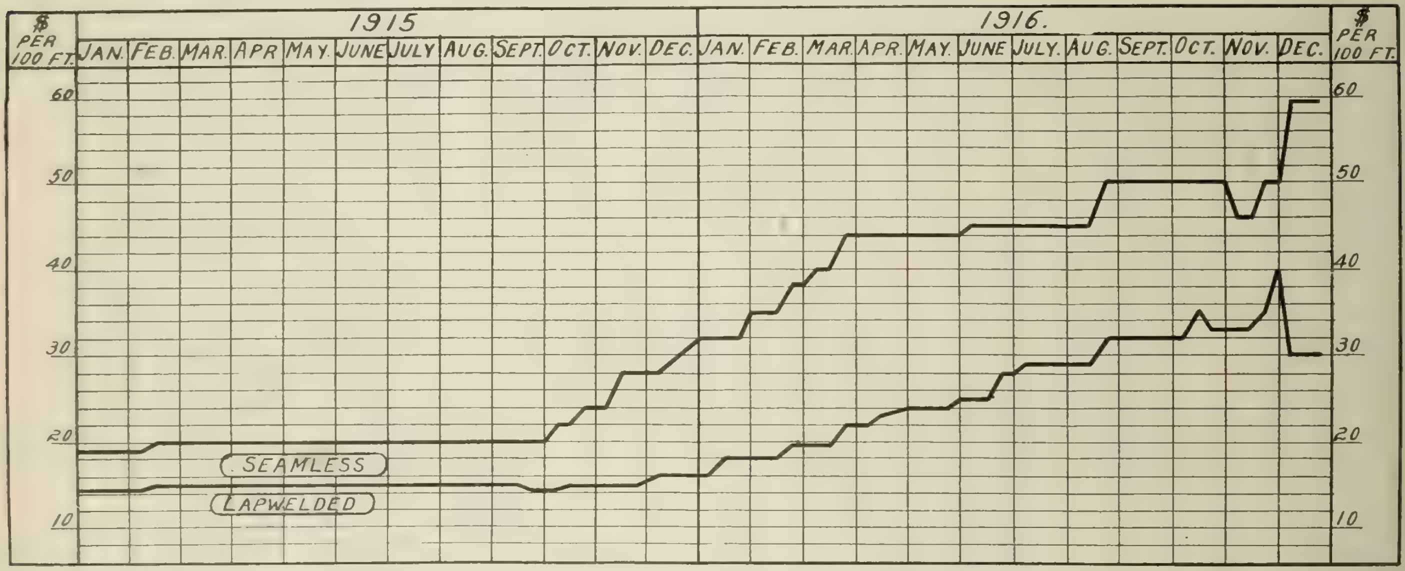


PRICE FLUCTUATIONS OF BOILER PLATE (¼" TO ½"), AND STEEL BARS DURING 1914, 1915 AND 1916.

the high cost of black sheets, while the consistent high price of spelter has also helped to keep prices up. The high cost of materials, principally spelter, has had the effect of considerably curtailing production of galvanized sheets, and the demand also fell off during the year. Some makers reduced their output by 50 per cent. and others even more. Owing to the war, the importations of British made sheets have been light and quotations have been largely nominal. The trade has been and still is in an unsatisfactory condition owing to the high cost and scarcity of all raw materials and the uncertainty of the spelter market. Black sheets have made a gain during the year of approximately $1.50 per 100 lbs. while galvanized sheets are about $1.25 per 100 lbs. higher than at the beginning of the year.

Bar

Prices of iron and steel bars have advanced steadily during the year from 2.75c to 3.75c per lb., a clear gain of 1c. Several times during the year makers have withdrawn prices on bars, this being always followed by an advance. Deliveries on steel bars have been getting more backward all the time with the result that iron bars are now being offered instead of steel owing to the quicker delivery on the former. Prices are to some extent nominal as quotations given are for delivery at mill convenience which may be anywhere from one to twelve months. Bars 2 in. and larger quoted at 5.25c base, have also made a substantial advance since the beginning of the year. The bar production is notable this year in that it has been confined almost entirely to meeting the demand for shrapnel bars.



PRICE FLUCTUATIONS PER 100 FT. OF 3½ INS. SEAMLESS AND LAPWELDED BOILER TUBES, DURING 1915 AND 1916.

Billets

The biggest gain in prices during the year has been made in semi-finished steel, such as billets, sheet bars and wire rods, the shortage of these having been more apparent than in any other steel products. On more than one occasion the situation was acute, but nothing developed of a more serious nature than a jump in prices. Bessemer and open-hearth billets and open hearth sheet bars started the year at $32 a ton, they are now quoted at $55 a ton. Forging billets which were $55, are now $80 a ton, while wire rods have advanced from $40 to $70 a ton, all Pittsburg prices. The Canadian mills making billets are absorbing their entire production for shell and other purposes.

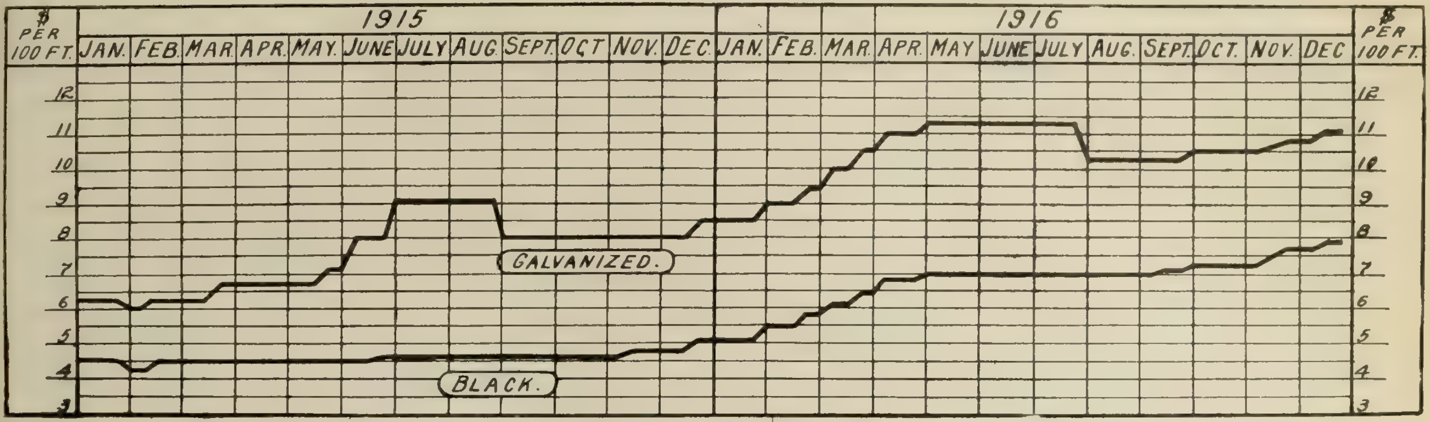
Pig Iron

During the latter part of the year, the activity in the pig iron market has been the outstanding feature. It is somewhat remarkable that, although steel has been steadily rising all the the year, it was not until September that pig iron began to move. For nine months, pig iron relatively with steel was getting further behind, notwithstanding the big demand for steel-making pig irons. At the close of the year, pig iron is not so very far below steel and is getting more into line with steel prices. The pig iron market in Canadian is rather restricted as all the big steel companies make their own pig, and in normal times have more than enough for their own purposes. There was therefore in ordinary times considerable tonnage available for grey iron foundries and prices consequently were reasonable. As the demand for steel increased, foundry iron gradually became scarcer and eventually up went prices. The most important independent furnace formerly producing foundry iron exclusively, is now turning out basic iron for steel making which has intensified the shortage of foundry grades. There has only been a comparatively light demand for foundry pig, otherwise the situation would have been very acute in the foundry business.

The upward movement in prices started in September at which time the two principal domestic irons were quoted around $24 a ton, this price having been current since the beginning of the year. When the movement got under way, the market seemed to go wild and prices advanced rapidly, the $32 mark being reached early in December. Shortly afterwards all quotations were withdrawn but based on U.S. prices $38 is about the market value at the close of the year. It will thus be seen that prices of pig iron have advanced more rapidly than at any time in the history of the trade, all previous records have been broken. The movement in Canada of course followed the activity which originated in the United States where prices advanced in a most extraordinary manner, being now approximately $12 higher than early in September. Stocks of pig iron at the furnaces were soon depleted and orders now on hand will take several months to fill. To make matters worse, transportation difficulties have hindered the movement of coke to the furnaces, and the winter weather will aggravate the situation. Only recently it was feared that the Hamilton, Ont, furnace would have to shut down owing to the shortage of coke. Although the coke production has increased, it is barely keeping up with the demand, while, in addition, there is a shortage of cars making the situation a difficult one to handle. There is ever present a possibility of a short supply for the furnaces.

Production Increases

During the year the steel companies have made important extensions, and the physical condition of the plants has been greatly improved. New open-hearth furnaces have been constructed and rolling mills extended. The capacity output at our steel concerns is now greater than it ever has been, and the profits which have undoubtedly been made, have placed the companies in a sound condition, financially, and have put the steel industry figuratively speaking on its feet. The effect of this will be felt more in normal times when the demand is lighter and competition keener. It is to be hoped that when the present rush is over some effort will be made to establish a plant or plants for rolling structural shapes and plates for which there will be an increasing demand in Canada. This country has so far been entirely dependent upon the States for plates and for all shapes, except small angles, etc. Now seems the time to give the matter some consideration so that the work can be proceeded with when the opportunity arrives. During the year some progress has been made on the new steel plant at Ojibway, Ont., which when completed will make an important addition to the steel producing facilities in Canada.



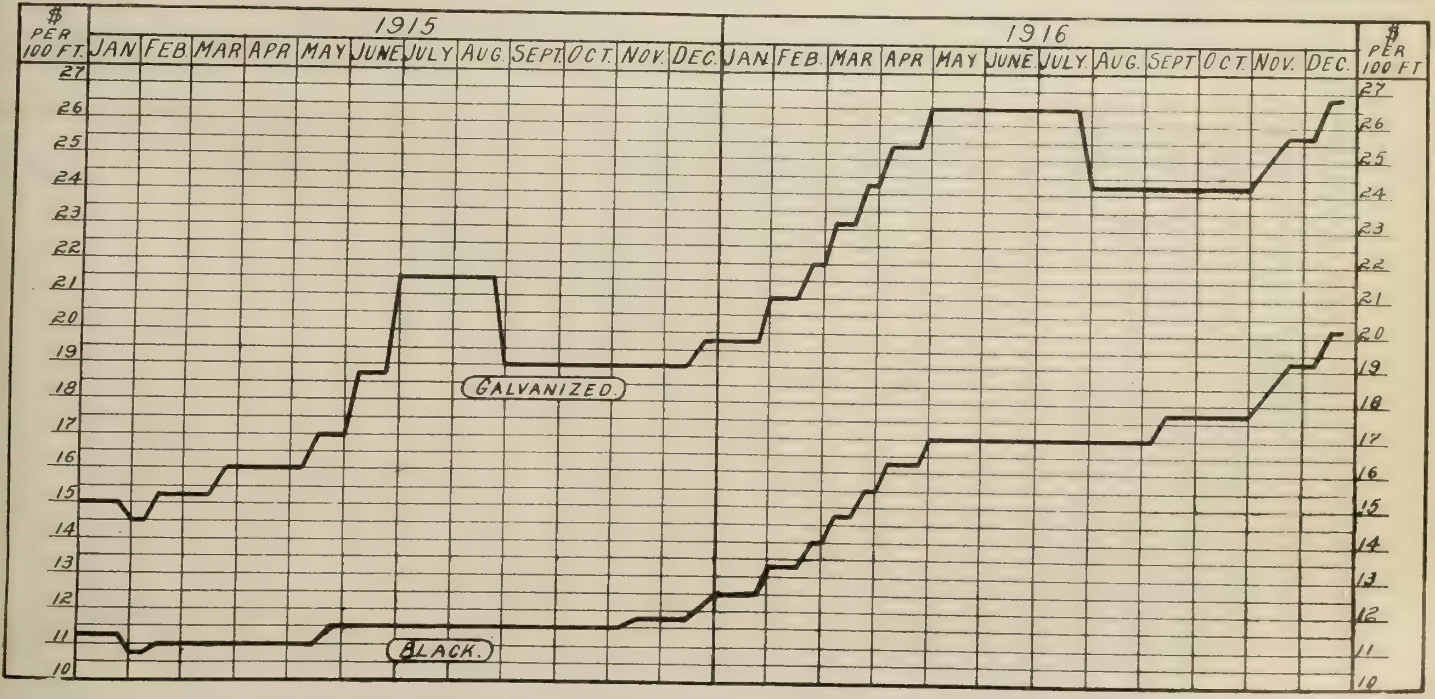
PRICE FLUCTUATIONS OF ONE-INCH WROUGHT IRON BUTT-WELDED PIPE, DURING 1915 AND 1916.

Future Uncertain

How long the prevailing prosperity in the steel industry will last is a debatable question. Until quite recently, twelve months was a fairly easy guess, but Germany's peace proposals, although promptly rejected, have served to remind people that it is almost entirely due to the great war that the industry is booming. It is true that the mills have all the business they can take care of for almost a year, but if by any good stroke of fortune, cessation of hostilities came within the next twelve months, then a part of that business would almost certainly be cancelled. Of course the tonnage might be taken out in some other form than shell steel, but conditions arising after peace has been declared will be discounted before this actually happens. It is just here that prices are liable to be affected before the activity at the mills slows down. Prices have reached a dangerous level and a sharp slump is not desirable. A note of warning is thus not out of place. That prices will go still higher is quite possible particularly on certain steel products where there is a decided shortage, but it is likely that the market has received a wholesome check in the meantime, and further developments in Europe will decide the swing of the pendulum.

METALS

THE metal markets have experienced another twelve months of war influence, but, generally speaking, they have not been quite so erratic as last year. The principal feature this year has been the big increase in volume of business, particularly in copper, which has reached enormous tonnages. The production of, so-called, war metals has increased greatly, and has assumed large proportions. New mines have been opened up and old mines reopened, while new refineries have been established to take care of the big increase in mines output.



PRICE FLUCTUATIONS OF 2 IN. LAP-WELDED WROUGHT IRON PIPE DURING 1915 AND 1916.

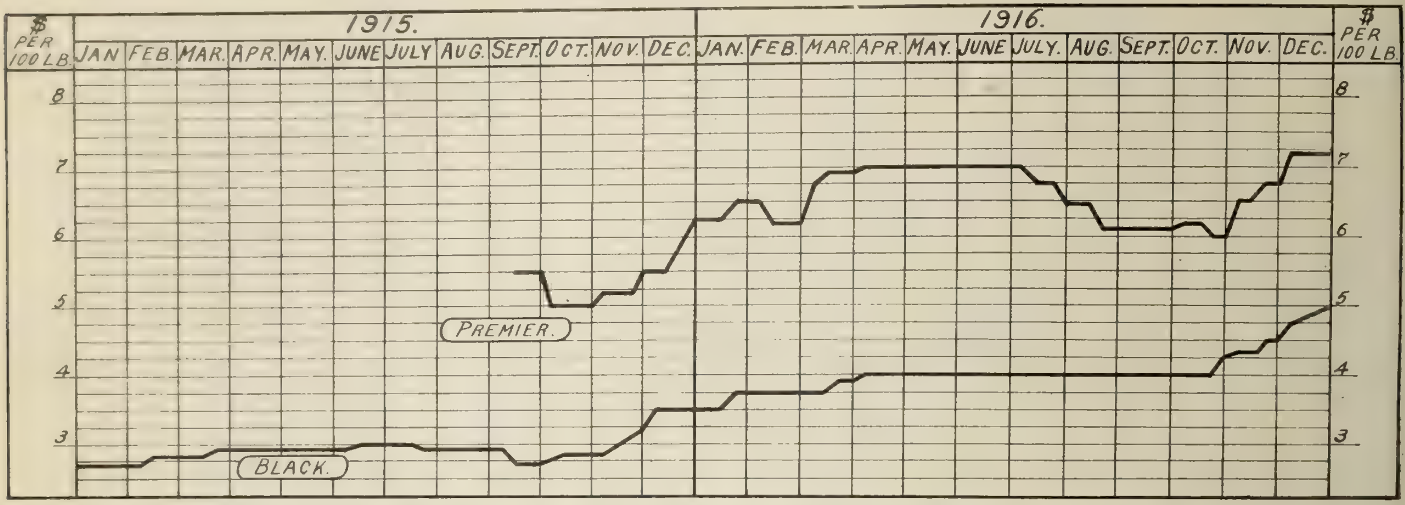
Although the largest percentage of the production of war metals still comes from the United States, this country has been the scene of remarkable activity, and the metal mining industry has developed in a corresponding degree. The production of copper has easily beaten all former records, the industry enjoying unparalleled prosperity. The output of lead and spelter in the United States is also much larger than in normal years owing to supplies from Europe having been cut off. For the same reason aluminum has reached record levels, large quantities having been exported to Europe instead of imported from there, as was the case before the war. Tin not being a war metal, has occupied rather a different position, and is the least likely of any metal to decline in value at the conclusion of the war. Antimony is a war metal, although not a very important one. At one time prices were very high, but this year there has been a sharp decline in value.

Considerable progress has been made in Canada in the metal industry. Copper and zinc refineries have been established at Trail, B.C., and the output, although not very important at the present time, is steadily increasing. The war has stimulated this industry, and in time no doubt all copper and zinc mined in Canada will be refined within her borders. At Port Colborne, Ont., the International Nickel Co. is building a refinery for treating nickel matte from the Sudbury district. There is also another concern who propose to establish a plant for refining nickel in Canada.

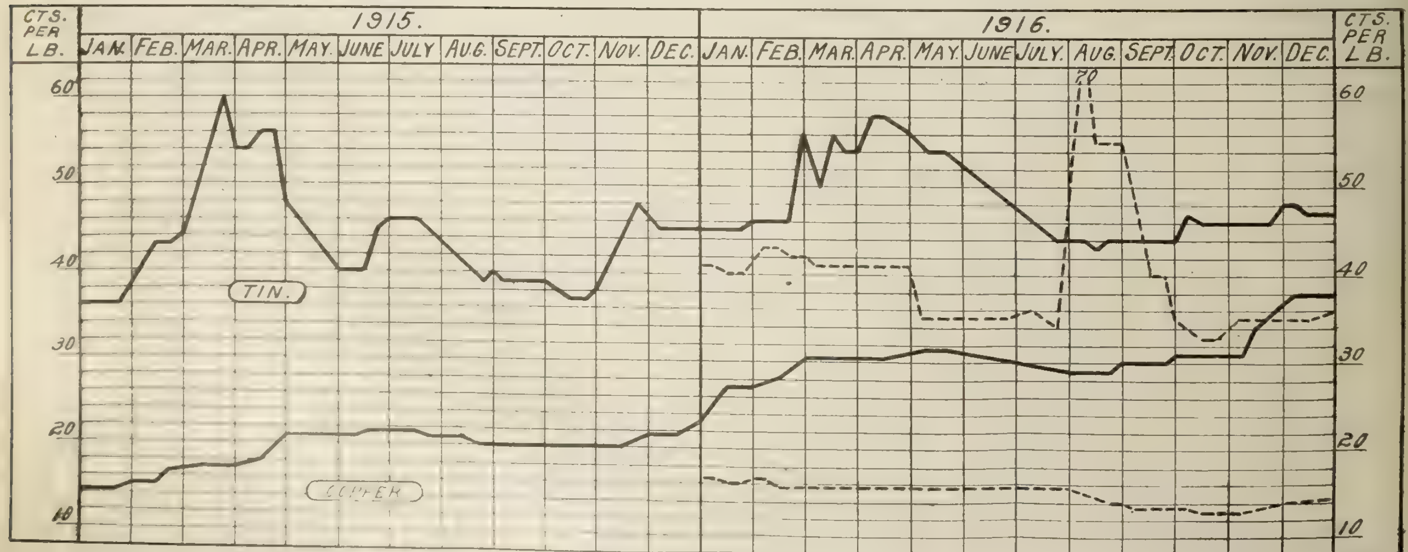
After War Situation

Although the German peace overtures have been rejected, there is still a possibility that before the end of 1917 peace will have been concluded or negotiations to that end finally begun. Although this may be an optimistic view, there is little doubt that during the coming year the possibilities of peace will be felt in the market, which will have a tendency towards lower prices. The situation will likely be unsettled for some time previous to the actual cessation of hostilities and the market discounted before the war ends. Whether prices decline gradually or rapidly depends upon developments in Europe.

That prices will decline after the war is a fair supposition, although to what extent it is difficult to say. The probability is that the price situation will have been adjusted to a great extent by the time peace is concluded. As far as can be seen the only metal that is likely to appreciate in value is tin, being essentially a peace metal. Copper will no doubt decline, but not to the same extent as other metals. The war demand will be replaced by a peace demand, which will doubtless be considerable, although a large quantity of metal used in munitions will have been recovered from the battlefields and utilized for other purposes. There will, however, always be a

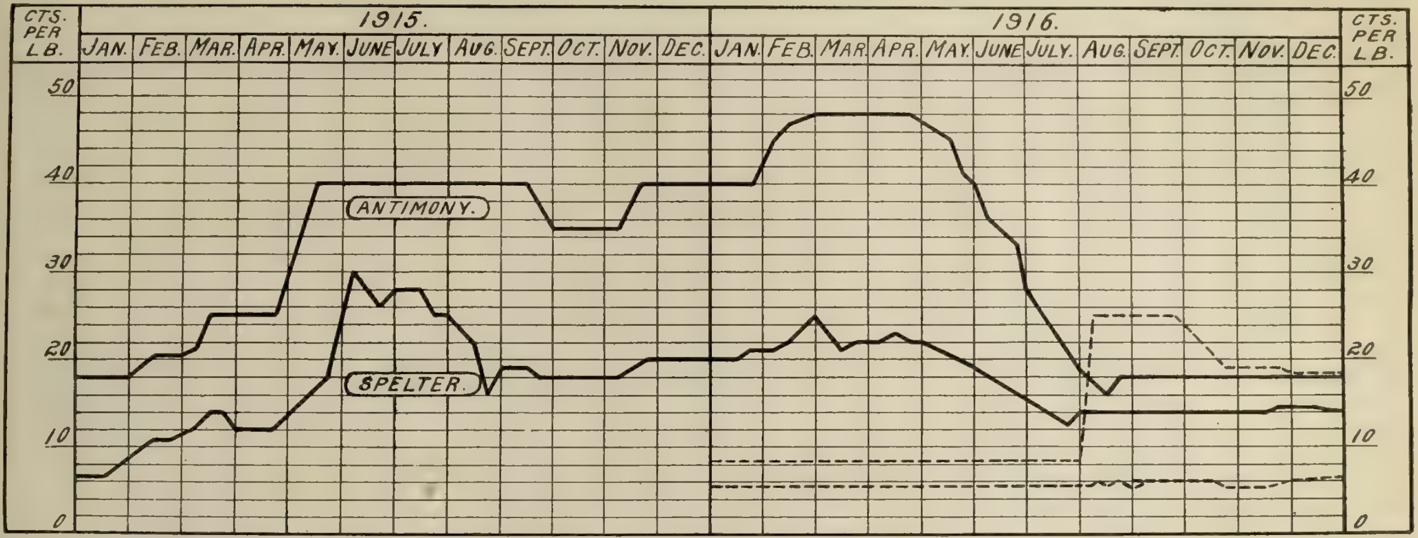


PRICE FLUCTUATIONS PER 100 POUNDS OF GALVANIZED (PREMIER) AND BLACK SHEETS (28 GAUGE), DURING 1915 AND 1916.



PRICE FLUCTUATIONS OF TIN AND COPPER DURING 1914, 1915 AND 1916.

plentiful supply of copper, which will tend to depress the market. When the German and Belgian supplies of spelter become available and the Australian supply gets on the market, production in the United States will fall off considerably, and prices as a result decline. Lead will probably not suffer a serious decline, as it has not been affected by the war to the same extent as some other metals. There will be a marked depreciation in antimony, as the demand will be small after the war. That aluminum will decline to its former position is likely, as the war demand will have stopped.



PRICE FLUCTUATIONS OF ANTIMONY AND SPELTER DURING 1914, 1915 ND 1916.

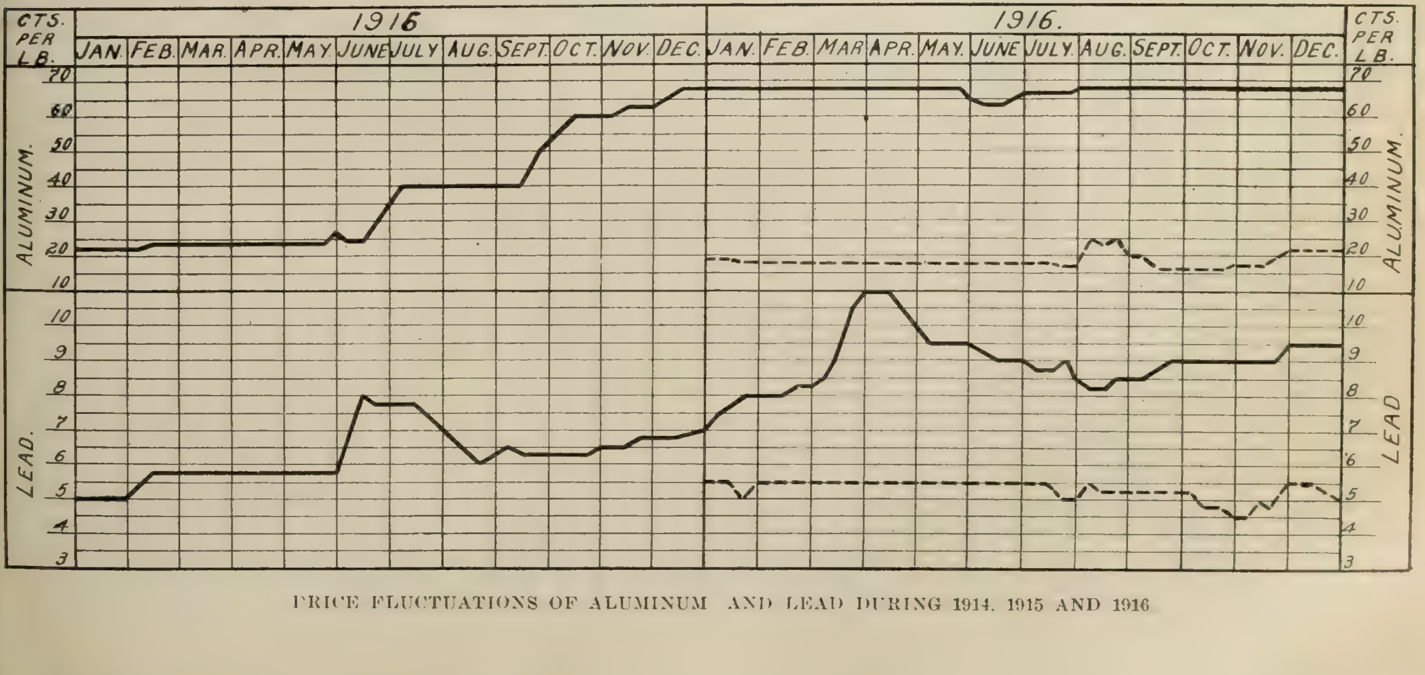
Copper

Chief interest this year has centered in copper, this being the most important of all war ingot metals. As the war increased in intensity, with a prodigious expenditure of shells, the demand for copper became more insistent, culminating in contracts being placed in the United States for enormous tonnages by the Allied Governments. This was additional to other large contracts placed earlier in the year. At the same time, large quantities of copper were required by the brass mills. The result was that by the end of the year the entire output of the United States' producers was taken up, and now there is no copper to be had for at least the first five months of 1917. With the market in such an oversold condition, the price naturally jumped up. It is estimated that the producing capacity of the States will soon be over one million tons per annum, which gives an idea of the enormous consumption of copper at the present time. The position of copper is now, of course, very strong, and is likely to be for some months to come. Opinions, however, differ as to what will happen to the market at the conclusion of the war, but it is probable that while prices will decline in sympathy with other metals, there will still be a big demand during the period of reconstruction, which will materially help to support the market.

During the year the market has been firm, with a steady rise in prices, and not much fluctuation. At the beginning of the year copper was about 23c, reaching to 27c by the middle of January. There was a gradual rise through February to 30½c, which was continued until the middle of May, when a new high price of 32c was registered. About this time the market weakened, and there was a steady decline to 29c in August. The market recovered and prices began to advance gradually through September and October up to the middle of November, when the market became very active and worked up to 38c by the end of that month. That price was maintained throughout December with a strong market. On an average the market was higher this year than in 1915.

Tin

Tin being a peace metal, has been adversely affected by the war, the con-



PRICE FLUCTUATIONS OF ALUMINUM AND LEAD DURING 1914, 1915 AND 1916 sumption having fallen off, and prices being low when compared with other metals. The fluctuations that have taken place have been caused by the activities of submarines in destroying shipping. Tin being obtained from the Far East, ships carrying this metal are more likely to be interfered with than in the Atlantic, and on more than one occasion the fear of cargoes being lost has caused a sharp advance in price. This has been more in evidence on the New York market, as tin can only be imported into the United States on a permit obtained in London, and these permits have been generally difficult to obtain. Dealers have endeavored to carry large stocks of tin, but the increased consumption has sometimes depleted supplies of spot metal. It is generally believed that at the conclusion of the war there will be a considerable increase in the demand for tin and prices will advance. During the war there will not likely be much change in the situation. The position of this metal, however, is a strong one, as it is indispensable for many lines of manufacture and price has little effect on demand.

The market has been steady throughout the year except in the spring, when during April the highest point of the year was reached. It started at 45c and by the end of February jumped to 56c. Early in March the market declined to 50c, but soon recovered, and by the end of that month was 56c. Prices continued advancing until the highest level of 58c was reached about the second week in April. These advances were due to scares over submarine activities. The market soon began to react, and by the end of July the price had dropped to 44c, which was maintained until the end of September. Early in October the market became firmer, and the price advanced to 48c, which was held until the middle of December, when the market weakened slightly, and lost one point, finishing the year at 47c. Compared with 1915, prices have had a higher average, although the highest point of that year, 60c, was not reached, nor the lowest of 30c.

Spelter

This metal has been affected by the war, principally by reason of the fact that supplies from two big producing countries, Germany and Belgium, have been cut off. The pre-war situation has been considerably changed. When war started, America was called upon to supply the spelter requirements of the Allies and the demand was so great that the producers had to immediately increase their output. Eventually the production increased to such an extent that it became equal to the demand, and the situation became adjusted to meet the new conditions. The present output of spelter in the States is about 650,000 tons a year. As spelter is used in making brass, this accounts for the big export business and domestic consumption. The big business has been done with the brass mills in high-grade spelter, the galvanizers having been operating at reduced capacity all the year owing to the high cost of all raw materials. The outlook is not very favorable for the spelter industry in the States after the war, as this metal will probably be affected more than any other. The British Government has agreed to take over the entire spelter production of Australia. During each year of the war, the Government will take 45,000 tons of spelter and 100,000 tons of concentrates, also for ten years after the war. There will be a big decrease in the production of spelter in the United States and prices will decline. Belgian and German supplies will be available and the situation the same as before the war.

During the year spelter has lost ground, opening at 20c and closing at 14c, with a highest point of 24½c in February. A slight rise in January to 21c was continued through February, reaching 24½c, after which the market weakened and the price dropped back during March to 21c, recovering to 22c. Prices fluctuated during April, and at the end of the month began to fall, touching 12½c, the lowest point of the year, at the end of July. Another recovery brought the price up to 14c, which was maintained during August, September and October, gaining slightly in November, but finishing weaker at 13½c. The market was steadier than in 1915, and did not touch either the highest or lowest levels of that year.

Lead

Lead, although a war metal, has not been affected in the same degree as spelter or copper. The position of this metal has, however, for the most part, been a strong one, and the demand has absorbed the supply. The market this year has been generally stronger than during 1915, and prices higher. There has been a heavy war demand, and also an increase in ordinary consumption. In the States there has been a steady increase in production in order to take care of the larger demand, both export and domestic. There will be a depreciation in the price of lead after the war, but the market will no doubt decline gradually.

Prices show a net gain for the year. The market started at 7c, the lowest point of the year, and advanced steadily to 12c in April. During this month the market weakened and prices declined until 8¼c was touched in the middle of August. The market then recovered, and the price advanced to 9c up to the end of November, when another advance brought the price up to 9½c, which was maintained during December.

Antimony

As antimony is used in making shrapnel bullets, it has become a fairly important metal during war time. English antimony has been off the market, but supplies have been coming from China and Japan. The production of antimony in the Far East has been more than doubled, and there will be a large excess of supplies after the war. Comparatively little animony is used in peace times, so prices will likely be considerably lower after the war than at present.

Antimony started the year at 40c and finished at 18c. A sharp advance at the end of January brought the price up to 48c by the end of February. This level was maintained during March and part of April, when a decline set in, and the market fell off badly, touching the lowest point of the year, 16c during August. The market then rallied to 18c, and has been steady since, that price having been maintained. The fall in 1916 was more pronounced than the rise in 1916.

Aluminum

This metal has been more or less scarce all through the year owing to the big demand and restricted production. This trade, as in the case of spelter, has been reversed, the United States having been called upon to export large supplies, which has had the effect of boosting prices. After the war prices will drop when trade is readjusted. Aluminum is becoming a more important metal for commercial purposes, a circumstance that will necessarily increase consumption. The market throughout the year has been high and steady, the price ranging around 68c, with a slight decline in June to 64c.

MACHINE TOOLS

THIS year has been one of great activity in the machine tool business, due almost entirely to the remarkable development in the munitions industry. In spite of the big business during the latter half of 1915, the demand for munition equipment has been heavier still this year. A large number of existing machine shops have been equipped for making shells, and new plants have also been built for this purpose. Large contracts for shells have been placed from time to time, and the number of plants engaged in this work has materially increased. There is no comparison between the output of shells now and what it was at the beginning of the year. This development in the munition industry has been reflected in the machine tool trade, and consequently the demand for shell-making equipment has been heavy.

Development Due to Munitions

In the early part of the year, the principal demand was for 18-pdr. shrapnel and 18-pdr. high explosive shell equip-

Canadian Shipping and Shipbuilding During 1916

Contributed and Compiled

Embracing statistics of shipments of a variety of commodities, port and canal tonnages, wrecks and loss of life; vessels built and building within the Dominion during 1916, together with their tonnage, horse power, and service; waterway improvements, etc.

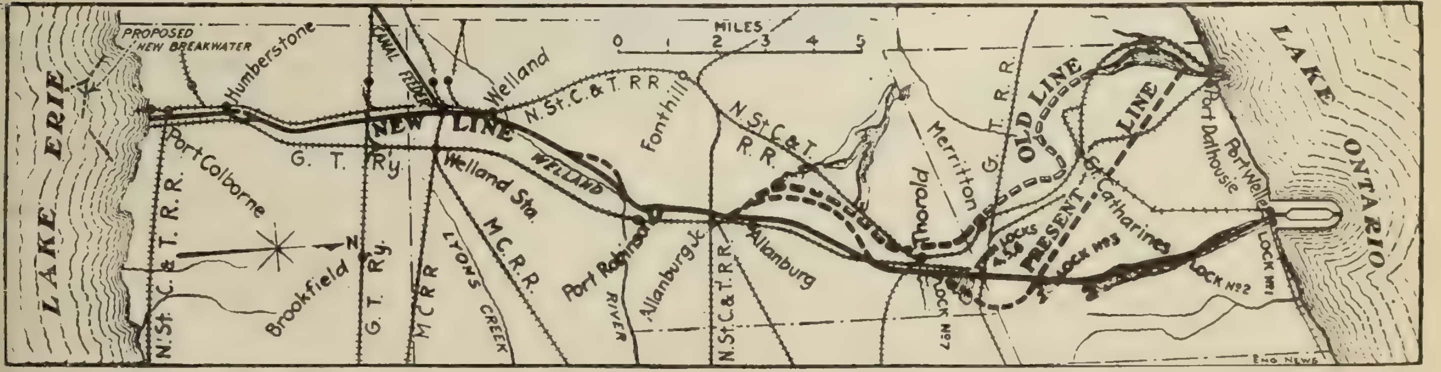
WELLAND SHIP CANAL

By J. L. Weller.*

CONSTRUCTION operations on the Welland Ship Canal have progressed steadily during the present year. The increasing shortage of labor has, however, been seriously felt by the different contractors, with the result that some portions of the work have had to be curtailed and the available labor largely concentrated on prism excavation and concreting in the locks. The work under contract at present is the same as last year, namely, Sections No. 1, 2, 3 and 5.

Section No. 1

The building of the harbor embankments, which will form the new Lake Ontario entrance to the canal, has been carried on continuously during the year, and approximately 5,500,000 cubic yards of the 8,000,000 cubic yards of material available for this purpose have been placed. The end of the west embankment has now reached the outer extremity of the harbor, and the east embankment is within a few hundred feet of the outer end. The balance of the material available will be used to widen out the embankments. Eighteen of the reinforced concrete cribs which will form the foundation for the outer entrance piers, and docking in the inner harbor, have been placed in position. Dredging in the channel has been carried on by three large dipper dredges, the dredged material being dumped to help form the harbor embankments.



DIAGRAMMATIC REPRESENTATION OF ROUTE OF NEW WELLAND SHIP CANAL.

Very good progress has been made on the construction of Lock No. 1, which is located just inside the shore line. The lock walls will be 82 ft. in height. A portion of the west wall of Lock No. 1, which includes the stairway from the lower to the upper level, recesses for the guard gates and single leaf gate, outlet valve chambers, etc., has been completed to coping level. The remainder of the wall is up to the elevation of the mooring chamber, 29 ft. below coping. The east wall is not quite as far advanced, being practically at the elevation of the mooring chamber over its entire length.

The long reinforced concrete retaining wall on the west side, extending from the foot of Lock No. 1 to the shore line, is complete with the exception of a short section where the contractor's concrete mixing plant is located. No dry excavation has been carried on during the year on this section, as the only remaining material to be excavated is being reserved for back-filling behind the lock walls.

Section No. 2

Work on this section has been almost entirely confined to the excavation of the canal prism and the construction of Lock No. 2. Prism excavation has been carried on by four steam shovels and three dragline excavators, the material being hauled to Lake Ontario and deposited in the harbor embankments. For a distance of 8,000 ft. above Lock No. 2, the canal is in fill, and the east bank is being built well around to the east side; in this way a large regulating pondage is being formed at the head of the lock. The construction of the canal banks is being carried on by an outfit of grading machines, and the embankments to form this pondage are now rapidly nearing completion.

The upper entrance walls to Lock No. 2 are practically complete, and the side walls of the lock have been under construction during the past year. These walls are built in 60-ft. monoliths, and the different monoliths in both the east and west walls are in various stages of advancement. The average height of the west wall is now 46 ft. above the lock floor, and in the east wall the foundation is complete to mitre still level. Considerable concreting has been done in four monoliths above this level. A small amount of work has also been done in the construction of the lower west entrance wall to the lock.

Excavation on the north half of the section is complete to grade, but a large amount of material has still to be removed from the south half. Very little work has been done this year at the site of Lock No. 3, beyond the excavation of the lock pit, as the contractors have concentrated their efforts on the building of Lock No. 2. The embankments which will form the regulating pond at the head of this lock are well advanced toward completion. A good deal of work has been done on the construction of the concrete protection to banks at the water line along the canal reaches on this section.

Section No. 3

Operations on this section have consisted almost entirely of earth and rock excavation, practically no concrete having been placed during the year. The pits for Locks 5 and 6 have been excavated to grade, and are now ready for concrete, with the exception of the cleaning up of the foundations. The earth overlying the rock on the site of Twin Locks No. 4 has been removed, and approximately 40 ft. of rock remains to be excavated before grade of the locks is reached. About the same depth of rock has still to be removed in the reach between Twin Locks No. 6 and the head of Single Lock No. 7.

The good rock from the excavation has been sent to the large crushing plant at the north end of the section, and furnished as concrete aggregate to sections No. 1 and 2. The inferior rock has been utilized as filling on low land on the east side of the flight locks. A washing plant has been constructed in connection with the rock crusher, and all stone requiring it is thoroughly washed before being used for concrete.

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*Engineer in charge.

The earth excavated from the north end of the section has been sent to Lake Ontario and deposited in the harbor embankments, while that from the south end has been taken to the site of the high dam at the head of the flight locks, and is rehandled into the dam by two excavating machines. This dam has now reached the required elevation over a considerable part of its length. The contractors have erected their concreting plant at the head of Twin Locks No. 6, and, if conditions are favorable, it is expected that good progress will be made on concreting in Locks 5 and 6 during 1917. A small amount of work was done in building the long upper entrance wall between the head of Lock No. 7 and the guard gates.

Section No. 5

This section consists of deepening and widening the present canal on the west side, between Allanburg and Port Robinson. Four dredges have been employed in deepening the channel, and a number of steam shovels excavating dry material along the west bank. The dry excavation has now been completed. The dredged material is dumped in a basin cut in the canal bank and pumped by a 20-in. hydraulic dredge into pondages formed on the west side of the canal.

Bridges

The concrete substructures for several bridges over the canal have been completed, but contracts for the bridge superstructures have not yet been awarded.

General Data

The distance from Lake Erie to Lake Ontario by way of the Welland Ship Canal is 25 miles.

Lake Erie is 326 ft. higher than Lake Ontario, and this difference in level will be overcome by seven lift locks, each lock raising or lowering a vessel a distance of 46½ ft.

The present canal has 25 lift locks of only 12 to 14 ft. lift.

The dimensions of the locks of the Welland Ship Canal will be:

800 ft. long in the clear, 80 ft. wide, and 30 ft. depth of water.

The locks on the present canal are:—270 ft. long, 45 ft. wide, and 14 ft. depth of water.

Locks Nos. 1, 2, 3 and 7 will be single locks, while Locks Nos. 4, 5 and 6, ascending the escarpment at Thorold, will be double locks in flight—that is, each pair rising one above the other.

The dimensions of the canal between locks and on the long level between Thorold and Lake Erie, will be:—200 ft. wide at the bottom, 310 ft. wide at the water line, and 25 ft. depth of water.

The largest vessel sailing the lakes today is 625 ft. long, with 59 ft. beam, and as navigation of the channels connecting the Upper Lakes does not at present permit of a greater draught than 20 ft., it is considered that the capacity of the Welland Ship Canal, when completed, will be ample for a great many years to come.

When greater depth is required, it can be obtained by dredging out the canal to 30 ft. in depth, as the locks and other structures are now being built to afford that depth of water.

Total quantity of earth to be excavated:—40,000,000 cubic yards; of rock, 6,000,000 cubic yards.

If all this material were loaded on dump cars, of the kind which may be seen passing along the construction railway parallel with the canal, it would require a train of such cars 15,000 miles long, extending half-way around the globe, to hold it.

Total quantity of concrete to be placed:—2,200,000 cubic yards.

This amount of concrete would build a solid wall 20 ft. high, 6 ft. wide, and 100 miles long.

The lock gates will be of the single-leaf type, extending clear across the chamber, instead of double gates meeting at the centre, as on the present canal. The lower gates will be 82 ft. high, 88 ft. long and 10 ft. thick, built of structural steel, and weighing 1,150 tons. The upper gates, which will rest on top of the "breast wall," will be 37 ft. high, 88 ft long, and 10 ft. thick.

The time required to pass a vessel through one of the Ship Canal locks will be about 20 minutes. The actual raising or lowering of the vessel in the lock will require but eight minutes.

The estimated time of passing a loaded freight vessel through the entire canal, from lake to lake, is eight hours, as against 15 to 18 hours on the present canal.

When traffic is heavy, or becomes congested for any reason, several vessels of present canal size can be passed through the Ship Canal locks at one lockage.

The estimated cost of the canal is $50,000,000.

Location Features

The Welland Ship Canal is being built on a new location from Lake Ontario to Allanburg, a distance of 12 miles; and from Allanburg to Lake Erie the course of the present canal is, more or less, followed. Whereas all the previous canals have had their Lake Ontario entrance at Port Dalhousie the entrance to the Ship Canal is located at Port Weller, three miles east of Port Dalhousie, where a new harbor of most commodious proportions is being constructed.

From Lake Ontario, the canal follows the course of the Ten-mile Creek, crossing the present canal twice, until Allanburg is reached. Here the present canal is entered, and utilized as far as Port Robinson, a distance of about three miles, this stretch being known as the "Deep Cut." At Port Robinson the canal enters the Welland River, which will be raised 6 ft. to canal level, by means of a dam and regulating weir at Port Robinson. This raising of the river will flood about 1,600 acres of low land between Port Robinson and the head of the river, west of Wellandport. From Port Robinson, the canal will follow the Welland River to the Town of Welland. At Welland, the present canal is again entered, and followed through to Port Colborne, on Lake Erie, with the exception of about 1½ miles, at a point known as Ramey's Bend, just this side of Port Colborne, where a very pronounced (S) curve occurs in the existing canal. Here the Ship Canal takes a straight course through a heavy rock cutting, resulting in some saving in distance and contributing toward greater ease of navigation.

Lake Erie Entrance

It is proposed to maintain the long level between Thorold and Port Colborne at elevation 568, which is extreme low water level in Lake Erie; consequently, vessels, except during periods of extreme low water, will have to lock up from the long level a few feet into Lake Erie at the Guard Lock, which is to be built in the rock cutting at Ramey's Bend, just north of the Village of Humberstone.

The present Lake Erie entrance at Port Colborne will be utilized for the Ship Canal. The harbor will not require to be deepened at present, as it already has a depth of 22 ft.; but the present breakwater will be extended about 2,000 ft. out into the lake in order to deaden the swells which now cause some disturbance, at times, to vessels lying at the elevator docks. Where the Ship Canal follows the course of the present canal, the latter will be deepened and widened on the west side, to the enlarged dimensions.

The Welland Ship Canal construction railway, which commences at the shore line of Lake Ontario, and extends along the west side of the canal to the rock crushing plant, north of the Town of Thorold, a distance of nearly 8 miles, and which is double-tracked throughout its length, and equipped with 60-lb. rails, complete interlocking and block signal system, and telephone train despatching system, was built and is maintained by the Department of Railways and Canals for the use of the contractors in hauling excavated material from Sections Nos. 1, 2 and 3 to the harbor embankments in Lake Ontario, and for hauling stone, excavated from the site of the flight of locks at Thorold to the site of Locks Nos. 1, 2 and 3. The railway is well ballasted with stone and kept in such condition that no accidents of any consequence have occurred since it has been in operation.

There will be 22 bridges crossing the canal to carry existing highways and railways, as well as several bridges over pondages, one swing bridge carrying the construction railway over the present canal, and a temporary bridge for the Grand Trunk Railway over the foot of Twin Locks No. 4. A few of these will be swing bridges, where the conditions favor this type, but the majority will be bascule lift bridges, or bridges of what are commonly known as the "Jack-knife" type.

For construction purposes, the canal route has been divided into nine sections, section 1 being at the Lake Ontario end, and the others following consecutively through to Lake Erie. Of these nine sections, four are under contract at the present time, namely, Sections Nos. 1, 2, 3 and 5. Sections 1, 2 and 3 include all the locks, and the value of the work which they represent is practically equal to one-half of the estimated cost of the entire canal.

Lock No. 1 is situated at the Lake Ontario entrance just inside the shore line; Lock No. 2 one and one-half miles south; Lock No. 3 two and one-half miles south of Lock 2, and at the points where the Ship Canal will cross the present canal. Locks Nos. 4, 5 and 6 are double locks rising immediately one above the other, and these, with single Lock No. 7, a little further on, will raise and lower vessels 186 ft. over the escarpment at this point.

OUR PACIFIC COAST SHIPPING AND SHIPBUILDING

by A. H. Seaton

THE shipping industry of British Columbia is really just emerging from its infancy, and is only now on the threshold of what bids fair to be an era of great prosperity. The reasons for this are not difficult to find, being chiefly due to the newness of the country and the undevelopment of its resources, which, although almost unlimited, have so far hardly been touched; as a consequence, while there has always been a strong demand for import tonnage, no return cargoes have been available. Our Pacific Coast cities have not been able to offer inducements to shipowners that were worth considering when compared with those offered by those more fully developed on the adjacent coast of Washington. Although a thriving Trans-Pacific trade has been done for many years, we in this British Columbia have only recently begun to seriously take a hand in it.

An earnest effort is now being made to put the cities of this Province definitely on the may as shipping centres, Vancouver is by far the largest of these, with Victoria second. There are now represented in Vancouver three companies engaged in Trans-Pacific trade—The Canadian Pacific Steamship Lines, The Dollar Co., and The Canadian Australasian Royal Mail Line. In addition, there are several companies engaged in the coasting trade, the latter fast assuming consideable proportions. Chief among them are the C.P.R., the G.T.P., the Union Steamship Co., and The Terminal Navigation Co.

Wallace Shipyards

A few months ago an order was placed with the Wallace Ship Yards of North Vancouver for three large, five-masted schooners by the Canada West Coast Navigation Co., the intention being to place them in the lumber carrying trade. The principal dimensions of these vessels are as follow:—

SCHOONER E. R. WEST ON B.C. MARINE CO. WAYS, VANCOUVER.

Length over all, 250 ft.
Length on L. W. L. about 235 ft.
Beam outside of planking 44 ft.
Maximum draught 16 ft.
Total displacement 3,500 tons.
Tonnage for cargo 2,500.
Cost equipped $250,000.00.

The auxiliary propelling machinery will consist of 2-Bolinder, Semi-Deisel-engines of 160 b.h.p. each.

The Wallace Shipyards have also, with a commendable spirit of enterprise, undertaken the building of a fourth schooner of the above dimensions, with the intention of either operating or selling her, as opportunity may offer. This commpany has also an order of two steel twin-screw cargo vessels of 4,200 tons displacement, one for British interests, and one for Matsui & Co. of Japan. Their chief dimensions are:—

Extreme length over all, 315 ft.
Length between perpendiculars 300 ft.
Beam 45 ft.
Maximum draught 18 ft. 6 ins.
Depth of hold 27 ft.
I.H.P. of engines 1500.
Tonnage for cargo 4500, including coal carried in bunkers.

The Wallace Shipyards are also well equipped for handling ship repairs, having two marine railways, one of them being capable of docking vessels up to 2,500 tons' displacement. The other and smaller one is intended chiefly for vessels such as tugs and scows; it is nevertheless capable of docking vessels up to 1,000 tons displacement.

Situated in the City of Vancouver itself there are two other concerns engaged in the business of shipbuilding and ship repair—The B. C. Marine, Ltd., and The Vancouver Ship Yard. The first named has accommodation for docking vessels up to 2,000 tons displacement. It is quite a promising little plant, well equipped for all ordinary ship repairs, and being close to the new Government grain elevator and dock, is very favorably situated. While this company in past years have built quite a number of fairly large vessels, they have not so far taken the share in the present revival of the ship-building industry to which they seem to be entitled, but have confined themselves strictly to repair work.

The Vancouver Shipyard has a well equipped little plant for small craft, and has a marine railway which is capable of hauling out vessels up to about 600 tons deadweight.

Vancouver Drydocks, Ltd.

Arrangements have been made by Charles Meek for the erection of a plant which marks the beginning of a new era as regards Vancouver shipping. It will operate under the name of The Vancouver Drydocks, Ltd., and is calculated to fill a long felt want, all large vessels hitherto having been forced to go elsewhere when actual dry-docking was required, many hundreds of thousands of dollars thus being lost to Vancouver annually. The present intention is to build one double section floating drydock which will be capable of handling vessels up to 18,000 tons displacement, this being sufficient to accommodate the largest vessels on this Coast at present with ease. It is confidently expected that this dock will be in actual operation within the next twelve months. It is also their intention to operate an extensive ship-building plant.

The White Pass & Yukon Railway Co., have also completed arrangements for the building in Vancouver of two small passenger vessels, one for service between Cariboo and Taku, and one on

Atlin Lake. That for the river service will be a typical stern-wheel craft, 165 feet long by 35 feet, however, with accommodation for eighty passengers. The other will be a twin-screw craft propelled by internal combustion engines, of 90 feet in length by 18 feet beam, and with accommodation for 100 passengers. She is intended for daylight service only. These two vessels will be shipped North in sections, and assembled there.

Genoa Shipbuilding Co.

An order was recently placed with the Genoa Shipbuilding Co., of Victoria for three wooden schooners, similar in all respects to those now building in Vancouver. Two of these are now nearing completion, and should be able to go to sea early in the coming year. The only two companies in Victoria who combine ship-building with repairs are the Victoria Machinery Depot and Yarrows, Ltd., the latter firm having just completed a light draft steel vessel for the Indian Government. They are now erecting the frame-work of a second one. Both these firms are equipped with marine railways capable of docking vessels of 3,000 tons displacement.

The shipping of Victoria Harbor is chiefly composed of small coasting vessels engaged in log towing for the numerous saw mills. It is also the headquarters for the Pacific Whaling Co., who operate quite a numerous fleet. Victoria is also a port of call for almost all the larger vessels which berth at Vancouver.

A great amount of work has been done by the Dominion Government to improve the docking and berthing faciities of Victoria, an extensive system of piers being now under construction at the mouth of the harbour. These are sheltered by a magnificent breakwater which is now almost completed. The work was rendered necessary owing to the depth of water in the harbour proper being only sufficient for vessels of about 18 feet draught at all stages of the tide. The minimum depth of water alongside the piers under the shelter of the breakwater is now 35 feet, which is sufficient for the largest vessels at present plying to the Pacific Coast.

COLLINGWOOD SHIPBUILDING CO.

NEW and repair work carried out during 1916, and meantime in progress at the Collingwood Shipbuilding Co. plant, Collingwood, Ont., in addition to munitions production, includes the following:—

Vessels Built and Completed

S. S. Royalite, S. S. Iocolite, S. S. Sarnolite, each 250 ft. x 43 ft. x 18 ft., 800 I.H.P., and of 2060 British Board of Trade gross tonnage for the Imperial Oil Co.

Repair Work Completed

S. S. Mariska, S. S. Sarnian, S. S. SSarnian, S. S. Inland, S. S. Hamonic, S. S. Iroquois, Tug Onaping, S. S. Mariska, S. S. Malton, S. S. Thos. J. Drummond, S. S. Glenlivet, S. Si.S. C.G.S. Bayfield, S S. Iroquois, Tug D. S. Pratt, S. S. Fordonian, S. S. J. Frater Taylor, Tug C. W. Chamberlain, S. S. Kearsage, S. S. Honoreva, lighter Harrison, S. S. Caribou, tug Maitland, S. S. Collingwood.

New Work On Hand

Ship No. 48—For Montreal Transportation Co., 550 ft. x 58 ft. x 31 ft., Board of Trade gross tonnage 8000 tons, 2400 I.H.P.

Ship No. 49—250 ft. x 43 ft. 6 ins. x 25 ft., about 2500 gross tons, oil tanker for the Imperial Oil Co.

Ship No. 50—Similar to No. 49.

Ship No. 51—Cargo boat 251 ft. x 43 ft. x 20 ft., 1200 I.H.P., Board of Trade gross tonnage 2500, for Owners' Account.

Repair Work on Hand

S.S. J. A. McKee, S.S. Alberta, S.S. Glenlyon, S.S Iroquois, S.S. Imperial.

YEAR OF PROSPERITY IN ST. JOHN, N.B.

THE year 1916 has been one of the busiest in the history of St. John. The export trade of the port has broken all records and has placed it in the second place of all Canadian ports in this respect. The export values for the fiscal year ended March 31, 1916, amounted to $120,042,590, as against $43,872,932 in 1915 and $21,359,760 in 1914. Imports for 1916 amounted to $11,165,463; for 1915, $9,112,916; and for 1914, $9,433,220. For the six months from April 1 to September 30, the values of exports at St. John were $55,970,441. Halifax followed with exports of $19,538,644.

During 1915, the lumber shipments to the United Kingdom and the continent of Europe were as follows:—Spruce deals, 139,486,183 sup. ft.; hardwood plank, 4,333,709 sup. ft.; birch timber, 1,611 tons. The figures in 1914 were respectively 84,027,826 sup. ft. (spruce deals); 7,651,181 sup. ft. (hardwood plank); and 1,411 tons (birch timber). The lumber exports to the United States in 1915 amounted to $1,371,450.45. During the first three quarters of 1916, they were valued at $1,076,126.44, as against $994,279.30 in the corresponding period of 1915. Grain exports in 1915-16 were 14,186,522 bushels, valued at $11,405,186, compared with 8,612,703 bushels, valued at $8,738,780 the previous year. The customs receipts for 1915-16 were $2,706,891.57, as against $1,670,957.65 the previous fiscal year. During the twelve months ended March 31, 1916, 3,118 vessels, of 1,790,948 registered tons, entered the port, as against 3,178 ships of 1,587,493 tons in 1915.

The bank clearings at St. John for 1916 are a fair indication of the city's business progress. For the eleven months to December 1, they totalled $82,218,682, as against $70,365,188, for the eleven months of 1915. The first week in December exceeded the record of any previous year, with a total of $2,500,355, compared with $1,777,511, in the corresponding period last year. Building figures for 1916 to December 1, aggregate $462,350, as against $323,400 for the like period in 1915.

The postal transactions at St. John for 1916 have not yet been given to the public. For 1915, the total revenue was $148,316.51, as compared with $144,333.68 in 1914. Money orders issued in 1915 amounted to $401,873.69; in 1914 to $399,924.18. Money orders paid in 1915, $944,882.28; in 1914, $906,017.24.

The winter port season opened very auspiciously this year, six transport vessels from C.P.R. liners and 1 barkentine being loaded in November. At present, the piers are very busy, with the prospect of a much busier season ahead. It is hoped that another new pier, No. 16, will be ready early in the New Year. The Government elevator, which was destroyed in August, 1914, is being rebuilt on another site farther down the harbor, immediately south of the custom house. It will have an initial capacity of 550,000 bushels. The plant will not be ready for use this winter.

Industrial Development.

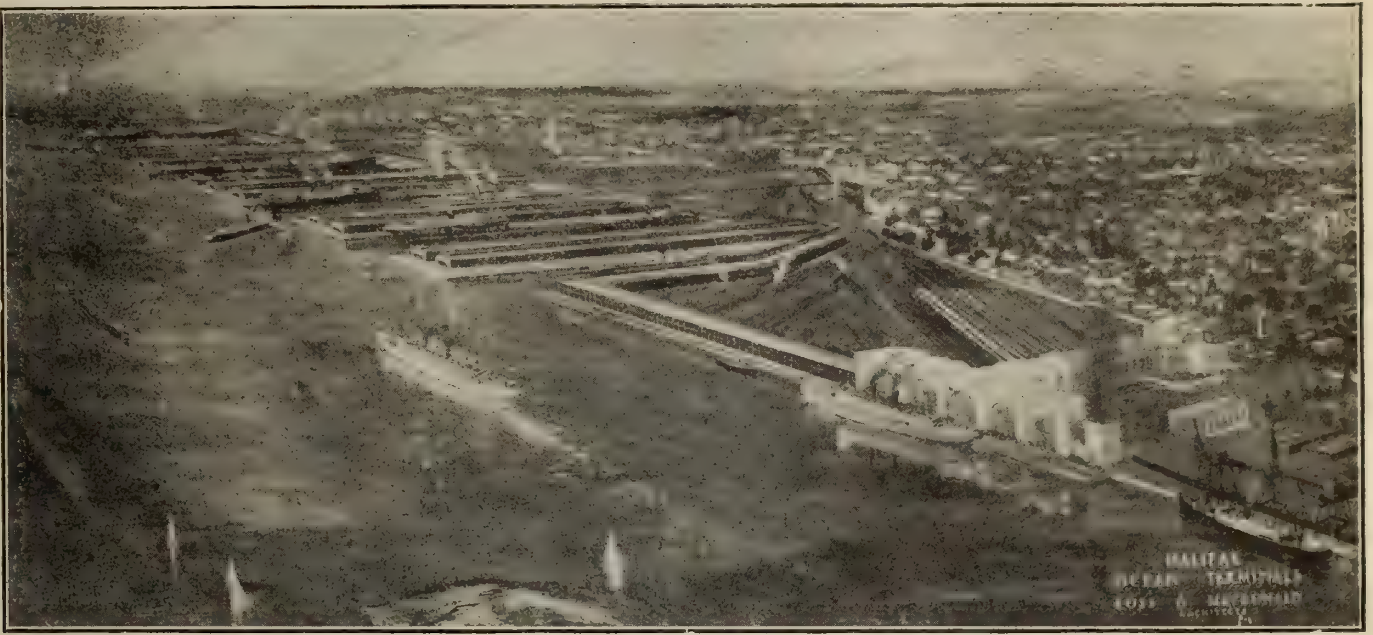
Speaking industrially, two large plants have been added to the city's industries during 1916. The most important of these is the McAvity machine shop, 80 x 400 ft., which was erected in six weeks and is now turning out munitions. The other industry is that of the manufacture of hydrated lime, which has been begun on a large scale by Messrs. Gandy & Allison.

On the whole, St. John has prospered in 1916. It tried out "Daylight Saving" during the past summer, and found it a success during the months of May, June, July and August. The Board of Trade is moving to have the plan made either Dominion-wide or Maritime Province-wide. That body has also entered upon a campaign to secure a fuller utilization of the port for British-Canadian traffic, its slogan being 'Canadian Ports and Canadian Railways for Canadin Business.'' The suggestion we understand is meeting with much acceptance both in Canada and Great Britain.

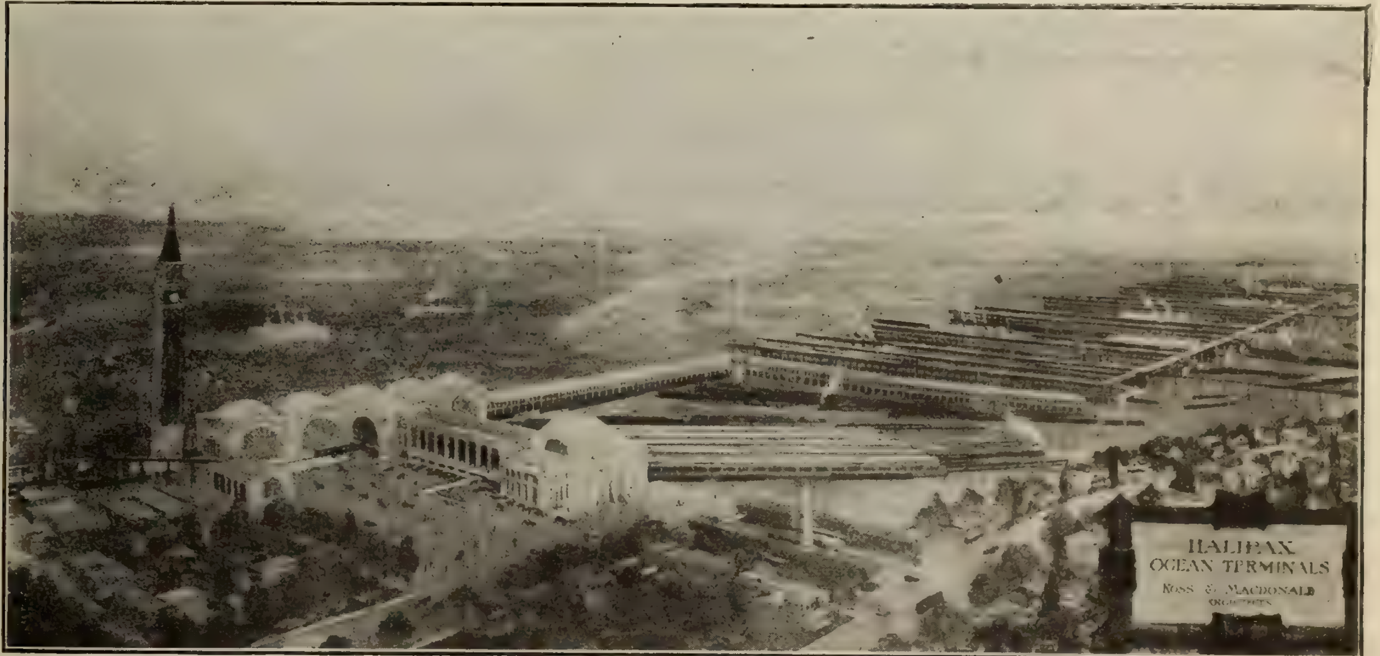
GRAIN EXPORT FROM MONTREAL

GRAIN received in the elevators of the Montreal Harbor Commission and the Grand Trunk Railway elevators up to the end of November 30, piled up the very respectable total of 71,646,455 bushels. Of this amount the Harbor Commissioners' elevators, according to a statement prepared for the Commission by Lieut.-Colonel F. Massey, provided 46,391,926 bushels, and the G. T. R. elevators the remaining 25,254,529 bushels. From the harbor elevators alone this is an increase over last year of 11,197,454 bushels, and the Grand Trunk total export also greatly exceeds that of last year.

The receipts in the Harbor Commissioners' elevators alone during the current season to the end of November were 47,658,804 bushels, and as two-thirds of this amount came in by rail, December will probably add some more to the total. In 1915, for the same time, the total receipts were only 34,862,861 bushels, so that there is this year an increase of 11,197,454 bushels.



OCEAN TERMINALS AT HALIFAX, N.S., AS THEY WILL APPEAR WHEN COMPLETED.



OCEAN TERMINALS AT HALIFAX, N.S., AS THEY WILL APPEAR WHEN COMPLETED.

* * *

MUIR BROS. DRY DOCK CO.

AROUND the Muir Dry Dock at Port Dalhousie are laid up the following:—Steamers Garden City, Jas. H. Shrigley, Natironco; tugs Meteor, Eleanor, Crawford, Lynn B; dredges Chas. Boone and The Meade; concrete scow Pioneer; and Great Lakes Dredging Co. scows Nos. 38 and 39; drill No. 4, belonging to C. S. Boone Dredging Co., and four scows also belonging to the same firm. The steel dredges Fundy and Delver, and the tug Alice, belonging to the Dominion Dredging Co.; tug Meteor, of Port Colborne Tug Co., and the large scow No. 38, belonging to the Great Lakes Dredging Co., were among the late dockages made. The Dry Dock has had a busy season repairing wooden boats for the most part, although several steel ships were also docked, and we hear that this establishment, so long associated with the repairing of wooden boats, is to shortly branch out into metal work, which will be an added convenience for lake shippers generally.

WESTERN DRYDOCK & SHIPBUILDING CO.

DURING the past year the Western Dry Dock & Shipbuilding Co., Port Arthur, Ont., completed two full canal size ocean going freighters, 261 ft. x 43 ft. 6 in. x 28 ft. 2 in., having triple expansion engines, with cylinders 20, 33 and 54 in. in diameter, by 40 in. stroke, supplied with steam by two Scotch boilers operating under natural draught, each 14 ft. 6 in. in diameter by 11 ft. long, of 190 pounds per sq. in. working pressure.

The machinery was placed amidships. Four cargo hatches were provided to each vessel, two forward and two aft.—26 ft. by 18 ft. Deck and other equipment consisted of six 4-ton American Hoist & Derrick Co. winches; 8 in. by 8 in. American Shipbuilding Co. windlass and steam steering gear; 7½ k.w. Engberg electric lighting outfit; steel masts, cargo derricks, etc. In the case of both ships, Thorgerd and Blaamyra, delivery was made five months from date of laying the keels. Six more of the same type of vessel are under contract for delivery in 1917.

At the present time the capacity of the plant is being doubled, this involving an additional building berth and additions to slips. The concrete drydock in connection with the plant — 700 ft. x 100 ft. x 16 ft.—was utilized during the year to carry out extensive repairs on some 35 vessels, and, in addition, to facilitate the carrying out of minor repairs on many others. The various departments of the plant are modernly equipped, individually electrically driven tools being prominent features. At present, 800 men are on the payroll but early in 1917, it is expected, that 1,200 men will find steady employment. The departmental constituent of the plant embraces shipyard, machine shop, blacksmith shop, boiler shop, pattern shop, iron foundry, pipe, electric, and joiner shops.

NOVA SCOTIA STEEL & COAL CO.

AT New Glasgow, N.S., the Nova Scotia Steel & Coal Co. have one steel cargo steamer of 220 ft. B.P., 35 ft. beam, and 20 ft. moulded depth, under construction. This boat should be completed some time in the early spring, 1917. She will be fitted with two Scotch marine boilers, 11 ft. 6 ins. in diameter and 11 ft. 6 ins. long, of a working pressure of 185 pounds per sq. inch., and De Laval steam turbines developing about 1,000 b.h.p. geared to the propeller by means of two reduction gears, reducing the speed of the turbines from 4,000 to 80 revolutions at the propeller. This is the first De Laval turbine to be installed in any steamship for propelling purposes, and the first of any kind in Canada. The boat will be fitted with large hatches and complete cargo discharging gear There are also two ships in the early stages of construction, each of 248 ft. 9 ins. B.P., 35 ft. beam, and of 20 ft. moulded depth. These two boats will be fitted with triple expansion engines and two Scotch boilers. Their completion is expected in the latter part of 1917.

SHIPPING SEASON AT PORT McNICOLL

DURING the season of 1916 there arrived at Port McNicol, 226 grain-laden vessels, while 106 trips have been made by the C.P.R. steamers with passengers and package freight. The elevator has handled nearly 44,000,000 bushels of grain, about twice as much as any other part, and there have been handled through the sheds 28,243 tons of flour and feed, eastbound; and 69,100 tons of package freight westbound.

The following vesseds are lying in the harbor with cargoes aboard: J. F. Taylor, 185,500 bushels of wheat; G. A. Graham, 147,000 bushels wheat; W. G. Morden, 735,250 bushels wheat; Valcartier, 297,760 bushels corn; Haggerty 519,500 bushels wheat; Masaba, 87,000 bushels wheat; Sarnian, 188,000 bushels wheat; Mariska, 142,980 bushels wheat; E. B. Osler, 332,950 bushels wheat; Emperor, 545,026 bushels wheat; Philbin, 350,000 bushels wheat; Davidson, 342,000 bushels wheat; Sultana, 135,000 bushels wheat; Adams, 305,700 bushels oats; Congdon, 372,000 bushels oats; Garretson, 368,000 bushels oats. Total, 5,230,616 bushels afloat.

SHIPPING SEASON AT HEAD OF LAKES

A COMPARATIVE statement issued by the Board of Grain Commissioners of Canada giving the total quantities of grain shipped from Port Arthur and Fort William during the seasons of navigation 1913, 1914, 1915 and 1916, shows that during the past year a record has been created both in number of cargoes shipped from the head of the lakes and in the quantity of grain carried. In 195 Canadian vessels, and 565 American vessels, 253,969,500 bushels of all kinds of grain were carried east. This is an increase of 341 cargoes and 52,200,000 bushels over 1915, and is more than double the amount shipped in 1914. In 1914 American vessels carried only one-third of the amount of grain shipped from the head of the lakes, but in 1916 Canadian vessels carried only 13,000,000 bushels more than American vessels.

In the season just ended. 656 United States vessels carried 84,397,000 bushels as against 138 vessels carrying 23,000,000 bushels in 1914. For the period September 1 to December 13, 1916, 65,680,000 bushels were shipped to Canadian and United States ports, in 474 vessels, of which amount 39,500,000 bushels went to United States ports and 26,180,000 bushels to Canadian ports.

THOR IRON WORKS, LTD.

AT the Thor Iron Works, Toronto, a full canal-size ocean-going freighter, 261 ft. long, x 43 ft. 6 ins. beam, x 28 ft. 2 ins. deep, is at present under construction for delivery on May 1, 1917. A similar vessel is on order for delivery in September, 1917. During the present year, in addition to general steel plate work contracts completed and in progress, a considerable number of marine repair jobs—large and small—were successfully negotiated.

CANADIAN VICKERS, LTD.

THE bulk of the work carried out during 1916 at the plant of Canadian Vickers, Ltd., Montreal, was for naval and military requirements, the specific details of which for obvious reasons are here withheld. The ice-breaker J. D. Hazen, originally contracted for by the Dominion Department of Marine and Fisheries, and later transferred to other owners, was launched in May and completed in November. A steel twin screw centre ladder hopper and barge loading dredge, also for the Dominion Department of Marine and Fisheries, was launched on November 18, her leading dimensions being as follows:—Length betwewen perpendiculars, 284 ft.; breadth moulded, 48 ft.; depth moulded, 20 ft. 6 ins.; mean draught, 16 ft. 6 ins.; dredging depth in specified condition, 57 ft. Contracts on hand include the construction of two 7,000 tons deadweight cargo steamers for neutral owners, with delivery in 1917. The floating dry dock Duke of Connaught was largely taken advantage of during the season of navigation, no less than 36 ships having been docked and repaired, including considerable repair and other work on transports. A number of repairs were also carried out to vessels afloat in Montreal harbor.

POLSON IRON WORKS

NO new vessel construction featured the activities of the Polson Iron Works, Toronto, until the last quarter of 1916, when work was started on the building of two ocean going freighters for Norwegian owners. The leading dimensions are as follows:—Length over all, 261 ft., between perpendiculars, 251 ft.; beam moulded, 43 ft. 6 ins.; depth moulded, 22 ft. 11½ ins.; deadweight 3,500 tons. The usual repair and outfitting of lake craft was carried out during the season of navigation; however, munitions manufacture constituted the major part of the plant production.

The A·R·Williams Machinery Company Limited

64-66 Front St. West,
Toronto

CANADA

St. John, N.B., Winnipeg,
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ORGANIZATION

Organization—The adaptation of means and methods to the needs and conditions as they exist.

THE High Powered Motor Truck, a development of Modern Transportation methods, to meet the requirements of modern business. The Canadian Tump Line, an adaptation of a primitive method, to meet the pressing needs of a critical situation.

Such is the basic principle on which our Service Department has built up an organization second to none. Our experts have proven themselves able to meet the emergencies which arise during the inception of new industries and to adapt the means and methods at hand to suit the requirements or to evolve new processes where the old have proven inadequate.

We are in touch with all the problems that arise in a variety of different manufacturing processes and have helped to solve them. The wide experience thus gained is at your disposal, to save you from costly experiments and to point the path to increased production and profits.

Our connection with leading up-to-date manufacturers, as illustrated in the following pages, places us in a position to serve you promptly and to good advantage.

We look forward to a New Year of New Industries and New Methods. We have the organization—Let us serve you.

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The A. R. Williams Machinery
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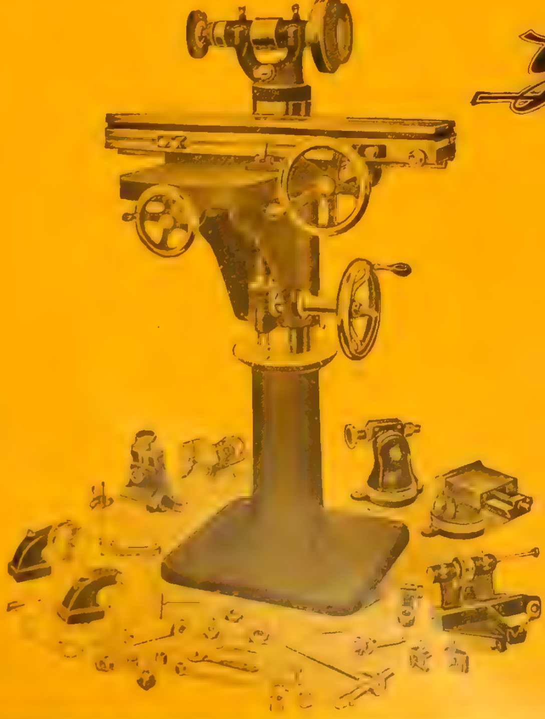
A VIGOROUS offshoot of the parent organization with well equipped Service Department and experts in the special manufacturing needs of the Great West. We are specialists in Shipbuilding, Contracting and Heavy Engineering Plants.

Large stocks of Woodworking and Ironworking Tools as well as Mill and Engine Room Supplies carried in our Warehouses at Vancouver, B.C., enable us to offer you attractive prices on goods which if purchased in Eastern Markets would have to bear the burden of excessive freight rates.

The large and up-to-date stocks of all kinds of Machinery in our Eastern Warehouse at Toronto together with the very extensive stocks carried at Vancouver, enable us to offer immediate delivery on almost any requirement.

Write us direct to Vancouver. We can serve and save you money.



Greenfield Usefulness

A careful study of the various attachments and of the grinder itself; then adapting these to the various requirements you will find use for in your plant. In its range of work lies its value. But if it had not Greenfield quality behind it, its life and usefulness would be short-lived.

Its rigid, accurate and convenient construction, its attachments for cylindrical, internal and flat grinding as well as for all sorts of tool making and sharpening, make it indispensable.

Write for our catalogue explaining various uses, etc.

Greenfield Machine Co.
Greenfield Mass. U.S.A.

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SPEAKING OF OPERATIONS — SCREW THREAD - CUTTING OPERATIONS —

Have you considered the Thread-Cutting and Cost-Cutting Operations of the

GEOMETRICS

Used on all makes
of Screw Machines
and Turret Lathes.

"Considering the quality of the work, and the service they give, lowers the cost to a point where they are economy."

That is the way one manufacturer puts it.

Every class of screw thread, internal or external, of any diameter and form, can be produced with a Geometric. Let us fit you out for your thread-cutting?

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A Record-making Metal Cutting Machine

SPEED ACCURACY ECONOMY STABILITY

AN IDEAL MACHINE FOR SHELL STOCK UP TO 12 by 12 inches. Either belt or motor driven.

Holds the world's record for the most accurate cutting at the least price.

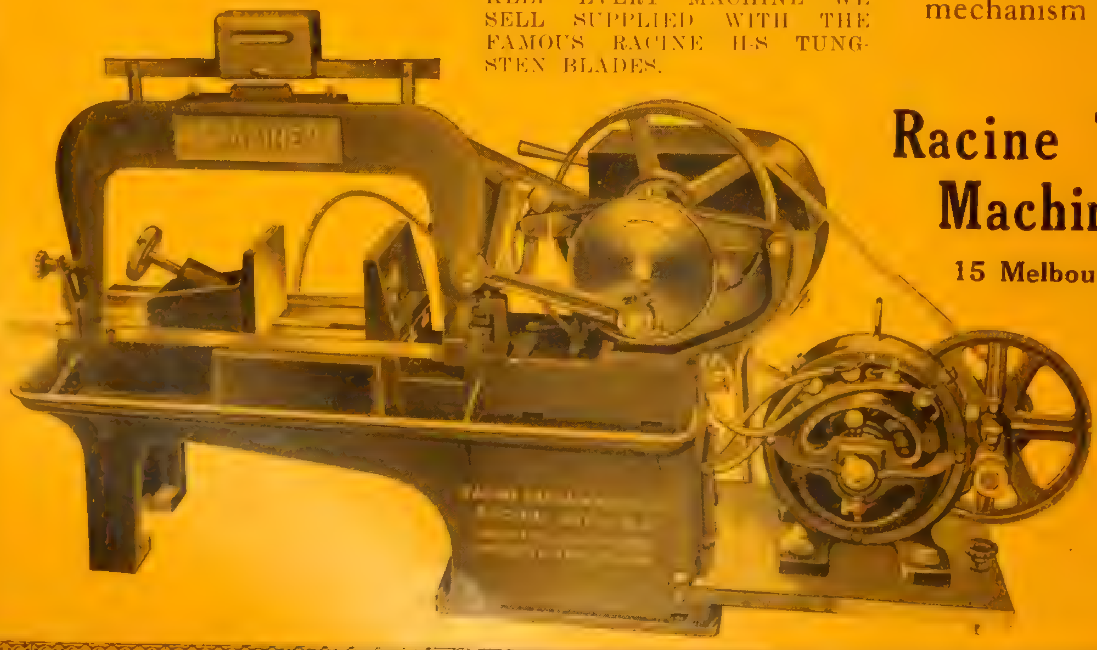
Being positive of our claims we are willing to send your selection of machine on approval.

Our Offer is to *YOU.*

Write us if you desire further particulars

1. The most rapid machine of its kind on the market today.
2. Guaranteed as to accuracy and you can absolutely depend on it to give you a perfectly true cut.
3. The most economical in operation of any machine of its kind, and will soon pay for itself in blade saving alone. Its simple operation does not require high-priced labor, and one man can operate as many as ten machines.
4. Very simple construction. No complex parts to get out of order. No delays because of delicate mechanism breaking.

ALSO, WE GUARANTEE TO KEEP EVERY MACHINE WE SELL SUPPLIED WITH THE FAMOUS RACINE H-S TUNGSTEN BLADES.



Racine Tool & Machine Co.

15 Melbourne Ave.

Racine,
Wis.,
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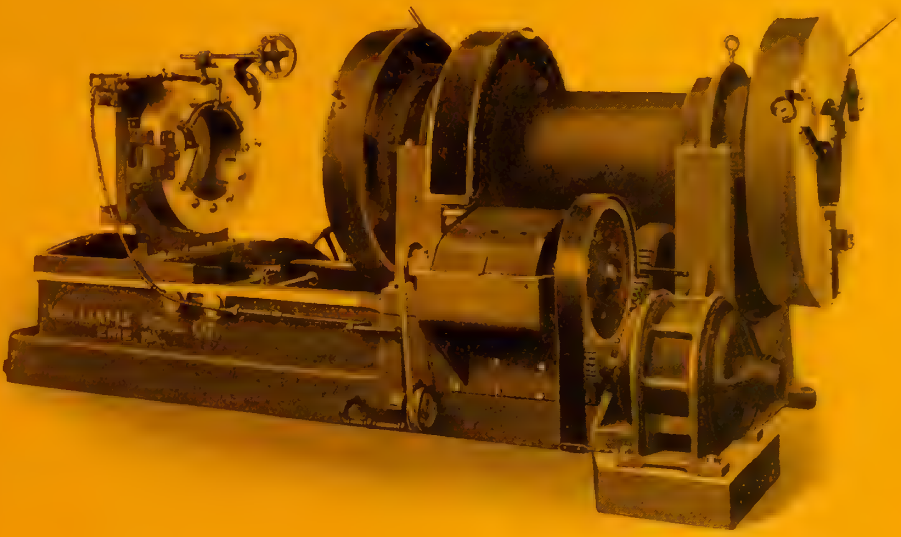

Pipe Cutting Machine

Regard to detail, close attention to construction, coupled with a knowledge of the requirements of pipe-cutting machine has enabled us to produce the best machine of its kind on the market.

Strength is very noticeable and ensures a superior grade of work in the shortest possible time. The protected gearing is a good safety factor.

Each machine will cut 10 consecutive sizes which range from ¼" to 18".

A machine of this capacity and quality should be of great value to you.

Inquire at once.

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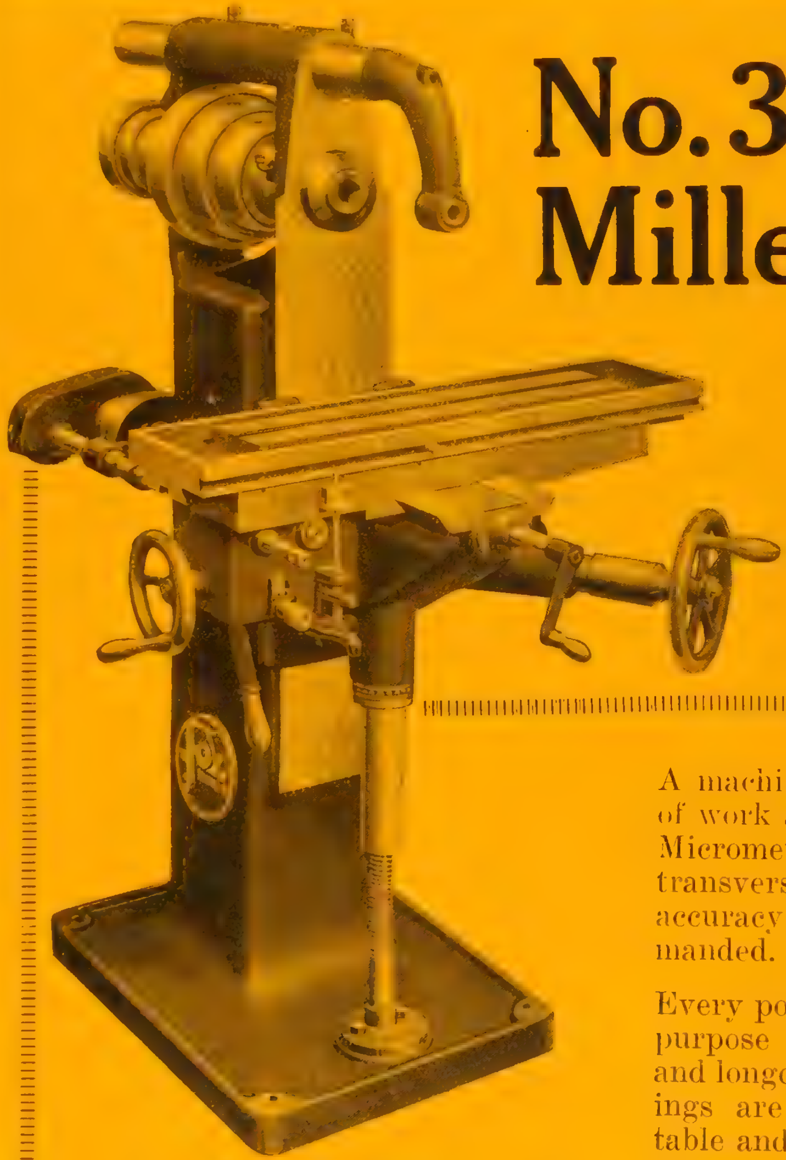

No. 3½ FOX Miller

Movement (Automatic) . . .	24 in.
Transverse Movement	6 in.
Vertical Movement	14¼ in.
Table to Spindle .	15½ in.

A machine ideal for a medium class of work and also for light tool work. Micrometer dials on the vertical and transverse movements give greater accuracy where close work is demanded.

Every point is strengthened with the purpose of giving greater efficiency and longer life. Front and rear bearings are of hard bronze. Heavier table and greater rigidity to the saddle are special features.

Equipment includes overhanging arm, 4" milling vise, oil can, two-speed friction countershaft, cranks, wrenches, levers, etc. ⅞ or 1" arbor **FREE.**

It will pay you to investigate this by writing us and asking for particulars.

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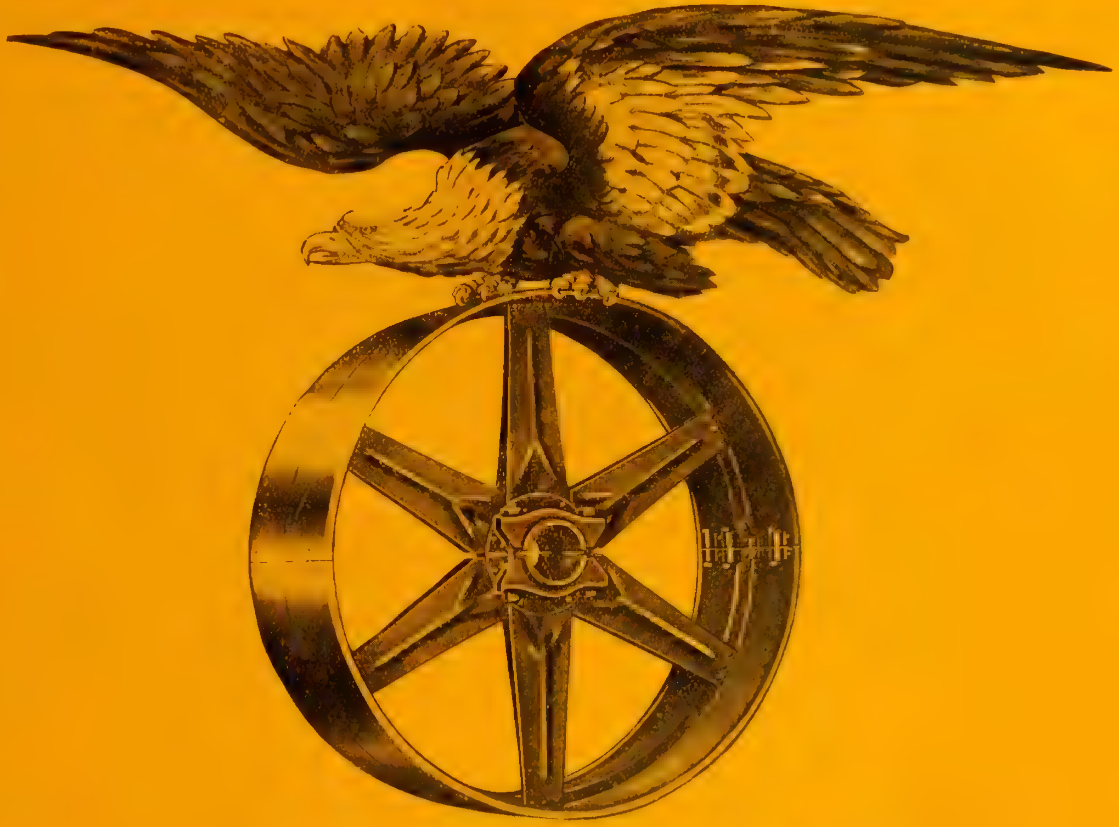

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ALL STEEL SPLIT PULLEYS

Better than cast iron because of much less belt slip.

Better than wood—they hold a belt as well and wear better and are not a fire risk.

"American" steel pulleys, made by the *American Pulley Company*, are better than other steel pulleys, because they are stronger, better made, and use less power because of less windage.

Stock sizes—3" to 72" diameter.
Larger diameters to specifications.
Special pulleys for unusual duty.
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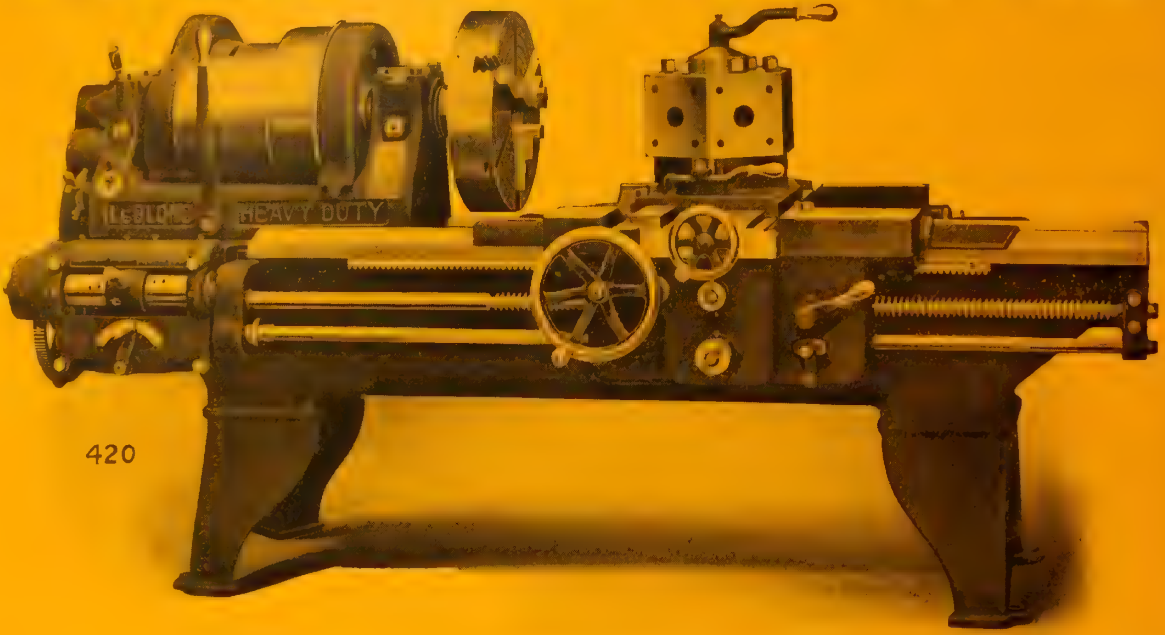
LeBLOND PROJECTILE LATHES



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OUR HEAVY DUTY UNIVERSAL TURRET LATHES ARE PARTICULARLY WELL SUITED FOR PROJECTILE WORK

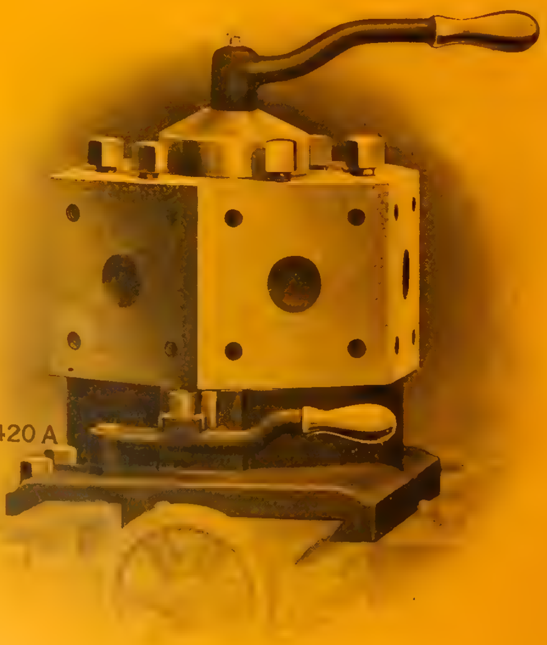
The **BROAD, HEAVY CARRIAGE BRIDGE** with the square lock thrust bearing, in addition to the regular dovetail, enables the turret to sustain exceptionally heavy cuts. This construction is clearly shown in the detail below.

The index mechanism is accurate to .001 of an inch, and the turret can be connected to the taper attachment for taper or form boring. Multiple cross-stops and an automatic longitudinal stop assure a duplication of sizes without measuring. Taps are given a positive lead by simply engaging the lead screw.

Our **PATENT DOUBLE FRICTION BACK GEARED HEADSTOCK** provides ample power for the heaviest cuts, besides enabling the speed changes for roughing and finishing to be made while running and under cut.

The **QUICK-CHANGE GEAR** provides an unlimited range of threads and feeds for all classes of work. Our patent compensating Heavy Duty Bed Section provides three times the carriage bearing surface found on other lathes of the same size, and additional strength in the same proportion.

Sizes: 17″ to 36″ swing.
EARLY DELIVERIES.



420 A

The R. K. LeBlond Machine Tool Co.
CINCINNATI, OHIO, U.S.A.

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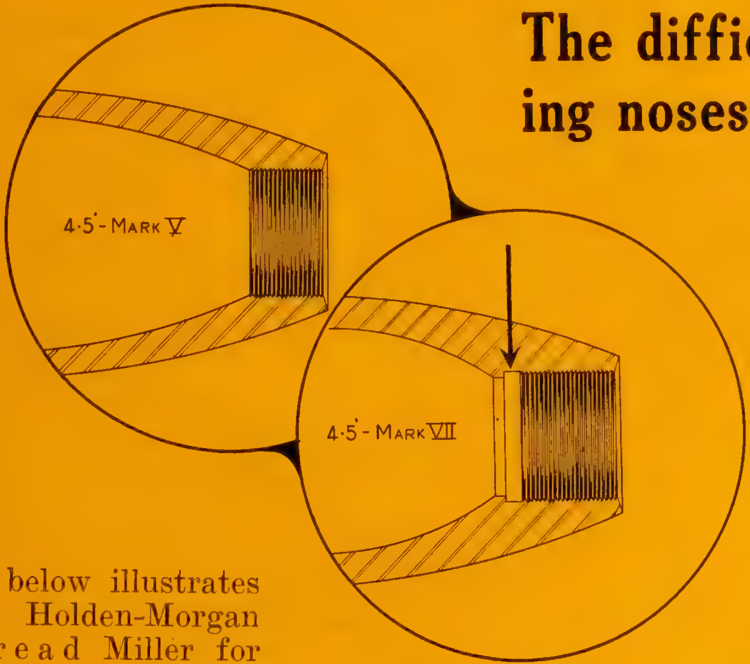


The difficulties of threading noses in 4.5 Mark VII

shells due to the recess, is easily overcome by the use of thread milling machines.

Holden - Morgan THREAD MILLERS

give a full thread with much smaller width of recess than is possible with taps.

Cut below illustrates the Holden-Morgan Thread Miller for Shrapnel and High Explosive Shells up to 6 in. diameter.

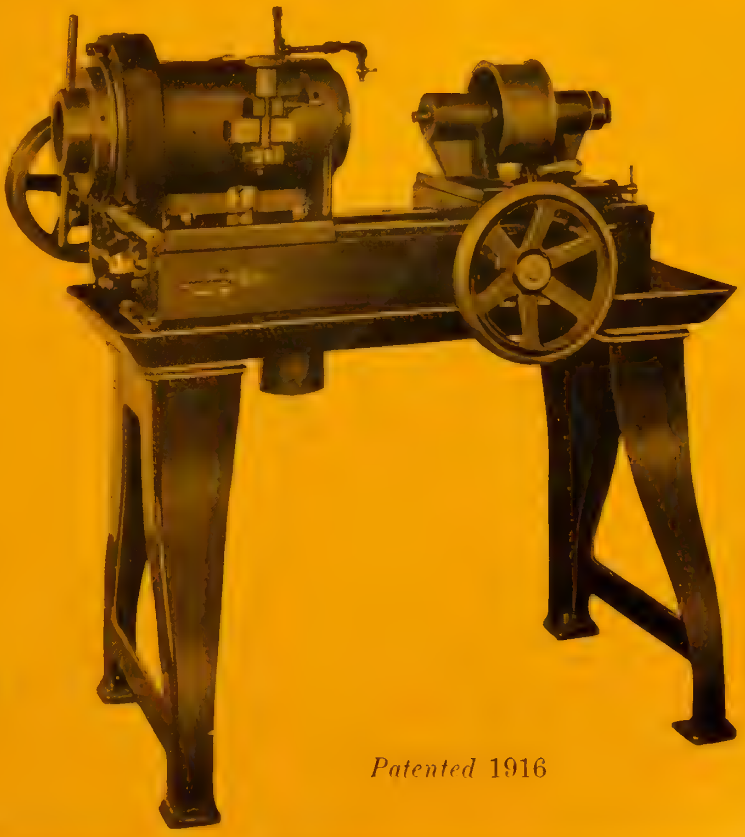
The shell is inserted at the left-hand end of machine, and is forced by a Quick-acting Clamp to centralize between two surfaces within the work mandrel, thus securing perfect concentricity of the threads.

One operator can manipulate two machines.

Machine is equipped with Oil Pan, Pump and necessary Piping, and one suitable Thread Milling Hob.

No countershaft is furnished, as all machines may be driven from a jack-shaft.

Write for general description and other particulars.



Patented 1916

The Holden - Morgan Company, Limited

579 Richmond Street West,
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The BEAUDRY HAMMER

—for "Nosing-in" and Banding Shells

Illustration shows Beaudry Hammers "nosing-in" high explosive shells. In this operation, starting with easy blows, so as not to make the metal flow unevenly to any point; the hammer delivers increasingly heavy blows until the shell is nosed. Beaudry Hammers are also ideal for banding high explosive shells, especially where strip copper instead of a ring is used for the band.

Beaudry Hammers Save Fuel, Time and Labor—cut forging costs.

Shell work well illustrates their adaptability to all kinds of general forging work.

Belt or motor-driven. Send for Catalog.

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The
BEAUDRY
HAMMER
Nosing
High
Explosive
Shells

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MUNITION MACHINERY LIST

ALL machines listed are practically new and can be inspected at the plant of the Union Switch and Signal Co., Swissvale, Pa., or the plant of the Westinghouse Air Brake Co., Wilmerding, Pa. Our office at Swissvale will take care of all inquiries and arrange for inspection at Wilmerding, Pa.

These machines used in the manufacture of 18-pdr. British Shrapnel Shells. For detailed description see List No. 2.

1—Double Spindle Vertical Center Punching Machine.
1—Double Spindle Vertical Centering Device.
39—Reed Prentice Semi-Automatic Lathes.
60—Potter & Johnston 6-A Automatics.
2—Notching Machines (Special).
4—12 x 24 Modern Grinders.
3—12 x 36 Modern Grinders.
1—10 x 50 Norton Grinder.
2—Base End Grinders.
2—No. 14 Besly Grinders and Press for glueing emery paper to Discs.
2—Brown & Boggs Marking Machines.
3—West Hydraulic Tire Presses for Inserting Copper Band (with pumps).
4—No. 4 Warner & Swasey Turret Lathes.
2—Allis Chalmers Special Purpose Machines for finishing copper bands.
1—Tapping Machine for retapping fuse socket.
1—Sprague Canning Co's Soldering Machine.
6—2-spindle Vertical Paint Machines.
3—Horizontal Spindle Paint Machines.

DISCS.

1—Ransom Disc Grinder 12" Disc.
1—Gorton Disc Grinder 12" Disc.
3—Baker Bros. 2-spindle 1" x 6" Semi-Automatic Drill Presses.
2—No. 2 Garvin Automatic Tapping Machines.
1—Machine Double Ended for filing radius.

FUSE SOCKETS.

6—No. 24 New Britain 4-spindle Automatic Machines.
2—2-Spindle High Speed Avey Drill Presses.
2—Single Spindle Avey Drill Presses.

COPPER BANDS.

6—Taylor & Wilson 4" Pipe Cutting Off Machines. Three of these used to cut-off open end of shells about three months.
1—Disc Machine for cutting-off Copper Bands.

Miscellaneous machinery used for the manufacture of 18-pdr. Shrapnel and Cartridge Cases.

LATHES.

1—26" x 8' Reed Lathe.
1—20" x 6' Reed Lathe.
1—26" x 10' Bullard Lathe.
7—14" Extra Heavy Reed Hand Operated Turret Lathes.

GRINDERS.

1—Diamond Machine Co.'s No. 2 Tool Grinder.
1—American Twist Drill Co.'s Drill Grinder.
1—Tool Grinder ½" x 16" Grinding Wheel.
1—Bridgeport Safety Emery Wheel Co. Tool Grinder.
1—No. 3 Bridgeport Safety Emery Wheel Co. Tool Grinder.
1—No. 1½ Cincinnati Universal Tool Grinder.

DRILL PRESSES.

1—3-Spindle Geo. Burnham Co. Drill Press.
3—16" Canedy Otto Drill Presses.
1—16" Prentice Co. Drill Press.
1—20" Prentice Co. Drill Press.
1—20" Cincinnati Drill Press.
1—Belt Driven Buffing Machine.
3—Motor Driven Double Ended Buffing Machines.
2—Curtis Centrifugal Oil Separators.
2—Gross Oil Filters.
3—Bowser Motor Driven Oil Pumps.
1—Small Brown & Sharpe Milling Machine.
1—Hand Milling Machine.
2—No. Bristol Hand Millers, New.

CANADA'S LEADING
MACHINERY
HOUSE

ST. JOHN, N.B.
WINNIPEG
VANCOUVER

The A·R·WILLIAMS MACHINERY Company Limited

64-66 Front Street W Toronto, Canada

These machines and presses used in the manufacture of 18-pdr. British Cartridge Cases and 3″ Russian Cartridge Cases.

No.	Type No.	Stroke	Name
1	57	18″	Toledo Press.
3	59	12″	Toledo Special Press.
1	59¼	8″	Toledo Special Press.
2	59¼	12″	Toledo Special Press.
21	355	46″	Toledo Rack and Pinion Press.
4	666	2″	Toledo Knuckle and Joint Swadging and Heading Press.
3	114	18″	Toledo Special Press.
2	14	2″	Press.

20 Bullard Turret Lathes, 15 for British Cases and 5 for Russian Cases.
3 Toledo Trimmers No. 335-A, modified by WABCO for trimming cartridge cases.
1 Toledo Trimmer No. 335-A, modified for polishing cartridge cases.
3 Trimmers for trimming cartridge cases.

Complete Bullet Plant---Labor Required, 4 Men

These presses, etc., used in the manufacture of bullets for the 18-pdr. British Shrapnel.

3—3-ton Quigley Lead Pots (one new) with cast iron parts for three furnaces.
3—Water-jacketed Slug Molds with stands.
1—Slug Mold Car for narrow gauge track.
2—Slug Heating Furnaces.
2—J. Robertson & Son Triplex Hydraulic Pumps with valves and fittings to connect with Extrusion Presses.
2—J. Robertson & Son 650-ton Hydraulic Extrusion Presses.
2—Automatic Reel Winding Racks. (Six reel capacity.) (Structural steel.)
2—Reel Racks (24 reel capacity) structural steel.
72—Reels.
12—2-ton capacity bullet dump buckets.
2—No. 75½ Bliss Power Presses.
6—Bliss Tumbling Barrels.

Miscellaneous Machinery

(For detailed description see List No. 2, pages 18 and 19).

1—Beaman & Smith Horizontal Boring Mill.
7—Seven-Spindle Beaman & Smith Milling Machines.
1—1½ Ton Link Belt Cage Operated Mono-Rail Electric Hoist.
1—2,000 lbs. Bement-Miles Double Frame Steam Hammer.
1—William Sellers & Co., No. 377 Horizontal Boring Mill.
20—3X Reed Prentice Semi-Automatic Lathes.
21—Libby Turret Lathes.
19—Lees Bradner Thread Millers.
15—Putnam Engine Lathes.
7—Thurlow Waving Machines.
4—3A Warner & Swasey Hollow Hex Turret Lathes.
3—Wave Nicking Machines.
2—No. 2 West Tire Setters and Pumps.
3—Holden Morgan Mechanical Wrenches.
9—18″ American Geared Head Lathes with turrets.
4—Jenckes Copper Band Turning Machines.
1—Shell Washing Machine.
2—No. 4 Warner & Swasey Screw Matchine.
3—Automatic Copper Band Cutting-off Machines.
1—Chain Feed Box Printing Press.
3—No. 4 Warner & Swasey Screw Machines.
18—6A Model, Potter & Johnson Automatics.
3—D-8 Colborne Heavy Duty Drills.
1—4½″ H.E. Shell Nosing Press Pump and Accumulator Piping and Valve.
2—2X Reed Prentice Lathes.
4—Steinle 24″ Turret Lathes.
6—No. 11 Amalgamated Lathes.
4—18″ Reed Shell Waving Machines.
1—No. 1 West Tire Setter Press and Pump.
1—De Vilbiss Varnish Machine.
1—Holden Morgan Plug Milling Machine.
1—Morgan No. 9 Box Nailing Machine.
17—14″ Reed Heavy Turret Lathes.
10—2¾″ Cleveland Model C Automatics.
2—National Air Compressor, 1 Reservoir.
5—1X Reed Prentice Semi-Automatic Lathes.
3—65-gallon Bowser Pumps.
6—24″ Davis Boring and Chucking Lathes.
6—20″ Hindman High Duty Lathes.
1—Fischer Universal Profile Tool Grinder.
1—Newton Vertical Type Continuous Miller.
2—25″ x 10′ Wickes Engine Lathes, one with taper attachment, one without.
2—26″ x 10′ Pittsburg Engine Lathe.
1—Brown-Boggs Shell Marker.
6—Van Dorn Aerial Grinders.
2—Sullivan Shell Grinding Machines.
3—Belt Lacing Machines.
1—Modern Tool Grinder.
13—Fairbanks Weighing Scales.
1—12 x 42 Cincinnati Plain Grinder.
1—16″ Prentice Sliding Head Drills.
1—24″ Aurora Sliding Head Drill.

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HANNIFIN
AERO
CHUCKS
M'F'G CO

AERO CHUCKS

Air Operated Chucks
Air Operated Expanding Mandrels
Air Operated Jigs and Clamping Devices
Air Operated Countershafts
Air Operated Vises
Air Operated Arbor Presses
Air Operated Chucks for Fuse Parts
Air Operated Chucks for All Size
Shells as Large as 9.2 inch

We can furnish anything in air operated chucking and clamping fixtures. Send us blue prints of your work and we will submit designs.

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Hannifin Mfg. Co

CHICAGO,
U. S. A.

Air Operated Three-Jaw
Universal Chuck

Air Operated Two-Jaw
Universal Chuck

Master Hinge Collet Chuck

Air Operated Expanding Mandrel

Air Operated Vise

Air Operated Arbor Press

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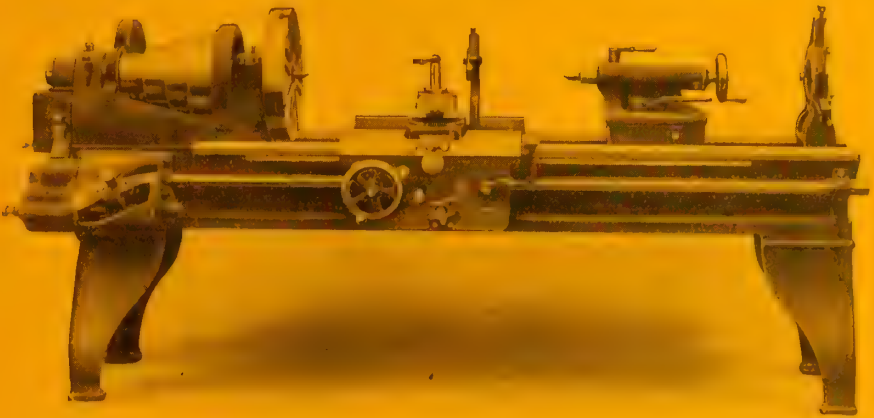
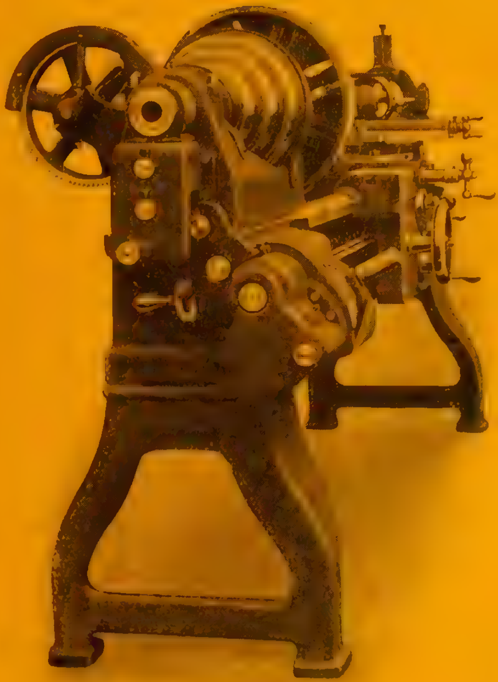
CISCO The Lathe with the Pull CISCO

STRONG
DURABLE
ACCURATE
EFFICIENT
ECONOMICAL

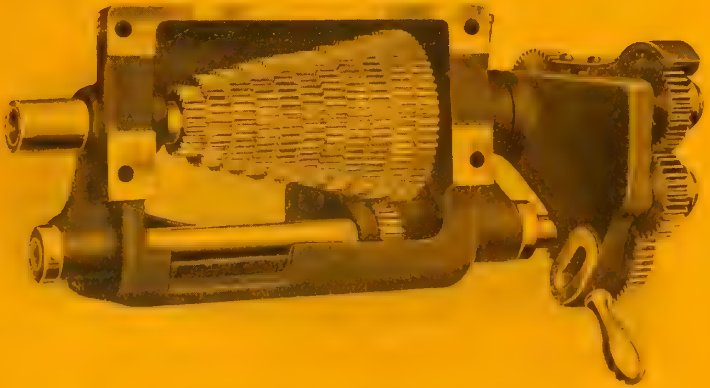


MADE IN THE
BEST WAY
OUT OF THE
VERY BEST
MATERIAL

Front View Cisco 4-Step.



End View Cisco.



Inside View Cisco Change Gear Box.

Rear View Cisco Apron.

Made in 3 or 4 Step 14" and 16"; 3 Step 18" and 24

by

THE CINCINNATI IRON AND STEEL COMPANY

CINCINNATI. U. S. A.

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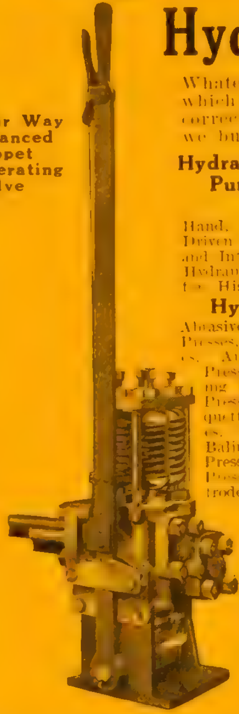
HYDRAULIC MACHINERY

Hydraulic Presses, Pumps and Valves

A Design for Every High Pressure Purpose

Whatever "Your Pressing Needs" may be—Press, Pump, Valve, Accumulator or Intensifier—we have a design which will suit your requirements. If your conditions are peculiar and our standard line does not include the correct type of machine we will furnish a new design to fit your wants. Just a few of the hydraulic machines we build are listed below:—



Four Way Balanced Poppet Operating Valve

Hydraulic Accumulators, Pumps, Valves and Fittings.

Hand, Belt, Motor and Steam-Driven Pumps, Accumulators and Intensifiers, Every Type of Hydraulic Valve and Fitting for High Pressure Service.

Hydraulic Presses.

Abrasive Wheel Presses, Arbor Presses, Asbestos Shingle Presses, Automobile Wheel Rim Presses, Baling Presses, Bending Presses, Brake Shoe Filling Presses, Broaching Presses, Briquetting Presses, Chicory Presses, Chocolate Presses, Cotton Baling Presses, Crank Pin Presses, Cork Chip Presses, Die Presses, Drawing Presses, Electrode Presses, Emery Wheel Presses, Fibre Board Presses, Forcing Presses, Flanging Presses, Forging Presses, Forming Presses, General Purpose Presses, Horn Comb Presses, Hot and Cold Plate Presses, Leather Presses, Leather Belt (double) Presses, Paper Bobbin Presses, Paper Calender Roll Presses, Paper Pulp Presses, Portable Presses, Powder Presses, Pulley Gluing Presses, Rubber Presses, Seed Oil Presses, Shell Banding Presses, Shell Forging Presses, Shell Nosing Presses, Straightening Presses, Tile Presses, Tufting Presses, Vulcanizing Presses, Wood Veneer Presses, Wheel Presses.

Write us about any kind of Hydraulic Machinery

The Hydraulic Press Mfg. Co.

89 Lincoln Ave., Mount Gilead, O., U.S.A.
Eastern Office, Room 1105-R, 39-41 Cortlandt St., New York City.

CANADIAN AGENTS:
A. R. Williams Machinery Co., Ltd., Toronto, Ont., and St. John, N.B.; Canadian Fairbanks-Morse Co., Toronto and Montreal; McLean & Barker, Southam Bldg., Montreal; Canadian Equipment & Supply Co., Edmonton, Alberta.

Pot Valve Type Motor Driven Triplex Hydraulic Pump

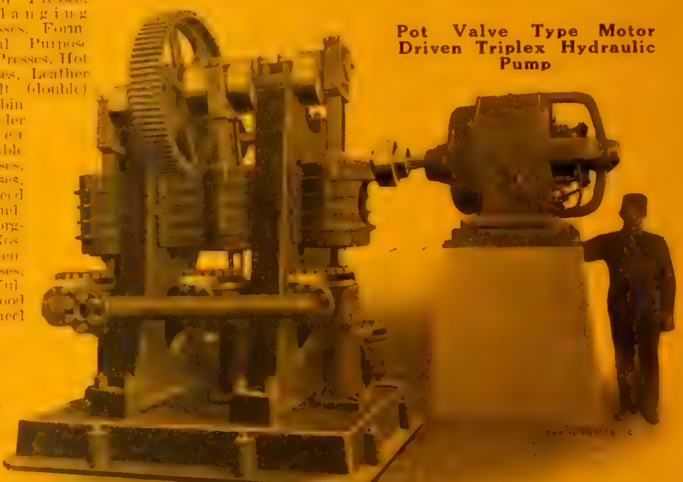
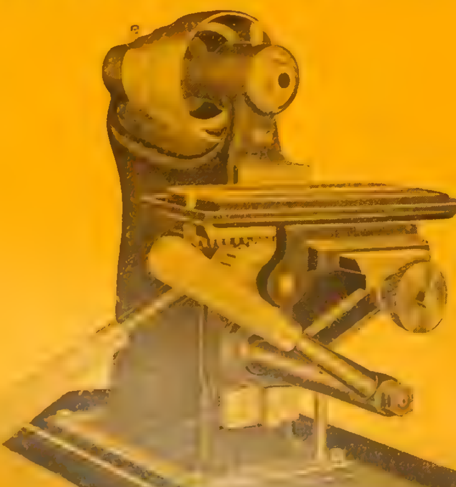


FIG. 1330 A

"BURKE" No. 1 MILLING MACHINE



A machine tool built for small jobs. An efficient little worker and a big time and money saver on all classes of lighter work.

SPECIFICATIONS:

Longitudinal feed of table	6 inches
Traverse feed	3¼ inches
Vertical motion to knee	5¾ inches
Maximum distance between center of spindle and table	7 inches
Working surface of table	3½ x 12
Greatest distance between centers (6-inch) swing	2⅜ inches
Largest diameter of cone	6 inches
Smallest diameter of cone	3½ inches
Driving Belt	2 inches
Taper hole in spindle	B. and S. No. 9
Hole in spindle	½ inch
Height over all	21 inches
Loose pulley on countershaft	7 x 2¼
Speed of countershaft	280 revolutions
Weight complete	190 pounds
Weight packed	260 pounds

The Burke Machine Tool Co.

CONNEAUT, OHIO, U.S.A.

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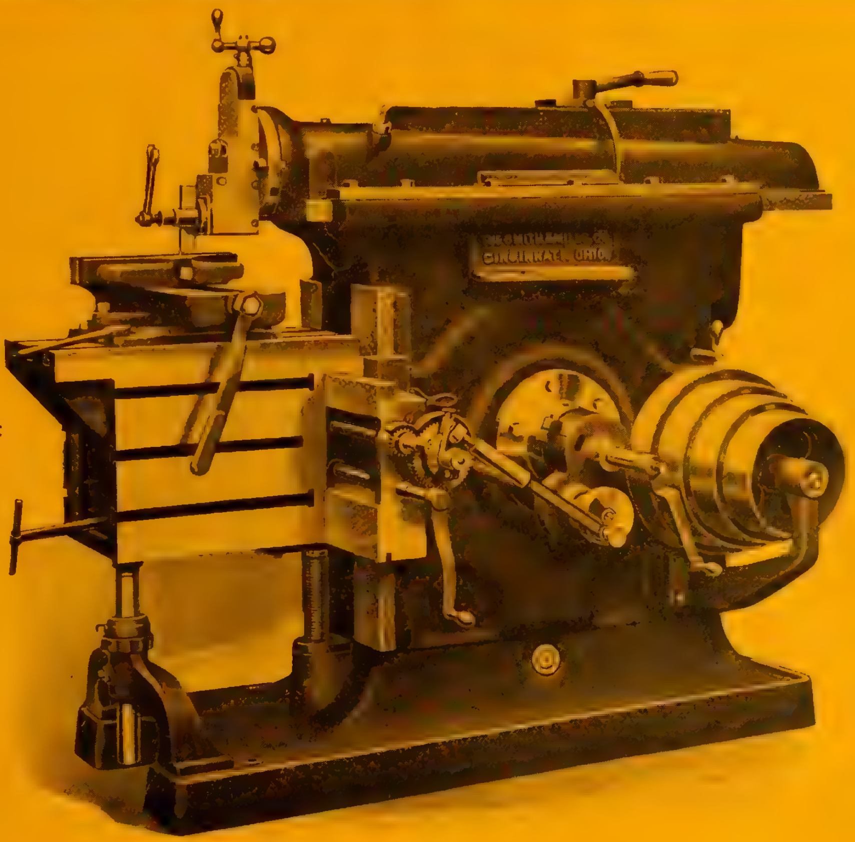

Shapers Exclusively

By confining our energies to the manufacture of one line of machines—shapers—we are able to present a product perfect in construction, production and operation.

Crank sizes—12", 14", 16", 20" and 25".

Geared sizes—24", 28" and 32".

Smith & Mills Company

Cincinnati Ohio U. S. A.

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WRIGHT HIGH SPEED HOIST

For use wherever loads must be frequently raised or where it is essential to raise them quickly.

In their construction, the use of STEEL and malleable iron has reduced to naught those lost minutes and cents due to break-downs and wear-outs.

The very high efficiency of these HOISTS places them in the class of the truly efficient labor-saving devices in plant production.

The WRIGHT Non-fouling Chain Guide assures you that the chain will NEVER foul nor clog in operation, whether used in vertical or horizontal position.

A feature of regular construction assures the foundry man of a positive lack of vibration and that the small hanging parts of sand on the cope will not BREAK off in lowering to close the flask.

With such a combination of material and construction, we feel that the praises of WRIGHT SERVICE are well earned.

"STEEL HOISTS NEVER BREAK"

Wright Manufacturing Company

Lisbon, Ohio, U. S. A.

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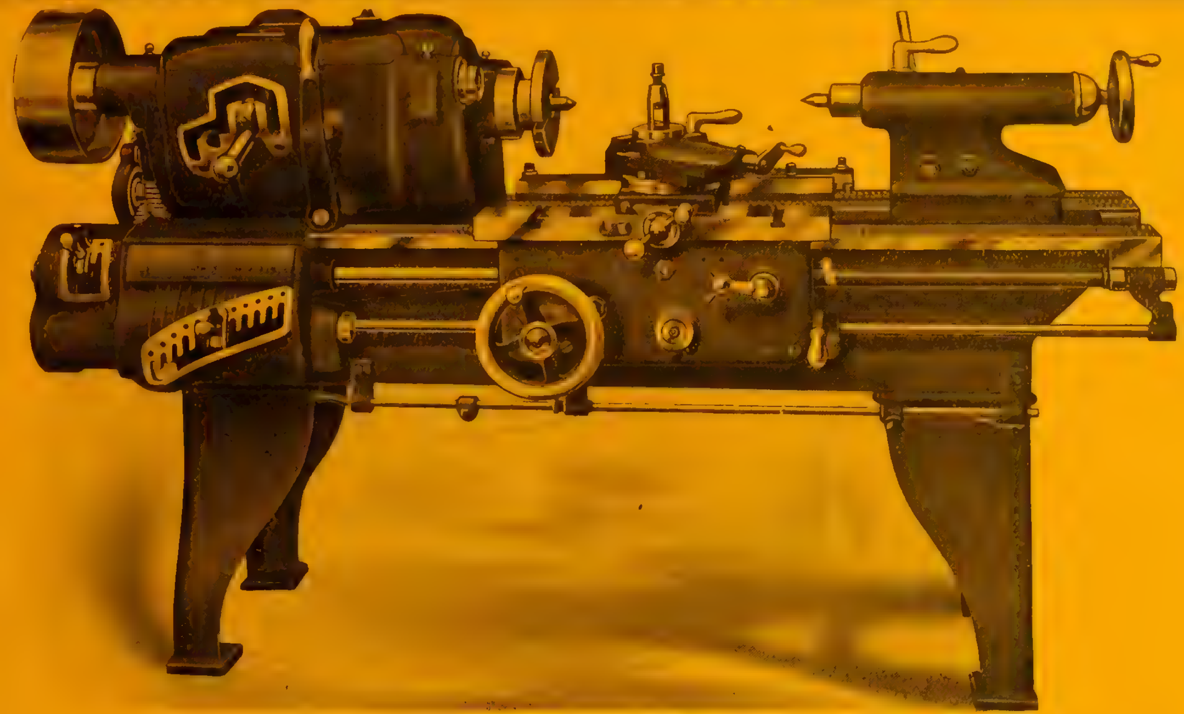
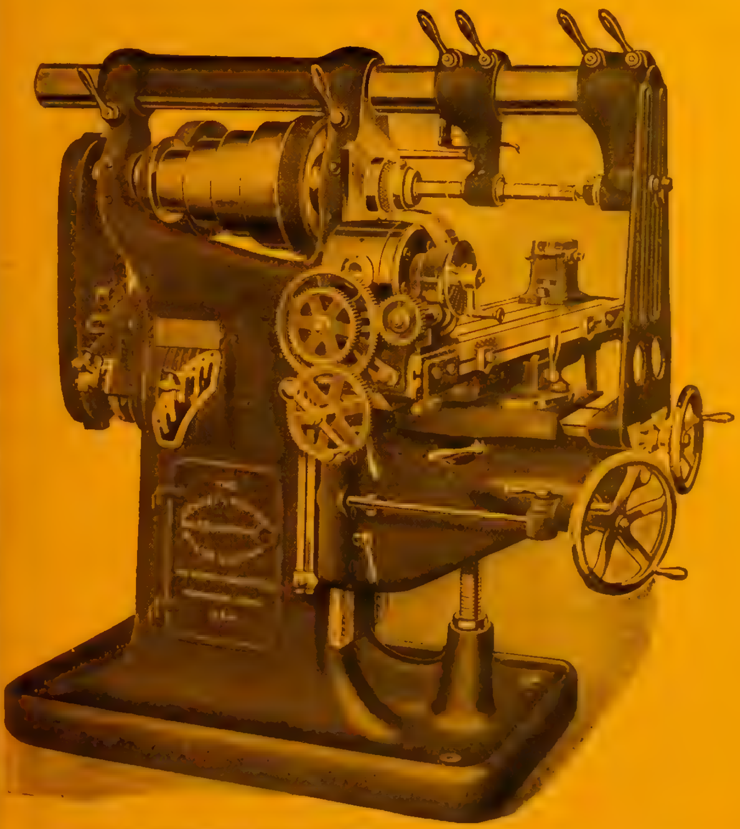


18-INCH GEARED HEAD LATHE.



NO. 3 UNIVERSAL MILLING MACHINE

HENDEY

Hendey Lathes are built with the requirements of exceptional service in mind—everything in design and construction is co-ordinated to this end.

36 DIFFERENT THREADS AND FEEDS are had through mounted Change Gearing; each change being quickly made through controlling handles in Gear Boxes.

It will be worth while to look into the possibilities of Hendey Lathes for your shop and tool room purposes.

Hendey Millers have a wide range of spindle speeds and feeds and will give you production of a remarkable degree of accuracy and perfection.

They are free from the usual complicated features. All working positions are secured with but few and easily understood movements on the part of the operator.

HENDEY MILLERS WILL TAKE ANY KIND OF A MILLER JOB THAT COMES INTO THE MODERN SHOP.

The Hendey Machine Co.

Torrington, Conn., U.S.A.

Canadian Agents: A. R. Williams Machinery Co., Toronto, Ont.; A. R. Williams Machinery Co., 260 Princess St., Winnipeg; A. R. Williams Machinery Co., Vancouver; A. R. Williams Machinery Co., St. John, N.B.; Williams & Wilson, Montreal.

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Accurate, Reliable and Immediate Records of Production

— right when you need them —while the work is being done! That's what it means to use The Productimeter. A glance at the large prominent figures will tell you instantly what each machine—each operator is producing in a day—in an hour. It's not necessary to wait for reports.

The Productimeter

gives you all the facts you need to analyze your production, and costs, and furnishes a proper basis for wage payment. No matter what the application may be, some one of its many styles and sizes can be found adaptable to meet your requirements.

Send for one on thirty days' free trial—give us the opportunity to show what The Productimeter can do for you at our expense. **Ask for Catalog No. 25 showing the complete Productimeter line.**

DURANT MFG. CO., **Milwaukee, Wis.**

"A Productimeter for Every Purpose"

ELECTRIC MOTORS?

PHONE MOTOR DEPARTMENT ADELAIDE 20

In Toronto and at all our branch warehouses we carry very complete stocks of Electric Motors, Dynamos and Portable Electric Tools of all kinds.

Just now we have large stock orders placed for 3-phase, 25-cycle Motors, and can in this way very often give you better deliveries than manufacturers themselves. We give special attention to all apparatus required in the nature of Electric Motor power, and can give you expert advice on all your Electrical Problems. Write us.

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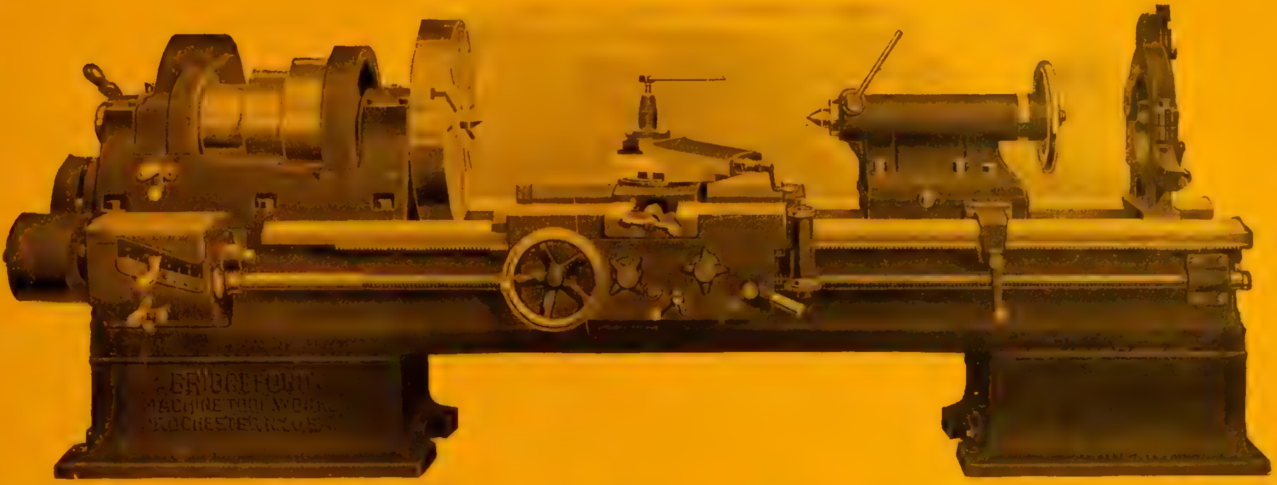


Bridgeford-

SPEED MEANS INCREASED PRODUCTION

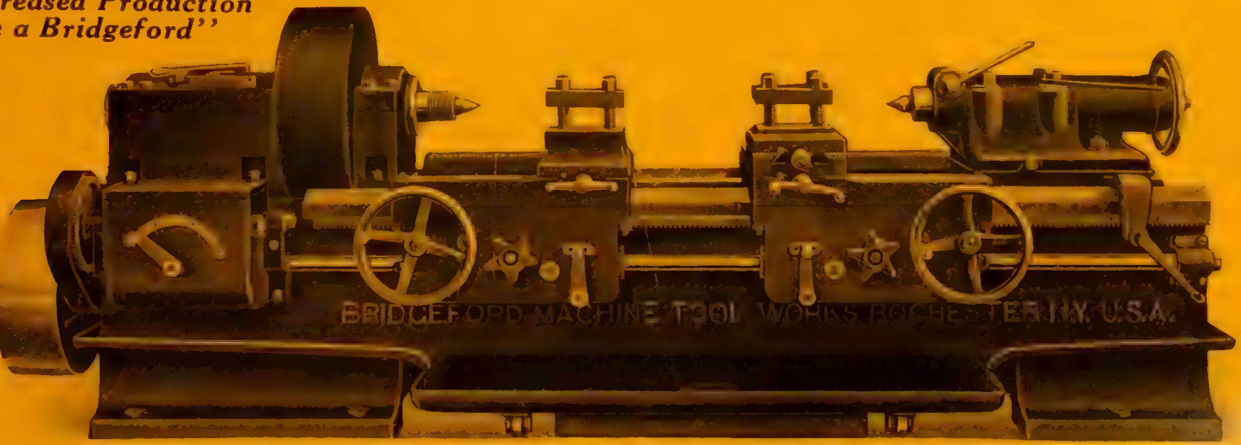
For Increased Production "Use a Bridgeford"

All Bridgeford Lathes are made for exceptionally heavy duty — are liberally dimensioned—making for freedom from repairs. Heavy, but not clumsy in operation—no complicated mechanism. This means successful operation by inexperienced help.

The qualities that have made for Bridgeford reputation in prominent steel mills and railroad shops should appeal to the work now in hand.

The 26" lathe (upper cut) is being used in large numbers by leading makers of shells for finishing operations on shells as large as 12". The 27" plain turning machine (lower cut) for roughing operations on shells—8" to 12".

Quick deliveries in return for early inquiries.



Bridgeford Machine Tool Works

HEAVY LATHE SPECIALISTS FOR 20 YEARS

237 MILL STREET
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MAXIMUM PRODUCTION

For Water
or Oil

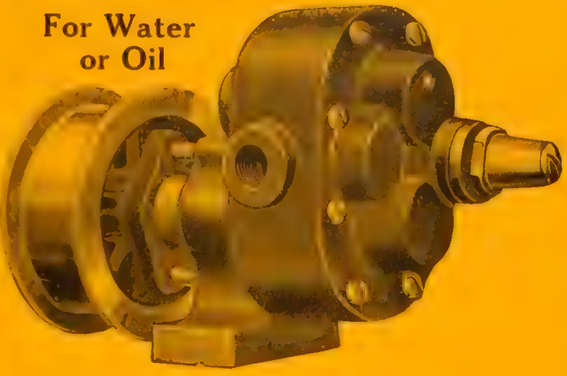

Fig. 1850. With Relief Valve.

FROM MACHINE TOOLS OF ALL CLASSES IS INCREASINGLY NECESSARY.

EFFICIENT SERVICE FROM ANY MACHINE DEMANDS FREEDOM FROM PUMP TROUBLES.

ANY LUBRICANT CAN BE SUPPLIED TO ANY CUTTING TOOL, IN ANY QUANTITY, AND WITH THE MACHINE RUNNING IN EITHER DIRECTION IF THE PUMP USED IS THE

Trahern Circulating Pump

IT OPERATES IN WATER OR OIL WITH EQUAL EFFICIENCY, AND ALL TYPES ARE FITTED WITH AUTOMATIC RELIEF VALVES, ENABLING DISCHARGE TO BE REDUCED OR CUT OFF WITHOUT STOPPING PUMP.

MACHINERY BUILDERS ENHANCE THE VALUE OF THEIR PRODUCT BY EQUIPPING WITH

TRAHERN PUMPS.

MACHINERY USERS INCREASE THE OUTPUT OF THEIR OLD MACHINES BY USING

TRAHERN PUMPS.

For Water
or Oil

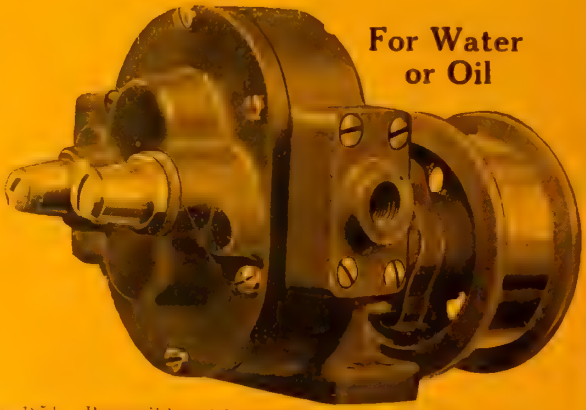

Fig. 1851. Reversible with Double Automatic Relief Valve.

OUR CATALOGUE SHOWS VARIOUS TYPES OF PLAIN AND REVERSIBLE PUMPS. PROMPT DELIVERY OF ALL TYPES.

TRAHERN PUMP CO.

Rockford - Illinois, U.S.A.

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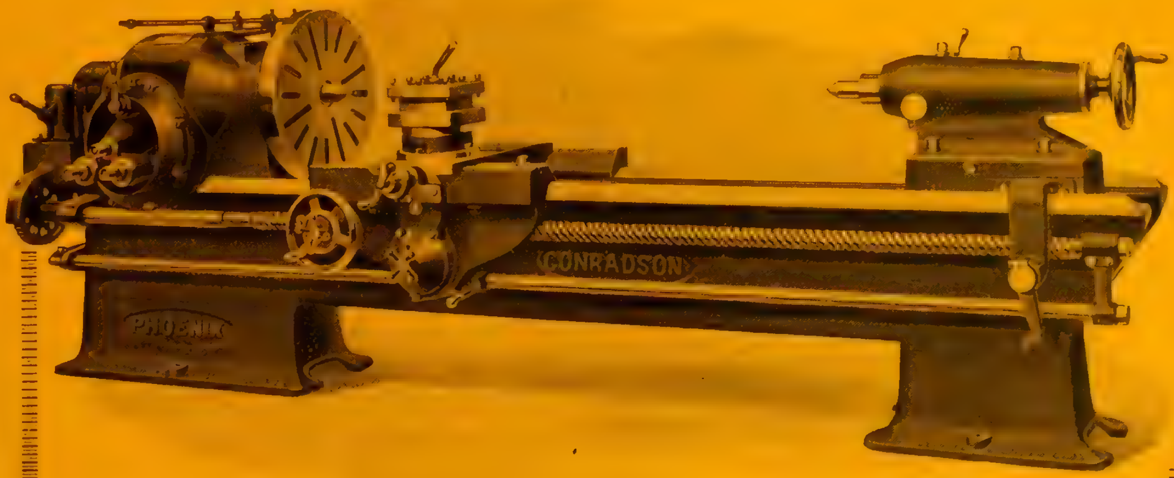

28" Conradson Engine Lathe

For Band Turning
Duplex Helical Drive

The reason for that massive strength in the headstock is because it is cast integral with the bed. Two bronze worm wheels are mounted on the spindle and are driven by hardened worm, having ball thrust bearings. The worms are driven by a train of heat-treated Nickel Chrome Steel gears. The gear system runs in oil. The spindle thrust is taken by a massive ball thrust bearing immersed in oil. Imported ball thrust bearings are used. The spindle bearings of Phosphor Bronze are of the conical sleeve type. By this description you will get an idea of the construction. The speed and quality of work produced are above the ordinary. Inquire at once.

Phoenix Manufacturing Co.

Eau Claire, Wis., U.S.A.

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Your Pressing Needs

There's a "Consolidated" for Every One of Them

Presses for Marking Fuses, for Fuse Bodies, for Blanking, Cupping and Drawing Cartridge Cases. Also a general line of Punch and Inclinable Presses.

Triple Geared Forging and Trimming Press (Front View)

No. A. Inclinable Open Back Press

Triple Geared Forging and Trimming Press (Rear View)

Consolidated Presses represent the highest grade in quality of material, design and workmanship, and have many exclusive features which make for economy in operation, notably the three locking points in the hubs of all flywheels, giving 20 per cent. more production than any press having only two locking points in flywheel to engage clutch. Get our beautifully illustrated catalogue for all the fine points of "Consolidated" construction.

GENERAL LINE OF CONSOLIDATED PRESSES CARRIED IN STOCK AT TORONTO.

THE CONSOLIDATED PRESS & TOOL CO.

HASTINGS, - - MICH., U.S.A.

MACHINE TOOLS

(Continued from page 730.)

ment, which were the types of shell being made in quantity at that time. As a number of plants had been equipped during 1915, business was not as active as later on in the year. However, early in March orders for 4.5 in. and 6-in. shells came along, and a new class of machine tools was required, which stimulated business. About the same time the manufacture of 18-pdr. high explosive shells was discontinued, the plants being then turned over to the larger calibre shells. The situation continued to develop until June, when the contracts for 8-in. and 9.2-in. shells were placed. This again called for still heavier equipment. The industry now became extremely active, as not only was further equipment for shrapnel shells required, but for the larger shells as well. Business continued good right along until early in December, when the demand fell off and the market became quieter. During November there was a call for fuse-making equipment. There has been all through the year a steady demand for toolmakers' equipment, but it has been most difficult to obtain. The so-called ordinary business has been quiet, and no large orders have been booked.

New Tools

An interesting feature has been the development of new special purpose tools for munitions, which might also include standard machines adapted for making shells. The single purpose lathe, which had been developed in the States in the previous year, was introduced into this market in connection with the bigger shells. Some Canadian makers designed and built single purpose lathes and other tools, widening the field of activity among domestic machine tool builders. Various types of machines for different operations in shell manufacture have been placed on the market by both Canadian and U. S. concerns, all of which have contributed to bring up the munitions output to its present quantity basis. There has been quite a demand for large swing lathes for the larger shells. The development in shrapnel shell equipment has not been so noticeable, this having reached more or less finality in 1915. Canadian machine tool builders have enjoyed a most prosperous year, and were never in better shape financially. They have had all the business they could handle, and have shown much ingenuity in the new tools which have been put on the market.

Deliveries and Prices

Machine tool builders in the United States have extended their connections in Canada and have found it a profitable field. During the year, especially the first half, many of these concerns were doing a big business, both European and domestic. Their output was for months sold well ahead and consequently deliveries have been very backward on most types of machine tools, shell and tool making equipment particularly. This has many times been a source of great inconvenience as machinery was badly wanted owing to the urgency of the shell production requirements. Latterly, conditions in this respect have improved, as the demand in the States is not nearly so heavy as at one time, European business also has declined considerably. Machine tools have of course advanced in price during the year, due principally to increase in cost of raw materials and higher wages. Standard lathes, for instance, are now about 60 per cent. higher than they were before the war, while heavier equipment such as cranes have advanced almost 110 per cent. Prices on the general run of machine tools are from about 30 to 40 per cent. higher.

The second hand machinery business has been less active as the market had already been well combed last year. Later on in the year, however, the supply of this class of equipment was greatly increased through a number of munition plants in the States finishing their contracts and offering their equipment for sale. In many cases a ready market was found.

Future Outlook

With regard to the coming year, indications point to a satisfactory volume of business, but perhaps not as heavy as during 1916. The majority of our munition plants are well equipped, but extensions to existing establishments are still being made, while two or three quite large plants are under construction. Renewals will also be required as present machinery gets worn out. The situation however is somewhat unsettled on account of the German peace proposals, which, although turned down, will no doubt be renewed later in the year. The effect of these proposals on the munitions business will be nil, that is until they have reached the stage where negotiations have assumed a more definite status and peace is within sight.

* * *

HIGH-SPEED TOOL STEEL

THERE has fortunately been less excitement in the high speed tool steel market this year than during 1915. While the demand has been greater on account of the increased consumption by munitions plants, available supplies have increased and there is now little fear of a shortage. During the year there has been a gratifying increase in the production of Canadian-made high-speed tool steel, which has come at a time when it was most needed. Shipments from Great Britain have been comparatively small this year owing to the extremely heavy demand for tool steel in the Old Country which has left very little for export except to France and Russia. As the steel plants in Great Britain are all controlled, no tool steel could be exported or even manufactured for export without a permit from the Minister of Munitions. The fact that production in England has been largely increased has not relieved the situation in Canada to any marked degree, as the output has been absorbed in the home market.

Supplies of tool steel have been coming through from the United States rather more freely, the demand there not being quite so urgent, while the output of course has been largely increased. At the beginning of the year the situation was very tight. Consumers in their anxiety to cover for their requirements, fearing a famine, ordered heavily which tended to force prices up and caused much excitement. The shortage threatened serious consequence at one time, but fortunately no plants were ever held up on this account. Production has been increasing all the time, and this together with careful use in the various plants allowed the crisis to pass.

Owing to the high cost of high speed tool steel, greater vigilance has been exercised in its use and in the disposal of scrap. Tool holders are being used to a greater extent, so that small pieces of tool steel can be used and a saving be thereby effected. Although the situation is easier than during the early part of the year, the price has not declined to any appreciable extent, prices ranging from $2.75 to $3 a pound for standard qualities. Some special alloys which have been put on the market are giving satisfactory results on munitions but they are higher priced.

The output of tungsten has been increased, but all supplies have been quickly absorbed by the tool steel makers. The manufacture of tungsten powder in England has developed in a satisfactory manner, but the entire output is monopolised there. Production of tungsten in Burmah and the United States has also increased, but these supplies have also been readily absorbed.

Indications point to an easier situation during 1917, also a probable decline in prices, depending of course largely on developments in Europe. The heavy consumption of tool steel this year has been entirely on account of munitions, and the large contracts for shells which have been placed, and those pending in addition, will ensure a continued steady demand. The future is somewhat obscured as the return of peace conditions would certainly be followed by a large falling off in demand.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$29 95
Lake Superior, charcoal, Chicago	31 75
Standard low phos., Philadelphia	53 00
Bessemer, Pittsburgh	35 95
Basic, Valley furnace	30 00

	Montreal	Toronto
Middlesboro, No. 3	.....	.....
Cleveland, No. 3	.....	.....
Clarence, No. 3	.....	.....
Hamilton		
Victoria	40 00	38 00

FINISHED IRON AND STEEL

Per Pound to Large Buyers.	Cents
Iron bars, base, Toronto	3.50
Steel bars. base, Toronto	3.75
Steel bars, 2 in. and larger, base	5.25
Iron bars, base, Montreal	3.35
Steel bars, base, Montreal	4.00
Twisted reinforcing bars, base	3.55
Bessemer rails, heavy, at mill	...
Steel bars, Pittsburgh	...
Tank plates, Pittsburgh	...
Beams and angles, Pittsburgh	...
Steel hoops, Pittsburgh	...
F.O.B., Toronto Warehouse.	**Cents**
Steel bars, base	3.65
Small shapes	3.85
F.O.B. Chicago Warehouse	**Cents**
Steel bars	3.60
Bars, 2 in. and up	4.00
Structural shapes	3.70
Plates	4.35

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS

	Montreal	Toronto
Lake copper, carload	$37 00	$36 00
Electrolytic copper	37 00	36 00
Castings, copper	36 00	36 00
Tin	46 00	45 00
Spelter	14 00	13 00
Lead	10 00	9 50
Antimony	15 00	18 00
Aluminum	70 00	68 00

Prices per 100 lbs.

BOILER PLATES

	Montreal	Toronto
Plates, ¼ to ½	$5 00	$5 00
Heads	5 35	5 25
Tank plates, 3-16 in.	5 25	5 25

WROUGHT PIPE

Prices in effect Dec. 6, 1916.

Buttweld

Per 100 feet.	Black.	Galv.
⅛ in.	$ 4 00	$ 5 50
¼ in, and ⅜ in.	3 42	5 55
½ in.	4 42	5 99
¾ in.	5 41	7 53
1 in.	7 99	11 14
1¼ in.	10 81	15 07
1½ in.	12 93	18 01
2 in.	17 39	24 24
2½ in.	27 50	38 32
3 in.	35 96	50 11
3¼ in.	45 08	62 10
4 in.	53 41	73 58

Lapweld

2 in.	$20 35	$26 83
2½ in.	30 42	40 66
3 in.	39 78	53 17
3½ in.	49 68	66 70
4 in.	58 86	79 03
4½ in.	68 58	92 08
5 in.	79 92	107 30
6 in.	103 70	139 20
7 in.	138 00	182 10
8 in. x 25 lbs. per ft.	145 00	191 30
8 in. x 25 lbs. per ft.	167 00	220 30
9 in.	200 10	263 90
10 in. x 32 lbs. per ft.	185 60	244 80
10 in. x 40 lbs. per ft.	239 00	315 00

List for Ontario, Quebec and Maritime Provinces

OLD MATERIAL

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	$22 25	$23 50
Copper, crucible	26 25	27 00
Copper, heavy	26 25	27 00
Copper wire	26 25	27 00
No. 1 machine compos'n	22 00	22 00
No. 1 compos'n turnings	18 00	19 00
New Brass clippings	17 25	19 00
No. 1 brass turnings	15 00	16 00
Steel, low phos.	14 00	18 00
Heavy melting steel	13 00	14 00
No. 1 machine cast iron	15 00	16 00
Steel turnings	7 00	7 00
Boiler plate	12 00	10 50
Rails	14 75	15 00
Axles, wrought iron	19 00	24 00
Tires, steel	12 00	11 00
Rails	13 75	14 00
Shafting	16 75	20 00
Malleable scrap	10 25	11 00
Pipe, wrought	10 50	9 00
Stove plate	12 00	12 50
Heavy lead	7 50	7 75
Tea lead	6 00	5 50
Scrap zinc	8 00	8 50
Aluminum	35 00	35 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Coach and lag screws	35
Stove bolts	55
Plate washers	20
Machine bolts, 7-16 and over	15
Machine bolts, ⅜ and less	25
Blank bolts	15
Bolt ends	15
Machine screws, fl. & rd. hd., steel	27½
Machine screws, o. & fil. hd., steel.	10
Machine screws, fl. & rd. hd., brass,	net
Machine screws, o. & fil. hd., brass,	net
Nuts, hex., up to 1 in.	$3.75 per lb. off
Nuts, hex., over 1 in.	$2.00 per lb. off
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	30
Boiler rivets, base ¾-in. and larger	$5.25
Structural rivets, as above	5.15
Wood screws, flat, bright	.75
Wood screws, O. & R., bright	.70
Wood screws, flat, brass	.42½
Wood screws, O. & R., brass	.40
Wood screws, flat, bronze	.35
Wood screws, O. & R., bronze	.32½

MILLED PRODUCTS

	Per Cent.
Set screws	40
Sq. & Hex. Head Cap Screws	30
Rd. & Fil. Head Cap Screws	15
Flat & But. Hd. Cap Screws plus	15
Fin. & semi-fin. nuts up to 1 in.	30
Fin. & semi-fin., nuts over 1 in.	25
Studs	15
Taper pins	45
Coupling bolts ... plus	15
Planer head bolts, without fillet	15
Planer head bolts, with fillet	net
Planer head bolt nuts, up to 1 in.	30
Planer head bolt nuts, over 1 in.	25
Planer bolt washers ... plus	10
Hollow set screws ... list plus	40
Collar screws ... list plus	20
Thumb screws	20
Thumb nuts	70
Patch bolts ... add	65
Cold pressed nuts to 1½ in. ..add	$3.50
Cold pressed nuts over 1½ in. add	$2.00

BILLETS

	Per gross ton
Bessemer billets, Pittsburgh	$55 00
Open-hearth billets, Pittsburgh	55 00
O. H. sheet bars, Pittsburgh	55 00
Forging billets, Pittsburgh	80 00
Wire rods, Pittsburgh	70 00

NAILS AND SPIKES

Standard steel wire nails, base	$4 75	$4 70
Cut nails	4 00	4 00
Miscellaneous wire nails		**65%**
Pressed spikes, ⅝ diam., 100 lbs		**$4 10**

MISCELLANEOUS

Solder, guaranteed	0.30
Solder, strictly	0.27
Babbitt metals	**.11 to .60**
Soldering coppers, per lb.	**.53**
Putty, 100-lb. drums	**3.00**
White lead, pure, per cwt.	14.25
Red dry lead, 100-lb. kegs, per cwt.	**13.87**
Glue, French medal, per lb.	**0.25**
Tarred slaters' paper, per roll	0.95
Gasoline, per gal., bulk	**0.27½**
Benzine, per gal., bulk	**0.26½**
Pure turpentine, single bbls., gal.	0.71
Linseed oil, raw, single bbls.	**1.12**
Linseed oil, boiled, single bbls.	**1.15**
Plaster of Paris, per bbl.	2.50
Plumbers' oakum, per 100 lbs.	**8 00**
Packing, square headed	0.25
Packing, No. 1 Italian	0.30
Packing, No. 2, Italian	0.23
Lead wool, per lb.	0.12
Pure Manila rope	**0.25½**
Transmission rope, Manila	029½
Drilling cables, Manila	**0.27½**

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	**25%**

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes	35
S.S. drills, 1/16 in. and larger	50
Standard drills to 1½ in.	50
Standard drills over 1½ in.	20
3-fluted drills to 1½ in.	20
3-fluted drills over 1½ in.	10
Bit stock	50
Ratchet drills	20
Machine bits for wood	15
S.S. drills for wood	45
Wood boring brace drills	35
Electricians	25
Sockets	30
Sleeves	40
Taper pin and taper reamers	30
"Premier" and "Leader" chucks	10
Arbors for above	net
Drills and countersinks	list plus 30
Bridge reamers	55
Centre reamers	10
Chucking reamers	10
Hand reamers	15

High-speed drills up to 1½ in. and over 1½ in. are now double list.

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, add 5 per cent.; B and C, 12½ per cent.; cast iron, 40; standard bushings, 50 per cent.; headers, 60; flanged unions, 45; malleable bushings, 50; nipples, 70; malleable, lipped unions, 55.

SHEETS.

	Montreal	Toronto
Sheets, Black, No. 28	$5 00	$5 00
Sheets, black, No. 10	5 50	5 50
Canada plates, dull, 52 sheets	5 75	5 75
Canada Plates, all bright	6 30	6 50
Apollo brand, 10¾ oz. galvanized	7 25	7 25
Queen's Head, 28 B.W.G.	7 75	7 75
Fleur-de-Lis, 28 B.W.G.	7 45	7 35
Gorbal's Best, No. 28	7 75	7 50
Colborne Crown, No. 28	7 25	6 75
Premier, No. 28 U.S.	6 70	7 20
Premier, 10¾ oz.	7 00	7 50

PROOF COIL CHAIN

¼ in.	$9.45
5-16 in.	9.10
⅜ in.	8.35
7-16 in.	7.15
½ in.	6.95
9-16 in.	6.95
⅝ in.	6.80
¾ in.	6.70
⅞ in.	6.55
1 inch.	6.40

Above quotations are per 100 lbs.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15.50
3-16 in.	11.70
¼ in.	8.40
5-16 in.	7.40
⅜ in.	6.35
7-16 in.	6.35
½ in.	6.35
⅝ in.	6.35
¾ in.	6.35

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Great Western, American	60
Kearney & Foot, Arcade	60
J. Barton Smith, Eagle	60
McClelland, Globe	60
Black Diamond	50
Delta Files	47½
Nicholson	50
Globe	57½
Vulcan	57½
Disston	60

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$30 00	....
1¼ in.	30 00	....
1½ in.	30 00	24 00
1¾ in.	29 00	21 00
2 in.	33 00	20 00
2¾ in.	33 00	.....
2½ in.	35 75	26 50
3 in.	48 50	30 00
3¼ in.	54 50	36 00
3½ in.	59 50	30 00
4 in.	65 50	49 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS

Castor oil, per lb.	.23
Royalite, per gal., bulk	.11
Machine oil, per gal.	.26½
Black oil, per gal.	.14½
Cylinder oil, Capital	.47½
Cylinder oil, Acme	.38½
Standard Cutting compound, per lb.	0.6
Lard oil, per gal.	1.35
Thread cutting oil	.35
Union thread cutting oil antiseptic	.70
Acme cutting oil, antiseptic	.39½
Imperial quenching oil	.39½
Petroleum fuel oil	.12¾

BELTING—NO 1 OAK TANNED.

Extra heavy, single and double	30-10%
Standard	40%
Cut leather lacing, No. 1	$1.40
Leather in sides	1.20

TAPES

Chesterman Metallic, 50 ft.	$2.00
Lufkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun. Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun. Steel Tape, 50 ft.	3.50

COKE AND COAL

Solvay Foundry Coke.	
Connelsville Foundry Coke	....
Yough Steam Lump Coal	.....
Pittsburgh Steam Lump Coal	....
Best Slack	....

Net ton f.o.b. Toronto

WASTE

WHITE	Cents per lb.
XXX Extra	.18
Peerless	.18
Grand	.17
Superior	.17
X L C R	.16
Atlas	.16
X Empire	.15
Ideal	.15
X press	.14
COLORED	
Lion	.12½
Standard	.11
No. 1	.11
Popular	.10
Keen	.09
WOOL PACKING	
Arrow	.24
Axle	.18
Anvil	.14
Anchor	.11
WASHED WIPERS	
Select White	.12
Mixed colored	.10
Dark Colored	.09

This list subject to trade discount for quantity

ANODES

Nickel	.50 to .54
Cobalt	1.75 to 2.00
Copper	.44 to .46
Tin	.49 to .56
Zinc	.23 to .25

Prices Per Lb.

COPPER SHEETS

	Montreal	Toronto
Bars, ½ to 2 in.	46 00	$46 00
Plain sheets, 14 oz., 14 x 28 in., 14 x 60 m.	45 00	45 00
Copper sheet, tinned, 14 x 60, 14 oz.	54 00	54 00
Copper sheet, planished, 14 x 60 base	57 00	57 00
Braziers' in sheets, 6 x 4 base	46 50	46 50

BRASS

Brass rods, base ½ in. to 1 in. rd.	0.55
Brass sheets, 8 in. wide, 20 oz.	0.60
Brass tubing, seamless	0.55
Copper tubing, seamless	0.55

PLATING SUPPLIES

Polishing wheels, felt	2.10
Polishing wheels, bullneck.	1.35
Emery in kegs, American.	.06
Pumice, ground	.04
Emery glue	.15 to .20
Tripoli composition	.04 to .06
Crocus composition	.07 to .08
Emery composition	.08 to .09
Rouge, silver	.35 to .50
Rouge, powder	.30 to .35

Prices Per Lb.

RUBBER BELTING

Standard	50%
Best grades	30%

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$12 00	$12 50
Sheets, 3½ lbs. sq. ft.	11 75	12 25
Sheets, 4 to 6 lbs. sq. ft.	11 50	12 00

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy	.35
Copper, sulphate	.17
Cobalt sulphate	.70
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.12
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute).	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.55
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.41
Sodium hydrate	.04
Sodium hyposulphite per 100 lbs.)	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents

Montreal, Que., Dec. 22, 1916.—The extent to which the war is responsible for the present condition of basic and allied industries was indicated to a slight extent by developments following the recent peace manoeuvres. In view of the improbability of any settlement in the near future, the effect was more in the nature of a temporary suspension of market activity rather than any serious set-back, further developments of allied activity being expected when occasion offers.

Pig Iron

Quiet prevails in the pig iron market, but production proceeds unabated, with the general situation continuing very firm.

Steel

Awaiting the outcome of the peace talk that has spread throughout the country during the past week, the activity in the steel market is practically at a standstill, although no cessation is evident in production. While no decision has yet been made, it is not anticipated that serious peace negotiations will be entered into at present, and trade conditions are expected to undergo little change for some time. A feature of the week has been the further advance of coke; furnace spot having advanced $1 a ton, the quotation being now $9.50 Foundry coke, immediate delivery is quoted at $12, an advance of $2 on the week. The general trend of the market is in an upward direction, but owing to existing conditions the lull has delayed further price advances..

Metals

The general market has been somewhat effected by the recent peace movement, and the tendency is to a decline in price quotations pending definite settlement. Copper is quiet and easier. Tin is lower abroad and quiet here. Spelter is unsettled with a weak undertone. Lead is unsteady but apparently scarce. Antimony is firm but quiet..

Copper.—The present market is very unsettled and will likely continue so until conditions following current peace talk take some definite form. Very little interest is being shown by consumers, the market being made by the activity of dealers and the appearance of resale metal. Both London and New York quotations having declined ½c on electrolytic and 1½c on lake. While the local situation is comparatively quiet, dealers are holding firm on last week's quotations of 37c for lake and electrolytic, and 36c for castings.

Tin.—The market has developed a weak tendency following the prevailing uncertainty. However with little prospect of an early settlement it is generally felt that the situation will continue to show strength.. London is much weaker and New York has declined ½c the nominal quotation being 42½c per lb. The market here has a quiet undertone but prices are firm at 46c per lb.

Spelter.—In common with other metals, spelter is unsettled. What market there is, is being made by the selling interests as consumers are loath to purchase under existing conditions. Markets here and abroad have become easier, New York quoting 10⅝c, a decline of ½c per lb. Dealers here are maintaining last week's prices, but report a weak undertone. Current quotations are 14c per lb.

Lead.—Owing to a recent curtailment in production, caused by weather conditions, the market has been held fairly firm, although experiencing the same anxiety as those in other metals. A slight decline of ⅛c has been made in the quotation of independents, the current price being 7¾c New York. Local conditions are unchanged with prices firm at 10c per lb.

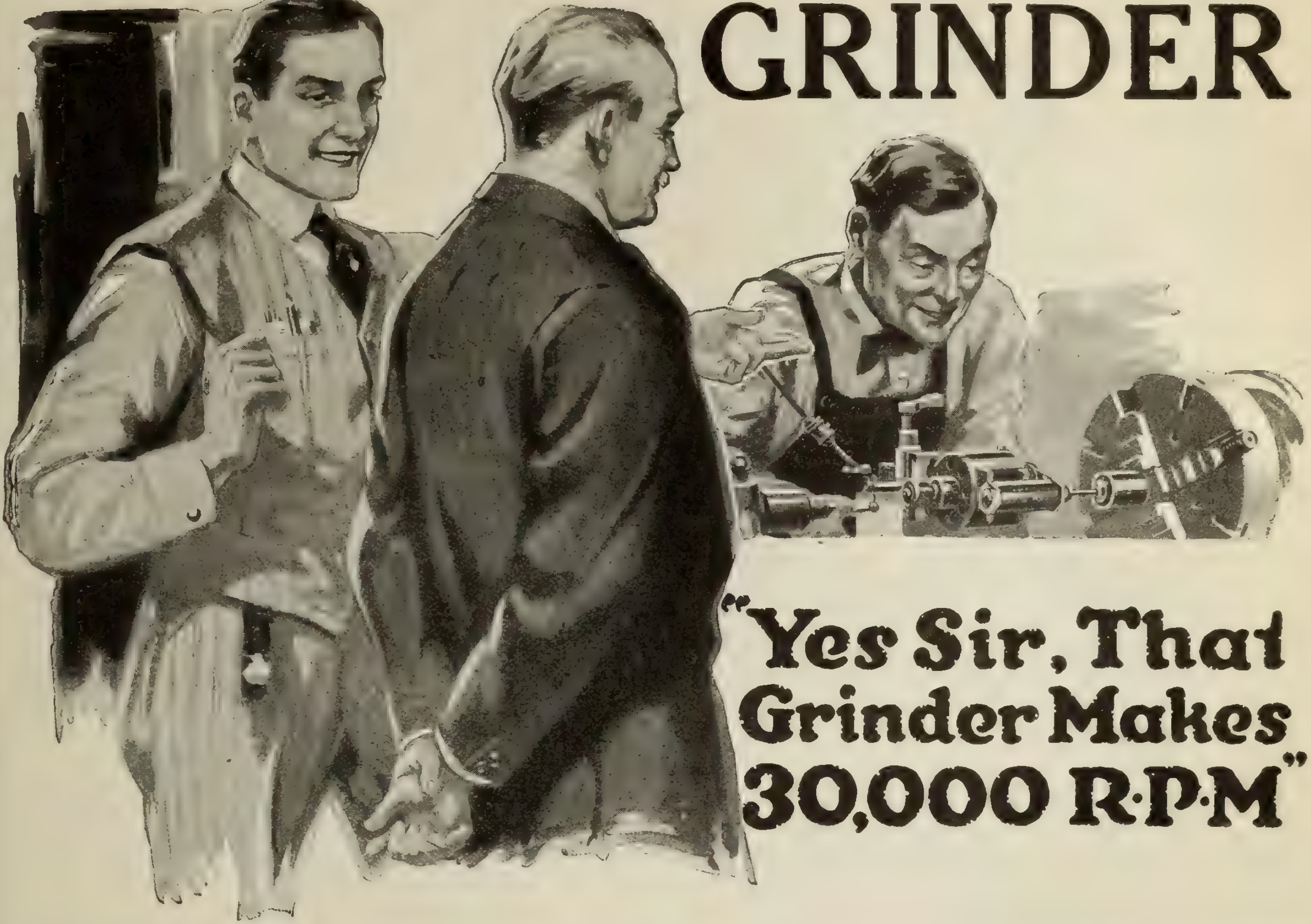
Antimony.—This metal is very quiet, dealers are making efforts to sell but consumers are apparently not interested. The market continues firm with prices unchanged at 15c per lb.

Aluminum. — The situation is unchanged, and quotations are firm.

Machine Tools and Supplies

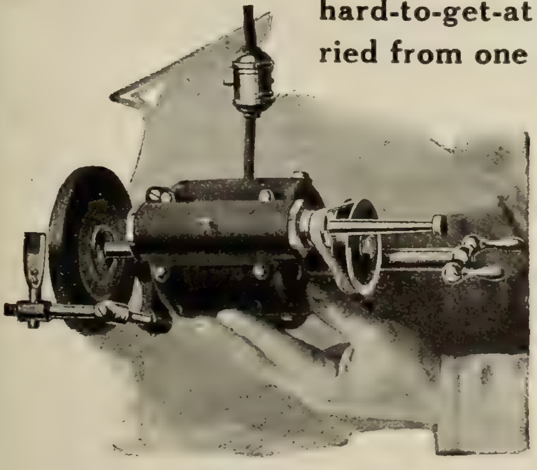
Recent developments have somewhat curtailed inquiries for machine tool

Aikenhead's DUMORE PORTABLE GRINDER



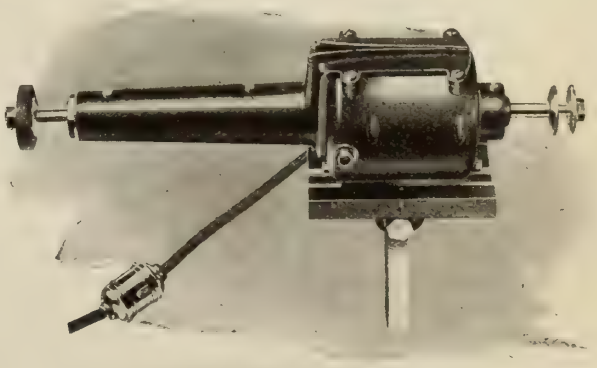
"Yes Sir, That Grinder Makes 30,000 R.P.M"

The DUMORE Grinder has become known as the most efficient Portable Grinder. Wherever there is grinding to be done the DUMORE is necessary. With it you can do all kinds of grinding, longitudinal, cylindrical, internal grinding and other hard-to-get-at jobs. It is portable—weighs only 17 lbs. Easily carried from one job to another.



FITTED WITH A-ARM

Portable Electric Universal Grinder



FITTED WITH B-ARM

AIKENHEAD HARDWARE LIMITED, 17 Temperance Street, Toronto

equipment but the market is still active. It is anticipated that added stimulus will be given as it is understool, that should peace negotiations be delayed, the production of munitions will require to be increased in order to live up to previous contracts. This will mean additional machinery in many shops now working on the various shells.

Scrap

With the uncertainty that prevails in all industrial circles regarding the immediate future, the scrap situation like all others is in an unsettled state. Quotations are comparatively firm, but with a declining tendency. With the exception of brass turnings and scrap zinc, both of which have declined ¼c, prices here are unchanged but unsteady.

Toronto, Ont., Dec. 26.—The year just closing has been one of great prosperity, but not one of much development, except in industries associated with the manufacture of munitions. The trade of the country, principally in exports, has increased greatly in volume, and the balance is now very favorable. The returns each month have shown increases, as have also the Customs receipts. While this large volume of trade is due principally to the war, and is, therefore, of a temporary nature, the benefit will be felt in future years through the accumulation of wealth which will assist in development. Further developments in connection with the peace proposals have not had any material effect on the business situation.

Steel

The market is quiet on account of the holiday season rather than because of the peace proposals, which have not as yet had any material effect on the situation. In spite of the peace talk, prices have held firm, but no advances have been announced during the week. The prospects of peace, although they appear somewhat remote at present, may check the upward movement in prices for a time, depending, of course, upon political happenings in Europe. Some steel products, such as plates, tubes, and black sheets, will likely go higher; in fact, an advance in black sheets is expected early in January. There is no improvement in the sheet situation. Sheet bars continue scarce, and are high in price, while transportation difficulties are hampering the mills. Plates will likely remain at a high level for a considerable time, as the demand for ship material is heavy, and will continue to be so more or less indefinitely owing to the urgent demand for tonnage. The shortage of coke and coal is the principal cause of anxiety in the steel trade at present. The trouble is due principally to transportation difficulties, originating in a shortage of cars and engines; in addition, the bad weather has made the situation more difficult for the railways to handle.

The iron and steel markets in the United States are on the whole decidedly quiet, due partly to the peace proposals and also on account of the holiday season, the market being usually quiet at this time of the year. There is no sign of weakness in prices, and none is expected in the meantime. The transportation situation appears to be growing worse, and, if there is no improvement in the near future, it will result in the mills curtailing production. There are no price changes of particular importance to note this week.

Pig Iron

Prices on domestic pig irons are still withdrawn, and no information is available as to when new quotations will be issued. Stocks of foundry iron have been exhausted, and Canadian furnaces have no pig iron of this grade to sell. The market is quiet, with the situation unchanged. In the United States the pig iron market is also quiet, with prices unchanged.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Machine Tools and Supplies

There has been comparatively little actual business done this week, although a few inquiries have been received by local machinery houses. The quietness is due entirely to the holidays and not to peace talk, which has had little or no effect on the situation. Local supply houses were very busy early in the week, but were quieter later. Prices continue very firm, with a possibility of further advances next month.

Metals

Locally, the market has been unsettled, and prices on some metals have declined. This is due to weakness in New York rather than any inherent weakness in the situation here. The German peace proposals upset the New York market, but had less effect in London. Business has been quieter, due to the holidays, and a return to former activity is not expected until after the New Year opens.

Copper.—The peace proposals have unsettled the market, and it will no doubt remain in this condition until the outlook becomes better defined. The extreme high price of copper made it susceptible to a situation such as has arisen, and it may have a permanent effect on prices. Copper has declined 2c locally, and is now nominally quoted at 36c per pound.

Tin.—The market is easier owing to the general unsettled situation, but the position of this metal has not weakened appreciably. The market is weaker locally, and prices have declined 2c, the current quotation now being 45½c per pound.

Spelter.—The peace talk has made the spelter market very unsettled, and prices have declined 2c, making the current quotation 13c per pound.

Lead.—The metal is holding its own, although the market is dull and inactive. Local price unchanged at 9½c per pound.

Antimony.—The market is dull and easy, with quotations unchanged at 18c per pound.

Aluminum.—No change in the situation in this market. Local price, 68c per pound.

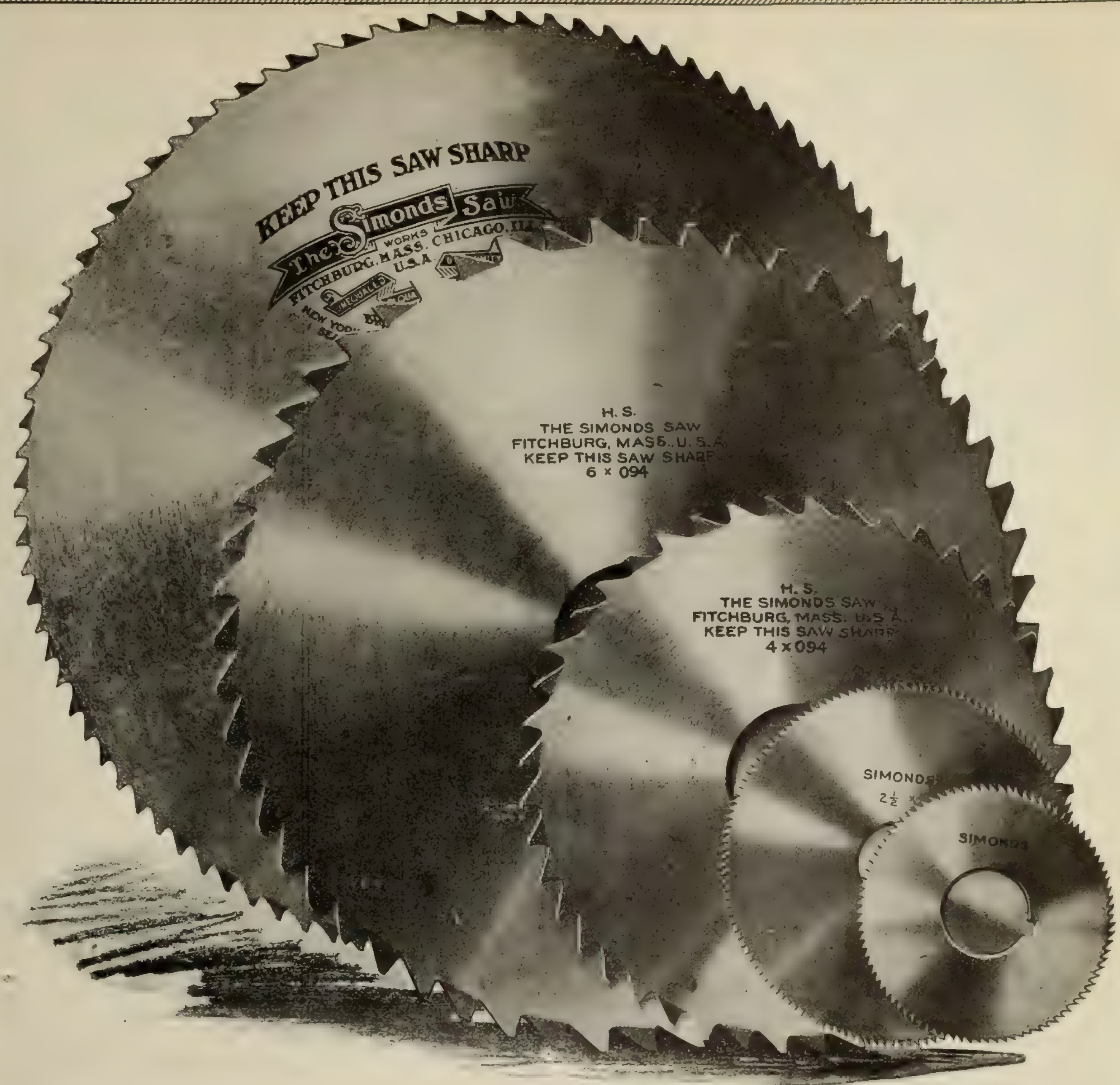
◆

TRADE OF NEWFOUNDLAND

THE trade of Newfoundland during the past year has been good. The only exception is the lumber industry. A good market exists for pit props in Great Britain, but the scarcity of tonnage has prevented shipments, and a large stock will be carried this winter in consequence. Prices at present are falling. The Bell Island Iron Mines have been working most of the year at full capacity and with profitable prices prevailing for the products.

It is too early to get reliable information regarding the year's catch of codfish, but expectations are that it will about equal that of last year, and bring greater returns because of the high prices now prevailing. Out of total exports of $18,960,000 during the colony's last fiscal year, codfish represented $10,394,000. Lobster exports show improvement. The seal catch this spring yielded $637,000, as against $94,000 in 1915. The latter, however, was one of the worst seasons ever experienced in the history of Newfoundland.

Manufacturers on the whole have had a good year, and, in the wholesale and retail trade, demands have been good and payments satisfactory. The revenue of the Government during the current year has exceeded expectations, and on the whole the colony is looked upon as being very prosperous at the present time. It is interesting to note that Newfoundland, in company with other borrowing countries, has for the first time in its history floated a public loan in New York and on terms favorable to the borrower.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INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Sarnia, Ont.—The Sarnia Metal Products Co., plans an addition to its plant.

London, Ont.—An addition will be made to the plant of the Ford Motor Co., to cost $25,000. Plans are being prepared.

Toronto, Ont.—W. H. Banfield & Sons Co. will build an addition to their plant to cost $10,000. A building permit has been issued.

Hull, Que.—The Hull Steel Foundries, Ltd., propose making improvements to their plant, including a blast furnace.

Pembroke, Ont.—The Pembroke Machinery Co., contemplate building a machine shop. Complete equipment will be required.

Brantford, Ont. — Kerr & Goodwin will build an addition to their factory. P. H. Secord & Sons of this town are the contractors.

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(Vulcan Iron Works) OTTAWA, ONT.

Sarnia, Ont.—The H. Mueller Mfg. Co., will erect and equip buildings to manufacture brass.

Ingersoll, Ont.—Fire on Dec. 19 destroyed the blacksmith shop at the Noxon Works, doing considerable damage, which is only partly covered by insurance.

Kingston, Ont.—J. J. Harty, vice-president of the Canadian Locomotive Co., who is in London at the present time, has secured an order from the War Office for forty consolidated locomotives.

Port Arthur, Ont.—J. J. Carrick, of this city was the successful tenderer for the Pic River pulp and timber limits, comprising 1400 square miles of timber. A pulp mill costing $1,000,000, to have a daily output of 150 tons, will be erected.

Belleville, Ont.—The guaranteeing of bonds to the amount of $250,000 priced low assessment, low water rates and sewer extensions are the terms upon which the Miller Co. of Akron, Ohio, will establish in Belleville their Canadian rubber factory, it is stated.

Victoria, B.C.—The Aetna Iron and Steel Co., has been organized here with a capital of $250,000 to manufacture bars and small structural shapes. As soon as possible the smelting of ores will be taken up to supply the requirements of the plant. David Milne of Medicine Hat, Alta., is the president.

Kingston, Ont. — The Lazier Paper Mills Ltd., has been taken over by a syndicate who will make considerable improvements to the plant and materially increase production. The plant has been used for the manufacture of straw paper for corrugating and carpet linings, and will be enlarged for the manufacture of box-boards, wrapping papers, waterproof specialties, etc.

Donnacona, Que.—A new paper machine is to be added to the equipment of the Donnacona Paper Co., whose mill is located at Donnacona, Que. The company now has two machines in operation and the new one will make a third. It will be a 160-inch machine and will double the output of the plant. Six new grinders are also being added to the ground wood mill, which will raise the capacity from 75 to 100 tons of ground wood per day. The Donnacona Paper Co., was organized in 1912 and has made good progress since its incorporation.

Quebec, Que.—The Dominion Iron & Wrecking Co., have secured the plant of the Standard Steel Foundries at Outremont, Que., and that of the Consolidated Brass Foundries at Pointe au Tremble. It is the intention to consolidate these plants and engage in the manufacture of munitions. New equipment is to be installed, including 15 electric furnaces of the newest type at the Consolidated Brass plant.

Belleville, Ont. — The Houpt Paper Mills have taken over a paper mill at Camden East near here to manufacture paper specialties. The directors are equipping their plant to manufacture water leaf for parchmentizing, being the only mill in Canada to manufacture pure vegetable parchment. They will also make light-weight bleached papers for waxing purposes and high-grade light-weight specialties. They expect to be ready to make paper not later than February 15.

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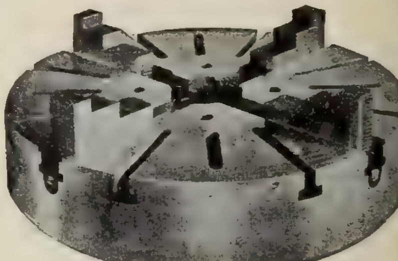

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General Industrial

Winnipeg, Man.—The William Galloway Co., Waterloo, Iowa, will erect an agricultural implement plant at St. Boniface, Man. J. B. Payne of this city is interested.

Ottawa, Ont.—A contract has been awarded to Cuthbertson & Clark, for the erection of a factory addition for the Dominion Wirecloth Mfg. Co., Estimated cost $4,000.

Ottawa, Ont.—The printing plant of Rolla L. Crain, Ltd., was almost totally destroyed by fire on Dec. 24. The loss is estimated at $150,000, covered by insurance. The cause is unknown.

Owen Sound, Ont.—The Keenan Woodenware Mfg. Co., contemplate the erection of extensions to their premises, and a by-law to grant them a loan of $20,000 will be submitted to the ratepayers in January.

Municipal

Aylmer, Ont. — The Town Council contemplate purchasing additional power equipment. Gas engines may be installed.

Port Arthur, Ont.—A by-law will be submitted to the ratepayers on Jan. 1, in connection with the proposed hydro-electric development.

St. Catherines, Ont.—It is estimated that a sewage disposal plant will cost $18,000 and a pumping plant $7,000. W. P. Near is city engineer.

Hamilton, Ont.—A by-law will be submitted to the ratepayers on Jan. 1, in connection with waterworks improvements which it is estimated will cost $362,500.

Chatham, Ont.—On Jan. 1, by-laws will be voted on by the ratepayers to raise $8,500 for the purchase of a fire truck and $45,000 for extensions to the hydro system.

Cayuga, Ont.—It is proposed to install a steel water tank, gas engine and pump, etc., in connection with the waterworks system. Jackson & Lee, Brantford are the engineers.

Woodworking

Chatham, Ont.—The C. & J. Hadley Co. has commenced the erection of a sawmill to cost $10,000; equipment and electrical supplies will be purchased.

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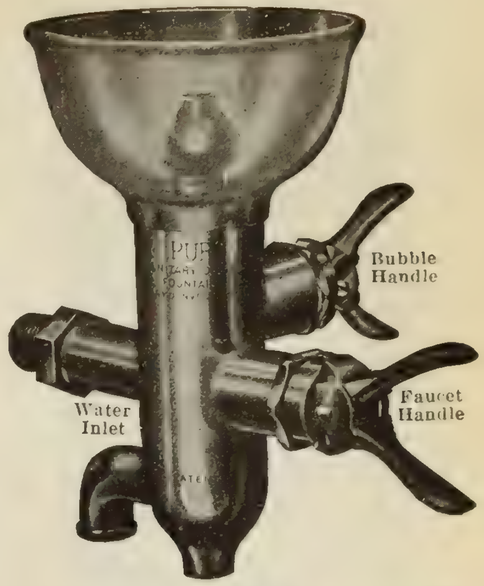

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HAVE YOU
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whether or not they
are of interest.

Canadian Machinery
Classified Advertising Section

Revelstoke, B.C. — The Trout Lake Shingle Mill Co., mill was destroyed by fire recently.

Smith's Falls, Ont.—The Canadian Cooperage Mfg. Co., will commence work at once on the erection of a factory to cost $20,000 to replace the one recently damaged by fire. F. F. Kessel, manager, is in the market for new machinery.

Trade Gossip

The Foundry Products Ltd., of Calgary, which has recently been incorporated, is an off-shoot of the Canadian Western Foundry and Supply Co. W. A. McLaws is president of the new company, and Geo. A. MacKenzie is general manager.

Galt, Ont.—The local Hydro Commission, which has for some time been faced with the problem of building a new substation or enlarging the present building, has finally decided to add another storey to the present building on Dickson street.

Newfoundland Trade.—Increases of more than four million dollars in imports and nearly six millions in exports are shown in a statement of the foreign business of the colony of Newfoundland for the fiscal year ended on June 30 last. Total imports were $16,427,336 and exports $18,969,493.

Russia Orders Engines.—It is announced in Montreal that the number of locomotives now being built by the Canadian Locomotive Co., Kingston, Ont., for the Russian Government is 80, an order recently placed having been for 50. Russia has ordered a total of 380 locomotives in the last month, of which the Canadian Locomotive Co. is building 130.

Potassium Chlorate from Japan.—As a result of the war, there has been a rapid development of the manufacture of potassium chlorate in Japan. An over-supply of the product has now affected the market. There are about thirty-three factories, and the total output is placed at 7,000 barrels a month, which will be increased to 10,000 barrels when projected extensions are completed.

Calgary, Alta.—Machine and woodworking shops are being equipped at the School of Technology and Art for the training of returned veterans in mechanical pursuits. The contract for almost the entire equipment is being executed by the Canadian Western Foundry & Supply Co., Calgary, through their machinery and tool department, of which J. E. Middleditch is in charge. T. A. McNaley is general manager of the company.

The Imperial Munitions Board, in a circular letter to munitions manufacturers, wishes to know if they have all the machinery needed in their factories, or if the Board can assist them in getting the machinery or supplies. It is stated that a central inspection office will be established in Toronto in the near future, where manufacturers can send their samples. In this way the inspection staff may be reduced twenty-five per cent.

Canada's November Trade.—Huge increases in Canadian trade are indicated for the month of November and the eight months of the fiscal year. November trade was $186,066,351 as against $154,225,481 in coresponding month last year. For the eight months total trade was $1,499,255,942, against $863,670,349. November imports increased $27,000,000 to $72,690,790. In the eight months imports increased by nearly $250,000,000 to $557,235,197.

Domestic exports for November totalled $109,558,950, an increase of $17,000,000. For the eight months these exports increased by our $300,000,000 to $731,592,639.

New Cut Gear Plant at Winnipeg.—The growing demand for cut gears in the West is responsible for the formation of a new concern which has been registered under the name of the Winnipeg Gear & Engineering Co. They will engage in the manufacture of cut gears of all descriptions, including sprocket, worm, and bevel gearing, specializing on the production of rawhide pinions. E. H. Derby is manager, and F. Ponton is superintendent, the offices and plant being located at 197-199 Princess street, Winnipeg, Man.

Montreal Port Season.—The export grain trade from the port of Montreal for the season for all kinds totalled 71,589,046 bushels, a gain of 28,000,000 bushels for the year. Twenty-one million bushels left port under sealed orders. The wheat exported was 34,668,656 bushels, corn 5,201,056 bushels, oats 26,616,786 bushels, barley 4,000,120 bushels, rye 685,406 bushels, peas 23,022 bushels. Earle & Thompson head the list of exporters with over 14,000,000 bushels, with James Carruthers & Co. coming third with 10,963,090 bushels. It was the biggest year in the history of the port of Montreal.

Mills for Publishers.—Building their own paper mills is the only solution apparent to the many owners of small newspapers in the U. S., who attended the hearings before the Federal Trade Commission at Washington, D.C., into the high cost of paper. Several companies are being formed by the publishers to build mills. Ohio publishers plan to secure a mill in Canada where pulp is plentiful, and several of the larger newspaper publishers will take stock in this company. Paper manufacturers charged with restricting the output of newsprint, say that there is more profit in wrapping and wallpaper.

Power Production and Export.—During the past fiscal year there was produced in Canada for domestic consumption and for export purposes 2,250,747,989 k.w. hours of electrical energy. Of this amount 1,228,966,730 k.w. hours were used in Canada and the remainder sent abroad. The greatest power producing plants in Canada are those of the Canadian Niagara Power Co., which produces 411,700,000 hours, the Cedar Rapids Power Co., 414,784,000 k.w. hours, the Ontario Power Co. producing 815,969,000, and the Electrical Development Co. producing 429,998,500 k.w. hours. The Canadian Niagara Power Co. exported 400,521,090 k.w. hours, the Electrical Development Co. 34,652,000 k.w. hours, the Ontario Power Co. 199,135,160 k.w. hours and the Cedar rapids Power Co. 358,763,000 k.w. hours.

Toronto, Ont. — The Hydro-Electric Commission has given to the town of Sudbury, Ont., an estimate that it will cost $2,900,000 to develop power on the French River, and this power delivered in Sudbury will cost between $26 and $28 per h.p. The estimate was asked for in order that the town would have something definite upon which to base its negotiations with the British-American Corporation which has agreed to establish an industry employing 3,000 people by opening up the Murray Mine three miles west of Sudbury and erecting smelters and possibly a refinery involving an outlay of over five million dollars. The representatives of the company met the town council of Sudbury last week. The council is favorable to passing a by-law for Hydro development at French River, providing the company agrees to assume a share of the financial obligation to the Hydro Commissions, which the securing of this power will entail to the town.

Domestic Demands for Steel.—It has been evident for some time that the demand for steel for domestic purposes would gradually expand even in the face of high prices and munitions necessities. In the United States and Canada maintenance cannot be postponed indefinitely and even new construction is being pressed. Structural steel work is now quite active in the United States, especially for railroad bridges and cars, and structural material for shipbuilding as well as factory construction. The heavy demand for steel for domestic use is, of course, caused largely by the fact that buyers have realized that foreign demand

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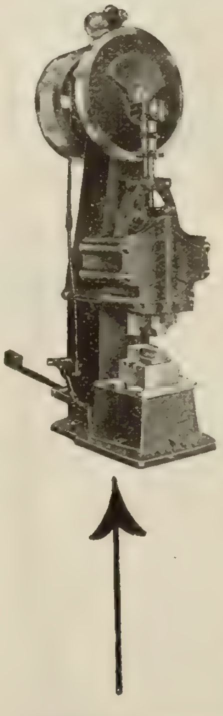

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is apt to persist for some time to come, and that it is doubtful whether maintenancy and new construction can be postponed until peace and lower price for steel obtains. In fact, a good deal of new work will have to be done at top prices, thus increasing the overhead for future years. Peace talk had some effect on orders and on prices for a day or two, thus indicating what the effect of peace would be, but in the latter part of this week the old tendency to advances returned.

Personal

Gordon Perry has been elected a director of the National Iron Works, Toronto.

A. B. Calder has been appointed assistant general passenger agent of the C.P.R., with offices at Montreal.

W. W. Butler has been appointed vice-president and general managing director, and **F. A. Skelton** vice-president and sec-treasurer of the Canadian Car & Foundry Co., Montreal.

Philip J. Duff, who for aver two years has been resident engineer for the John verMehr Eng. Co., on the construction of the new filtration plant, Toronto, has resigned his position to accept an appointment on the inspection staff of the Imperial Munitions Board, Ottawa.

William Phillips has been appointed by the Canada Steamship Line as their Canadian representative in the office of the Robert Reford Co., Montreal, general agents for Canada. Mr. Phillips was born in Toronto Jan. 31, 1870, and has had an extensive experience in railway and steamship business.

B. H. Phillips has been appointed secretary-treasurer of the Montreal Machinery & Supplies, Ltd., recently organized for the supply of contractors' machinery and plant for munitions manufacturers. The office is at McGill Building, Montreal. Mr. Phillips was formerly connected with the Montreal Ammunition Co., and the National Bridge Co.

W. F. Angus, vice-president and managing director of the Canadian Steel Foundries, Montreal, will shortly retire from his present position to take executive office with the Dominion Bridge Co. Mr. Angus was connected with the Dominion Bridge Co., in 1896 when he joined the staff of that company as engineer and draughtsman. He also served for a time with the Laurie Engine Co. He afterwards joined the Canada Switch & Spring Co., which was formed into the Montreal Steel Works, and his advancement with this company was a rapid one until 1911, when, on the formation of the Canadian vice-president and managing director, a position which he has held since that time. The Canadian Steel Foundries is of the Canadian Car & Foundry group, and the directors of the latter have, we understand requested Mr. Angus to remain on the board of both companies.

Tenders

Thorold, Ont.—Tenders will be received by the undersigned until December 30, for the supply of a turbine pump and electric motor. Specifications can be secured from the undersigned, L. S. O'Connor, Superintendent of Waterworks, Thorold, Ont.

Montreal, Que.—Tenders will be received until Jan. 2 for construction of C.N.R. terminal site in Montreal, including excavation, both earth and rock, and disposal of same, repropping of slopes, concrete retaining walls, etc. Plans and specifications, form of bid and agreement, can be seen at 411 Dorchester street west, Montreal.

Toronto Ont.—Tenders will be received, addressed to the chairman, Board of Control, City Hall, Toronto, up to January 16, for the installation of a 40 million Imperial gallon centrifugal sewage pump at the main sewage pumping station, Toronto. Specifications and forms of tender may be obtained at the Works Department, Room 6, City Hall.

Ottawa, Ont.—Tenders will be received up to January 15, for the construction of a reinforced concrete lighthouse tower and fog alarm building combined, and a wooden dwelling at Point Abino, township of Bertie, Welland county, in the Province of Ontario. Plains, specifications, form of contract and schedule of wages, can be seen, and forms of tender procured, at the Department of Marine, Ottawa; at the Harbor Master's office, Toronto, and at the post offices, Welland, Port Colborne, St. Catharines, Bridgeburg, Hamilton and Brantford.

Building Notes

Saskatoon, Sask.—The Saskatoon Public School Board have disposed of a school site near the Quaker Oats Mill to the Winnipeg Oil Co. for the sum of $2,500.

Toronto, Ont.—The City Architect has issued a permit for the construction of the new Union Station. The permit is for the main building and east wing on Front Street, between Bay and York Streets, which is estimated to cost $2,800,000. The main building will cost $2,000,000, and the east wing $800,000. The total cost of the building will be $3,400,000.

Refrigeration

Niagara Falls, Ont.—The Pure Ice & Cold Storage Co., has let contract for erection of a 10-ton ice making plant to be ready for operation by March 1, 1917.

Lindsay, Ont.— Plans for rebuilding the cold storage plant of Flavelles, Ltd., are being prepared by the Madison Cooper Co., New York City. It will cost $75,000.

Winnipeg, Man.—The Ontario & Manitoba Cold Storage Co., it is reported, will build a cold storage warehouse to cost about $100,000 in the near future.

East Bella Bella, B.C.—The Gosse-Millerd Packing Co., has had installed a 7-ton ammonia compressor which was furnished by the Armstrong Machinery Co., Spokane, Wash.

The Frick Ice and Refrigeration Co., Montreal, have been awarded a contract by Canadian Explosives, Ltd., Montreal, for an 8-ton refrigerating machine, to be installed at Nobel, Ont.

The Frick Ice and Refrigeration Co., Montreal, have sold a 15-ton refrigerating machine to Curtis & Harvey, Ltd., Rigaud, Que., and a 10-ton machine to the Elmhurst Dairy, Montreal.

Marine

Victoria, B.C.—At the end of the present month, the breakwater will be complete, and early in January will be turned over by the contractors, Sir John Jackson, Ltd., to the Dominion Government.

Sarnia, Ont.—The steamer Harmmonic has arrived in port on her last trip of the season, and will go into winter quarters with the other steamers of the fleet already here, the Noronic and Huronic.

Sarnia, Ont.—The Ferry Company will shortly have another boat on the ferry line between Port Huron and Sarnia, having purchased the steamer City of Cheboyan, which formerly plied out of St. Ignace.

Ottawa, Ont.—Colonel W. P. Anderson, chief engineer of the Marine Department has left for Midland, Ont., to organize, if necessary, an ice-breaking service for Canadian lake navigation. It has been represented to the department that a number of vessels loaded with grain are due to reach Midland and that ice may interfere with their arrival. Col. Anderson will be on hand in such an eventuality.

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There is someone who is looking for just such a proposition as you have to offer. For two cents a word you can speak across the continent with a condensed advertisement in this paper.

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Machine Springs, Valve Springs, Automobile Cushion Springs, etc., of a quality that defies competition. Tell us your requirements. Send sample or specification for price.
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MORTON MANUFACTURING CO.
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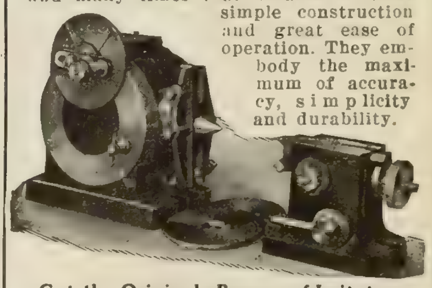
DRAW CUT SHAPERS
SPECIAL DRAW CUT R.R SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE AND WORKS: MUSKEGON HEIGHTS USA

Quality is Highest—Not the Price
Dickow's Guaranteed 10-Inch Universal Index Centers
You save from $50 to $125 on first cost, and many times that because of their simple construction and great ease of operation. They embody the maximum of accuracy, simplicity and durability.



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Strong and Accurate, Rigid Grinding Surface, Quick Adjustments, Large Tray and Water Pot Combined.
A Canadian-made machine that is not equalled, considering price, workmanship and qualities, by any machine of this type on the advertised market. Guaranteed to give satisfaction.
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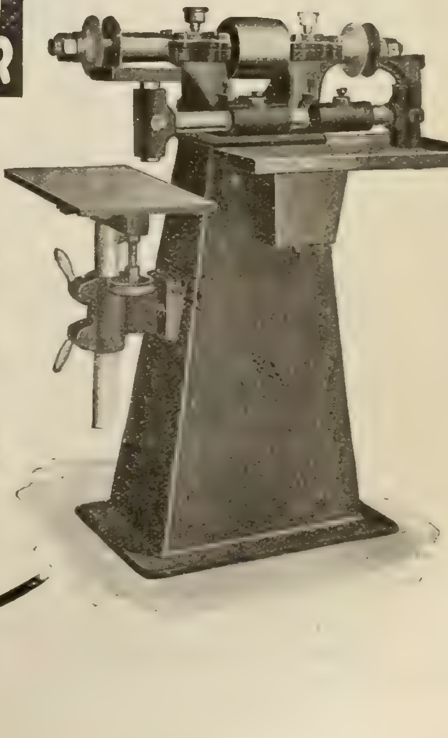

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FOR SALE

ENGINE FOR SALE—50 HORSE-POWER Corliss; no reasonable offer refused if taken at once. Box 587, Chatham, Ont. (2)

FOR SALE—TWO BAKER DRILLS NO. 310, with pumps; almost new. 1 Colburn drill No. 14, with pumps; standard. Alton Foundry Co., Alton, Ont. (22)

BROWN-BOGGS MARKING MACHINE FOR 4.5 shells. Has been used for short time only, and is in good condition. Box 248, Canadian Machinery. (24)

FOR SALE—1 ¼-1½ MODEL A CLEVE-land automatic screw machine. F. T. Coffin, 17 Tudor St., Cambridge, Mass., U.S.A. (2)

FOR SALE—75 H.P. CANADIAN GENERAL Electric motor, 25 cycle, 3 phase, 550 volts, 950 R.P.M.. In first-class condition. Box 258, Canadian Machinery. (26)

ONE REED TURRET LATHE, 8′ BED, swing, 28″; 4 2″ holes in turret. This machine is in first-class condition and was only used on 3,000 shells. Is a very powerfully built machine and will bear fullest investigation. Box 241, Canadian Machinery.

1 VERTICAL, SINGLE ACTION, DOUBLE cylinder hydraulic pump, 6″ stroke, all ready to connect up; almost new; price $75. McGregor & McIntyre, 1139 Shaw Street, Toronto. (tf)

FOR SALE—FIFTEEN HEAVY CAST IRON columns, from thirteen to seventeen feet long. Columns tapered and have good heavy base and top. Also four roof trusses. Sixty feet long. Ten feet in centre, eight foot at ends. Will cut columns to suit purchaser. Woodside Bros., Port Arthur, Ont. (2)

FOR SALE — IMMEDIATE SHIPMENT — New Heavy Duty Shell Boring Lathe for manufacture of 6″ High Explosive Shells. Write for complete specification. Wm. Hamilton Co., Ltd., Peterboro, Ont. (20)

1—2-SPINDLE SHAPER, WOOD TOP, JOHN Ballantyne, Preston, make, used two months. 1 Dynamo, 45 lights, Toronto and Hamilton Electric Co. make. Used five months. Good as new. Box 195, Jordon, Ont. (R.T.F.)

FOR SALE—1 40 H.P. ROBB, ARMSTRONG high-speed engine; 1 4 x 1 Marsh deep well steam pump, and 1 Barton generator, 80 lamp capacity, with switch-board. All in good order and cheap for quick sale. Richards-Wilcox Canadian Co., Ltd., London. (20)

FOR SALE—TWELVE H.P. GAS OR GASOline Engine. Goold, Shapley & Muir Ideal. In first-class condition. Cheap. Stedman Brothers, Ltd., Brantford, Ont. (21)

DOUBLE-END FEATHERSTONE AXLE cutting off machine with countershaft and equipment adapted for cutting off two 4.5 forgings at once. Bargain $500. Medicine Hat Pump & Brass Mfg Co., Ltd., Medicine Hat, Alberta. (tf)

BAND SAW—COWAN & CO. MAKE, 30″ Iron Frame. Post Machine 29½″ x 33″. Iron Tilting Table and Saw Guard, including Brazing Tools, setter for Filing etc., has had very little use. Whaley, Royce & Co. Limited 237 Yonge St., Toronto, Ont. (23)

SHRAPNEL SOCKET AND ADAPTER machinery, turret lathes, boring machines, cutting-off machines and thread millers tooled for operation. Globe Electric Machine Co. Hamilton. (tf)

WANTED

WANTED, FOR IMMEDIATE DELIVERY, belt ribbon power pump; also detached accumulator to operate one hundred and fifty tons hydraulic press, twelve-inch ram, nosing 4.5 shells. Can use second-hand if in first-class condition. Medicine Hat Pump and Brass Mfg. Co., Medicine Hat, Alta. (25)

ONE AUTOMATIC SCREW MACHINE, capacity up to 1-in.; can use machine having had some service. Canadian Matthew-Gravity Carrier Co., 484 Richmond St. west. Toronto. (2)

WANTED — BORING MILL, 30″ TO 42″ table; state make, condition, time used, lowest price, and send cut to Winnipeg Machinery Exchange, Sutherland and Gladstone Sts., Winnipeg, Man. (21)

WANTED — THREE TURRET LATHES suitable for steel sockets, also Thread Millers suitable for milling outside thread of sockets. Give price and particulars to Steel Furnishing Co., New Glasgow, N.S. (19)

WANTED—COMPLETE SET OF DRAWings or blue prints of Universal grinder, with all attachments. Box 251, Canadian Machinery. (1)

WANTED—POWER-DRIVEN ROLLER 8′ long, suitable to roll ¼″ steel plates; state make, condition, time used. Give price and particulars to L'Air Liquide Society, corner First Ave. and Ernest St., Maisonneuve, Montreal.

WANTED—SMALL SCREW-CUTTING ENgine lathe 12″ or 13″ x 5′ or 6′ bed, automatic feed, power cross feed, compound rest; must be cheap and lathe in good working order; give full particulars in first letter. J. W. M., Suite 34, Thelmo Mansions, Burnett St., Winnipeg, Man. (24)

WANTED — THE FOLLOWING EQUIPment for 18-pr. H.E. shells:—2 electric or steam baking ovens, 2 painting machines, 1 banding press and pump, 2 band turning machines, 3 sensitive drills for drilling and tapping grub screw hole, 1 Bowser varnish pump, 1 marking machine. Send quotations to Box 253, Canadian Machinery. (24)

REPAIRING

ALL KINDS OF MACHINERY REPAIRED, rebuilt and installed. W. H. Sumbling Machinery Co., 643 Yonge Street, Toronto, Ont.

SITUATIONS WANTED

TOOL MAKER, ACCURATE, GOOD draughtsman, desires responsible position. Box 254, Canadian Machinery. (4)

SUPERINTENDENT, DESIROUS OF change, 18 pdr. shrapnel, and 6″ H. E. shells. Box 247, Canadian Machinery. (26)

MECHANICAL ENGINEER, EXPERIenced in eighteen-pounders and six-inch nosed-in shells, with twelve years' drawing office, shop and general experience, will be disengaged shortly. Box 252, Canadian Machinery (25)

EXPERT FOUNDRYMAN FAMILIAR with all modern foundry appliances, desires position as foreman or assistant in gray or malleable iron foundry. Box 250, Canadian Machinery. (25)

SUPERINTENDENT WITH PROVEN MEchanical and executive ability desires position as same, or one of equal grade. Wide experience with well known firms manufacturing high explosive shells, rifles, electrical machinery and instruments, light and heavy sheet metal and plate products. Have satisfactorily supervised installation and organized new plants for widely varied lines of product. Address P.O. Box 122, Dartmouth, Nova Scotia. (25)

SITUATIONS VACANT

TOOLMAKERS AND MECHANICS. APPLY Pease Foundry Co., Brampton; Junction 4341. (3)

WANTED—MAN TO TAKE CHARGE OF machine shop doing repair and new work. Must be up-to-date and able to show results. State experience and salary and when you can start. Apply Box No. 257, Canadian Machinery. (26)

FIRST CLASS GRIDLEY AUTOMATIC men wanted to set up Gridley automatic machines, also operators for same, highest wages paid, only first class mechanics need apply. Apply 47 Richmond St. East, Toronto. (24)

WANTED—NIGHT SUPERINTENDENT TO take charge of factory making 4.5 sockets. Apply Box 237, Canadian Machinery.

WANTED — EXPERIENCED STEEL works draftsman for Nova Scotia. Give full particulars, including salary, permanency. Apply Box 234, Canadian Machinery. (17)

ALL-ROUND MACHINISTS WANTED FOR tool-room; highest wages paid. A. R. Ormsby Co., Limited, 48 Abell Strett, Toronto. (21)

WANTED — FIRST-CLASS MACHINIST able to take charge of our repair shop. Apply Hull Iron & Steel Foundries, Ltd., Hull, Que. (23)

MECHANICAL DRAUGHTSMAN WANTED for tracing and detailing on general machine work, also opening for man with experience on plate and structural work. Box 245 Canadian Machinery. (23)

SPLENDID OPPORTUNITY FOR YOUNG man about twenty-one, well educated and with some mechanical knowledge, who desires to learn the machinery business. Apply in first instance with full particulars as to experience, etc., to Box 243 Canadian Machinery.

WANTED—EXPERIENCED MILL WRIGHT and Machinist to take charge of construction and repair work in growing factory. A man who has had experience as foreman preferred. An excellent opportunity for a first-class man. State when you can start, also experience and salary wanted. Apply Box No. 256, Canadian Machinery. (26)

WANTED—EXPERIENCED MECHANICAL Draftsman: one who has had some experience on machine design and factory layout preferred. Apply stating experience and salary desired to the Goodyear Tire & Rubber Co., Bowmanville, Ont. (26)

WANTED — TECHNICAL ENGINEER — steady, energetic, practical, to learn the business and take charge of the operating and construction departments of a firm manufacturing compressed gases, and apparatus to use such gases. Reply giving experience and salary expected to Box No. 255, Canadian Machinery, 701 E.T. Bank Bldg, Montreal. (26)

PATENTS

THE PROPRIETORS OF LETTERS PATENT M. R. Matti No. 137772 Arrangement for changing the amount of fuel injection into the combustion chamber during the run of the motor and for regulating the quantity of fuel, desires to dispose of the patent or to grant license to Interested Parties at reasonable terms with a view to the adequate working of the Patent in Canada Inquiries to be addressed to the patentees, Srora Kopparbergs Bergslags Aktiebolag, Falun, Sweden. (26)

IS IT STEEL YOU NEED? WE HAVE IT. ANY QUANTITY, BEST QUALITY, FOR DURABILITY AND EFFICIENCY.

Stelko High Speed Steel, the latest and best out, the only **high speed steel** containing **Treoxide**, the new discovery, 20 per cent. better than tungsten. All sizes delivered promptly, annealed or unannealed.

Our Titanium Tool Steel for all round tool work, such as punches, dies, shears, snaps, chisels and blacksmith's tools.

Our Chrome Manganese for **hot work**, is just the thing for hot shell punching and hot rivet dies, etc.

Our Silver Steel Drill Rod is the most accurate to size and best in quality. Also machinery steel, in any quantity in car load lots if desired, also Crucible Machinery Steel. Let us serve you.

The NEW METAL STEEL COMPANY, Sebago Lake, Me., Boston and New York
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IN STOCK FOR IMMEDIATE DELIVERY

LATHES.

1—20 x 10 New Haven, plain change, compound rest (new).
1—18 x 8 Mueller Dbl. Back Gear, quick-change (new).
1—16 x 8 Hamilton Quick-change Gear (new).
1—14 x 6 Hamilton Quick-change Gear (new).
1—14 x 6 Hamilton Quick-change Gear, taper attachment (new).
1—14 x 6 Hamilton Quick-change Gear, taper attachment, pan bed (new).
1—14 x 6 Hamilton Plain Quick-change Gear (new).
2—13 x 6 Worcester Plain Quick-change Gear (new).
1—9 x 12 Porter Cable, compound rest (new).
1—11 x 5 Blount Speed Lathe (new).

TURRET LATHES.

2—21″ Gisholt Style H Turret Lathes.
1—12″ W. & S. Plain Turret Lathe.
1—2 x 24 Jones & Lamson Geared Head Flat Turret.

BENCH LATHES.

2—No. 5½ Sloan & Chace, cpd. slide, 3-speed cs., 10 collets (new).

SCREW MACHINES.

1—2″ Geared Fric. Head Power Feed to Turret (new).
1—1½″ Geared Fric. Head, Power Feed to Turret (new).
2—1″ Plain Head, wire feed (new).
2—9-16″ Plain Head, wire feed (new).

BENCH MILLER.

1—No. 2 Sloan & Chace Tool Room, index centers and vise (new).

PUNCH PRESSES.

2—No. 5 Toledo Open-back Presses (new).
2—No. 2½ Toledo Open-back Presses (new).
1—No. 4 Baxendale (new).
1—No. 3 Zeh & Hanneman Inclinable Press.
1—No. 68N Bliss Press.

MILLING MACHINES.

1—No. 12 Garvin Plain Miller (new).
1—No. 0 Rockford Plain Miller (new).
3—Standard Hand Millers, vise and arbors (new).
1—No 15 Garvin Plain (new).
1—No. 2 Plain Cincinnati.
1—No. 2 P. & W. Lincoln Type.

DRILL PRESSES.

2—20″ Barnes, sq. base, lever and worm feed (new).
1—20″ Barnes sq. base, B.G., S.F. and A.S. geared tapper (new).
1—3-spindle Avey Ball-bearing (new).
6—Myers Sensitive Bench Drills (new).
3—Barnes Sensitive Bench Drills, friction (new).
2—20″ Buffalo B.G. (new).
1—36″ Aurora Sliding Head, Geared Tapper.
1—24″ Aurora Sliding Head.

TOOL ROOM GRINDERS.

1—Capital Internal Grinder (new).
1—No. 2 Hartford Surface Grinder (new).
1—Steno. Surface Grinder, Duplex, 2 magnetic chucks (new).

GRINDERS.

2—6 x 32 Norton Plain Grinders.
2—8″ Blount Grinders (new).
2—10″ Blount Grinders (new).
1—12″ Blount Grinders (new).
2—No. 6T Sterling Grinders (new).

WALL RADIAL.

1—Canedy-Otto 3½ ft. (new).

CHUCKING LATHE

1—7 x 14 Potter Johnson Automatic.

MISCELLANEOUS.

1—4″ Whiton Centering Machine.
1—10″ Pratt & Whitney Traveling Head Shaper.
1—6″ Boynton & Plummer Shaper.
1—No. 2 Hawk-Eye Helve Hammer.

COLD ROLLED STEEL.

We have an extremely large stock of new, round, flat, square and hexagon in our Rochester warehouse. Write for quotations on immediate deliveries.

We have been in the machine tool and supply business for 20 years, and believe that we can serve you to your advantage.

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1—250 K.W. General Electric Continuous Current D.C. Generator, 225 volts. Direct connected to a 16 x 26½ x 20 Skinner Automatic Compound Engine. Speed 200 RPM. This unit is complete with Grey Marble Switchboard, Hand Meter, Circuit Breaker and Field Rheostat, etc.

1—125 K.W. Westinghouse D.C. Generator, 220 volts. Direct connected to a 17 x 20 Skinner Simple Automatic Engine. Speed 210 R.P.M. This unit is complete with Switchboard, Circuit Breaker, Field Rheostat, etc.

1—250 K.W. Westinghouse Belt Driven Generator, 550 volts, 455 Amp., 450 R.P.M.

1—250 K.W. Western Belt Driven Generator, 550 Volt, 455 Amp., 500 R.P.M.

1—90 K.W. Woods Belt Driven Generator, 6 Pole, 220 volts, 360 Amp., 750 R.P.M.

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Riverside Machinery Depot
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DETROIT, MICH., U.S.A.

TURRET LATHES AND SCREW MACHINES.

3¼″ Gridley, automatic.
40″ x 16′ Conradson, heavy duty.
24″ x 8′ Lodge & Shipley.
22″ x 8′ Martin.
20″ x 10′ American.
17″ x 6′ Garvin.
16″ x 6′ Pratt & Whitney.
16″ x 5′ Windsor, wire feed.
15″ x 5½′ Fox, American.
32″ x 18″ Lodge & Shipley.
8″ x 31″ Brown & Sharpe.
6″ x 28″ Brown & Sharpe.
2″ x 24″ Jones & Lamson, flat turret
No. 22½ Garvin, wire feed.
No. 2 Garvin, wire feed.

ENGINE LATHES.

42″ x 20′ Fifield.
30″ x 10½′ Pond.
26″ x 40″ x 20′ London Gap.
26″ x 14′ Gleason, D.B.G. (2).
26″ x 14′ Hamilton, D.B.G. (2).
24″ x 12′ Putnam.
22″ x 12′ American, all-geared head.
21″ x 8′ back geared, single purpose (3).
20″ x 12′ Lodge & Shipley, patent head (2).
20″ x 10′ Reed.
20″ x 10′ Lodge & Shipley, D.B.G.
20″ x 8′ Walcott, D.B.G.
20″ x 8′ Hercules, heavy duty.
20″ x 8′ American.
20″ x 8′ Ames.
20″ x 7′ Fay & Scott.
18″ x 10′ MacGregor, Gourlay.
18″ x 8′ Walcott, D.B.G., (2).
18″ x 8′ New Haven.
18″ x 6′ Barker.
18″ x 6″ New Haven.
17″ x 8′ Blaisdell.
17″ x 8′ Willets.
16″ x 6′ Prentice (2).

UPRIGHT DRILLS.

24″ Bickford, shaft driven.
24″ Kerkhoff, back geared, sliding head.
20″ Bertram, power feed.
20″ Bawden
16″ Avey, high speed, 4 spindle, sensitive.
16″ Canedy-Otto.
14″ Excelsior.
14″ Garvin, 4 spindle.
No. 10A Bausch, 16 spindle.

IRON PLANERS.

30″ x 30″ x 17′ Wheeler.
24″ x 24″ x 6′ Gray.
20″ x 20″ x 5′ Bertram.

MILLING MACHINES.

No. 12 Brown & Sharpe, plain.
Loudon, universal.
Bertram, plain.
Fitchburg, plain.
Holden-Morgan, Thread miller.

GRINDERS.

18″ Crescent disk.
12″ x 66″ Landis, plain.
12″ x 42″ Landis, plain.
No. 60 Heald, cylinder.
No. 14 Besley.
No. 2 Canedy-Otto, pedestal.
No. 0 Excelsior, pedestal.
Standard Universal.

PRESSES.

No. 5 Waterbury, inclinable.
Abt, foot power, pendulum.
No. 2½ Greenerd, Arbor press.
No. 3 Greenerd, Arbor press.
No. 1 Greenerd, Arbor press.

MISCELLANEOUS.

24″ Gould & Eberhardt, B.G. Shapers (2).
No. 10 Racine, Hack Saws (2).
No. 1 Racine, Hack Saws (2).
No. 4 Robertson, Hack Saw.
No. 1 Robertson, Hack Saw.
Lo-Swing Lathes (2).
Excelsior, combination grinder and buffing lathe.
32″ x 9′ special Facing and Tapping Machine.
No. 4 St. Louis Tapping Machine.
No. 1 Garvin, automatic Tapping Machine.
No. 2 Cochrane-Bly, Filing Machine.
15″ London, Punch & Shear.
No. 1 Buffalo Forge, Angle Shear.

H. W. PETRIE, LTD.
FRONT STREET WEST, TORONTO
Sole Selling Agents for Canada

FOR SALE

GRINDERS.

2 12" x 24" Modern Plain, self-contained.
1 12" x 42" Landis Plain, self-contained.
1 No. 3 Landis Universal.
1 No. 2 Oesterlein Universal, Tool and Cutter.
1 No. 3 B. & S. 12" x 40" Universal.

GEAR CUTTING MACHINES.

1 15" Gleason Bevel Gear Generator.
1—No. 5A Lees-Bradner Gear Generator.
2 12" Gleason Single Tool Gear Planers.
1 18" B. & S. Automatic Gear Cutter.
1 30" x 8" Flather Automatic Gear Cutter.
1 36" Fellows Gear Shaper.
1 48" Brainard Automatic Gear Cutter.
1 No. 5 B. & S. 60" x 11" Gear Cutter.

BORING AND TURNING MACHINES.

1—84" Cincinnati Boring and Turning Mill, Motor Driven.
1 24" Bullard Vertical Turret Lathe, with side head.
1 34" Colburn Vertical Turret Boring and Turning Machine.
1 36" B. & S. Vertical Turret Boring Machine.
1 72" Bickford Vertical Boring and Turning Mill.
1—10' Betts Vertical Turning and Boring Mill.

MILLING MACHINES.

5 No. 2½ LeBlond Universal.
1 No. 3 Cincinnati Universal, with vertical and spiral attachments.
1 No. 2 Cincinnati Plain Miller.
1 No. 1½ Hendey Universal.
1 No. 3 Cincinnati Universal.
25 Lees Bradner Thread Millers, for 3", 4½" and 6" shells.
1 No. 5 Becker Vertical Miller with Rotary Attachment.
2—No. 2 Becker Vertical Millers with Rotary Attachments.
2—No. 12 B. & S. Manufacturing.
1 No. 3 Becker Profiler.
2—P. & W. Spline Millers.

PLANERS.

1—24" x 24" x 8' Gray, one ead.
1—24 x 24 x 6' Pease, one head.
1 30 x 30 x 8' Cleveland Openside, one rail, one side head.
1—34 x 30 x 8' New Haven, one head.
1—36 x 36 x 8' Powell, one head.
1—42 x 42 x 10' Whitcomb, two heads.
1—72 x 57 x 17' Gleason, two heads.
1 16' Sellers Plate Planer.

SCREW MACHINES.

1 No. 2 Pierce, 1" capacity.
1 No. 3 Stecher, 1 5-16" capacity.
2— No. 4 B. & S.
7 No. 4 Smurr & Kamen.
2—P. & W., ½" capacity, automatic.
2—No. 53 National Acme Automatics.
4—No. 54 National Acme Automatics.
1—No. 56 National Acme Automatics.
3—2¼" Gridleys, single spindle, automatic.

TURRET LATHES.

2 3" x 36" Jones & Lamson, geared head; one with chucking equipment, one with bar and chucking equipment.
1—24" Gisholt.
1 24" Steinle.
8—21" Gisholts.
10—13" Gisholts.

ENGINE LATHES.

1 14" x 6' Hendey Tool Room, with Taper Attachment, Drawing-in Attachment, 9 Collets.
20 14" x 6' Reed Stud Lathes.
2—14" x 6' L. & S.; one with Taper and Draw-in Chuck.
1—18" x 8' National, with Taper.
1—18" x 9' Chard Lathe.
1—20" x 10' LeBlond Lathe.
1—20" x 10' L. & S. Lathe.
15—21" x 8' LeBlond Lathes, with oil pan and pump, turret on carriage, double back-geared, with 3-step cone for 4½" belt, quick-change.
12—21" x 8' LeBlond Heavy Duty Automatic Lathes, with forming attachments, pans and pumps, double tool posts
1—22" x 6' Reed Lathe, taper attachment.
1—24" x 11' New Haven.
1—24" x 25' Reed.
1—24" x 12' Blaisdell.
1—30" x 14' Fifield.
1—32" x 16' Fay & Scott.
25—32" x 16' Pittsburg.
1—36" x 20' New Haven.
1—40" x 20' Fifield.
1—42" x 11' Lodge & Shipley (not screw cutting).
1—28"-48" x 13' Harrington Extension Gap.
1—48" x 27' Betts, triple-geared.
1—54" x 12' New York.
1—62" x 34' Putnam, triple geared, motor driven.
1—68" x 20' Fifield, triple geared.
1—90" x 30' Stover, triple geared.

DRILLING MACHINES.

5—Colburns D-3.
1—25" Kern Sliding Head with Tapping Attachment.
1—8-spindle Baush, ½" capacity.
1—12-spindle Gardam, ½" capacity.
1—24-spindle Baush, drilling head 16" x 30", ½" capacity.

Write us for what you want—also for what you have for sale.

W. F. DAVIS MACHINE TOOL COMPANY

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Cullen Machinery Company

Clevelan', Ohio Cincinnati Branch

42 x 42 x 10 Whitcomb planer.

48 x 48 x 12 Hewes and Phillips planer.

12" Industrial slotter.

18' Dunkirk plate planer.

No. 5 Bath grinder.

12" x 72" Queen City plain Cyl. grinder.

3" bar, Pond Hor. boring and tapping machine. Does not mill; with 18" spindle traverse; 10' x 12' floor plate; outboard bearing.

Long & Allstatter style A single end punch; 10" throat; new.

Long & Allstatter style 4 double machine; 7" throat.

Lo-Swing lathe 7" x 84" x 10'; taper and facing attachment.

Industrial locomotive crane; 3T. at 20' R 4 wh. Standard G.

L. & S. Q. Ch. 5 step, trip. B.G. lathe.

Two Greaves & Klusman, 16" x 8' 3 step Dbl. B.G.

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36" x 36" x 15' and/or larger planers with 2 or more heads.

Five and six foot radial drills.

Six 8 and 10' vertical boring mills.

Bending and straightening rolls.

Let us have your specifications of any new or used machinery needed and list with prices any heavy machinery you have for sale.

Wanted!

We will pay highest market price for Shell End Scrap, any tonnage.

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HULL IRON & STEEL FOUNDRIES, Limited

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(26)

FOR SALE

WARNER & SWASEY TURRET LATHES

FROM STOCK

Ten (10) 16 inch No. 2, Geared Friction Head Universal Turret Lathes, only used a few months—equal to new.

Williams & Wilson
Limited
320 St. James St., Montreal, P.Q.

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Then insert a condensed ad. here and find it.

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Classified Advertising Section
143-153 University Ave., Toronto, Canada

FOR SALE

By TOWN OF GODERICH

The Doty Marine Engine and Boiler Manufacturing Plant, including Moulding Shop, Fully Equipped and all in First-Class Running Order.

Inventory about $75,000.00. The Town is open to receive offers for the whole plant, either in bulk sum or at a rate on the $1.00. Reasonable terms to bonafide manufacturers. Immediate possession. Inspection solicited. Transportation C.P.R., G.T.R. and Lake. Marked Tenders addressed to the undersigned to be received not later than Saturday, the 6th day of January, 1917. This plant can be equipped for making of Munition at little expense.

The highest or any tender not necessarily accepted.

R. McLEAN,
Mayor,
Goderich, Ont.

L. L. KNOX,
Town Clerk,
Goderich, Ont.

Immediate Delivery

2—No. 3 Lees-Bradner Thread Milling Machines, arranged for cutting 2¼"-14 thread, Whitworth, left hand. Price $800.00 each.

1—No. 3 Dwight-Slate Marking Machine, with die holders and complete set of date dies. Price, $50.00.

1—21" Gisholt Turret Lathe. Price, $750.00.

1—Automatic Shell Grinding Machine, capacity 4" diam., 10" long. Price, $750.00.

In addition we have a number of dies, taps and high-speed drills. Also 6 28" Huther Bros. inserted tooth saws.

All prices F.O.B. Bay City, Mich.

INDUSTRIAL WORKS
BAY CITY, MICH., U.S.A.

FOR SALE

1 24" Baker Bros. Heavy Duty Drill Press No. 4 M.T.
1—24" Foote-Burte Heavy Duty Drill Press No. 5 M.T.
2—D-1 Colburn Heavy Duty Drill Presses, No. 4 M.T.
1—3 ft. Prentice Cone Driven Radial.
1—4 ft. Prentice Cone Driven Radial.
2—24" Sibley Sliding Head Drills, new.
10—20" Stationary Head BGPF Drills, new.
1—No. 1½ Hendey Universal Milling Machine.
1—No. 2 Kempsmith Plain Milling Machine, new.
4—21" Gisholt Turret Lathes, Taper Attachments.
1—20 x 8 Perkins Engine Lathe PR.
1—20 x 12 Perkins Engine Lathe PR.
1 16" x 7 Oliver Engine Lathe in pan, new.
1—22" x 22" x 5′ Flather Planer.
1—12" Crank Planer.
2—12" Gleason Single Tool Gear Generators.
1—15" Gleason Double Tool Gear Generator.
1—No. 5 Becker Vertical Miller, with rotary.
2—No. 4-B Becker Vertical Millers, without rotary.
1—No. 2 Becker Vertical Miller, with rotary.
14—14" x 6′ Reed-Prentice Geared Head Engine Lathes, new.

Brownell Machinery Co.
Providence, R.I., U.S.A.

Used Machine Tools
FOR
Immediate Shipment

Newton Horizontal Milling Machine, 6′ table, 30" between uprights

No. 13 Brown & Sharpe Gear Cutters.

10 x 36" Norton Grinders.

14" x 50 Norton Crank Shaft Grinders.

Baker Brothers Keyseater, 30" stroke.

Binsse Horizontal Boring Mill, 2½" bar.

72" Pond Double Swivel Head Vertical Boring Mill.

48" Gould & Eberhardt Automatic Gear Cutter.

32" x 24′ LeBlond heavy duty engine lathe.

36" x 18′ Fifield Lathe with subtable chuck jaws, and boring bars. Raising blocks to swing 60".

No. 1 Kearney & Trecker Plain Milling Machine.

30" x 30" x 6′ Gray Spiral Geared Planer.

We have a variety of second-hand tools not listed above, and would be pleased to have your inquiries for any machine tools.

We can make immediate shipment on NEW Hand Screw Machines different sizes; also No. 1 Toledo Hand Milling Machines.

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Biggs-Watterson Co.
722 Guardian Bldg.
Cleveland, O.
Branches: Cincinnati, Detroit

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MACHINE TOOLS

LATHES.

1—28 x 15 Putman Standard Engine Lathe, C.R., S.S., P.F.
1—22 x 14 Putman Standard Engine Lathe, C.R., S.S., P.F.
1—18 x 36 x 10′ LeBlond Extension Bed Engine Lathe.
3—(New) 7 x 60 Fitchburg Lo-Swing Lathes, with 2 tool taper att.
1—(New) 18 x 8 Reed-Prentiss D.B.G. Engine Lathe.
1—18 x 8 Jones & Lamson Engine Lathe.
2—16 x 6 Barnes Engine Lathes.
1—16 x 8 Cincinnati Engine Lathe.
1—16 x 6 Walcott Engine Lathe
1—16 x 6 Reed Engine Lathe.
1—16 x 8 Porter Engine Lathe.
1—14 x 6 Lodge & Shipley Engine Lathe.

MILLING MACHINES.

1—(New) No. 25 Ohio Milling Machine.
1—No. 3 Chicago Hand Miller.
1—No. 12 P. & W. L.T. Miller.
4—No. 13 P. & W. L.T. Millers.
1—Warner & Swasey Profiler.

GRINDERS.

1—No. 2 Bath Universal Grinder.
2—12 x 36 Landis Plain Geared Head Grinders.
1—No. 5 Springfield Oscillating Surface Grinder.
1—No. 2 Gardner Disc Grinder.
1—No. 34 Gardner Double Disc Grinder.

PLANERS.

1—Pond 62" (widened pattern type), 9′ bed.
1—36 x 36 x 10 Industrial Planer, one rail head and one side head.

TURRET LATHES.

1—No. 6 Foster Friction Geared Hand Screw Machine.
1—3 x 36 Jones & Lamson, with bar and chucking attachment.
1—2 x 24 Jones & Lamson, with bar and chucking attachment.
2—(New) No. 4 B. & O. Chucking Turret Lathes.
1—(New) No. 4½ B. & O. Hand Screw Machine, wire feed.
1—No. 4 Warner & Swasey Friction Geared Hand Screw Machine.
1—14" B. & O. Chucking Machine.
1—No. 5 Pearson Hand Screw Machine.
1—1 x 8 Pierce Hand Screw Machine (new).
1—2" Cleveland Automatic Screw Machine (Model A).
2—2" Cleveland Jigger Feed Screw Machines.

AIR COMPRESSORS.

Steam

1—12 x 12 x 12¼ x 12 Ingersoll-Rand, Class M.F. 1.
1—16 x 18 x 12 D.A. Union, S.L., 2 S., Air Compressor.
2—8 x 8" Westinghouse.

Belt.

2—10 x 10 Bury Hor. Belt Driven (182 C.F.)
1—10 x 10 Curtis Vertical D.C., with base (160 C.F.).
1—8 x 8 Ingersoll-Sergent Hor. (100 C.F.).
1—8 x 8 Chicago Pneumatic Hor. (100 C.F.).

DRILLS AND SLOTTERS.

1—(New) No. 61B Harrington Multiple Spindle Drill Press, 19 spindles.
1—(New) No. 51A Harrington Multiple Spindle Drill Press, 10 spindles.
1—(New) No. 51B Harrington Multiple Spindle Drill Press, 8 spindles.
4—(New) No. 61B Harrington Multiple Spindle Drill Presses, 16 to 33 spindles.
3—(New) 20" Buffalo Drills, W. & L.F.
1—17-spindle Moline.
1—5-spindle Barnes.
1—24" Niles Geared Slotter.

GEAR CUTTERS.

2—11" Gleason Gear Generators.
1—12" Becker-Brainard Automatic Gear Cutter.
1—17" Newark Spur Gear Cutter.

PRESSES AND HAMMERS.

1—No. 64 Toledo S.S., B.G.
1—No. 95 Consolidated Press.
2—Briscoe S.S., 7" stroke.
2—1200-lb. B. & S. Roll Board Hammers.
1—800-lb. B. & S. Roll Board Hammer.
1—1200-lb. Toledo Roll Board Hammer.

We carry a large line of Boilers, Pumps, Engines, Generators, etc.

Riverside Machinery Depot
Detroit, Mich.

In these High-cost days of New Tools---perhaps some of these

MODERN USED TOOLS

will be of interest to you—Many of them still set up just as they had been used.

UPRIGHT BORING AND TURNING MILLS.

42" Swing, Double-head, with Motor, and Countershaft, "Bullard."
42" Swing, Double-head, Speed-box, C-shaft, etc., "Colburn."
65" Swing, Double-head, with Motors and Countershaft, "Betts."
80" Swing, Double head, heavy, "Pond Machine Tool Co."
86" Swing, Double head, with C-shaft, "Niles Tool Works."
16' Swing, heavy, Motor-driven (10' under rail), "Niles Tool Works."

LATHES.

16" Swing, 6' bed, "Reed," Hollow-spindle, Cpd. Rest, etc.
18" Swing, 8' bed, "LeBlond," Hollow-spindle, Cpd. Rest, etc.
18" Swing, 12' bed, "Schumacher & Boye," Cabinet legs, Hollow-spindle, etc.
20" Swing, 14' bed, "Hamilton," Quick-change, Hollow-spindle, etc.
20-48" Swing, 18' bed, Taper att., "McCabe," Double-spindle; latest.
28" Swing, 36' bed, Compound-rest, Hollow-spindle, "Fay & Scott."
56" Swing, 28' bed, Triple-geared, "Putnam Machine Co."
62" Swing, 24' bed, Triple-geared, "New Haven Mfg. Co."

RADIAL DRILLS.

7' Arm, heavy, with Motor drive and Motor, complete, "Niles Tool Works."
7' Arm, heavy, with C-shaft, etc., "Baush Mch. Tool Co."
5' Arm, heavy, Speed-box, "Dreses Machine Tool Co."
5' Arm, heavy, with C-shaft, "Pond Mch. Tool Co."

TURRET LATHES.

2 x 24" Flat Turret Lathes, "Jones & Lamson," Sliding-head.
2 x 24" Flat Turret Lathe, "Jones & Lamson," Sliding-head, arr. for Motor.
20" Swing, full-automatic, "Potter & Johnston."

HORIZ. BORING AND DRILLING MACHINE.

3 15-16" bar, with outside Yoke support, "Knee type" Binsse style.

PLANERS.

26" x 26" x 6', one head, "Pratt & Whitney."
32" x 32" x 8', two heads, "Pond Mch. Tool Co."
36" x 36" x 12', two heads, "G. A. Gray Co.," Frog and Switch.
48" x 48" x 14', two heads, "Niles Tool Works."

VERTICAL MILLING MACHINES.

60" Bement Miles & Co.'s, extra heavy.
42" Niles Tool Works, heavy.

MILLING MACHINES
"Planer Type"

37" x 14' Horizontal spindle, "Bement-Miles & Co.'s."
36" x 8', Vertical spindle only, "Newton Mch. Tool Co."
24" x 6', Horizontal spindle, "Ingersoll Milling Machine Co."

MULTIPLE SPINDLE DRILLING MACHINES.

18 spindle, cap'y 1" holes, with C-shaft, "Baush Mch. Tool Co."
16 spindle, cap'y 1" holes, arranged for Motor, "Baush Mch. Tool Co."

PUNCHES AND SHEARS.

60" Throat, No. 6, "Hilles & Jones," arranged for Motor, heavy.
60" Throat, Horizontal, cap'y 1½" through 1¼", Bement-Miles; new.
36" Throat cap'y 1" through 1", "Wm. Sellers & Co."
30' gap, Rotary Splitting Shears, "Lennox."
14" Throat, heavy, Standard

Write for our latest complete list of entire stock.

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149 Broadway, New York, U. S. A.

New and Used Tools

Immediate Delivery

13" x 5' 6" NEW Carroll-Jamieson.
13" x 7' 6" NEW Carroll-Jamies.
15" x 6' NEW Carroll-Jamieson, quick change.
15" x 8' NEW Carroll-Jamieson, quick change.
14" x 6' Lodge & Shipley, quick change.
14" x 10' Prentiss, taper attachment.
16" x 6' Blaisdell.
9 17" x 8' NEW National, quick change.
8 17" x 8' NEW Sidney, D.B.G., quick change, swings 19" over V8s.
18" x 10' Rahn-Mayer.
20" x 8' Prentiss, taper attachment.
20" x 10' Blaisdell.
20" x 10' Fitchburg.
24" x 10' 6" NEW Carroll-Jamieson, heavy pattern.
26" x 14' Star.
6 28" x 10' 6" Johnson, taper attachment.
10 26" 48" x 14' NEW McCabe, double spindle lathes, heavy pattern, new style.
1 26" 48" x 18' NEW McCabe, double spindle lathes, heavy pattern, new style.
30" x 14' Johnson.
32" x 12' NEW Rahn-Larmon.
24" Gisholt, Motor Driven.
2½" Wire Feed B. G. friction head Foster Ring.
2 x 24" Jones & Lamson.
2" Cleveland Automatic Screw Machine.
16" x 6' Johnson B. G. Turret.
14" x 5' Bridgeport, plain head turret.
14" x 5' Lodge & Shipley, 1⅛" wire feed.
16" x 2' P. & W. ⅜" wire feed.
No. 1 Cincinnati NEW Universal Miller.
Pedrick & Ayer Universal Miller.
2 No. 0 Steptoe NEW B. G., P. F.
4 No. 0 Steptoe, NEW, Hand.
2 Standard NEW hand.
Beaman & Smith, vertical Miller.
36" x 36" x 16' American open-side Planer, one head on rail, one on side.
42" x 42" x 10' Fitchburg, heavy duty Planer, 2 heads.
36" x 36" x 12' Whitcomb Planer.
22" x 22" x 6' Powell Planer.
12" Fitchburg traveling head Shaper.
15" Bement traveling head Shaper.
14" NEW Steptoe Shaper.
20" B. G. Cincinnati Shaper.
20" NEW B. G. Steptoe Shaper.
24" B. G. Flather Shaper.
36" Baker Bros. tapping and boring Drill.
28" Snyder Drill, square table.
3—20" NEW Superior B. G., P. F. Drills.
600 lb. Morgan Steam Hammer.
10" Bignall & Keeler Pipe Machine.
50" x 11" G. & E. Automatic Gear Cutter.

FRANK TOOMEY, Inc.
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The Pick of the Country's Stock

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No. 1 Wilmarth & Morman Full Universal Grinder, complete with equipment; brand new	$1,000
Two American Standard Universal Grinders, complete with full equipment and in very good operative condition, swings 8" with water guards, 8¾" without water guards, takes 16" between centers.each	1,000
No. 2 Woods Full Universal Cutter and Tool Grinder, with complete equipment; brand new; internal grinding attachment	625
No. 184 Wells Universal Cutter and Reamer Grinder; brand new	200
No. 210 Heald Piston Ring Grinder with 8" magnetic chuck, automatic feed; in first-class shape	525
Gisholt Universal Tool Grinder; like new	300
No. 5 Bath Duplex Internal Grinder, complete and in very good condition	1,200
No. 6 Besley Double End Ring Wheel Grinder, with ring wheel chucks; like new	750

MILLERS.

Twenty Brand New Whitney Two-step Cone Millers ..each	250
Seven No. 7 Becker Lincoln Millers, in first-class condition......each	225
No. 20 Oesterlein Universal Miller, brand new; delivery March	1,500
No. 2 Becker Full Universal Miller, complete with regular equipment, brand new, no arbor, all power feeds; delivery latter part of this month	2,250

LATHES.

30" x 12' Pratt & Whitney Screw-cutting Engine Lathe, triple geared, compound rest, power cross feed, solid spindle	1,200
32" x 8½' Fifield Screw-cutting Engine Lathe, triple geared, compound rest, power cross feed, no gears	700
24" x 16' Lodge & Shipley Quick-change Gear Lathe, taper attachment, 2" hole in spindle, compound rest, power cross feed, lot of equipment	1,550
22" x 16' Niles Screw-cutting Engine Lathe, compound rest, power cross feed, hollow spindle	650
18" x 18' 2" Putnam Screw-cutting Engine Lathe, power cross feed	650
18" x 12' American Quick-change Gear Lathe, compound rest, power cross feed, hollow spindle	1,000
18" x 8' LeBlond Screw-cutting Engine Lathe, compound rest, power cross feed, hollow spindle	750
16" x 8' Lodge & Shipley Screw-cutting Engine Lathe, quick-change gear, taper attachment, compound rest, power cross feed, hollow spindle	750
Three Brand New 14" x 6' Monarch Quick-change Gear Lathes, screw-cutting ..each	600
Three Brand New 13" x 6' Seneca Falls Screw-cutting Lathe, actual swing 14"	485
Two Seneca Falls Brand New Screw-cutting Lathes, same as above, but with draw-in attachment and one ½" collet...each	535
12" x 6' Hendey Tool Room Lathe, quick-change gear, pan bed, compound rest, hand cross feed, automatic stop, hollow spindle, draw-in attachment, six collets	625
12" x 5' Pratt & Whitney Lathe, rise and fall rest, taper attachment, just taken from micrometer department	325
12" x 5' Fairbanks Screw-cutting Lathe, compound rest, power cross feed, hollow spindle	300
Two 12" x 4' Brand New Shepard Quick-change Gear Lathes...each	225

SPECIAL

Fitchburg Lo-Swing Lathe, like new, complete with large equipment	$ 900
24" x 12' Hendey-Norton Lathe, compound rest, power cross feed, hollow spindle, full swing rest with round six-hole tool post, automatic stop, tie bar head, quick-change gear, taper attachment, 18" four-jaw chuck, 24" and 14½" face plates, steady and follow rests; machine has not a scratch on it and is just as good as the day it was delivered from the factory; appearance and condition like new	1,900
24" x 16' Springfield "Ideal" Lathe, detachable, quick-change gear, complete equipment; in first-class condition	1,000
Fifty Heavy Duty Shell Boring Lathes, specially designed for boring and turning shells 8" to 16"; brand new.	

VERTICAL AND HORIZONTAL BORING MILLS.

36" Brown & Sharpe Vertical Chucking Machine, 8" square turret head on slide with 4 1¾" holes	550

AUTOMATIC AND HAND SCREW MACHINES.

8½ x 16 Potter & Johnson Automatic, with large equipment, first-class condition	900
⅝" National Acme, 4-spindle two-belt type	450
1" National Acme, 4-spindle two-belt type	650
1½" National Acme, 4-spindle two-belt type	850

Above three National Machines have not been overhauled, but with a few new parts and cleaning can be made first-class.

Eight No. 12½ Brand New Garvin Friction Geared Head Screw Machines, 2" wire feed capacity, automatic feed to turret....each	875
25 Milwaukee Screw Machines, 1½" wire feed capacity, geared friction head ... each	800
25 Warner & Swasey Type Screw Machines, 2" wire feed capacity, geared friction head ...each	800
Ten No. 2 Toledo Brand New Screw Machines, 1 1-16" wire feed capacity ... each	675
6" Cleveland Full Automatic, capacity 6", 4 1¾" holes in turret, 6¾" length can be milled, length of stock feed 7"; first-class condition	3,000

DRILLS.

24" Cincinnati Heavy Pattern Upright Drill with patent geared type attachment; like new	425
Twenty Brand New Sigourney Single Spindle Drills, high-grade machines ... each	100
Ten Two-spindle, same type as above ... each	165
Ten Brand New No. 0 Burke Bench Drills 10" swing.........each	15
24" Baker Bros. Drill, single pulley drive; like new	550

SHAPERS.

16" Smith & Mills Crank Shaper	375
24" Gould & Eberhardt Back-geared Crank Shaper	600
16" Parker & Chard Geared Crank Shaper	375
16" Springfield Back-geared Crank Shaper, heavy pattern	425

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Shop and Warehouse—52 and 54 Walker St.
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Telephone
Franklin 1816

New York's Greatest Stock

MILLING MACHINES

- No. 2½ LeBlond Full Universal, dividing heads, vise
- No. 2 Cincinnati Universal, dividing heads, vise, chucks, vertical attachment
- No. 2 Cincinnati Plain, quick-change, dividing heads, vise
- No. 1 Hendey-Norton Universal, dividing heads, vise
- No. 3 new model Becker-Brainard Universal, dividing heads, vise, vertical attachment
- No. 3 Becker-Brainard Plain, dividing heads
- No. 5 Kempsmith Plain
- Ingersoll Slab, adjustable rail, platen 12' long, 42" between housings, weight 55,000 lbs.; three heads
- 76" Newton Vertical, 48" rotary table
- Newton Duplex Slab, 42" between heads, platen 121"
- Newton Slab, table 12" x 42"
- Detrick & Harvey Milling, Drilling and Boring Machine
- No. 4½ Burr Slab, motor driven
- Four No. 12 Brown & Sharpe Plain Manufacturing
- No. 20 Kempsmith Plain
- Two No. 1 Pratt & Whitney Plain
- Pedrick & Ayer heavy back geared, table 14" x 44"
- Garvin heavy back geared, table 9" x 48"
- No. 4 Garvin Profiler
- Two No. 1 Garvin Profilers, two spindle

GRINDERS

- 12" x 42" Landis Universal
- 12" x 36" Modern Plain Cylindrical
- 10" x 36" Thompson Universal
- 3' Pratt & Whitney Vertical Surface
- Springfield Surface, table 22" x 50"
- Saxon Surface, table 8" x 18"
- Whitney Surface, table 6" x 12"
- No. 1½ Landis Internal
- No. 1 Brown & Sharpe Internal
- Two new "BX" Wilmarth & Morman Cutter, Reamer and Drill Grinders, with cylindrical and internal attachments
- No. 2 Garvin Cutter and Reamer
- 30" Warner & Swasey Cock
- 10" x 7' Brown Roll

BORING MILLS

- 10' Betts Vertical, two heads, chasing attachment
- 66" Betts Vertical, two heads
- 60" Niles Vertical
- 60" Baush Vertical, two heads
- 60" Bement Vertical
- 36" Bullard Vertical, two heads
- Niles Horizontal, 9" bar
- Barrett Horizontal, 3¾" bar
- Rockford Horizontal, 2 1-16" bar
- 50" Bement-Miles Car Wheel
- 48" Niles Car Wheel
- Underwood Automobile Cylinder, 3⅝" bar

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Offices: 50 Church St., NEW YORK

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We can make immediate shipment on large and small orders for:

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- **Etc., Etc.**

Let us have a copy of the first enquiry you may be sending out to the trade. We can offer you both price and service equal to, or better than that which can be obtained elsewhere.

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Advantages of Dealing With Us:

Our stock is a complete range, enabling us in most cases to ship your order the same day as received. We will arrange wherever possible to include your order with carload lots, thus giving you the advantage of lower freight rates.

We follow each order through to its destination by our own tracing department.

The advantage of being able to secure your material in exactly the size you want saves you paying freight on waste; also the time and labor otherwise required for alterations.

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Manitoba Bridge & Iron Works, Ltd.

Winnipeg, Manitoba, Canada

IMMEDIATE DELIVERY

BORING MILLS.

40" Rogers & Hemphill, two swivel heads.
42" Gisholt, one turret and one swivel head.
52" Niles, car wheel boring mill.
62" Bement, horizontal.

DRILLING MACHINES

34" Barnes, s.h., b.g., p.f.
3½' Industrial Radial.
Avey, 1-spindle, B.B. (new).
Avey, 4-spindle, B.B.
No. 10 Natco 8-spindles.
No. M-1 Natco 8-spindles.
12-spindle Multiple, P. & W.
No. 30 C. Baush, 12-spindle.
Allan, 2 spindles (new).
Allan, 4 spindles (new).

GEAR CUTTERS

30" x 9" G. & E. Auto, for spur and bevel.
24" x 7" G. & E. for spur.
36" Walcott, for spur.

GRINDERS

14" x 20" B. & S. Universal.
Gisholt Tool Grinder.
No 5 Diamond Water Tool.

LATHES

12" x 5' Davis, c.r.
14" x 6' Fairbanks, c.r., taper.
16" x 6' Prentice, c.r.
16" x 6' Sebastian, p.r.
16" x 10' Greaves & Klusman, c.r.
17" x 10' Blaisdell, c.r.
18" x 6' Bradford, c.r., taper.
18" x 8' L. & S., pat. head, c.r., taper.
18" x 10' Bradford, c.r., taper.
18" x 12' Barker, c.r.
20" x 10' Flather, c.r.
20" x 14' Blaisdell, c.r.
21" x 12' New Haven, c.r.
21" x 12' Bradford, c.r., taper.
24" x 12' New Haven, c.r.
24" x 13' New Haven, c.r.
30" x 27' Reed, c.r., taper.
32" x 16' Blaisdell, c.r.
36" x 22' Lodge & Shipley, geared head, q.c.g., motor drive with motor.
68" x 20' Fifield, c.r., t.b.g.

MILLING MACHINES

No. 4 LeBlond, plain.
No. 13 P. & W., Lincoln
No. 4-B Becker Vertical.
No. 5 Becker Vertical.

PLANERS

22" x 22" x 4' New Haven, one head.
30" x 30" x 12' Cincinnati, two heads.
36" x 36" x 12' Powell, single head, arranged for two.
36" x 36" x 16' Sellers, one head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.
42" x 36" x 12' Cincinnati, two heads.

PRESSES

No. 20 Bliss, O.B., Inc.
No. 3 Walsh O.B. Inc.
No. 174 Consolidated, double crank.

SHAPERS

14" Pratt & Whitney.
14" Smith & Mills.
16" Gould & Eberhardt.
16" American.

SCREW MACHINES

No. 1 Chicago automatic.
1 3-16" Hartford Automatic.
⅞" Cleveland Automatic.
2" Cleveland automatic.
2¾" Cleveland automatic.
1" B. & S., plain.
16" P. & W., plain.

TURRET LATHES

16" Lodge & Shipley.
25" Niles.
No. 2 Warner & Swasey Hollow Hexagon.
2" x 24" Jones & Lamson.
24" Gisholt, spindle capacity 6¼".
3" x 36" Jones & Lamson, chucking outfit.

MISCELLANEOUS

Bolt Cutter, 1½" Acme.
Centering Machine, No. 1 Whitton.
No. 3 Burr Cold Saw.
No. 14 Higley Cold Saw.
No. 2 National Oil Separator.
No. 00 Baker Keyseater.
2—100 lb. Bradley Helve Hammers.
No. 80A Grant Rivet Spinner.
Stecher Rivet Spinner.
Write for our Stock List.

Write for our Stock List.

The H. A. Stocker Machinery Company, **566-572 W. Randolph St., CHICAGO, ILL.**

ADVERTISELL IT!

If you have machinery which your plant has outgrown, advertisell it.

Or if you have a factory building which you have outgrown, advertisell it.

That is, advertise in our Classified Advertising section and *sell* what you have for sale.

CANADIAN MACHINERY
143-153 UNIVERSITY AVE., TORONTO

Look These Over

SECOND-HAND LATHES.

16 x 6 American, Quick-change Gear, Geared Friction Head, Hexagon Turret and Power Feed.
14 x 6 American Quick-change Gear, with Hexagon Turret and Taper Attachment.
16 x 6 American Quick-change Gear, Geared Friction Head, Hexagon Turret.
14 x 6 American Quick Change Gear, Geared Friction Head, Hexagon Face Turret.
24 x 6 Reed Compound Rest and Turret
13 x 5 Barnes, compound rest.
3 22 x 10 Davis Quick Change Double Back Geared.
2 18 x 7 Reed-Prentice, geared head, flat turret lathes, automatic stops and fitted with air chucks.
26 x 16 Old Style Lathe, good repair lathe.

NEW LATHES.

13 x 6 South Bend
15 x 6 South Bend.
16 x 7 South Bend
18 x 8 South Bend.
16 x 8 Cisco, actual swing 18⅝".
2 -18 x 8 Cisco, Double Back Geared, actual swing 20⅝".

SECOND HAND TURRET MACHINES.

14" Warner & Swasey Geared Friction Head, Automatic Chuck, Lathe with 9" air cylinder and chuck.
14" Warner & Swasey Geared Friction Head Turret Lathe, with air chuck and cylinder.
14" Warner & Swasey Turret Lathe with friction head, wire feed, oil pan and pump.

NEW TURRET MACHINES.

Two each No. 1, No. 2, No. 3, No. 4, No. 5, No. 6 and No. No. 7 Foster Screw Machines with complete equipment.

SECOND-HAND MILLING MACHINES.

Garvin No. 2 Hand Miller with vise and arbor.
Pratt & Whitney No. 0 Hand Miller with vise and arbor

NEW MILLING MACHINES.

2 Standard Whitney Type Hand Millers, with lubricating equipment.

SECOND-HAND DRILL PRESSES.

Barr 3-Spindle Gear Driven, 18" swing, No. 2 taper spindle.
Barr 6-spindle, style "E," 18" swing, No. 2 taper.
Henry & Wright 4 Spindle, Ball Bearing No. 2 taper.
Barnes 10" Friction Sensitive Drill.

NEW DRILL PRESSES.

1 Sipp 2-Spindle Ball Bearing.
1—Sipp 3 Spindle Ball Bearing.
2 -Sipp 4 Spindle Ball Bearing.
1 -Barnes 20" All Geared Self Oiling.
1 Hoefer 10" Friction Sensitive Drill.

MISCELLANEOUS TOOLS.

2 Heavy Pattern Ranson Polishing Machines.
2 Eager 3-horse power, 60-cycle, 220-volt, 2-phase, 3,600 r.p.m. Polishing Motors with extended spindle.
2—4½" Davis Cutting-Off Machines with 4.5 Air Chucks and vertical forming slide.
6 Holden-Morgan Thread Millers, designed for thread on 3" shells, to be sold in one lot.
2 West Tire Setter Bending Machines.
2 Watson Stillman 1½ x 2 Pumps, 1,200 cu. in. at 2,100 pounds pressure.
1 50-Pound Kane & Roach Blacksmith Hammer.
1 18" Disc Grinder and Press.
1 Waterbury Farrel Sprue Cutter.
1 225 Light Onondaga Direct Current, 110 volt Dynamo.
Barnes Self-Oiling All Geared Drilling Machines.
Peerless 6" High Speed Hack Saw Machine.
Sterling 2-A High Speed Hack Saw Machine.

The H. A. Smith Machinery Co.

Machinery Merchants

384 West Fayette St., Syracuse, N.Y., U.S.A.

QUALITY FIRST
DOMINION
MACHINERY CO.
TORONTO

CAN'T BE BEATEN FOR PRICE AND QUALITY

LATHES

2 -14" New Champion Tool-room Lathes, with oil pan and pump, taper attachment.
1 -20" New Heavy Duty American Tool Works Lathe, double back gear, quick-change gear.
2 -18" x 8' New Double Back gear, Quick-change Gear Lathes.
1 -26 x 10 Used Whitcombe-Blaisdel Heavy Duty Engine Lathe, quick-change gear, double back gear; in first-class condition.
1 -24 x 14 Used Lodge & Shipley Engine Lathe, single back gear, quick-change gear; good as new.
1 24 x 14 Prentice Engine Lathe, with taper attachment, hollow spindle, compound rest; used, but in very good condition.
1 -20 x 16 Used Bullard Engine Lathe, hollow spindle, compound rest; in good condition.

DRILLS

1 -34" Used Barnes Sliding Head Drill, back geared, power feed; first class condition.
2 -24" Foot-Burt Heavy Duty Drills; used.
1 -2-Spindle Reed Sensitive Drill; used.
1 1-Spindle Reed Sensitive Drill; used.
1 25" Back-geared Davis Drill; used.

MISCELLANEOUS

1 18" New Barker Back-geared Shaper.
1 4½ Brown & Sharp Full Universal Miller, single pulley drive; four years old.
1 24 x 24 x 6 Lodge & Davis Planer; in first class condition.
1 24 x 24 x 8 Whitcombe-Blaisdel Planer; in first class condition.
1—9" Cut-off Machine; new.
2 New Dominion Universal Grinders.
1 -Second hand 75 H.P. Motor, 25 cycle, 3 phase, 550 volts; Canadian General Electric make, complete with starter.

Our used machinery is sold on its own merits. We buy nothing but machines that are really good. Every machine is rebuilt.

DOMINION MACHINERY COMPANY

110 Church Street - - Toronto, Ontario, Canada

Don't Keep It--Sell It!

If you have a lathe
a drill
a milling machine
a planer
a chain block
a chuck
a motor
a crane
a stock of belting
an engine
a compressor

or any other machine shop equipment for which you really have no further use, why not turn it into *cash?*

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY

Classified Advertising Section

143-153 University Avenue TORONTO, ONT.

BAIRD'S MACHINE TOOLS

LATHES

8—18" x 8' Walcott Quick Change D.B.G. Lathes
1—18" x 8' Lodge & Shipley Quick Change Lathe
1—14" x 6' American Geared Head Quick Change Lathe
2—17" x 7' Street Heavy Duty Lathes
1—13" x 6' Le Blond Quick Change Lathe
5—14" x 6' Walcott Quick Change Lathes, D.B.G.
1—14" x 10' Lodge & Shipley Quick Change Lathe with turret
1—10" x 4' Seneca Falls Lathe
2—11" x 5' Worcester Lathes, semi-quick change
1—16" x 8' Flathers Engine Lathe
1—20" x 10' Walcott Quick Change D.B.G. Lathe
1—24" x 14' LeBlond Engine Lathe

SHAPERS AND PLANERS

1—30" x 30" x 7' Flathers Heavy Planer
1—10" x 10" x 30" Bench Planer
1—16" Gould & Eberhardt B.G. Shaper
1—14" Steptoe Crank Shaper

MILLERS AND GEAR CUTTERS

1—No. 21 Garvin Plain Miller
1—No. 3½ Garvin Plain Miller
1—No. 1 Lodge & Davis Plain Miller
1—Farwell Gear Tester
1—Quick Change Farwell Hand Miller
2—24" Becker Automatic Millers
2—No. 0 Rockford Plain Millers
1—U.S. Hand Miller

GRINDERS

1—No. 2 Modern Universal Grinder
2—6 x 32 Norton Plain Grinders
1—No. 4 Landis Universal Grinder
1—6 x 18 Landis Plain Grinder
1—10 x 36 Landis Plain Grinder
4—No. 1 La Salle Surface Grinders
2—No. 1 Wilmarth & Morman Surface Grinders
2—Yankee Twist Drill Grinders

DRILLS

1—26" Barnes Sliding Head Drill
2—Reed High Speed Ball Bearing Drills ⅞" Cap
1—20" Davis Upright Drill
4—Champion Bench Drills
2—20" Buffalo B.G. Upright Drills
3—20" Lindgren Dull Gear Box Drive
10—13" Rockford Sensitive Drills
10—10" Burke Sensitive Bench Drills

SCREW MACHINE AND TURRET LATHES

4—1" Smith Hand Screw Machines
2—1¼ Stecher Screw Machines
4—1⅝" Screw Machine Friction Back Gear & P.F.
1—2¼" Modern Flat Turret Lathe
1—¼" Cleveland Automatic
1—¾" Cleveland Automatic
1—⅝" Pratt & Whitney Automatic
1—1" Hartford Automatic
1—9-16" Hartford Automatic

PRESSES

1—No. 2 Barnes Screw Press
1—No. 40 Perkins Inclinable Press
3—Foot Power Press
1—No. 5 Atlas Arbor Press
1—No. 2 V.K. & V. Inclinable Press
1—Adriance Inclinable Press
1—No. 33 Consolidated Arch Press

We also carry in stock at our Detroit Warehouse a full line of small tools and transmission equipment.

W. J. Baird Machinery Company

54-56 Jefferson Avenue **DETROIT, MICHIGAN**

Second-Hand Machinery List

Besides having a complete machinery equipment for sale, for manufacturing 18-pdr. British Shrapnel Shells, we have available the following machines:—

AUTOMATICS

2" Cleveland
Reed-Prentice Semi-Automatic Lathe
Potter & Johnson 6-A

BORING MILLS

24" Bullard V. T. L. (New).
No. 2 Baker Cylinder Borer.

DRILL PRESSES

Baker Brothers Two Spindle 1" x 6" Semi-Automatic.
4' Baush Radial
24" Cincinnati Upright

KEYSEATERS

No. 0 Baker.
No. 2 Baker.

LATHES

14" x 6' Fay & Scott (New).
18" x 8' Davis Three Step Cone D. B. G.
20" x 10' Bridgeford Quick Change.
22" x 14' Davenport.
26" x 12' Bridgeford Three Step Cone D. B. G.
Tindell-Morris Crankshaft.

TURRET LATHES

24" Gisholt's (with 6¼" and 5¼" holes).
24" Gisholt's (with 2⅝" holes).
1⅛" Bardons & Oliver.
1" Foster-Kimball.
⅞" Garvin.
1" Warner & Swasey.

The above being a partial list of our stock, would ask that you advise us your needs.

Assuring you that all inquiries will have our best attention.

The Motch & Merryweather Machinery Company

711 Lakeside Avenue, N.W.
CLEVELAND, OHIO, U.S.A.
DETROIT PITTSBURGH CINCINNATI

New and Second Hand Machinery

BORING MILLS.

Rochester 3½" Bar Floor Type Motor Driven,
42" Niles Vertical, 2 Heads and Boring Head Geared Feed,
34" Colburn Vertical, Turret Head, all Geared Feed,
28" Bullard, Actual Swing 34",

RADIAL DRILLS.

2½' foot Muller, Cone Drive.
3 foot Bickford, Belt Feed.
3 foot Bickford, Single Pulley Drive,
3 foot Gang, Cone Drive.

SHAPERS.

16" Smith & Mills.
16" American, Back Geared,
20" Smith & Mills,
24" Barker, New.

TURRET LATHES SCREW MACHINES.

1—No. 1 Pratt & Whitney, Wire Feed,
2—No. 1 Garvin, Wire Feed,
1—No. 2 Garvin, Wire Feed,
28" Gisholt,
24" Steinle,
2—2 x 24 Jones & Lamson Single Pulley Drive, Bar and Chucking equipment.

POWER PRESSES.

8—No. 18 Bliss Presses, Inclineable.
4—No. 1 V. & O. Inclineable.
3—No. 1 V. & O. Inclineable, Double Action.
1—Press Equal No. 23 Bliss 4 inch Stroke Inclineable, Weight 10,000 lbs.,
Stiles No. 3 Power Press.

MILLING MACHINES.

Garvin No. 3 Hand Miller.
Becker No. 5 Vertical Miller.
Miller & Crowningshield Hand & Power Feed Miller.

LATHES.

1—10 x 4 Champion, Compound Rest, Hollow Spindle, Power Cross Feed,
1—12 x 5 Fairbanks, Compound Rest, Hollow Spindle, Power Cross Feed,
1—13 x 5 Seneca Falls, Compound Rest, Hollow Spindle, Power Cross Feed,
3—14 x 6 Carrol Jamison, Compound Rest, Hollow Spindle, Power Cross Feed,
1—15 x 6 Blaisdell, Compound Rest, Hollow Spindle, Power Cross Feed,
1—14 x 6 American, Quick Change Gears, Compound Rest, Hollow Spindle, Power Cross Feed.
1—16 x 6 Prentice, Compound Rest, Hollow Spindle, Power Cross Feed.
1—16 x 8 American, Quick Change Gears, Compound Rest, Hollow Spindle, Power Cross Feed.
2—16 x 6 Schumacher & Boye, Compound Rest, Hollow Spindle, Power Cross Feed.
1—17 x 8 Blaisdell, Compound Rest, Hollow Spindle, Power Cross Feed.
1—15 x 6 Putnam, Compound Rest, Hollow Spindle, Power Cross Feed.
1—16 x 6 Prentice, Compound Rest, Hollow Spindle, Power Cross Feed.
1—18 x 8 Bradford, Compound Rest, Hollow Spindle, Power Cross Feed.
1—18 x 12 Schumacher & Boye, Compound Rest, Hollow Spindle, Power Cross Feed.
1—19 x 16 Greaves Klausman, Compound Rest, Hollow Spindle, Power Cross Feed.
1—20 x 8 Le Blond, Compound Rest, Hollow Spindle, Power Cross Feed.
4—22 x 10 Lodge & Davis, Compound Rest, Hollow Spindle, Power Cross Feed.
1—14 x 8 Lodge & Shipley, Quick Change Gears, Taper Attachment.
3—16 x 6 Simplex, Compound Rest, Hollow Spindle, Power Cross Feed, New.
1—16 x 6 F.E. Reed, Compound Rest, Hollow Spindle, Power Cross Feed.

MISCELLANEOUS.

1—41 x 41 x 13 foot New Haven Planer, Single Head.
1—No. 2 Oesterlein Universal Grinder.
1—4 Spindle Acme Nut Tapper.
1—4 Spindle Baker Mfg. Drill.
1—5 Spindle Adjustable Foote Burt Drill.

American Machinery Exchange INC.

Entire Plants Bought And Sold

Office, 30 Church Street; Warehouse, 217 Centre Street
New York City, U. S. A.

GRAVES MACHINERY EXCHANGE

SUCCESSORS TO

The Co-Operative Used Machinery Company

Success is such a simple thing after all. All that is necessary is to *KNOW YOUR BUSINESS.* We're not so old, to have gone to seed. Not so young, to be an experiment. Just 25 years of practical experience in the used machinery business—*At your service.* Used machine tools principally of class and distinction. We stock every size, make and description of

MACHINE TOOLS

Note the following samples which indicate our *HIGH CLASS STOCK.*

LATHES.

21" x 8' 6" Fitchburg, back-geared, 4-step cone, 2½" belt, plain rest, rod and screw feed, screw in back, 61" between centers	$ 175
21" x 12' Fifield, back-geared, 4-step cone for 3" belt, C.R., P.C.F., rod and screw feed, screw in back, 9' between centers, 19" and 9" face plates, steady rest, gears, cabinet legs	375
22" x 9' Reed, 1¼" H.S., 5-step cone for 3" belt, 20" face plate, C.R., P.C.F., 60" between centers	500
22" x 8' Niles, ½" H.S., 3-step cone, 3" belt, back geared, friction head, C.R., P.C.F., Q.C.G., 50" between centers with 22" dia. chuck, steady rest	425
22" x 10' Blaisdell, back-geared, 4-step cone, 3" belt, C.R., P.C.F., belt feed, rod and screw in front, taper attachment, set over tail stock, 60" between centers, 16" four-jawed chuck	375
Three 24" x 10' Lodge & Shipley, Q.C.G., 2" H.S., 5-step cone, 3½" belt, C.R., P.C.F., 60" between centers, cabinet legs, each	1,100
24" x 16' Harrington, 4-step cone, 3½" belt, back-geared, C.R., P.C.F., 12' between centers	650
Four 24" x 8' Lodge & Shipley, Q.C.G., 1¾" H.S., 5-step cone for 3" belt, C.R., P.C.F., 22" face plate, cabinet legs, each	1,000
24" x 12' Jones & Lamson, 2" H.S., back-geared, 4-step cone, 3½" belt, C.R., P.C.F., rod and screw feed, screw feed in back, 90" between centers, with 24" face plate, 22" four-jawed independent chuck	1,200
24" x 10' New Haven, 2" H.S., back-geared, 5-step cone, for 3¼" belt, 24" face plate, C.R., P.C.F., cabinet legs, 65" between centers	550
24" x 12' Harrington, back-geared, 4-step cone for 3" belt, C.R., P.C.F., 96" between centers, 21" four-jawed chuck, 24" face plate	500
Seven 24" x 12' Lodge & Shipley, 1¾" H.S., 5-step cone, 3½" belt, back-geared, Q.C.G., C.R., P.C.F., cabinet legs, 82" between centers, with 24" face plate, steady rest, each	1,200
24" x 10' Reed, back-geared, 5-step cone, 3½" belt, compound rest, power cross feed, rod and screw feed, taper attachment, 64" between centers	675
24" x 12' Lodge & Shipley, 2" H.S., 5-step cone, 3½" belt, back-geared, C.R., P.C.F., Q.C.G., 78" between centers	1,200
24" x 12' New Haven, back-geared, 4-step cone, 3" belt, plain rest, 100" between centers with 21" face plate	200
26" x 12' Fitchburg, 4-step cone, 3½" belt, back-geared, C.R., P.C.F., extra turning rest	500
26" x 18' Fifield, 4-step cone, 4" belt, back-geared, 26" face plate, C.R., P.C.F., 13' between centers	1,000
26" x 12' Prentiss, 1½" H.S., P.C.F., offset tail stock, 70" between centers, with 11" and 24" face plate, cabinet legs	1,000
26" x 18' American Tool Works, 5-step cone for 3½" belt, 2" H.S., back-geared, C.R., P.C.F., 13' between centers	1,500
28" x 9' Powell, 4-step cone, 4" belt, plain rest, 50" between centers with 26" face plate, P.C.F.	350
28" x 12' Niles Tool Works, back-geared, 5-step cone, 3½" belt, C.R., P.C.F., 83" between centers	850
28" x 14' Putnam, sliding bed, 2" H.S., back-geared, 5-step cone, 4" belt, C.R., P.C.F., will swing 57" in gap, lathe bed will slide 8' on base; max. distance between centers 160"; complete with gears	1,500
32" x 15' Nicholson & Waterman, 1½" H.S., back-geared, 5-step cone, 4" belt, 26" four-jawed independent chuck, C.R., P.C.F., cabinet legs, taper attachment, 102" between centers with steady rest	1,250
36" x 14' Gleason, double back-geared, 4-step cone, 4" belt, C.R., P.C.F., 96" between centers with 18" and 36" face plate	1,400
38" x 20' Lodge & Davis, heavy pattern, 5-step cone, for 4½" belt, 2½" H.S., rod and screw feed, C.R., P.C.F. to compound rest, 26" four-jawed chuck, reinforced bed	2,350
38" x 14' New Haven, heavy pattern lathe, back-geared, 5-step cone, 4½" belt, C.R., P.C.F., 106" between centers with 38" face plate, steady rest	1,500
42" x 20' Woodlite & Co., takes 15' between centers, C.R., P.C.F., face plate, 4-step cone, countershaft, tight and loose pulleys	1,500
100" x 30' Niles, 5-step cone, 5" belt, face plate drive, 64" face plate with T slots and holes for bolts, C.R., P.C.F., 9" spindle, will take 16' between centers	5,000
84" x 27' Putnam, C.R., P.C.F., takes 16' between centres, motor driven	3,500

HORIZONTAL BORING MILLS.

Beaman & Smith 5" bar, bores to center of 60", travel of bar by power 60", motor driven, with variable speed motor	1,500
Sellers Double Spindle, has two hor. spindles 5" dia.; distance between uprights 6'; height, top of table to center of bars 16"; minimum distance between centres 10"; between bars 24"; each bar has 3 cutter slots, and is driven independently by 5-step cone through gears, 3" belt; table is 50" long, 36" wide, with 8 T slots, hand and power feed, power feed to table in line with spindle, travel of table in line with spindle, travel of table in line with spindle 36"	$500

VERTICAL BORING MILLS.

No. 1 Brown & Sharpe Chucking Machine, 28" table, single head, 9" dia. turret, five 1½" holes; 5-step cone, 2½" belt	300
No. 2 Brown & Sharpe Chucking Machine, 36" dia. table, 5-step cone for 3" belt, friction feed, 10" turret, six 1¾" holes, 17½" max. distance under head	450
Two 30" Bullards (turret head), each	700
36" Bullard	500
54" Industrial, one head on cross rail, 3 independent jaws on table, max. distance between table and cross rail 36"	500
42" Niles, 2 swivel heads	1,250
10' Pond, actual swing 11' 5", table 8' dia., height under cross rail 6', cross rail 24" wide, belt driven, powerfully back-geared, 7-step cone, 5" belt, friction feed	5,500

MILLING MACHINES.

No. 13½ Garvin, back-geared, 4-step cone, 2½" belt, power feed, 36" x 12" table, 5" swivel vise	700
Kempsmith, 8" x 36" table, 3-step cone, 3" belt, back-geared, power feed	550
No. 21 Garvin plain, 6" x 30" pan table, T slots, 3-step cone, 3½" belt, power feed	200
Two Pratt & Whitney Lincoln Type, with 3-step cone for 3" belt, belt feed, 2" driving spindle for cutters, 7" x 28" table, max. distance between housing and outboard stand 18"; max. height of cutter arbor over table 10"; each	150
Pratt & Whitney Lincoln Type, 3-step cone for 3" belt, belt feed, 2" driving spindle for cutters, 7" x 28" table, max. distance between housings and outboard stand 18"; max. height of cutter arbor over table 10"	250
No. 9 Kempsmith plain, back-geared, 3-step cone, 3" belt, 4" arm, 12" x 36" table, 3 T slots, power feed	750
No. 3 Kempsmith plain, old style, back-geared and cone reversed, table 7" wide, 34" long, 3 T slots, supplementary table on top about 1½" thick, 3 T slots, 3-step cone, 3" belt, power length feed only	350
Brown & Sharpe plain, 3-step cone for 2½" belt, 8" x 30" table	200
Brown & Sharpe Universal, 4-step cone, 3" belt, no overhanging arm, table 5" wide, 28" long, one T slot, 3 changes power feed, table feed about 18"; transverse feed 4½" vertically	300
Lodge & Davis, 3-step cone, 3" belt, back-geared with 6" x 32" table, power feed	550
Brown & Sharpe, 2-step cone, 3" belt, sliding head, 12" x 4' table, geared feed, worm gear drive	700
No. 9 Garvin Mfg. Type, with 3-step cone for 2½" belt, back geared, 7½" x 29" table, pump, power feed, max. distance between table and cutter arbor 8"	275
No. 0 Pratt & Whitney Power, 4-step cone, 2½" belt, 5" x 24" table, power feed	225
Seven No. 12 Brown & Sharpe Mfg. Type, 3-step cone for 2½" belt, back-geared, power feed, 6" x 34" pan table, each	300
60" x 54" x 8' Ingersoll Hor. Slab Miller, bed 14' 18", table 56" wide overall; 50" working surface; 8' between pockets; T slots cut from the solid; table adjustment by both hand and power in either direction; use miter quick return; table feed positive; 8" for each cutter speed; reverse feed, housings 9" wide on the face; 60" deep; cross rail, counterbalanced; raised and lowered by both hand and power, 21" bearing on housing; spindle gear standard 36" in dia.; spindle 5¼" dia., at large end of taper; arbor 3" dia.; full width 61" between housings; full height from top of table to center of horizontal spindle 54"; oil pump and tank furnished with machine, belt driven	4,000

PLANERS.

22" x 22" x 4' Wheeler, single head	350
24" x 24" x 4' Wheeler, single head	350
22" x 22" x 5' New Haven, single head	400
24" x 24" x 6' Wheeler, single head	450
24" x 24" x 4' New Haven, single head	400
24" x 24" x 6' Fitchburg, single head	400
24" x 24" x 5½' New Haven, single head	400
27" x 24" Pond, 6' table, one head on cross rail	500
30" x 30" x 6' Sellers, single head	650
36" x 36" x 14' Powell, 2 heads on cross rail, heavy table and bed	1,650
36" x 36" x 8' Niles Tool Works, 2 heads on cross rail, 2 side heads	2,000
36" x 20" x 10' Betts, 2 heads, extra heavy table and bed plate	1,500

Remember—these are only SAMPLES!

Write for our stock list.

THE GRAVES MACHINERY EXCHANGE

Warehouse and R.R. Siding: 408 Claremont Ave., Jersey City, N.J.
Telephones, Cortland 8264, 665
Offices: Suite 482, 50 Church St., New York, U.S.A.

MADE
IN
CANADA

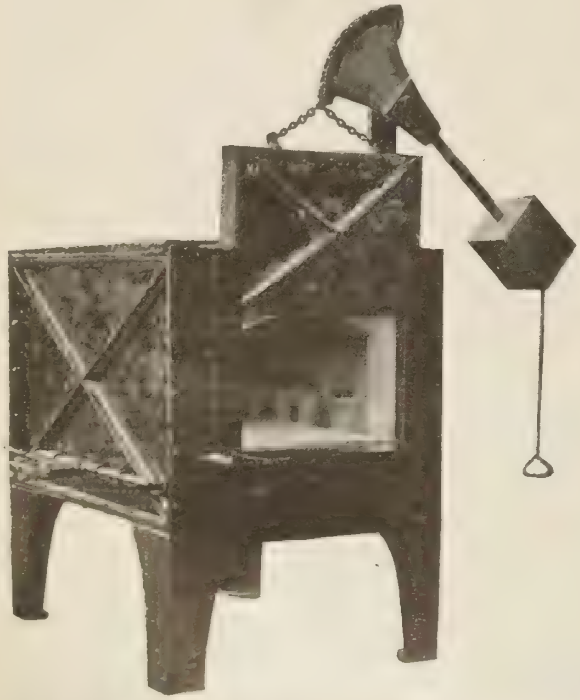
HOSKINS

TRADE MARK REGISTERED

TYPE F.B. 206

Electric Furnaces

Perfect and minute temperature control, absence of injurious gases, freedom from radiated heat and the even chamber temperature make the electric furnace ideal for hardening of fine tools, annealing and other work where scale is injurious and accurate operating temperature is required. The operating cost in many cases is lower than where gas or oil fuel is used.



G. 81

HOSKINS
Gas Furnaces

for annealing, hardening, tempering and forging.

Specially designed for heavy-duty work.

Canadian Hoskins Limited

ELECTRIC, GAS AND OIL FURNACES AND PYROMETERS
General Offices and Factory, WALKERVILLE, ONT., CAN.

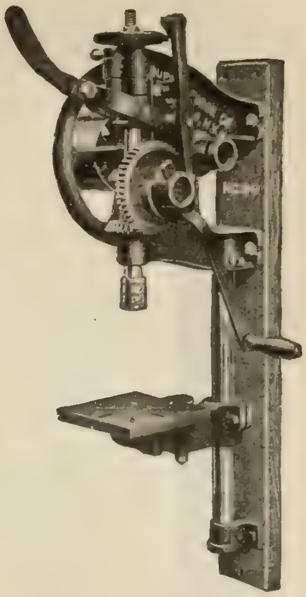
Sales Offices:

MONTREAL
224 St. James Street

TORONTO
Traders Bank Building

MADE IN CANADA

"Buffalo" Tools

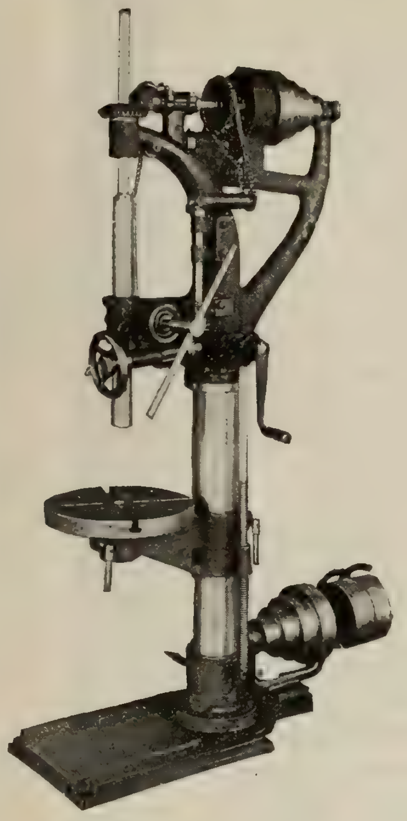


Ball Bearing Post Drills

For Hand and Power

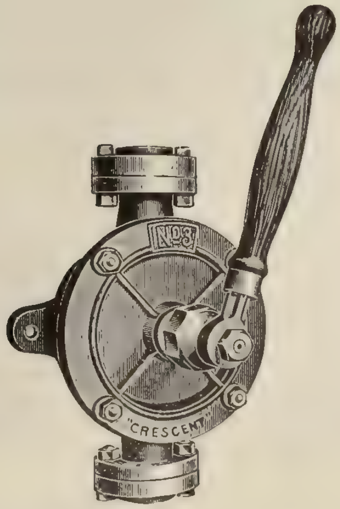
Blacksmiths' Forges

Hand and Electric



Geared Power Drill

These drills are heavy, accurately made tools, and are built in five styles, including hand and power feeds with and without back gearing and automatic stop.



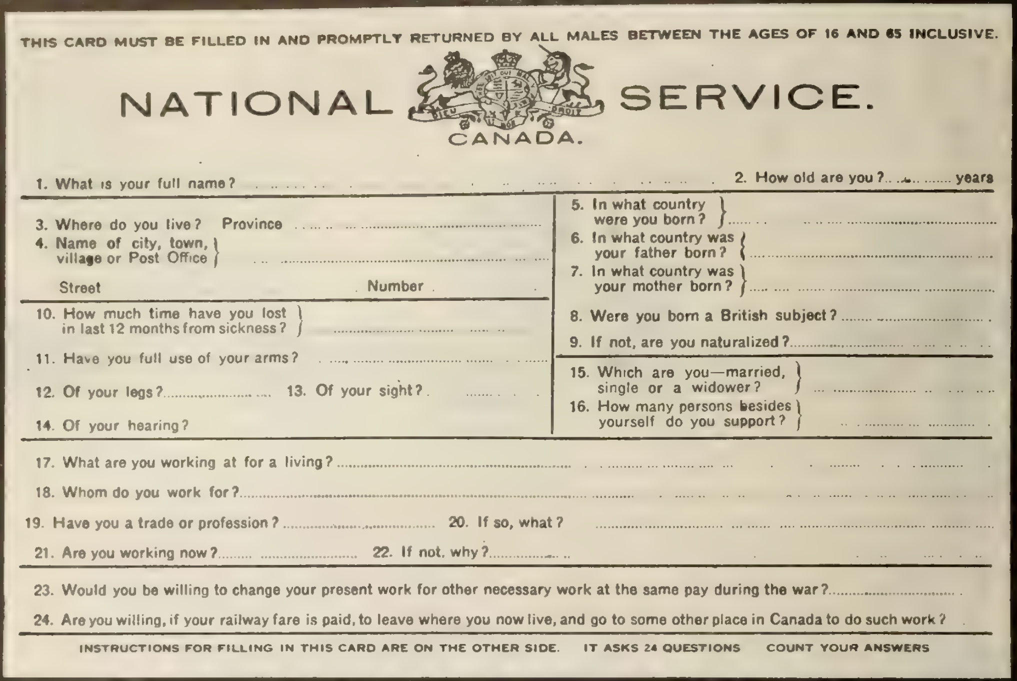
Our well-known line of "Buffalo" Blacksmith tools is the only complete one manufactured in the Dominion of Canada, and includes a large variety of Forges, Blowers and Hand and Power Ball-Bearing Drills.

We carry a large stock at all times, insuring prompt shipment.

We manufacture Blacksmiths' Forges, Blowers and Drills, Steam, Hand and Power Pumps, Fans and Blowers of every description. We furnish and install complete systems for forced and induced draft, heating and ventilating, drying and exhausting. Write for catalogues and information.

Canadian Blower & Forge Company, Limited
KITCHENER (Formerly Berlin) ONT., CANADA

A National Call for Information!



THIS CARD MUST BE FILLED IN AND PROMPTLY RETURNED BY ALL MALES BETWEEN THE AGES OF 16 AND 65 INCLUSIVE.

NATIONAL SERVICE.
CANADA.

1. What is your full name? .... 2. How old are you? .... years

3. Where do you live? Province ....
4. Name of city, town, village or Post Office ....
Street .... Number ....

5. In what country were you born? ....
6. In what country was your father born? ....
7. In what country was your mother born? ....
8. Were you born a British subject? ....
9. If not, are you naturalized? ....

10. How much time have you lost in last 12 months from sickness? ....
11. Have you full use of your arms? ....
12. Of your legs? .... 13. Of your sight? ....
14. Of your hearing?

15. Which are you—married, single or a widower? ....
16. How many persons besides yourself do you support? ....

17. What are you working at for a living? ....
18. Whom do you work for? ....
19. Have you a trade or profession? .... 20. If so, what? ....
21. Are you working now? .... 22. If not, why? ....

23. Would you be willing to change your present work for other necessary work at the same pay during the war? ....
24. Are you willing, if your railway fare is paid, to leave where you now live, and go to some other place in Canada to do such work?

INSTRUCTIONS FOR FILLING IN THIS CARD ARE ON THE OTHER SIDE. IT ASKS 24 QUESTIONS COUNT YOUR ANSWERS

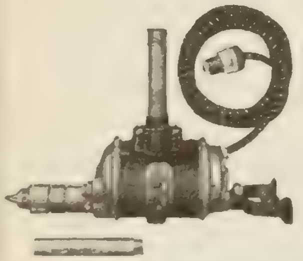
Write your Answers on the Card which you will shortly receive and Return Promptly. *It is Obligatory!*

"Cincinnati" Electrics

ARE

Time and Money Savers.

Guaranteed Mechanically and Electrically



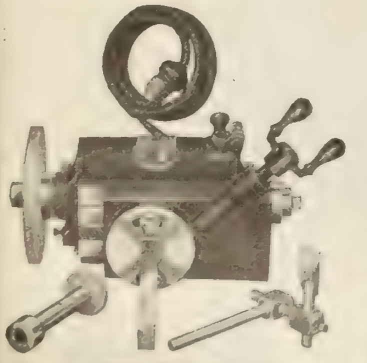
Hand or Breast Drill

Made in 12 sizes. ¼ to 2½" capacity. Weight from 7 pounds up. Ball and Thrust Bearings throughout. All gears and working parts hardened.

SCREW FEED DRILLS

SCOTCH RADIAL DRILLS

All sizes and types, ¼ to 3 H.P. Weights from 16 pounds up. For grinding centers, dies, rolls, internal or surface grinding of all kinds. Motor fully enclosed. Dust and dirt proof. Used on lathe, planer or milling machine.



Tool Post Grinder

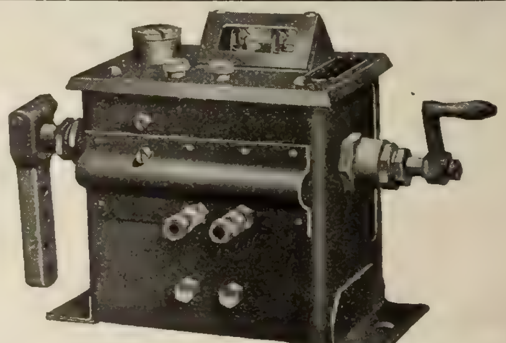
BENCH AND FLOOR GRINDERS

HAND AND AERIAL GRINDERS

New Catalog No. 7-a on request.

Cincinnati Electrical Tool Co.

Cincinnati, Ohio



Madison-Kipp Lubricators are Valveless

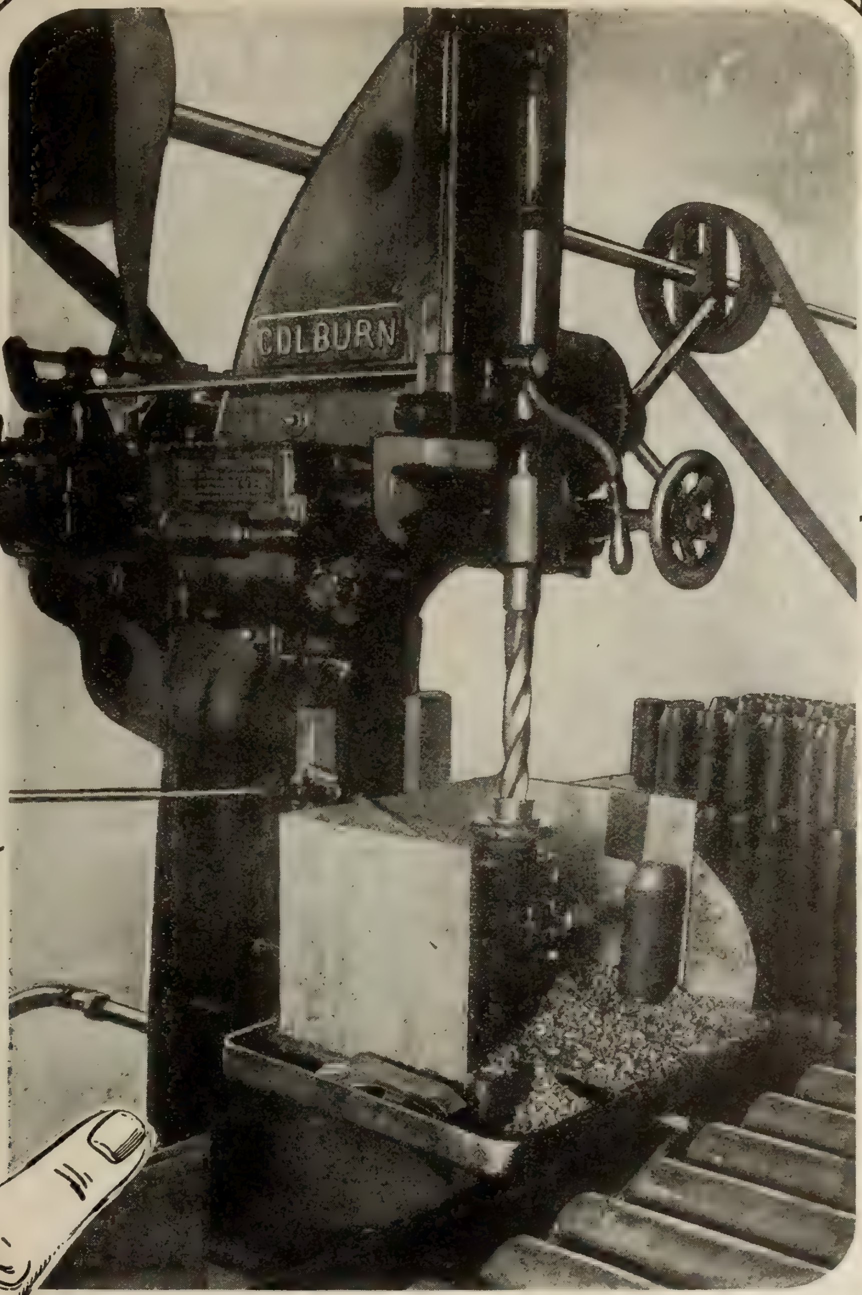
THEY ARE CONSTRUCTED ON THE KIPP NO-VALVE PRINCIPLE WITHOUT SPRING AND BALL CHECKS.

THE PERFORMANCE IS UNQUESTIONABLY POSITIVE. THE OIL CONSUMPTION IS ABOUT ONE-HALF.

MORE MADISON-KIPP FORCE FEED LUBRICATORS ARE PRODUCED EACH YEAR THAN ALL OTHER MAKES COMBINED.

Madison-Kipp Lubricator Co.

Madison, Wis., U.S.A.



COLBURN
HEAVY DUTY DRILL PRESS

"The machine with the BACKBONE and speed"

Proof of the Drill Press is in the drilling of shells.

None but a machine that is built for power, stiffness and rigidity can stand the strain of constant drive, drive, drive on shell work. **"Colburn" Drill Presses will increase your output of shells** or any other work because its rigidity permits driving drills at highest speed — its drilling capacity being really only limited by the endurance of the drill.

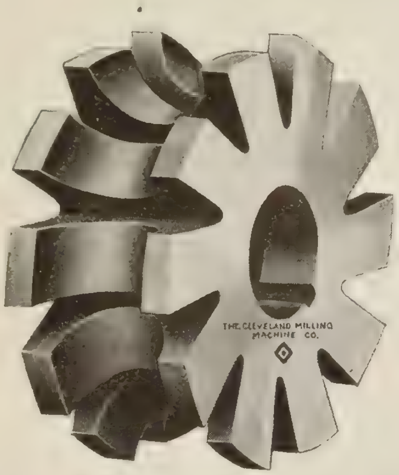
There is positively no spring, drill breakage is small and drills wear long between grinds.

Arranged for belt or motor drive.

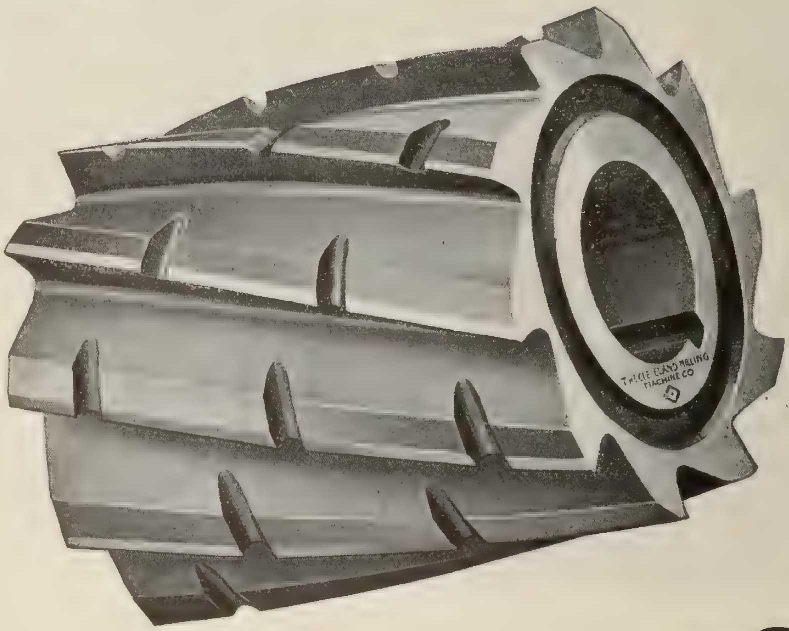
JOT DOWN A LINE FOR FULL DETAILS

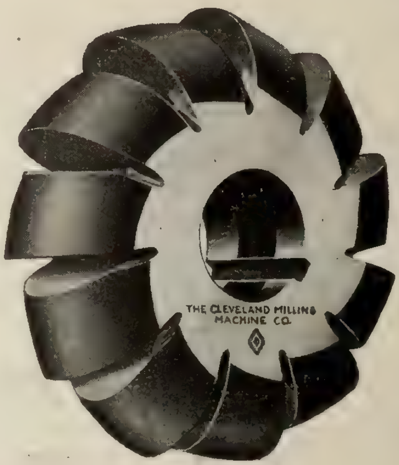
Colburn Machine Tool Co., Franklin, Pa., U.S.A.

Milling Cutters Milling Machines Relieving Machines


THE CLEVELAND MILLING MACHINE CO.

In addition to a standard line of milling cutters we are equipped to handle special cutters for making rifle and machine gun parts, also thread hobs for shell work.

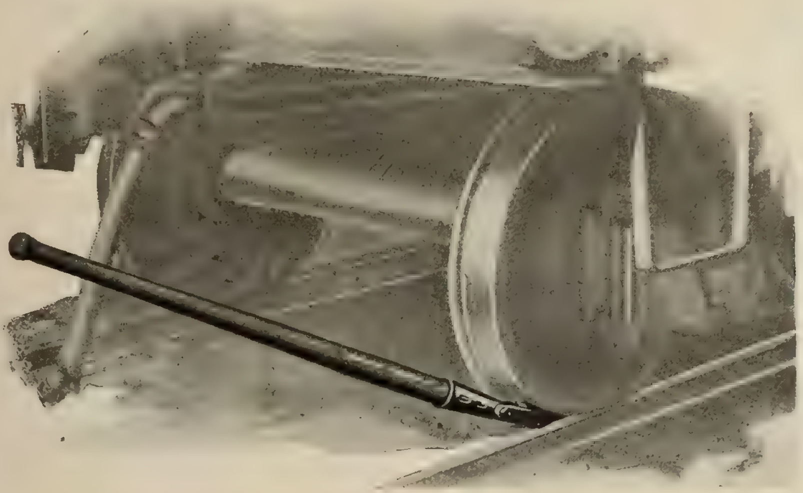

THE CLEVELAND MILLING MACHINE CO


THE CLEVELAND MILLING MACHINE CO.

The Cleveland Milling Machine Company

18511 Euclid Avenue **Cleveland, Ohio**

The "SAMSON" Railway Car Mover



Every railway siding should be supplied with one of these tools. Takes the place of fifteen men and puts the heaviest loaded car just where you want it. It will pay for itself in 30 days.

Cut on the left shows position of mover before moving car and cut below after car has been moved.

It is one of the most simple and powerful devices for moving cars by hand.

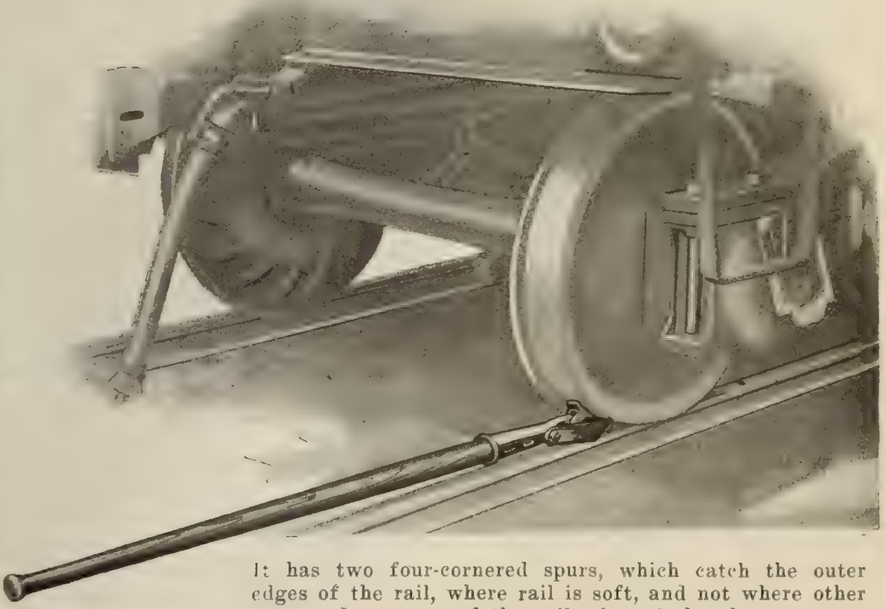
It is provided with **Never Slip Spurs**, which is the most important feature on a Car Mover.

It is very easy to move a car if the Mover does not slip back. By the use of our double spur we get a double hold on the rail and thereby double the resistance, which is the most essential part of a Mover. You will notice that the working parts of this device are not connected by rivets and links which are constantly wearing out and breaking. One bolt connects all working parts. It is so constructed that when car is just started you have the most leverage, and it gains speed as the lever is depressed. We claim that our Mover will work under a lower brake than any other Mover.

It is so constructed that when the handle is raised to push the Mover forward it raises the spur from the rail, which protects the spur from being dulled. This does away with all springs and rollers, which are only a nuisance.

It has no equal and stands superior to anything else in the market.

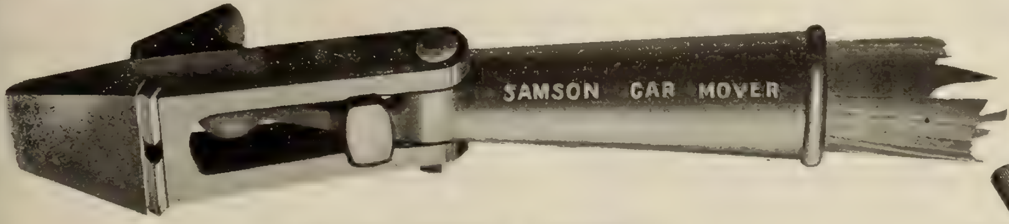
Select Northern hard maple handles make it light and handy. Malleable castings make it light and strong. The spurs or heels are made of special tool steel. We guarantee malleable parts six months.



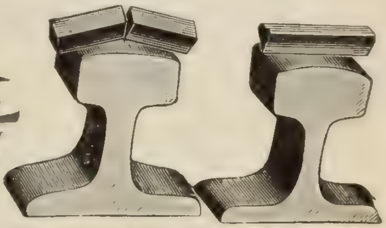
It has two four-cornered spurs, which catch the outer edges of the rail, where rail is soft, and not where other movers do, on top of the rail where it has become case-hardened from the wear the car wheels, as shown in lower right-hand cut. The spurs can easily be driven out and turned as edges get dull.

If your jobber cannot supply you, write us direct

Special attention given to Export Orders



OUR NEW "SAMSON" CAR MOVER.



Our New Never Slip. The Old Always Slip.

THE DILLON MFG. COMPANY

OSHAWA - ONTARIO

Saw-sets, Jointers, Gauges, Carpenters' Mallets, Barn and Stable Equipment, Car Movers, and other Hardware Specialties

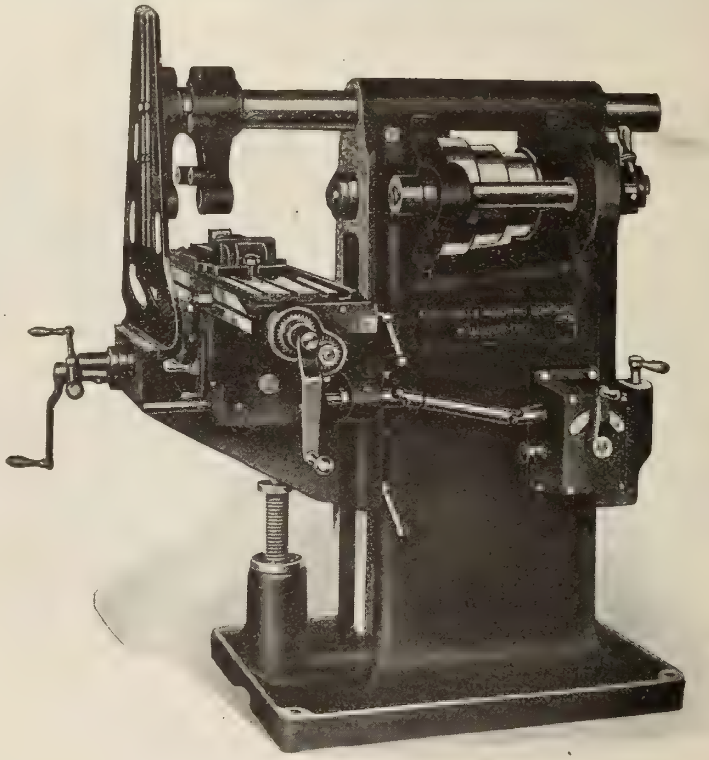
SIMPLICITY DESIGN DURABILITY WORKMANSHIP **The Ford-Smith Machine Company** SIMPLICITY DESIGN DURABILITY WORKMANSHIP

FORD-SMITH

27" x 19" x 7½"

MILLING MACHINES

All Gear Feeds



Additions to our Plant and Equipment
enable us to offer Interesting Deliveries.

See Our Special Miller Bulletin

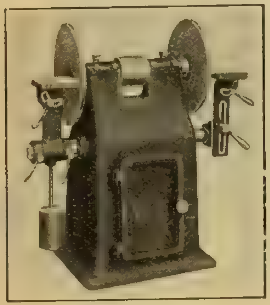
THE FORD-SMITH MACHINE COMPANY

LIMITED

HAMILTON - - - CANADA

The Ford-Smith Machine Company

Foundry Section

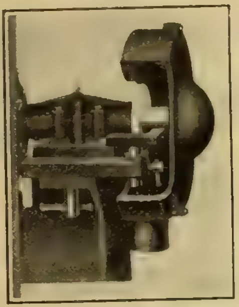


Disc Grinders

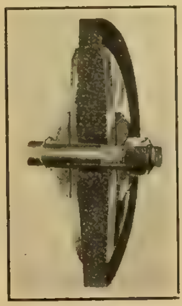
Bench Water Tool Grinders

Light Type Floor Grinders

Water Tool Grinders



Safety Hoods



Safety Collars

Heavy Type Polishers

Plow Grinders

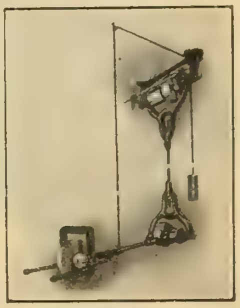
Ford-Smith Grinders

Our Line is making a new notch in Grinder Service.

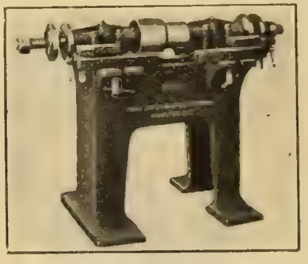
We build all types and sizes for Foundries—also any style of Special Grinder

Additions to our Plant and Equipment allow us to offer Interesting Deliveries.

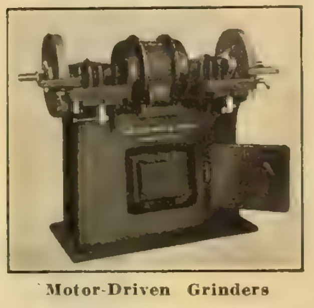
The Ford-Smith Machine
Company, Limited
HAMILTON - - CANADA



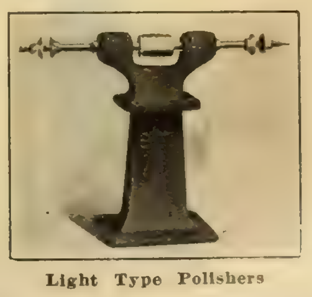
Swing Grinders



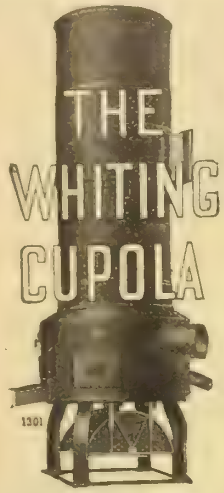
Heavy Type Floor Grinders



Motor-Driven Grinders



Light Type Polishers



FOUNDRY EQUIPMENT

for any class of foundry:

Grey Iron, Brass, Car Wheel, Pipe, Converter Steel and Malleable

Complete plants designed, equipped and put into operation.

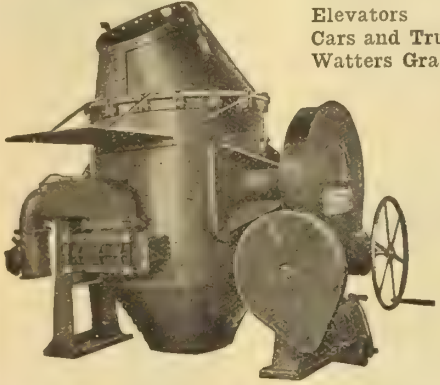
Take advantage of our 35 years' experience

We Specialize on:

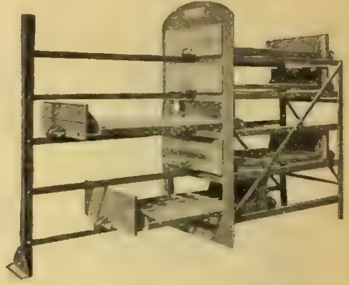
- Cranes
- Dust Arresters
- Turntables
- Elevators
- Cars and Trucks
- Watters Grab Buckets
- Cupolas
- Ladles
- Tramrails
- Converters
- Tumblers
- Core Ovens
- Air Hoists
- Brass Furnaces
- Sand Sifters
- Water Cinder Mills

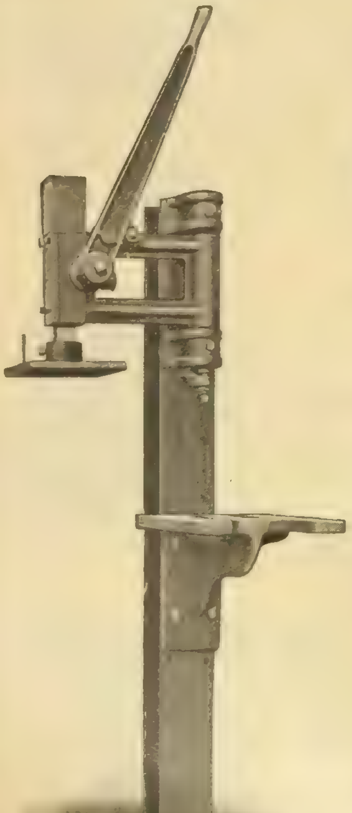
We also make Transfer Tables, Locomotive Hoists and Tainter Gate Hoists.

Send for Catalogs



WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB.





Eliminate Expensive Compressed Air and Intricate Machinery by Installing

MOLINE HAND SQUEEZERS

The Moline Hand Squeezer entirely eliminates the high cost of compressed air.

All working parts are above the table and sand cannot get into the mechanism, causing destruction or deterioration.

While fully as efficient as any molding machine or squeezer on the market, it requires less floor space.

The parts are made of steel, malleable iron and semi-steel castings, thus insuring long, economical service.

The swinging arm, balanced on the steel centers, can be swung to the right or left by a slight motion of the hand, making it convenient for *bench molding* as well as *squeezer work*.

Make more molds for less money in much less time.

The Moline Hand Squeezer is easier and faster in operation than any other hand squeezer. It will greatly increase your capacity, reduce your costs and enable your molders to increase their earnings.

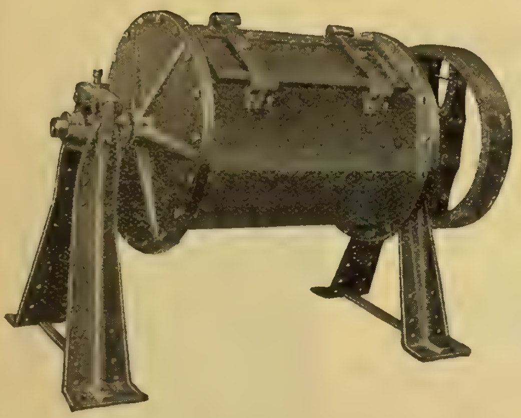
You can use on this machine, flasks varying in sizes from 9" to 16" in width, by 10" to 25" in length, and any depth can be used by lowering or raising the molder's bench.

WRITE FOR FULL DETAILS

H. W. Cooper Saddlery Hardware Manufacturing Co.
MOLINE, ILLINOIS

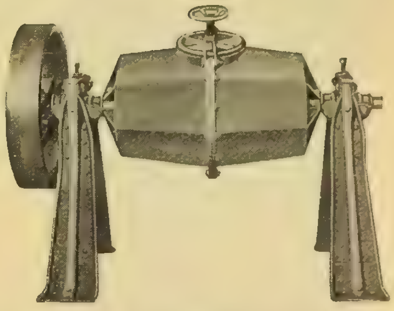
Cleaning and Burnishing Castings

BRASS IRON STEEL



Horizontal Barrels

Tilting Barrels

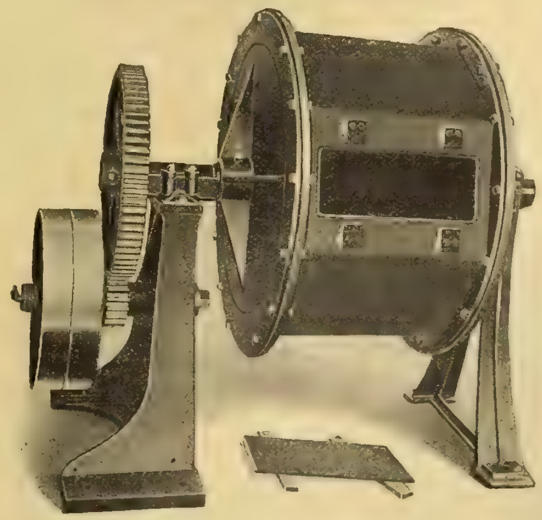


Tapered Hexagonal Barrels

Made in several sizes to suit your work

These are the most approved types of horizontal barrels in use to-day, and are a great improvement over the ordinary tumbling barrels. Both these types are water-tight, and can be used for either dry or wet tumbling.

**Mechanical
Apparatus
of
All Kinds**



Burnishing Barrels

**Specialty—
Economy
and
Service**

The barrels are especially constructed for burnishing with steel balls. The process is used both as a preliminary to nickel or other plating and after plating as a final finishing process. This system will save you money. Look into it.

We manufacture everything for

Polishing and Plating of Metals

CONSULT US AND REDUCE YOUR COSTS

CANADIAN HANSON & VAN WINKLE COMPANY, LIMITED

TORONTO : : CANADA

PLATING OUTFITS

FOR ALL PURPOSES

W.W.WELLS
TORONTO CANADA

COMPLETE EQUIPMENT FOR

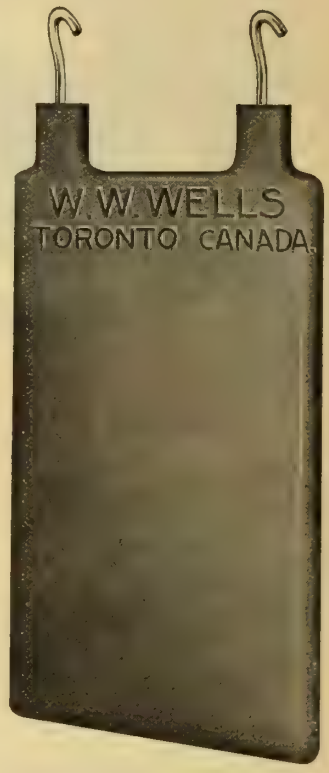
Copper, Nickel or Electro Galvanizing

IMPROVED AMERICAN

Giant Plating Dynamos, Switchboards, Volt and Ammeters, Polishing Lathes, Polishing Wheels

We are the only Manufacturers in Canada of

Nickel Anodes
and
Nickel Castings
of all kinds



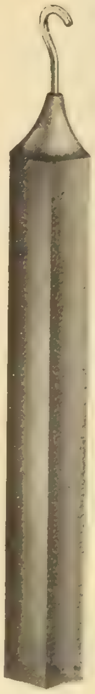
Manufacturer of

Anodes

Of the Highest Grade in

- Brass
- Bronze
- Copper
- Nickel
- Tin and
- Zinc

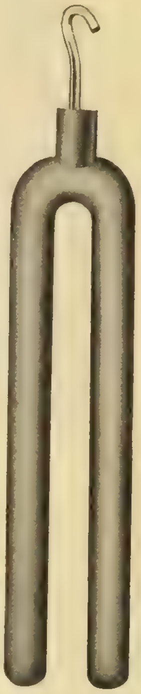
Any Style or Shape.
Quality
Guaranteed.



Canadian Headquarters for

- Cyanide
- Nickel Salts, Single and Double
- Copper Sulphate
- Copper Carbonate
- Zinc Sulphate
- Zinc Carbonate
- Sulphurette
- Sulphuric Acid
- Nitric Acid
- Ammonia
- Emery, All Grades
- Pumice
- Rouge
- Polishes of All Kinds
- Buffs
- Felt Wheels
- Brushes

And All Chemicals, Machines or Materials Used in the Plating and Polishing Trade



Manufacturer of

Buffs

- Unbleached Cotton
- Bleached Cotton
- Printed Cotton
- Printers' Ink Buffs
- Canton
- Flannel
- Canvas
- Duck
- Sheepskin
- Etc.

W. W. WELLS

368-370 VICTORIA STREET - TORONTO, CANADA

WATCH

Inefficient Methods;
Purchase of Faulty Materials;
Failure to use Waste Products

We Point Out Where Your Profits Leak

We have been able to increase the earnings of our clients because our staff consists of men who have been thoroughly trained to go right to the plant and make inspection of methods, mixtures and equipment, etc., and point out where practical economies can be effected.

We investigate and solve your engineering problems from the standpoint of commercial success. No doubt you have some problems right now, that pay you to have us look into.

TAKE ADVANTAGE of our wide experience; Chemical, Metallurgical, Engineering, and have us help you to detect those leaks that make profits dwindle. We have resident Inspectors in all the principal manufacturing centres.

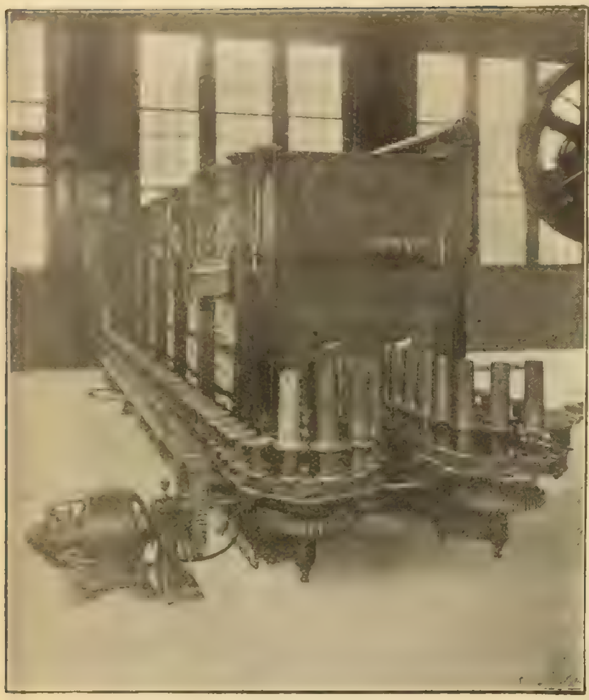
Write us.

CANADIAN INSPECTION AND TESTING LABORATORIES, LIMITED

Inspecting and Metallurgical Engineers and Chemists. The Pioneer Inspection Company of Canada

Head Office and Main Laboratories: MONTREAL

Branch Offices and Laboratories: Toronto. Winnipeg. Edmonton. Vancouver. New Glasgow. and New York



Automatic End Heating Furnace

W.S. ROCKWELL CO.
INDUSTRIAL FURNACES
ESTABLISHED 1888
50 CHURCH ST.
NEW YORK

The uniformity of your product may determine its acceptance or rejection. Under some of the most difficult conditions, operating continuously, day and night, installations that we have made maintain remarkably uniform temperatures throughout long periods of operations.

Rockwell Service has satisfactorily solved difficult heat-treating problems in a number of large Canadian Plants.

We have furnaces of every type to solve every heating requirement. We have the knowledge and experience to see that your furnace equipment is suited to your particular work and capable of handling it in the best possible manner at the lowest cost.

Our New Catalogue 30-G. talks about automatic furnace practise. It may contain some ideas that you have been looking for. Want a copy? Will send it upon request.

We solicit inquiries for better heating methods and equipment irrespective of purpose or fuel.

We make inspection of plant, devise methods and means of working, prepare plans, furnish complete industrial furnace equipment and guarantee results using either coal, coke, gas or oil, as the best interests of our patrons require.

Automatic Hardening Furnace-charging End

W. S. ROCKWELL & CO.

Furnace Engineers and Contractors

50 Church St. (Hudson Terminal Building) NEW YORK

Victoria

Foundry
Malleable

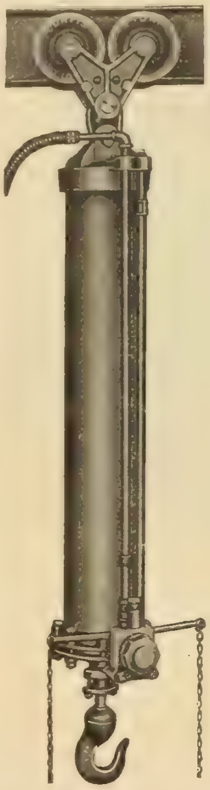
from the plant of The Canadian Furnace
Company, Ltd., Port Colborne, Ontario.

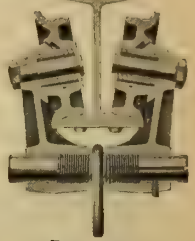
M.A. HANNA & Co.

Sales Agents **Cleveland**

M·A· HANNA &Co.

PIG IRON IRON ORE COAL COKE





CURTIS, St. Louis, U.S.A.

AIR COMPRESSORS — AIR HOISTS — TROLLEYS AND TROLLEY SYSTEMS—SAND BLASTS—PNEUMATIC AND HYDRO-PNEUMATIC ELEVATORS—JIB AND TRAVELING CRANES.

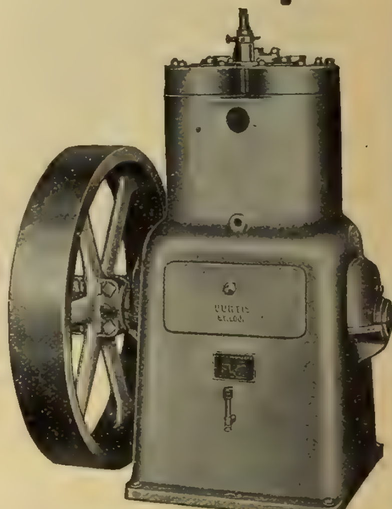
We have specialized for over 22 years on pneumatic machinery. We have developed the simple air cylinder into a straight line motor with wonderful speed control and dependability capable of the widest application to hoisting problems.

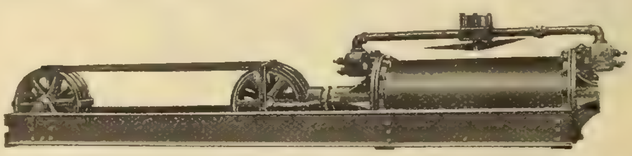
Our new controlled-splash oiling system with regulatable sight feed cylinder oiling is something entirely new in air compressor design.

Complete catalogs and descriptive circulars on our entire line furnished on request.

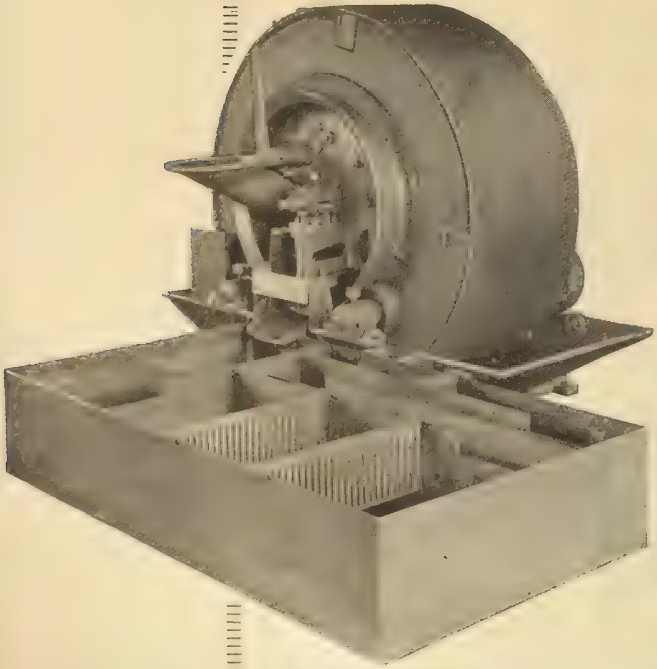
Curtis Pneumatic Machinery Co.

1585 Kienlen Avenue - St. Louis, U.S.A.
New York Office - 532F Hudson Terminal





The Standard Cinder Crushing Mill



Shows an amazing saving over old method

These Mills will reclaim from 98% to 99% of all the metal contained in cinders, slag, skimmings, old crucibles, etc. Great savers in power, labor and water consumption. The same water is used over and over again.

Standard Mills are manufactured in sizes ranging from 600 lbs. to 1,500 lbs. capacity per hour. Continuous feeding and requiring from 2½ to 3½ H.P.

For full description of this CRUSHER and its many profitable features, write

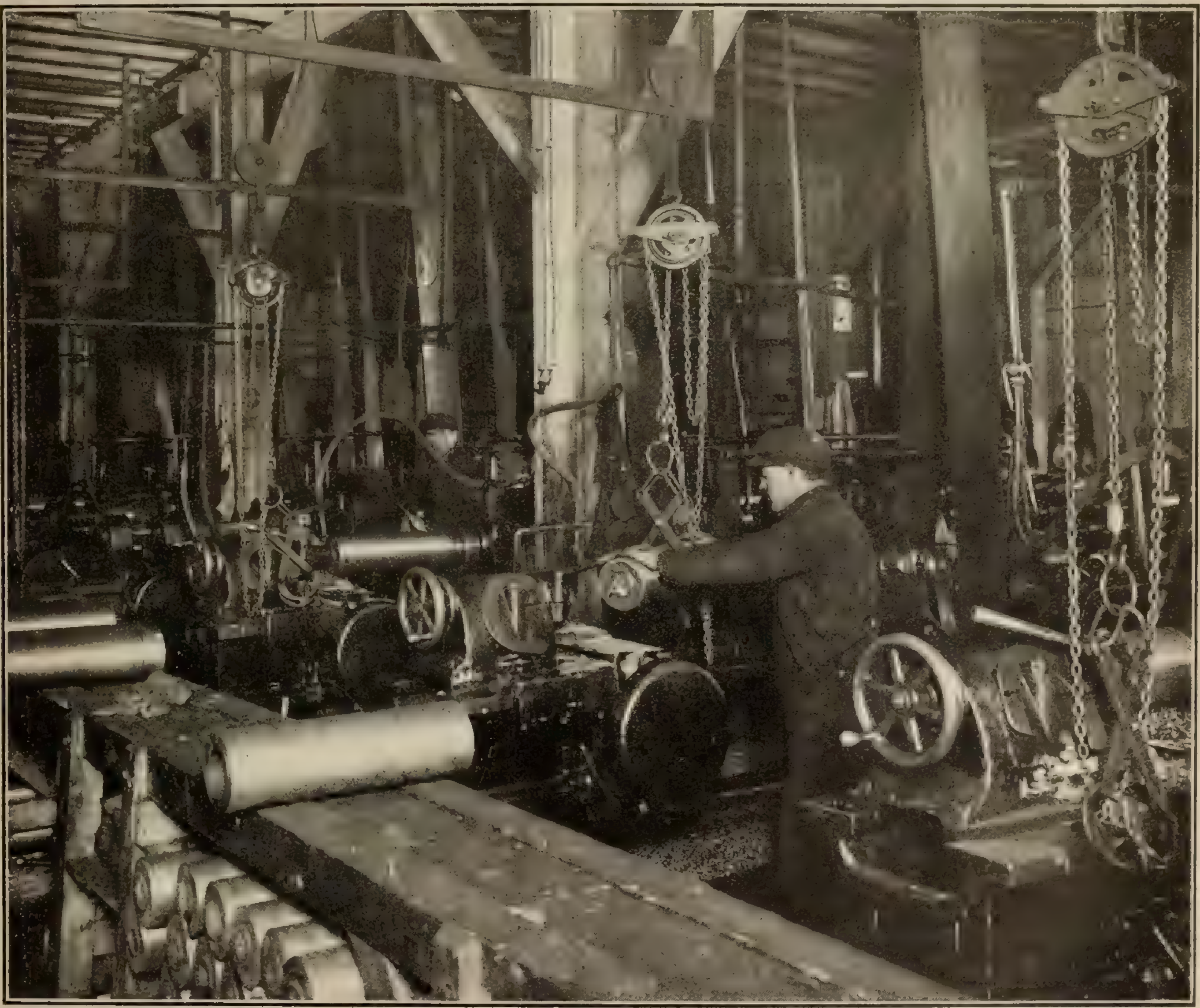
THE STANDARD EQUIPMENT COMPANY

47 Orange St., NEW HAVEN, U.S.A.

YOU CAN TRUST YOUR LIFE TO A MORRIS CHAIN-BLOCK

THE HERBERT MORRIS CRANE & HOIST COMPANY, Limited

EMPRESS WORKS, Peter Street, TORONTO, CANADA



ALL THE LEADING MUNITIONS PLANTS

are using Morris High-Speed chain-blocks for handling H. E. Shells. The chain-blocks shown above are helping in the production of the 6 inch size: the gears are arranged to give twelve inches lift by overhauling only four feet of hand chain. This is two and a half times the speed of any other chain-block made.

If you want to cut down your handling time, you should order one of these blocks and try it out. Mention the capacity you want and we will ship to you by express from stock.

Telegraph your order to save time.

Castings

High Grade Material
Good Service

THE GALT MALLEABLE IRON COMPANY, Ltd., Galt, Ontario

Brass, Phosphor Bronze, Copper and Aluminum

CASTINGS

We have the largest Jobbing Brass Foundry in Canada.

Can make prompt delivery.

Tallman's reputation is in the goods.

Tallman Brass & Metal Co.
HAMILTON, ONT.
CANADA

POTTS

We have a fully equipped pattern shop capable of turning out first-class patterns of any description.

Guarantee prompt delivery.
Prices right.

Write, call or telephone.
Phone Adelaide 103.

PATTERN WORKS

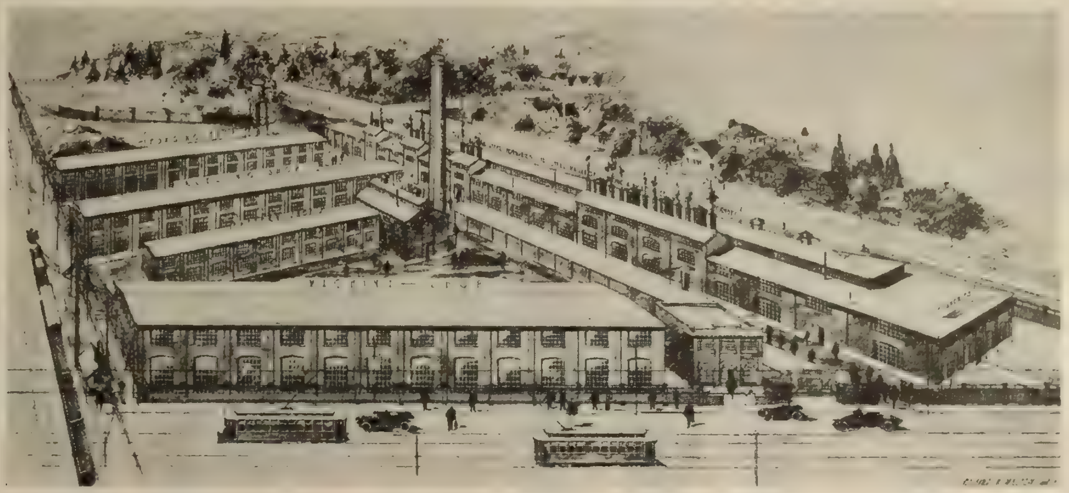
117 Peter Street
TORONTO - - ONT.

STEEL CASTINGS

High Quality *Reliable Service*

CRUCIBLE AND CONVERTER STEEL CASTINGS

Swedish Crucible Steel Co. of Canada, Limited
Windsor, Ontario



The Plant Behind "Hisco" Products

We specialize in the manufacture of all parts pertaining to Cement Mill and Mining Machinery Castings, Stamp Mills, Crushing Plants and Excavating Outfits. Manganese, Chrome or Nickel Steel forms the major part of these machines.

Punches of our Special "Hisco" Steel for forging shells of any size.

Steel Castings for Car Builders to specifications.

MACHINE MOULDED GEARS of any size up to 18 feet diameter.

Send us your requirements, we do the rest.

Hull Iron & Steel Foundries
Limited

HULL P.Q. CANADA

Machine Moulded Spur Gear

Machine Moulded Bevel Gear and Pinion

STEEL CASTINGS

TIVANI ELECTRIC STEEL

The quality of our castings proves that there is much care and experience behind them.

We feel sure that a trial of our product will leave a "repeat order" impression.

Electric Furnace Steels

Nickel and Chrome Steels

Manganese Steels

Nickel and Vanadium Steels

Made in Canada from Canadian Ores

The first in any country to make steel from Titaniferous Iron Ores, and the first in Canada to make High-Speed Steel in the Electric Furnace.

Our ore is practically free from Sulphur and Phosphorus, and contains Titanium, Vanadium, Cobalt, Chromium and Manganese.

We make prompt delivery on all classes of Steel Castings.

TIVANI ELECTRIC STEEL CO., LIMITED
BELLEVILLE, CANADA

STEEL CASTINGS

of any kind and of any size, such as
Marine, Mill Gear, Locomotive, Rolling Stock, etc., etc.

CANADIAN STEEL FOUNDRIES, LIMITED

GENERAL OFFICE:
Transportation Bldg.
Montreal, Canada.

LONDON (England) OFFICE:
Trafalgar House, Waterloo Place.

WORKS:
Welland, Ont.; Point St. Charles, Montreal; Longue Pointe, Montreal.

Our Steel Castings are made to specifications and are true to pattern.

Our equipment and experience are ideal for the production of superior castings.
Capacity 1 oz. to 60 tons.

Above illustration shows Stern casting for Ice-Breaker "John D. Hazen."

Propeller Shaft Bearing for Ice-Breaker "John D Hazen."

MALLEABLE AND CAST IRON PIPE FITTINGS

Made to Compel Respect for Outstanding Quality

We have to set a new standard in pipe fittings by aiming to serve the trade with a product that would satisfy the most exacting requirements.

Satisfied customers testify to our success.

Our line of malleable and cast iron pipe fittings, both screwed and flanged, can be had in all sizes.

We also do galvanizing and make malleable and grey iron castings.

Our modern facilities enable us to give your orders prompt attention and

Immediate Delivery

May we quote on your requirements?

International Malleable Iron Company, Limited
GUELPH, CANADA

STEEL
Castings

and Manganese Steel Castings
Up to 5,000 Lbs.

High-grade material and workmanship, plus a modernly equipped plant stand behind our castings.

BRONZE

M.C.B. Standard Journal Bearings and Engine Bearings.

BRAKESHOES

Locomotive Driver and Truck Shoes, Freight and Passenger Car and Electric Car Shoes.

Canadian Brakeshoe Company, Limited
Sherbrooke, Quebec

Made in Canada

NORTHERN CRANES

We make a wide range of Crane and Hoist designs. All sizes and capacities, 1 to 100 tons.

Tell us your needs. The service of our products makes satisfaction double-sure.

You will be taking a good step by getting our prices and specifications before you buy.

In asking prices, state SERVICE, CAPACITY, SIZE OR SPAN POWER, and, if electric, KIND OF CURRENT.

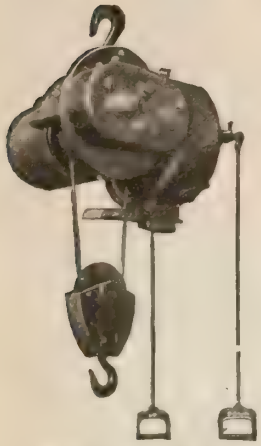
Catalogue free.

Northern Crane Works, Limited

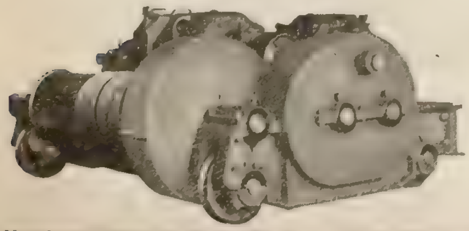
Walkerville, Ontario, Canada

Electric and Air Hoists.

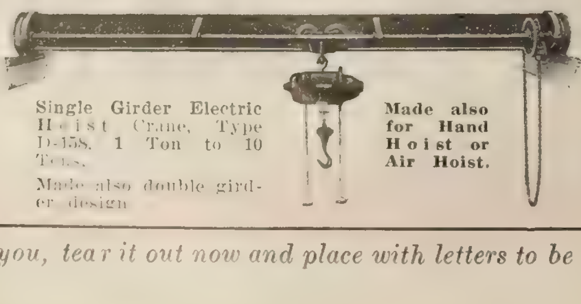
Trolleys and Tracks.



Type D Electric Hoists —$\frac{1}{2}$ to 10 Tons.



Northern Type E Crane Trolley, Rigid, Enclosed Construction. Patented in Canada.



Single Girder Electric Hoist Crane, Type D-158. 1 Ton to 10 Tons.

Made also double girder design

Made also for Hand Hoist or Air Hoist.

Type No. 20 Air Hoist.

If any advertisement interests you, tear it out now and place with letters to be answered.

WAREHOUSE 350 FT. X 150 FT.

HILL, CLARKE & CO.
MACHINERY MERCHANTS
OF
CHICAGO

THE HOME OF
ReMANUFACTURED
-(ORIGINATED BY US)-
MACHINE TOOLS

NEARLY 1000 IN STOCK

Our PICTURE BOOK shows them.
Our GREEN LIST describes them.

HILL, CLARKE & CO. OF CHICAGO
125 N. CANAL ST., CHICAGO, ILL.

NEARLY 1000 IN STOCK NOW.

Shell Conveyor Device in Plant of P. Lyall & Sons Construction Company, Montreal

Never was man's time more costly:-

Handling materials by the old man-and-truck method means the employing of several men and trucks—and eats a big hole in your profit.

Mathews Gravity Steel Roller Conveyors

not only greatly reduce handling costs, but speed up handling operations and save wear and tear on the floors.

We design special conveyors for any product, such as shell billets and forgings, barrels, drums, lumber, brick, pig-iron, bars of iron and tubing.

We shall be pleased to make an estimate of cost and submit plans and specifications without obligating you in any way, if you will write us of your proposition.

Write for our catalog.

Canadian Mathews Gravity Carrier Co.

484 Richmond St. West, TORONTO, ONT.

Special Machine Work

Send us your drawings or samples and specifications, and we will be pleased to quote prices.

WE are in a position to do your special machine work, either on contract or hourly basis, such as expanding arbors, shell reamers and shell-reaming fixtures. Up-to-date pattern shop and foundry in connection.

BRUCE STEWART & CO., LIMITED

Founders, Engineers, Machinists and Boilermakers

CHARLOTTETOWN, P.E.I.

KEYSEATS

INTERNAL

Milled by Rotary Cutter

A drilling machine attachment that can be used in shops large and small. It mills keyseats in places where shaper, planer and keyseating machine can't reach. This is the right tool to use for milling keyseats for interchangeable parts. The tool is fitted with a high-speed steel cutter for milling internal keyseats in one cut. To complete a keyseat it is only required to pass the tool through the hole just once. Innumerable inexpensive eccentric bushings are supplied whereby the tool may be bushed to meet any diameter above its own. It can be made to mill internal keyseats for taper keys. Multiple keyseats exactly spaced can be milled with this attachment. Long length holes to be keyseated is a difficult job under any circumstances, while it is a simple operation with this tool. It is as simple as drilling a hole. This tool is a quantity producer and is used in shops where parts are keyseated by thousands. Blind holes, offset holes and taper holes can also be keyseated. There is no limit to the variety of internal keyseats that can be milled with this tool. It is chucked in the drilling machine and made ready for use as rapidly as any straight shank drill; taper shank is also supplied if required.

Write for Catalog C.

National Machine Tool Company

2270-2272 Spring Grove Avenue - CINCINNATI, OHIO, U.S.A.

Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, St. John, Toronto, Winnipeg, Calgary, Vancouver, Ottawa, Quebec, Hamilton, Saskatoon and Victoria

Beaver Brand Metals

Interior view of rod mill casting shop — showing bars and rods being cast from crucibles.

Interior view of new Extrusion Rod Mill

Brass, Bronze, Gilding Metal

IN SHEETS, ROLLS, PLATES AND RODS

Our combined output for 1917 will be 5,000,000 pounds monthly.

Whatever your requirements are they cannot demand a finer product than that which we are producing.

"RODS"
Manufactured by the cold rolled and drawn, and also extrusion process.

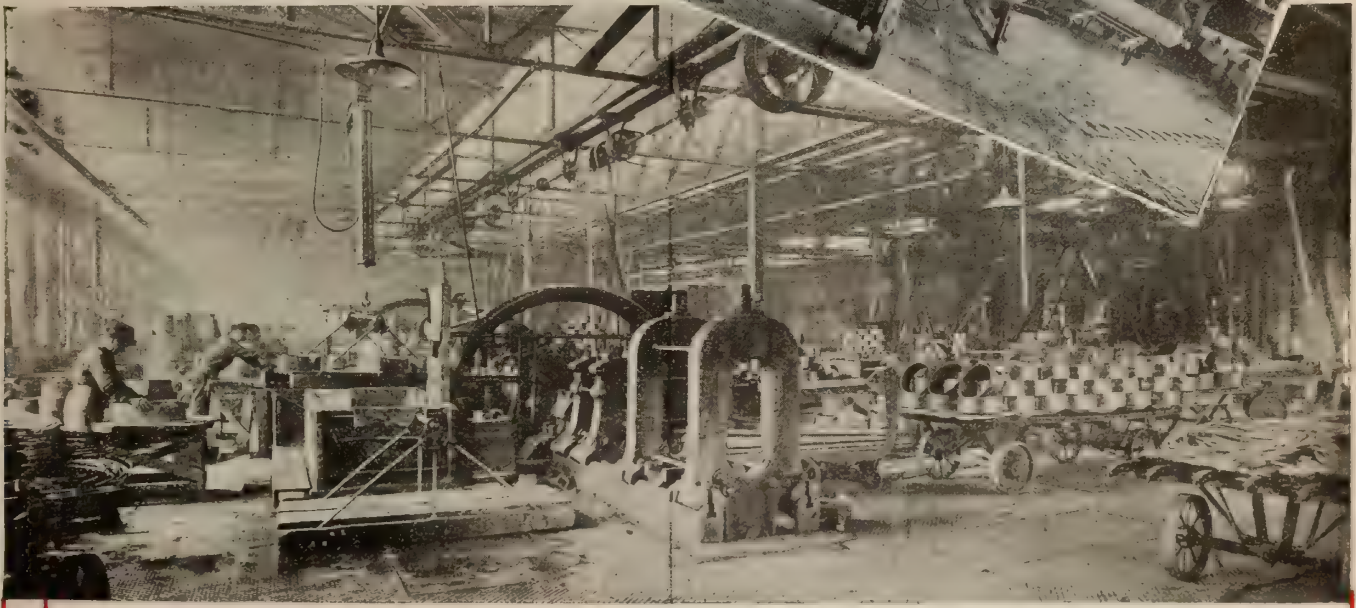
BROWN'S COPPER & BRASS ROLLING MILLS LIMITED

General Offices and Mills
NEW TORONTO, CANADA

COPPER & BRASS
BROWN'S
QUALITY
ROLLING MILLS

Made In Canada

Illustration on right shows interior view of East bay of sheet mill cartridge case blank department.



Interior view of sheet mill showing rolling mills and brass sheets after rolling.

For drilling and free turning you will find few others equal to

Beaver Brass Rod

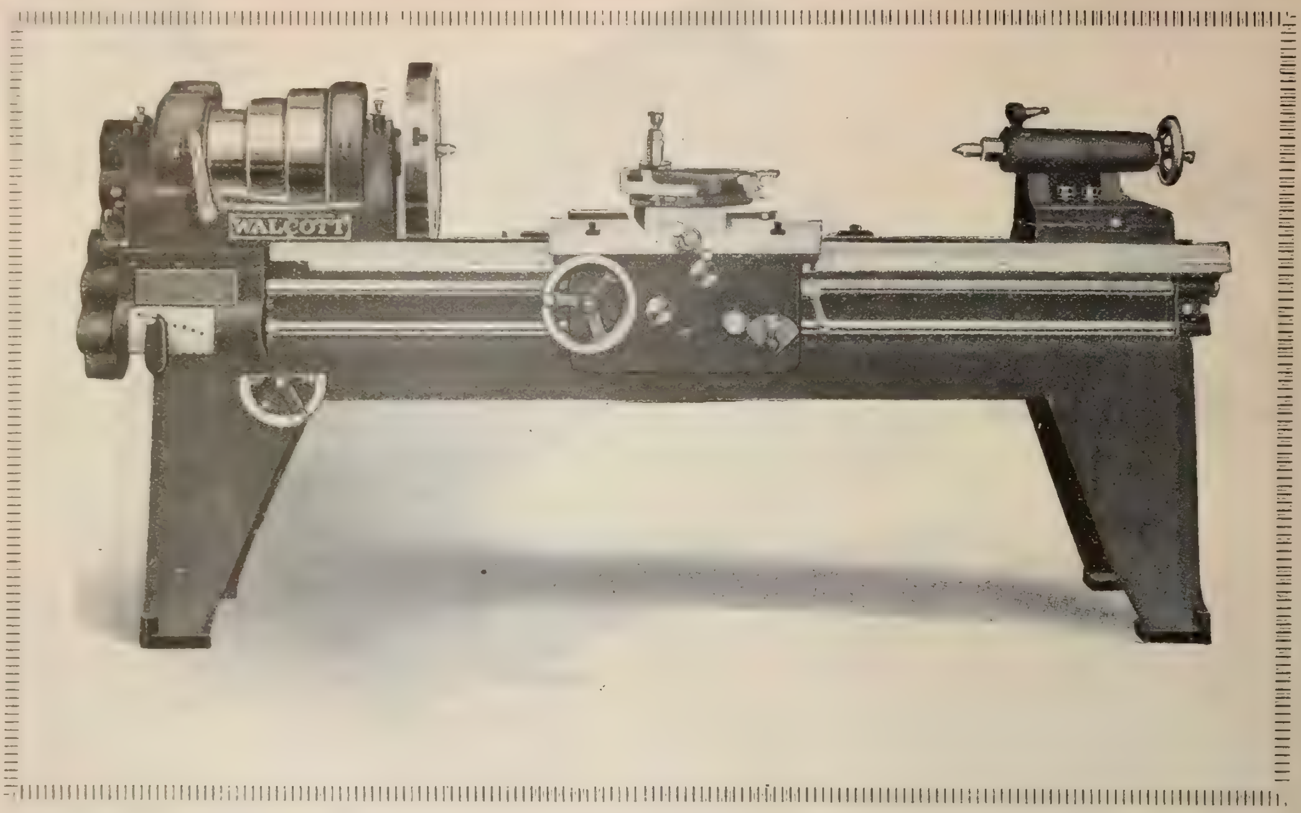
For shaftings and bearings use **Brown's Special Marine Bronze Rod.**

Our prices are right.

A trial will convince YOU that it's to your advantage to buy from us.

BROWN'S COPPER & BRASS ROLLING MILLS LIMITED

General Offices and Mills
NEW TORONTO, CANADA



Established 35 Years

THE REASON

This lathe is one of the reasons why the "Walcott Line" has for the past 35 years been considered to be the ideal line of lathes to obtain the maximum production with minimum cost.

The reason for that opinion will be easily seen because its construction is in entire accord with the latest designs, being a simple, strong and speedy unit with every safety factor possible included in its construction. Features include all-steel gears in apron, 32 feeds, 2 to 112 threads, quick-change gear changes quick-change speed: mechanism interchangeable parts.

Line includes lathes, from 14" to 28". Circulars give complete information.

Walcott Lathe Company

Successors to Walcott & Wood Machine Tool Company

414-420 Jackson Street

Jackson : Mich. : U.S.A.

H. W. PETRIE, Limited, Toronto, Agents

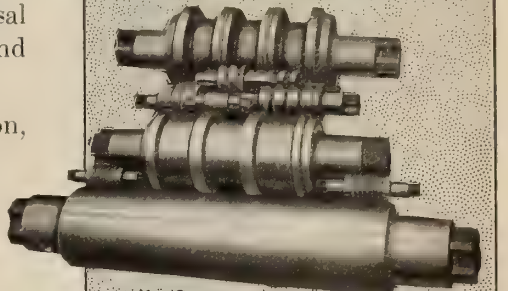
MACKINTOSH-HEMPHILL & CO.

Equipment for Iron and Steel Works

Steel Casting Helical Gear Rim, mounted on Steel Casting Center

ROLLING MILLS.—Unexcelled facilities and large experience in the design and construction of Blooming Mills, Universal Mills for slabs and plates, Structural, Rail, Plate, Sheet and Merchant Mills.

CASTINGS.—Our foundry includes large separate iron, steel and brass foundries, in conjunction with pattern shop and laboratory. We make a specialty of heavy Steel Gears, Pinions and Superior Steel Rolls for rolling mills. We especially recommend our MANGANITE (Steel Alloy) ROLLS as of superior strength and wearing qualities, for Blooming, Billet, Structural and Continuous Mills and for Sheet Mill Roughing Rolls.

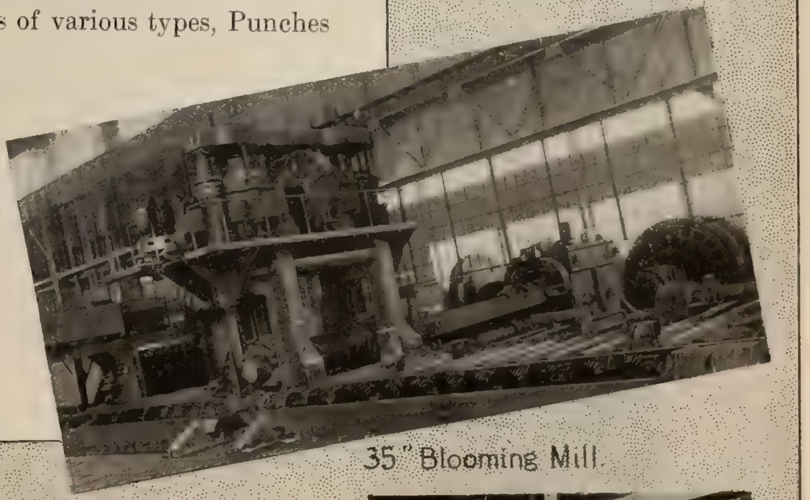


Write for information about our Superior Steel and Manganite Rolls.

OTHER PRODUCTS.—Engines of various types, Punches and Shears, Hydraulic Presses, etc.

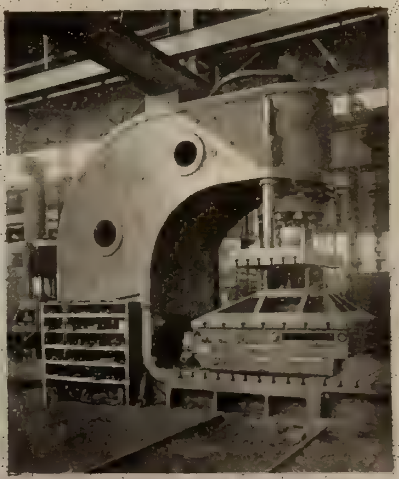
Ask for complete catalog of Mackintosh-Hemphill products. Sent free on request.

Mackintosh-Hemphill & Co.
Pittsburgh, Pa.

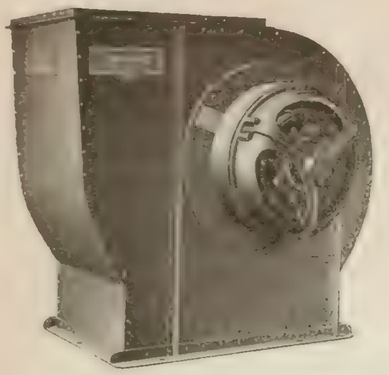


35" Blooming Mill.

26" Lamberton Continuous Running Billet Mill.



400-Ton Hydraulic Flanging Press.



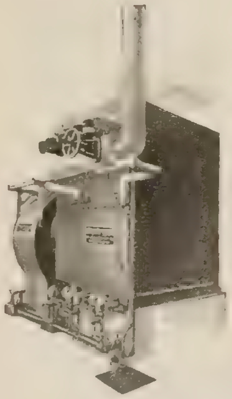
Sturtevant
(TRADE MARK)

Fans, Fans Systems, Heating and Ventilating Apparatus

The Sturtevant Fan System will heat fresh air and distribute it to every corner of your factory. This means not only heating but also ventilation.

Factories which have a positive system of mechanical ventilation, attract and hold the highest grade help. The poorly ventilated factory which has no means of ventilation can only secure low grade help, with corresponding decrease in output and quality of workmanship.

Surely abundant fresh warm air in water and fresh cool air in summer will increase the efficiency of your men—raising your output—as it has done in all shops where Sturtevant Heating and Ventilating Systems have been installed.



Sturtevant
(TRADE MARK)

Individual Heater Units for Shop Heating

Illustration shows small self-contained heating unit with turbine-driven disc fan. These units diffuse large volumes of warm air along the floor, and are ideal for heating shops, roundhouses, industrial buildings, pump-houses or oil-houses.

ADVANTAGES:

> Inexpensive — Self-contained — Require only one steam pipe—Exhaust steam from turbine used in coils—Can be moved by crane or truck to other location or plant—Can be readily sold—Belt-drive or motor-drive is readily possible.

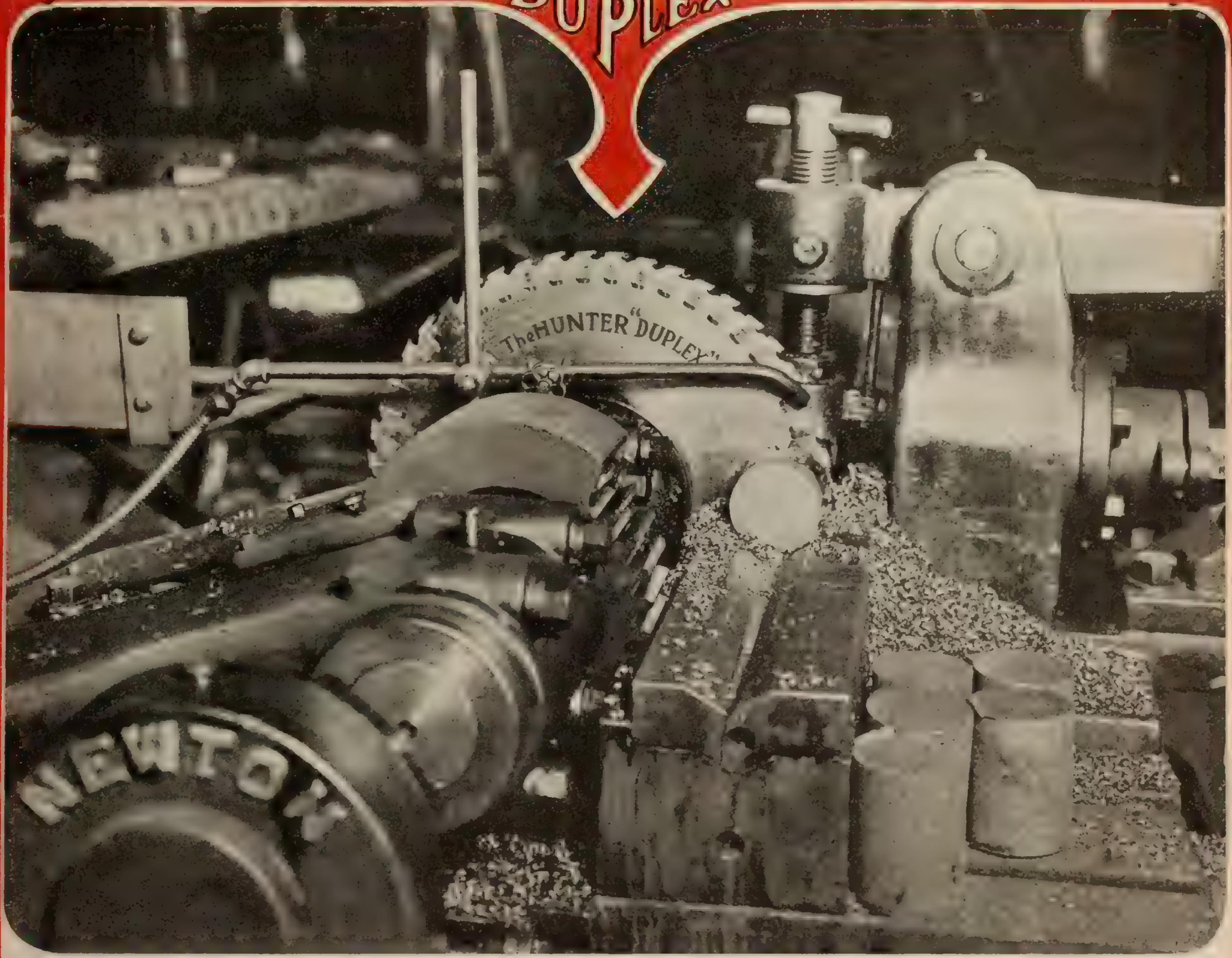
No matter what you need in the way of heating or ventilating apparatus or fans, we can serve you. Write for our general catalog 195-I.

B. F. Sturtevant Company, of Canada
LIMITED
GALT, ONTARIO, CANADA
MONTREAL TORONTO WINNIPEG VANCOUVER

Sturtevant
TRADE MARK

HUNTER

DUPLEX



Hunter Duplex cutting Shrapnel in prominent Canadian Munition Plant.

SAVE TIME

Hunter "Duplex" Saws make a big saving in time, and make for more efficient work, when employed on Shrapnel or any other Stock.

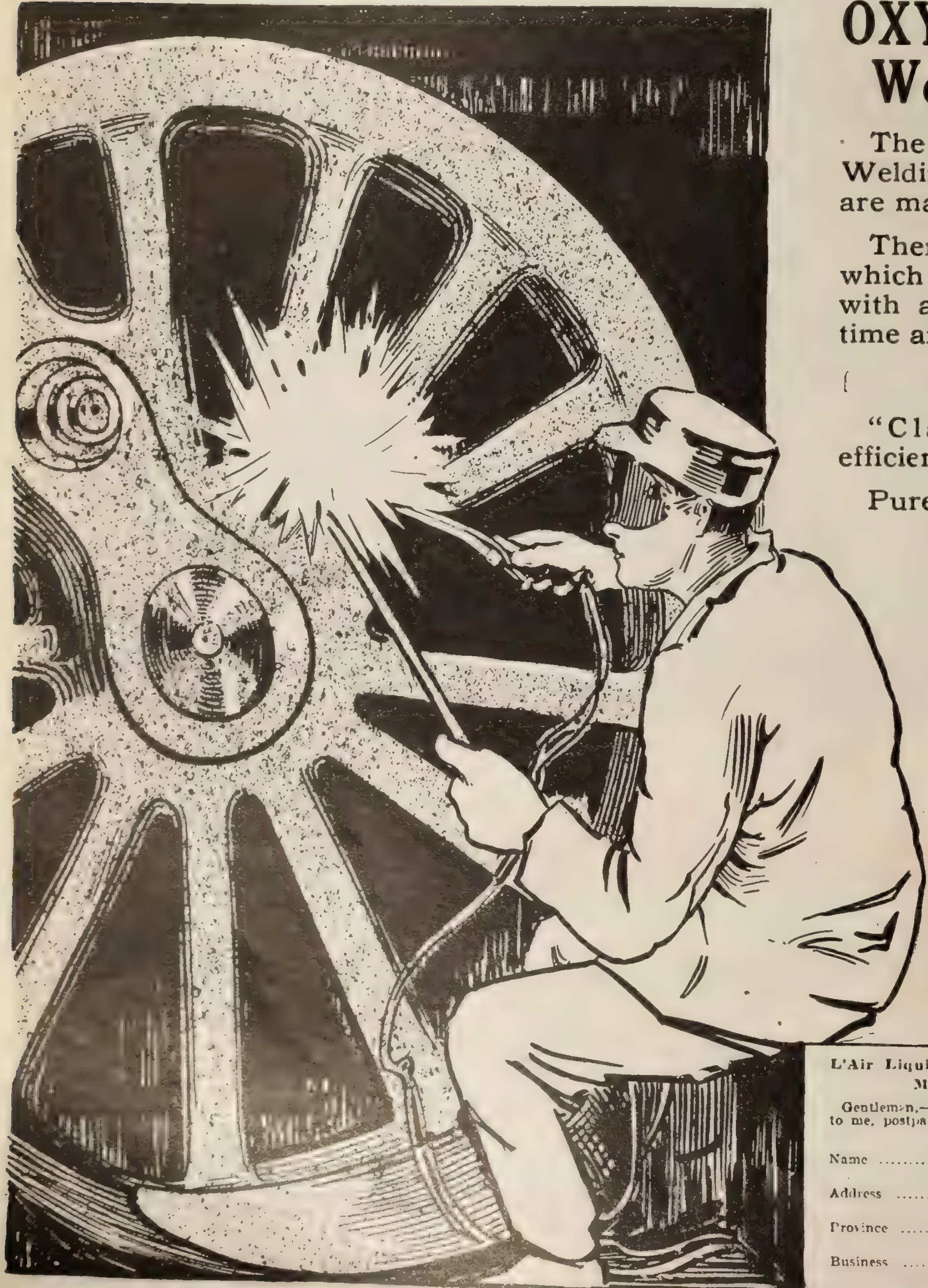
Illustration shows a Hunter "Duplex" **cutting billets for 18-lb. Shrapnel Shells** in a prominent Canadian Munition Plant. Hunter "Duplex" makes easy work of tough cutting.

We will be pleased to demonstrate the saving you can make by installing a Hunter "Duplex" inserted tooth blade.

Hunter Saw & Machine Co., PITTSBURGH, PENNA., U.S.A.

The day of the necessity of scrapping Broken Castings or Machine Parts because of a break or defect is gone

Many manufacturers are not only saving the buying of new parts but are eliminating delays and inconvenience by the use of the



OXY-ACETYLENE Welding Process

The uses of Oxy-Acetylene Welding and Cutting Plants are many.

There are dozens of ways in which you can employ them with a saving of considerable time and money.

Write for catalog.

"Claude Oxygen"—pure, efficient, low-priced.

Pure Dissolved Acetylene.

L'AIR LIQUIDE SOCIETY

Factories the World Over:

26 Boler Street, WEST TORONTO; Maisonneuve, MONTREAL; 325 William Avenue, WINNIPEG.

Send coupon for full particulars.

L'Air Liquide Society, Maisonneuve,
MONTREAL, P.Q.

Gentlemen,—Will you please send, without obligation to me, postpaid, your New Booklet?

Name ....

Address ....

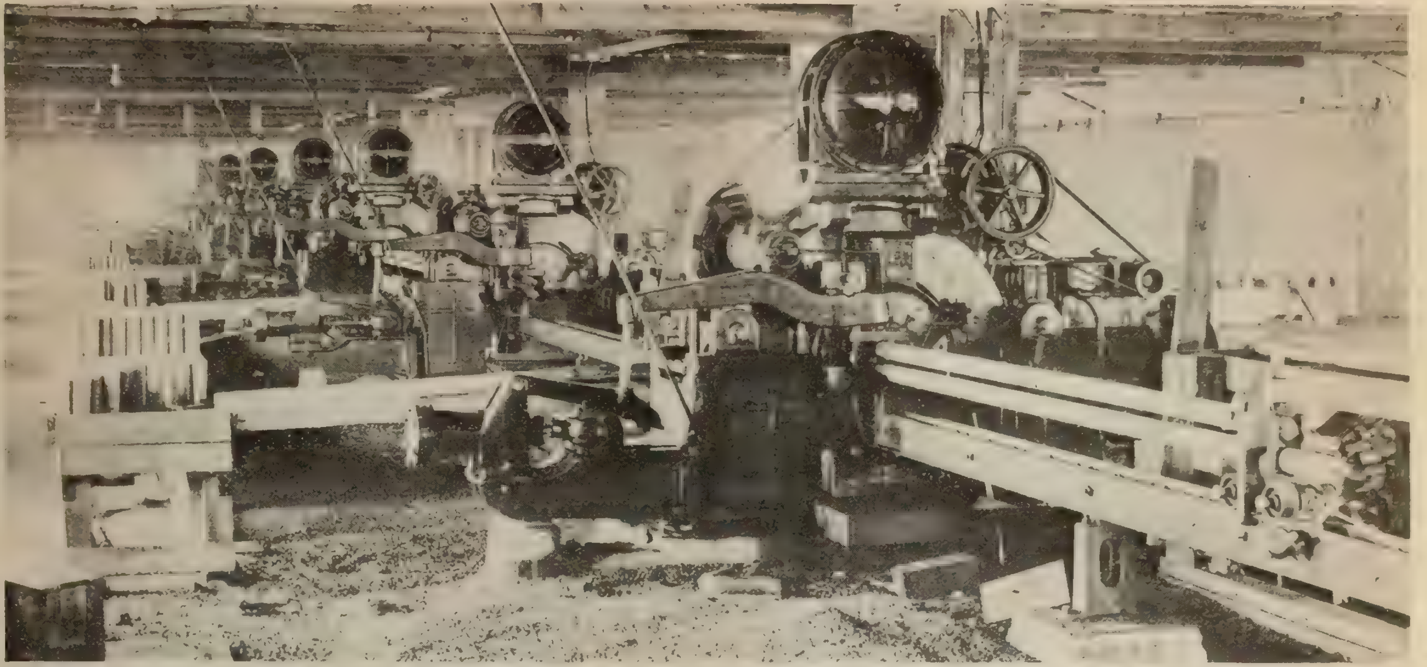
Province .... Date ....

Business ....

C.M.

Mention this paper when writing advertisers. It will identify the proposition about which you require information.

Battery of Gortons "Doing Their BIT"



Seven 6-inch Gorton Heavy Duty Cutting-Off Machines Installed in Plant of Dominion Iron & Steel Co., Limited, Montreal, Can.

THE DOMINION IRON AND STEEL CO. have fifteen 6″ Machines—also THREE of our 13″ Machines. In a letter received from them they express themselves regarding these machines, as follows:

> **"We have the most up-to-date Cutting-Off equipment on this Continent, which are turning out at the present time 12,000 tons shell blanks per month, cut into lengths ready for forging, being 3½ to 9″ Rounds, all .55 carbon. The fine work done by your machines is the admiration of all who have had an opportunity of seeing them in operation."**

General Superintendent C. S. Martin states: "We have seven of these machines, each operating about 22 hr. per day in the cutting of Mill Length Bars of 3½ in. diameter into 9¾ in. Shell Blanks, each machine producing from 900 to 1,000 blanks daily. This output could be considerably increased by use of one of the High Speeds, but recent supplies of High-Speed Cutter Steel has rendered the operation of High Speeds inadvisable . . . Under normal conditions, and a better quality of High-Speed Steel available, we believe no difficulty would be experienced in increasing our output to 1,200 or 1,300 blanks per day.

"Up to the present, we have had very few mechanical defects in our cutting operations, the Machines standing up to the work very well."

This same firm has reordered FOUR TIMES since placing their first order

It is reasonable to claim that what these machines are doing for this, and many other firms throughout the world, they will do for you.

Decidedly, this is the only machine for shrapnel and shell work. Cost of production and repairs considered, is the cheapest tool of its kind there is. Built by a firm that has as its head one of the most capable machine and tool designers in the country. The product of this shop has a decade of enviable record for actual performance and economy of operation. The very appearance of the machines shows their inherent strength.

In its present condition this tool is as perfect as mechanical skill and precision *can make* it, based on the actual building and testing out of various styles and types. The machine shown is exceedingly rugged in every detail, suitable for constant hard service continually, month in and month out, without excessive repair.

When severing a 6-in. ordinary round steel bar in 40 seconds there is absolutely no chatter or vioration. This means prolonged life of cutter over 700 cuts without sharpening—a record hitherto unheard of.

Approximate cost per 100 blanks $1.60 to $1.65. Mark you, this includes all labor cost of handling the bars, placing in the machines, cutting off, removing burrs, marking and loading on the cars. In other words, $1.60 to $1.65 represents the actual cost from bar to car.

When cutting 6½-in. round finished shell steel the production is 550 per 22-hr. work while the same machine operating on ordinary open-hearth steel would double the output—1,100 billets.

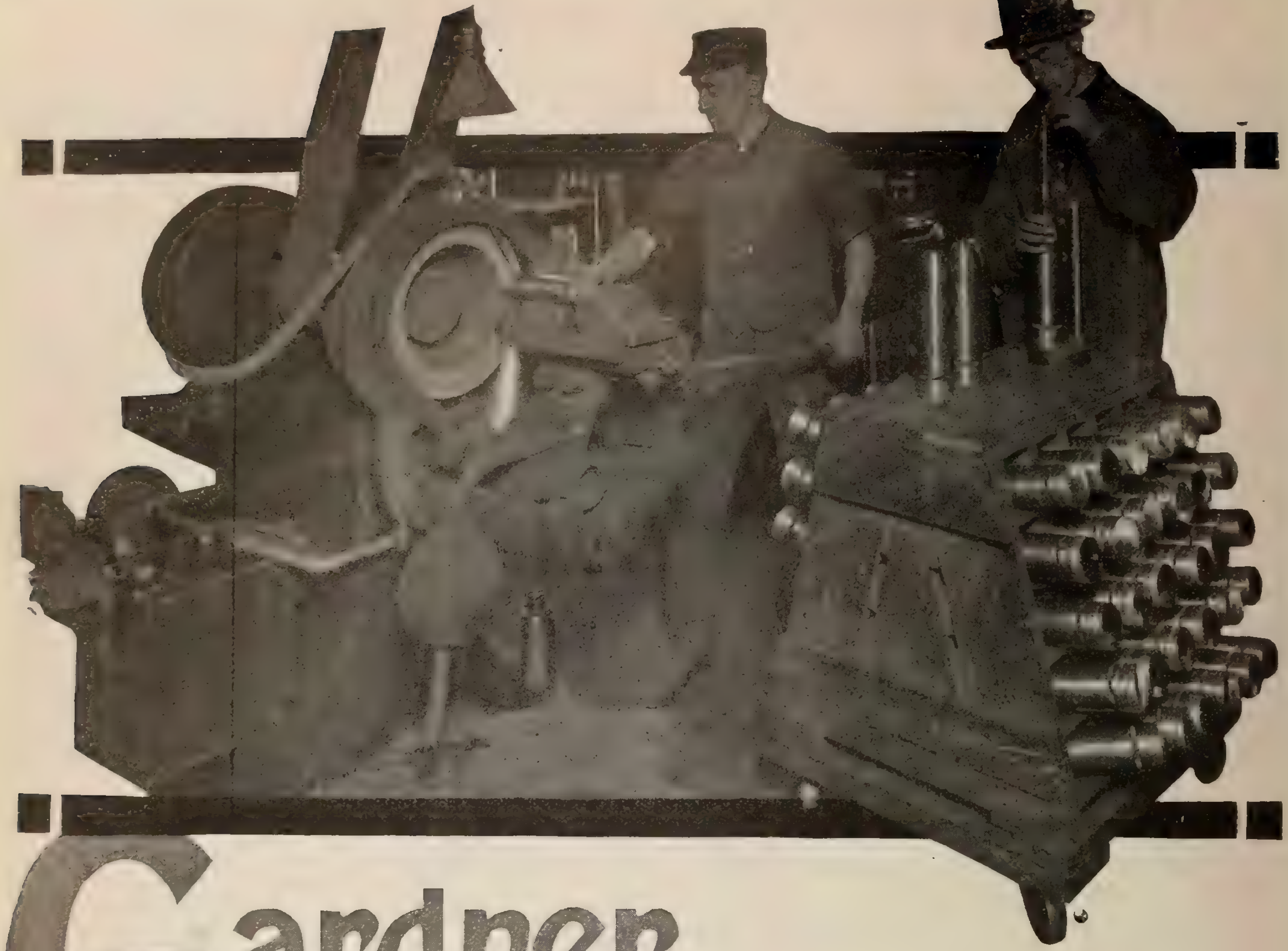
Prompt—6½-in. rounds or less machines, one each week. 13-in. machines, one every 30 days. These machines will operate successfully 24 hours day in and day out, yet keep out of the repair shop. Send for illustrated descriptive catalog—free for the asking—no obligation incurred

Manufacturers Engraving Machines and Fine Machine Tools of all kinds. Large stock standard H.S.T. Steel Cutters always on hand.

Geo. Gorton Machine Co.

Racine, Wis., U. S. A. Cable Address, Gorton, Racine

Use A.B.C. Code (4th edition) or Western Union Code (Universal Edition). Prompt attention given all inquiries.



Gardner Grinders

Illustration shows a grinder developed especially for removing the hub or centre projection from the ends of shells. This machine is also used for cutting off the square or angular hubs from High Explosive Shell Base Plates. We build a much more powerful grinder to be used for these same operations on 6-inch shells.

Features:

High-grade Babbitt Bearings and Lever Feed.

Rapid clamping of Shell into "V" fixture.

Pump and water system driven from countershaft directs the water or grinding compound at point of grinding contact.

Can be equipped and operated at both ends for double output.

Output, according to size of projection to be removed from 40 to 100 per hour. Equipment includes two 16" Perfection chucks, two 16" abrasive ring wheels, two semi-universal lever-feed work tables, two shell-holding fixtures, water and pump, with connections; countershaft and usual attachments. Weight, 4,500 lbs.

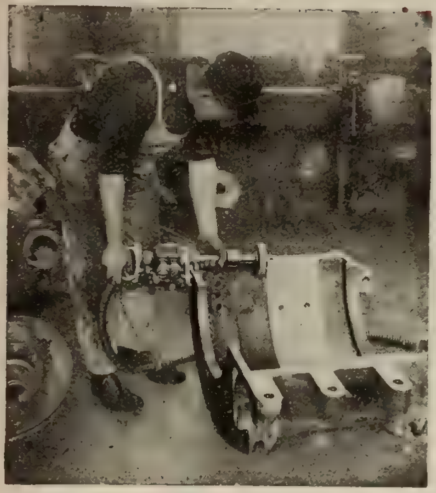
For further particulars write:

The Gardner Machine Company, Beloit, Wis, U.S.A.

Thor

Pneumatic Tools

Electric Drills



Grinding out Cylinder with No 7½ Thor Grinder.

Riveting in Base of Shell with Thor Single Valve Chipping Hammer.

Drilling in Automobile Frame with Thor Electric Drill.

HOW MUCH DOES IT COST YOU

in time and labor every time an air tool fails?

This is the cost you must reduce if you get real economy—the cost of time and unproductive labor.

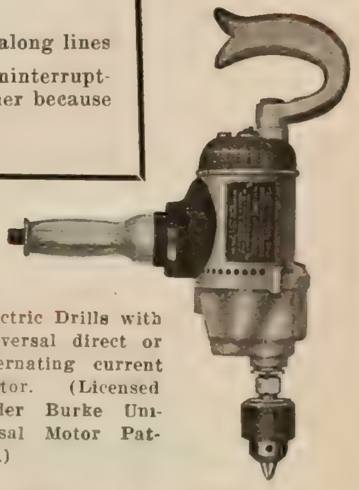
Thor tools are constructed by mechanical experts along lines that insure air tools and electric drills that will give uninterrupted service. They satisfy both the workman and the owner because they save time, labor, trouble and expense.

Ask for circular showing complete line.

SHIPPED ON TRIAL FREE

Only Portable Pneumatic Grinder made with Corliss Valves, Roller Bearings, and Vanadium Pressed Sttel Toggles.

Chipping Hammer with single valve of latest improved design. Light and easy to operate. No vibration.

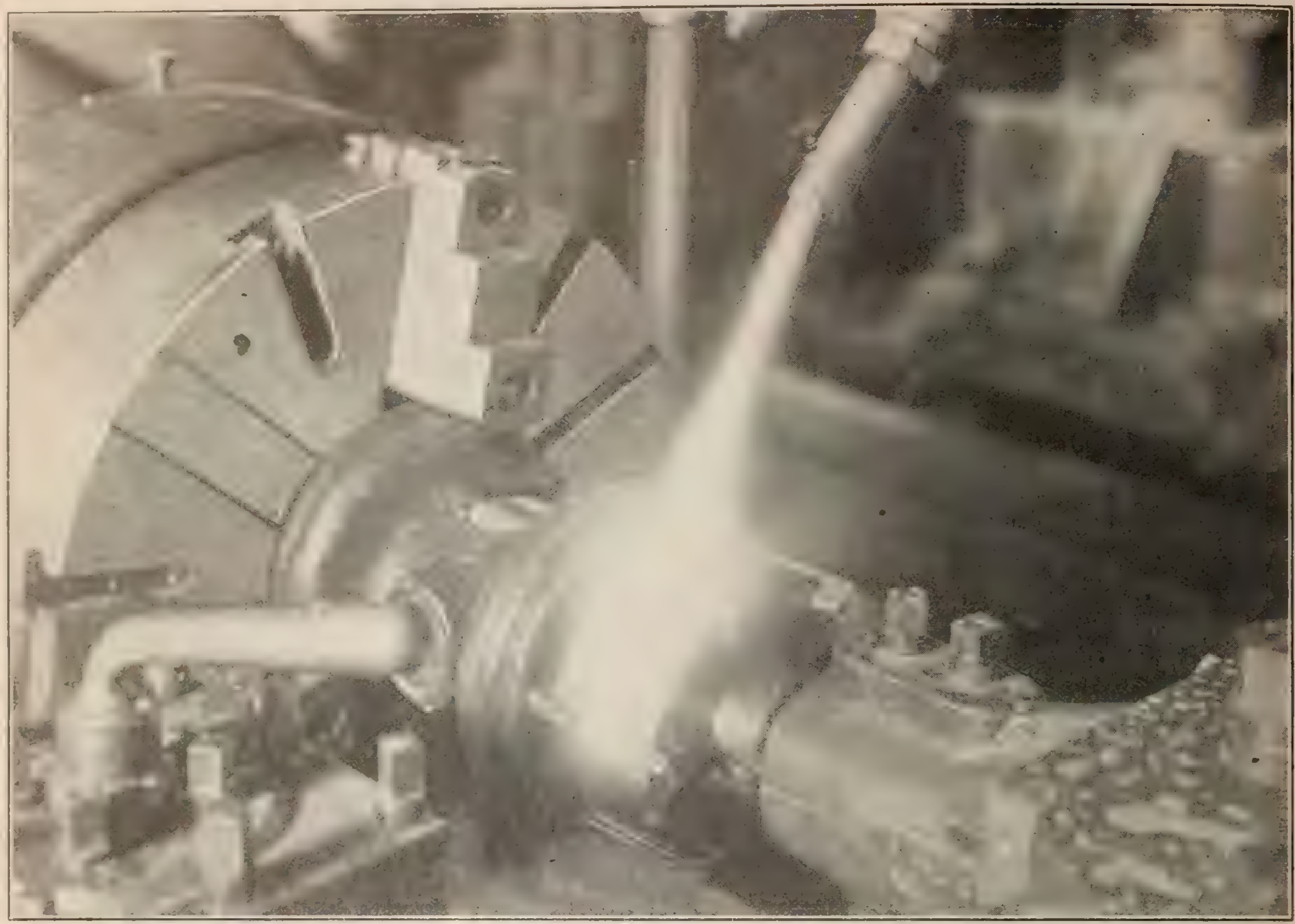


Electric Drills with universal direct or alternating current motor. (Licensed under Burke Universal Motor Patent.)

INDEPENDENT PNEUMATIC TOOL COMPANY

334 St. James Street ∴ MONTREAL

32 Front Street W., Toronto
123 Bannatyne Avenue E., Winnipeg
1142 Homer Street, Vancouver



Recommended After Practical Tests

Speed is demanded in all cutting operations, provided the quality of work is kept up to the highest point. When Mystic Cutting Compound is working in co-operation with the operator the tools have no chance of losing their temper or cutting-edge from overheating. Mystic keeps a strict and constant contact with the friction points and has them perfectly lubricated at all times.

It has four distinct features that will convince you of its excellent quality.

1. For machining Shrapnel Shells it has no equal.
2. Will not separate in solution, gum machines or rust.
3. It increases production and costs less.
4. It is non-combustible, and contains nothing injurious to operator's hands.

Our confidence in its quality, backed by the opinions of our users, as shown in our excellent free trial offer. Remember, you will be under no obligation. Inquire at once.

The sooner you inquire—the more you will save in production cost, and the better the results.

We will demonstrate, free of cost, the value of Mystic Compound.

Cataract Refining Company, Limited

Toronto, Ontario, Canada

ATTENTION, CANADIAN MANUFACTURERS

An Opportunity for an Aggressive Concern to Secure a Protected Industry

The license for the **Anderson Rolled Gear** (now being manufactured in England and United States in large quantities) is open in Canada. This gear, which is generated hot in a few seconds, equals or betters the accuracy of any cut gear, has a forged tooth, which shows in test 25% more strength. Any form of tooth, including double helical, spurs or bevels, can be rolled as readily as the straight spur or bevel, and these forms of gears are far more desirable but could not be produced economically enough for commercial purposes. Practically all gears which have been manufactured to date are used in automobile rear axles, where highest accuracy is required. The market for gears is a large one, as nearly everything mechanical carries gearing.

Samples and full information to responsible concerns desiring to investigate.

Address

H. N. ANDERSON
Station G - CLEVELAND, OHIO

This machine will thread any size of shell from 6" to 9.2", also larger by using special chucks.

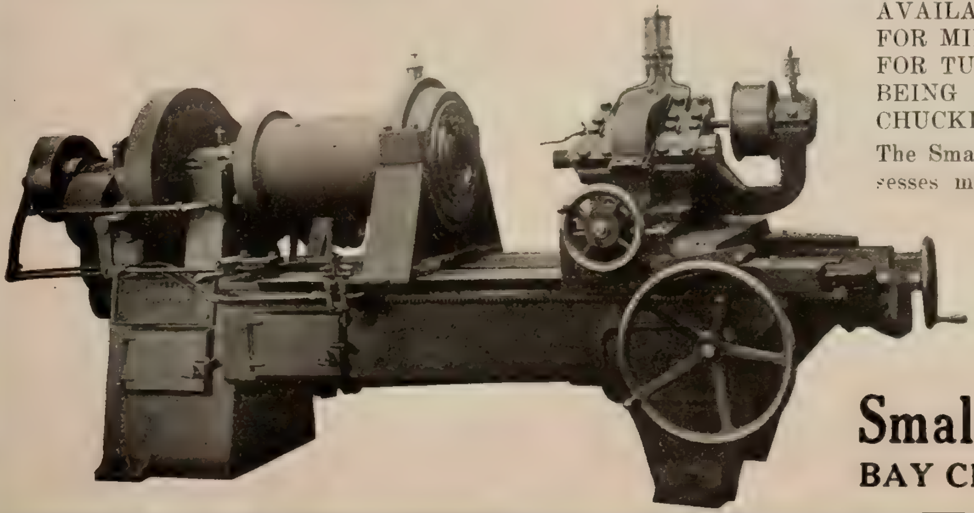
Other sizes up to 18 in. dia. by 6 ft. 6 in. long.

Smalley-General Thread Millers

The Smalley-General Thread Miller possesses maximum productive capacity because of its correct design and properly disposed weight, which enable it to withstand hard use indefinitely.

The illustration shows machine equipped with air-operated collet chuck for either shells or adapters; semi-pot chucks can also be used.

TWO SPEEDS ARE INSTANTLY AVAILABLE, THE SLOW SPEED FOR MILLING AND THE FAST ONE FOR TURNING, BOTH OPERATIONS BEING PERFORMED AT THE ONE CHUCKING.



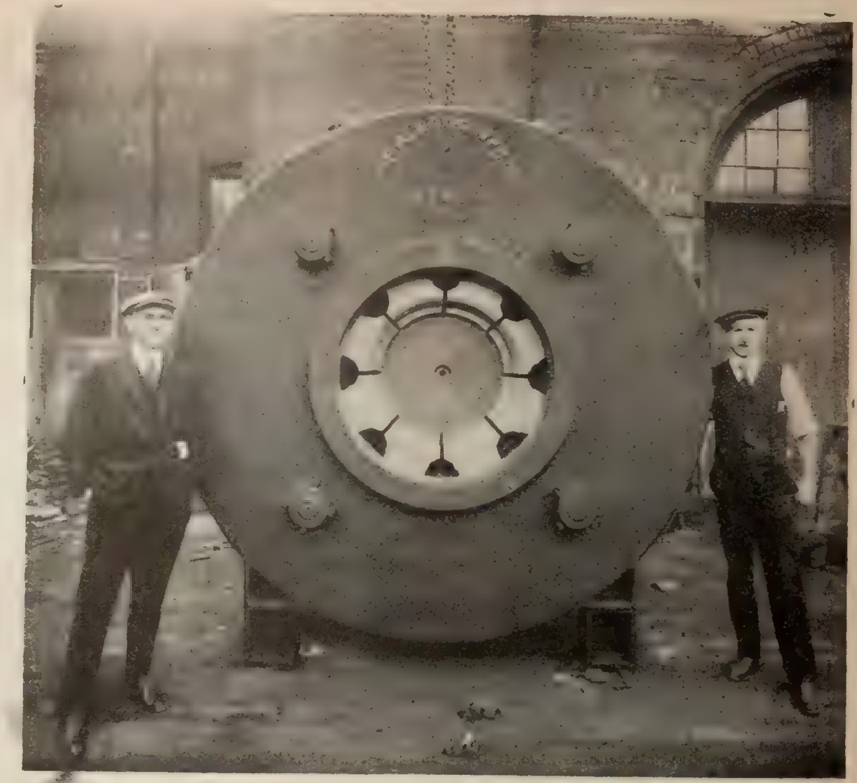
The Smalley-General Thread Miller possesses maximum range of capacity for its size and is used by the United States Government.

Built with either belt or motor drive.

Prompt shipments of this machine can be made.

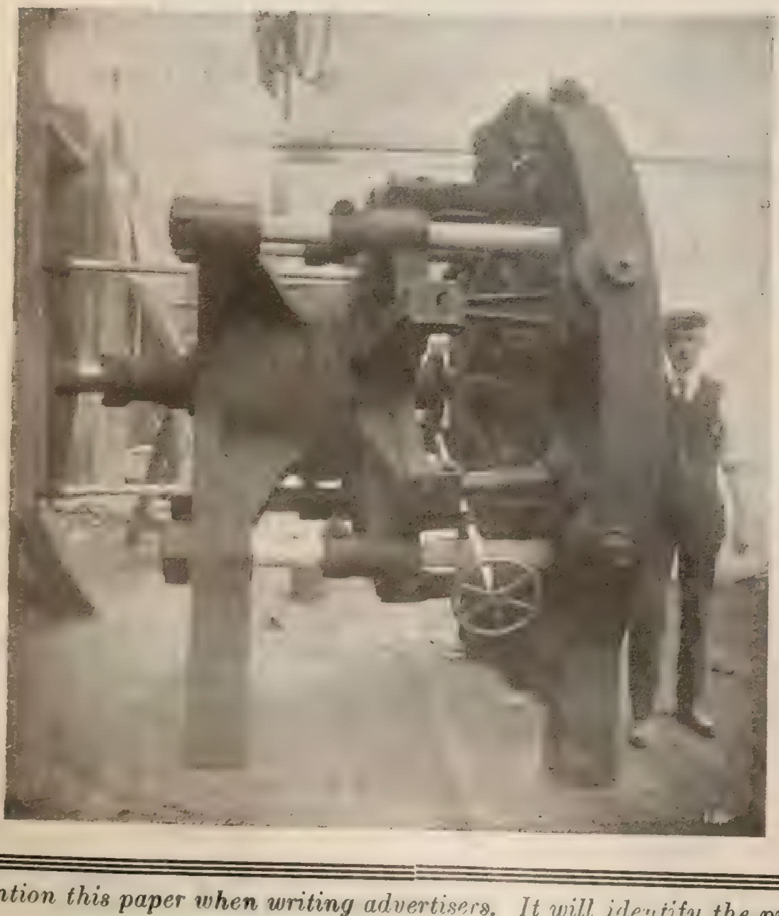
Smalley-General Co.
BAY CITY MICH., U. S. A.

A recent development of High-Speed Hydraulic Machinery—



Hydro-mechanical Rim Shrinker for Automobile Rims.

Combination of Hydraulic and toggle, with constant pressure pull-back, and adjustment for stroke of ram. Maximum closure, 3" diameter.



Designed for Accumulator pressure.

All steel construction. Carbon steel toggles and dies. Dies interchangeable.

Weight: 26,000 lbs.

Metalwood Manufacturing Co.
Detroit, Mich., U.S.A.

Butterfield & Co.
Derby Line, Vt. U.S.A.
Rock Island, Canada
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WHIT. STD.

Butterfield-

Taps—Dies Reamers

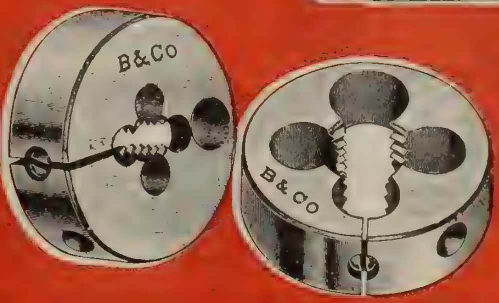
Unusually tough propositions in threading or reaming is ordinary work for Butterfield tools.

You can't make a mistake when you buy "Butterfield" tools. *They are remarkably fast and accurate workers,* — and the reputation which has taken us years to build up—stands back of every one of them.

Write for a copy of our catalog.

Butterfield & Company
Inc.
ROCK ISLAND, QUEBEC,
CANADA

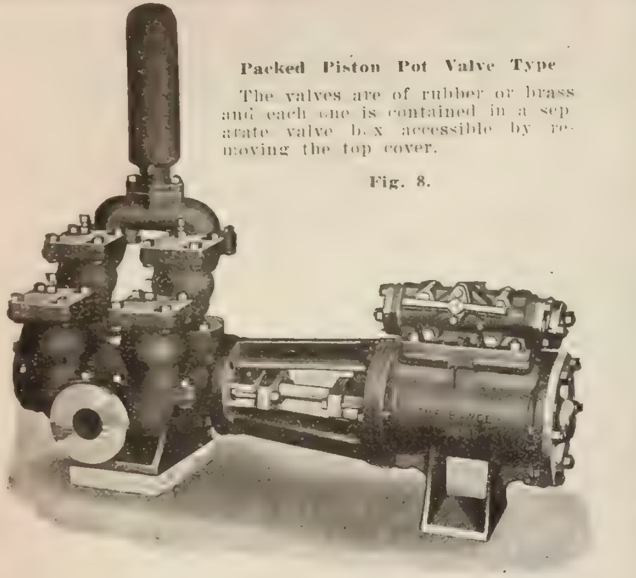
BUTTERFIELD & CO.



BUTTERFIELD & CO.

BAWDEN

PUMPS



Packed Piston Pot Valve Type

The valves are of rubber or brass and each one is contained in a separate valve box accessible by removing the top cover.

Fig. 8.

ADVANTAGES

No Tappets, No External Valve Gear Levers, No Springs, No Internal Tubes or Stuffing Glands

The Steam end has absolutely nothing to go wrong; it will make a full stroke under any and all conditions, run at any working speed without adjustment, and has no dead centres, proved by the fact that it will run on water pressure as well as steam pressure.

The water valves have the seats driven in on a special taper and held solid with brass stoppers through top cover, making it impossible for them to rattle or shake loose.

OUR GUARANTEE:

A– Saving in steam consumption over all standard duplex pumps.

B –To make a full stroke of the piston under all conditions.

C –Has no dead centres.

D Run at any working speed without adjustment of any kind.

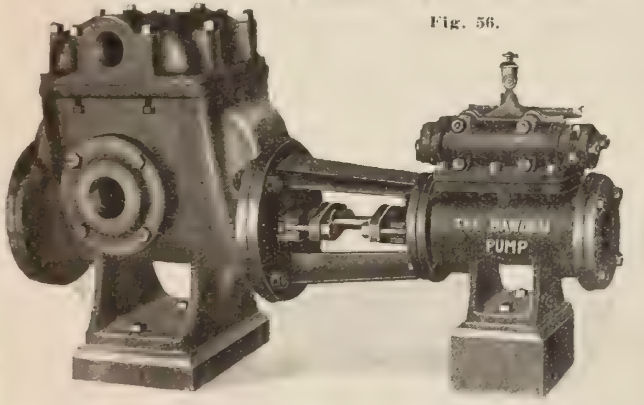
E Not to knock or bang.

F –Pumps to be all we guarantee, or returned at our expense.

Vacuum Pumps

These long full stroke pumps embody the best features for producing high vacuum. The pump valves have large areas and are all water sealed.

Fig. 56.



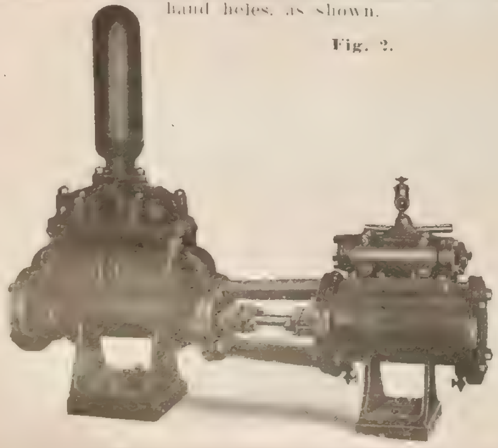
The Bawden Machine Company, Ltd.

125-137 Sterling Road, TORONTO, CANADA

Packed Piston Type

Pistons are packed with best quality hydraulic packing. The valves are of rubber or brass and accessible through hand holes, as shown.

Fig. 2.

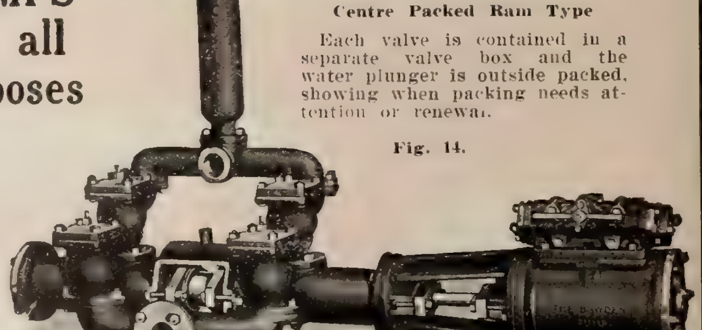


PUMPS for all purposes

Centre Packed Ram Type

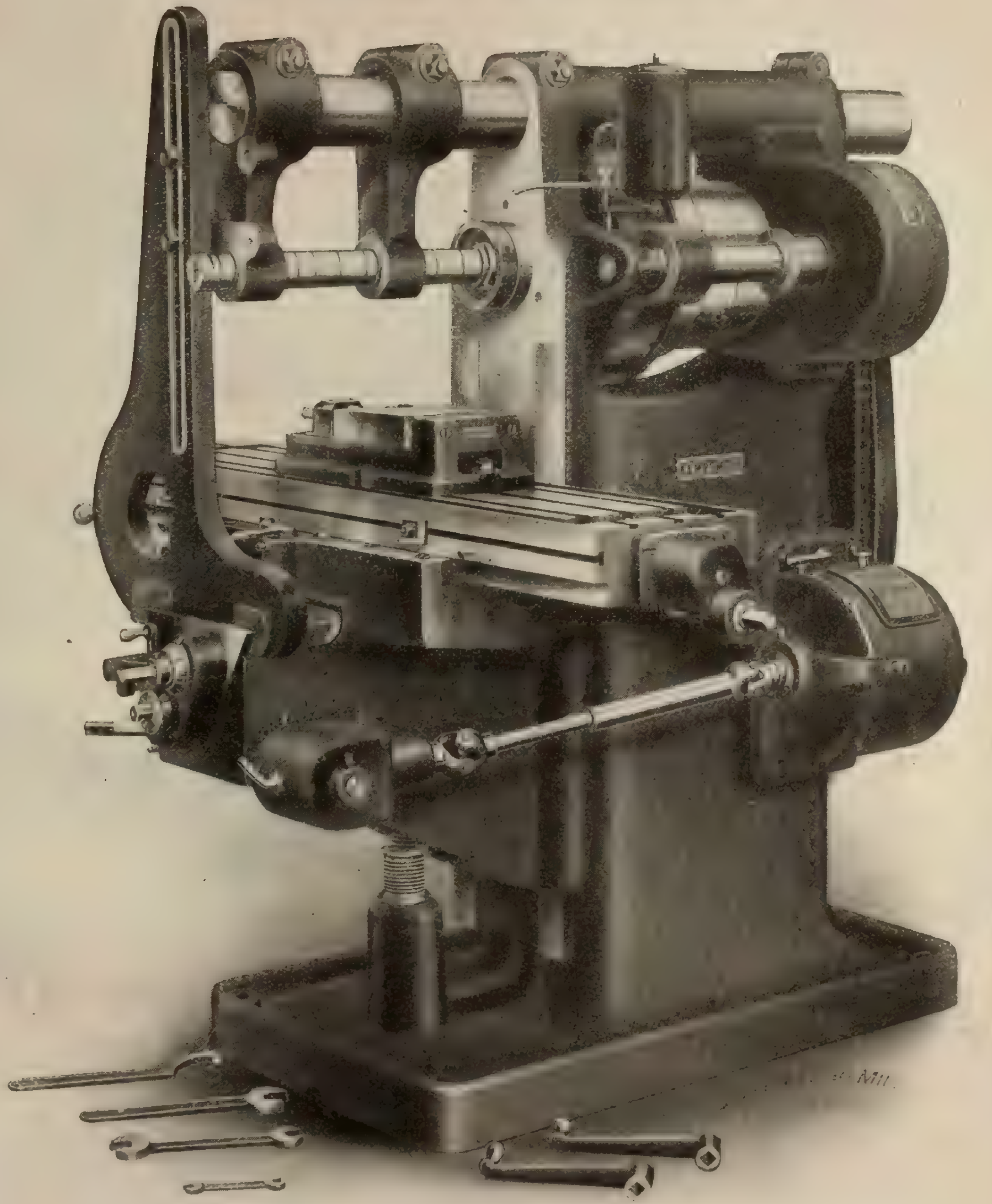
Each valve is contained in a separate valve box and the water plunger is outside packed, showing when packing needs attention or renewal.

Fig. 14.



BAWDEN NEVER-SHORT-STROKE PUMPS

KEMPSMITH



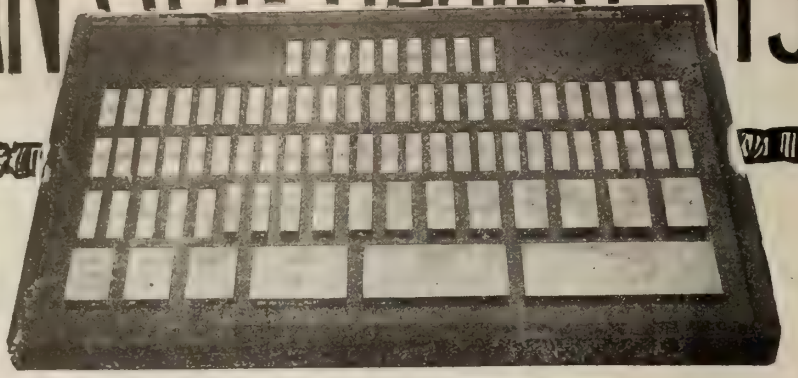
KEMPSMITH MILLING MACHINES

We solicit your inquiries when in the market for Milling Machines.
Our catalog illustrates many reasons why we think we
can satisfy the most exacting requirements.

THE KEMPSMITH MANUFACTURING CO.

MILWAUKEE, WIS., U.S A.

JOHANSSON GAGING SYSTEM



The Standard of the World

Accuracy .00001-in.

Johansson Standard Gages

Adopt THE LIMIT SYSTEM and use the "Johansson" as your standard. Any desired size quickly obtained! Their use in the tool-room for laying out and checking jigs, dies, fixtures, gages, etc., is unlimited. They are equally valuable in the inspection department. They save time, eliminate argument, detect mistakes, prevent waste, and add to your reputation. They are ideal for setting and checking

Johansson Shop Gages

The Johansson Adjustable Limit Snap Gage and The Johansson Adjustable Limit Plug Gage are correctly designed and constructed in every detail. They *save you money* because they are adjustable for wear, different sizes, and changing limits. They give you a Gaging System with a gage always *ready* for any size or any limit. They have steel measuring plugs, hardened and seasoned by "Johansson methods." Both gages are light in weight, but strong and durable. A particular feature of the *Snap Gage* is its insulated grip. The unusual design of the *Plug Gage* permits the sensitive measuring of blind holes and holes of various depth since different length handles can be used. The name "Johansson" on every gage is a guarantee for quality.

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Wherever there is a quantity of work that must be turned, bored and faced, or formed, you will find the "LIBBY" Lathe making big money for the user.

The entire control of the machine is concentrated for the operator, and so designed as to reduce to a minimum the actual manual labor required of him, and to offer him every assistance and inducement to push the machine and get the results.

Drop us a card for Specifications and Full Details.

26-in.
LIBBY
"C"
HIGH-POWER TURRET LATHE
FOR RAPID PRODUCTION

International Machine Tool Co.

INDIANAPOLIS,
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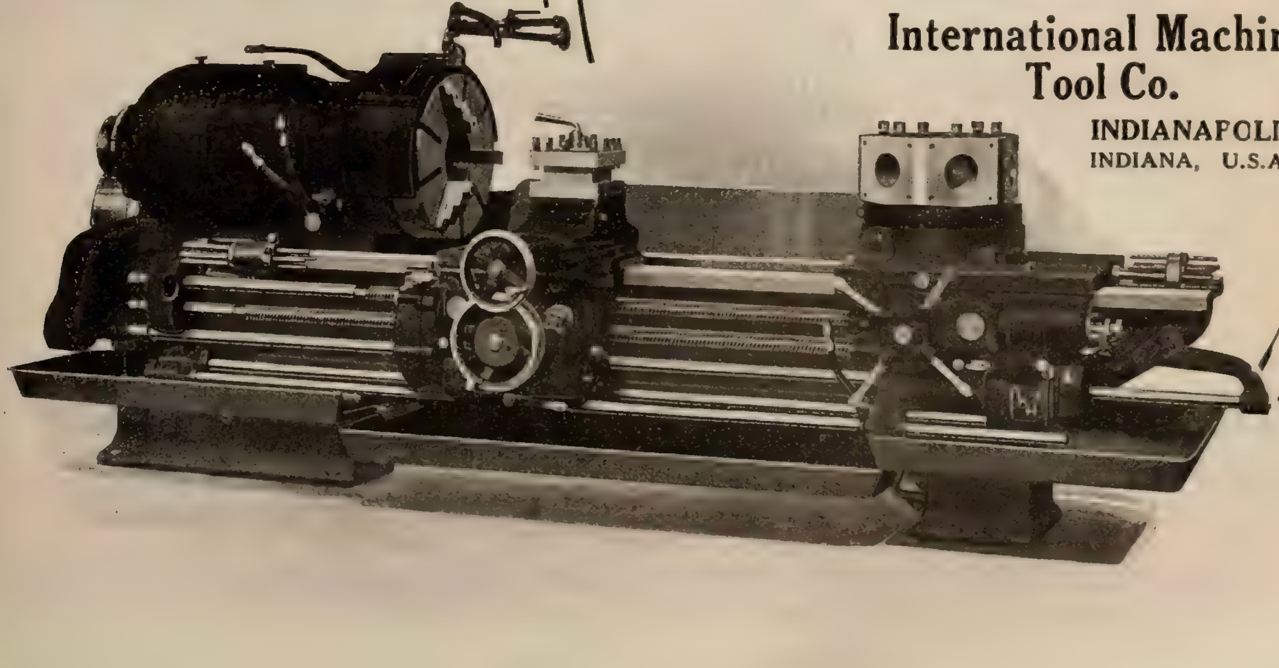
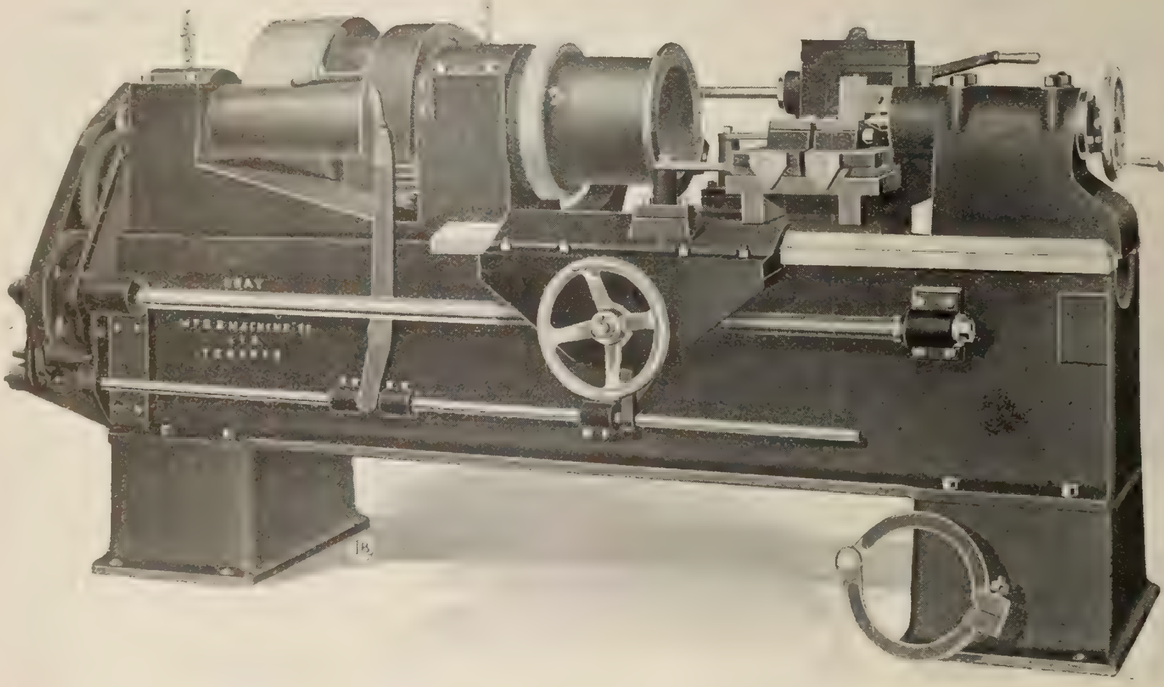


HEAVY DUTY LATHES and WAVING MACHINES



Machine for Waving and Undercutting 9.2 Shells. Weight, 8,000 pounds.

Equipped for various operations on 6-in., 8-in. and 9.2 Shells, and ready to use.

DESIGNED AND BUILT FOR HEAVY DUTY AND CONTINUOUS SERVICE.

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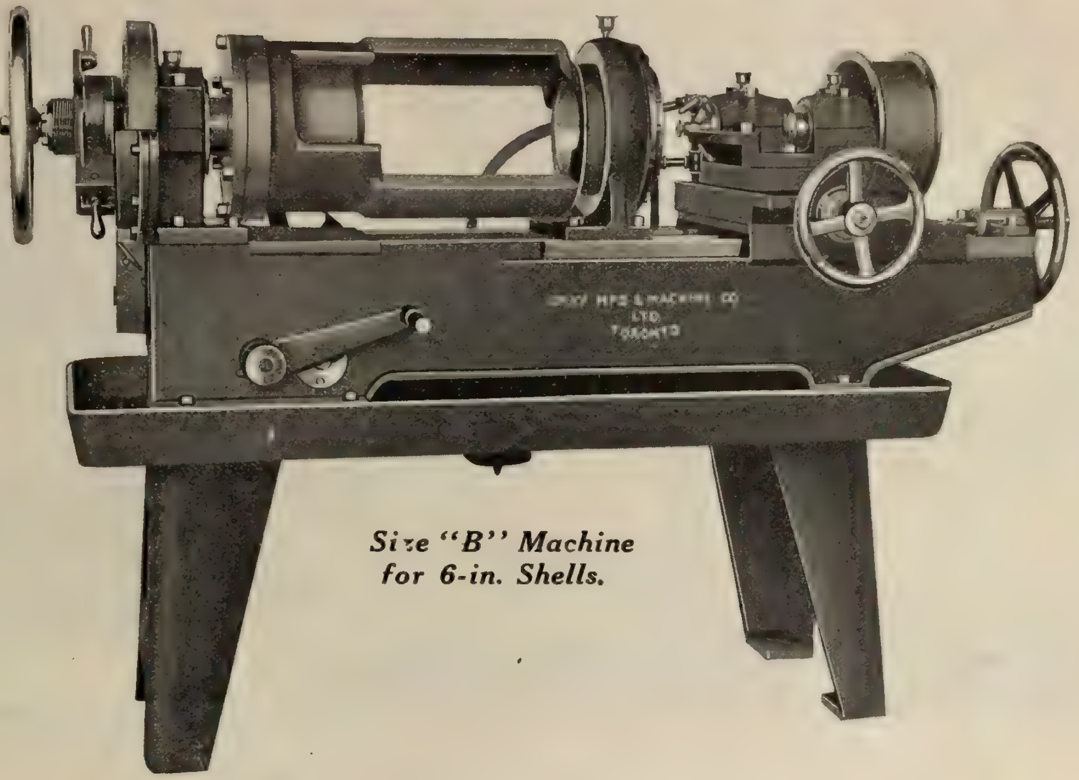
THE GRAY MFG. & MACHINE CO., LIMITED

686-692 St. Clarens Avenue -:- Toronto, Canada

THREAD MILLERS



Size "B" Machine for 6-in. Shells.

Accurate Threads

The Gray Thread Miller is designed with ample strength and solidity, and built with high-class and careful workmanship, so that continued accuracy is assured, combined with high production and low maintenance cost.

True Seats

All standard Gray Thread Millers are arranged to run at two speeds, and a suitable tool holder is placed on the cutter spindle slide, so that, at the same setting, the fuse seat or plug recess may be trimmed, making these surfaces perfectly true with the threaded hole.

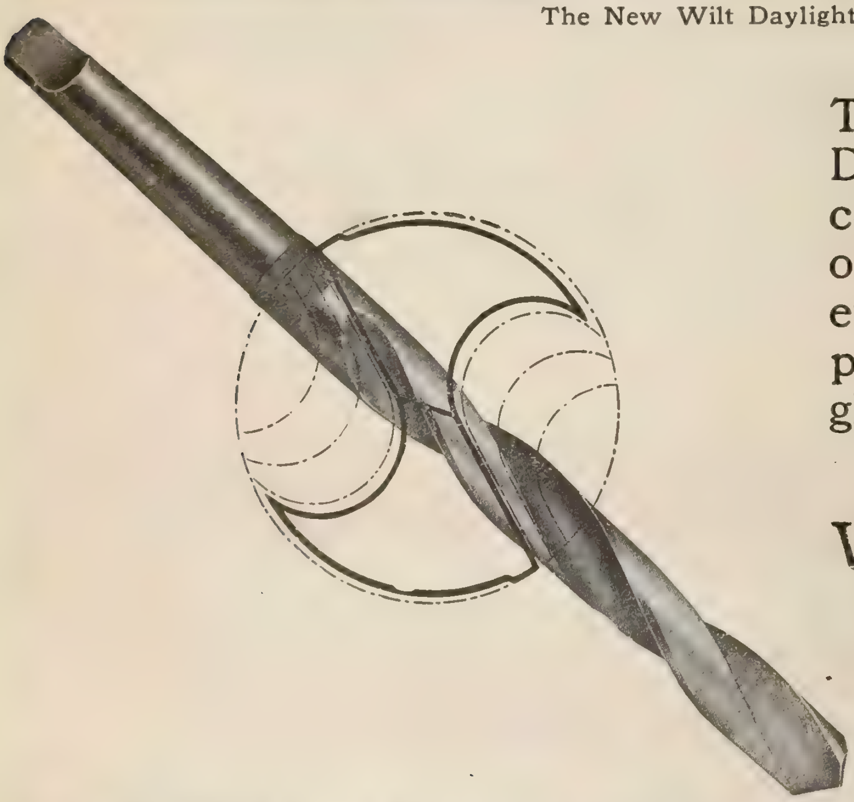
We also manufacture a size "A" machine for shells 5" and smaller, and a size "C" machine for 8" and 9.2 Shells and Base Plugs.

PROMPT DELIVERIES.

THE GRAY MFG. & MACHINE CO., LIMITED

686-692 St. Clarens Avenue -:- Toronto, Canada

The New Wilt Daylight Factory



That WILT TWIST DRILLS have gained the confidence of the majority of Canadian users is evidenced by the above picture of our new modern glass-roofed plant.

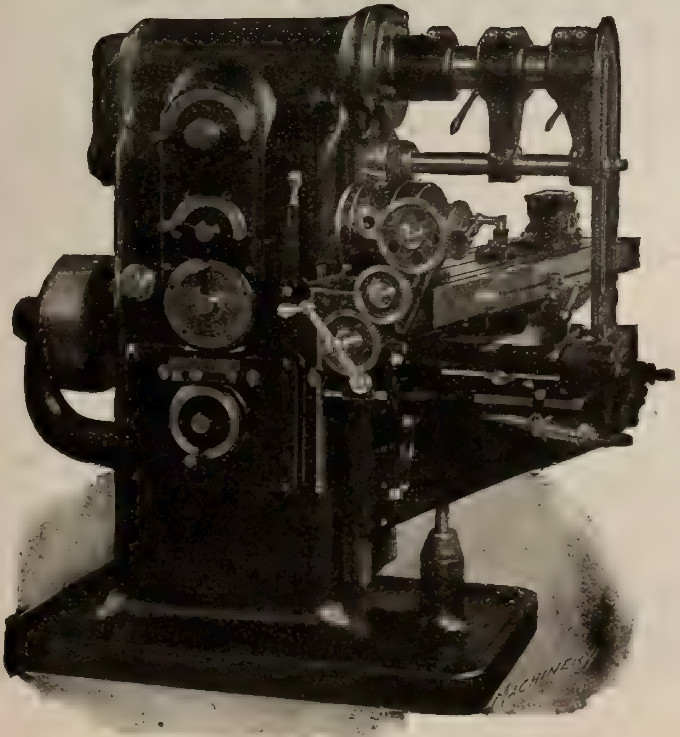
WILT—SYNONYMOUS WITH QUALITY

The Wilt Twist Drill Co. of Canada, Limited

WALKERVILLE, ONTARIO, CANADA

Speed in Production

"Rockford" Milling Machine



Profits come quicker with use of the *"Rockford"* Miller. Its unusual capacity for all classes of work and the ease with which it can be operated give you a speed of production that makes a big increase in your profits.

The secret of the productive power of this No. 2 "Rockford" Universal Milling Machine is the great surplus power over all demands that may be made of the machine—it more than meets severe demands of modern milling. For tool room or shop, for manufacturing or jobbing, the *"Rockford"* holds first place as a profit-maker.

This Milling Machine has many mechanical features that save dollars in time and labor, and expedite production. Let us describe these features in detail. Inquiries promptly attended to.

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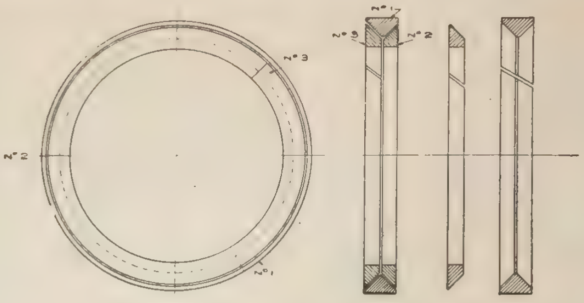
M. Mett & Co., Petrograd, Russia.
Aktiebolaget Machinery Osakeyhtio, Abo, Finland.
Roku-Roku Shoten, Tokyo, Japan.
The Selson Engineering Co., Ltd., Sydney, Australia.

ROCKFORD MILLING MACHINE COMPANY, Rockford, Ill., U.S.A.



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MANUFACTURED BY

The Chapman Double Ball Bearing Co.

OF CANADA, LIMITED

and fitted to your car, will add power to the engine, reduce consumption, increase mileage.

YOUR CAR WILL RUN BETTER, LAST LONGER.

The Chapman Double Ball Bearing Co., Limited, Toronto

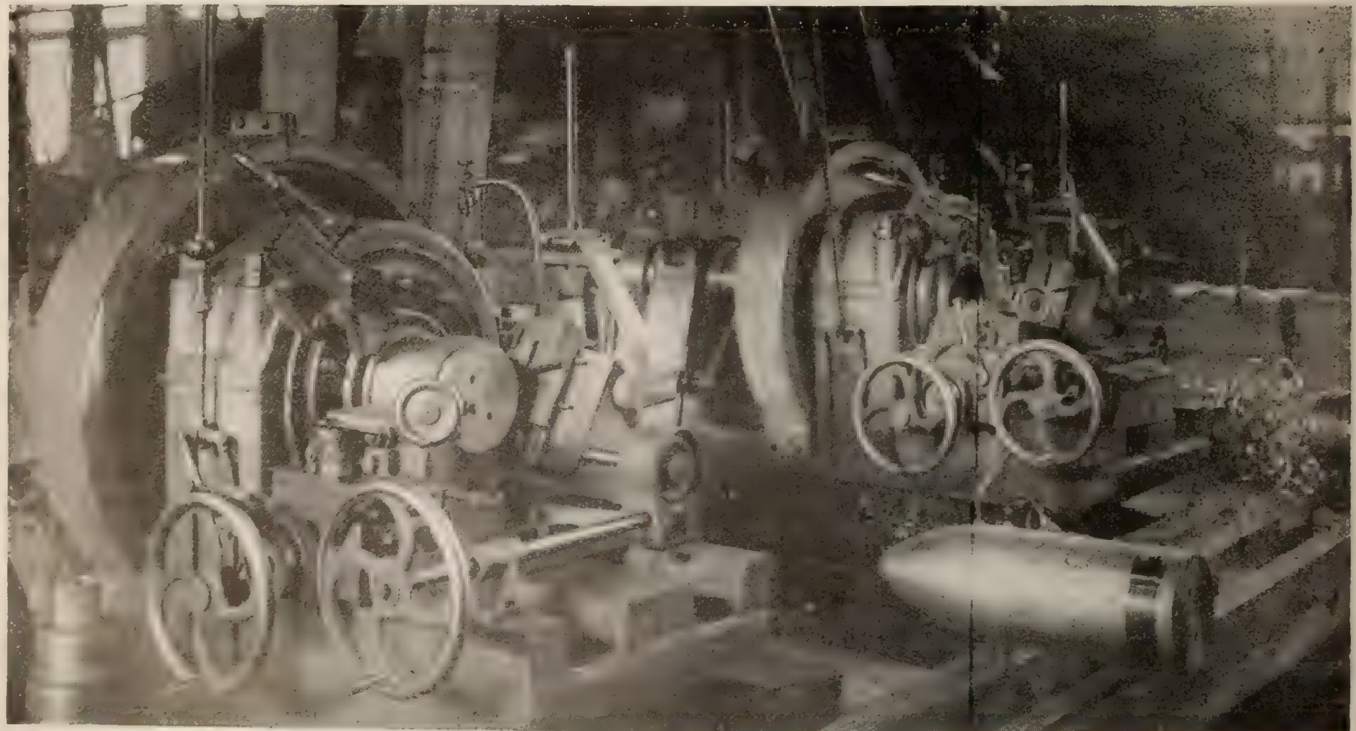

Photo shows two of our Band Turning Machines in one of the largest shell shops in Canada. These machines are used for turning bands on 8", 9.2" and 12" shells. They are giving perfect satisfaction in several of the largest 9.2" shops in Canada. Let us put you in touch with some of them. **Write for full particulars and price.**

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MADE IN CANADA
STELLITE

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by
DELORO SMELTING & REFINING CO.
Limited

A year ago this Company arranged with the Patentee, Mr. Elwood Haynes, of Kokomo, Ind., for the manufacture and sale in Canada, Great Britain and Europe of his recently discovered alloy "Stellite," a remarkable high-speed tool metal that has been effective in greatly increasing the output in the factories where it has been used. This material was introduced to the Trade in Canada by the Canadian B. K. Morton Company, and the success of the new metal in Canada has been very marked.

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Stock will be carried at 200 KING ST. WEST, TORONTO, from which place deliveries can be promptly made to customers in that district, and later office and warehouse will be maintained in Montreal.

The rapid increase in the demand for this metal both in Canada and Europe has warranted the erection of an extensive plant and equipment at Deloro, and we are now in position to fill all orders promptly.

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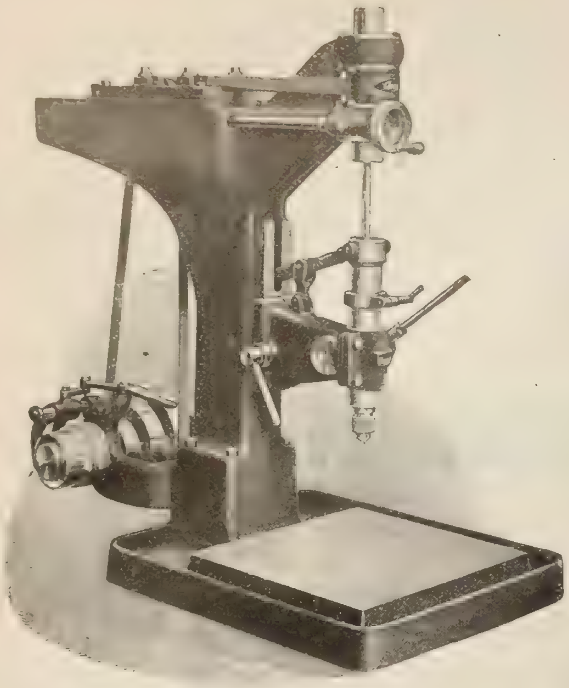
Stellite Sales Dept. - DELORO, ONT.
Toronto Branch: 200 King St. W.



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The Superior High Speed Ball Bearing Drilling Machine

A wide range of designs for every need in small hole drilling.

This No. ½ Avey bench or column type offers speeds up to 12000 R.P.M.

Rigid — Well Balanced — Smooth Running

The Standard Machine for Fuse Parts

Your agent sells it. Get the Avey.

THE CINCINNATI PULLEY MACHINERY CO.
CINCINNATI, OHIO, U.S.A.

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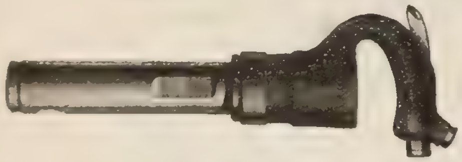
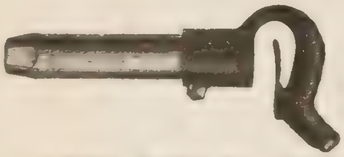
MOST POWERFUL AND EFFICIENT AIR TOOLS ON THE MARKET



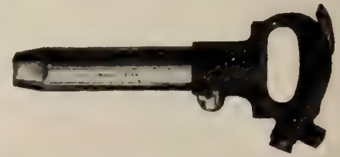
Cleveland Pocket-in-Head Riveters are made in 15 styles, with Outside and Inside Latch, and have driving capacities of ¼-in. to 1½-in. rivets in Boilers, Tanks, Stacks, etc.

They have an enviable record for durability and economy in service.



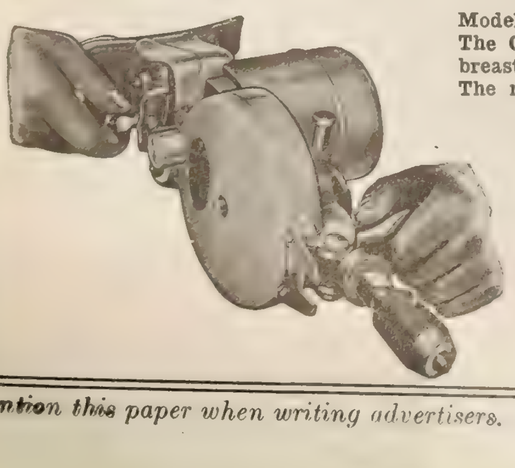
CLEVELAND CHIPPING HAMMERS

are made in 19 styles and sizes to suit all classes of work. They are ideal tools for foundries, as they have high speed, no recoil, and are practically dust-proof.



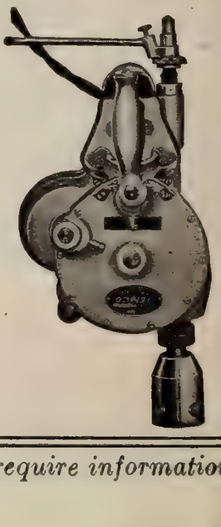
In stock: Riveting and Chipping Hammers, Air Drills, Corner Drills, Sand Rammers, Portable Grinders, Bowes Couplings, Chisels, River Sets, etc.

PORTABLE ELECTRIC DRILLS



Model "B" Drill illustrated, shows compactness of design. The Casing, Switch and Gear Covers are aluminum; the breast plate, motor-head and handle supports are of steel. The machine is light in weight, convenient in shape; has high speed; operates on either A.C. or D.C. currents and runs either forward or reverse as desired. Model "C" has two speeds and in construction is similar to Model B.

Bulletins mailed on request.



Cleveland Pneumatic Tool Co.
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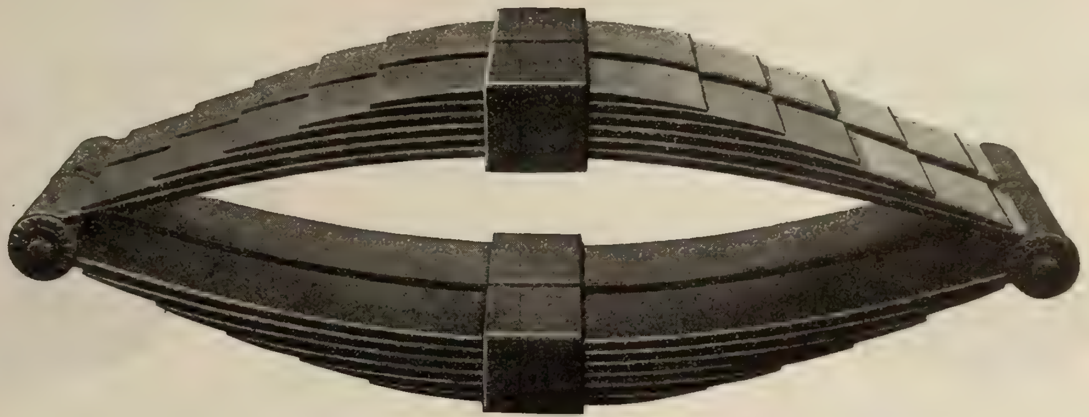

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Double Elliptic Spring with our improved eye and wrapper, made from the full thickness of steel without rolling. This insures strength where it is needed, and a smooth bearing necessary for an easy riding spring.

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We supplied the Draft, Truck and Buffer Springs to the Eastern Car Company, Ltd., New Glasgow, N.S., for use under 2,000 box cars ordered by the Russian Government, and make all kinds of spiral springs from the largest to the smallest.

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Rail Braces, Tie Plates, Anti-Rail Creepers, Tie Rods, Guy Anchors, Guy Rods of one quality—the "Best" in Material, Design and Workmanship.

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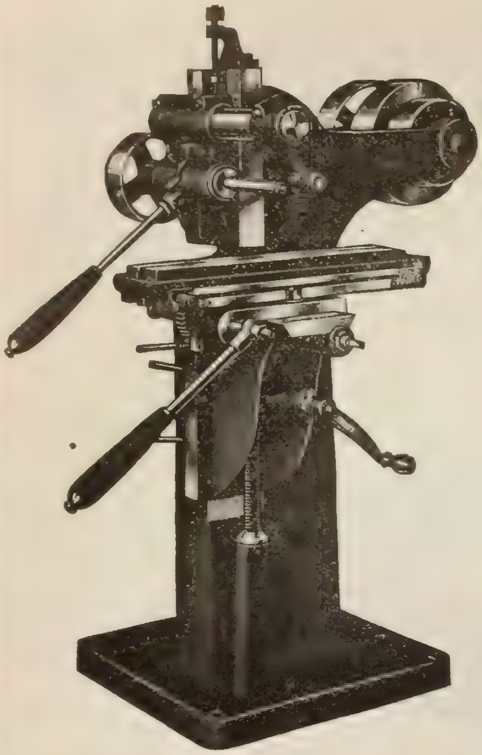

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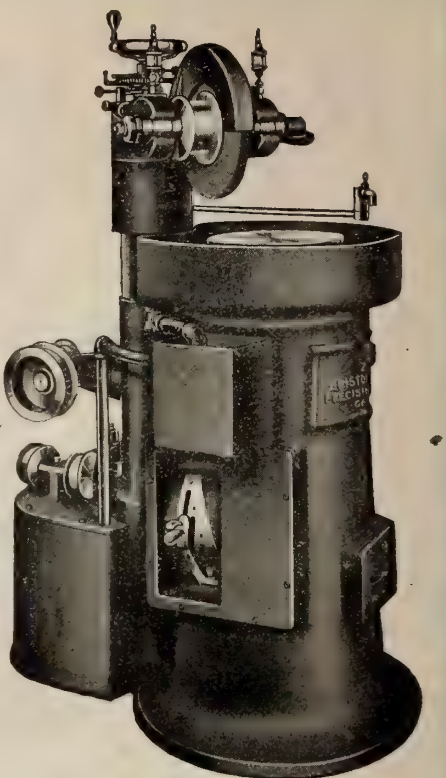
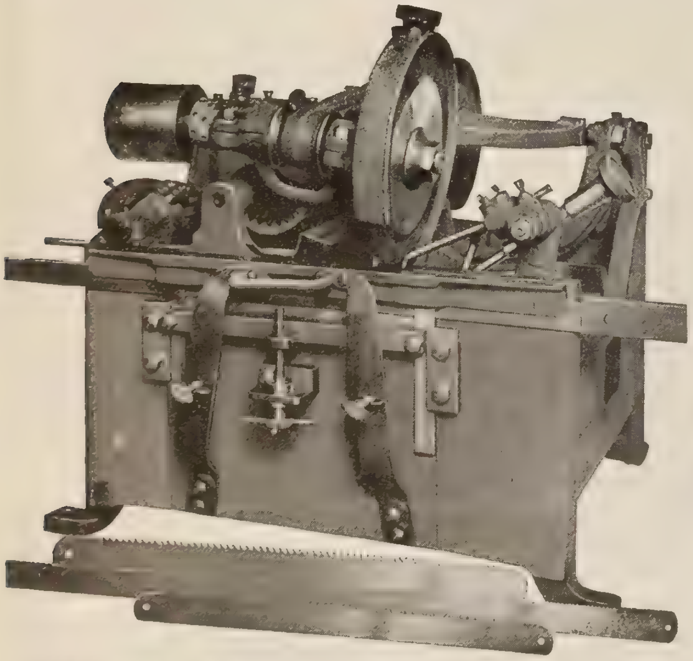


No. 0 Bristol Hand Milling Machine

12-in. Bristol Precision Rotary Surface Grinder.

The C. G. Garrigus Machine Co., Bristol, Connecticut, U.S.A.



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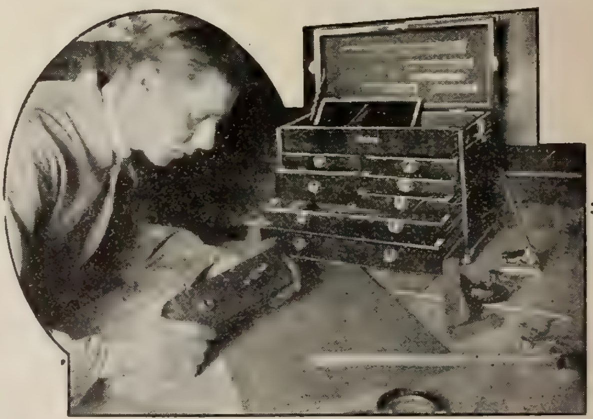

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UNION TOOL-CHEST

Roomy, well-built, has a place for every tool. Saves time, keeps tools clean, safe, free from bangs, knocks and moisture. Gives actual assistance in your work because tools can be so arranged that you need only open a drawer and immediately pick out the tool wanted.

Made of plain or quartered oak or leatherette covered. Drawers strong, and perfectly fitted. Some lined with felt. Guaranteed satisfactory or money back.

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Manufacturers of

Shell Forgings

We have the Equipment and Experience and can execute orders for

Nose Sockets Base Plates
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For any size shells. ***Can execute orders promptly.***

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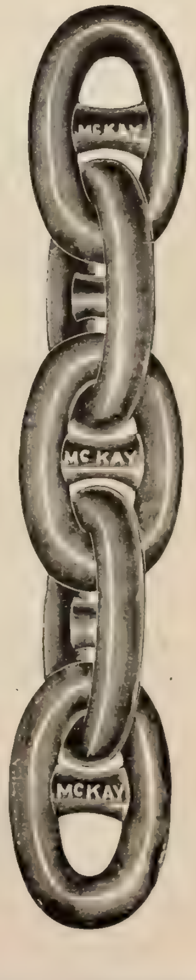

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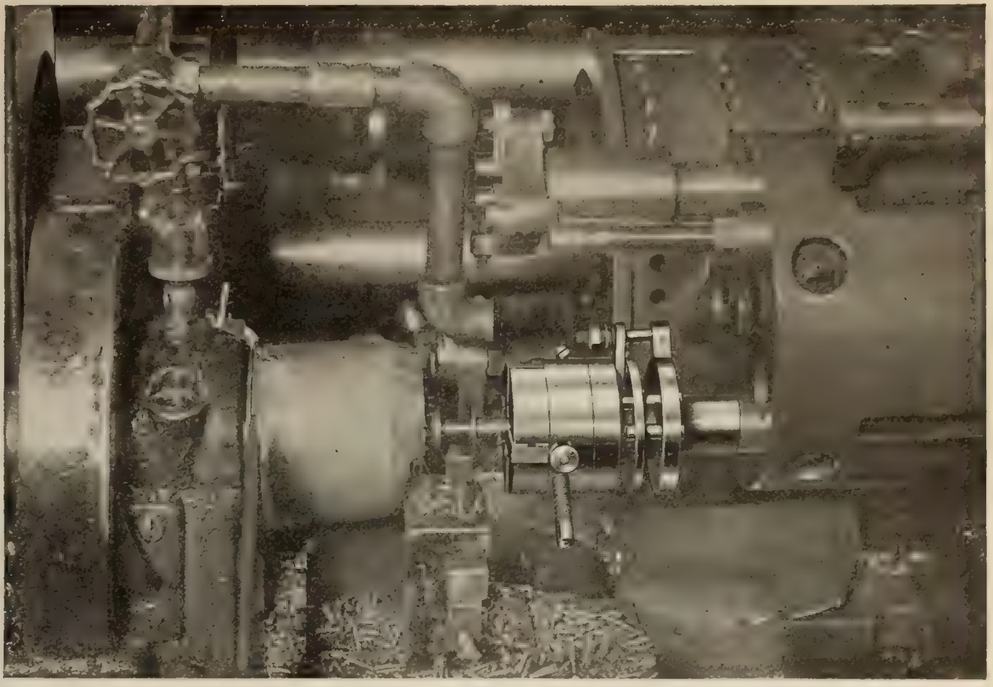
Your Screw Machine

Whatever Its Make, can be Fitted with a

Geometric
SELF-OPENING
DIE HEAD

The Geometric Die Head here shown is fitted to the turret of a Cleveland Automatic in the plant of the Henderson Motor Cycle Co., where it is in constant operation.



When you order a Screw Machine, whether hand or automatic, specify that the turret shall carry a Geometric Die Head. Others do, and there is no reason why your screw threads should not be given the Geometric finish. Cut out the waste. Tell us what threads you are now cutting and let us make a Geometric recommendation to you.

The Geometric Tool Company, New Haven, Conn., U.S.A.

CANADIAN AGENTS: Williams & Wilson, Limited, Montreal; The A. R. Williams Machinery Co., Limited
TORONTO, WINNIPEG and ST. JOHN, N.B.

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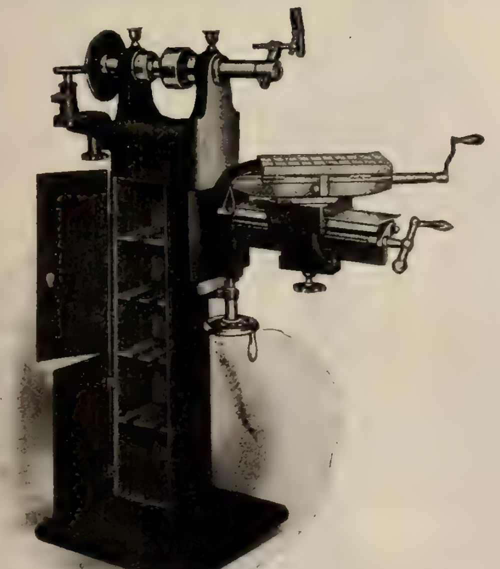
From Cutters and Tools kept Sharp on

GARVIN No. 3 UNIVERSAL
CUTTER AND SURFACE GRINDERS



GARVIN No. 3 Universal Cutter and Surface Grinder.
Use Code—Banish.

Simple Light Running Accurate

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriage is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14 in. x 6 in.; SURFACES, 9½ in. x 6 in.

For Further Information {ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

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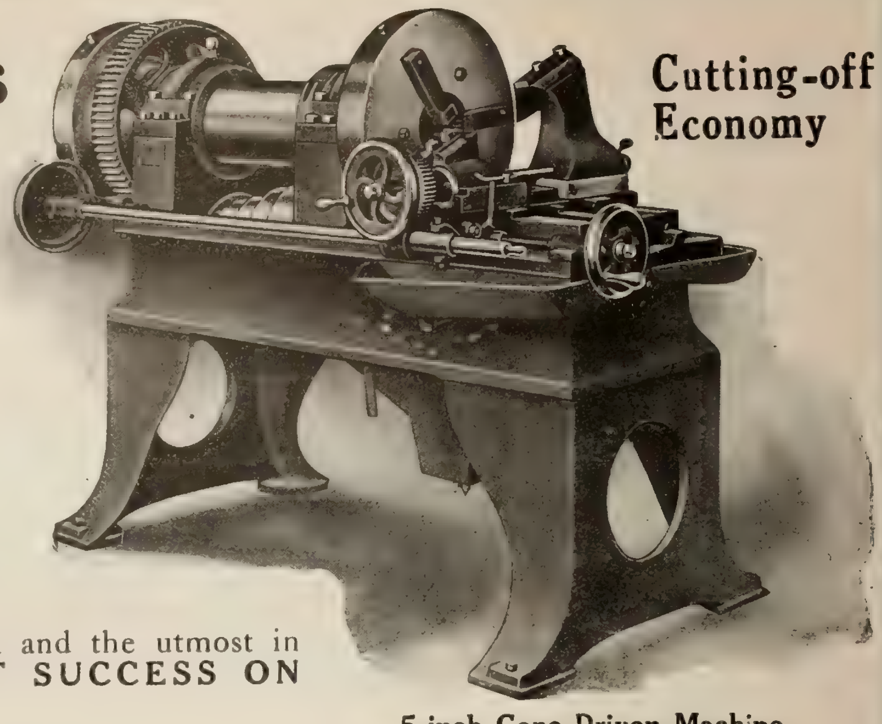
MANUFACTURED BY

THE GARVIN MACHINE COMPANY

Spring and Varick Streets ***(Visitors Welcome)*** **50 Years New York City**

Two Cuts

Simultaneously



Cutting-off Economy

One up, the other down. This is what makes the **Hurlbut-Rogers Cutting-Off and Centering Machine** virtually double the output and reduce the cost per piece about one-half.

The Hurlbut-Rogers Machine gives you capacity of two machines at the expense and in the floor space of one machine.

We build them for hard work and the utmost in accuracy—and their **GREAT SUCCESS ON SHELLS** shows it.

5-inch Cone-Driven Machine

Let us go into details.

HURLBUT-ROGERS MACHINERY CO., South Sudbury, Mass.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle-on-Tyne. H. W. PETRIE, TORONTO, CANADA.

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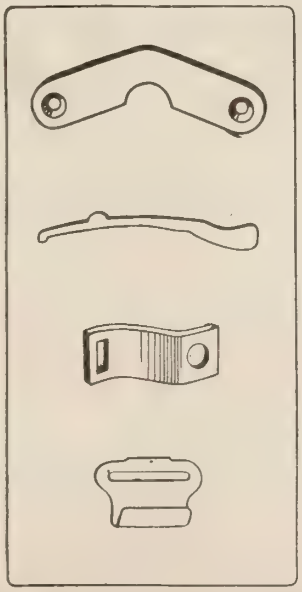
For the manufacture of your small metal stampings — in lots of 25,000 and more — we offer you the services of our battery of automatic presses.

Really, you'd be surprised to learn the prices for which small stampings can be made on these presses.

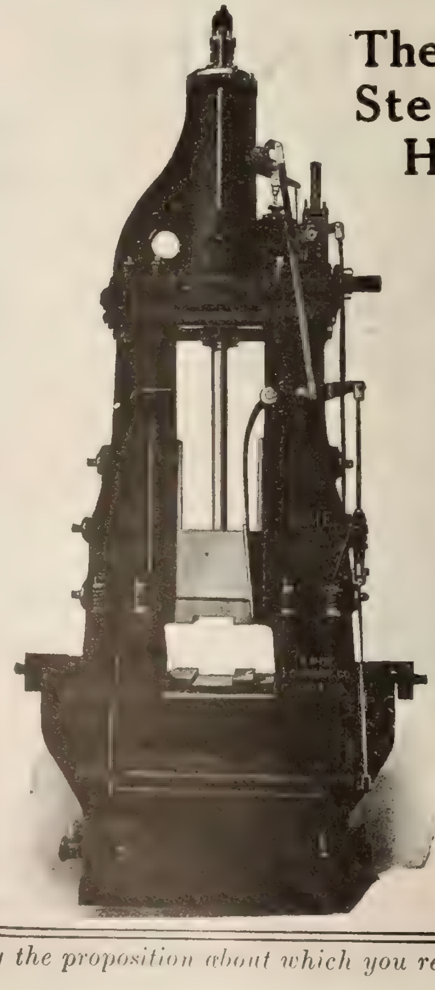


Send us samples or drawings for estimate and please mention this paper.

The Globe Machine & Stamping Company

Cleveland, Ohio

The "ERIE" Steam Drop Hammer



is the last word in Hammer construction. Ask any user.

A list will be supplied upon request.

We also build Trimming Presses.

Single and Double Frame Steam Forging Hammers, and Tool Dressing Hammers.

Erie Foundry Co.

ERIE, PA.

SPEED

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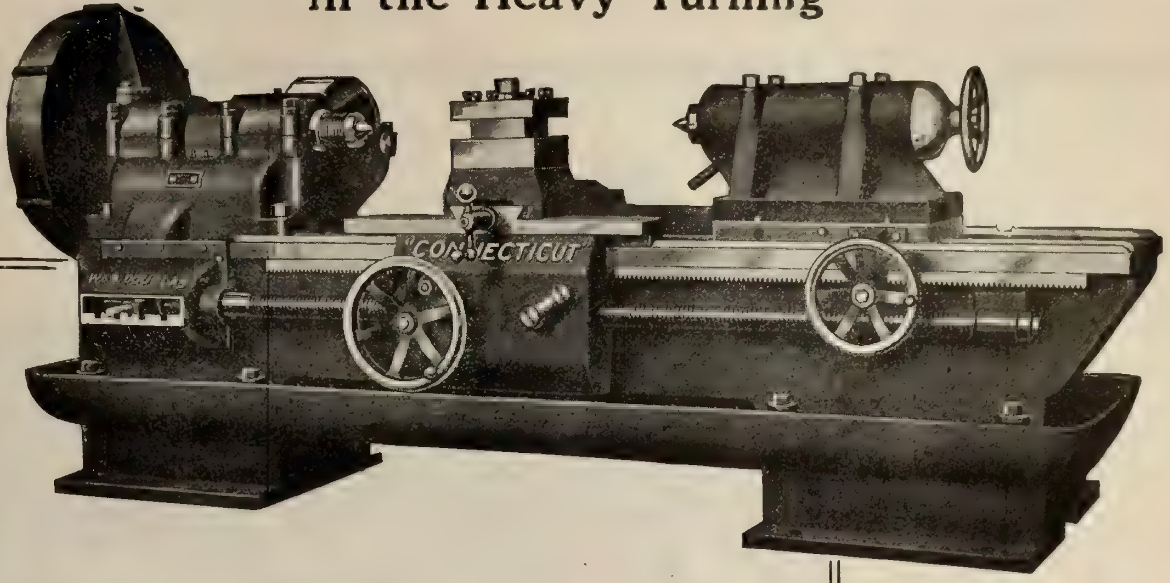

The Connecticut High-Duty Lathe

A "Single Purpose" lathe built to turn or bore high carbon steel forgings to the limit of the cutting tools.

It is rigid and accurate under all conditions, easy to operate and a fast worker.

It is efficient in the extreme and has demonstrated its superior service in prolonged tests of great severity in many shops. It is in all respects heavier and more rigid than standard 30-inch and even 36-inch lathes giving the same distance between centres.

The Usual Cutting Speeds on Shell Work are 40 to 50 feet per minute on shells up to 8 inch diameter, 30 feet per minute on larger sizes. Depth of cut from ¼ inch to ⅝ inch depending upon the eccentricity of the piece. Our lathes will stand more than this.

We admit the **big gear** is not particularly handsome, but it eliminates the train of small gears, and adds greatly to the strength and wearing qualities.

Let us tell you all about it. Write for bulletin giving full details.

JANUARY DELIVERY

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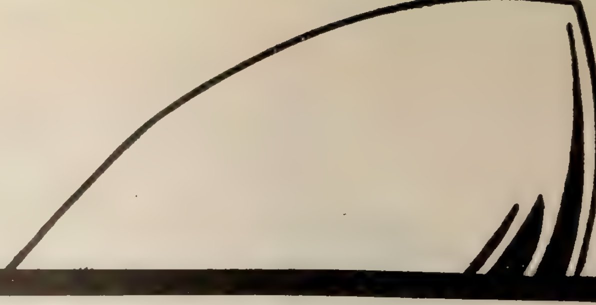
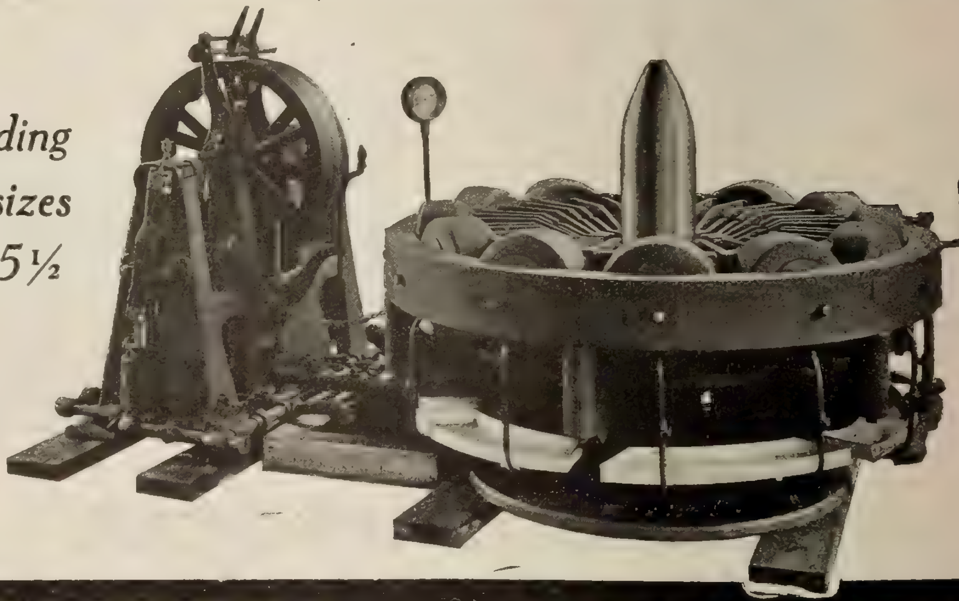
Agents:

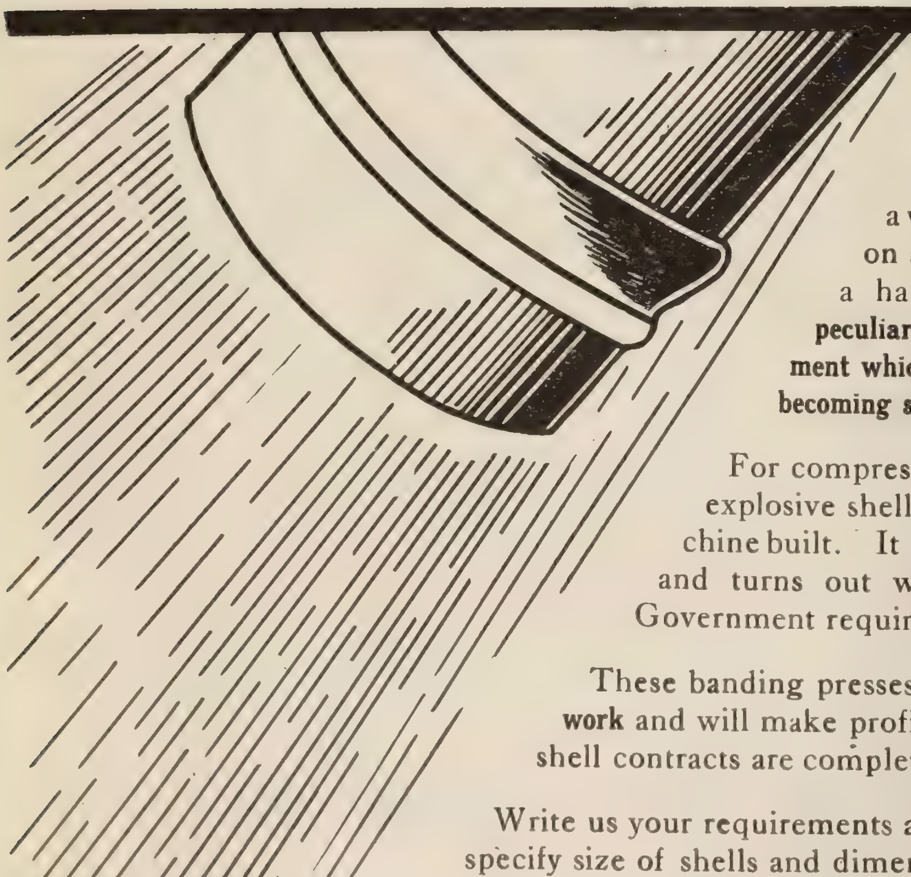
THE CANADIAN FAIRBANKS-MORSE CO., LTD., TORONTO
WILLIAMS & WILSON, LTD., MONTREAL

Big Shells Too



This Hydraulic Banding Machine is Built in sizes to take Shells up to 15½ inches diameter.





Machine consists of a series of hydraulic rams set around inside a weldless rolled steel ring, mounted on a cast-iron base, and operated by a hand-driven pump. **An advantage peculiar to this machine is the special equipment which prevents the edges of the bands from becoming sheared during the banding operation.**

For compressing bands on shrapnel and high explosive shells there is no more efficient machine built. It is **RAPID, RELIABLE** in **OPERATION** and turns out work in strict accordance with Government requirements.

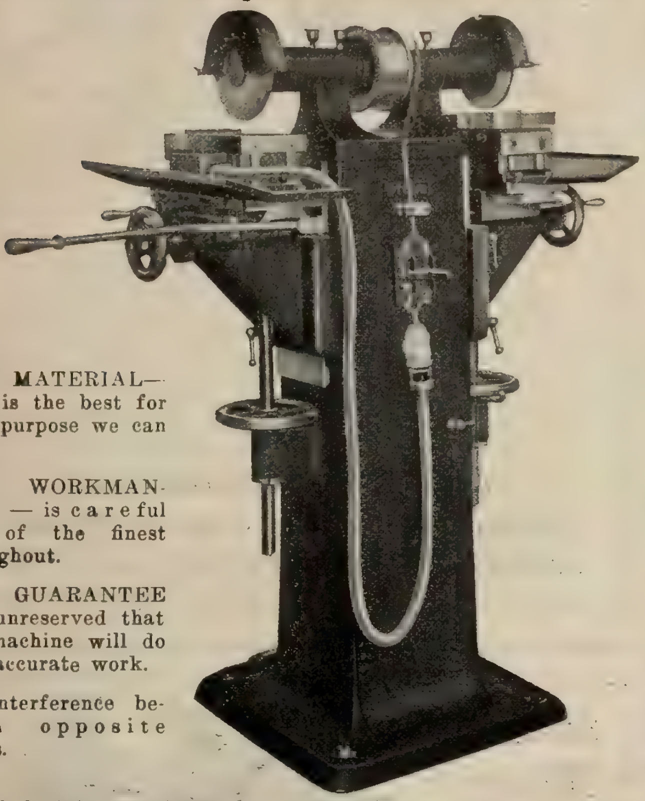
These banding presses are **adaptable to a variety of other work** and will make profitable permanent equipment after shell contracts are completed.

Write us your requirements and let us submit prices. Please specify size of shells and dimensions of bands.

The West Tire Setter Company

ROCHESTER, N. Y., U.S.A.

The "Steno" Duplex Surface Grinder



THE MATERIAL—used is the best for each purpose we can get.

THE WORKMANSHIP — is careful and of the finest throughout.

OUR GUARANTEE —is unreserved that the machine will do fine, accurate work.

No interference between opposite tables.

THE STENOTYPE COMPANY, INDIANAPOLIS, INDIANA, U.S.A.
Manufacturers of the "STENO" Duplex Surface Grinder, the "STENO" 1" x 7" Turret Hand Screw Machine and "STENO" Milling Cutters, Reamers, Fixtures, Jigs and Gauges.

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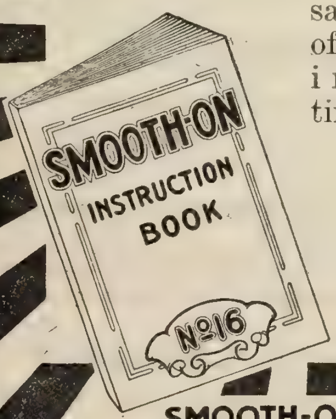
TRADE MARK—REG. U.S. PAT. OFF.

Our new instruction book No. 16 has many kinks in it that every mechanic should know.

It tells in type and illustrates by pictures actual repairs of steam and water leaks in castings, piping, boilers, etc., that saved thousands of dollars and indispensable time.

Drop a postcard for your copy. It's ready.



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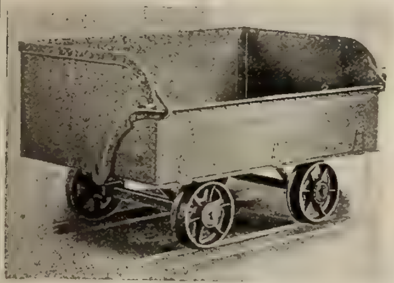
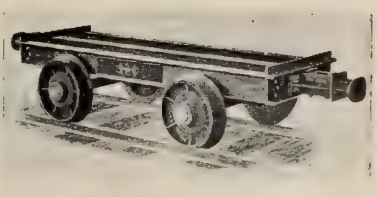
8 White St., Moorfields, London, E.C.





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Heated with our Enclosed Flame Gas Burners, or Electricity
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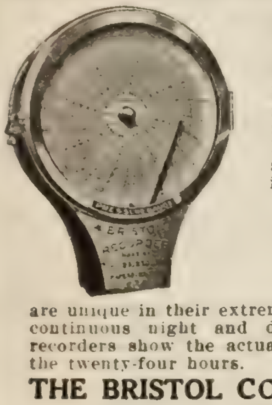

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Recording Gauges

are unique in their extreme simplicity of construction. The continuous night and day records obtained with these recorders show the actual pressure maintained throughout the twenty-four hours.

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Industrial Chemists, Inspectors and Engineers
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ANALYSES AND ASSAYS
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Rivet Machines
WITH
Absolutely Accurate Automatic Feed

In sizes to work blanks up to 6 inches long, 7/16 in. diameter stock. Capacity from 80 to 200 rivets per minute, according to size.

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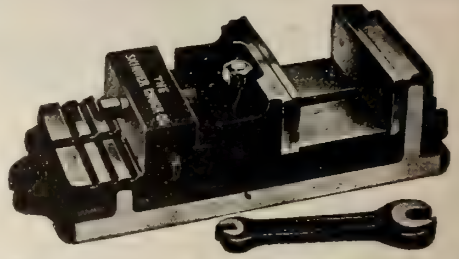

A substantial, durable tool which will pay for itself in short order in any machine shop. Four sizes to accommodate a wide range of work. Try one and you'll buy more.

Printed matter promptly mailed on request.

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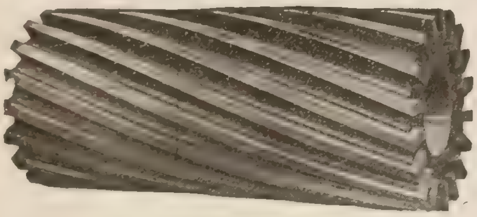

Will outwear and outcut any other milling cutters.
Let us prove this in your shop
Write for Bulletin R. P. and 30-day trial offer.
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Will Save You Much Money, Time, Trouble and Worry

"Viking" Belts are just in their element when in wet places and under adverse conditions.

A trial will convince you that they are all-round savers.

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Aeroplane Metal Fittings, and all classes of machining, stamping, welding, brazing.
Prompt Deliveries.

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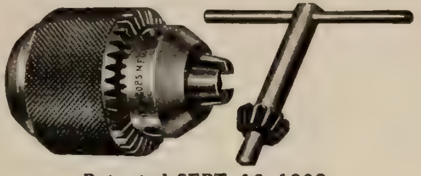

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Our Ballas Diamonds
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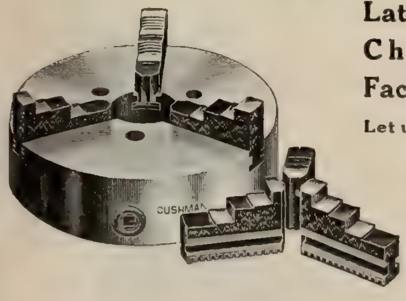

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The Cushman
Chuck Co.
Hartford, Conn.,
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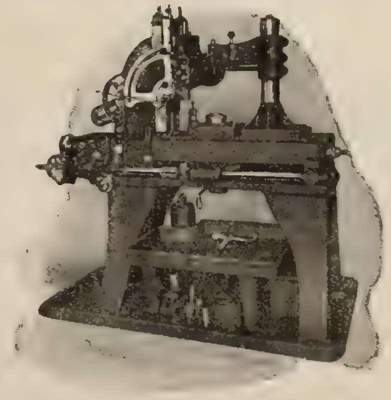

The Whiton
AUTOMATIC
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The D. E. Whiton
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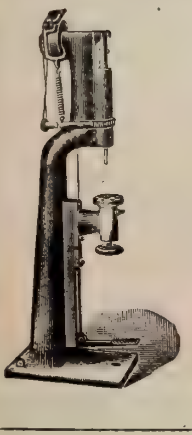

IS YOUR RIVETING
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Our Elastic Rotary Blow Riveting Machine does profitable work, because one machine will do the work of several hand riveters, and do it better.

Every head is perfectly formed, any shape, round, flat, oval, rectangular, etc.

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Also makers of Wire Straighteners and Cutter, Cotter Pin Machines, etc.

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In stock and to order any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.
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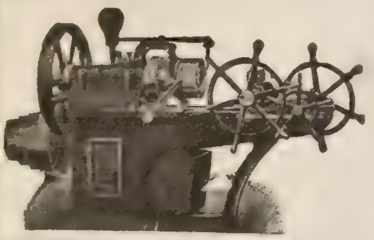
Because it is situated in the centre of lumber industry and has near by abundant supply of maple, oak and other hard wood. It is only 60 miles from market, such as Ottawa and Montreal, and has the best of shipping facilities by G.T. Ry., C.N. Ry., and Ottawa River. Has abundant electric power at reasonable rates. For further particulars apply to Dennis Paquette, Secretary of Board of Trade, Hawkesbury, Ont.


BOLT, NUT, FORGING AND WIRE NAIL MACHINERY
"National" Bolt Cutters, "Wedge Grip" Bolt and Rivet Headers, Forging Machines, Nut Machines, Roll Threaders and Wire Nail Machines are used by leading Railroads and Industrials.
THE NATIONAL MACHINERY CO TIFFIN, OHIO, U.S.A.
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Measuring Tapes, Steel Rules, Straight Edges, Surveyors' Band Chains, Engineers' Tools
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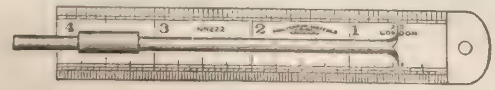
Wind-up Measures, Steel, Linen and Metallic. With Improved Patent Flush Handle.
Chesterman tools are the highest standard of accuracy in the British Empire, and the quality of steel and substantial build guarantee a maximum of service and economy.

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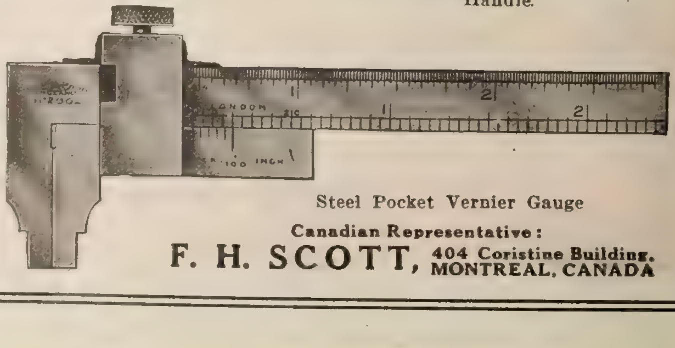
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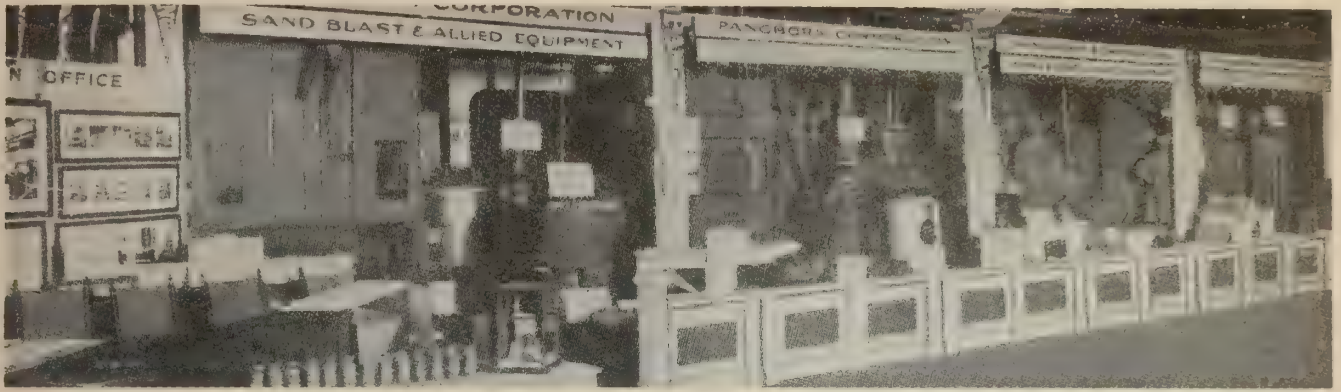
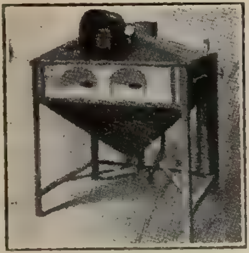
WHO'S WHO IN THE SAND BLAST LINE AND WHY

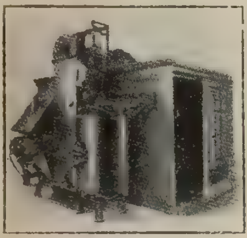


"PANGBORN" Exhibit at the 1915 Foundrymen's Convention, Atlantic City, September 25th to October 1st. The largest and most complete operating exhibit of Sand-Blast and Allied Equipment ever made in the world.

"LA" Table Sand-Blast



"EA" Cabinet Sand-Blast



"L" Room Sand-Blast

"GC" Barrel Sand-Blast

THE Exhibit filled 4 large freight cars and required 2000 sq. ft. floor space (considerably more than was occupied by all the other Sand-Blast exhibitors put together) and conclusively demonstrated the completeness of the "PANGBORN" line of Sand-Blast and Allied Equipment. The smooth and shop-like operation was evidence of "PANGBORN" capacity and facilities for doing the out-of-the-ordinary speedily, and under the most adverse conditions. It, indeed, was no simple matter. The equipment was put through the Shops on short notice without serious interference with a large volume of regular business, and the erecting of the equipment on the pier at Atlantic City was completed in less than 5 days. Examination of the Exhibit revealed the striking features of "PANGBORN" products, viz.: Safety of Operation, Compactness, First Class Materials and Workmanship. The operation of the Equipment proved that "PANGBORN" Equipment has maximum efficiency and makes the best investment.

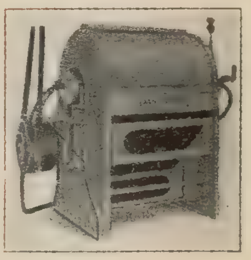
The Equipment exhibited consisted of the following:

- "L" Room Sand-Blast
- "AF" Hose Sand-Blast
- "BG" Screen Sand-Separator
- "IB" Belt-Bucket Elevator
- "FC" Grated Top Room Truck
- "D" Dustless Operator's Helmet
- "LA" Rotary Table Sand-Blast
- "GB" Suction Barrel Sand Blast
- "HA" Baffle Moisture-Oil Separator
- "AC" Pressure Hose Sand-Blast
- "GC" Pressure Barrel Sand-Blast
- "DC" Modern Stove Sand-Dryer
- "AG" Pressure Twin Hose Sand-Blast
- "EA" Suction Cabinet Sand-Blast
- "KD" Coned Wheel Dust Exhauster
- "CC" Screen Dust Arrester

The Exhibit, of course, did not include the whole "PANGBORN" line. There are other designs of the types of equipment exhibited, and additional types and sizes that were not exhibited at all. The complete line of "PANGBORN" Equipment covers practically every requirement, and special equipments are designed and made to order.

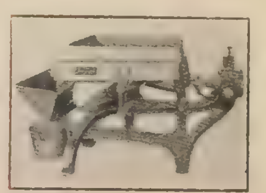
"PANGBORN" Sand Blast and Allied Equipment
is making and saving money
in hundreds of the best foundries throughout the country
It will do the same for you
Send now for latest 12-page Bulletin just off the press

"AC" Hose Sand-Blast



"GB" Barrel Sand-Blast

"CC" Dust Arrester



"BG" Sand Separator

PANGBORN
CORPORATION
HAGERSTOWN, MD.
SAND-BLAST SPECIALISTS

P. O. Box 859

Oxy-Acetylene Welding and Cutting

The above shows the Prest-O-Lite Process as used for making an "on the spot" repair in shops of P. F. Collier & Co., New York City, publishers of "Collier's Weekly."

Welding Makes Possible Marked Economies in Your Plant

By avoiding costly delays and saving expensive replacements, single repairs by welding have often times more than paid the cost of complete welding equipment in hundreds of shops and factories.

Fortify **your** plant against losses incurred by sudden breakdowns. The many highly profitable uses to be found both inside and outside your shop for oxy-acetylene welding will amaze you.

More important perhaps than effecting emergency repairs to important tools or equipment is the usefulness of this process in simplifying many manufacturing operations and cutting production costs.

In many instances it is entirely displacing the rivet and bolt, because welded joints, in nearly all cases, are better, stronger and neater than those of other methods of metal-joining.

Find out about these possible economies for your plant.

Prest-O-Lite PROCESS

Employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene (ready made carbide gas) is backed by Prest-O-Lite Service, which insures prompt exchange of full cylinders for empty ones. Provides dry, purified gas, insuring better welds, quicker work, and lower cost, and also avoids the large initial outlay and heavy depreciation incurred in making crude acetylene in a carbide generator.

Necessary equipment is not expensive. We furnish high-grade welding apparatus for $75.00; acetylene service at nominal cost. Adaptable for oxy-acetylene cutting by the addition of special cutting blow-pipe. Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene; any average workman who understands metals can learn the process quickly and easily.

We'll be glad to give you full information on the Prest-O-Lite Oxy-Acetylene Process of welding and cutting. Tell us about the particular work you are contemplating.

The Prest-O-Lite Co., Inc. Dept. F.
The World's Largest Makers of Dissolved Acetylene.
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MERRITTON, ONTARIO
Factory Branch: Winnipeg, Man.
53 Branches and Charging Plants

Keep Canadian Factories Going. Insist on Buying Goods MADE IN CANADA.

PRACTICALITY

AFTER fifteen years' study of the Miner's and Lumberman's wants, we know just what is and what is not required in tools for them.

Practicality has been the keynote of our organization. Experience has aided us in eliminating all unnecessary parts and in perfecting the design of our tools.

The use of best material and finest workmanship enable us to manufacture tools that are unexcelled.

We make a complete line.

Write us for prices.

J. W. CUMMING & SON, LTD.
NEW GLASGOW, - - CANADA

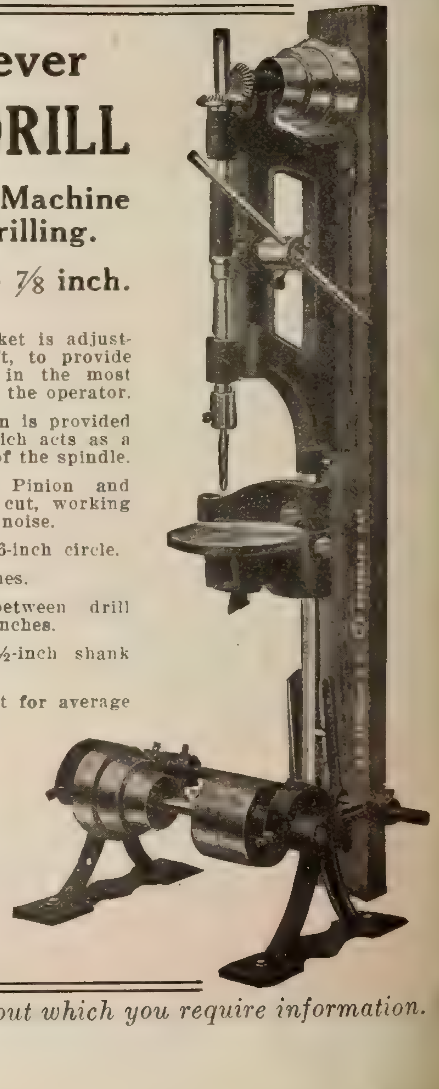
Wood or Steel, let Cummings make it.

---

16 in. Lever POST DRILL

A Giant Little Machine For Light Drilling.

Will drill up to 7/8 inch.



The Feed Lever Socket is adjustable on the feed shaft, to provide for setting the lever in the most convenient position for the operator.

An adjustable friction is provided for the feed shaft, which acts as a balance to the weight of the spindle.

Bevel Gears, Feed Pinion and Rack are all machine cut, working smoothly and without noise.

Drills to centre of 16-inch circle.

Run of feed 5¼ inches.

Greatest distance between drill spindle and table, 22 inches.

Spindle bored for ½-inch shank twist drills.

Speed of countershaft for average work, 300 per minute.

A. B. Jardine & Co.

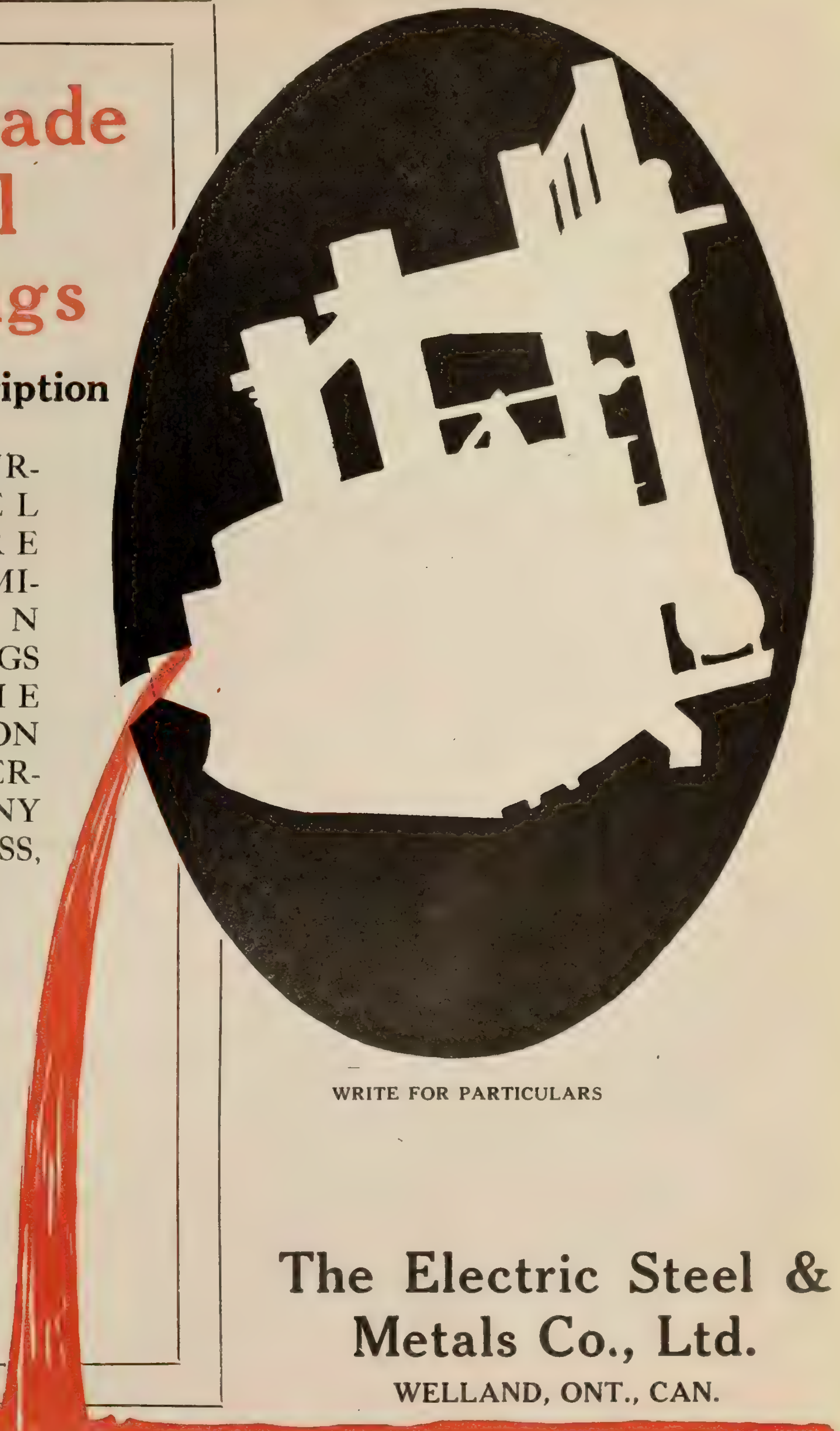
Hespeler, Ontario

High Grade Steel Castings

of every description

ELECTRIC FURNACE STEEL CASTINGS ARE PURER CHEMICALLY THAN ANY CASTINGS OF THE SAME COMPOSITION MADE COMMERCIALLY BY ANY OTHER PROCESS, BECAUSE OF SUPERIOR REFINING CONDITIONS.

ES&M
BRAND
Stands for Quality



WRITE FOR PARTICULARS

The Electric Steel & Metals Co., Ltd.
WELLAND, ONT., CAN.

Electric Steel Castings

AIR CHUCKS FOR SHELL MAKERS

Increase your production 25% by installing Hannifin Air-operating Mandrels and Special Projectile Collet Chucks.

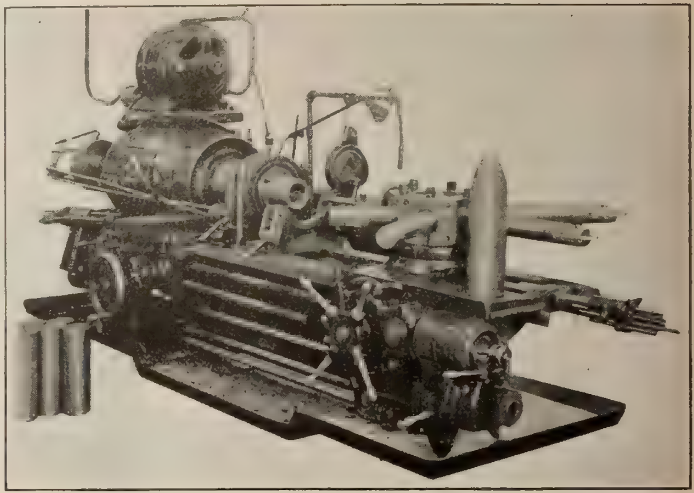
SEVERAL years ago the railroads adopted the Air brake because of its increased efficiency over the hand-brake. We all know the Air brake has come to stay.

Progressive manufacturers throughout Canada and the United States have seen the advantages of Air Equipment in their machine shops as a method of increasing production and decreasing cost. Ask the man who has used one, and then see us.

We have a thoroughly equipped plant devoted exclusively to the manufacture of Air Equipments.

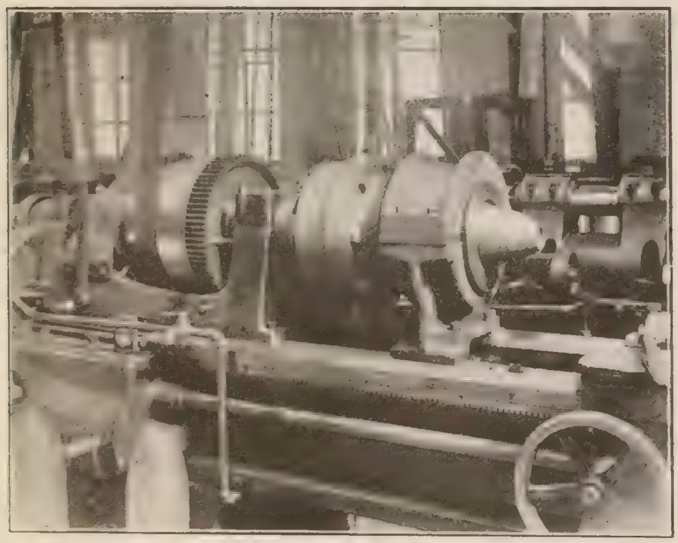
Our experience extends over a period of eight years.

Mail blue prints for estimates.



Machine above is performing second boring operation on shells.

J. R. Stone Tool & Supply Co.
DETROIT, MICH.



Cut shows Chuck on nosing operation. This is one of over two hundred in this Canadian plant.

A Big Efficiency Unit in Your Shell Plant

A. J. LAVOIE'S

LOW PRESSURE

Compressed Air Chuck

This chuck is *built on the duplicate part system. It is simple, effective and fool-proof.*

It grips the shell in a predetermined position. The jaws will not slip on the shell. It has shell interior and exterior adjustable stops.

A trial on one of your lathes will convince you that this is THE Chuck for shell work.

This chuck can be applied to any make of lathe, without alteration to the machine, and will increase production from 25% to 75%. It grips and releases the shell while in motion—no need to stop your machine.

It is a single unit combination attached to the face plate of lathe, supported by an additional heavy duty bearing, thus making a heavy duty lathe out of a light machine. A small lever operates the chuck. Will operate with a pressure of 60 lbs. per sq. in.

MANUFACTURED BY

The Montreal General Tool Co.
673-5 Notre Dame Street, Maisonneuve, Montreal, P.Q.

Also manufacturers of shell tools, and special machine attachments of all kinds made to order.

"THE CRITICAL MOMENT"

All the dramatic intensity of the original scene—with all its rich coloring—has been caught and held in the "Cleveland" wall calendar for 1917.

It is a fit successor to our "Robert Fulton" calendar of 1916 and we anticipate an even greater demand for it.

Wouldn't You Like a Copy For Your Shop or Office?

We will be glad to send it, but that prompt delivery may be assured, we would suggest that you write on your letterhead or—better yet—use the attached reservation blank.

THE
CLEVELAND ◇ TWIST DRILL
COMPANY
NEW YORK CLEVELAND CHICAGO

THE CLEVELAND TWIST DRILL CO.
Cleveland, Ohio

Gentlemen:

Send your new five-color wall calendar for 1917 to the undersigned as offered to the readers of Canadian Machinery

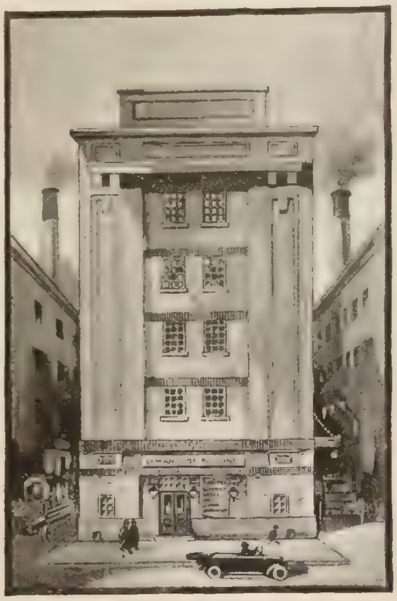
Name ____________________

Firm ____________________

Street ____________________

City __________ State __________

LYMAN



Future Headquarters
of the
LYMAN LINE
in Montreal

Work is already well under way on this new building of reinforced concrete and brick, which we expect to occupy early next spring.

Here we shall have plenty of room, and the most up-to-date facilities for handling our large stocks of Seamless Steel Tubing, Mechanical Equipment and Electric Railway Supplies. This will ensure for our customers the most efficient service.

THE
LYMAN LINE
We are Sole Canadian Distributors for:

The National Tube Co., Pittsburg, Pa.
Shelby Seamless Steel Tubes.
Ellwood Ivins Tube Works, Philadelphia, Pa.
Steel, Aluminum and Brass Tubes.
Solid Drawn Forging Company, Ellwood City, Pa.
Steel Forgings.
Wm. Wharton, Jr., & Co., Inc., Philadelphia, Pa.
Special Manganese Track Work.
The Electric Service Supplies Co., Philadelphia, Pa.
Electric Rly. Supplies and Equipment.
R. D. Nuttal Company, Pittsburg, Pa.
Gears and Pinions.
Baldwin Chain & Mfg. Co., Worcester, Mass.
Roller and Block Chains.
Samson Cordage Works, Boston, Mass.
Sash, Trolley and Signal Cords.
Societe Le Carbone, Paris, France.
Carbon Brushes.
The Hoffman Mfg. Co., Chelmsford, England.
Steel Balls and Bearings.
The New Departure Mfg. Coy., Bristol, Conn.
Steel Balls and Bearings.
Pressed Steel Mfg. Coy., Philadelphia, Pa.
Ball Bearings.
Keystone Lantern Co., Philadelphia, Pa.
Railway Lanterns.
The Chisolm & Moore Mfg. Coy., Cleveland, Ohio.
Chain Hoists and Trolleys.
Research Mfg. Co., Philadelphia, Pa.
Edis Compound for Pickling Metals.
Chicago Rawhide Company, Chicago, Ill.
Rawhide Blanks and Pinions.
Graphite Lubricating Co., Bound Brook, N.J
Trolley Bushings and Graphite Bronze Bearings.
Columbia Nut & Bolt Co., Bridgeport, Conn.
Lock Nuts and Specialties.
Veeder Mfg. Co., Hartford, Conn.
Speed Counters and Odometers.

LYMAN TUBE & SUPPLY CO. LIMITED
MONTREAL TORONTO NEW YORK

LYMAN

LYMAN Service from Stock

In these strenuous days of short supplies and rush demands, we are daily demonstrating to our customers what SERVICE means.

From our Warehouses in Montreal and Toronto we are prepared to make IMMEDIATE SHIPMENTS of:

Shelby Seamless Steel Tubing in over 350 sizes, round and square.
Steel Balls
Journal and Thrust Bearings
Driving Chains of all types
Chain Hoists and Trolleys
Rawhide Gear Blanks in all sizes
Lock Nuts
Speed and Revolution Counters
Sash and Trolley Cord
Railway Lanterns
Carbon Brushes
Graphite Bronze Bushings
Garton-Daniels Lightning Arresters
Also Steam and Electric Railway Supplies

LYMAN Personal Buying Service in New York City

Supplementing our "Service from Stock," we have opened for our customers' accommodation a special purchasing office at 2606 Equitable Bldg., New York City, under the management of Mr. K. E. Gury. Our experience and connection enable us to locate and ship at once supplies which our Canadian customers have been unable to secure elsewhere. Here is a typical instance:

Just the other day one of our largest Street Railway customers came to us in almost desperate need of a certain line of Steel Wire. None seemed available—yet through our New York Office we found, purchased and shipped the wire to them the very same day.

Remember, this service is for YOUR accommodation. We are prepared to purchase for you, from stocks in New York, all classes of Tubes, Metals and Mechanical Equipment, also Steam and Electric Railway Supplies.

LYMAN TUBE & SUPPLY CO. LIMITED
MONTREAL TORONTO NEW YORK

TO SHELL MAKERS

We Specialize on:

(a) Our Patented Nosing Die (4.5″-5″ and 6″).
(b) Thread and Seating Gauges (all sizes).
(c) Milling Hobs for Milling Nose of all sizes of shells.
(d) Thread and Seating Attachment for Lathes. (Patent Applied for).
(e) Band Turning Tools for 4.5″ and 6″ shells, Price $25.

(a) If you are changing Nosing Dies every five or ten thousand shells, you are wasting valuable time and money. Try our patented die, and so make your nosing operation continuous.

(b) We guarantee that if our Thread and Seating Gauge passes your shells, that the Government Gauges will also pass them; otherwise we take them back without hesitation. The life of our Gauge is longer than all others. Price $50.

(c) Our Milling Hobs are made by experts, and we specialize on this class of work for all sizes of shells. Price $15.

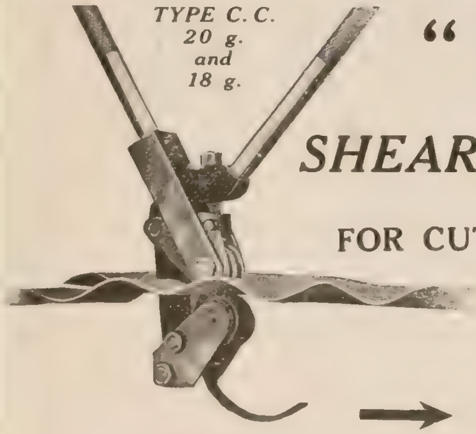
(d) Which would you rather use?

1 Thread Milling Machine and 4 Hand Seating Tools requiring 5 men for each Shift turning out 150 Shells per Shift at a cost of $18.00	OR	1—16″ Lathe and 1 Thread and Seating Attachment (Patent Applied For) requiring 1 man for each Shift turning out 150 Shells per Shift at a cost of $4.00

The cost of this attachment is only $120.00, and your engine lathe will be of use after the war work is over.

Toronto Type Foundry Company, Limited

50 Coleman Avenue, Toronto



TYPE C.C.
20 g.
and
18 g.

"TANGENT"

SHEET METAL

SHEARING APPLIANCES

Can. Pat. No. 167666

FOR CUTTING CORRUGATED and
FLAT SHEETS

Self-Feeding
Non-Distorting
Maximum Power
Minimum Weight

Indispensable to all Sheet Metal Workers

FULLY ILLUSTRATED DESCRIPTIVE
PAMPHLET SENT ON APPLICATION

MONTGOMERY, SMITH & CO., L^{D.}

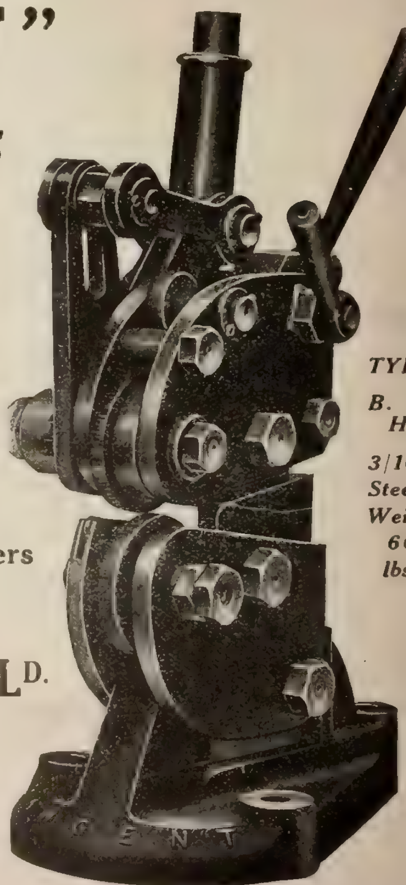
Patentees and Manufacturers

TANGENT WORKS

KEYNSHAM, SOMERSET, ENG.

Applications for Selling Agencies or Rights to manufacturers under license will be considered

TYPE H.P.C.
3/32″ Steel
Weight
8 lbs.

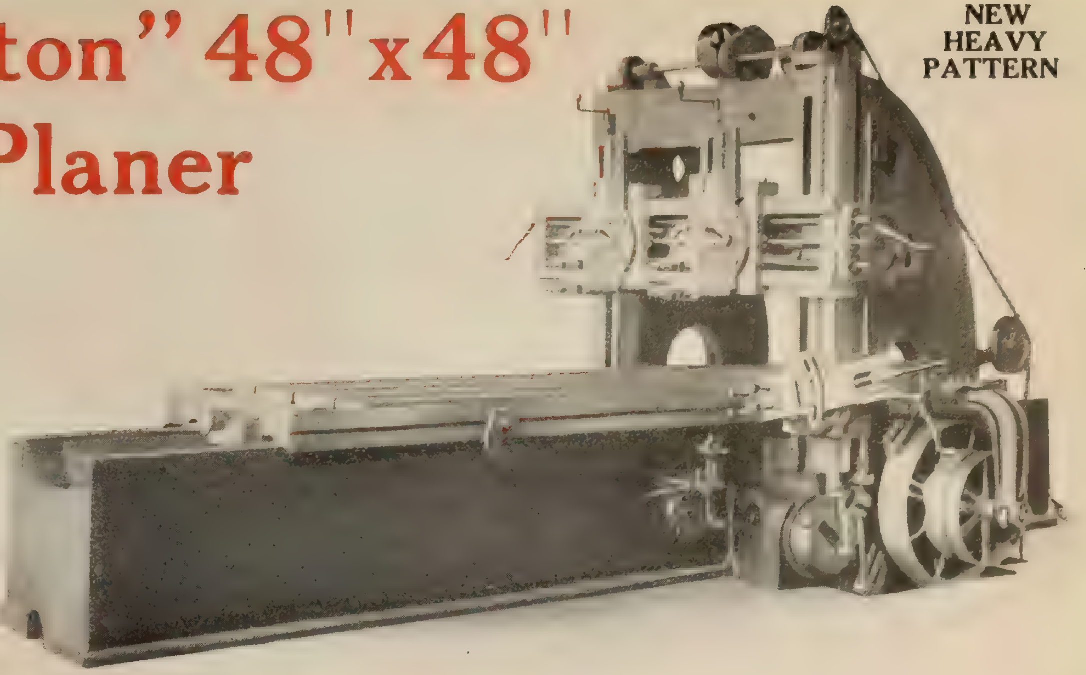


TYPE
B. C. H.
3/16″
Steel.
Weight
60
lbs.

"Hamilton" 48" x 48" Planer

NEW HEAVY PATTERN

A heavy duty machine, capable of handling work with precision and dispatch. Its extremely liberal dimensions, excellent proportions, great convenience in operations and careful construction assure both quantity and quality of output, and the machine is high-class in all respects. Sizes from 24" x 24" to 54" x 54".



For Twenty-Five Years

Manufacturers of Fine Machine Tools

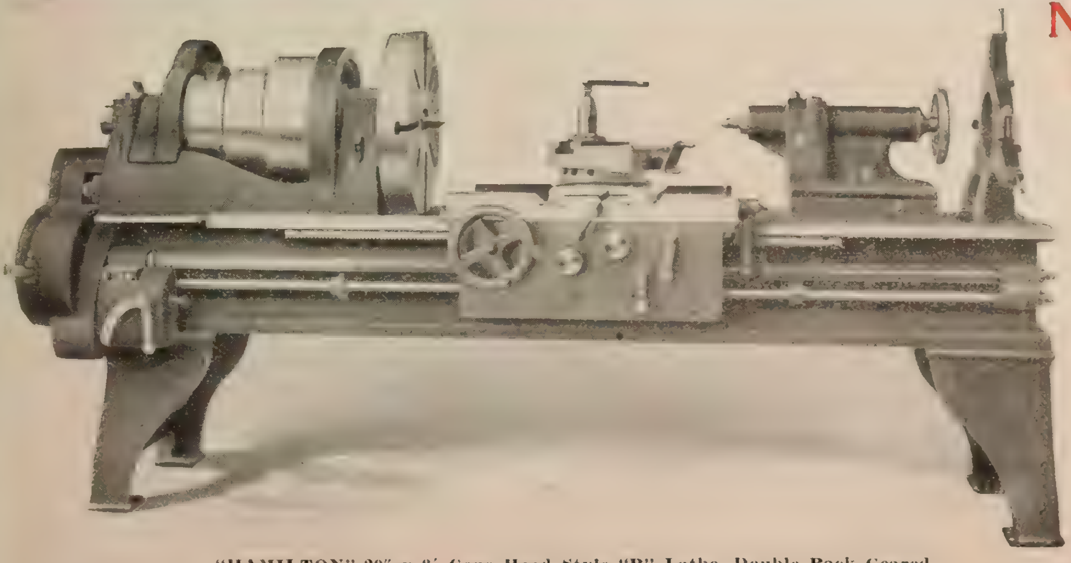
The war didn't start the manufacture of Hamilton Machine tools—there has been no hurry-up idea behind their construction, but years and years of experience and careful study.

Hamilton Tools have won distinction for their accuracy, production and durability. As an investment you will consider them without equal.

WRITE FOR FULL DETAILS.

THE HAMILTON MACHINE TOOL COMPANY
HAMILTON, OHIO, U.S.A.

New "Hamilton" 20" Cone Head Lathe

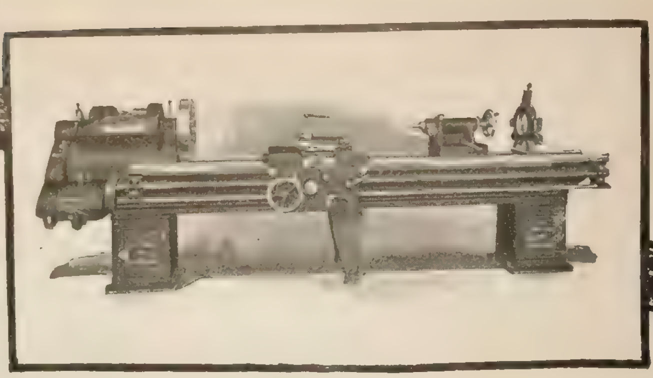


"HAMILTON" 20" x 8' Cone Head Style "B" Lathe, Double Back Geared.

A modern, substantial lathe of accurate construction, capable of turning out work rapidly and with precision.

Has Double Back Gears, Three-Step Cone, Quick-Change Feed Box. Full details in our catalog. May we send it?

A lathe that meets and triumphs over modern conditions. Sizes 14 to 24 inch.



The SIDNEY for SERVICE Lathe Speeds Production

—in practically every line of manufacture—yours included!

"We must put through more of our product!" Time after time manufacturers reach that point. It seems imperative to speed production—but quality has to be maintained—and it becomes a matter of selecting *better* tools with which to handle each operation. A good man takes up no more space than a poor one. The same is true of a good lathe. The "Sidney" lathe makes valuable floor space still more valuable. Will it do better work? Has it made good in Canada under severe conditions? Can we secure prompt delivery?

Just a few of the many questions which we can answer to your entire satisfaction if you will write the home office or to a Canadian agent.

Check off these points and then write for complete bulletin on the "Sidney" lathe:

- 20% steel mixture in bed casing.
- 50-point carbon steel headstock spindle offset 1" off centres for heavy duty work.
- Heavy carriage vee 2½" wide.

For HEAVY TURNING the particular type illustrated above will give excellent service.

The Sidney Tool Co.

Sidney, Ohio, U.S.A.

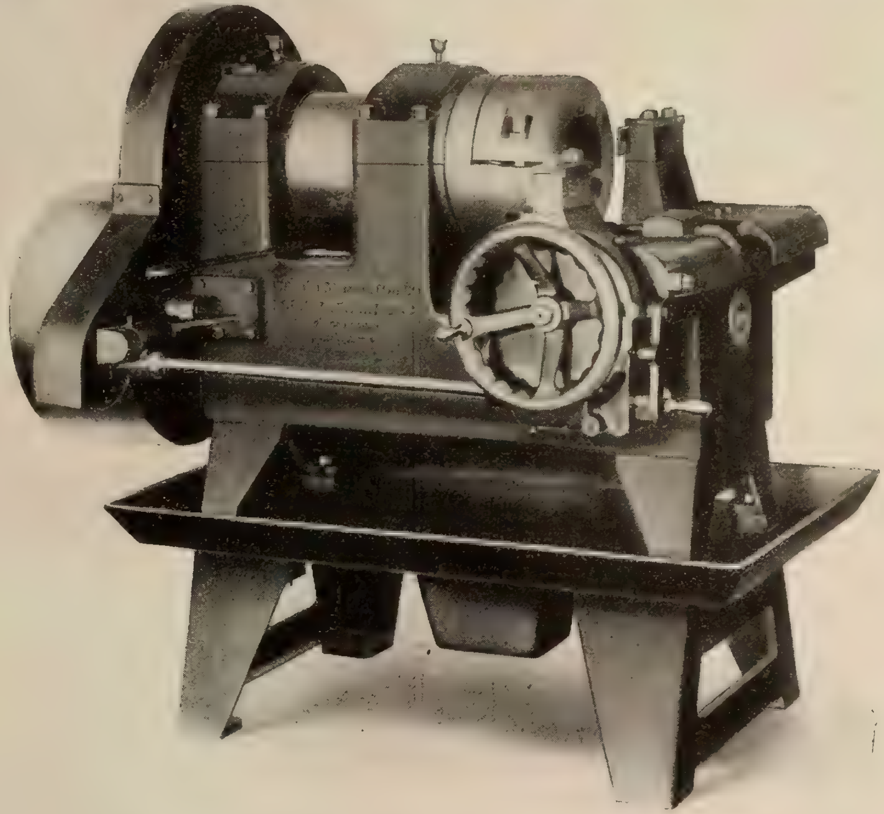
Canadian Agents:

ONTARIO: A. R. Williams Machinery Company
TORONTO: Foss & Hill Machinery Company

REMEMBER

and write for the "Sidney" Lathe Bulletin and carefully consider this machine as a means of increasing efficiency.

Symington Single Purpose Machinery



Type A-1-6 for cutting of open ends off 4.5, 5 and 6-inch forgings.

For Shell Manufacture

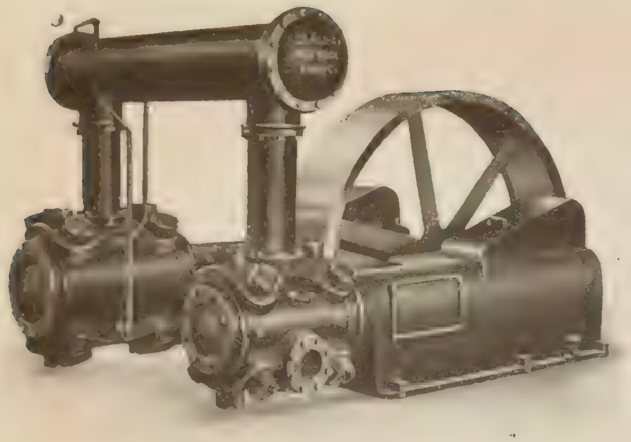
Machines Tooled Up Complete For

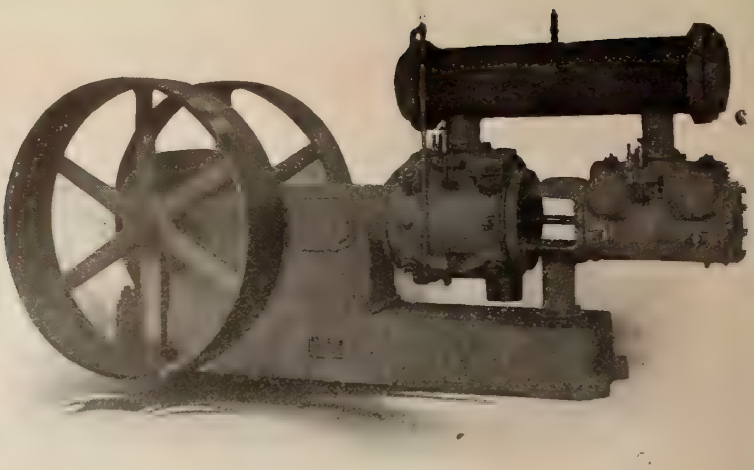
18-pdr. British High Explosive
18-pdr. British Shrapnel
3-pdr. Russian Shrapnel
3-pdr. Russian High Explosive
75-mm. French High Explosive
75-mm. Italian High Explosive

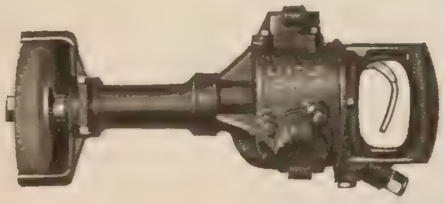
We are prepared to furnish complete battery of machines for all operations. Machines have been sold to Russia, France, Italy, Australia, Canada and United States, and are giving eminent satisfaction.

THE T. H. SYMINGTON COMPANY

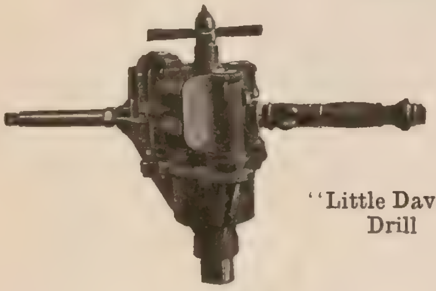
Machine Tool Dept. **ROCHESTER, N.Y., U. S. A.**



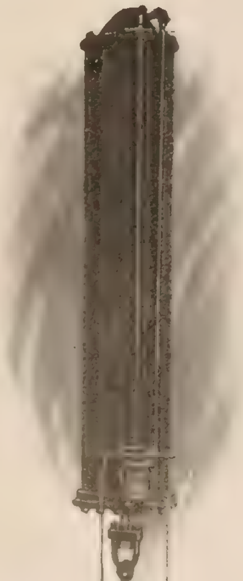




"Little David" Grinder



"Little David" Drill



Air Hoist

High Grade Tools

Maximum Power
Minimum Cost

Realizing that maximum power and minimum cost are dependent on one another for the solution of that great problem, cost-reduction, we have the Ingersoll-Rand Air Compressors and "Little David" tools perfect in operation and as simple as possible in construction. We do not mean the first cost, but rather upkeep cost.

In Air Compressors, the Ingersoll-Rand products bear the stamp of quality that singles them out distinctive from all other makes. For small plants we build compressors from 10 to 100 lbs., with short belt-drive attachment.

The "Little David" tools are air driven. Two of their line are shown to the left. The Grinder is admirable for grinding out the bore and afterwards buffing same on large shells. The Drill will perform all ordinary drilling or reaming operations.

The Air Hoist is featured by air being under pressure on both sides of the piston. This fact, together with its simplicity, makes it indispensable in the all-round efficiency of your plant.

Inquire at any of our offices.

Canadian Ingersoll-Rand Co.
Limited
Commercial Union Bldg., Montreal, Canada
Works at Sherbrooke, Quebec, Canada

Sydney
Toronto
Cobalt
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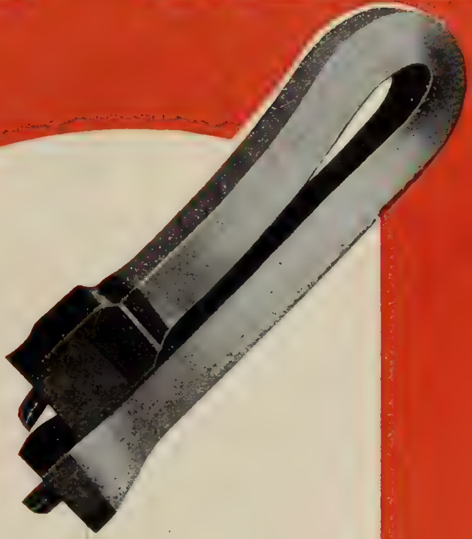
Nelson

Mention this paper when writing advertisers. It will identify the proposition about which you require information.

STEEL CASTINGS



This is a sample cut from a Dominion Steel Casting machined and bent cold. It illustrates the superiority of Dominion Cast Steel for machinery parts.

Representative Physical Test.

Tensile Strength	**74200**
Elastic Limit	**38400**
Elongation in 2″	**31.2%**
Reduction in Area	**51.5%**

The *greater strength and durability and freedom from blow-holes* of Dominion Steel Castings protect you against complaints and lost sales that are the result of broken iron parts.

These castings are the product of our *Acid Open-hearth Furnace,* and are made from a special steel mixture. All heats are subjected to chemical and physical tests.

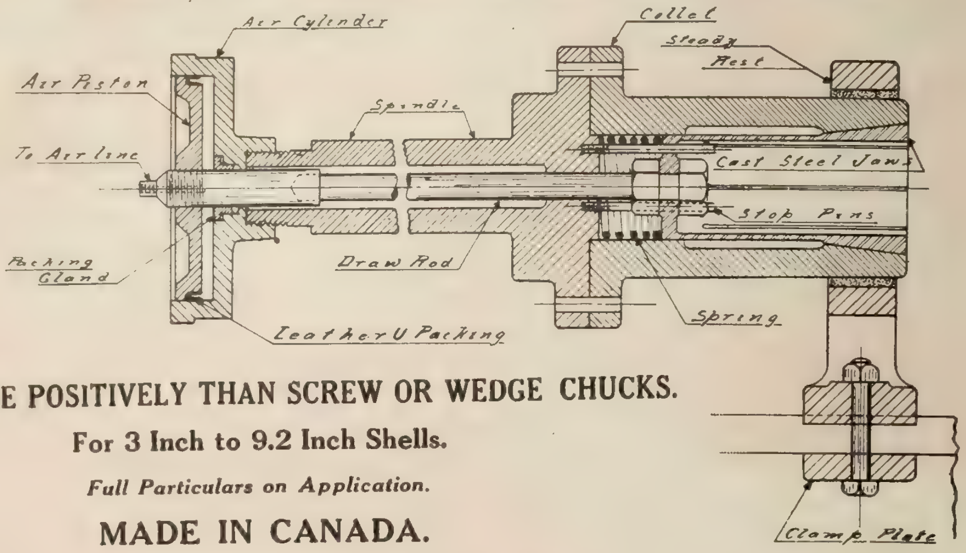
They cost slightly more than grey iron castings—*but remember,* the better your castings, the better your product—and the better your business.

THE
Dominion Steel Foundry Company, Limited
HAMILTON, ONTARIO

Have You Any "Chuck" Difficulties?

The H.E.W. Air Collet Chuck will solve them and increase your capacity.

NO BRUTE FORCE OR HAMMER REQUIRED TO TIGHTEN.



GRIPS MORE POSITIVELY THAN SCREW OR WEDGE CHUCKS.

For 3 Inch to 9.2 Inch Shells.

Full Particulars on Application.

MADE IN CANADA.

HYDE ENGINEERING WORKS

P.O. BOX 1164

27 William St., MONTREAL, P.Q.

PRACK & PERRINE

INDUSTRIAL ARCHITECTS
Construction Engineers

We have constructed and designed some of the largest Factories, Power Plants and Commercial Buildings in Canada.

No work too large for us to handle or too small for our careful consideration.

Toronto - Ontario

Lumsden Building

Phone Main 7123

Battery Wash Bowls

Sanitary, Economical and Efficient

Furnished in:

A with
  1. Plain iron bowls.
  2. Galvanized iron bowls, or
  3. Vitrified porcelain and iron bowls.
B arranged in
  1. Single or
  2. Double batteries of any number of bowls in a battery.
C arranged for
  1. Cold or tempered, or
  2. Hot and cold water.
D with
  1. Plain nozzle.
  2. Compression bibb or
  3. Self-closing bibb.

Send for Our Complete Catalogue

showing our line of Wash Bowls, Metal Lockers, All Steel Stools and Chairs with Inset Wood Seats. Stock and Storage Racks, Metal Shelving, Metal Vault Fixtures, Improved Soda Kettles, 40 and 60 gallons, Water Heaters and Instantaneous Mixers, Bubbling Drinking Fountains. Full Line of Plumbing Material. Work Benches and Bench Legs, Drawing Stands, etc.

Manufacturing Equipment and Engineering Co.

Office and Showrooms—Boston, Mass., U.S.A.
Works—Framingham, Mass.
MAIL ADDRESS—Framingham, Mass, U.S.A.

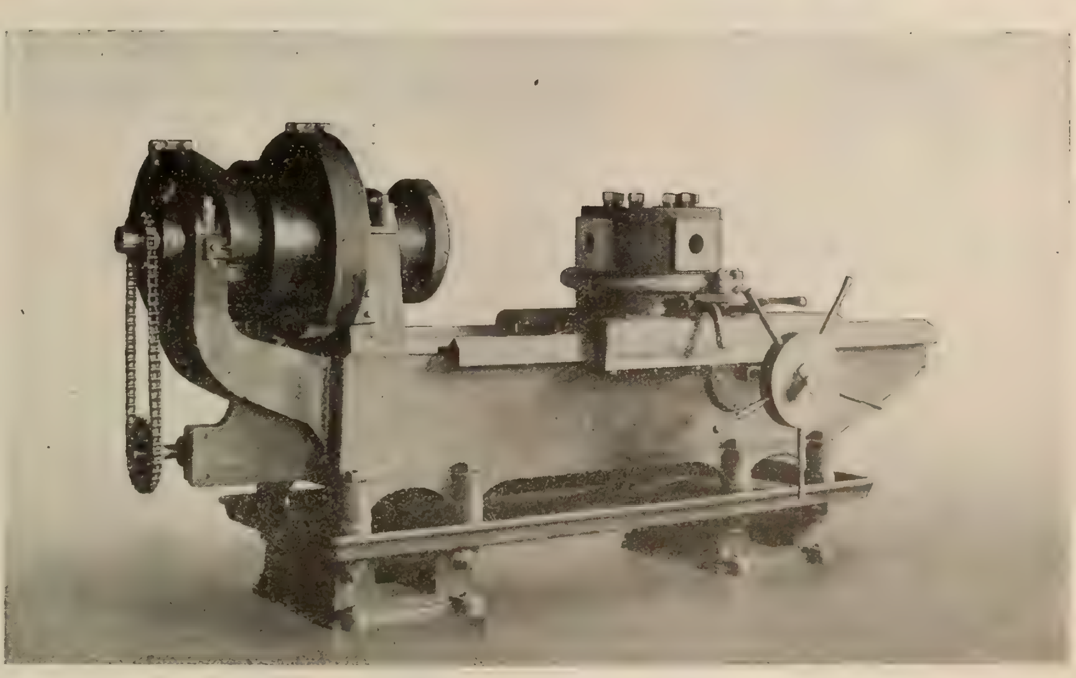
THE H. E. W. LATHE

Rugged Compact Simple Efficient

For Boring and Turning

In Sizes to handle 3 inch to 9.2 inch Shells
Built for the Most Severe Service.

WHAT ARE YOUR REQUIREMENTS?



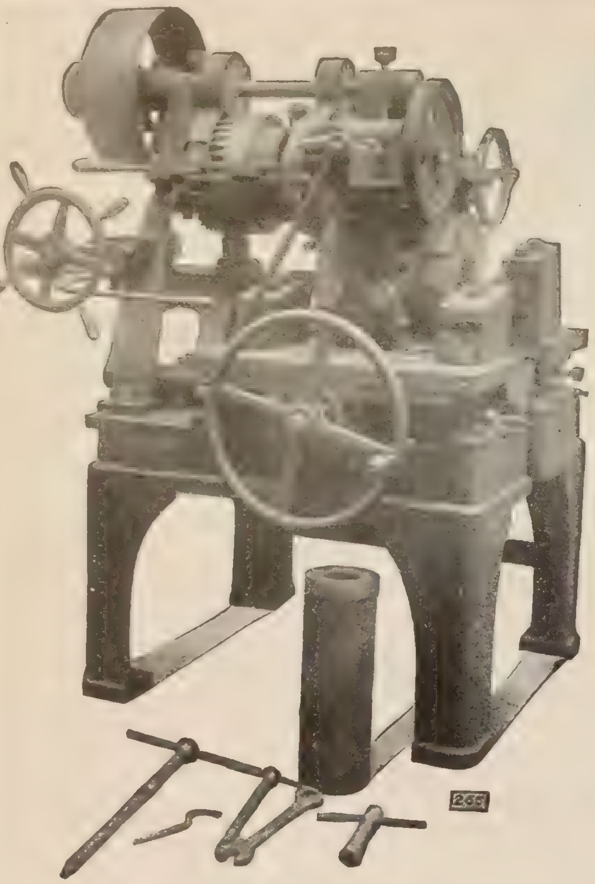
Style "C" Boring Lathe

Repeat orders received by us daily are evidence of scores of Satisfied Customers.

MADE IN CANADA

HYDE ENGINEERING WORKS

P. O. Box 1164
27 William St., Montreal, P. Q.



CUTTING-OFF MACHINES

"Cuts Both Ends at Once"

18 POUNDERS TO 6-INCH
SINGLE END MACHINES
8 INCHES AND OVER

Two Speeds with Quick Change While Cutting

Floor space, 4 ft. x 5 ft.
Maximum Rigidity
Forgings feed in one end and out the other
Four tools work at once

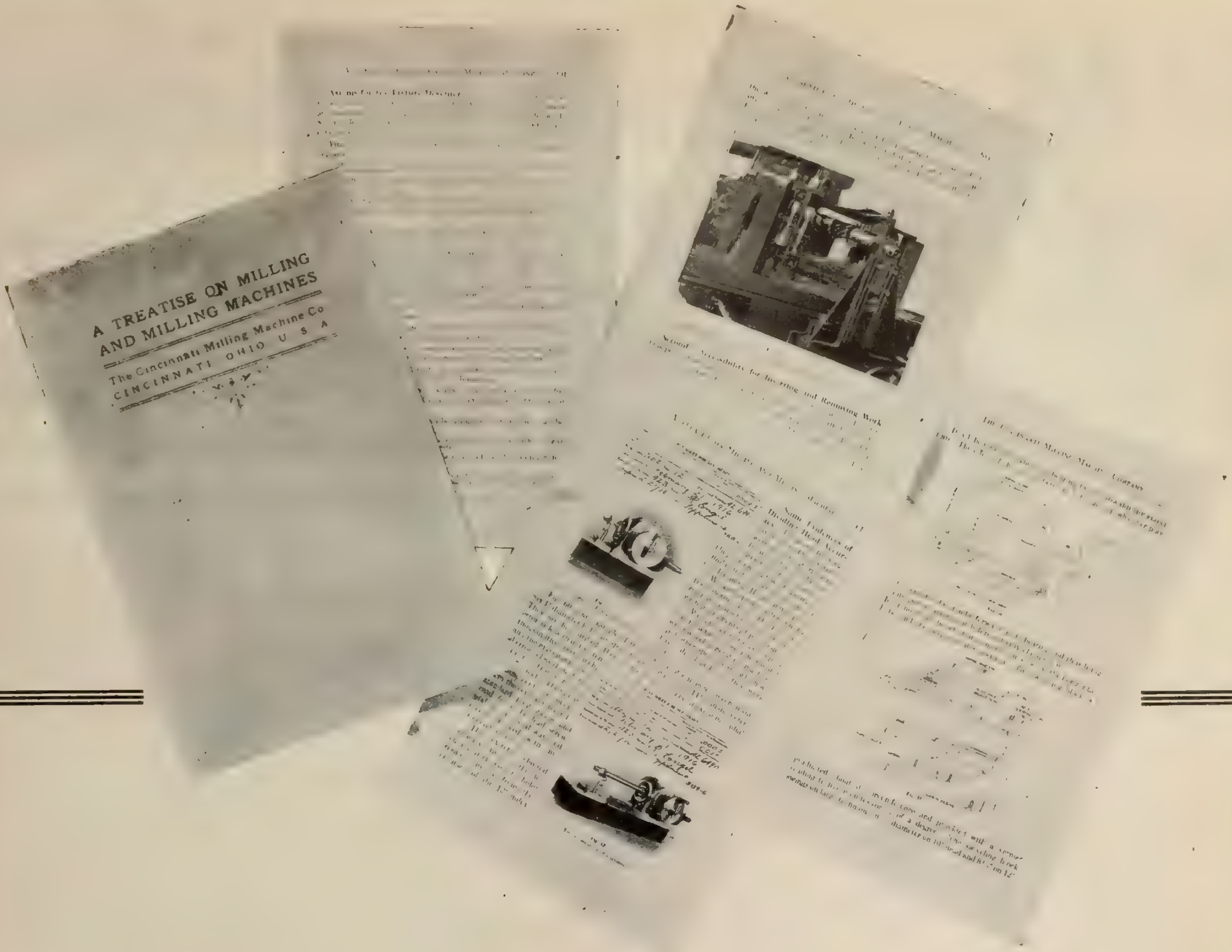
PROPELLER WHEELS

Solid and Sectional
In Steel, Semi-steel, Cast Iron and Brass.
From 1 to 20 ft. Diameter

STEEL CASTINGS

MALLEABLE STEEL, MANGANESE STEEL, CHROME STEEL, Etc.

THE WM. KENNEDY & SONS, Limited, Owen Sound


A TREATISE ON MILLING AND MILLING MACHINES
The Cincinnati Milling Machine Co
CINCINNATI OHIO U S A

Just off the Press—A New Book on Milling

NOT THE usual compilation of catalog matter, but a 412 page book full of data on all branches of milling, most of which have never before been published. Tells you just what you want to know about the latest practice in—

Speeds and Feeds; Cutter Design; Jigs and Fixtures; The Best Method for Milling a Given Job; Power Required to do Milling; Size of Cut Each Machine Can Take; How to Set Up for the Best Results; Cutter Sharpening; Chattering—its causes and remedies. Use of the Dividing Head—and a complete, simple discussion of the mathematics of Spur, Bevel, Mitre, Spiral and Worm Gear Cutting, Angular Indexing, Computing Change Gears, etc.

Complete Tables for Indexing, Spiral Milling, Cum Milling, Rack Milling, Trigonometric Functions, etc.

Invaluable to the superintendent, foreman, milling machine operator and draftsman.

Prices $1.50 Postage Prepaid

The Cincinnati Milling Machine Co.

CINCINNATI OHIO U.S.A.

The MacLean Business & Class Publications in Canada

TO SELL or buy from Canada such lines as machinery, hardware, food products, dry goods, books and stationery, paper, printing machinery and supplies and general merchandise of almost every description, raw or manufactured, use or consult the MacLean Business and Class Publications, as per list below. For special information, write the publishers. Concerning the quality of the MacLean publications, let this copy of CANADIAN MACHINERY which you hold in your hands speak for all. The MacLean list of 14 publications is as follows:—

The Canadian Grocer (Est. 1886)
Serving the Grocery, Provision and Food-stuffs Trades. Published weekly.

Hardware and Metal (Est. 1889)
Serving the Hardware, Stove and Metal-working Trades. Published weekly.

Dry Goods Review (Est. 1889)
Serving the Dry Goods Trade generally; Wholesale, Retail, Manufacturing and Department Stores. Published monthly.

Men's Wear Review (Est. 1898)
Serving the Manufacturers of Clothing, Underwear, Shirts, Collars, Neckwear, Footwear, Hats and Caps and Allied Sundries, and their Retail Distributors. Published monthly.

Canadian Machinery (Est. 1905)
Serving the Machinery, Metal-Working, Iron and Steel, Foundry and Allied Trades. Published weekly.

The Power House (Est. 1907)
Serving the Operating and Consulting Engineers and Power Superintendents. Devoted to the Generation, Transmission and Application of Steam, Gas, Electric, Air and Water Power; and to the operation of Refrigerating Machinery. Published monthly.

Bookseller and Stationer (Est. 1884)
Serving the Book, Stationery, Fancy Goods and Associated Trades. Published monthly.

The Sanitary Engineer (Est. 1907)
Serving the Manufacturers of Sanitary, Heating and Ventilating Machinery, Systems and Equipments, and those installing them. Published semi-monthly.

Marine Engineering of Canada (Est. 1910)
Serving the Marine Engineering, Merchant and Shipbuilding Trades. Published monthly.

Canadian Foundryman (Est. 1909)
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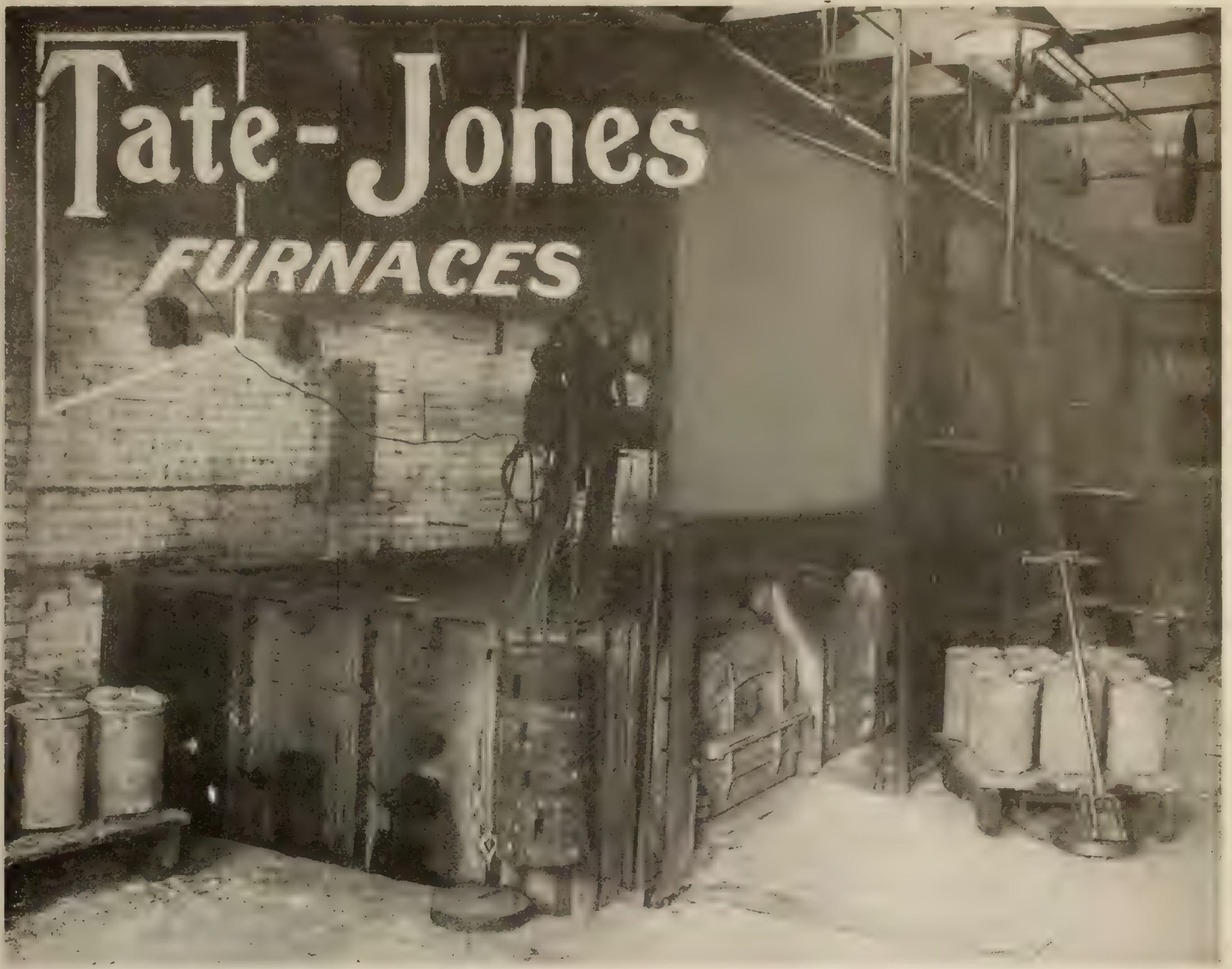

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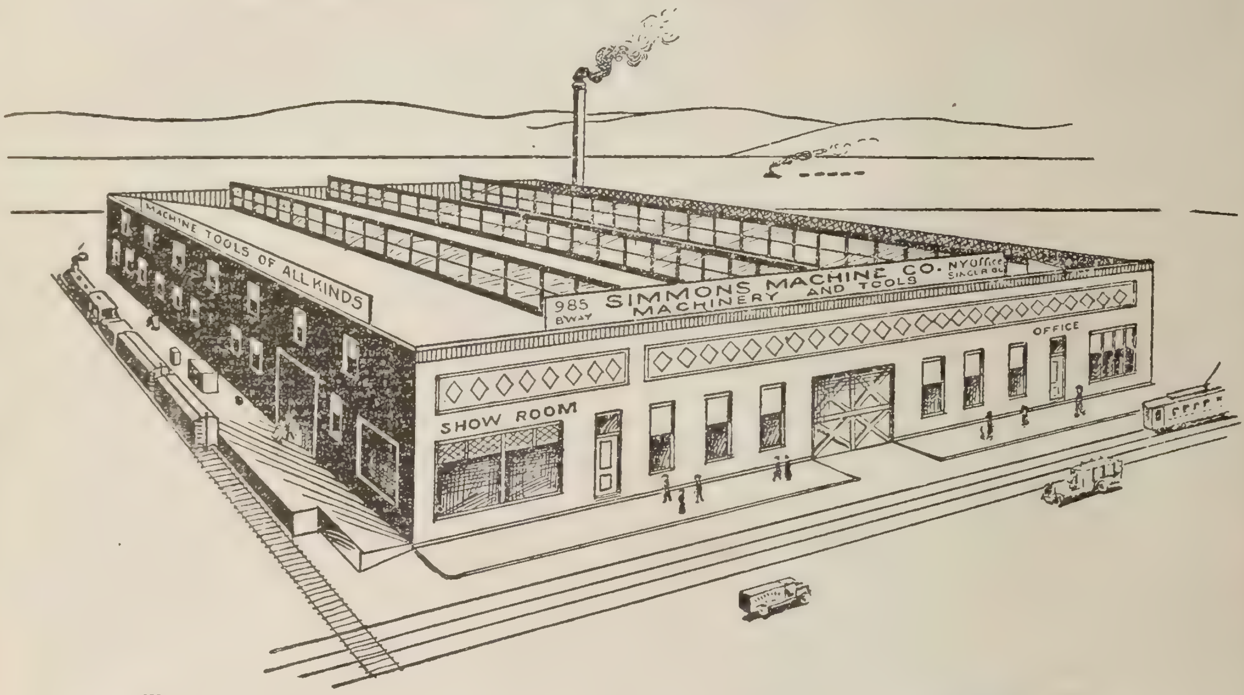

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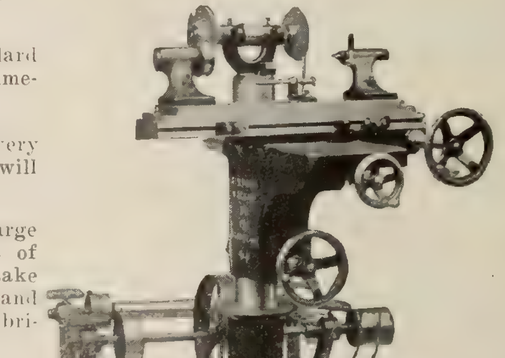

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machy. Co., St. Louis, Mo
Garlock-Walker Machinery Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Smart-Turner Machine Co., The, Hamilton.
Wickes Brothers, Saginaw, Mich.

CONSTRUCTION ENGINEERS
Prack & Perrine, Pittsburgh, Pa.

CONDENSERS.
Darling Bros., Ltd., Montreal, Que.
Goldie & McCulloch, Galt, Ont.

CONTROLLERS AND STARTERS, ELECTRIC MOTORS
Dominion Machy. Co., Toronto, Ont.
Lachapelle, J. D., & Co., Montreal, Que.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.

CONVERTERS, STEEL SLIDE-BLOW
Whiting Foundry Equipment Co., Harvey, Ill.

COPING MACHINES.
Can. Blower & Forge Co., Kitchener, Ont.
John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

CORPORATION SPECIALTIES
T. McAvity & Sons, Ltd., St. John, N.B.

COUNTERS
Durant Mfg. Co., Milwaukee, Wis.

COUNTERBORES AND COUNTERSINKS.
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.

COUNTERSHAFTS.
Corbet Fdry. & Mach. Co., Ltd., Owen Sound, Ont.
Baird Machine Co., Bridgeport, Conn.
Webber Bros. Mach. Co., Toronto, Ont.

COUPLINGS.
Can. Bond Hanger & Coupling Co., Alexandria, Ont.
Corbet Fdry. & Mach. Co., Ltd., Owen Sound, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.

CRANES, LOCOMOTIVE.
Davenport Locomotive Works, Davenport, Iowa.
Can. Link-Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville.

CRANES, GANTRY.
Armstrong, H. J., Markdale, Ont.
Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, GOLIATH AND PNEUMATIC
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, PORTABLE.
Aikenhead Hardware Co., Toronto, Ont.
Armstrong, H. J., Markdale, Ont.
Can. Link-Belt Co., Toronto, Ont.
Davenport Locomotive Works, Davenport, Iowa.
Herbert Morris Crane Hoist Co., Toronto, Ont.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER.
Armstrong, H. J., Markdale, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.
Rudel-Belnap Machy. Co., Montreal, Que.

CRIMPS, LEATHER.
Graton & Knight Mfg. Co., Montreal.

CRUSHERS, STONE AND ORE
Dominion Road Mach. Co., Ltd., Goderich, Ont.
Jenkes Machine Co., Sherbrooke, Que.

CUPOLAS.
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CUPOLA BLAST GAUGES & BLOWERS.
Sheldon's, Ltd., Galt, Ont.

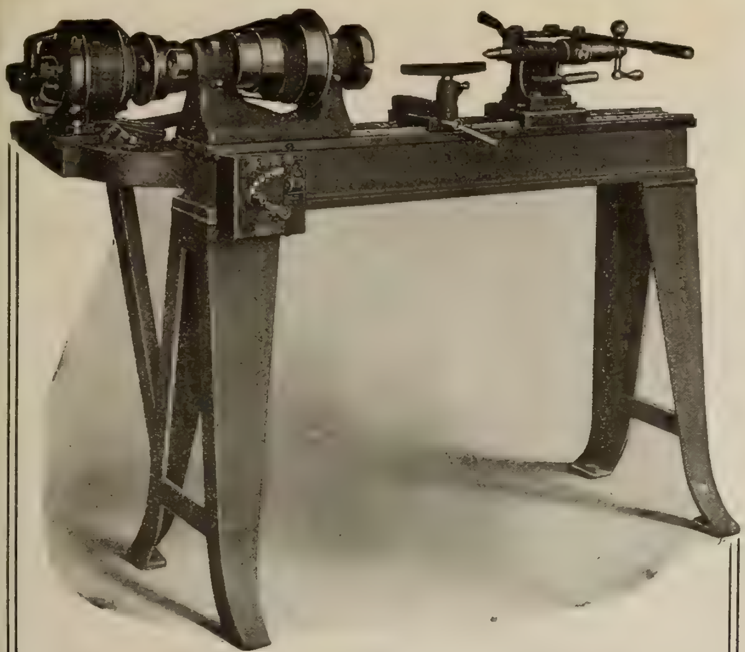
CUTTERS, DIE MACHINES
Anderson Die Mach. Co., Bridgeport, Conn.

CUTTER GRINDERS AND ATTACHMENTS.
Cincinnati Milling Machine Co., Cincinnati
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
H. W. Petrie, Ltd., Montreal.

CUTTERS, FLUE.
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machinery Co., Montreal.
Garvin Machine Co., New York.
Morse Twist Drill and Machine Co., New Bedford
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Stenotype Co., Indianapolis, Ind.
Tabor Mfg. Co., Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.



Motor Driven Speed Lathe

This style of motor drive employs a constant speed motor mounted on a plate having an extension arm to support a bearing for the outer end of the motor shaft. The motor plate is fitted to a slide on a shelf which is securely fastened to the back of the lathe bed. The motor plate is moved by means of a screw which tightens or loosens the belt. A four-step cone pulley on the motor shaft is belted to a four-step cone pulley on the spindle. This gives the same speed variation as when a countershaft is used, and by means of various size cones on the motor a wide range of speeds are obtainable.

The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is crossed-braced and all clamping levers are above the ways.

J. G. BLOUNT CO. - Everett, Mass., U.S.A.

Determine, Measure and Eliminate
LOST TIME and MOTION

Master Cronograph

The day of advanced prices only for the purpose of advanced profits **has** now passed.

To "economize" on selling expense **may** be "to save yourself into bankruptcy."

The one opportunity for the manufacturer to increase his profits is by a reduction of costs.

Labor in America will never sell itself cheaper than to-day, and the cost of materials is increasing yearly.

Therefore, increased profits in your plant are dependent upon just one thing:

You must determine, measure and eliminate lost time and motion.

The Master Cronograph will enable you to determine without further calculation just what a man or a machine DOES DO and SHOULD DO in an hour or a minute.

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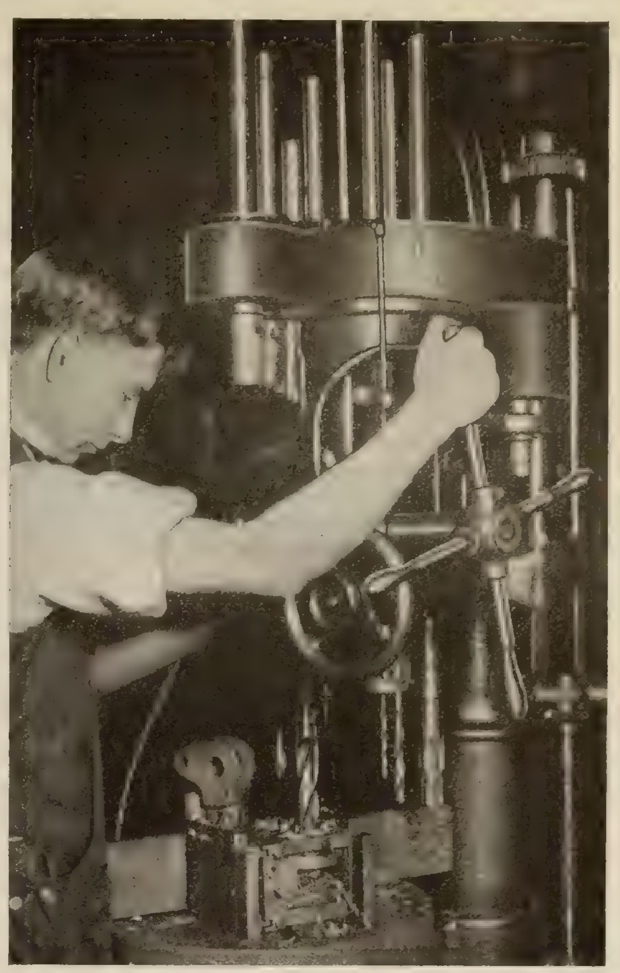

TURNER TURRET ?

If it is a question of drilling, reaming, threading, undercutting, facing, underboring, etc., the Turner Turret will accomplish these at a great saving. One reason for the saving is that 4, 5 and 6 operations may be completed without resetting tools. Good reason, isn't it? But that isn't the only reason.

Trunnion Chucks make working on several sides possible with one chucking.

Turret is suspended within rigid, accurate case. Detent located in case and fits adjustable socket in turret.

Turner Machine Company
Danbury, Conn., U.S.A.

Incorporated with

Turner, Atherton & Company, Limited
Denton, Manchester and Stockport, England

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Can Economic Lubricant Co., Montreal.
Cataract Refining & Mfg. Co., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.

CUTTING-OFF MACHINES.

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Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hurlbut, Rogers Machy. Co., South Sudbury, Mass.
John H. Hall & Sons, Brantford, Ont.
Wm. Kennedy & Sons, Owen Sound Ont
Montreal Machy. & Supplies, Ltd., Montreal, Que.
Peerless Machine Co., Racine, Wis.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rudel Belnap Machy. Co., Montreal, Que.
Racine Tool & Machine Co., Racine Wis.
Root & Van Dervoort Engr. Co., East Moline, Ill.
Tabor Mfg. Co., Philadelphia, Pa.

DAMPER REGULATORS.

Canadian Fairbanks-Morse Co., Ltd., Montreal.
Darling Bros., Ltd., Montreal, Que.

DERRICKS

Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co., Montreal.
The Winnipeg Gear & Engineering Co., Winnipeg, Man.

DIAMONDS, BLACK AND ROUGH

Geo. A. Joyce Co., Ltd., New York.

DIE BLOCKS

Hammond Steel & Forging Co., Syracuse, N.Y.

DIAMOND TOOLS

Aikenhead Hardware Co., Toronto, Ont.
Geo. A. Joyce Co., Ltd., New York.

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Hannifin Mfg. Co., Chicago, Ill.
Mathews, Jas. H. & Co., Pittsburgh, Pa.

DIES AND DIE STOCKS

Aikenhead Hardware Co., Toronto, Ont.
Armstrong Mfg. Co., Bridgeport, Conn.
Banfield, W. H., & Son, Toronto.
Butterfield & Co., Rock Island, Que.
Brown, Boggs & Co., Hamilton, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Hannifin Mfg. Co., Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Modern Tool Co., Erie, Pa.
Montreal Machy & Supplies, Ltd., Montreal, Que.
Morse Twist Drill and Machine Co., New Bedford
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rickert-Shafer Co., Erie, Pa.
Rudel Belnap Machy. Co., Montreal, Que.
Wells Brothers Co. of Canada, Galt, Ont.

DIES FOR BIT BRACE USE

Hannifin Mfg. Co., Chicago, Ill.
Wells Brothers Co. of Canada, Galt, Ont.

DIES, NOSING

Hannifin Mfg. Co., Chicago, Ill.
Marsh & Henthorn, Belleville, Ont.

DIES, PIPE-THREADING

Hannifin Mfg. Co., Chicago, Ill.
Ideal Tool & Mfg. Co., Beaver Falls, Pa.

DIE SINKERS

Hannifin Mfg. Co., Chicago, Ill.
Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.
H. W. Petrie Ltd., Montreal.

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Northern Electric Company, Montreal, Que.
Aikenhead Hardware Co., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

DIES, HOT PIERCING

Hammond Steel & Forging Co., Syracuse, N.Y.

DIE MAKING MACHINERY

[illegible] Die Mach. Co., Bridgeport, Conn.

DIE SINKING PRESSES, HYDRAULIC

Charles F. Elmes Eng. Works, Chicago.

DIES, SELF-OPENING

Eastern Mach. Screw Corp., New Haven, Conn
Geometric Tool Co. New Haven.
Ideal Tool & Mfg. Co., Beaver Falls, Pa.
Landis Machine Co., Waynesboro, Pa
Modern Tool Co. Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Wells Brothers Co. of Canada, Galt, Ont.

DIES FOR SCREW PLATES

Wells Brothers Co. of Canada, Galt, Ont.

DIES, SHEET METAL WORKING

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Brown, Boggs & Co., Hamilton, Conn.
Worth Engineering Co., Toronto, Ont

DIES, SCREWS AND THREAD

Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Wells Brothers Co. of Canada, Galt, Ont.

DISCS, LEATHER

Graton & Knight Mfg. Co., Montreal.

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Commercial Camera Company, Providence, R.I.

DRAFT, MECHANICAL

W. H. Banfield & Sons, Toronto.
Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Limited, Galt, Ont.

DRILL HOLDERS

Aikenhead Hardware Co., Toronto, Ont.

DRILL PRESSES

Aurora Tool Works, Aurora, Ind.
W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Colburn Mach. Tool Co., Franklin, Pa.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Montreal Machy. & Supplies, Ltd., Montreal, Que.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
A. R. Williams Machinery Co., Toronto.

DRILL SOCKETS

Modern Tool Co., Erie, Pa.

DRILLING MACHINES, GANG

Barnes, W. F. & John, Co., Rockford, Ill.
Canada Machinery Corporation, Galt, Ont.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE

John Bertram & Sons Co., Dundas.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corporation, Galt, Ont.
Can. Fairbanks-Morse Co., Montreal
Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rockford Driling Mach. Co., Rockford, Ill.

DRILLING MACHINES, RADIAL AND TURRET

John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Colburn Mach. Tool Co., Franklin, Pa.
Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Perfect Machine Co., Galt, Ont.
H. W. Petrie, Toronto.
Turner Machine Co., Danbury, Conn.

DRILLING MACHINES, SENSITIVE

Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
D. McKenzie Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York
R. E. T. Pringle, Ltd., Toronto, Ont.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL

Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt Ont
Colburn Mach. Tool Co., Franklin, Pa.
Dominion Machy. Co., Toronto, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
R. McDougall Co. Galt.
Newton Mach. Tool Works, Inc., Philadelphia, Pa.
Niles Bement Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rockford Driling Mach. Co., Rockford, Ill.
Rudel-Belnap Machy. Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

DRILLING POSTS

Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.

DRILLS, BENCH

Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal
Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
Foss & Hill Machy Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.

DRILLS, BLACKSMITH AND BIT STOCK

Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy. Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

DRILLS, CENTRE

Aikenhead Hardware Co., Toronto, Ont.
Celfor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.

DRILLS, CORNER (PNEUMATIC)

Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, ELECTRIC AND PORTABLE

Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cincinnati Electric Tool Co., Cincinnati, Ohio.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Independent Pneumatic Tool Co., Chicago.
Lachapelle, J. D., & Co., Montreal Que
Newton Mach. Tool Works, Inc., Philadelphia, Pa.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.
R. E. T. Pringle, Ltd., Toronto, Ont.
United States Electrical Tool Co., Cincinnati, O.
A. R. Williams Machy. Co., Toronto.

DRILLS, HIGH SPEED

Aikenhead Hardware Co., Toronto, Ont.
J. R. Baxter & Co., Ltd., Montreal, Que.
Cleveland Twist Drill Co., Cleveland.
Can. Fairbanks-Morse Co., Cleveland.
H. A. Drury Co., Montreal.
Foss & Hill Machy Co., Montreal.
Montreal Machy. & Supplies, Ltd., Montreal, Que.
Morse Twist Drill & Machine Co., New Bedford.
W. F. & John Barnes Co., Rockford, Ill.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, MULTIPLE SPINDLE

Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, OIL TUBE

Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.

DRILLS, PNEUMATIC

John F. Allen Co., New York.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York.
R. E. T. Pringle, Ltd., Toronto, Ont.

DRILLS, RADIAL

Cincinnati Electrical Tool Co., Cincinnati, Ohio.

DRILLS, RATCHET AND HAND

Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago.
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, ROCK

Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy Co., Montreal.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
A. R. Williams Machy. Co., Toronto.

DRILLS, SENSITIVE

The Burke Machine Tool Co., Conneaut, Ohio.

DRILLS, TRACK

Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy Co., Montreal.
Morse Twist Drill and Machine Co., New Bedford.

DRILLS, TWIST

Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Ltd., Montreal.
Boker & Co., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Celfor Tool Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill and Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

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Sheldons, Ltd., Galt, Ont.
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Sheldons, Ltd., Galt, Ont.

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Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

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Dominion Machy. Co., Toronto, Ont.
Lancashire Dynamo and Motor Co., Ltd., Toronto
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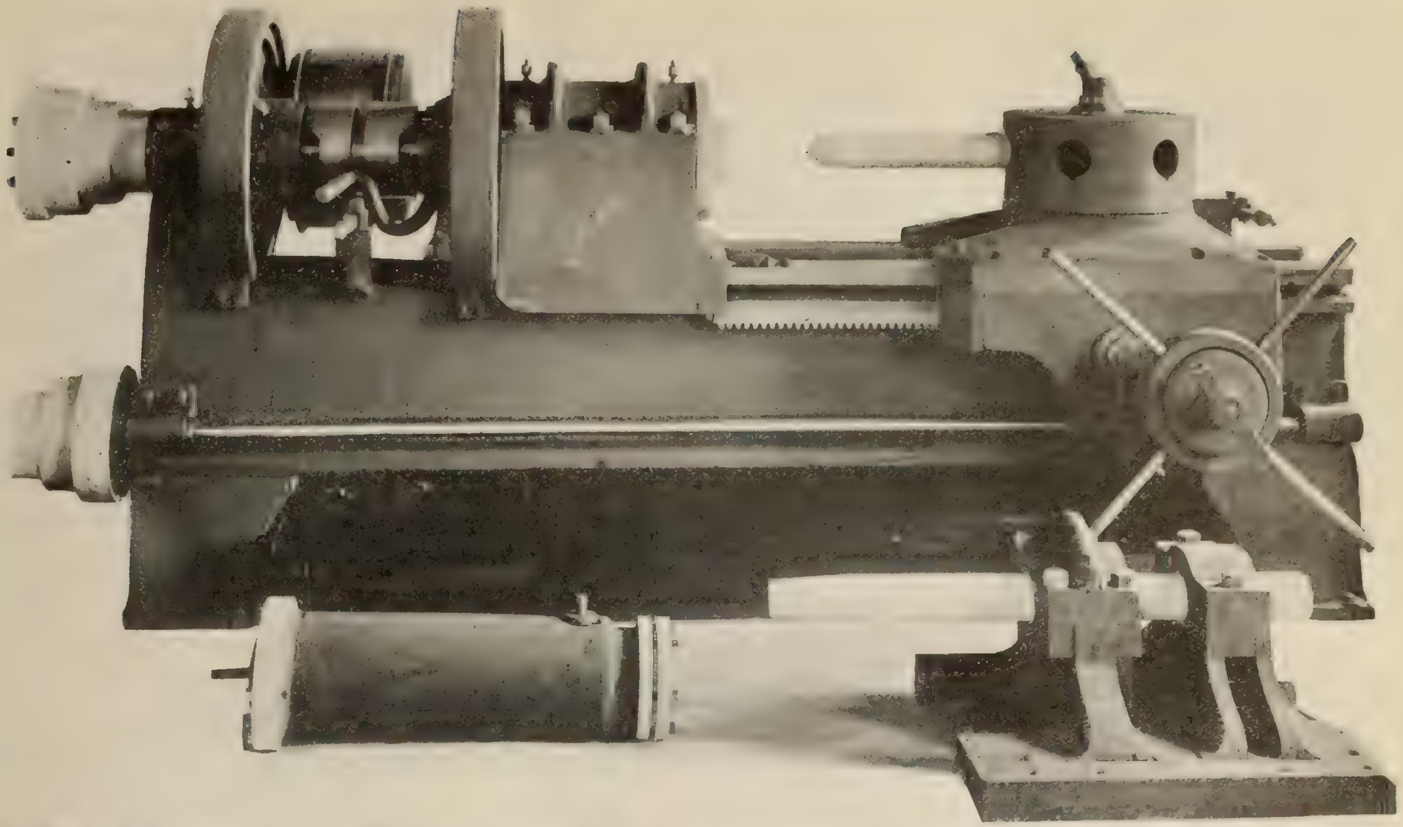
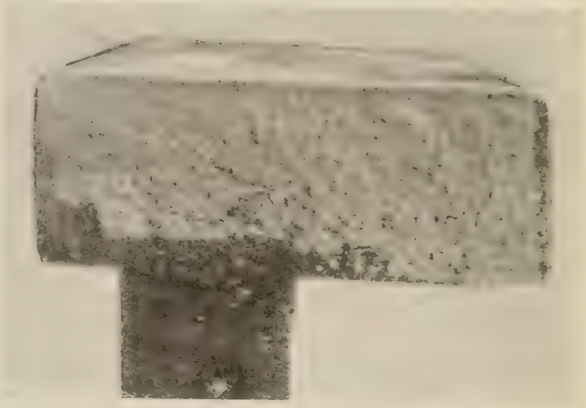
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.
Pratt & Whitney Co., Dundas, Ont.
L. S. Starrett Co., Athol, Mass.



Hollow Spindle Shell Lathe

for boring and turning shells from 9.2 down



Showing the close grain of the metal used in making these lathes.

ABOVE CUT SHOWS ATTACHMENTS AVAILABLE

1. Bed has Chilled Ways. These are deep and wide, and braced by wide cross ribs. Permanent maintenance of alignment. Bearings are dowled into position.
2. Can be furnished with centre rack if desired. Furnished also with boring bar with removable cutters, as shown.
3. We furnish this lathe also with Hydraulic Cylinder giving quick return and positive drive.

Among other good features, note the following:-

- 3" belt on feed.
- 7" belt and 75 H.P. friction.
- 18" turret.
- Keys for boring bars.
- External feed friction.
- Four-pitch rack.
- Note Sheet Steel Oil Pan.
- No countershaft required.
- Bronze Bearings throughout.
- Hardened and ground thrust collars.
- An overplus of strength throughout.
- Workmanship and material guaranteed.
- Hollow Spindle entirely developing shell. Two speeds to drive.

THIS LATHE WILL GIVE YOU SATISFACTION. IT IS FURNISHED COMPLETE WITH AIR CHUCK AND BORING BARS IF REQUIRED.

Immediate Shipment from Stock (Subject to Prior Sale)

The FOUNDRY & MACHINE CO. LIMITED

1167 CARRIER ROAD MONTREAL, CANADA

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Dennis Wire & Iron Works, London, Ont.
Waterous Engine Works, Brantford, Ont.

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Curtis Pneumatic Machy. Co., St. Louis, Mo.
Whiting Foundry Equipment Co., Harvey, Ill.

ELEVATING AND CONVEYING MACHINERY
Banfield, Edwin J., Toronto.
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Dominion Road Mach. Co., Ltd., Goderich, Ont.
Herbert Morris Crane Hoist Co., Toronto, Ont.
Waterous Engine Works, Brantford, Ont.

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Stow Mfg. Co., Binghamton, N.Y.

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Garvin Machine Co., New York.
Hart Wheels, Ltd., Hamilton, Ont.
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Ford-Smith Mach. Co., Hamilton, Ont.
Montreal Machy. & Supplies, Ltd., Montreal, Que
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.

EMERY WHEELS, DRESSERS AND STANDS
Can. Desmond-Stephan Mfg. Co., Hamilton, Ont.
Dominion Abrasive Wheel Co., Ltd., New Toronto, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Norton Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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John Inglis Co., Toronto, Ont.
Plessisville Foundry Co., Plessisville, Que.

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Chicago Rawhide Mfg. Co., Chicago, Ill.
John Inglis Co., Toronto, Ont.
International Engr. Works, Montreal, Que.
Johnson, Carlyle Mach. Co., Manchester, Conn.
Lachapelle, J. D., & Co., Montreal, Que.
H. W. Petrie, Toronto.
Waterous Engine Works, Braneford, Ont.

ENGINES, HORIZONTAL AND VERTICAL
John Inglis Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
Waterous Engine Works, Brantford, Ont.
Johnson-Carlyle Machine Co., Manchester, Conn.
A. R. Williams Machy. Co., Toronto.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Berlin, Canada.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.

FANS
Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.

FAUCETS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

FENCE, IRON FACTORY
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Canada.

FILES
Aikenhead Hardware Co., Toronto, Ont.
J. R. Baxter & Co., Montreal, Que.
Delta File Works, Philadelphia, Pa.
Montreal Machy. & Supplies, Ltd., Montreal, Que.
Nicholson File Co., Port Hope, Ont
Simonds Canada Saw Co., Montreal, Que.

FIRE ESCAPES
Canada Wire & Iron Goods Co., Hamilton, Ont.
[illegible] File & Mach. Co., Ltd., Owen Sound, Ont.
Dennis Wire & Iron Works, London, Ont.

FISH PLATES
Can. Steel Foundries, Ltd., Montreal, Que.

FITTINGS, PIPE
[illegible]
International Malleable Iron Co., Ltd., Guelph, Ont.

FITTINGS, MALLEABLE AND GAY IRON
International Mall. Iron Co., Ltd., Guelph, Ont.

FITTINGS, HYDRAULIC
Hydraulic Press Mfg. Co., Mount Gilead, O.
International Malleable Iron Co., Guelph, Ont.

FLEXIBLE SHAFTS
R. E. T. Pringle, Ltd., Toronto, Ont.
Stow Mfg. Co., Binghamton, N.Y.

FORGES, HAND, ETC.
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE
Bliss, E. W., Co., Brooklyn, N.Y.
Canadian Billings & Spencer, Ltd., Welland.
Cumming & Son, J. W., New Glasgow, Canada.
Dom. Forge & Stpg. Co., Walkerville, Ont.
Hammond Steel & Forging Co., Syracuse, N.Y.
McKay, James Co., Pittsburgh, Pa.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
J. H. Williams & Co., Brooklyn, N.Y.

FORGINGS, SPECIAL HAMMER
Hammond Steel & Forging Co., Syracuse, N.Y.

FORGING HAMMERS, BELT-DRIVEN
Bliss, E. W., Co., Brooklyn, N.Y.
J. H. Williams & Co., Brooklyn, N.Y.

FORGING HAMMERS, STEAM OR AIR
Erie Foundry Co., Erie, Pa.

FORGING MACHINERY
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Erie Foundry Co., Erie, Pa.
Garlock-Walker Machinery Co., Toronto, Ont.
National Machinery Co., Tiffin, Ohio.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

FRICTION CLUTCH PULLEYS, ETC.
American Pulley Co., Philadelphia, Pa.
Baird Machine Co., Bridgeport, Conn.
Can. Link-Belt Co., Toronto, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Toronto.

FRICTION LEATHERS
Can. Hoskins, Ltd., Walkerville, Ont.
Chicago Flexible Shaft Co., Chicago, Ill.
Graton & Knight Mfg. Co., Montreal.

FUEL OIL SYSTEMS
Gilbert & Barker Mfg. Co., Springfield, Mass.

FURNACES, ANNEALING, ETC.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Lachapelle, J. D., & Co., Montreal, Que.
Mechanical Engineering Co., Montreal.
Northern Crane Works, Ltd., Walkerville, Ont
Rockwell Co., W. S., New York, N.Y.
Tate, Jones & Co., Pittsburgh, Pa.
Rudel-Belnap Machy. Co., Montreal, Que.
Whiting Foundry Equipment Co., Harvey, Ill.

FURNACES, BLAST
Toronto Iron Works, Ltd., Toronto.

FURNACES, BRASS, MALLEABLE
Whiting Foundry Equipment Co., Harvey, Il.

FURNACES, HEAT TREATING, HARDENING AND TEMPERING
Chicago Flexible Shaft Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Montreal Machy & Supplies, Ltd., Montreal, Que.
Northern Crane Works, Ltd., Walkerville, Ont.
Tate-Jones & Co., Pittsburgh, Pa.

FURNACES, FORGING
Gilbert & Barker Mfg. Co., Springfield, Mass.
Northern Crane Works, Ltd., Walkerville, Ont.

FURNACES FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING
Oven Equipment & Mfg. Co., New Haven, Conn.

FUSE BOXES, STEEL
Dom. Forge & Stpg. Co., Walkerville, Ont.

FUSE CAP MACHINERY
Noble & Westbrook Mfg. Co., Hartford, Conn.
R. E. T. Pringle, Ltd., Toronto, Ont.

GALVANIZING MACHINERY
Erie Foundry Co., Erie, Pa.

GANG PLANER TOOLS
Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

GAS BLOWERS AND EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt.

GAS MACHINES
Brown, Boggs & Co., Hamilton, Can.

GAS PRODUCER PLANTS
Can. Fairbanks-Morse Co., Montreal

GAUGES, HYDRAULIC PRESSURE
Charles F. Elmes Eng. Works, Chicago
J. R. Baxter & Co., Ltd., Montreal, Que.
Swedish Gage Co., Montreal, Que.

GAUGES, STANDARD
Bawden Machine Co., Toronto, Ont.
Brown Engineering Corp., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Foundry & Mach. Co., Montreal, Que.
Garvin Machine Co., New York.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Hartford, Conn.
Stenotype Co., Indianapolis, Ind.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GEAR BLANKS
Brown Engineering Corp., Toronto, Ont.
Can. Steel Foundries, Ltd., Montreal, Que.
Lyman Tube & Supply Co., Montreal, Que.
Webber Bros. Mach. Co., Toronto, Ont.

GEAR-CUTTING MACHINERY
Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Hamilton Gear & Machine Co., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rudel-Belnap Machy. Co., Montreal, Que.
The Smart-Turner Machine Co., Hamilton.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.

GEAR TURNING MACHINES, BEND
Bridgeford Mach. Tool Works, Rochester, N.Y.

GEARS, CUT, MORTISE, ANGLE, WORM
Can. Link-Belt Co., Toronto, Ont.
Corbet Fdry. & Mach. Co., Ltd., Owen Sound, Ont
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.
Winnipeg Gear & Engr. Co., Winnipeg, Man.

GEARS
Armstrong Bros., Toronto, Ont.
Chicago Rawhide Mfg. Co., Chicago, Ill.

GEARS, RAWHIDE
Chicago Rawhide Mfg. Co., Chicago, Ill.
Hamilton Gear & Machine Co., Toronto.
Gardner, Robt. & Son, Montreal.
Grant Gear Works, Boston, Mass.
Philadelphia Gear Works, Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont
Winnipeg Gear & Engr. Co., Winnipeg, Man.

GENERATORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Lancashire Dynamo & Motor Co., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto
Rudel-Belnap Machy. Co., Montreal, Que.
Wickes Brothers, Saginaw, Mich.
A. R. Williams Machy Co., Toronto.

GRAIN FOR POLISHING
Norton Co., Worcester, Mass.

GRAPHITE
Aikenhead Hardware Co., Toronto, Ont.
Montreal Machy. & Supplies, Ltd., Montreal, Que.

GRAVITY CARRIERS
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont.

GREASES (SEE LUBRICANTS)

GREASE CUPS
Can. Winkley Co., Windsor, Ont.

GRINDERS, AUTOMATIC KNIFE
W. H. Banfield & Son, Toronto.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Rudel-Belnap Machy. Co., Montreal, Que.

GRINDERS, CENTRE, PEDESTAL AND BENCH
Blake & Johnson Co., Waterbury, Conn.
Canada Machinery Corp., Galt, Ont
Cincinnati Electrical Tool, Cincinnati, Ohio.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Dominion Machy. Co., Toronto, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gray Mfg. & Machine Co., Toronto.
Niles-Bement-Pond Co., New York.
Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
Rudel-Belnap Machy. Co., Montreal, Que.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.
J. E. Wing & Son, Hamilton, Ont.

GRINDERS, CUTTER
Brown & Sharpe Mfg. Co., Providence, R.I
Foss & Hill Machy Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Pratt & Whitney Co., Dundas, Ont.
J. E. Wing & Son, Hamilton, Ont.

GRINDERS, DIE CHASER
Bignall & Keeler Mfg. Co., Edwardsville, Ill
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
J. E. Wing & Son, Hamilton, Ont.

GRINDERS, DISK
Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

GRINDERS, DRILL
Aikenhead Hardware Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
United States Electric Tool Co., Cincinnati, O.

GRINDERS, CYLINDER, INTERNAL
Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn
Greenfield Machine Co., Greenfield, Mass.
Modern Tool Co., Erie, Pa.
R. E. T. Pringle, Ltd., Toronto, Ont
Rivett Lathe & Grinder Co., Brighton, Mass.

GRINDERS, PNEUMATIC
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

GRINDERS, PORTABLE, ELECTRIC, HAND TOOL, POST, FLOOR AND BENCH
J. R. Baxter & Co., Ltd., Montreal, Que.
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Dominion Machy. Co., Toronto, Ont.

RUDEL-BELNAP

Machinery Co.

Limited

Shell Machinery Specialists

We SUPPLY all kinds of TOOLS and MACHINERY for the manufacture of shells, forgings and their component parts.

We EQUIP complete plants.

We GIVE service.

We GIVE the most valuable practical experience in machine shop practice.

We can SUPPLY your requirements promptly.

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Foss & Hill Machy. Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago.
Norton Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machy. Co., Toronto.

GRINDERS, RADIAL
Rivett Lathe & Grinder Co., Brighton, Mass.

GRINDERS, TOOL AND HOLDER
Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blake & Johnson Co., Waterbury, Conn.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R I
Cincinnati Electrical Tool Co., Cincinnati Ohio.
Greenfield Machine Co., Greenfield, Mass.
H. W. Petrie, Ltd., Montreal.
Taber Mfg. Co., Philadelphia Pa.
F. E. Wells & Son Co., Greenfield Mass.

GRINDERS, UNIVERSAL, PLAIN
Modern Tool Co., Erie, Pa.

GRINDERS, VERTICAL SURFACE
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Pratt & Whitney Co., Dundas, Ont.
Stenotype Co., Indianapolis, Ind.

GRINDING AND POLISHING MACHINES, PORTABLE, PNEUMATIC AND SPRING FRAME
Bryant Chucking Grinder Co., Springfield, Vt.
Can. Fairbanks-Morse Co., Montreal
Can. Hart Wheels, Ltd., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford.
Niles-Bement Pond Co., New York.
Perfect Machine Co., Galt, Ont.
H. W. Petrie Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.
Wardwell Mfg. Co., Cleveland, Ohio.

GRINDING WHEELS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Carborundum Co., Niagara Falls.
Can. Hart Wheels, Ltd., Hamilton, Ont.
Dom. Abrasive Wheel Co., Ltd., New Toronto, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Barkey Bros., Stouffville, Ont.
Foss & Hill Machy. Co., Montreal.
Norton Co., Worcester, Mass.
H. W. Petrie, Toronto.

GRINDING WHEEL DRESSERS
Can. Hart Wheels, Ltd., Hamilton, Ont.
Can. Desmond-Stephan Mfg. Co., Hamilton, Ont.

GUARDS, WINDOW AND MACHINE
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Canada.
Ford-Smith Mach. Co., Hamilton, Ont.
New Britain Mach. Co., New Britain, Conn.

HACK SAW BLADES
Aikenhead Hardware Co., Toronto, Ont.
Boker & Co., H., Montreal, Que.
Diamond Saw & Stamping Works, Buffalo, N.Y
Foss & Hill Machy. Co., Montreal.
H. W. Petrie Ltd., Montreal.
Montreal Machy. & Supplies, Ltd., Montreal, Que.
Racine Tool & Machine Co., Racine, Wis.
Simonds Canada Saw Co., Montreal, Que.
L. S. Starrett Co., Athol, Mass.
Victor Saw Works, Ltd., Hamilton, Canada.
Zenith Coal & Steel Products, Montreal, Que.

HACK SAW FRAMES
Aikenhead Hardware Co., Toronto, Ont.
Garvin Machine Co., New York City.

HACK SAW MACHINERY
Garlock-Walker Machinery Co., Toronto, Ont.
Ralph B. Norton, Montreal, Que.
Peerless Machine Co., Racine, Wis.
Perfect Machine Co., Galt, Ont.

HAMMERS, AIR
Erie Foundry Co., Erie, Pa.

HAMMERS, DROP AND BELT-DRIVEN
Beaudry & Co., 8 Oliver St., Boston, Mass.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canadian Billings & Spencer, Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
High Speed Hammer Co., Rochester, N.Y.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.

HAMMERS, HELVE POWER
Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.

HAMMERS, POWER
Beaudry & Co., 8 Oliver St., Boston, Mass.
Erie Foundry Co., Erie Pa.

HAMMERS, CHIPPING, CAULKING, PNEUMATIC
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
R. E. T. Pringle, Ltd., Toronto, Ont.

HAMMERS, MARKING
Matthews, Jas. H. & Co., Pittsburgh, Pa.

HAMMERS, MOTOR-DRIVEN
Beaudry & Co., 8 Oliver St., Boston, Mass.

HAMMERS, NAIL MACHINES
Whitman & Barnes Mfg. Co., St. Catharines, Ont

HAMMERS, RAWHIDE
Chicago Rawhide Mfg. Co., Chicago, Ill.

HAMMERS, STEAM
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.

HAND LEATHERS OR PADS
Graton & Knight Mfg. Co., Montreal.

HANGERS
Baird Machine Co., Bridgeport, Conn
Can. Bond Hanger & Coupling Co., Alexandria, Ont.
Dodge Mfg. Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
The Smart Turner Machine Co., Hamilton.
Waterous Engine Works, Brantford, Ont.

HARDNESS TESTING INSTRUMENTS
Shore Instrument & Mfg. Co., New York.

HEATING AND VENTILATING ENGINEERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

HEAT GAUGES, HARDENING AND ANNEALING
Shore Instrument & Mfg. Co., New York.

HINGE MACHINERY
Baird Machine Co., Bridgeport, Conn.

HINGES
London Bolt & Hinge Works, London, Ont

HOISTING AND CONVEYING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont
Jenckes Mach. Co., Sherbrooke, Que.
Herbert Morris Crane Hoist Co., Toronto, Ont.
Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
H. W. Petrie, Ltd., Montreal.
Waterous Engine Works, Brantford Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

HOISTS, CHAIN, ELECTRIC AND PNEUMATIC
Can. Link-Belt Co., Toronto, Ont.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia Pa
Herbert Morris Crane Hoist Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Jenckes Mach. Co., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

HOISTS, ELECTRIC
Darling Bros., Ltd., Montreal, Que.
Herbert Morris Crane Hoist Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Northern Crane Works, Walkerville Ont.
Winnipeg Gear & Engrng. Co., Winnipeg, Man.

HOLDERS, STEEL DIE FOR MARKING
Matthews, Jas. H. & Co., Pittsburg, Pa.

HOPPERS
The Jenckes Mach. Co., Ltd., Sherbrooke, Que
Man. Bridge & Iron Works, Ltd., Winnipeg, Man.
Toronto Iron Works, Ltd., Toronto, Ont.

HOSE, PNEUMATIC
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

HOLDERS FOR DIES AND DRILLS
Wells Bros. Co. of Canada, Galt, Ont.

HYDRAULIC MACHINERY
Dominion Machinery Co., Toronto.
Charles F. Elmes Eng. Works, Chicago.
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
Rudel-Belnap Machy. Co., Montreal, Que.

IMPELLERS
Ontario Specialties, Ltd., Ottawa, Can.

INDICATORS, SPEED
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
L. S. Starrett Co., Athol, Mass.

INDEX CENTRES
Fred C. Dickow, Chicago, Ill.
Garvin Machine Co., New York.

IRON ORE
Hanna & Co., M. A., Cleveland, O

JACKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal
Herbert Morris Crane Hoist Co., Toronto, Ont.
Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
H. W. Petrie, Toronto.

JACKS, HYDRAULIC
Charles F. Elmes Eng. Works, Chicago.

JACKS, PNEUMATIC
Northern Crane Works, Walkerville.

JACKS, PIT AND TRACK
Can. Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.

JAWS, FACE PLATE
Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.

JIGS, TOOLS, ETC.
Hamilton Gear & Machine Co., Toronto.

KEY SEATERS
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
National Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.
Winnipeg Gear & Engrng. Co., Winnipeg, Man.

KILNS
Can. Blower & Forge Co., Kitchener, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Sheldons, Limited, Galt, Ont.

LABELS AND TAGS
Matthews, Jas. H. & Co., Pittsburgh, Pa.

LABORATORIES, INSPECTION AND TESTING (SEE CHEMISTS)

LACERS, BELT (SEE BELT LACERS)

LADLES, FOUNDRY
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

LAG SCREW GIMLET POINTERS
National Machy. Co., Tiffin, Ohio.

LATHES, CHUCKING
Acme Machine Tool Co., Cincinnati, Ohio.

LATHE CHUCKS (SEE CHUCKS)

LATHE DOGS AND ATTACHMENTS
Armstrong Bros., Tool Co., Chicago.
Hendey Machine Co., Torrington, Conn.
J. H. Williams & Co., Brooklyn, N.Y.
Winnipeg Gear & Engrng Co., Winnipeg, Man.

LATHES, AXLE
Bridgeford Mach. Tool Works, Rochester, N.Y.

LATHES, BENCH
W. F. & John Barnes Co., Rockford.
Blount, J. G., & Co., Everett, Mass.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hardinge Bros., Chicago, Ill.
New Britain Mach. Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.
Rivett Lathe & Grinder Co., Brighton, Mass.
Walcott Lathe Co., Jackson, Mich.

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The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Roelofson Machine & Tool Co., Toronto, Ont.
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Warden King Co., Montreal, Que.

LATHES, BRASS
Acme Machine Tool Co., Cincinnati, Ohio.

LATHES, ENGINE
Acme Machine Tool Co., Cincinnati, Ohio.
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Armstrong, H. J., Markdale, Ont.
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Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Cincinnati Iron & Steel Co., Cincinnati, Ohio.
Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
Davenport Locomotive Works, Davenport, Iowa.
Dominion Machinery Co., Toronto.
Douglas, W. & B., Middletown, Conn.
Foss & Hill Machy Co., Montreal.
Foundry & Mach. Co., Montreal, Que.
International Mach. Tool Co., Indianapolis, Ind.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Gray Mfg. & Mach. Co., Toronto, Ont.
Hamilton Mach. Tool Co., Hamilton, Ont.
Hendey Machine Co., Torrington, Conn.
Hepburn, John T., Ltd., Toronto, Ont.
Himoff Machine Co., New York.
Houston, Stamwood & Gamble Co., Cincinnati, O.
Hyde Engineering Works, Montreal, Que
L. K. Leblond Mach. Tool Co., Cincinnati, Ohio.
R. McDougall Co., Galt.
Montreal Machy. & Supplies, Ltd., Montreal, Que.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich
Perfect Machine Co., Galt, Ont.
H. W. Petrie, Toronto.
Preston Woodwork. Mach. Co., Ltd., Preston, Ont.
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Rockford Milling Mach. Co., Rockford, Ill.
Rudel-Belnap Machy. Co., Montreal, Que.
Walcott Lathe Co., Jackson, Mich.
Wickes Bros., Saginaw, Mich.
A. R. Williams Machy. Co., Toronto.

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Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Jenckes Mach. Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

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Bertram, John, & Sons Co., Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Gray Mfg. & Mach. Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Himoff Machine Co., Inc., New York, N.Y
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

The Schoop Process

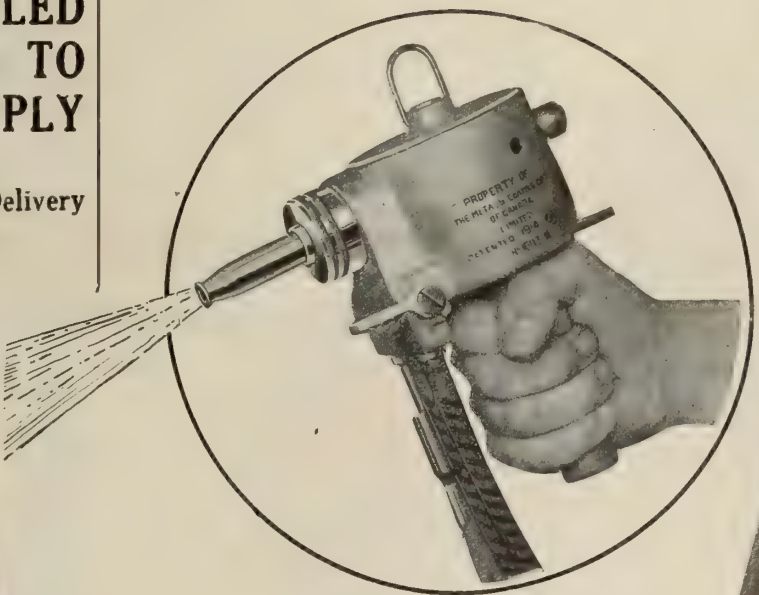
OF BUILDING UP LIGHT-WEIGHT SHELLS. ONLY ONE OF ITS NUMEROUS USES

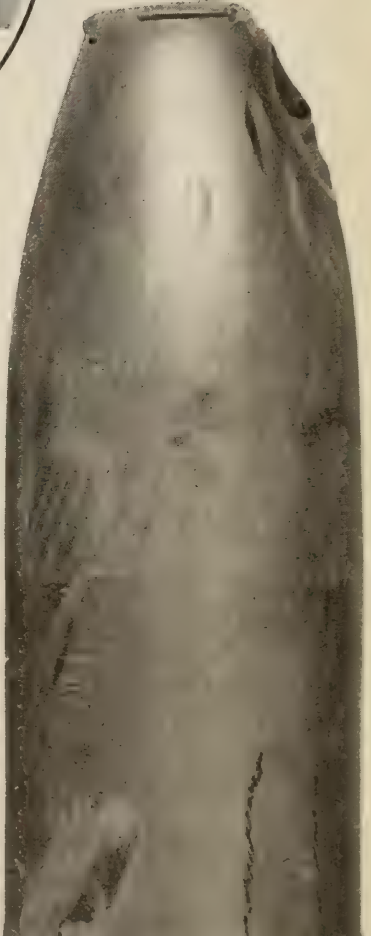
Montreal Gazette
Dec. 13th, 1916.

CANADA HAS FAILED IN HER PROMISE TO BRITAIN ON SUPPLY

Mr. J. W. Flavelle Says Delivery of Munitions Must be Speeded Up

SHELLS shown on this page were 4.5 Howitzer, which WERE SHORT WEIGHT. They were copper-coated by the Schoop method and after having been fired, at the proving grounds at Quebec, **the copper remained intact.**





Canada will not fail in her promise, as all short weight shells can be re-claimed by this method.

Simple—Efficient—Cheap

LET US HELP WIN THE WAR.

Building up short-weight shells by our process.

Write for Booklet

The Metals Coating Co. of Canada, Limited

Versailles Building, 90 St. James Street
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Root & Van Dervoort Engr. Co., East Moline, Ill.
Rudel-Belnap Machy. Co., Montreal, Que.
[illegible] Lathe Co., Jackson, Mich.

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Canada Machinery Corp., Galt, Ont.
Davenport Locomotive Works, Davenport, Iowa.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

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Bliss, E. W., Co., Brookln, N.Y.
Toledo Mach. & Tool Co., Toledo.

LATHES, TURRET AND SPEED

[illegible] Co., Cincinnati, Ohio.
John Bertram & Sons Co., Dundas.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
[illegible] & Machine Co., Ltd., Owen Sound, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
[illegible] Mfg. & Mach. Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Jones & Lamson Mach. Co., Springfield, Vt.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Montreal Machy. & Supplies, Ltd., Montreal, Que.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
Phoenix Mfg. Co., Eau Claire, Wis.
Pratt & Whitney Co., Dundas, O.
Rudel-Belnap Machy. Co., Montreal, Que.
Steinle Turret Mach. Co., Madison, Wis.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

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Whiting Foundry Equipment Co., Harvey, Ill.

LIBTING EQUIPMENT

Northern Electric Company, Montreal, Que.

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Can. Link Belt Co., Toronto, Ont.
Graton & Knight Mfg. Co., Montreal.

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Bertrams, Ltd., Edinburgh, Scotland.

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L'Air Liquide Society, Montreal, Toronto.
Lyman Tube & Supply Co., Montreal, Que.

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Dennis Wire & Iron Works, London, Canada.

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T. McAvity & Sons, Ltd., St. John, N.B.
Mfg. Equipment & Engg. Co., Framingham, Mass.

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Davenport Locomotive Works, Davenport, Iowa.

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Madison-Kipp Lubricator Co., Madison, Wis.
Roper, C. F., & Co., Hopedale, Mass.

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Can. Fairbanks-Morse Co., Montreal.
Dickow, Fred C., Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Garlock-Machinery, Toronto.
Goldie & McCulloch Co., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
[illegible] Mach. & Supplies, Ltd., Montreal, Que.
New York Machinery Exchange, New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
Rudel-Belnap Machy. Co., Montreal, Que.
Stocker, H. A., Machinery Co., Chicago, Ill.
Strong & [illegible], Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.

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MACHINERY REPAIRS

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Frank H. Scott, Montreal.
J. H. Williams & Co., Brooklyn, N.Y.

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Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont.
Jersey City Machine Co., Jersey City, N.J.

McCrosky Reamer Co., Meadville, Pa.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Stone Tool & Supply Co., J. R., Detroit, Mich.

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Pritchard-Andrews Co. of Canada, Ottawa, Ont.

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Brown, Boggs Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Noble & Westbrook Mfg. Co., Hartford, Conn.
Perrin, Wm. R., Toronto.

MEASURING TAPES AND RULES

James Chesterman & Co., Ltd., Sheffield, Eng.

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Can. Inspection & Testing Lab., Montreal, Que.
Toronto Testing Laboratory, Ltd., Toronto.

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Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Dominion Metal Co., Sherbrooke, Que.
Electric Steel & Metals Co., Welland, Ont.
Montreal Machy. & Supplies, Ltd., Montreal, Que.

METAL BABBIT

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Dominion Metal Co., Sherbrooke, Que.

MILL MACHINERY

Alexander Fleck, Ltd., Ottawa.

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Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Cleveland Milling Mach. Co., Cleveland, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
Hendey Mach. Co., Torrington, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.
Rockford Milling Mach. Co., Rockford, Ill.

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John Bertram & Sons Co., Dundas.
Cleveland Milling Machine Co., Cleveland, Ohio.
Garlock-Walker Machinery Co., Toronto, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Gooley & Edlund, Cortland, N.Y.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rudel-Belnap Machy. Co., Montreal, Que.
Steptoe, The John Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.

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Brown & Sharpe Mfg. Co., Providence.
The Burke Machine Tool Co., Conneaut, Ohio.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Chicago, Ill.
Hendey Machine Co., Torrington.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

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Can. Fairbanks-Morse Co., Montreal.
Cook, Asa S., Co., Hartford, Conn.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Winnipeg Gear & Engine Co., Winnipeg, Man.

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Brown & Sharpe Mfg. Co., Providence.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Tabor Mfg. Co., Philadelphia, Pa.

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Can. Fairbanks-Morse Co., Montreal.
Cumming & Son, J. W., New Glasgow, Canada.
Jenckes Mach. Co., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke.
Marsh & Henthorn, Belleville, Ont.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Jenckes Mach. Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

MORTISING MACHINES

Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Mach. Co., New Britain, Conn.

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Can. Fairbanks-Morse Co., Montreal.
Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Lachapelle, J. D., & Co., Montreal, Que.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Northern Electric Company, Montreal, Que.
H. W. Petrie, Ltd., Montreal.
R. E. T. Pringle, Ltd., Toronto, Ont.
Wickes Brothers, Saginaw, Mich.
A. R. Williams Machy. Co., Toronto.

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Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.

MULTIPLE INDEX CENTRES

Garvin Machine Co., New York.

NAME PLATES, BRONZE, ETCHED AND STAMPED

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Pritchard-Andrews Co., Ottawa, Can.

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Landis Machine Co., Waynesboro, Pa.

NITROGEN

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L'Air Liquide Society, Montreal, Toronto.

NOZZLES, SPRAY

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NUT BURRING MACHINES

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National Machy. Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

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National Machy. Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.
Victor Tool Co., Waynesboro, Pa.

NUT TAPPERS

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Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machy Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

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Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
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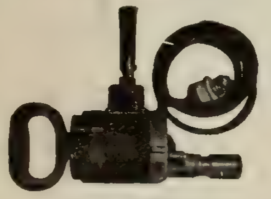

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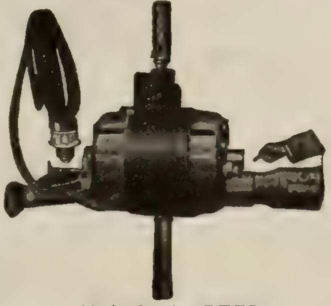

½ inch—2 SPEED.
Speed, 400-750 R.P.M.

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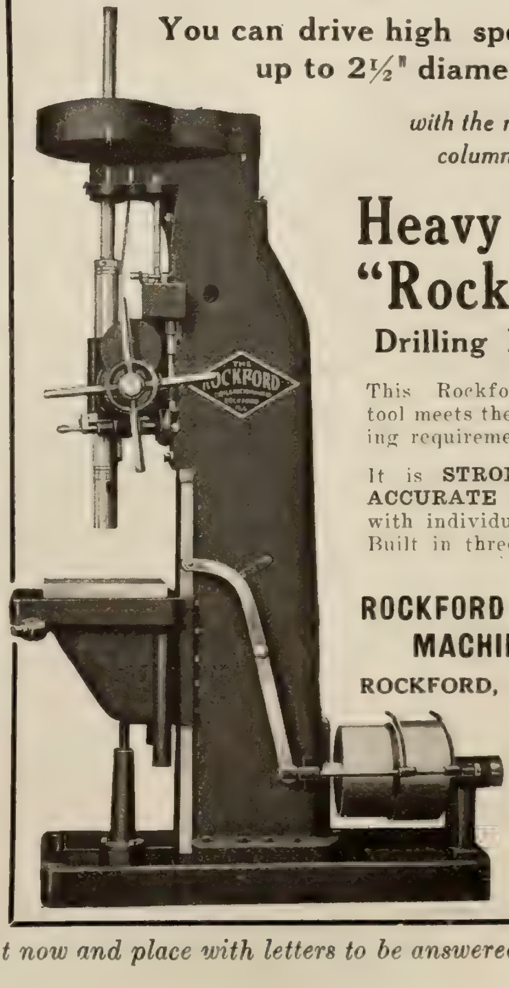

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with the new box-column type

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Drilling Machine

This Rockford machine tool meets the most exacting requirements.

It is **STRONG, RIGID, ACCURATE AND FAST,** with individual features. Built in three styles.

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Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
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Williams Tool Co., Erie, Pa.
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Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Oliver Machy. Co., Grand Rapids, Mich.
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H. W. Petrie, Toronto.
Preston Woodwork. Mach. Co., Ltd., Preston, Ont.

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Foss & Hill Machy. Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
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Hamilton Mach. Tool Co., Hamilton, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto
Preston Woodwork. Mach. Co., Ltd., Preston, Ont.
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A. R. Williams Machy. Co., Toronto.

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Atlas, Press Co., Kalamazoo, Mich.

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Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
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Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Metalwood Mfg. Co., Detroit, Mich.
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H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto
Rudel-Belnap Machy. Co., Montreal, Que.
West Tire Setter Co., Rochester, N.Y.

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[illegible] Ltd., Montreal.
Wm. R. Perrin, Ltd., Toronto.

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E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago, Ill.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press & Tool Co., Hastings, Mich.
Erie Foundry Co., Erie. Pa.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Niles-Bement-Pond Co. New York.
Wm. R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

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Bawden Machine Co., Toronto, Ont.
John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill
Consolidated Press & Tool Co., Hastings, Mich.
Dominion Machy. Co., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rudel-Belnap Machy. Co., Montreal, Que.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.
R. D. Wood & Co., Philadelphia, Pa.

PRESSES, HYDRAULIC DIE STAMPING

Hydraulic Press Mfg. Co., Mount Gilead, O.
Montreal Machy. & Supplies Ltd., Montreal, Que.

PRESSES, PNEUMATIC

Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
R. D. Wood & Co., Philadelphia, Pa.

PRESSES, POWER

Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
Garlock-Walker Machinery Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Rudel-Belnap Machy. Co., Montreal, Que.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.
R. D. Wood & Co., Philadelphia, Pa.

PRESSES, BALING

Fred S. Blackall, New York, N.Y.
Hydraulic Press Mfg. Co., Mount Gilead, O.
William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT

Baird Machine Co., Bridgeport, Conn.
Fred S. Blackall, New York, N.Y.
Toledo Machine & Tool Co., Toledo.
Brown, Boggs & Co., Hamilton, Can.

PRESSES, SCREW

Barnes, W. F. & John. Co., Rockford, Ill.
Fred S. Blackall, New York, N.Y.
Wm. R. Perrin, Ltd., Toronto.

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PULLEYS

American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Bond Hanger & Coupling Co., Alexandria, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
Dodge Mfg. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
D. K. McLaren, Ltd., Montreal, Que.
Montreal Machy. & Supplies, Ltd., Montreal, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Ltd., Toronto.
The Smart-Turner Mach. Co., Hamilton.
Waterous Engine Works, Brantford, Ont.
A. R. Williams Machy. Co., Toronto.

PULLEY MACHINERY, DRILLING AND TAPPING

Can. Fairbanks-Morse Co., Montreal.
Wells Bros. Co. of Canada, Galt, Ont.

PULLEYS, STEEL

Oneida Steel Pulley Co., Oneida, N.Y.

PULP MILL MACHINERY

Waterous Engine Works, Brantford, Ont.
T. McAvity & Sons, Ltd., St. John, N.B.

PUMPS, AIR

Bawden Machine Co., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL

Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Darling Bros., Ltd., Montreal, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

PUMPS, HIGH PRESSURE

Charles F. Elmes Eng. Works, Chicago.
Darling Bros., Ltd., Montreal, Que.
Hydraulic Press Mfg. Co., Mount Gilead, O.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

PUMPS, ALL KINDS

Bawden Machine Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Charles F. Elmes Eng. Works, Chicago.
Goldie & McCulloch, Galt, Ont.
Darling Brothers, Montreal.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
Rudel-Belnap Machy. Co., Montreal, Que.
The Smart-Turner Mach. Co., Hamilton.
Waterous Engine Works, Brantford, Ont.
A. R. Williams Machy. Co., Toronto.

PUMPS, HYDRAULIC

Charles F. Elmes Eng. Works, Chicago, Ill.
Darling Brothers, Montreal.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
Metalwood Mfg. Co., Detroit, Mich.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto.

PUMPS, LUBRICANT AND OIL

Cincinnati Lubricant Pump Co., Cincinnati, Ohio
Madison-Kipp Lubricator Co., Madison, Wis.
Roper, C. F., Co., Hopedale, Mass.
Traheın Pump Co., Rockford, Ill.

PUMP LEATHERS

Graton & Knight Mfg. Co., Montreal.

PUNCHES AND DIES

W. H. Banfield & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
Globe Machine & Stamping Co.
A. B. Jardine & Co., Hespeler, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER

John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

PUNCHES, PNEUMATIC

Corbet Fdry. & Mach. Co., Ltd., Owen Sount, Ont.
Jno. F. Allen Co., New York.

PUNCHING MACHINES, HORIZONTAL

Bertrams, Ltd., Edinburgh, Scotland.
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown. Boggs Co., Ltd., Hamilton, Canada.
Niles-Bement-Pond Co., New York.
Rudel-Belnap Machy. Co., Montreal, Que.
Wickes Brothers Saginaw, Mich.

PYROMETERS

Shore Instrument & Mfg. Co., New York City.

QUARTERING MACHINES

John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS (SEE GUARDS)

RAIL BENDERS

Niles-Bement-Pond Co., New York.

RAILROAD TOOLS

Can. Fairbanks-Morse Co., Montreal.
Cumming & Son, J. W., New Glasgow, Canada.
Dillon Manufacturing Co., Oshawa, Ont.
Niles-Bement-Pond Co., New York.

RAILS, STEEL

Cumming & Son, J. W., New Glasgow, Canada.
Hammant Steel Car & Engineering Works, Hamilton, Ont.

RATCHETS

Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMER FLUTING MACHINES

Garvin Machine Co., New York.

REAMERS, ADJUSTABLE

Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McCrosky Reamer Co., Meadville, Pa.
Montreal Machy. & Supplies, Ltd., Montreal, Que.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Stenotype Co., Indianapolis, Ind.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED

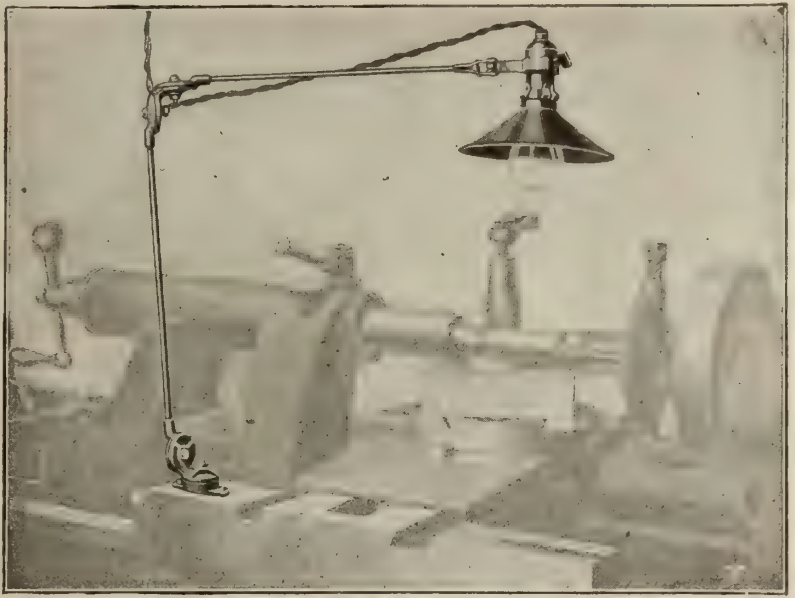
Aikenhead Hardware Co., Toronto, Ont.
Boker & Co., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
McKenna Bros. Brass Co., Pittsburgh.
R. E. T. Pringle, Ltd., Toronto, Ont.
Rudel-Belnap Machy. Co., Montreal, Que.
F. E. Wells & Son Co., Greenfield, Mass.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE

Boker & Co., H., Montreal, Que.
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.

More Production — Greater Accuracy — Less Globe Breakage — Happier Men

That sums up the argument on this lamp bracket. Three frictional universal joints that can't wear out and are adjustable for any desired tension give the reason.
Just a slight push or pull puts the light where you want it, when you want it.
Any workman will do more and better work if his light is always in just the right place and under instant control.



The Searchlight Bracket

will pay for itself many times over in one season. The period of short days is approaching. Many shops are working night and day the whole year through. The cost is trifling compared with results. Only $1.50 each, with big discount, according to quantity.
Write now for samples and let us show you how your whole factory could be equipped at a big saving to you. Any quantity sent on 30 days' trial to any responsible concern. You can't possibly lose, and **You Might Win!**

The McCrosky Reamer Company
Meadville, Pa., U.S.A.
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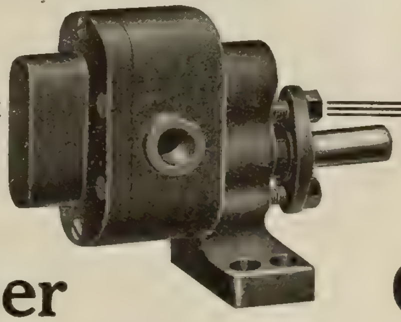

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To the progressive foreman or manager who is ever on the alert to get away from the "good enough" stage and enter into the "best" class this pump has a direct appeal. this is a one-way pump, giving a free, steady flow that is absolutely free from that undesirable pulsating flow so common.

We also make reversing pumps for machines where tools operate with the spindle running in both directions.

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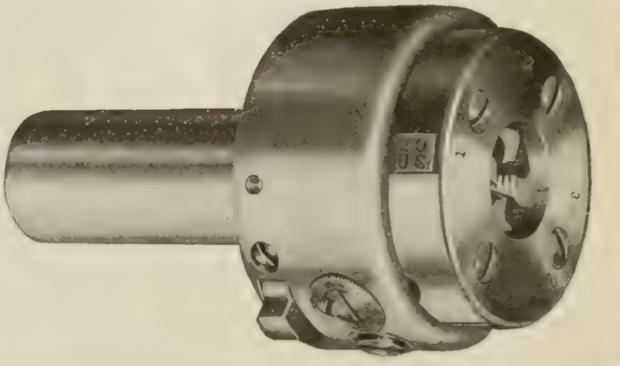
Hopedale - Mass. - U.S.A.



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Your Threads

Will they stand improvement? If they will and you want the best results—H. & G. Automatic Self-Opening Die Heads will do the trick.

The **chasers** are set and held in place by a steel cam, which, once adjusted, locks; there is no stoppage or changing in size. The **quick release** not only insures the cutting of the thread to a given point every time, but permits cutting right up to a shoulder when necessary.

Write for our booklet!

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NEW HAVEN CONN. U.S.A.

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Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
A. B. Jardine & Co., Hespeler, Ont
Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont
F. E. Wells & Son Co., Greenfield, Mass

REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

RIVET MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Cook, Asa S., Co., Hartford, Conn.
National Machinery Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

RIVETS, TUBULAR, BIFURCATED
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
Jno. F. Allen Co., New York.
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.

RIVETING MACHINES, ELASTIC ROTARY BLOW
Grant Mfg. & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.

ROLLS, BENDING AND STRAIGHTENING
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.
Wickes Brothers, Saginaw, Mich.

ROLLS, CRUSHING
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
L. S. Starrett Co., Athol, Mass

SAND BLASTS
Curtis Pneumatic Machinery Co., St. Louis, Mo
Gray Mfg. & Machy. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Pangborn Corporation, Hagerstown, Md.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

SAWS, CUT OFF, BAND AND BAND FILING
Preston Woodwork. Mach. Co., Preston, Ont.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt. & Son, Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo
Man. Bridge & Iron Works, Ltd., Winnipeg, Man.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto
Preston Woodwork Machy. Co., Preston, Ont.
Wickes Brothers, Saginaw, Mich.
A. R. Williams Machy. Co., Toronto

SAWS, CIRCULAR METAL
Espen Lucas Mach. Wks., Philadelphia, Pa.
F. A. Drury Co., Montreal
Huther Brothers, Rochester, N.Y.
Hunter Saw & Machine Co., Pittsburg, Pa
Simonds Canada Saw Co., Montreal, Que.
Tabor Mfg. Co., Philadelphia, Pa
Newton Mach. Tool Works, Inc., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)

SAWS, INSERTED TOOTH
Huther Brothers, Rochester, N.Y.
Tabor Mfg. Co., Philadelphia, Pa
Espen Lucas Mach. Wks., Philadelphia, Pa.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.

SCREW MACHINE PARTS
Johnson [illegible] Mach. Co., Manchester, Conn.

SCREW MACHINE PRODUCTS
Eastern Mach. Screw Corp., New Haven, Conn.
Milholland, W. K., Co., Indianapolis.

SCREW MACHINES, HAND, AUTOMATIC
Bawden Machine Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler.
Milholland, W. K., Co., Indianapolis, Ind.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rivett Lathe & Grinder Co., Brighton, Mass.
Stenotype Co., Indianapolis, Ind.
Rudel-Belnap Machy. Co., Montreal, Que.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

SCREW MACHINES, MULTIPLE SPINDLE
New Britain Machine Co., New Britain, Conn
Windsor Machine Co., Windsor, Vt.

SCREWS
Galt Machine Screw Co., Galt, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
Wells Bros. Co. of Canada, Galt, Ont.

SCREW SLOTTERS
Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont
Simonds Canada Saw Co., Montreal, Que.

SECOND-HAND MACHINERY
American Machy. Ex., New York, N.Y.
Baird Machy. Co., W. J., Detroit, Mich.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Hill, Clarke & Co., Chicago, Ill.
New York Machinery Co., New York
Modern Machy. Ex., New York, N.Y.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Simmons Machine Co., Albany, N.Y.
H. A. Stocker Co., Chicago, Ill.

SET SCREWS, SAFETY
Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Fox Machine Co., Jackson, Mich.
Gardner, Robt., & Son, Montreal.
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Preston Woodwork. Mach. Co., Ltd., Preston, Ont.
Steptoe, The John Co., Cincinnati, Ohio.
Smith & Mills Co., Cincinnati, Ohio.

SHAFTING
Can. Fairbanks-Morse Co., Montreal.
Can. Bond Hanger & Coupling Co., Alexandria, Ont.
Can. Drawn Steel Co., Hamilton, Ont.
Dodge Mfg. Co., Toronto, Ont.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
A. R. Williams Machy. Co., Toronto.

SHARPENING STONES
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

SHAVINGS, SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

SHEARING MACHINES, ANGLE IRON, BAR AND GATE
John Bertram & Sons Co., Dundas.
Bertrams, Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
A. B. Jardine & Co., Hespeler.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.
Wickes Brothers, Saginaw, Mich.

SHEARS, POWER
John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

SHEARS, PNEUMATIC
John F. Allen Co., New York.
Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Canada.

SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Peck, Stow & Wilcox, Cleveland, O.
Steel Bending Brake Works, Ltd., Chatham, Ont.

SHEET METAL STAMPINGS
Dominion Forge & Stpg. Co., Walkerville, Ont.

SHELL BANDING MACHINES, HYDRAULIC
Chapman Double Ball-Bearing Co., Toronto, Ont.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Hydraulic Press Mfg. Co., Mount Gilead, O.
Lymburner, Ltd., Montreal.
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Wm. R., Toronto.
West Tire Setter Co., Rochester, N.Y.
Rudel-Belnap Machy. Co., Montreal, Que.

SHELL PAINTING MACHINE
Can. Blower & Forge Co., Kitchener, Ont.
Rudel-Belnap Machy. Co., Montreal, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Sheldons, Ltd., Galt, Ont.

SHELL RIVETERS
Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.

SHELL WASHER
Can. Economic Lubricant Co., Montreal, Que.

SHRAPNEL SHELL MARKER
Brown-Boggs Co., Hamilton, Ont.
Noble & Westbrook Mfg. Co., Hartford, Conn.

SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.

SILVER SOLDER
Geo. H. Lees & Co., Hamilton, Ont.

SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

SLOTTERS
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.

SMOKESTACKS.
Corbet Fdry. & Mach. Co., Ltd., Owen Sound, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke, Que.

SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
J. H. Williams & Co., Brooklyn, N.Y.

SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Can.

SOLDERS
Aikenhead Hardware Co., Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.

SPECIAL MACHINERY
Armstrong Bros., Toronto.
Anderson Die Mach. Co., Bridgeport, Conn.
Baird Machine Co., Bridgeport, Conn.
Banfield, Edwin J., Toronto.
Banfield, W. H., & Sons, Toronto.
Bertram, John, & Sons Co., Dundas.
Bawden Machine Co., Toronto, Ont.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Brown Engineering Corp., Toronto, Ont.
Bruce Stewart & Co., Charlottetown, P.E.I.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
Corbet Fdry. & Mach. Co., Ltd., Owen Sound, Ont.
Grant Mfg. & Machy. Co., Bridgeport, Conn
Holden-Morgan Co., Toronto, Ont.
John H. Hall & Sons, Brantford.
Himoff Machine Co., New York, N.Y.
Jardine, A. B., & Co., Hespeler.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
D. McKenzie Machinery Co., Guelph, Ont.
Root & Van Dervoort Engr. Co., East Moline, Ill.
Smalley-General Co., Inc., Bay City, Mich.
Smart-Turner Machine Co., Hamilton, Ont.
Webber Bros. Mach. Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.
Winnipeg Gear & Enging. Co., Winnipeg, Man.

SPIKE MACHINES
The Smart-Turner Machine Co., Hamilton.

SPIRAL CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Can. Matthews Gravity Carrier Co., Toronto, Ont.

SPRING COILERS
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.

SPRINGS, MACHINERY
Barnes, Wallace, Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
B. J. Coghlin Co., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Jas. Steele, Ltd., Guelph, Ont.

SPROCKETS, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.

SPROCKET WHEELS, CAST
Can. Link-Belt Co., Toronto, Ont.
Perrin, Wm. R., Toronto.

SQUEEZERS, HAND
H. W. Cooper Saddly. Hdwe. Mfg. Co., Moline, Ill.

STAIRS, IRON
Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works, London, Canada.

STAMPINGS
Dom. Forge & Stpg. Co., Walkerville, Ont

SISCO

"Special"
"Extra"
"High Speed"
Tool Steels

LARGE
STOCK
ON HAND

ALL MADE IN SWEDEN FROM SELECTED DANNEMORA ORE.

**Swedish Steel
and Importing Company, Limited**
95 McGill Street, Montreal, Que., Canada

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Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Can. Winkley Co., Windsor, Ont.

STAMPS S,TEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Can.

STEAM FITTERS' SUPPLIES
T. McAvity & Sons, Ltd., St. John, N.B.

STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.
H. W. Petrie, Toronto.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.
Waterous Engine Works, Brantford, Ont.

STEEL ALLOY (SEE ALLOYS, STEEL)

STEEL BENDING BRAKES
Steel Bending Brake Works, Ltd., Chatham, Ont.

STEEL, CARBON, FERRO-TUNGSTEN
Dominion Iron & Steel Co., Montreal, Que.
Boker & Co., H., Montreal, Que.
Thos. Firth & Sons, Ltd., Montreal, Que.
Tivani Electric Steel Co., Belleville, Ont.
Vanadium-Alloys Steel Co., Pittsburgh, Pa
Zenith Coal & Steel Products, Montreal, Que

STEEL, COLD ROLLED
Can. Drawn Steel Co., Hamilton, Ont.
Union Drawn Steel Co., Hamilton, Ont.

STEEL DRUMS
Kayser Ellison Co., Montreal, Que.
Smart-Turner Machine Co., Hamilton, Ont.

STEEL PRESSURE BLOWERS
Atlas Crucible Steel Co., Dunkirk, N.Y.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

STEEL, HIGH SPEED
Atlas Crucible Steel Co., Dunkirk, N.Y.
Armstrong Whitworth of Canada, Ltd., Montreal.
Boker & Co., H., Montreal, Que.
Latrobe Electric Steel Co., Latrobe, Pa.
Can. Fairbanks-Morse Co., Montreal
Thos. Firth & Sons, Ltd., Montreal, Que.
H. A. Drury Co., Ltd., Montreal.
Hawkridge Bros. Co., Boston, Mass.
Kayser Ellison Co., Montreal, Que.
H. W. Petrie, Toronto.
Standard Alloys Company, Pittsburgh, Pa.
Tivani Electric Steel Co., Belleville, Ont.
Electric Steel & Metals Co., Welland, Ont.
Vanadium Alloys Steel Co., Pittsburg, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Zenith Coal & Steel Products, Montreal, Que.

STEEL DIE ENGRAVING
Noble & Westbrook Mfg. Co., Hartford, Conn.

STEEL, STRUCTURAL
Man. Bridge & Iron Works, Ltd., Winnipeg, Man.

STEEL VANADIUM
Boker & Co., H., Montreal, Que.
Drury, H. A., Co., Montreal, Que.
Standard Alloys Co., Pittsburgh, Pa.
Tivani Electric Steel Co., Belleville, Ont.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa
Dom. Iron & Steel Co., Montreal, Que.

STELLITE, HIGH-SPEED TOOL METAL
Can. B. K. Morton Co., Toronto, Ont
Standard Alloys Company, Pittsburgh, Pa.

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New Britain Machine Co., New Britain Conn.

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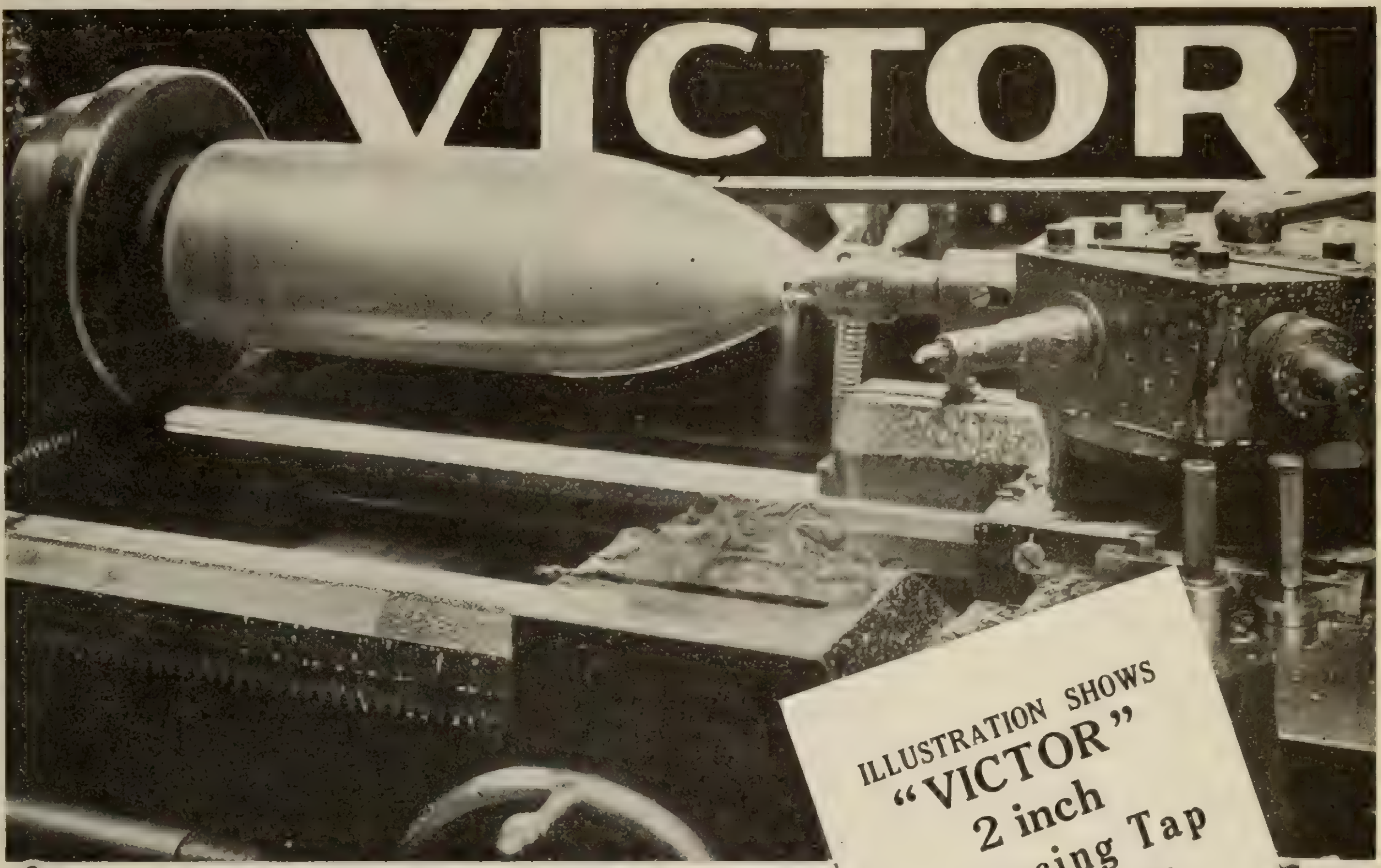

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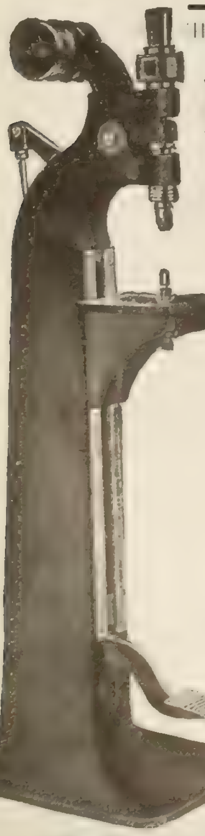

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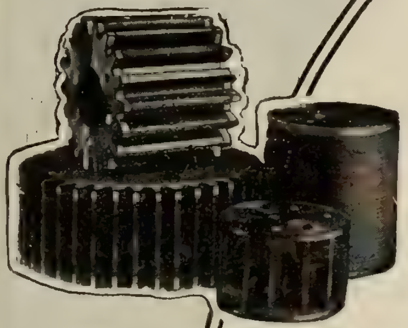

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Wadsworth Core Mach. & Equip. Co., Akron, Ohio.
Woodison, E. J., Co., Toronto, Ont.

CORE OILS
Can. Hanson & Van Winkle Co., Toronto, Ont
Hamilton Facing Mill Co., Ltd., Hamilton, Ont.
Lindsay, W. W., & Co., Philadelphia, Pa.
Woodison, E. J., Co., Toronto, Ont.

CORE OVENS—SEE OVENS

CORE WASH
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
Joseph Dixon Crucible Co., Jersey City, N.J.
Woodison E. J., Co., Toronto, Ont.

CORE WAX
Can. Hanson & Van Winkle Co., Toronto, Ont.

CRANES
Can. Hanson & Van Winkle Co., Toronto, Ont.
Lindsay, W. W., & Co., Philadelphia, Pa.
Northern Crane Works, Ltd., Walkerville, Ont.
Woodison, E. J., Co., Toronto, Ont.

CRUCIBLES, RESERVOIR, TILTING FURNACE, BOTTOM POUR, ETC.
Can. Hanson & Van Winkle Co., Toronto, Ont.
Dixon Crucible Co., Joseph, Jersey City, N.J.
Gautier, J. H., & Co., Jersey City, N.J.
Hamilton Facing Mill Co., Ltd., Hamilton, Ont.
McCulloch Dalzell Crucible Co., Pittsburg, Pa.
Seidel, R. B., Philadelphia.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

CUPOLAS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Ltd., Hamilton, Ont.
Lindsay, W. W., & Co., Philadelphia, Pa.
Monarch Eng. & Mfg. Co., Baltimore.
Northern Crane Works Ltd., Walkerville, Ont.
J. W. Paxson Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

CUPOLA BLAST GAUGES
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Ltd., Hamilton, Ont.
J. W. Paxson Co., Philadelphia, Pa.
Woodison, E. J., Co., Toronto, Ont.

CUPOLA BLOWERS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Monarch Eng. & Mfg. Co., Baltimore.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

CUPOLA LININGS BLOCKS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Ltd., Hamilton, Ont.
J. W. Paxson Co., Philadelphia, Pa.
Whitehead Bros. Co., Buffalo, N.Y.
Woodison, E. J., Co., Toronto, Ont.

CUPOLA TWYERS
Can. Hanson & Van Winkle Co., Toronto, Ont.
J. W. Paxson Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

CYANIDE OF POTASSIUM.
Can. Hanson & Van Winkle Co., Toronto, Ont.
W. W. Wells, Toronto.
Woodison, E. J., Co., Toronto, Ont.

DIPPERS, GRAPHITE
Can. Hanson & Van Winkle Co., Toronto, Ont.
Joseph Dixon Crucible Co., Jersey City, N.J.
Gautier, J. H., & Co., Jersey City, N.J
Woodison, E. J., Co., Toronto, Ont.

DRYING OVENS FOR CORES
Can. Hanson & Van Winkle Co., Toronto, Ont.
Woodison, E. J., Co., Toronto, Ont.

DYNAMOS
Can. Hanson & Van Winkle Co., Toronto, Ont.
W. W. Wells, Toronto.
Woodison, E. J., Co., Toronto, Ont.

DUST ARRESTERS AND EXHAUSTERS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Sly, W. W., Mfg. Co., The, Cleveland, O.

ELEVATORS, FOUNDRY, HYDRAULIC, PNEUMATIC
Can. Hanson & Van Winkle Co., Toronto, Ont.
Woodison, E. J., Co., Toronto, Ont.

EMERY STANDS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Ford-Smith Machine Co., Hamilton.
Woodison, E. J., Co., Toronto, Ont.

EMERY WHEELS—SEE WHEELS

FANS, EXHAUST
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Ltd., Hamilton, Ont.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

FILLERS (METALLIC)
Can. Hanson & Van Winkle Co., Toronto, Ont.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

FILLETS, LEATHER AND WOODEN
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Ltd., Hamilton, Ont.
Woodison, E. J., Co., Toronto, Ont.

FIRE BRICK AND CLAY
Can. Hanson & Van Winkle Co., Toronto, Ont.
Gautier, J. H., & Co., Jersey City, N.J.
Hamilton Facing Mill Co., Ltd., Hamilton, Ont.
Monarch Eng. & Mfg. Co., Baltimore.
J. W. Paxson Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Whitehead Bros. Co., Buffalo, N.Y.
Woodison, E. J., Co., Toronto, Ont.

FIRE SAND
Can. Hanson & Van Winkle Co., Toronto, Ont.
Wm. Penn Silica Works, Wm. Penn P.O., Pa.
Whitehead Bros. Co., Buffalo, N.Y.
Woodison, E. J., Co., Toronto, Ont.

FLASKS, SNAP, ETC.
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
J. W. Paxson Co., Philadelphia, Pa.
Tabor Mfg. Co., Philadelphia, Pa.
Woodison, E. J., Co., Toronto, Ont.

FOUNDRY COKE
Can. Hanson & Van Winkle Co., Toronto, Ont.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

FOUNDRY PARTING
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
J. W. Paxson Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Whitehead Bros. Co., Buffalo, N.Y.
Woodison, E. J., Co., Toronto, Ont.

FOUNDRY FACINGS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Joseph Dixon Crucible Co., Jersey City, N.J.
Hamilton Facing Mill Co., Hamilton, Ont.
Monarch Eng. & Mfg. Co., Baltimore.
J. W. Paxson Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Whitehead Bros. Co., Buffalo, N.Y.
Woodison, E. J., Co., Toronto, Ont.

FOUNDRY GRAVEL
Can. Hanson & Van Winkle Co., Toronto, Ont.
Wm. Penn Silica Works, Wm. Penn Po., Pa.
Hawley Down Draft Furnace Co., Easton, Pa.
Woodison, E. J., Co., Toronto, Ont.

FURNACE LINING
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
Hawley Down Draft Furnace Co., Easton,
Monarch Eng. & Mfg. Co., Baltimore.
Stevens, Frederic B., Detroit, Mich.
Whitehead Bros. Co., Buffalo, N.Y.
Woodison, E. J., Co., Toronto, Ont.

FURNACES
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
Hawley Down Draft Furnace Co., Easton,
Monarch Eng. & Mfg. Co., Baltimore.
J. W. Paxson Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Whitehead Bros. Co., Buffalo, N.Y.
Woodison, E. J., Co., Toronto, Ont.

FURNACES, BRASS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
Hawley Down Draft Furnace Co., Easton,
Monarch Eng. & Mfg. Co., Baltimore.
J. W. Paxson Co., Philadelphia, Pa.
Woodison, E. J., Co., Toronto, Ont.

GOGGLES
Can. Hanson & Van Winkle Co., Toronto, Ont.
Tilghman-Brooksbank Sand Blast Co., Philadelphia, Pa.
Woodison, E. J., Co., Toronto, Ont.

GRAPHITE PRODUCTS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Joseph Dixon Crucible Co., Jersey City, N.J.
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McCulloch-Dalzell Crucible Company, Pittsburg, Pa.
Woodison, E. J., Co., Toronto, Ont.

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Can. Hanson & Van Winkle Co., Toronto, Ont.
Joseph Dixon Crucible Co., Jersey City, N.J.
Woodison, E. J., Co., Toronto, Ont.

GRINDERS, DISC, BENCH, SWING
Can. Hanson & Van Winkle Co., Toronto, Ont.
Ford-Smith Machine Co., Hamilton, Ont.

HELMETS
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Tilghman-Brooksbank Sand Blast Co., Philadelphia, Pa.
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Whiting Foundry Equipment Co., Harvey, Ill.
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Stevens, Frederic B., Detroit, Mich.

IRON FILLER
Can. Hanson & Van Winkle Co., Toronto, Ont.
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Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

JOLT MACHINES AND SQUEEZERS
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Midland Machine Co., Detroit, Mich.
Mumford, E. H., Co., Elizabeth, N.J.
Mumford Molding Mach. Co., Chicago, Ill.
Woodison, E. J., Co., Toronto, Ont.

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Can. Hanson & Van Winkle Co., Toronto, Ont.
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Whitehead Bros. Co., Buffalo, N.Y.
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Woodison, E. J., Co., Toronto, Ont.

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Can. Hanson & Van Winkle Co., Toronto, Ont.
Joseph Dixon Crucible Co., Jersey City, N.J.
Hamilton Facing Mill Co., Hamilton, Ont.
Northern Crane Works, Walkerville.
Monarch Eng. & Mfg. Co., Baltimore.
J. W. Paxson Co., Philadelphit, Pa.
Sly, W. W., Mfg. Co., The, Cleveland, O.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

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McCulloch-Dalzell Crucible Company, Pittsburg, Pa.
Woodison, E. J., Co., Toronto, Ont.

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Can. Inspection & Testing Laboratories, Montreal.
Hamilton Facing Mill Co., Hamilton, Ont.
Monarch Eng. & Mfg. Co., Baltimore.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

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Charles C. Kawin Co., Toronto.
Toronto Testing Laboratories, Toronto.

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Woodison, E. J., Co., Toronto, Ont.

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Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

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Hamilton Facing Mill Co., Hamilton, Ont.
E. H. Mumford Co., Elizabeth, N.J.
Midland Machine Co., Detroit.
Mumford Molding Mach. Co., Chicago, Ill.
Stevens, Frederic B., Detroit, Mich.
Tabor Mfg. Co., Philadelphia.
Woodison, E. J., Co., Toronto. Ont.

MOLDING SAND—SEE SAND

MOLDING SIFTERS
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Whitehead Bros. Co., Buffalo, N.Y.
Woodison, E. J., Co., Toronto, Ont.

OVENS FOR CORE-BAKING AND DRYING
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Wadsworth Core Mach. & Equip. Co., Akron, Ohio
Woodison, E. J., Co., Toronto, Ont.

OIL AND GAS FURNACES
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Monarch Eng. & Mfg. Co., Baltimore.
J. W. Paxson Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
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Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

PIG IRON
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Steel Co. of Canada, Hamilton, Ont,

PHOSPHORIZERS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Joseph Dixon Crucible Co., Jersey City, N.J.
McCulloch-Dalzell Crucible Company, Pittsburg.
Whitehead Bros. Co., Buffalo, N.Y.
Woodison, E. J., Co., Toronto, Ont.

PLUMBAGO
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
Joseph Dixon Crucible Co., Jersey City, N.J.
J. W. Paxson Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

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W. W. Wells Toronto.
Woodison, E. J., Co., Toronto, Ont.

POLISHING WHEELS—SEE BUFFING WHEELS

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Can. Hanson & Van Winkle Co., Toronto, Ont.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

RETORTS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Joseph Dixon Crucible Co., Jersey City, N.J.
Jonathan Bartley Crucible Co., Trenton, N.J.
Woodison, E. J., Co., Toronto, Ont.

RIDDLES
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Ltd., Hamilton, Ont.
J. W. Paxson Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

RESIN
Can. Hanson & Van Winkle Co., Toronto, Ont.
Sly, W. W., Mfg. Co., The, Cleveland, O.
Woodison, E. J., Co., Toronto, Ont.

ROUGE
Can. Hanson & Van Winkle Co., Toronto, Ont.
W. W. Wells, Toronto.
Woodison, E. J., Co., Toronto, Ont.

SAND BLAST MACHINERY
Brown Specialty Machy. Co., Chicago, Ill.
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Ltd., Hamilton, Ont.
New Haven Sand Blast Co., New Haven, Conn.
J. W. Paxson, Philadelphia, Pa.
Sly, W. W., Mfg. Co., The, Cleveland, O.
Stevens, Frederic B., Detroit, Mich.
Tilghman-Brooksbank Sand Blast Co., Philadelphia, Pa.
Woodison, E. J., Co., Toronto, Ont.

SAND BLAST SAND
Can. Hanson & Van Winkle Co., Toronto, Ont.
Whitehead Bros. Co., Buffalo, N.Y.
E. J. Woodison Co., Toronto.

SAND CONVEYING MACHINERY
Can. Hanson & Van Winkle Co., Toronto, Ont.
Standard Sand & Mach. Co., Cleveland, O.
Woodison, E. J., Co., Toronto, Ont.

SAND BLAST MACHINERY, BARRELS, ETC.
Can. Hanson & Van Winkle Co., Toronto, Ont.
New Haven Sand Blast Co., New Haven, Conn.
Sly, W. W., Mfg. Co., The, Cleveland, O.
Standard Sand & Mach. Co., Cleveland, O.
Woodison, E. J., Co., Toronto, Ont.

SAND MOLDING
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
J. W. Paxson, Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Whitehead Bros. Co., Buffalo, N.Y.
Woodison, E. J., Co., Toronto, Ont.

SAND MIXING MACHINERY
Wadsworth Core Mach. & Equip. Co., Akron, Ohio

SAND SIFTERS
Battle Creek Sand Sifter Co., Battle Creek, Mich.
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
J. W. Paxson Co., Philadelphia, Pa.
Woodison, E. J., Co., Toronto, Ont.

SIEVES
Can. Hanson & Van Winkle Co., Toronto, Ont.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

SILICA WASH
Can. Hanson & Van Winkle Co., Toronto, Ont.
Woodison, E. J., Co., Toronto, Ont.

SILICA ROCK, GROUND AND PULVERIZED
Can. Hanson & Van Winkle Co., Toronto Ont.
Wm. Penn Silica Works, Wm. Penn Po., Pa.
Woodison, E. J., Co., Toronto, Ont.

SKIMMERS, GRAPHITE
Can. Hanson & Van Winkle Co., Toronto, Ont.
Joseph Dixon Crucible Co., Jersey City, N.J.
Woodison, E. J., Co., Toronto, Ont.

SMALL ANGLES
Can. Hanson & Van Winkle Co., Toronto, Ont.
Dom. Iron & Steel Co., Sydney, N.S.
Woodison, E. J., Co., Toronto, Ont.

SOAPSTONE
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
Woodison, E. J., Co., Toronto, Ont.

SPELTER BOWLS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Joseph Dixon Crucible Co., Jersey City, Pa.
Woodison, E. J., Co., Toronto, Ont.

SPIT PATTERN MACHINES
Mumford, E. H., Co., Elizabeth, N.J.

SPRUE CUTTERS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
J. W. Paxson Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

SQUEEZER MOLDING MACHINES
Can. Hanson & Van Winkle Co., Toronto, Ont.
E. H. Mumford Co., Elizabeth, N.J.
Mumford Molding Mach. Co., Chicago, Ill.
Tabor Mfg. Co., Philadelphia.
Woodison, E. J., Co., Toronto, Ont.

SQUEEZERS, POWER AND HAND
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
Mumford, E. H. Co., Elizabeth, N.J.
Tabor Mfg. Co., Philadelphia.
Woodison, E. J., Co., Toronto, Ont.

STEEL GRIT
Can. Hanson & Van Winkle Co., Toronto, Ont.
Wm. McGregor, Scottish Steel Grit Works, Airdire, Scotland.
Woodison, E. J., Co., Toronto, Ont.

STEEL RAILS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Dom. Iron & Steel Co., Sydney, N.S.
Woodison, E. J., Co., Toronto, Ont.

STEEL BARS, ALL KINDS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Dom. Iron & Steel Co., Sydney, N.S.
Northern Crane Works, Walkerville.
J. W. Paxson Co., Philadelphia, Pa.
Steel Co. of Canada, Hamilton, Ont.
Woodison, E. J., Co., Toronto, Ont.

STIRRERS, GRAPHITE
Can. Hanson & Van Winkle Co., Toronto, Ont.
Joseph Dixon Crucible Co., Jersey City, N.J.
Woodison, E. J., Co., Toronto, Ont.

STONES, RUBBING AND OIL
Can. Hanson & Van Winkle Co., Toronto, Ont.
Can. Hart Wheels, Hamilton, Ont.

TALC
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
E. J. Woodison Co., Toronto.
J. W. Paxson Co., Philadelphia, Pa.
Woodison, E. J., Co., Toronto, Ont.

TEEMING CRUCIBLES AND FUNNELS
Can. Hanson & Van Winkle Co., Toronto, Ont.
McCulloch Dalzell Crucible Company, Pittsburg,

TRIPOLI
Can. Hanson & Van Winkle Co., Toronto, Ont.
W. W. Wells, Toronto.
Woodison, E. J., Co., Toronto, Ont.

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TROLLEYS AND TROLLEY SYSTEMS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.
J. W. Paxson Co., Philadelphia, Pa.
Woodison, E. J., Co., Toronto, Ont.

TRUCKS, DRYER AND FACTORY
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
J. W. Paxson Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

TURNTABLES
Can. Hanson & Van Winkle Co., Toronto, Ont.
Northern Crane Works, Walkerville.
J. W. Paxson Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.
Woodison, E. J., Co., Toronto, Ont.

VENT WAX
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
United Compound Co., Buffalo, N.Y.
Woodison, E. J., Co., Toronto, Ont.

VIBRATORS
Can. Hanson & Van Winkle Co., Toronto, Ont.
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Tabor Mfg. Co., Philadelphia.
Woodison, E. J., Co., Toronto, Ont.

WALL CHANNELS
Can. Hansen & Van Winkle Co., Toronto, Ont.
Dom. Iron & Steel Co., Sydney, N.S.
Woodison, E. J., Co., Toronto, Ont.

WHEELS, GRINDING
Can. Hanson & Van Winkle Co., Toronto, Ont.
Can. Hart Wheels, Hamilton, Ont.
Woodison, E. J., Co., Toronto, Ont.

WHEELS, POLISHING, ABRASIVE
Can. Hanson & Van Winkle Co., Toronto, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
Stevens, Frederic B., Detroit, Mich.
United Compound Co., Buffalo, N.Y.
Woodison, E. J., Co., Toronto, Ont.

WIRE WHEELS
Can. Hanson & Van Winkle Co., Toronto, Ont.
Hamilton Facing Mill Co., Hamilton, Ont.
Stevens, Frederic B., Detroit, Mich.
W. W. Wells, Toronto.
Woodison, E. J., Co., Toronto, Ont.

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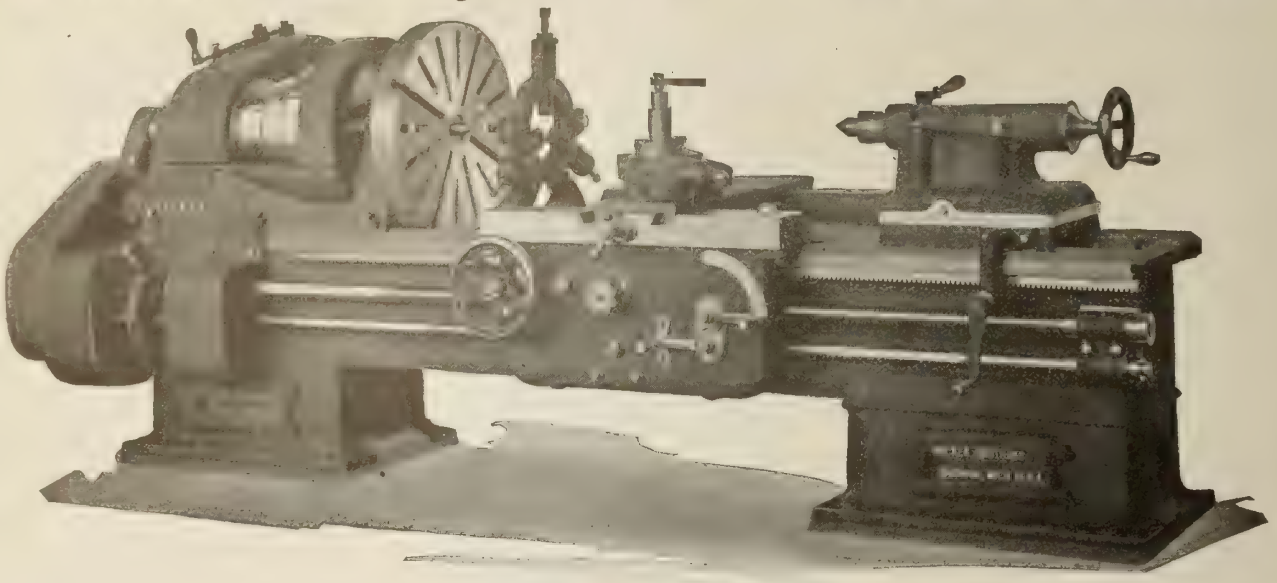

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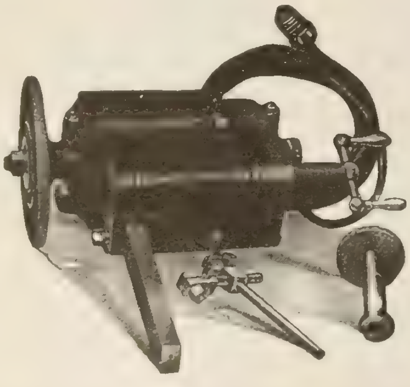

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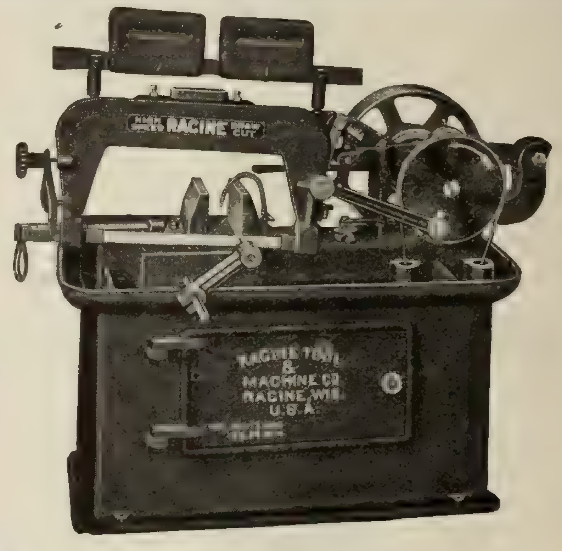
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RACINE TOOL & MACHINE CO RACINE, WIS. U.S.A.

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CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XVI. TORONTO, DECEMBER 28, 1916 No. 26

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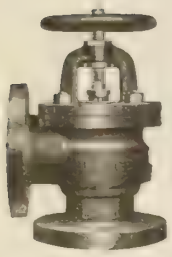
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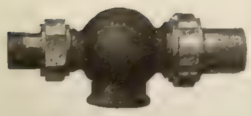
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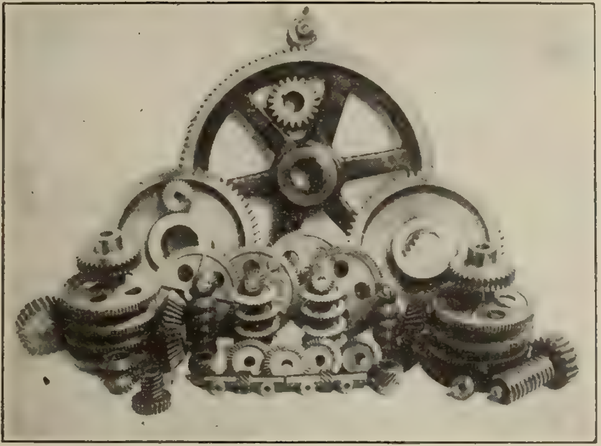

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